Q. Further to PUB-Nalcor-058, please provide copies of any reports filed with the Board in relation to this Plan, including any progress reports, evaluation studies and cost recovery related filings for the programs.

A. Please refer to the following documents:

(i) PUB-Nalcor-059, Attachment 1 for a copy of Hydro’s 2015 Conservation and Demand Management Report;

(ii) PUB-Nalcor-059, Attachment 2 for a copy of Hydro’s 2016 Conservation and Demand Management Report;

(iii) PUB-Nalcor-059, Attachment 3 for a copy of Hydro’s 2017 Conservation and Demand Management Report;

(iv) PUB-Nalcor-059, Attachment 4 for a copy of the 2015 Isolated Systems Energy Efficiency Program - Final Report;

(v) PUB-Nalcor-059, Attachment 5 for a copy of the 2016 Isolated Systems Energy Efficiency Program - Final Report;

(vi) PUB-Nalcor-059, Attachment 6 for a copy of the 2017 Isolated Systems Energy Efficiency Program - Final Report;

(vii) PUB-Nalcor-059, Attachment 7 for a copy of the Insulation Rebate Program Evaluation, July 21, 2017

(viii) PUB-Nalcor-059, Attachment 8 for a copy of the Thermostat Rebate Program Evaluation, July 21, 2017;

(ix) PUB-Nalcor-059, Attachment 9 for a copy of the Benchmarking Program Evaluation, November 29, 2017;

(x) PUB-Nalcor-059, Attachment 10 for a copy of the 2017 Benchmarking Program Evaluation;

(xi) PUB-Nalcor-059, Attachment 11 for a copy of the Business Efficiency Program Evaluation, July 12, 2018; and

(xii) Hydro applied for recovery of deferred balances from 2009 – 2016 in its Compliance Rates Application, which is provided as PUB-Nalcor-059, Attachment 12. Calculations of the Utility and Industrial Customer CDM Cost Recovery Adjustments effective from July 1, 2017 – June 30, 2018 are provided in Appendix C to Exhibit 4 of this attachment.

Hydro applied for recovery of deferred balances from 2017 in two separate applications:

1. Hydro's 2018 Utility Customer Interim Rates Application, provided as PUB-Nalcor-059, Attachment 13. Schedule 5 provides the calculation of the CDM Cost Recovery Adjustment effective July 1, 2018 to June 30, 2019; and
2. Hydro's 2018 Island Industrial CDM Cost Recovery Application, provided as PUB-Nalcor-059, Attachment 14. Schedule 5 provides the calculation of the CDM Cost Recovery Adjustment effective July 1, 2018 to June 30, 2019.

A REPORT TO
THE BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

2015 Conservation and Demand Management Report

NEWFOUNDLAND AND LABRADOR HYDRO

March 2016

TABLE OF CONTENTS

1 Introduction

This report provides an overview of Conservation and Demand Management (CDM) activities undertaken by Newfoundland and Labrador Hydro (Hydro) in 2015. The report also provides information on major activities planned for 2016 and provides an estimate of the value of CDM from a utility perspective.

The programming described in this report includes the joint utility programs offered by Hydro and Newfoundland Power through the takeCHARGE partnership, and focuses on the costs and initiatives for Hydro's portion of program implementation. The report also describes programs offered by Hydro under the takeCHARGE brand that targets only Hydro customers.

Since the launch of the initial takeCHARGE programs in 2009 additional programs have been added in subsequent years, as displayed in the tables throughout the report. Some programs have seen changes in offerings and eligibility requirements.

2 Coordination and Context

2.1 Utility Planning

Energy conservation initiative was a topic of interest during Hydro's 2006 General Rate Application (GRA), and subsequently a CDM Potential Study was completed in 2008. Following the 2008 potential study, an initial five-year strategic plan[1] was completed which outlined proposed energy conservation initiatives to be implemented jointly by Newfoundland Power and Hydro (the Utilities). The Utilities have since designed and implemented a joint utility portfolio of programs for electricity customers in Newfoundland and Labrador. Current programs offered through the joint utility model are available for residential, commercial, and industrial customer sectors and provide rebate options to address energy savings for electricity consumers in each sector.

[1] Five Year Energy Conservation Plan: 2008-2012

In 2012 an updated strategic plan[2] continued to focus on joint utility programs but also outlined additional programs identified and implemented by Hydro to address opportunities in higher avoided cost isolated diesel systems. In 2012 Hydro launched the Isolated Systems Community Program and the Isolated Systems Business Efficiency Program (ISBEP) for customers served from Isolated Diesel Systems. In late 2013, the Business Efficiency Program (BEP) was launched for business customers served from the Interconnected Systems through the joint utility partnership. Hydro has been developing programs outside the joint utility process to engage customers with additional ways to conserve and to provide learnings for expanded offerings of joint utility programs. Hydro's retailer coupon program offered in 2010-2011 created the impetus for the Small Technology program launched provincially in 2014, that provides point-of-purchase and mail-in coupons for a range of technologies including lighting and appliances.

In 2012 Hydro launched a program to promote the use of block heater timers. This program was unique to the Labrador Interconnected System because of its extremely cold climate which presents a conservation opportunity associated with pre-warming of vehicles. The program launch event included a giveaway of block heater timers to provide awareness of the technology to the market, and was followed up with a coupon for in-store purchase discount. The program was set to run two winter seasons (2012-2013 and 2013-2014) but due to lack of participation this program was not continued beyond 2014.

The focus of the first two joint utility CDM plans was on high marginal cost energy savings that translated into fuel savings, and also to the longer-term goal of the development of a culture of conservation. In 2015 the Utilities had a new CDM potential study completed to guide future initiatives around both energy conservation and demand management. Following the 2015 potential study a third strategic plan[3] was completed, which will be implemented jointly over the next five year period.

[2] Five Year Energy Conservation Plan: 2012-2016
[3] Five-Year Conservation Plan: 2016-2020 (the 2016 Plan)

The activities in the 2016 Plan include a new residential customer behavioural based program, expansion of existing commercial programs, reshaping or discontinuation of several programs, and continuation of the custom industrial program. This plan will be flexible to address customer expectations, market conditions for energy efficient products, and electrical system costs. It also allows for continued support for customer awareness, education, and community engagement to stimulate attitude change. An overview of the programs offered during 2015 is included in Appendix A: CDM Program Descriptions and includes current programs offered both through a joint utility partnership and those directly targeting Hydro's customers. A copy of the 2016 Plan is included in Appendix B.

The Utilities continuously evaluate the customer conservation programs and also have third party program evaluations completed. The evaluations are used to refine program design and support future planning. For example, in 2014 DNV GL-Energy[4] completed a market and process evaluation of the residential joint utility programs. This work supported the Utilities decision to conclude the ENERGY STAR® Windows Program at the end of 2014 because of market transformation.

2.2 Government Engagement

Hydro continues to have a positive working relationship with the Provincial Department of Environment and Conservation Office of Climate Change and Energy Efficiency (OCCEE), and remains engaged in dialogue on potential programming, policy, and partnership opportunities. In 2014, Hydro partnered with OCCEE to implement its Residential Energy Conservation Pilot Project involving real-time energy monitoring and energy conservation tips to 750 residential participants. The real-time energy monitoring pilot ran throughout 2015 and the analysis will conclude during the first quarter of 2016. The Utilities continued to partner with the OCCEE and the Department of Education and Early Childhood Development on the Provincial Government's *HotShots* pilot project to improve students' awareness of energy and

[4] DNV-GL Energy is recognized within the energy efficiency sector, providing program evaluation and assessments.

conservation, and also partnered with the OCCEE on its training plan for the National Building Code Energy Efficiency Requirements for Houses and Small Buildings.

3 CDM Programs

3.1 Portfolio Level Program Costs and Energy Savings

Table 1: Hydro CDM Portfolio Costs, and Table 2: Hydro Annual CDM Portfolio Energy Savings, describe Hydro's total CDM expenses and energy savings from 2009 to 2015 across all of Hydro's systems including the Labrador Interconnected System. This report will provide further detail and breakdown of those costs that will be recovered through the CDM Deferral Account[5] and the associated energy reductions in section 6 Regulated Program Energy Savings and Program Costs.

Table 1: Hydro's CDM Portfolio Annual Spending ($000s)

	2009	2010	2011	2012	2013	2014	2015
Windows	44	48	80	117	169	38	2
Insulation	40	60	140	126	157	92	70
Thermostats	13	19	31	47	51	35	20
Coupon Program	-	140	135	-	-	-	-
Commercial Lighting	13	12	59	20	29	15	18
Industrial[6]	57	221	103	173	89	1,244	(102)
Block Heater Timer	-	-	-	31	8	8	-
Isolated Systems Community	-	-	-	858	871	615	530
ISBEP	-	-	-	93	115	96	7
Heat Recovery Ventilator	-	-	-	-	11	7	6
Business Efficiency Program	-	-	-	-	45	101	151
Small Technologies	-	-	-	-	1	252	295
Isolated Load Control Pilot							6
Total	**167**	**500**	**548**	**1,465**	**1,546**	**2,503**	**1,003**

[5]The CDM Cost Deferral Account is meant to defer the program costs for regulated Hydro (excludes program costs for the Labrador Interconnected System). The Board approved the deferral of Hydro's 2015 program costs in Board Order No. P.U. 36(2015).

[6] In 2014 an accrual setup for Industrial was based on an estimate of outstanding invoices. The actual invoices received in 2015 were less than expected, therefore the accrual was overstated in 2014, and understated in 2015. The understatement appears as a credit in 2015.

Table 2: Hydro's CDM Portfolio Annual Energy Savings (MWh)

	2009	2010	2011	2012	2013	2014	2015	Total
Windows	13	37	61	136	99	85	10	441
Insulation	35	126	404	382	794	142	105	1,989
Thermostats	9	35	30	53	24	38	34	223
Coupon Program	-	64	256	-	-	-	-	320
Commercial Lighting	3	10	227	95	99	79	124	637
Industrial	-	-	165	3,172	-	22,258	-	25,595
Block Heater Timer	-	-	-	-	288	-	-	288
Isolated Systems Community	-	-	-	1,676	1,096	1,357	1,426	5,555
ISBEP	-	-	-	3	27	111	67	207
Heat Recovery Ventilator	-	-	-	-	1	6	5	11
Business Efficiency Program	-	-	-	-	-	107	797	904
Small Technologies	-	-	-	-	-	148	164	312
Total	**60**	**272**	**1,143**	**5,517**	**2,428**	**24,331**	**2,733**	**36,483**

3.2 Residential Programs

Hydro's residential portfolio included four programs offered jointly by the Utilities and one solely by Hydro. The joint utility programs for Insulation, Thermostats, Heat Recovery Ventilators, and Small Technologies continued to be offered through 2015. The ENERGY STAR windows program was not offered beyond 2014 because the local market has transformed to this technology. The energy savings for windows in 2015 is from residual rebate applications from 2014 that were processed in early 2015. During 2015, Hydro continued to advertise in local retailer flyers to promote the takeCHARGE programs and technologies. Local advertising and building strong partnerships with retailers will continue to be a focus moving forward as part of the promotion of customer rebate programs.

The Isolated Systems Community Energy Efficiency Program is a program specifically for residential and commercial customers in Hydro's Isolated Diesel systems. The objective is to provide outreach, education, and energy efficient products to residential and business customers in the remote diesel-system communities within Newfoundland and Labrador, free of charge. From 2012 to 2015 the program operated in 42 remote communities, installed 70,640 energy efficient products, helped customers save a total of 5.5 GWh of electricity, and has provided employment for over 48 residents of these communities.

The Isolated Systems Community Energy Efficiency Program includes residential and commercial direct installations with a focus on building knowledge and capacity in the communities by hiring and training local representatives. These representatives work within their own communities to promote the program, provide useful information on energy use, and provide direct installation of energy efficient products, including low flow showerheads, faucet aerators, LED lamps, compact fluorescent lamps (CFLs), smart power strips, and hot water tank and pipe insulation. It is administered by Summerhill Group[7], and involves a number of interventions.

In 2015, 965 residential and business customers received a direct install of 22,469 products consisting of water saving technologies and specialty bulbs for lighting needs, including chandelier, vanity, and flood lamps. During this work information was also collected about the type of lighting, heating, and appliances in the homes and businesses, which will be used for future program planning.

3.3 Commercial Programs

Hydro's Business Efficiency Programs were also delivered to business customers in the company's interconnected and isolated areas in 2015. The business programs include discounted high performance lighting, product rebates for heating and lighting controls, and a custom program that offers incentives based on economical energy saving improvement projects specific to individual customer facilities. The programs provide technical support to identify economical energy efficiency opportunities, and provide financial support for capital upgrades.

In 2015 the commercial lighting program continued to be offered solely through the distributors and as such there is little to no direct customer contact for promotions and information. Even so, participation was encouraging with targets being exceeded in 2015. In 2016 the program will be incorporated into the Business Efficiency Program and will offer

[7] Summerhill Group is an energy efficiency services company specializing in consumer engagement program delivery with offices in Toronto and Halifax.

prescriptive rebates directly to participating customers as opposed to being offered through participating lighting distributors, however we will continue to engage with the distributors to promote the sale of high performance lighting products. Changes to the program will also see the removal of high performance T8 ballasts since these are now standard in the market, but additional products will be added to the prescriptive component late in 2016, including LED screw-in lamps, high bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems, and low flow pre-rinse spray valves.

More than 60 walkthrough audits have been conducted for Hydro's business customers through the two business efficiency programs since 2012. The aim of the audits is to engage customers in the Isolated Systems Business Efficiency Program and the Business Efficiency Program by facilitating opportunity identification, technical analysis, and project completion. In 2015, eight commercial facility audits were completed to inform customers of opportunities for incentives. Four customers completed projects involving upgrades and improvements to LED lighting, building automation controls, insulation, and thermostats, resulting in 988 MWh of annual energy savings.

3.4 Industrial Program

Since 2010, Hydro has delivered the Industrial Energy Efficiency Program (IEEP) which provides industrial electricity customers with financial assistance and technical support to complete feasibility studies and capital upgrades to achieve energy savings. Findings from a 2014 review of the industrial program indicated there continues to be a strong interest among industrial customers to participate, but challenges with competing business priorities hamper uptake of the program.

The Industrial Energy Efficiency Program was relaunched in 2015 with emphasis on direct communications with customers, greater emphasis on maintaining communications with customers actively participating, and documenting initiatives they are interested in. In 2015, each of the five Industrial Customers was directly engaged regarding their interest in energy efficiency, and surveyed to understand their future plans for efficiency improvements. One industrial customer completed a compressed air optimization study, which was supported by funding through the Industrial Program, and another customer has identified capital funds to undertake efficiency improvements over the next two year period. Hydro continues to engage with the industrial customers to encourage and support improvement projects.

4 Planning and Evaluation

In January 2015 the Utilities contracted with ICF International to undertake a conservation and demand management potential study to identify the achievable, cost-effective electric energy efficiency and demand management potential in the Province. The study was completed in 2015 and included consultation with customers, trade allies, retail partners, and other interested parties.

The Conservation and Demand Management Potential Study: 2015 was used by the Utilities to develop the Five-Year Conservation Plan: 2016-2020 (see Appendix B). This plan includes a new residential benchmarking program; expansion of existing commercial programs; and reshaping or discontinuation of elements of the residential program offerings. Hydro is also assessing implementation of a direct load control pilot for the community of Postville, Labrador with aim to reduce peak loading and defer system expansion. In 2015 Hydro managed a home energy monitoring project on behalf of the Provincial Office of Climate Change and Energy Efficiency, which will be completed in 2016. The results of this project will be used to assess whether real time monitoring of home energy may be considered for future conservation initiatives.

5 Outreach and Support

During 2015, Hydro continued to partner with Newfoundland Power to deliver the takeCHARGE program which offers customer education and conservation awareness activities, primarily through promotion of its takeCHARGE rebate programs and outreach activities. Residential and Business programs are promoted through activities including mass media marketing, targeted promotions, community outreach, school programming, trade ally development, partnerships, and events.

The advertising campaign includes newspaper, radio, online and social media advertisements. Campaigns run throughout the year for insulation, thermostats, HRV's, instant rebates and appliances, and the Business Efficiency Program. The media chosen is based on time of year the programs are in market, and consumer purchasing behaviours.

takeCHARGE is also active in social media through a joint utility Facebook page, YouTube channel, Twitter account, and website. To date, approximately 12,649 Facebook users have "liked" the takeCHARGE Facebook fan page, and YouTube views are continuing to increase through direct links to videos from other takeCHARGE social media channels. takeCHARGE currently has 1,872 Twitter followers and continues to increase. The takeCHARGE website underwent a design refresh and added mobile capabilities in 2015 which resulted in a 328% increase in mobile sessions from 2014.

Hydro engages with retailers, suppliers, students, and other groups through presentations, and interactive booth displays to promote programs, answer questions and promote energy conservation. The 2015/2016 takeCHARGE Town Challenge initiative was launched in November 2015. It was aimed at encouraging residents and municipalities to reduce their energy use. Municipalities were invited to submit proposals that will support their efforts to develop or improve energy conservation or energy efficiency projects. Projects had to demonstrate a positive effort to conserve energy that benefits the entire community. Winners will be announced in 2016. The takeCHARGE school contests for K-6 classes and 7-12 classes, were run again with a goal to have students explain why saving energy is important and demonstrate what they can do to conserve. The contests were launched in 2015 with winners chosen in 2016.

In 2015, takeCHARGE held the 7th annual Energy Efficiency Week from October 3 to 9, 2015 with a theme of "Ask an Energy Expert". Energy Efficiency Week was all about getting customers the information they need to know to save energy and money! During the week, customers used social media and the hashtag #EEWeekNL on Facebook and Twitter to ask takeCHARGE Energy Experts all their questions. Also during Energy Efficiency Week, takeCHARGE teams were out in the province at special events, promoting takeCHARGE, and airing 2 minute segments on NTV during the news hour with the energy savings tips of the day.

Table 3 provides Hydro's costs to provide education, outreach, support, and planning for its CDM programs.

Table 3: Hydro's CDM Support Costs ($000s)

	2009	2010	2011	2012	2013	2014	2015
Education &Outreach	262	106	212	200	135	158	154
Support	53	48	43	53	27	52	68
Planning	176	180	304	127	152	224	442
Total	**491**	**334**	**559**	**380**	**314**	**434**	**664**

6 Regulated Program Energy Savings and Program Costs

Table 4 below illustrates the annual energy savings from Hydro customers in relation to programming associated with the annual regulated deferral request.

Table 4: Annual Energy Savings from Deferral Account Activity (MWh)

	2009	2010	2011	2012	2013	2014	2015	Total
Windows	8	14	38	50	43	40	4	197
Insulation	29	63	229	126	123	100	52	722
Thermostats	2	16	16	28	14	16	23	115
Coupon Program	-	47	166	-	-	-	-	213
Commercial Lighting	3	-	92	25	19	22	46	207
Industrial	-	-	165	3,172	-	22,258	-	25,595
Block Heater Timer	-	-	-	-	-	-	-	-
Isolated Systems Community	-	-	-	1,676	1,096	1,357	1,426	5,555
ISBEP	-	-	-	3	27	111	67	207
Heat Recovery Ventilator	-	-	-	-	1	1	-	2
Business Efficiency Program		-	-	-	-	73	794	867
Small technologies	-	-	-	-	-	80	71	151
Total	**42**	**140**	**706**	**5,080**	**1,322**	**24,058**	**2,484**	**33,832**

The costs associated with the delivery of the CDM program portfolio include direct costs for advertising, salaries, rebates and other expenses directly associated with a specific rebate program. These costs vary depending on the uptake of the program and the number of programs offered.

Table 5: Program Costs from Deferral Account Activity provides a program level breakdown.

Table 5: Program Costs from Deferral Account Activity ($000s)

	2009	2010	2011	2012	2013	2014	2015
Windows	44	41	69	102	150	31	1
Insulation	40	53	116	108	112	87	62
Thermostats	13	18	25	43	47	32	19
Coupon Program	-	113	123	-	-	-	-
Commercial Lighting	13	-	43	10	17	10	11
Industrial[8]	57	190	98	170	88	1,244	(115)
Block Heater Timer	-	-	-	-	-	-	-
Isolated Systems Community	-	-	-	858	871	615	530
ISBEP	-	-	-	93	115	96	7
Heat Recovery Ventilator	-	-	-	-	8	3	4
Business Efficiency Program	-	-	-	-	40	92	134
Small Technologies	-	-	-	-	1	219	242
Isolated Load Control Pilot							6
Total	**167**	**415**	**474**	**1,384**	**1,449**	**2,429**	**901**

7 Program Participation and Savings

Table 6 provides the breakdown of rebate transactions for each of the programs in the Five-Year Plan and the Coupon Pilot Program. The transaction units are specific to each program. The Residential Energy Star Window, Insulation, Thermostat and HRV programs reflect approved rebates. The Coupon Program reflects numbers of coupons redeemed. The Commercial Lighting and Small Technology Programs each reflect the number of products rebated through the programs. The Block Heater Timer Program reflects the number of timers determined to be installed through post-giveaway surveys or coupon redemption. The ISBEP,

[8] In 2014 an accrual setup for Industrial was based on an estimate of outstanding invoices. The actual invoices received in 2015 were less than expected, therefore the accrual was overstated in 2014, and understated in 2015. The understatement appears as a credit in 2015.

BEP, and Industrial Efficiency Programs reflect the number of completed retrofit projects. Finally, the Isolated Systems Program denotes the number of direct installs completed for both residential and commercial customers.

Table 6: Life to Date Program Participation

Program	2009	2010	2011	2012	2013	2014	2015	Life to Date
Windows	11	19	41	61	48	24	7	211
Insulation	14	24	104	50	53	22	35	302
Thermostat	4	28	32	45	23	20	15	167
Coupon Program	-	3,178	5,832	-	-	-	-	9,010
Commercial Lighting	221	556	12,973	5,403	3,086	2,593	2,977	27,809
Industrial	-	-	1	1	-	3	-	5
Block Heater Timers	-	-	-	-	629	-	-	629
Isolated Systems Community	-	-	-	1,355	1,153	1,181	965	4,654
ISBEP	-	-	-	1	1	4	1	7
Heat Recovery Ventilator	-	-	-	-	1	11	9	21
Small Technology Program	-	-	-	-	-	6,920	4,551	11,471
Business Efficiency Program	-	-	-	-	-	4	7	11

8 Life to Date Value of Program Energy Savings

The value of energy and demand savings has been estimated from a utility perspective based on overall cost reductions associated with the programs recorded in the Deferral Account. It includes Holyrood fuel savings and impacts on transmission and distribution costs including losses. No losses are included for the Industrial Energy Efficiency Program as they are transmission level customers. Estimated energy and demand savings are based on when the customer completed installation of energy saving measures during the year, and take into consideration reductions due to free ridership. This estimate is less than that based on savings accrued to participants on an annual basis, as presented elsewhere in this report. The value of energy savings changes each year primarily due to the change in avoided fuel prices.

Table 7: Life to Date Value of Deferral Energy Savings (2015 $s)

Program	2009	2010	2011	2012	2013	2014	2015	2015 Life to Date
Windows	237	982	2,942	6,518	5,974	8,967	7,605	33,226
Insulation	1,098	5,053	19,803	32,815	19,044	32,748	35,220	145,781
Thermostat	62	847	2,025	3,830	2,945	4,184	8,005	21,897
Coupon Program	-	2,403	14,147	34,362	-	-	-	50,912
Commercial Lighting	-	-	8,118	13,880	5,083	10,263	10,000	47,345
Industrial	-	-	980	296,302	302,654	1,800,951	2,026,311	4,427,198
Isolated Systems Community	-	-	-	175,232	387,034	473,279	451,584	1,487,129
ISBEP	-	-	-	336	1,863	25,004	38,528	65,732
Heat Recovery Ventilator	-	-	-	-	-	379	316	695
Business Efficiency Program	-	-	-	-	-	6,371	139,196	145,567
Small Technology Program						6,982	14,170	21,152
Total	**1,397**	**9,286**	**48,016**	**563,275**	**724,598**	**2,369,128**	**2,730,935**	**6,446,633**

Appendix A

CDM Program Descriptions

Residential takeCHARGE Rebate Programs
Program applications are processed primarily through customer applications. The programs are promoted in partnership with trade allies in the retail, home building and renovation industries.

Insulation Rebate Program
The objective of this program is to provide incentives to increase the insulation R-value in residential basements, crawl spaces and attics, thereby increasing the efficiency of the home's building envelope. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects are eligible. Customers can receive an incentive of 75% of the cost for insulation for basement ceiling or walls up to $1,000, and 50% of the cost for insulation for the attic up to $1,000.

Thermostat Rebate Program
This program encourages installation of programmable and electronic thermostats to allow customers better control of the temperature in their home and to save energy. These high performance thermostats allow customers to set back the temperature during the night or when they are away. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects and new home developments are eligible. Incentives of $10 for each programmable thermostat and $5 for each electronic high performance thermostat are offered.

ENERGY STAR Window Rebate Program
This program encourages customers to purchase ENERGY STAR rated windows over standard windows to improve the efficiency of their home's building envelope and reduce space heating energy. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects are eligible. Customers who purchase ENERGY STAR windows can receive a rebate of $2 per square foot of window installed. This program ended December 31, 2014.

HRV Rebate Program
This program encourages customers to purchase a high efficiency HRV to improve the efficiency of their home. Eligible measures in this program include all HRV models that have a Sensible Recovery Efficiency of 70% or more. Customers who purchase a high efficiency HRV can receive a rebate of $175. All customers are eligible for this program regards of age of home or heat source.

Isolated System Community Energy Efficiency Program – Hydro Program
This program provided both residential and commercial components targeting customers in Isolated Diesel and L'Anse au Loup Systems. The focus is on

residential customers through the direct install of a kit of technologies, at-cash coupons on small technologies and mail-in rebates on energy efficient appliances. Commercial customers also receive a direct install of a kit of technologies. The kit includes items for water savings, draft proofing, lighting and other measures.

Homeowners received education on energy efficiency and information on the existing takeCHARGE rebate programs. There were community events, social media promotions and exchanges held to promote the program and energy efficiency awareness.

Through this program Hydro has piloted a number of approaches and technologies to assess their validity for the rural market including pop up retail shops, drain water heat recovery, and in 2014, explored residential air sealing and online sales opportunities for energy efficient products.

Block Heater Timer Program – Hydro Program
Targeting customers in the Labrador Interconnected System this program encouraged the purchase of energy saving Block Heater Timers through in-store discounts offered at partnering retailers. The program launched with a giveaway of the technology to create awareness of the product as there was little or no use of the technology before the program. The incentive was offered over two winter seasons (2012-2013 and 2013-2014) and ended in spring 2014.

Small Technologies Program

Instant Rebates
This program promotes a variety of smaller technologies, such as CFLs and LED lighting, and smart power bars through instant rebates available at the cash register of participating retailers. All customers are eligible for this program regardless of age of home or heat source.

Appliances and Electronics
This program encourages customers to purchase high efficiency appliances. Participants will receive $100 off select energy efficient washers, freezers, refrigerators, and $30 off eligible TVs. All customers are eligible for this program regardless of age of home or heat source.

Commercial takeCHARGE Rebate Programs

Commercial Lighting Incentive Program
The Commercial Lighting Program targets energy reductions through more efficient lighting technologies in commercial buildings. The Commercial Lighting

Program offers incentives for lamps and ballasts to commercial customers in an effort to reduce the cost differential for upgrading to the higher efficiency lighting systems and provide a sales incentive for the lighting distributor.

The Commercial Lighting Program also includes incentives for LED exit signs for retrofit applications. High bay fluorescent lighting, including T8 and T5 fluorescent fixtures used in areas with high ceilings, such as warehouses, gymnasiums, arenas and garages are also eligible for incentives.

These lighting technologies offer energy savings of 25% to 90% compared to standard lighting systems. The program is primarily promoted through local lighting distributors. It is a requirement of the program that the lighting distributors provide the Company with sales and customer data for program tracking.

Business Efficiency Program
Launched in 2013, the objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency projects.

This program is available for existing commercial facilities that can save energy by installing more efficient equipment and systems. The program includes custom projects and rebates for specific measures on a per unit basis.

Isolated Systems Business Efficiency Program (ISBEP) – Hydro Program
The ISBEP was launched in 2012 and targets commercial customers in the Isolated and L'Anse au Loup Systems. The program provides a custom approach to finding energy efficiency solutions and provides free energy walkthroughs as well as financial assistance for feasibility studies and for retrofit projects. It has the same program design and offerings as the joint utility Business Efficiency Program, but has higher incentive levels for retrofit work because of the higher avoided cost of generation in these systems.

Industrial Energy Efficiency Program (IEEP)

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings, and other supports to enable industrial facilities to identify and implement efficiency and conservation opportunities.

This program is a custom program to respond to the unique needs of the industrial market, rather than a prescriptive technology approach.

Appendix B

Five-Year Conservation Plan: 2016 - 2020

FIVE-YEAR CONSERVATION PLAN: 2016 – 2020

newfoundland labrador hydro
a nalcor energy company

NEWFOUNDLAND POWER
A FORTIS COMPANY

October 2015

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1.0 EXECUTIVE SUMMARY

Newfoundland and Labrador Hydro ("Hydro") and Newfoundland Power have offered customer energy conservation programs on a joint and coordinated basis under the *takeCHARGE* brand since 2009. These programs provide a range of information and financial supports to help customers manage their energy usage.

The joint *Five-Year Conservation Plan: 2016-2020* (the "2016 Plan") builds on this experience, and continues to reflect the principles underlying two previous joint, multi-year conservation plans developed by Hydro and Newfoundland Power (the "Utilities").[1] It reflects refinement of the opportunities identified in a recently updated conservation potential study (the "2015 CPS") through in-depth local market research and program cost benefit analysis.

The 2016 Plan represents both growth and evolution of the Utilities' joint customer energy conservation program portfolio. It includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. The approach outlined in this plan will remain flexible to address the changing provincial landscape, in terms of customer expectations, market conditions for energy efficient products, and electrical system costs. The 2016 Plan also addresses customer support and education, program planning and evaluation processes, as well as the Utilities' costs and cost recovery arrangements.

The total estimated energy savings for 2016 through 2020 are 883 GWh.[2] Total estimated costs through this period are $41.1 million.

[1] The *Five-Year Energy Conservation Plan: 2008-2013* was filed with the Board on June 27, 2008. The *Five-Year Energy Conservation Plan: 2012-2016* was filed on September 14, 2012.

[2] The energy savings indicated throughout the *Five-Year Energy Conservation Plan: 2016-2020* represent *gross* energy savings achieved by customers. These savings reflect all technologies installed by participating customers since program implementation. *Net* energy savings would reflect adjustments for: (i) the timing of customer installations giving rise to the energy savings; and (ii) program *free ridership* (an estimate of participants who would have chosen the more efficient product without the program).

2.0 BACKGROUND

2.1 Planning Context

Hydro and Newfoundland Power have collaborated on customer energy conservation program planning and delivery for the past 8 years. The programs offered jointly under the takeCHARGE brand have included a variety of information and financial supports which help customers manage their energy usage. The Utilities' provision of energy conservation programming is responsive to customer expectations, supports efforts to be responsible stewards of electrical energy resources and is consistent with provision of least cost, reliable electricity service. Initiatives address conservation opportunities for customers in each sector: residential, commercial and industrial.

The Utilities' practice has been to refresh their joint strategic plans for customer conservation programming every three to four years. This ensures programs achieve long term goals while being responsive to changes in customer expectations, market barriers, technology developments, and economics. Current program offerings are based on the Five Year Energy Conservation Plan: 2012-2016 ("the 2012 Plan").

One of the key inputs into the 2016 Plan was the outcome of the Conservation Potential Study ("CPS"), completed by the Utilities in 2015. The CPS identified cost-effective energy and demand reduction measures, outlined general parameters for program development, and quantified achievable energy savings potential by sector and end-use. The results of the CPS are considered with the Utilities' experience and other factors in the local market to determine potential programs and energy saving targets for the 2016 Plan.

The Utilities' conservation planning is coordinated with overall planning for the electrical system. Significant changes to the Island Interconnected System are anticipated to occur in this planning period. Interconnection of the Muskrat Falls hydroelectric development is forecast for 2018 and will include the Island's first connection to the

North American grid. As a result, there is uncertainty with respect to the marginal cost of energy and capacity on the Island Interconnected System beyond 2017.

Schedule A provides the current forecast marginal cost of energy and capacity for 2015-2035.[3] The forecast indicates a decrease in the marginal cost of energy beginning in 2018. This effectively reduces the value of energy savings arising from customer energy conservation programming, and limits the types of programs that can be cost effectively offered.

Costs of electricity supply additions are expected to be incorporated into customer rates starting in 2018, putting upward pressure on customers' rates. This is expected to increase customers' motivation to conserve energy to manage their electricity costs. Also, the recent economic slowdown is anticipated to continue into this planning period and will influence customer behaviour with regards to conservation.

The 2008 and 2012 Five Year Conservation and Demand Management Plans, delivered jointly by the Utilities, had focused primarily on energy conservation. This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Generating Station) which justified such a focus. The events of recent winters have since brought to light issues with peak load and generation capacity on the Island Interconnected System which are anticipated to continue into this planning period. The 2016 Plan therefore considers demand management opportunities as well as energy conservation.

The Utilities have been offering some form of customer energy conservation programming since 1991, and have achieved significant energy savings over this time. The current forecast, particularly for insulation, anticipates diminishing returns. For example, the remaining potential for energy savings through insulation upgrades has

[3] The marginal costs used to determine cost effectiveness of the customer energy conservation programs are based on the most recent marginal cost forecast as projected by Hydro in February 2015. These estimates are currently under review by Hydro to incorporate the forecast interconnection with the North American grid. Once more current estimates are available, they will be incorporated in the screening process.

been impacted by changes to the National Building Code requiring basement insulation in new homes, as well as barriers to retrofitting many of the eligible existing homes. This is consistent with experience in other North American jurisdictions where utility programming has harvested the “low hanging fruit” and subsequently has moved on to address more challenging and costly opportunities.

Energy conservation programming has also been affected by technology advancements and changes to standards. Lighting product standards changes have effectively eliminated availability of incandescent bulbs for consumers. At the same time, LED technology has advanced and become more affordable and available. The pace of this change has been even faster than anticipated in the 2012 Plan. This is demonstrated by higher than projected uptake in the Utilities’ Instant Rebate component of the Small Technologies program.

The Utilities continue to work with the Provincial Government, through the Office of Climate Change and Energy Efficiency, regarding policy development for energy conservation and efficiency, and particularly potential impacts and approaches to building codes, product standards and broader market transformation objectives.

Many of the influences on the provincial energy conservation market can be seen in other North American jurisdictions. In recent years, many jurisdictions have experienced decreasing marginal costs of energy and increasing program costs due to maturing conservation programs. As a result, utilities and program administrators have revised their approach to economic analysis of energy conservation. The Utilities have conducted research on current economic evaluation practices. A summary of this research is provided in Schedule B. It indicates that Canadian jurisdictions use the Total Resource Cost (“TRC”) test as their primary benefit cost test for program screening, with the Program Administrator Cost test as a secondary test. Only one of the seven Canadian utilities researched used Ratepayer Impact Measure as a primary benefit cost test for program screening. In the United States, most jurisdictions follow

similar practices with over 70% using TRC as the primary benefit cost test and 2% using Ratepayer Impact Measure for program screening.

2.2 Energy Conservation Programs

Based on the 2012 Plan, the Utilities have jointly offered customer energy conservation programs which provide both information and financial incentives to encourage customer installation of energy efficient technologies.[4] In addition, Hydro has offered programming for its customers, such as incentives for commercial customers in its isolated system service territories, where market conditions and system costs differ.

Table 1 shows, by sector, the portfolio of programs that have been offered under the 2012 Plan.[5]

Table 1
Conservation Programs
By Sector

Residential	Commercial	Industrial
Insulation Thermostat ENERGY STAR Window[6] HRV Block Heater Timer Small Technologies Isolated Systems Community Program	Lighting Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

4 Once installed, these more energy efficient technologies provide energy savings for the customer throughout the life of the product. For example, an HRV has an estimated life of 15 years and will result in energy savings benefits throughout that period.
5 The Utilities also engage in demand management activities, including Newfoundland Power's Curtailable Service Rate Option and Hydro's interruptible load arrangements with its Industrial Customers.
6 The ENERGY STAR Window Program concluded at the end of 2014.

Schedule D summarizes the energy savings and costs for the customer energy conservation programs offered by the Utilities from 2009 through 2015.

Residential Programs

Table 2 provides a summary of residential customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).[7]

Table 2
Residential Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	2.5	7.1	18.6	28.5	38.4	51.5	65.7	**212.3**

The takeCHARGE residential programs are expected to result in aggregate energy savings of approximately 212.3 GWh by the end of 2015.[8]

Insulation Program

As a result of the updates to the National Building Code in 2012, several changes were made to the Insulation Program. New homes are no longer eligible and the minimum R-value requirements for existing homes have been increased. As well, the rebate structure was revised to provide a higher, easy-to-calculate rebate. Customers can receive an incentive of 75% of basement wall or ceiling insulation material costs up to $1,000, and 50% of attic insulation material costs up to $1,000.

[7] Energy savings include savings arising from all technologies installed by all participants since program implementation. This reflects the fact that these technologies provide energy savings benefits for the customer throughout the life of the product.

[8] Since implementation in 2009, there have been approximately 36,650 participants and over 638,000 at-the-cash rebates were provided on energy efficient products in the takeCHARGE residential customer programs.

Thermostat Program

High efficiency programmable and electronic thermostat replacements allow customers to conserve energy at relatively low cost and effort. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage.

ENERGY STAR Window Program

This program concluded at the end of 2014. After 5 years, and over 9,200 participating customers, the program had achieved its objective of making more efficient windows the standard in the local market.

Heat Recovery Ventilator Program

This program promotes the installation of high efficiency heat recovery ventilators ("HRVs"). HRVs have been widely used in new home construction in the province since the 1990s, to control humidity and air quality. The HRV program has experienced lower than projected participation since its launch in late 2013.[9] There has been improvement in 2015, and the Utilities will continue to monitor and evaluate this program in order to find opportunities to increase participation.

Block Heater Timer Program

Hydro provided giveaways and at-the-cash coupons for block heater timers to customers in Hydro's Labrador Interconnected System from 2012-2014. While vehicle engine block heaters are used extensively in this area, timers are rarely used. Instead of using electricity throughout the night, block heater timers allow vehicle owners to reduce the amount of time that electricity is used to warm the vehicle engine. Due to lack of participation this program was not continued past 2014 but commercial customers can take advantage of this technology through the Business Efficiency Program ("BEP") or the Isolated Systems Business Efficiency Program ("ISBEP").

[9] The Utilities have received feedback regarding low customer knowledge of home ventilation, with many customers being unaware of the purpose of a HRV in their home and how it can save energy. Also, there are complexities in the supply chain for acquiring a high efficiency HRV which can be problematic for potential participants.

Small Technologies

The small technologies program is supported by retail partners and appeals to a broad customer group as it does not involve a major home renovation. The program uses different marketing approaches for two different groups of energy efficient products.

The Instant Rebate component offers relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home.[10] Participation and energy savings results in the first two years of the program have exceeded the forecast in the 2012 plan. The Appliance and Electronics component offers incentives that are relatively higher value and available by mail-in and online application throughout the year.[11]

Isolated Systems Community Program

Following two pilot programs in 2010 and 2011, Hydro launched a full-scale, energy efficiency direct install program in 2012. The program includes direct installations of energy efficient products at no cost to homes and businesses.[12] The program also focuses on customer education and building capacity in the communities by hiring and training local representatives. These representatives work in their own communities to promote the program, provide information on energy use, and install the products.

[10] Products include LED lighting, motion sensors, timers, dimmer switches, smart power strips and more.

[11] Products include energy efficient clothes washers, full-size refrigerators, full-size freezers and TVs.

[12] Products include low-flow showerheads and aerators, CFLs, smart power strips, and hot water tank and pipe insulation.

Commercial Programs

Table 3 provides a summary of commercial customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).

Table 3
Commercial Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	0.2	0.9	2.4	3.3	3.9	6.5	11.4	**28.6**

The takeCHARGE commercial programs will result in estimated aggregate energy savings of approximately 28.6 GWh by the end of 2015.[13]

Commercial Lighting Program

The Commercial Lighting Program targets reduced energy use through efficient lighting in commercial buildings, including high performance T8 and T5 fluorescent lighting and LED exit signs. This program has primarily been promoted through local lighting distributors by discounting lighting products at time of purchase.

The Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings from custom projects, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency improvement projects. It also includes rebates for specific measures on a per unit basis.

[13] Since implementation in 2009, there have been over 1,050 participants in the takeCHARGE commercial customer programs.

Isolated Systems Business Efficiency Program

This program is targeted toward commercial customers located in Hydro's isolated system communities. This custom program provides incentives based on the energy savings from efficiency improvement projects. This allows customers to implement energy efficient technologies that are suitable for their specific buildings, equipment and operations.

Industrial Programs

Table 4 provides a summary of industrial customer energy savings achieved through Utility customer energy conservation programs from 2009 through 2015(F).

Table 4
Industrial Program Energy Savings
2009 through 2015(F)
(GWh)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Energy Savings	-	-	0.2	3.3	3.3	25.6	25.6	58.0

The takeCHARGE Industrial Energy Efficiency program will result in estimated aggregate energy savings of approximately 58.0 GWh by the end of 2015.[14]

The Industrial Energy Efficiency Program is a custom program that responds to the unique needs of Hydro's transmission level industrial customers. This program provides financial support for engineering feasibility studies of efficiency projects and for project implementation costs. The Industrial program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011 and the last being submitted in 2013. No projects were completed in 2013 as focus was put on feasibility studies for work to be completed in 2014. The program then underwent an assessment by an external third party in 2014 and was re-launched as a full program in 2015.

[14] Since implementation in 2009, there have been 5 projects completed under the takeCHARGE Industrial Energy Efficiency Program.

2.3 Education & Support

The Utilities continue to provide energy efficiency education and support to customers through a variety of channels, which include a joint website, outreach activities, school presentations and partnerships with other organizations.

Table 5 shows the number of customer-initiated contacts with the Utilities for energy conservation information from 2010 through 2015 YTD.

Table 5
Customer Contacts for
Energy Conservation Information

	2010	**2011**	**2012**	**2013**	**2014**	**2015YTD**
Contact Centre Inquiries	11,704	12,624	9,793	9,630	10,830	5,328
Website Visits	52,013	72,996	49,202	76,278	186,003	197,973

The majority of customers chose electronic means of communication with the Utilities to obtain information on energy conservation and rebate programs. This is consistent with promotion of the takeCHARGE website as the primary resource for customer inquiries and information. Customer visits to the takeCHARGE website grew by 144% from 2013 to 2014. Activity in the first eight months of 2015 shows continued growth, with approximately 80% of website visits via a mobile device. This increase is related to increased promotion, changes to existing programs, and addition of new programs.

The Utilities have participated in an average of 214 community outreach events each year since 2012. This included presentations to retailers and suppliers, senior citizens, trade allies and other groups. takeCHARGE information booths were displayed at home shows, trade fairs, and retail stores across the province. The Utilities also offer a number of outreach events, such as the annual takeCHARGE of Your Town Challenge and Energy Efficiency Week. Through these outreach activities, members of the takeCHARGE team assisted customers with their energy efficiency questions, while raising awareness of energy conservation and the takeCHARGE rebate programs.

Over the last three years the takeCHARGE *Kids in Charge* K-I-C Start school program, has provided energy efficiency and conservation education support to students throughout Newfoundland and Labrador. This has included delivering in classroom presentations and an annual contest for primary and elementary students. In 2014, takeCHARGE partnered with the Provincial Office of Climate Change and Energy Efficiency to extend this program through the Hotshots pilot program.[15] As a result, in 2014-15 school year, over 11,000 students in 106 schools throughout the province participated in 448 presentations about energy conservation.

Trade allies play an integral role in helping customers make knowledgeable decisions regarding energy conservation and related home improvements. Retail partners display information about takeCHARGE programs and energy efficiency products in their stores and in flyers, as well as during special promotional events.[16] Similarly, the Utilities are continuing to grow a network of business to business service providers and suppliers that support the commercial and industrial sectors.[17]

The Utilities have also developed partnerships with a variety of other organizations that share common goals for the province's conservation market, including the Association of Newfoundland and Labrador Realtors, the Canadian Home Builders Association, Newfoundland and Labrador Housing Corporation, and the Canadian Mortgage and Housing Corporation.

[15] Through the HotShots pilot, the Province provided funding and support for additional in-class presentations, curriculum linked teacher materials, and a contest for high school students.
[16] The Utilities continue to work with over 160 retail store partners, 11 manufacturers/distributors, and approximately 50 HRV installers.
[17] These include lighting equipment manufacturers and distributors, electrical and HVAC contractors, and engineering firms.

Table 6 shows costs for education and support for the period 2009-2015(F).

Table 6
Conservation Education & Support
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Education	666	486	428	426	501	647	693	3,847
Support	236	206	219	222	186	174	158	1,401
Total	**902**	**692**	**647**	**648**	**687**	**821**	**851**	**5,248**

2.4 Planning & Evaluation

Planning

The focus of the Utilities' CDM planning process is to develop a 5-year plan for the implementation of comprehensive customer energy conservation and demand management programs around the technologies that were determined to have conservation potential in the provincial market. The completion of the CPS in 2015 effectively initiated the development of the 2016 Plan.

Programs are developed and revised through consultation with the various market stakeholders, such as government, trade allies and local interest groups, to gather feedback on program delivery strategy.

Table 7 shows costs for conservation planning for the period 2009-2015(F).[18]

Table 7
Conservation Planning
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Planning	401	429	509	404	462	958	1,202	4,365

Variations in annual conservation planning costs primarily reflect the periodic nature of the Utilities' program planning and research activities.

Research

In 2013, the Utilities completed a joint Commercial Facility Equipment Inventory ("CFEI") on 54 commercial facilities.[19] This research provided information on how commercial customers use electricity, through an inventory and analysis of all mechanical and electrical equipment in each facility.[20] This data was used as a direct input into the CPS conducted in 2015.

In 2014, Newfoundland Power and Hydro jointly conducted a survey to gather information regarding electricity end uses in the residential sector. The information gathered was used to assess potential electricity savings opportunities, and was used as a direct input into the current planning cycle. These results are also being taken into account in making adjustments to the *takeCHARGE* programs. For example, because

[18] Conservation planning costs include costs related to surveys and research, development of the potential study and the five-year plan, and general administration.

[19] The CFEI was completed by CBCL Limited, a consultant that conducted on-site facility audits for participating commercial customers. CBCL Limited is a leading employee owned multidisciplinary engineering and environmental consulting firm in Atlantic Canada.

[20] The CFEI found, for example, that the food retail sector are the largest users of electricity on a square footage basis of the customers audited, followed by the manufacturing/fish processing sector.

of survey findings regarding the prevalence of CFLs, these have been removed from the Instant Rebates Program beginning in the fall of 2015.[21]

Newfoundland Power completed research on ductless mini-split heat pumps ("MSHP") from 2013 to 2015. The objectives of this research were to assess the current MSHP market in Newfoundland, the use of the MSHP as a supplementary heat source and the potential impact of MSHPs on the electricity system. The results indicate that MSHP are more efficient and do save energy compared to electric baseboard heat.[22] This analysis also shows that there is not likely to be peak demand reduction on the electricity system from installation of MSHPs.[23] Customer demand for MSHP products has grown significantly in recent years and continues to be strong. However, there are issues with availability of qualified installers and customer understanding of product quality requirements.

In the fall of 2014, Newfoundland Power launched a pilot program to assess the economic, market, and technical feasibility of direct load control to reduce overall peak demand. This pilot was initiated in response to the constraints on system capacity that became evident after the events in January of 2013 and 2014. The pilot involved controlling hot water tanks in approximately 500 customer homes in Paradise and Mount Pearl. Demand reduction achieved by the direct load control events on average was 0.6 kW per participant, and for events that included all participants, approximately

[21] Customers were asked what types of lighting they use in areas of their house where they spend the most time: 63% reported that they use incandescent bulbs, 53% CFLs, and 18% LEDs (multiple responses allowed). In another question, 31% of respondents claimed to have changed all their bulbs to more energy efficient types, and 45% indicated that they have begun to change to more energy efficient types.

[22] Approximately half of the homes in the study recorded energy savings after installation of the MSHP. In these homes, electricity usage declined by an average of 5,300 kWh or 19% per year, with savings ranging from 7% to 50%. The remaining homes recorded an increase or no change in energy usage. This appears to reflect factors such as heating of additional living space, fuel switching, or operational issues with the MSHP.

[23] Savings at time of system peak are dependent on a number of factors such as the efficiency and defrost cycle of the MSHP system, and temperature. A high efficiency MSHP may be capable of providing peak savings in warmer parts of the province but not in colder regions, while a less efficient MSHP may not be capable of providing peak savings in any region. On colder weekdays, the study observed little difference in the load profile of the MSHP homes vs. electric baseboard homes, and occasionally the MSHP homes' peak load was slightly higher.

298 kW of demand reduction was achieved. The Pilot results also indicate that a full scale provincial program does not meet the economic requirements.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project, which is supported by the Utilities and administered by Hydro, began in September 2014 and aims to assess whether real time display of energy use has a positive effect on electricity conservation behavior. The pilot involves approximately 750 customers: 250 with an in-home display device, 250 with an in-home display device as well as electricity conservation information in a monthly mail out, and 250 with only the electricity conservation information. Monitoring of participants will continue until January 2016 and the final report will be submitted to Government by end of March 2016.

Evaluation

The customer energy conservation programs are continuously evaluated by the Utilities on their energy savings, market impacts and delivery process effectiveness. Additional review by external third party evaluators has also been conducted. Program evaluation findings are used to refine program design and implementation details on an ongoing basis, as well as support further planning.

For example, the third party residential program evaluation in 2013 found that two-thirds of windows sold in the province were ENERGY STAR, which supported the Utilities' decision to conclude the ENERGY STAR Windows Program.[24]

Economic and energy savings evaluation of the customer energy conservation programs is performed annually. Program participants are required to provide certain information on program rebate applications. This information ranges from technical data, such as the R-value of installed insulation, or efficiency rating of a HRV to the type of heating in the home and its geographic location. Analysis of this data allows the

[24] The 2013 residential program evaluation was conducted DNV GL- Energy, headquartered in Burlington, Massachusetts, and specializing in evaluating programs that promote energy efficiency, demand response, and distributed generation.

Utilities to accurately estimate the energy savings for each program and perform industry standard economic cost-benefit tests.

2.5 CDM Costs & Cost Recovery

Table 8 provides a summary of the customer energy conservation program and general costs of the Utilities from 2009 through 2015(F).[25]

Table 8
Conservation Costs
2009 through 2015 (F)
($000s)

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015F**	**Total**
Programs								
Residential	1,386	2,322	3,473	3,436	3,921	4,277	5,188	24,003
Commercial	79	95	216	214	355	926	1,388	3,273
Industrial	57	226	103	173	89	1,244	19	1,910
Total Programs	1,522	2,643	3,791	3,823	4,365	6,447	6,595	29,186
General	1,303	1,121	1,156	1,052	1,149	1,779	2,054	9,614
Total	**2,825**	**3,764**	**4,947**	**4,875**	**5,514**	**8,226**	**8,649**	**38,800**

The Utilities' costs related to conservation programs have increased from approximately $2.8 million in 2009 to $8.6 million in 2015. This primarily reflects the addition of new customer energy conservation programs in 2013, specifically the Small Technologies Program and the Business Efficiency Program. This also reflects the increased levels of customer participation and rebates related to the joint takeCHARGE program portfolio. The expansion of customer programs has also resulted in increasing energy savings.

25 This cost summary does not include (i) costs related to programs offered independently by the Utilities prior to June 2009; (ii) costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management); and (iii) costs related to Hydro's interruptible service arrangements with its Industrial Customers.

Details of the Utilities' customer energy conservation program and general costs are provided in Schedule C.

The Utilities each bear the costs related to the provision of customer energy conservation programming in their own service territory. General conservation and program costs, such as customer rebates and costs related to responding to customer inquiries are incurred directly by each utility. Costs which are incurred jointly, such as provincial mass media advertising, are split on an 85% / 15% basis between Newfoundland Power and Hydro, respectively.[26]

Cost Recovery

Newfoundland Power's current conservation cost recovery practice reflects Board Order No. P.U. 13 (2013). Conservation program costs are deferred and amortized over a seven-year period. Through the annual operation of the Company's Rate Stabilization Adjustment, customer rates are adjusted to reflect any difference between the conservation program costs included in the most recent test year and the costs actually incurred. Newfoundland Power's annually recurring general conservation costs related to providing general customer information, community outreach and planning are expensed in the year in which the costs are incurred.

Hydro's current customer rates, as approved by the Board in Order No. P.U. 8 (2007), include recovery of approximately $0.4 million in costs related to management and planning of conservation programming. In each year from 2009 to 2014, inclusive, Hydro has deferred recovery of direct program costs related to the expansion of customer energy conservation programming under the 2008 Plan and 2012 Plan.[27] As of August 14, 2015, associated with a general rate application filed by Hydro on July 30, 2013, and an amended general rate application filed by Hydro on November 10, 2014,

[26] This approach to division of jointly incurred costs reflects the proportion of customers served by each utility.

[27] The deferred recovery of these costs in 2009, 2010, 2011, 2012, 2013, and 2014 were approved by the Board in Order Nos. P.U. 14(2009), P.U. 13(2010), P.U. 4(2011), P.U. 3(2012), P.U. 35(2013), and P.U. 43(2014), respectively.

the Consumer Advocate, Newfoundland Power, the Industrial Customer Group and Vale, with participation by Board Hearing Counsel, have engaged in negotiations with Hydro. As a result, these parties agreed that "Hydro's proposal to defer and amortize annual customer energy conservation program costs, commencing in 2015, over a discrete seven year period in a Conservation and Demand Management (CDM) Cost Deferral Account should be approved."[28]

3.0 PLAN: 2016-2020

3.1 Conservation Potential & Program Selection

The programs included in the 2016 Plan have been selected based on a number of considerations. Opportunities identified in the 2015 CPS are a key input and these have been further assessed by the Utilities in terms of engineering, market and economic viability. Consideration has also been given to the experience of the Utilities and others in the local marketplace, feedback from customers, as well as experience shared from other Canadian jurisdictions.

Conservation Potential Study

In June 2015, a comprehensive study was completed of electricity conservation and demand management potential for the province.[29] This Conservation Potential Study estimated the potential for electrical energy and demand savings by sector and by electricity system from 2015-2029. It also identified specific technologies available to assist in achieving that potential. The CPS essentially provides a framework, consistent with current North American practices, within which to assess conservation programming. The findings enabled the Utilities to quickly focus on cost effective technologies and begin assessment of market characteristics to guide program concept development.

[28] Newfoundland and Labrador Hydro – Amended General Rate Application – Parties' Settlement Agreement dated August 14, 2015.

[29] ICF International (previously called Marbek) conducted Conservation Potential Studies for the Utilities in 2007 and 2015. ICF International is a leading environmental and energy management consultancy and has extensive experience conducting Conservation Potential Studies in Canada.

Electrical system marginal costs of supply are used in the CPS to screen the economic viability of more efficient technologies.[30] For the current CPS, these costs were based on the most recent marginal cost forecast as projected by Hydro in February 2015.[31] These estimates are currently under review. Once Hydro's marginal cost study is completed, the CPS results will be reassessed. If such a review results in changes to the list of cost effective technologies with conservation potential, these will be considered in future updates to the 2016 Plan.

Figure 1 shows the baseline provincial energy usage forecast which was input to the 2015 CPS (the reference case), and the upper and lower achievable potentials estimated by the Potential Study.[32]

30 Technologies are considered to be economically viable when the cost of saving one kWh or kW of electricity is equal to, or less than, the marginal cost of supplying the electricity.

31 The 2015 CPS included an analysis of the sensitivity of potential technologies to changes in marginal costs. The analysis was based on a range of + 30% to – 10% of the February 2015 forecast marginal costs. It indicated a modest level of variability in technology viability and resulting conservation results. Please see CPS, section 7.5 Energy Efficiency Supply Curve, filed with the Board September 15, 2015.

32 The reference case is based on the provincial energy usage forecast from 2014. After this study was completed the energy usage forecast decreased due to the economic downturn, mainly in the industrial sector. The achievable potential is defined as the portion of the economic conservation potential that is achievable through utility interventions and programs given institutional, economic and market barriers. The upper achievable potential is considered to be the best case scenario with all market barriers removed, such as capital cost and product accessibility. The lower achievable potential is considered a business as usual scenario with the existing market barriers remaining in place.

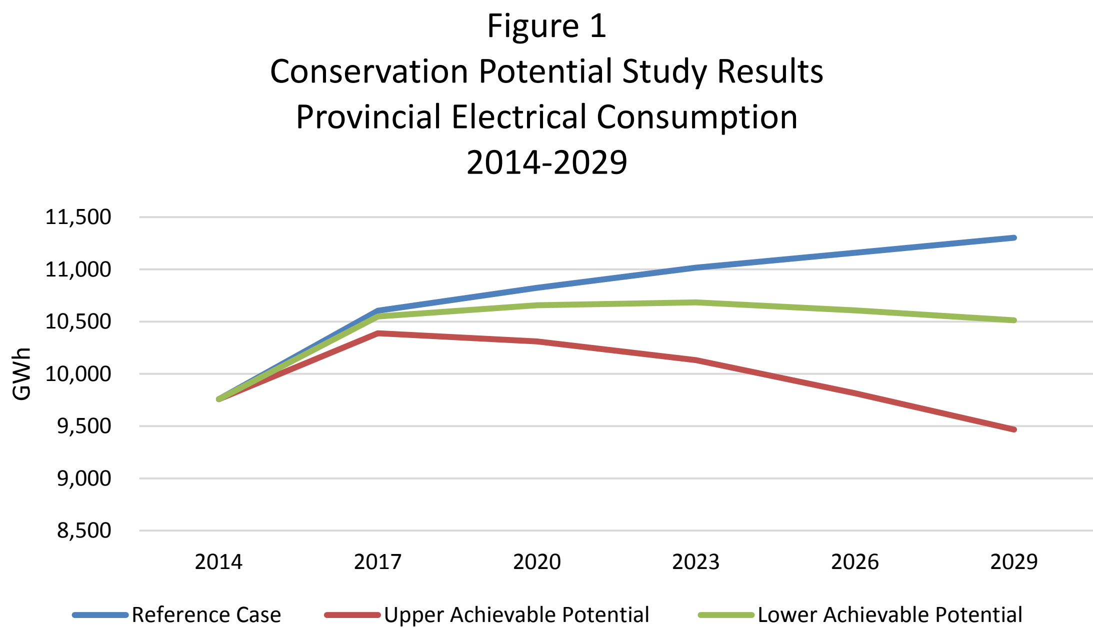

Figure 1 shows that, over time, the cumulative effects of implementing cost effective efficient technologies can significantly reduce forecast growth in electricity usage.[33]

Figures 2 and 3 show the results of the CPS regarding achievable demand reduction potential from energy efficiency measures ("Energy Efficiency") and from demand response specific measures ("Demand Response") by 2020.[34]

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[33] At the end of the first estimation interval, in 2017, the CPS shows a range of 55 GWh for the lower achievable potential savings and 215 GWh for the upper achievable potential savings. This compares with annual savings of approximately 116 GWh currently estimated in the Plan for the same timeframe.

[34] The Commercial and Industrial sector includes Hydro's large transmission level Industrial customers as well as Newfoundland Power's general service customers.

Figure 2
Lower Achievable Demand
Reduction Potential
Island Interconnected System
2020
(MW)

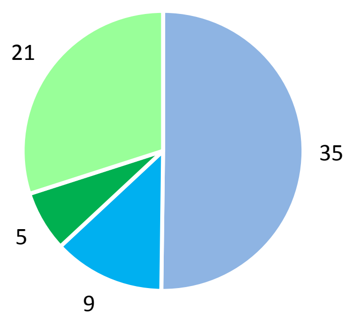
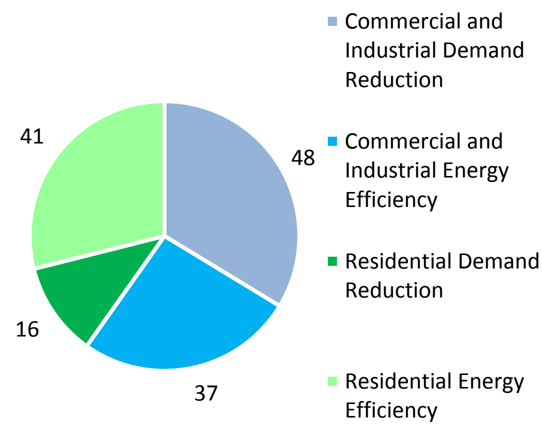


Figure 3
Upper Achievable Demand
Reduction Potential
Island Interconnected System
2020
(MW)



Figures 2 and 3 show 70 MW for the lower potential and 142 MW for the upper potential demand reduction on the Island Interconnected System.[35] Installation of energy efficiency measures that reduce consumption during times of peak demand account for approximately 43% and 55% of the lower and upper achievable demand reduction, respectively, by 2020.[36]

The majority of the demand reduction potential was identified in the Commercial and Industrial sectors. Specifically, the Industrial sector represents about 87% and 74% of the total lower and upper achievable demand reduction, respectively. The demand reduction technologies identified through the CPS as having the most potential included curtailable load arrangements with commercial and industrial customers and direct load control of residential hot water tanks.

[35] 21+35+9+5=70 and 41+16+37+48= 142
[36] (21+9)/70=43% and (37+41)/142=55%.

Selection

The technologies that passed the economic screening of the CPS were reviewed in detail to assess their possible inclusion in the 2016 Plan. Local market research was conducted to identify barriers to broader adoption of more efficient technologies, such as capital cost, market availability and awareness. This included consultation with market stakeholders and trade allies, as well as discussions with other utilities.

Once existing market barriers were identified, a program strategy was then developed to attempt to overcome those barriers. Costs associated with the program were considered and the cost effectiveness of the program determined.[37] This more detailed review of program costs and benefits can cause a technology that had passed economic screening in the CPS to fail the economic tests required of CDM programs.

Economic Screening

The Utilities' economic screening of the customer energy conservation programs has previously required a positive result for both the Total Resource Cost ("TRC") and Ratepayer Impact Measure ("RIM") cost-benefit tests.[38] Recent research indicates Canadian and U.S. utility practice has changed to focus on the TRC and Program Administrator Cost ("PAC") tests.[39]

The Utilities recommend adoption of the TRC as the primary means of program economic screening, and the PAC as a secondary means. This is consistent with current North American practice, and is appropriate based on the electrical system marginal costs and program objectives in this jurisdiction. Based on this recommendation the programs included in the 2016 Plan passed economic screening

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[37] Program cost estimates include marketing, delivery and administration, incentives, measurement and verification, and evaluation.

[38] In Order No. P.U.7 (1996-97), the Board required customer conservation programs to be evaluated with respect to rate impact, as well as the total resource costs. The Utilities' have interpreted this Order to require a TRC of 1.0 and a RIM of 0.8 as described in *Newfoundland Power Inc. – 2009 Conservation Cost Deferral Application, Section 2: Proposed Customer Program Portfolio* filed with the Board October 29, 2008.

[39] See Section 2.1, page 4, and Schedule B.

based on the TRC and PAC.[40] The Utilities' will continue to monitor changes to economic screening practices to appropriately reflect evolving program characteristics and electrical system costs.

3.2 Conservation & Demand Management Programs

The 2016 Plan builds on the outcomes of the 2012 plan as well as the experience of the Utilities. Programs included in the 2016 Plan address conservation opportunities in all three sectors: residential, commercial, and industrial. The 2016 Plan includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. These conservation programs are broadly consistent with programs offered by utilities in other jurisdictions.

Table 9 shows, by sector, the portfolio of programs to be offered under the 2016 Plan.

Table 9
Conservation Programs
By Sector

Residential	**Commercial**	**Industrial**
Insulation Thermostat HRV Small Technologies Isolated Systems Community Program Benchmarking	Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

40 Application of the RIM test would result in elimination of a number of programs, including Benchmarking, HRV, and Small Technologies.

Residential Programs

Insulation, Thermostat and HRV Programs

These existing joint incentive programs primarily target space heating energy savings, and will continue to be offered as part of the 2016 Plan. The remaining eligible market for the Insulation and Thermostats programs has been declining in recent years. The HRV program has had limited participation due to barriers related to customer understanding and market complexity. These programs will be continuously evaluated to ensure program cost effectiveness.

Small Technology Program

The jointly offered Small Technologies program will continue to use different marketing approaches for the two different groups of energy efficient products.

The Instant Rebate component will continue to offer relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home. As part of the 2016 Plan, Instant Rebates will include additional technologies.[41] It is anticipated that this component will end during 2018 as LED lighting becomes the norm in the residential lighting market.[42] Most of the energy savings benefits in this program are related to customers' early adoption of LED lighting from less efficient technologies, and energy savings from non-lighting products are not expected to be sufficient to offset the program delivery costs.

Incentives for the Appliance and Electronics component will continue to be available through 2017. At that time, anticipated reductions in marginal costs on the electricity system will effectively reduce the value of energy saving benefits, causing the program to fail economic screening.

[41] As part of the 2016 Plan, Instant Rebates will include additional technologies, such as faucet aerators, door bottom weather stripping, door adhesive weather stripping, window insulation kits, electrical outlet gaskets, and caulking.

[42] The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Isolated Systems Community Program

The existing format for this program will continue to be offered to customers in Hydro's isolated system communities through 2017. Information and feedback collected in 2014 and 2015, particularly for the direct install component, will be used to evaluate and plan for the Isolated Systems Community Program beyond 2017.

An Appliance Retirement component will be added to this program beginning in 2016, targeting at least one community. Older inefficient appliances will be removed from participating homes and routed for appropriate disposal.[43]

Benchmarking

This new joint program will promote customer behaviour changes to encourage more efficient energy use. Benchmarking involves using social norms to encourage neighbourly competition to reduce electricity consumption. This program will include comparison of participant households' energy consumption with their energy history and that of similar households. Participants will also receive personalized home energy reports that provide household specific electricity usage information and savings tips to help them reduce energy use and lower their electricity bills. This program will be available to customers from 2016 to 2019.

Commercial Programs

Lighting Program

Beginning in 2016, existing commercial lighting program products will become prescriptive rebates under the Business Efficiency Program, including the fluorescent high bay, high performance T8 fluorescent lamp and LED exit sign. This change will allow for more specific marketing initiatives and increased awareness of the rebates available for these technologies.

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[43] This component will be evaluated to determine whether a broader program would be cost effective.

Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts have become the market standard. Industry partners indicate that approximately 55% of ballasts sold in the province in 2014 meet the program efficiency criteria.[44]

Business Efficiency Program

The Business Efficiency Program, offered jointly by the Utilities, will continue to provide custom and prescriptive incentives to commercial customers for energy efficiency improvements. Continued growth in customer participation and energy savings are anticipated for this program. The Utilities will increase the customer education and awareness component of this program to include sector-based identification of energy efficiency opportunities. New technologies will also be added to the program's list of prescriptive incentives.[45]

Isolated Systems Business Efficiency Program

This program will continue through 2020, and will be offered to Hydro's commercial customers located in isolated system communities. The program will continue to provide incentives based on the energy savings of customer projects, similar to the Business Efficiency Program.

Industrial Programs

Industrial Energy Efficiency Program

Through 2020, this customized program will continue to offer support and financial incentives based on energy savings for retrofit of industrial process equipment for Hydro's transmission level industrial customers.[46]

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44 Note that U.S. Federal Regulations are now equivalent to this ballast efficiency specification.

45 These include: LED screw-in lamps, high bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems, and low flow pre-rinse spray valves.

46 The Industrial Energy Efficiency Program's cost effectiveness and potential energy savings will be evaluated on a year to year basis.

Customer Energy Savings

Table 10 shows forecast customer energy reduction estimates for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 10
2016 Plan Energy Reduction Estimates
2016 through 2020
(GWh)

	2016	2017	2018	2019	2020	Total
Residential	80.4	102.7	118.1	123.5	111.7	536.4
Commercial	18.7	27.6	37.5	48.6	61.4	193.8
Industrial	30.6	30.6	30.6	30.6	30.6	153.0
Total	129.7	160.9	186.2	202.7	203.7	883.2

The programs in the 2016 Plan will result in estimated aggregate customer energy savings of approximately 883.2 GWh from 2016 through 2020. Customer energy savings are forecast to increase annually through 2020, due to expansion of the program portfolio and the addition of program technologies for the residential and commercial sectors.

Several program offerings are expected to be concluded during the planning period. These include the Small Technologies program and the Benchmarking program. Design of alternate programming for the residential sector is anticipated through the Utilities' program planning in 2018.

Demand Management

The previous conservation and demand management plans have focused primarily on energy conservation.[47] However, the Utilities' customer energy conservation programs have resulted in quantifiable demand savings.

The technologies identified through the CPS as having the most potential for demand reduction included direct load control of residential hot water tanks and curtailable load arrangements with commercial and industrial customers. Recent research has identified issues with the cost effectiveness of residential load control on the Island Interconnected System. As a result, this measure is not included in the 2016 Plan.[48] The Utilities will continue to pursue curtailment opportunities with their larger customers.[49]

A new component will also be added to the Business Efficiency Program ("BEP") to include a custom incentive for demand reduction measures that are economically viable and that provide measureable demand reduction during peak times.[50]

47 This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Station) which justified such a focus.

48 Although residential load control on the Island Interconnected System does not make economic sense, Hydro's isolated communities served by diesel generation have higher marginal costs which may make the program cost effective.

49 Hydro currently has interruptible load arrangements with its Industrial Customers which have potential for more than 90 MW of capacity assistance. Newfoundland Power currently has 16 customers participating in its Curtailable Rate Option, providing 10.4 MW of potential load reduction.

50 More information on the custom demand component of the BEP can be found in Schedule C.

Table 11 shows forecast customer demand reduction estimates for the customer energy conservation programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 11
2016 Plan Demand Reduction Estimates
2016 through 2020[51]
(MW)

	2016	2017	2018	2019	2020	Total
Residential	3.3	4.7	5.0	4.3	1.4	18.6
Commercial	2.1	2.0	2.3	2.5	2.8	11.7
Total	5.4	6.7	7.3	6.8	4.2	30.3

The Utilities' takeCHARGE customer energy conservation programs are forecast to achieve approximately 30.3 MW in peak demand reduction through 2020. This demand reduction will occur annually for the life of the installed technologies.[52]

[51] Hydro does not forecast demand reduction for their transmission level industrial customers.
[52] For example, a customer who installs basement insulation in 2014 will achieve approximately 0.9 kW of annual peak demand reduction for the next 20 years.

2016 Plan Program Costs

Table 12 shows forecast costs for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 12
2016 Plan Program Costs Estimates
2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Residential	5,987	6,308	4,540	3,048	2,042	21,925
Commercial	1,628	1,906	1,933	2,258	2,301	10,026
Industrial[53]	667	10	10	10	10	707
Total	8,282	8,224	6,483	5,316	4,353	32,658

The Utilities' costs related to programs in the 2016 Plan are forecast to be approximately $32.7 million over the five-year planning period. Forecast changes in program costs primarily reflect the expansion of programs and additional technology offerings anticipated from 2016 to 2018, and the conclusion of certain programs through the planning period.

3.3 Education & Support

The Utilities' customer education and support activities will continue to evolve to support changes in customer energy conservation programs and in the broader conservation market. The Utilities will continue to provide customer support and be responsive to customer expectations. Current activities, including customer outreach events, the takeCHARGE website and partnerships with industry stakeholders will be key elements of customer education.

[53] Forecasted Industrial program costs after 2016 are associated with program promotion and customer engagement. Given the small number of transmission level customers in the province, there is a high degree of uncertainty for participation in the program year to year. The forecasted amounts after 2016 will increase if customers avail of the program for feasibility assessments or incentives for energy efficiency retrofits. Projects will continue to be screened based on cost effectiveness to ensure the program remains above minimum economic thresholds.

The Utilities' educational initiatives will be expanded to include a program promoting mini-split heat pumps. The program components will include financing, education and marketing initiatives directed towards customers, and direct engagement with certified installers and suppliers. A marketing campaign will be launched to raise customer awareness of the benefits of this technology, how to choose a high quality product, as well as the necessity of having the system installed by qualified contractors. The eligibility criteria for on-bill financing of these systems will encourage the installation of high efficiency units, installed by qualified contractors.[54]

The Utilities will continue to build upon their experience offering the takeCHARGE K-I-C Start School Program. Marketing will continue to build awareness of the program amongst school boards and teachers. Teaching aids will be developed and be made available on the takeCHARGE website to assist in furthering conservation education after presentations are conducted. Updates will also be made to strengthen the message of conservation for younger students, and awareness-building contests will be offered for all age groups.

Table 13 shows forecast costs for conservation education and support for the period 2016 to 2020.

Table 13
Conservation Education & Support
Costs 2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Education	770	791	827	851	873	4,112
Support	171	175	181	184	191	902
Total	941	966	1,008	1,035	1,064	5,014

54 Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016.

3.4 Planning & Evaluation

Planning

The 2016 Plan incorporates research and analysis required for the next iteration of multi-year conservation portfolio planning by the Utilities.

Table 14 shows forecast planning costs included in the 2016 Plan.

Table 14
Conservation Planning Costs 2016-2020(F)
($000s)

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Planning	527	596	767	863	644	3,397

Variability in annual planning costs reflects the Utilities' multi-year planning cycle for customer conservation programs.

The Utilities anticipate development of the next multi-year plan for customer energy and demand conservation programming in 2018. Further clarity regarding electrical system cost dynamics is expected to be a factor in the next planning cycle.[55] Further assessment and adjustments to the programming contained in the 2016 Plan may also be required within the next three years as marginal cost forecasts are updated.

Research

The next update of the study of conservation potential in the province is being planned for 2020. In advance of this study, the Utilities will undertake a number of research projects regarding electricity end-use trends and the state of the local market for efficient technologies. For the residential sector, customer surveys will gather details on

[55] An updated marginal cost study is expected to be a key input to the next conservation plan in 2018 and the next CPS in 2019-2020.

the type of electrical equipment that customers have in their homes, as well as their energy-related behaviour and motivation. Research for the commercial sector will include on-site facility audits to collect data on mechanical and electrical equipment being used.

The residential lighting market will be evaluated in 2017 to determine whether the Small Technologies program should continue. This research is expected to include a socket saturation study, with onsite inventories, as well as customer surveying. This will provide the Utilities with detailed data regarding the remaining potential for energy efficient lighting replacements.

Hydro is currently investigating the implementation of an Isolated System Direct Load Control Pilot in the community of Postville, Labrador.[56] The community of Postville is served by diesel generation. The objective of this pilot will be to reduce the peak load in the community and defer investment in electrical system upgrades. The Utilities will also continue to coordinate conservation planning with electrical system planning, and will evaluate potential for conservation initiatives targeted in specific areas or communities that may provide a lower-cost alternative to electrical system upgrades.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project is ongoing and the final report will be submitted to Government by end of March 2016. The results of this pilot project will be used to assess whether this type of technology may be considered as part of future energy conservation programming.

During this planning period, the Utilities will also monitor developments in North American practices for economic evaluation and screening of conservation programs.[57]

[56] The pilot will involve commercial and residential customers. It will include installing load controllers on hot water tanks, and commercial electric heating circuits, for commercial customers. Load controllers will only be activated during maximum system peak events. The customers that participate will receive incentives such as credits at the local store in Postville.

[57] While reliance on the TRC and PAC tests for primary economic screening is currently the norm in North American jurisdictions, modifications to the TRC methodology are being considered in a number of cases. These modifications primarily involve inclusion of customers' non-energy benefits from efficiency upgrade projects.

Evaluation

The customer program portfolio will continue to be evaluated in terms of its energy savings, market impacts and delivery process effectiveness. Additional review by third party evaluators is expected, reflecting the expanded program portfolio and delivery methods.[58] Program evaluation findings will be used to refine program design and implementation details on an ongoing basis, as well as support further planning.

Specific evaluation objectives in the 2016 Plan are to monitor market saturation of particular technologies as well as cost effectiveness of the programs. For example, the Instant Rebates component of the Small Technologies program will be evaluated and an exit strategy designed based on research into the pace and impact of LED sales growth in the local lighting market.

Similarly, the Utilities will continue to closely monitor the Insulation, Thermostat and HRV programs. These programs have unique challenges and barriers to program participation.[59] Evaluation of these programs will ensure they continue to satisfy cost effectiveness requirements.

In the case of new program introductions, post-implementation evaluations will be conducted within 12 months of program launch to ensure full assessment of program design assumptions, as well as marketing and delivery process effectiveness.

[58] Evaluation costs are primarily reflected in the costs for each specific program.

[59] For the Insulation and Thermostat Programs, these barriers primarily reflect the inherent difficulty in renovating existing living spaces and the remaining market being increasingly hard-to-reach. For the HRV program, this reflects the low level of customer understanding and slow adoption by the supply chain.

3.5 Costs & Cost Recovery

Table 15 provides a summary of the Utilities' customer energy conservation program and general costs from 2016 through 2020.[60]

Table 15
Conservation Costs
2016 through 2020
($000s)

	2016	2017	2018	2019	2020
Program					
Residential	5,987	6,308	4,540	3,048	2,042
Commercial	1,628	1,906	1,933	2,258	2,301
Industrial	667	10	10	10	10
Total Programs	8,282	8,224	6,483	5,316	4,353
Education	770	791	827	851	873
Support	171	175	181	184	191
Planning	527	596	767	863	644
Total General Costs	1,468	1,562	1,775	1,898	1,708
Total	9,750	9,786	8,257	7,214	6,061

Costs related to the customer energy conservation programs outlined in the 2016 Plan are forecast to be $9.8 million in 2016 and 2017.[61] This increase primarily reflects the addition of a new program, and enhanced program technology offerings. Costs begin to decrease in 2018 from $8.3 million to $6.0 million in 2020. This decrease primarily reflects the conclusion of the Small Technologies program in 2018 and the conclusion of the Benchmarking program in 2019.

60 This cost summary does not include costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management) and costs related to Hydro's interruptible load arrangements.

61 All customer energy conservation programs outlined in the 2016 Plan are cost effective, and are justified on a cost of service basis.

Schedule E provides a summary of forecast energy savings, cost estimates and cost effectiveness analysis results for the programs in the 2016 Plan.[62]

Cost Recovery

The Utilities propose conservation cost recovery based on amortizing customer energy conservation program costs over seven years.[63] The amortization of program costs over a seven-year period is considered appropriate because of the extended nature of the energy savings benefits provided by program technologies.

The Utilities' annually recurring general conservation costs would continue to be expensed as incurred.[64]

4.0 OUTLOOK

The Utilities anticipate significant changes in the electrical system serving the province within the five years considered in this plan. The Muskrat Falls hydroelectric development and related interconnection to the North American grid will affect system operations and costs, as well as customer prices. The next iteration of multi-year conservation program planning is anticipated in 2018, to coincide with these events.

In the interim, the approach outlined in the 2016 Plan will remain flexible to address ongoing changes. The initiatives in the 2016 Plan are cost effective based on current information, and were assessed for sensitivity to changes in system costs. As the Utilities implement the program changes outlined in this Plan, they will continue to evaluate program offerings to ensure they create economic benefits and are responsive to evolving customer expectations and market conditions.

62 Cost forecasts can be expected to be refined as detailed program design progresses in 2016.
63 Newfoundland Power has used this approach since 2013, based on Order No. P.U. 13 (2013). Hydro has proposed this approach in its ongoing general rate application, and the proposal has been agreed to by the parties to settlement negotiations in that matter.
64 While general customer energy conservation costs provide benefits to customers in terms of information, knowhow and advice, those benefits are not transparently quantifiable in the same manner as program benefits.

With growing customer awareness of conservation, and of the takeCHARGE brand, the Utilities will continue to seek opportunities to partner with complementary organizations and trade allies for customers' advantage. Information sharing and policy coordination with the Province will also continue, primarily through the Office of Climate Change and Energy Efficiency.

Table A-1 shows most recent marginal cost forecast as projected by Newfoundland and Labrador Hydro in February 2015.

Table A-1
Marginal Cost Projection
for the
Island Interconnected System
2015 - 2035

	Energy ($/MWh)	Capacity ($/KW – Yr)
2015	108	51
2016	133	70
2017	134	74
2018	47	98
2019	50	99
2020	54	108
2021	56	112
2022	59	115
2023	62	119
2024	65	123
2025	68	126
2026	70	126
2027	73	125
2028	76	125
2029	78	124
2030	81	124
2031	85	121
2032	88	118
2033	92	116
2034	96	113
2035	100	110

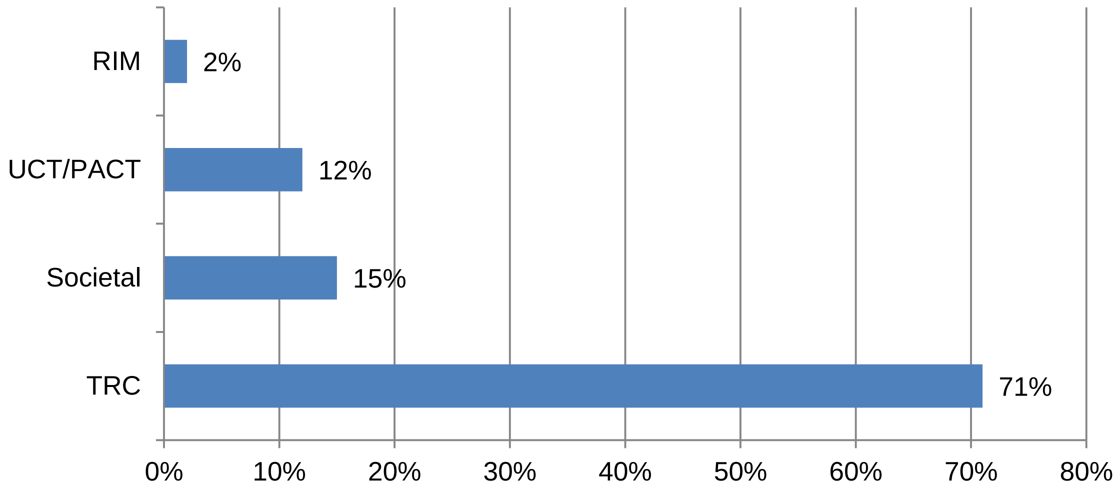
Notes:
1. Modeled as per NERA Economic Consulting marginal cost approach (2006).
2. Fuel costs per NLH corporate assumptions, January 2015.
3. Excludes transmission marginal costs.
4. Projection is at customer bulk delivery point.
5. Island Interconnected costs beyond 2017 reflect opportunity cost as per NERA approach.

Table B-1
Current Canadian
Utility Practice
Economic Evaluation Practices

Province	Economic Test				
	TRC	PAC	RIM	PCT[1]	SCT[2]
British Columbia	X[3]				
Ontario	X	X			
Nova Scotia	X	X			
Manitoba[4]	X		X	X	X
Saskatchewan	X	X			
Quebec	X		X[5]		
Prince Edward Island	X	X[6]		X	X[6]

1 Participant Cost Test ("PCT").
2 Societal Cost Test ("SCT").
3 British Columbia uses a modified TRC that includes non-energy benefits that are not traditionally included in the TRC.
4 Manitoba also considers the levelized resource cost, net utility benefit, utility net present value, levelized utility cost, and simple customer payback calculation.
5 Quebec considers the RIM as a secondary test.
6 Prince Edward Island considers the PAC and SCT as secondary tests.

Chart B-1
Current American Utility Practice
Economic Evaluation Practices
(Percent of States)



[7]

n=43

[7] Research conducted by the American Council for an Energy Efficient Economy (February 2012) "A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs".

Insulation Program

Program Description
The objective of this program is to increase the insulation level in residential basements, crawl spaces and attics. Increasing the insulation R-value in a home will result in space heating energy savings. The program components include rebates and financing, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.
Target Market: Residential
This program targets residential customers completing retrofit projects. Changes to the National Building Code of Canada implemented in December 2012 mandated that all new homes install basement insulation and increased the R-Value requirements in the attic. As a result, this program is only offered to existing homes (i.e. connected to the electricity grid before January 1, 2014) to exclude minimum building code compliance in new homes. Eligibility will continue to be limited to electrically-heated homes.
Eligible Measures
Eligible measures in this program include insulation upgrades to basements, crawl spaces and attics. Technical requirements will be approximately aligned with National Building Code of Canada.
Delivery Strategy
Delivery of this program will continue to be bundled with Thermostat, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio. Marketing initiatives include partnering with retailers and trade allies in the renovation industry, and target both do-it-yourself and professional installers. Tools and tactics will include retail point-of-sale materials, advertising, website, tradeshows, community outreach and trade ally activities. Rebates and financing will be processed through mail and online customer applications.

Insulation Program

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the impact on space heating energy, the practical difficulties of renovating an existing living space and a decreasing number of eligible participants. Experience with the existing program has shown participation to be responsive to awareness-building marketing activities.

Incentive Strategy

Incentives for this program include rebates and financing. In August 2014, the rebate structure was simplified and increased. Customers can now get a rebate of 75% of the cost of materials installed in the basement and 50% of the cost of materials in the attic. Rebates amounts are capped at $1,000.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation and cost effectiveness. A representative sample of installations will be inspected. Formal external evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,187	1,207	1,202	1,197	1,223	6,018
Estimated Cumulative Energy Savings (GWh)	30.0	33.1	36.1	38.9	41.8	180
Total Resource Cost						**2.5**

Thermostat Program

Program Description

The objective of this program is to encourage installation of programmable and high performance electronic thermostats in homes. Programmable and high performance electronic thermostats allow customers to better control the temperature of their homes and to set back the temperature during the night or while away. The program components consist of rebates, financing options, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.

Target Market: Residential

This program targets residential customers, including home retrofit and new home construction. Eligibility will continue to be limited to electrically-heated homes.

Eligible Measures

Eligible measures in this program include both programmable and high performance electronic thermostats. All thermostats must have a setting precision of +/- 0.5 degrees Celsius or less.

Delivery Strategy

The delivery strategy for this program remains unchanged. Delivery of this program will continue to be bundled with the Insulation, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio.

Marketing initiatives include partnering with retailers, electrical contractors, homebuilders and real estate professionals, to educate consumers regarding the energy savings and comfort benefits of programmable & high performance electronic thermostats. Tools and tactics include retail and model home point-of-sale materials, website, tradeshows, community outreach and trade ally activities. Rebates will be processed through mail and online customer applications.

Thermostat Program

Market Considerations

Barriers to installation of programmable and high performance electronic thermostats include lack of awareness of the potential for energy savings, difficulty programming, and reluctance to pay for an electrician to install the thermostats, and a decreasing number of eligible participants.

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $5 per high performance electronic thermostat and $10 per programmable thermostat. This continues to reflect incremental cost of the more efficient options. A time limit is no longer required for incentive redemption.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation, and cost effectiveness, and a representative sample of installations will be inspected. Formal evaluations will be conducted every two years during program operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	517	555	539	557	552	2,720
Estimated Cumulative Energy Savings (GWh)	9.7	11.1	12.5	13.8	15.2	62
Total Resource Cost						**2.8**

Small Technologies Program

Program Description
The objective of this program is to increase home energy efficiency and awareness by offering instant rebates on a variety of energy efficient technologies as well as online and mail in rebates for eligible appliances and electronics. This program also includes promotional events to raise awareness of the technologies and to engage the public.
Target Market: Residential
This program is marketed toward all residential customers province wide. All customers are eligible to participate regardless of age of home or heat source. A variety of marketing techniques such as TV news sponsorships, print, radio, online, website, as well as social media channels are used to engage customers.
Eligible Measures
Eligible measures in this program will vary over time and will be selected based on cost effectiveness, energy saving potential and market conditions. Instant rebates are available for small energy efficient items such as LEDs and smart power bars, and online and mail in customer applications are required for qualifying models of full-size refrigerators, clothes washers, TVs and full-size Energy Star freezers. Six new measures will be added to the technology list in 2016. They are: • Faucet aerators • Door bottom weather stripping • Door adhesive • Window insulation kit • Electrical outlet gaskets • Caulking

Small Technologies Program

Delivery Strategy

Partnerships have been made with both chain and independent retailers to offer instant rebates to customers on a number of energy efficient products. Efforts to engage both urban and rural retailers have been made in order to ensure rebated products are available in all areas of the province.

Campaigns are held in the spring and fall each year. During each campaign, the Utilities set up in-store events at the participating locations to raise customer's awareness of the rebates and encourage use of energy efficient products.

Market Considerations

The technologies included in the program do not involve a major renovation. This program will allow the Utilities to reach customers that may not have been able to participate in the other incentive programs.

Incentive Strategy

Incentives for this program include instant rebates for small energy efficient items that will vary by year and campaign. Online and mail in customer applications are available for eligible appliances and electronics. The rebate value will be different for each technology offered, and will reflect incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. Exit interviews will be conducted during selected retail events. Formal evaluations will be conducted after the first year of implementation, and biannually during operation.

It is anticipated that this program will end after 2018. The Utilities expect that LEDs will make up the majority of bulbs that are sold in the province. If this occurs, the economics of the program will no longer be cost effective. The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Small Technologies Program

Estimated Costs & Energy Savings						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	3,113	2,879	1,578	-	-	7,570
Estimated Cumulative Energy Savings (GWh)	23.8	33.3	38.2	37.4	36.5	169
Total Resource Cost						**1.3**

HRV Program

Program Description

The objective of this program is to increase the installation of higher efficiency Heat Recovery Ventilators (“HRV”). The program components include rebates and financing, and a variety of education and marketing tools.

Target Market

This program targets all residential customers regardless of heat source or age of home. Eligibility is available to all homes that install or replace an HRV.

Eligible Measures

Eligible measures in this program include all HRV models that have an SRE of 70% or more and meet the minimum fan efficacy requirements.

Delivery Strategy

Delivery of this program will be bundled with other takeCHARGE residential programs as part of the overall portfolio. Marketing initiatives include partnering with trade allies in the home building and renovation industry, particularly Heating Refrigeration and Air conditioning Institute certified installers. Tools and tactics include website presence, tradeshows, and trade ally activities. Rebates and financing will be processed through customer application.

Market Considerations

The market includes new construction and existing HRV replacement with an emphasis on existing replacements. Early HRV installations of the 1990s are at or near the end of their useful life, so many of these require replacement.

This program has faced a number of barriers such as understanding of what a HRV is and its purpose in the home, initial cost, and awareness of the benefits of selecting more efficient HRVs.

HRV Program

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $175 for qualifying HRV units. This reflects the incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. This program has experienced challenging barriers to program participation. Attempting to overcome these barriers can be administratively costly and may outweigh the benefits of program delivery. This program will be monitored to ensure that the participation goals are being met in each year to ensure the program remains cost effective. A representative sample of installations will be inspected. Formal evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	223	218	232	231	267	1,171
Estimated Cumulative Energy Savings (GWh)	0.7	1.0	1.3	1.6	2.0	7
Total Resource Cost						**1.3**

Benchmarking Program

Program Description

Energy social benchmarking is the analysis of a household's energy consumption and the comparison of its performance with its energy history and that of other similar households. Historic consumption information, tracking over time and comparisons with other households can encourage customers to reduce energy consumption. A printed paper report is delivered to participating customers via mail. These reports include a normative comparison that compares the customer to similar neighbors. The printed Home Energy Report is supplemented by access to an online web portal allowing for increased customer energy usage information and tips and resources to facilitate energy use reduction.

Target Market: Residential

The Benchmarking program is marketed to residential customers across the province. Customers will be selected into the program and can withdraw (opt-out) at any time.

Eligible Measures

A home's energy use is compared anonymously to the usage patterns of other homes in the vicinity that are of similar size, age, heating type, etc. The Home Energy Report is designed to provide new information to help home owners understand their energy use and find ways to make the home more efficient.

Delivery Strategy

The program is delivered largely by a third party service provider that develops and issues the Home Energy Report and maintains the online web portal. takeCHARGE will oversee all aspects of the program to ensure greater customer insight into their home energy use. The program is available year round and will be supported with takeCHARGE marketing and communication efforts.

Benchmarking Program

Market Considerations

This program will allow the Utilities to reach customers that have not been able to participate in the other incentive programs. It will also allow takeCHARGE actively engage with customers using direct home energy consumption information. This program also allows for the cross promotion of existing takeCHARGE rebate programs as methods to reduce household consumption and to drive participation in these programs.

Incentive Strategy

No monetary incentive will be offered. It has been demonstrated that for this type of program that using social norm comparisons drives the greatest and longest lasting changes to household energy consumption.

Program Monitoring & Evaluation

The program is monitored for participation levels, service quality and cost effectiveness. Formal evaluation will be conducted very two years during operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	530	1,034	989	1,063	-	3,616
Estimated Cumulative Energy Savings (GWh)	0.3	8.0	13.8	15.6	-	38
Total Resource Cost						**1.0**

Mini Split Heat Pump Educational Initiative

Program Description

The objective of the program is to encourage customers to choose high efficiency mini split heat pumps (MSHP), installed by qualified contractors. When installed correctly, a high efficiency MSHP will provide space heating energy savings. The program components include financing, education and marketing initiatives directed towards customers, and direct engagement of certified installers. Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016, however the eligibility criteria for MSHP will be updated to support the uptake of high efficiency units.

Target Market

This program targets residential customers. New home construction and retrofit customers with electric baseboard heat are considered to have the greatest potential for participation, however customer eligibility to participate in financing will not be limited by heating fuel, age or type of dwelling.

Eligible Measures

Financing will now be limited to MSHP with an estimated Heating Seasonal Performance Factor (HSPF) of 9.6 or higher. This is aligned with the minimum HSPF required for certification of units meeting the “ENERGY STAR® Most Efficient 2015” designation. To qualify for financing the installation must be performed by a contractor that has the necessary permits and certification to perform electrical and refrigeration work in the province.

Delivery Strategy

Delivery will be a two pronged approach including marketing to customers and engaging eligible installers.

Marketing initiatives will include information on the takeCHARGE website as well as bill inserts and mass media advertising regarding the benefits of choosing the right heat pump and installer. Installer engagement will include information sessions, contests, and maintaining relationships with qualified installers.

Financing applications will be processed through customer application via the existing customer service channels (online or by phone).

An incentive could not be offered for this program because it does not pass the economic analysis.

Mini Split Heat Pump Educational Initiative

Market Considerations

One of the biggest barriers is a lack of customer awareness and availability of certified installers in rural areas. In order to achieve significant energy savings, the unit must be appropriate for the Newfoundland climate, properly installed and operated.

Other major barriers include identifying what to look for in an installer (i.e. what certification should be required) and difficulty of customers to find qualified installers. The upfront cost of highly efficient units is also a barrier for some customers.

Program Monitoring & Evaluation

This program will be monitored for participation level, and service quality. The criteria for eligible models and installers will also be continually reviewed to ensure the program is promoting units and installers that will provide customers the highest achievable energy savings at a reasonable cost.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	119	100	103	102	104	529

Business Efficiency Program

Program Description

The objective of the Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.

Target Market: Commercial

This program targets business owners and property managers who have an interest in making their businesses more energy efficient. The program includes a custom project approach which appeals primarily to large commercial customers. In 2016, the program will also include rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting, which appeal to small and medium sized customers as well.

Eligible Measures

The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in electrical energy and demand savings. The program excludes alternative energy and fuel switching.

Beginning in 2016 the custom stream of the Business Efficiency Program will also include incentives for demand reduction based on the options available at the customer's facilities as well as the amount of demand they are able to reduce during peak times.

Also beginning in 2016, the existing fluorescent High Bay program and the current Commercial lighting program (including high performance T8 fluorescent lamps and LED exit signs) will become prescriptive rebates under the Business Efficiency Program.[1] Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts are now considered to be the market standard.

The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems and low flow pre-rinse spray valves will be added to the prescriptive list of incentives.

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1 Prescriptive incentive program are customer energy conservation programs that have per unit rebates for installing certain defined technologies. For example, providing a predefined rebate amount for a LED light bulb;

Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. A walk through audit can help customers identify efficiency opportunities.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing and through industry associations such as the Building Owners and Managers Association. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, retail point-of-sale materials, website and advertising in trade publications. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the program and available incentives, budget & planning cycles, technical know-how, and customer time constraints.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at 10 cents/kWh for first year savings or project demand savings at $100 per kW per month over the December to March period. Demand saving projects require a minimum of 50 kW savings and be sustainable over 5 years. Incentives of up to $50,000 per site help garner interest and lower customer project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online submissions.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy or demand savings achieved are consistent with incentives paid.

Business Efficiency Program

Estimated Costs & Energy Savings						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,519	1,791	1,813	2,133	2,171	9,427
Estimated Cumulative Energy Savings (GWh)	18.2	26.9	36.7	47.6	60.2	190
Total Resource Cost						**2.4**

Industrial Energy Efficiency Program

Program Description

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings and other supports to enable industrial facilities to identify and implement efficiency and conservation projects. This program is a custom program to respond to the unique needs of the Newfoundland and Labrador industrial market, rather than a prescriptive technology approach.

Target Market: Industrial

This program targets existing, transmission level, industrial customers served by Newfoundland and Labrador Hydro.

Eligible Measures

Eligibility of projects is based on engineering review and confirmation of estimated energy savings impact. Technologies include, but are not limited to, compressed air, pump systems, process equipment and process controls.

Delivery Strategy

The program is managed internally, with external engineering services used as required. The utility takes the role of facilitator and consultant in providing methods for industrial customers to complete project proposals and implement approved projects.

This program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011, and closed to new projects in 2013. The industrial pilot was reviewed in 2014 by an external party for performance; the review indicated the program matched or exceeded performance of comparable industrial CDM programs relative to the size of the industrial sector in the Newfoundland and Labrador market. The program was officially re-launched as an ongoing program in 2015, with the same structure as the pilot program.

Industrial Energy Efficiency Program

Market Considerations
This market requires a one-on-one approach to project design and delivery. The program builds on the work already completed by the industrial customers, and addresses their unique barriers to improved efficiency, which include, but are not limited to, access to capital and human resources. The lifecycle for each program transaction will be measured in months rather than weeks because of the need for review, contract development, budgeting and implementation timelines, and post-installation evaluation. This type of program requires that facilities have financial and business stability to continue operations for a time period appropriate to achieve cost effective savings.
Incentive Strategy
Incentives for this program include an initial comprehensive energy audit for the site, funding assistance for feasibility studies, and financial assistance for project implementation based on energy savings.
Program Monitoring & Evaluation
The program will be regularly monitored for participation level, service quality, and cost effectiveness, including engineering review and inspection of all projects and assessment of long-term impact on customer processes.

Industrial Energy Efficiency Program

Estimated Costs & Energy Savings[2]						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	667	10	10	10	10	707
Estimated Cumulative Energy Savings (GWh)	30.6	30.6	30.6	30.6	30.6	153
Total Resource Cost						**1.7**

[2] While Customer audits have confirmed that there are several potential projects at Hydro's customers' sites, savings for the Industrial Energy Efficiency Program (IEEP) have only been forecasted for 2016 because there are only five transmission level industrial customers in Newfoundland and Labrador and participation depends on each company's capital budgets and focus for the year. As a result of such a small market and budget considerations, participation is extremely variable from year to year and difficult to forecast. The costs from 2017-2020 are the fixed administration costs associated with program promotion and customer engagement in the IEEP. The majority of costs are incurred after a project is submitted and passes economic screening. Projects for the Industrial EE Program will be evaluated on a yearly basis and projects with a TRC of 1.0 or greater will be completed.

Isolated Business Efficiency Program

Program Description
The objective of the Isolated Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.
Target Market: Commercial
This program targets business owners and property managers in Hydro's isolated diesel and L'Anse au Loup systems who have an interest in making their businesses more energy efficient. The program includes a custom project approach and also rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting.
Eligible Measures
The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in economical electrical energy savings. The program excludes alternative energy and fuel switching. The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, Electrically Commutated Motors for Evaporator fans, Cold climate air source heat pump systems and Low Flow Pre-rinse spray valves will be added to the prescriptive list of incentives.

Isolated Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. The custom track involves a walkthrough audit and feasibility analysis to determine savings and eligible incentive. This allows for a wide range of eligible technologies and projects.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, and a website. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to efficiency in the commercial market include financial and human resource concerns. Incentives will assist in making energy efficiency upgrades more accessible. Human resource concerns are around awareness and knowledge of the technology options as well as time to develop the business case for retrofit projects.

The isolated systems have additional challenges with access to products and access to specific technical skill sets in the evaluation of projects and technology. Hydro’s program staff will assist in addressing these gaps.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at the lesser of $0.4/kWh for first year savings or 80% of eligible project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online customer applications.

Isolated Business Efficiency Program

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy savings achieved are consistent with incentives paid.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	106	112	117	122	128	585
Estimated Cumulative Energy Savings (GWh)	0.5	0.7	0.8	1.0	1.2	4
Total Resource Cost						**1.6**

Isolated Systems Community Program

Program Description
The objective of this program is to provide a portfolio of technologies and opportunities to help residential and commercial customers in isolated diesel communities save electrical energy and to promote energy efficiency awareness.
Target Market
This program targets both residential and commercial customers in Hydro's isolated systems. This includes Isolated Diesel systems on the Island, in Labrador, and the L'Anse au Loup system.
Eligible Measures
Measures will range from efficient lighting products, hot water saving products, pipe insulation, hot water tank insulation, commercial LED exit signs, and others that may be applicable. An Appliance Retirement program is being planned for at least one community. Old inefficient appliances will be removed from participating homes and routed for appropriate disposal. This will save energy and money for the homeowner. This component will be evaluated to determine if it is economic to develop into a broader program. The Isolated systems T12 replacement program will take place in 2-3 Isolated communities. This project will offer, free of charge to commercial customers, the supply and install of new High Performance T8 lamps and ballasts.
Delivery Strategy
Hydro has engaged Summerhill Group to deliver this program. They are using a number of delivery strategies, including hiring and training local representatives, to engage residential and commercial customers. Direct installs will be completed, whereby the customer receives the technology in their home or business at no cost. During the direct install visit, customers also receive information on energy usage and efficiency options.

Isolated Systems Community Program

Market Considerations

Availability and awareness of energy efficient technologies continues to be an issue in rural communities and often technologies available are at a higher price than in urban markets. This program will address the barriers of availability. There is a heavy electric hot water heating penetration and opportunities exist in plug load and behavior based areas.

Commercial customers tend to be smaller businesses and as such find it challenging to find the time and resources to address energy consumption issues; this program will provide the one on one interaction needed to assist these customers. The technologies included in the program do not involve a major renovation. This program will allow the utility to reach customers that may not have been able to participate in the other incentive programs.

Following the 2015 direct install component, information collected in 2014 and 2015 will be used to plan for Isolated Systems Community programming beyond 2017. Costs and energy savings will be estimated once the technologies have been determined.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. A representative sample of direct installs will be surveyed for confirmation of continued installation and use. Formal evaluations will be conducted after each year of operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	415	415	-	-	-	830
Estimated Cumulative Energy Savings (GWh)	5.2	5.5	5.5	5.5	5.5	27
Total Resource Cost						**2.7**

Table D-1
Conservation Programs
Energy Reductions: 2012 – 2015(F)
by Sector
(GWh)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	15.8	20.6	24.0	27.0	87.4
Thermostat Program	4.5	5.8	7.0	8.4	25.7
ENERGY STAR Window Program	6.1	8.6	10.1	10.1	34.9
Coupon Program	0.3	0.3	0.3	0.3	1.2
HRV	0.0	0.0	0.2	0.4	0.6
Small Technologies	0.0	0.0	5.5	14.4	19.9
Isolated Systems Community Program	1.7	2.8	4.1	4.8	13.4
Block Heater Timer Program	-	0.3	0.3	0.3	0.9
Total Residential Portfolio	**28.4**	**38.4**	**51.5**	**65.7**	**184.0**
Commercial					
Lighting Rebate Program	3.3	3.9	5.8	6.5	19.5
BEP	-	-	0.6	4.5	5.1
Isolated Systems Business Efficiency Program	-	-	0.1	0.4	0.5
Total Commercial Portfolio	**3.3**	**3.9**	**6.5**	**11.4**	**25.1**
Industrial					
Industrial Energy Efficiency Program	3.3	3.3	25.6	25.6	57.8
Total Portfolio	**35.0**	**45.6**	**83.6**	**102.7**	**266.9**

Table D-2
Conservation Programs
Program Costs: 2012 – 2015(F)
by Sector
($000s)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	882	1,092	796	1,039	3,809
Thermostat Program	492	253	227	454	1,426
ENERGY STAR Window Program	1,173	1,634	698	7	3,512
Coupon Program	-	-	-	-	-
HRV	-	59	56	225	340
Small Technologies	-	4	1,877	2,884	4,765
Isolated Systems Community Program	858	871	615	579	2923
Block Heater Timer Program	31	8	8	-	47
Total Residential Portfolio	**3,436**	**3,921**	**4,277**	**5,188**	**16,822**
Commercial					
Lighting Rebate Program	121	128	373	790	1,412
BEP	-	112	457	532	1,101
Isolated Systems Business Efficiency Program	93	115	96	66	370
Total Commercial Portfolio	**214**	**355**	**926**	**1,388**	**2,883**
Industrial					
Industrial Energy Efficiency Program	173	89	1,244	19	1,525
Total Portfolio	**3,823**	**4,365**	**6,447**	**6,595**	**21,230**

Table E-1
Conservation Programs
Energy Reduction Estimates: 2016 – 2020
by Sector
(GWh)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	30.0	33.1	36.1	38.9	41.8	179.9
Thermostat Program	9.7	11.1	12.5	13.8	15.2	62.3
ENERGY STAR Window Program	10.1	10.1	10.1	10.1	10.1	50.5
Coupon Program	0.3	0.3	0.3	0.3	0.3	1.5
Isolated Systems Community Program	5.2	5.5	5.5	5.5	5.5	27.2
Small Technology Program	23.8	33.3	38.2	37.4	36.5	169.1
HRV Program	0.7	1.0	1.3	1.6	2.0	6.6
Benchmarking	0.3	8.0	13.8	15.6	-	37.7
Block Heater Timer Program	0.3	0.3	0.3	0.3	0.3	1.5
Total Residential Portfolio	**80.4**	**102.7**	**118.1**	**123.5**	**111.7**	**536.4**
Commercial						
Isolated Systems Business Efficiency Program	0.5	0.7	0.8	1.0	1.2	4.3
Business Efficiency Program	18.2	26.9	36.7	47.6	60.2	189.6
Total Commercial Portfolio	**18.7**	**27.6**	**37.5**	**48.6**	**61.4**	**193.8**
Industrial						
Industrial Energy Efficiency Program	30.6	30.6	30.6	30.6	30.6	153.0
Total Portfolio	**129.7**	**160.9**	**186.2**	**202.7**	**203.7**	**883.2**

Table E-2
Conservation Programs
Program Cost Estimates: 2016 – 2020
by Sector
($000s)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	1,189	1,207	1,202	1,197	1,223	6,018
Thermostat Program	517	555	539	557	552	2,720
Isolated Systems Community Program	415	415	-	-	-	830
Small Technology Program	3,113	2,879	1,578	-	-	7,570
HRV Program	223	218	232	231	267	1,171
Benchmarking Program	530	1,034	989	1,063	-	3,616
Total Residential Portfolio	**5,987**	**6,308**	**4,540**	**3,048**	**2,042**	**21,925**
Commercial						
Isolated Systems Business Efficiency Program	106	112	117	122	128	585
Business Efficiency Program	1,522	1,794	1,816	2,136	2,173	9,441
Total Commercial Portfolio	**1,628**	**1,906**	**1,933**	**2,258**	**2,301**	**10,026**
Industrial						
Industrial Energy Efficiency Program	667	10	10	10	10	707
Total Programs Portfolio	**8,282**	**8,224**	**6,483**	**5,316**	**4,353**	**32,658**

Table E-3
Conservation Programs
Total Resource Cost Test Results
by Sector

	TRC Results
Residential	
Insulation Program	2.5
Thermostat Program	2.8
Isolated Systems Community Program	2.7
Small Technology Program	1.3
HRV Program	1.3
Benchmarking	1.0
Commercial	
Isolated Systems Business Efficiency Program	1.6
Business Efficiency Program	2.4
Industrial	
Industrial Energy Efficiency Program	1.7

2016 Conservation and Demand Management Report

March 31, 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

Table of Contents

1.0 Introduction

This report provides an overview of Conservation and Demand Management (CDM) activities undertaken by Newfoundland and Labrador Hydro (Hydro) in 2016. The programs described in this report include the joint utility programs offered by Hydro and Newfoundland Power through the takeCHARGE partnership; however, the report focuses primarily on the costs and initiatives for Hydro's portion of program implementation. The report also describes programs which are offered by Hydro through takeCHARGE but are specifically targeted to Hydro's customers.

Since the initial implementation of takeCHARGE initiatives in 2009, additional programs have been added. Which are identified in various tables throughout this report. In addition, several programs have evolved in terms of offerings and eligibility requirements since their respective initial program launches. Hydro's programs achieved 1,977 MWh of annual incremental energy savings in 2016 and, since 2009, have accumulated energy savings of 38,461 MWh.

2.0 Coordination and Context

2.1 Utility Planning

Energy conservation was addressed during Hydro's 2006 General Rate Application (GRA). Subsequent to the GRA, a CDM Potential Study was completed in 2008. Following the 2008 CDM Potential Study, a five-year strategic plan which outlined proposed energy conservation initiatives to be implemented jointly by Newfoundland Power and Hydro (the Utilities) was developed.[1] The Utilities have since designed and implemented a joint utility portfolio of programs for electricity customers in Newfoundland and Labrador. Current programs offered through the joint utility model are available for residential, commercial, and industrial customers and provide rebate options to address energy savings for each type of electricity consumer.

[1] The *Five Year Energy Conservation Plan: 2008-2012* was filed with the Board on June 27, 2008.

In 2012, an updated strategic plan was developed.[2] The new plan continued to focus on joint utility programs, but also outlined additional programs identified and implemented by Hydro to address opportunities in higher avoided cost isolated diesel systems. In 2012, Hydro launched the Isolated Systems Community Program and the Isolated Systems Business Efficiency Program for customers served from Isolated Diesel Systems. In late 2013, the Business Efficiency Program was launched for business customers served from the Interconnected Systems through the joint utility partnership. Hydro has been developing programs outside the joint utility process to provide customers with additional opportunities to conserve and to provide feedback for expanded offerings of joint utility programs. For example, Hydro's retailer coupon program offered in 2010-2011 was the impetus for the Small Technology program launched provincially in 2014. This program provides point-of-purchase and mail-in coupons for a range of technologies including lighting and appliances.

In 2012, Hydro launched a program to promote the use of block heater timers. This program was unique to the Labrador Interconnected System because of its extremely cold climate, which presents a conservation opportunity associated with pre-heating of vehicles. The program launch event included a giveaway of block heater timers to provide awareness of the technology to the market, and was followed up with coupons for in-store purchase discounts on block heater timers. The program was set to run two winter seasons (2012-2013 and 2013-2014); however, due to lack of participation, this program was not continued beyond 2014.

The two primary areas of focus for the first two joint utility CDM plans were high marginal cost energy savings that translated into fuel savings, and working towards developing a culture of conservation that will be sustained in the long-term. In 2015, the Utilities had a new CDM Potential Study completed to guide future initiatives related to energy conservation and demand management. Following the 2015 CDM Potential Study, a third strategic plan (the 2016

[2] The *Five Year Energy Conservation Plan: 2012-2016* was filed with the Board on September 14, 2012.

Plan) was completed, which will continue to be implemented jointly by the Utilities over the 2016 to 2020 period.[3]

The activities in the 2016 Plan include a new residential customer behavioural based program, expansion of existing commercial programs, reshaping or discontinuation of several programs, and continuation of the custom industrial program. This plan will be flexible to address customer expectations, market conditions for energy efficient products, and electrical system costs. It also allows for continued support for customer awareness, education, and community engagement to stimulate a change in customers' perception of conservation and demand management. An overview of the programs offered during 2016 is included in Appendix A. It includes current programs offered through both the joint utility partnership and those specific to Hydro's customers. The 2016 Plan is included in Appendix B.

The Utilities continuously evaluate customer conservation programs and also have periodic third party evaluations of the programs. The evaluations are used to refine program design and support future planning. For example, in 2014, DNV GL-Energy completed a market and process evaluation of the residential joint utility programs.[4] This work supported the Utilities' decision to conclude the ENERGY STAR® Windows Program at the end of 2014 due to market transformation.

2.2 Government Engagement

Hydro continues to have a positive working relationship with the Provincial Office of Climate Change (OCC), and remains engaged in dialogue on potential programming, policy, and partnership opportunities. In 2014, Hydro partnered with the OCC to implement its Residential Energy Conservation Pilot Project, which involves real-time energy monitoring and provision of energy conservation tips to 750 residential participants. The real-time energy monitoring pilot

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[3] The *Five-Year Conservation Plan: 2016-2020* was filed as Appendix B of Schedule 3, Appendix H - *2015 Conservation Cost Deferral and Program Expansion Report* of the Amended 2015 Cost Deferral Application filed November 12, 2015.
[4] DNV-GL Energy is recognized within the energy efficiency sector, providing program evaluation and assessments.

ran throughout 2015 and concluded during the first quarter of 2016. The Utilities continued to partner with the OCC and the Department of Education and Early Childhood Development on the Provincial Government's *HotShots* pilot project to improve students' awareness of energy and conservation. The Utilities also partnered with the OCC on its training plan for the National Building Code Energy Efficiency Requirements for Houses and Small Buildings.

3.0 CDM Programs

3.1 Portfolio Level Program Costs and Energy Savings

Table 1 and Table 2 describe Hydro's total CDM expenses and energy savings from 2009 to 2016 across all of Hydro's systems including the Labrador Interconnected System. This report will provide further detail and breakdown of those costs that will be recovered through the CDM Deferral Account[5] and the associated energy reductions described in Section 6 Regulated Program Energy Savings and Program Costs.

Table 1: Hydro's CDM Portfolio Spending ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016
Windows	44	48	80	117	169	38	2	
Insulation	40	60	140	126	157	92	70	61
Thermostats	13	19	31	47	51	35	20	22
Residential Benchmarking								49
Coupon Program		140	135					
Commercial Lighting	13	12	59	20	29	15	18	
Industrial[6]	57	221	103	173	89	1,244	(102)	28
Block Heater Timer				31	8	8		
Isolated Systems Community				858	871	615	530	451
ISBEP				93	115	96	7	45
Heat Recovery Ventilator					11	7	6	6
Small Technologies					1	252	239	247
Business Efficiency (Prescriptive)								22
Business Efficiency (Custom)					45	101	152	183
Appliance Retirement Pilot							56	(12)
Isolated Load Control Pilot							6	158
Total	**167**	**500**	**548**	**1,465**	**1,546**	**2,503**	**1,004**	**1,260**

[5] The CDM Cost Deferral Account is meant to defer the program costs for regulated Hydro (excludes program costs for the Labrador Interconnected System).
[6] Credits are due to an overstated accrual in the preceding year.

Table 2: Hydro's CDM Portfolio Annual Energy Savings (MWh)

	2009	2010	2011	2012	2013	2014	2015	2016	Life to Date
Windows	13	37	61	136	99	85	10		441
Insulation	35	126	404	382	795	142	105	72	2,061
Thermostats	9	35	30	53	24	38	34	44	268
Residential Benchmarking									0
Coupon Program		64	256						320
Commercial Lighting	3	10	227	95	99	79	124		637
Industrial			165	3,172		22,258		177	25,772
Block Heater Timer					288				288
Isolated Systems Community				1,676	1,096	1,357	1,426	512	6,067
ISBEP				3	26	111	67	241	448
Heat Recovery Ventilator						6	5	5	16
Small Technology Program						148	164	191	503
Business Efficiency Program(Prescriptive)							22	147	168
Business Efficiency Program(Custom)						107	775	588	1,470
Total	**60**	**272**	**1,143**	**5,517**	**2,427**	**24,331**	**2,734**	**1,977**	**38,461**

3.2 Residential Programs

Hydro's residential portfolio included five programs offered jointly by the Utilities and one offered solely by Hydro. The joint utility programs for Insulation, Thermostats, Heat Recovery Ventilators, and Small Technologies continued to be offered in 2016, and a new Residential Benchmarking Program was launched in December 2016. The ENERGY STAR® windows program was not offered beyond 2014 because the local market has transformed to this technology. Energy savings for windows in 2015 are a result of residual rebate applications from 2014 that were processed in early 2015. During 2016, Hydro continued to advertise in local retail flyers to promote the takeCHARGE programs and technologies. Local advertising and building strong partnerships with retailers continues to be a focus as part of Hydro's efforts to promote customer rebate programs.

The Isolated Systems Community Energy Efficiency Program is a program specifically for residential and commercial customers in Hydro's Isolated Diesel systems. The objective of the program is to provide outreach, education, and energy efficient products to residential and business customers in remote diesel system communities within Newfoundland and Labrador, free of charge. From 2012 to 2016, the program operated in 42 remote communities, installed over 76,000 energy efficient products, helped customers save a total of 6.1 GWh of electricity, and provided employment for over 45 residents of these communities.

The Isolated Systems Community Energy Efficiency Program includes residential and commercial direct installations and focuses on building knowledge and capacity in the communities by hiring and training local representatives. These representatives work within their own communities to promote the program, provide useful information on energy use, and provide direct installation of energy efficient products, including low flow showerheads, faucet aerators, LED lamps, compact fluorescent lamps, smart power strips, and hot water tank and pipe insulation.

In 2016, 345 residential and business customers received direct installation of more than 5,700 products consisting of water saving technologies and specialty bulbs for lighting needs, including chandelier, vanity, and flood lamps. While this work was ongoing, information was also collected about the type of lighting, heating, and appliances in the homes and businesses, which Hydro will use for future program planning.

3.3 Commercial Programs

Hydro's Business Efficiency Programs were also delivered to business customers in the company's interconnected and isolated areas in 2016. The business programs include prescriptive product rebates for heating and lighting controls, and a custom program that offers incentives based on economical energy saving improvement projects specific to individual customer facilities. The programs provide technical support to identify economical energy efficiency opportunities and provide financial support for capital upgrades.

Prior to 2016, the commercial lighting program was offered solely through lighting distributors. As such, there was almost no direct customer contact. In 2016, the Commercial Lighting Program was incorporated into the Business Efficiency (Prescriptive) Program making rebates available directly to participating customers. This change facilitated more direct contact with business customers for program support and promotion. Hydro continues to engage with lighting distributors to promote the sale of high performance lighting products. Other changes to the program include the removal of high performance T8 ballasts, which are now standard in the market, and the addition of products to the prescriptive component, including LED screw-in lamps and high bay LED fixtures. In 2017, ECM motors, roof-top heat pumps, and high efficiency spray nozzles will be added to the prescriptive component of the Business Efficiency Program.

More than 70 walkthrough audits have been conducted for Hydro's business customers through two business efficiency programs since 2012. The intent of the audits is to engage customers in the Isolated Systems Business Efficiency Program and the Business Efficiency Program by facilitating opportunity identification, technical analysis, and project completion. In 2016, ten commercial facility audits were completed to inform customers of opportunities for incentives. Fifteen customers completed projects involving upgrades and improvements to LED lighting, building automation controls, insulation, and thermostats. Total energy savings achieved as a result of Hydro's prescriptive and custom business programs in 2016 was 976 MWh.

3.4 Industrial Program

Since 2010, Hydro has delivered the Industrial Energy Efficiency Program, which offers support and financial incentives based on energy savings for the retrofit of industrial process equipment for Hydro's transmission level customers. Participation in the Industrial Energy Efficiency Program has been variable given the small number of industrial customers in the province. Promotion of the Industrial Energy Efficiency Program is now included under Hydro's Key Account Management framework to minimize this variability, and to support improved project planning and scheduling. Within the Key Account framework, each of the five industrial customers is directly engaged, including their interest in energy efficiency, to better understand their plans and schedules for potential efficiency improvement projects. In 2016, one industrial customer completed a lighting upgrade that was supported by program funding.

4.0 Planning and Evaluation

In January 2015, a CDM Potential Study was completed to identify the achievable, cost-effective electric energy efficiency and demand management potential in the Province. The study also included consultation with customers, trade allies, retail partners, and other interested parties. The 2015 CDM Potential Study was used by the Utilities to develop the 2016 Plan. The first year of 2016 Plan was implemented during 2016, including the launch of a residential benchmarking program and expansion of existing commercial programs.

Hydro also initiated a direct load control pilot in the community of Postville, Labrador to assess peak load reduction technologies. This load control pilot will continue throughout 2017. A Home Energy Monitoring pilot that Hydro managed on behalf of the Provincial Office of Climate Change was completed in March 2016. The pilot provided five hundred participants with real-time energy use information to determine if it encouraged behavioral actions to support energy conservation. Results indicate modest energy savings from households with multiple (two or more) heating fuels where people were inclined to switch from electricity to an alternate fuel to maintain space heating comfort.

5.0 Outreach and Support

During 2016, Hydro continued to partner with Newfoundland Power to deliver the takeCHARGE program which offers customer education and conservation awareness activities, primarily through promotion of its takeCHARGE rebate programs and outreach activities. Residential and Business programs are promoted through activities including mass media marketing, targeted promotions, community outreach, school programming, trade ally development, partnerships, and events.

The advertising campaign includes newspaper, radio, online, and social media advertisements. Campaigns run throughout the year for insulation, thermostats, HRVs, instant rebates and appliances, and the Business Efficiency Program. The media is chosen based on the time of year that programs are in market and consumer purchasing behaviors.

takeCHARGE is also active on social media through a joint utility Facebook page, YouTube channel, Twitter account, and website. To date, approximately 13,030 Facebook users have "liked" the takeCHARGE Facebook fan page, and YouTube views are continuing to increase through direct links to videos from other takeCHARGE social media channels. takeCHARGE currently has 2,614 Twitter followers and continues to increase. The takeCHARGE website page views continue to increase year over year. In 2010, there were just over 52,000 page views, compared to 423,298 in 2016.

Hydro engages with retailers, suppliers, students, and other groups through presentations and interactive booth displays to promote programs, answer questions, and promote energy conservation. The takeCHARGE Town Challenge initiative was launched in 2010 and to date has awarded $55,000 to winning towns. It is aimed at encouraging residents and municipalities to reduce their energy use. Each year, municipalities are invited to submit proposals that will support their efforts to develop or improve energy conservation or energy efficiency projects. Projects have to demonstrate a positive energy conservation effort that benefits the entire community. The takeCHARGE school contests for K-6 classes and 7-12 classes were run again in 2016 with a goal to enable students to understand and explain why saving energy is important, and to demonstrate what they can do to conserve energy.

In 2016, takeCHARGE held the 8^{th} annual Energy Efficiency Week from October 1 to 7 with a theme of "Guess Watt? Ask our energy experts." Energy Efficiency Week is a full week dedicated to ensuring customers are equipped with the information they need to know in order to save energy and money. During the week, customers used social media and the hashtag #EEWeekNL on Facebook and Twitter to ask takeCHARGE Energy Experts questions. Also during Energy Efficiency Week, takeCHARGE teams were visible throughout in the province at special events, promoting takeCHARGE, and airing 2 minute segments on NTV during the news hour with the energy savings tips of the day.

Table 3 provides Hydro's costs to provide education, outreach, support, and planning for its CDM programs.

Table 3: Hydro's Support Costs ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016
Education	262	106	212	200	135	158	154	138
Support	53	48	43	53	27	52	68	42
Planning	176	180	304	127	152	224	442	250
Total	**491**	**334**	**559**	**380**	**314**	**434**	**664**	**429**

6.0 Regulated Program Energy Savings and Program Costs

Table 4 illustrates the annual energy savings from Hydro customers in relation to programming associated with the annual regulated deferral request.

Table 4: Energy Savings from Deferral Account Activity (MWh)

	2009	2010	2011	2012	2013	2014	2015	2016	Life to date
Windows	8	14	38	50	43	40	4		197
Insulation	29	63	229	126	123	100	52	40	762
Thermostats	2	16	16	28	14	16	23	33	149
Residential Benchmarking									0
Coupon Program		47	166						213
Commercial Lighting	3		92	25	19	22	46		207
Industrial			165	3,172		22,258		177	25,772
Block Heater Timer									0
Isolated Systems Community				1,676	1,096	1,357	1,426	512	6,067
ISBEP				3	26	111	67	241	448
Heat Recovery Ventilator					1	1		1	3
Small Technology Program						80	71	21	172
Business Efficiency Program(Prescriptive)							21	131	152
Business Efficiency Program(Custom)						73	773	588	1,434
Total	**42**	**140**	**706**	**5,080**	**1,322**	**24,058**	**2,484**	**1,744**	**35,576**

The costs associated with the delivery of the CDM program portfolio includes direct costs for advertising, salaries, rebates, and other expenses directly associated with a specific rebate program. The costs vary depending on the uptake of the program and the number of programs offered.

Table 5 provides a breakdown of annual program costs.

Table 5: Program Costs from Deferral Account Activity ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016
Windows	44	41	69	102	150	31	1	
Insulation	40	53	116	108	112	87	62	57
Thermostats	13	18	25	43	47	32	19	21
Residential Benchmarking								49
Coupon Program		113	123					
Commercial Lighting	13		43	10	17	10	11	
Industrial	57	190	98	170	88	1,243	(115)	27
Block Heater Timer								
Isolated Systems Community				858	871	615	530	451
ISBEP				93	115	96	7	45
Heat Recovery Ventilator					8	3	4	4
Small Technologies					1	219	186	143
Business Efficiency (Prescriptive)								14
Business Efficiency (Custom)					40	92	134	193
Isolated Load Control Pilot							6	158
Appliance Retirement Pilot							56	(12)
Total	**167**	**415**	**474**	**1,384**	**1,449**	**2,428**	**902**	**1,152**

7.0 Program Participation and Savings

Table 6 provides the number of rebate and project transactions for each of Hydro's programs. The transaction units are specific to each program. The Residential Energy Star Window, Insulation, Thermostat, and HRV programs reflect approved rebates. The Coupon Program reflects coupons redeemed. The Commercial Lighting and Small Technology Programs each reflect the number of products rebated through the programs. The Block Heater Timer Program reflects the number of timers determined to be installed through post-giveaway surveys or coupon redemption. The Isolated Systems Business Efficiency Program, Business Efficiency Program, and Industrial Efficiency Programs reflect the number of completed retrofit projects. The Isolated Systems Program denotes the number of residential and commercial customer premises that received direct installations. Finally, the Residential Benchmarking Program indicates the number of customers included in the treatment group.

Table 6: Life to Date Program Participation

Program	2009	2010	2011	2012	2013	2014	2015	2016	Total
Windows	11	19	41	61	48	24	7		211
Insulation	14	24	104	50	53	22	35	31	333
Thermostats	4	28	32	45	23	20	15	63	230
Residential Benchmarking								1,000	1,000
Coupon Program		3,178	5,832						9,010
Commercial Lighting	27	74	470	320	339	377	323		1,930
Industrial			1	1		3		1	6
Block Heater Timers					629				629
Isolated Systems Community				1,355	1,153	1,181	965	345	4,999
ISBEP				1	1	4	1	5	12
Heat Recovery Ventilator					1	11	9	8	29
Small Technology Program						6,920	4,551	26,601	38,072
Business Efficiency Program(Prescriptive)							4	173	177
Business Efficiency Program(Custom)						4	3	10	17
Total	56	3,323	6,480	1,833	2,247	8,566	5,913	28,237	56,655

8.0 Levelized Utility Costs

One measure of cost effectiveness is the levelized utility cost of the customer conservation programs. The levelized utility cost represents the economic cost to the utility (¢ per kWh) to generate energy savings. It is an industry metric which is calculated by discounting future energy savings resulting from conservation programs to a present value. Table 7 provides the Levelized Utility Cost for Hydro's programs for 2016. The energy savings represent the annual savings resulting from the individual program participation during 2016.

Table 7: Hydro Program Participation, Savings and Levelized Utility Cost 2016

Program	Participation	Energy Savings (MWh)	Non-coincident Demand Savings (kW)	Levelized Utility Costs(¢/kWh)	Life to date Levelized Utility Cost(¢/kWh)
Windows					15.5
Insulation	32	72	17	8.5	3.6
Thermostats	62	44	12	5.5	10.1
Residential Benchmarking					
Coupon Program					51.6
Industrial	1	177		3.6	1.7
Block Heater Timer					2.9
Isolated Systems Community	345	512	158	8.5	11.9
Isolated BEP	5	241	164	2.4	11.5
Heat Recovery Ventilator	8	5	1	14.6	23.5
Business Efficiency (Custom and Prescriptive)	183	735	148	4.4	4.7
Small Technology Program	26,601	191	59	16	17.4
Total Programs		1,977	559	4.32	4.47

9.0 Conclusion

Hydro has continued its efforts to promote energy conservation and demand management throughout 2016. Hydro continues to work with Newfoundland Power to develop and execute programs that are accessible to all customers of the Utilities, and will continue to do so going forward. The takeCharge program has been successful in providing education and fostering the development of a culture of energy conservation. In addition, Hydro continues to work with its customers to understand their needs and drivers of their electrical consumption, ultimately supporting the achievement of sustainable energy savings through the various programs described in this report. Hydro will continue to work towards the completion and implementation of the 2016 Plan and remains committed to adapting its programs as the needs of its customers continue to evolve. Overall, Hydro's efforts supported annual incremental energy savings of 1,977 MWh in 2016 and accumulated energy savings of 38,461 MWh since 2009.

Appendix A

CDM Program Descriptions

Residential takeCHARGE Rebate Programs

Program incentives are processed primarily through customer applications. The programs are promoted in partnership with trade allies in the retail, home building and renovation industries.

Insulation Rebate Program

The objective of this program is to provide incentives to increase the insulation R-value in residential basements, crawl spaces and attics, thereby increasing the efficiency of the home's building envelope. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects are eligible. Customers can receive an incentive of 75% of basement wall and ceiling insulation materials up to $1,000, and 50% of attic insulation material costs up to $1,000.

Thermostat Rebate Program

This program encourages installation of programmable and electronic thermostats to allow customers better control of the temperature in their home and to save energy. These high performance thermostats allow customers to set back the temperature during the night or when they are away. Eligibility for the program is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects and new home developments are eligible. Incentives of $10 for each programmable thermostat and $5 for each electronic high performance thermostat are offered.

ENERGY STAR Window Rebate Program

This program ended December 31, 2014 due to market transformation. When it was available, the program encouraged customers to purchase ENERGY STAR® rated windows over standard windows to improve the efficiency of their home's building envelope and reduce space heating energy. Eligibility for the programs was limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects were eligible. Customers who purchased ENERGY STAR® windows were eligible to receive a rebate of $2 per square foot of window installed.

HRV Rebate Program

This program encourages customers to purchase a high efficiency HRV to improve the efficiency of their home. Eligible measures in this program include HRV models that have a Sensible Recovery Efficiency of 70% or more. Customers who purchase a high efficiency HRV can receive a rebate of $175. All customers are eligible for this program regardless of age of home or heat source.

Isolated System Community Energy Efficiency Program – Hydro Program

This program includes both residential and commercial components targeting customers in Isolated Diesel and L'Anse au Loup Systems. The focus is on residential customers through the direct install of a kit of technologies, at-cash coupons on small technologies and mail-in rebates on energy efficient appliances. Commercial customers also receive a direct install of a kit of technologies. The kit includes items for water savings, draft proofing, lighting and other measures.

Homeowners receive education on energy efficiency and information on the existing takeCHARGE rebate programs. Community events, social media promotions and exchanges held to promote the program and energy efficiency awareness.

Through this program Hydro has piloted a number of approaches and technologies to assess their validity for the rural market including pop up retail shops, drain water heat recovery, and in 2014, explored residential air sealing and online sales opportunities for energy efficient products.

Block Heater Timer Program – Hydro Program

This program targeted customers in the Labrador Interconnected System to encourage the purchase of energy saving Block Heater Timers through in-store discounts offered at partnering retailers. The program launched with a giveaway of the technology to create awareness of the product as there was little or no use of the technology before the program. The incentive was offered over two winter seasons (2012-2013 and 2013-2014) and ended in spring 2014.

Small Technologies Program

Instant Rebates

This program promotes a variety of smaller technologies, such as LED lighting, and smart power bars, through instant rebates available at the cash register of participating retailers. All customers are eligible for this program regardless of age of home or heat source.

Appliances and Electronics

This program encourages customers to purchase high efficiency appliances. Participants receive incentives of $100 for select energy efficient washers, freezers, and $30 for eligible TVs. All customers are eligible for this program regardless of age of home or heat source. In 2017, the eligible products and incentive levels for this program will be evaluated and revised as necessary to reflect changes in appliance energy standards and local market conditions.

Residential Benchmarking Program

This program encourages customers to adopt energy efficient behavioural changes. Participants receive Home Energy Reports that provide insight into their home’s electricity use. The reports help customers understand changes in their usage over time, as well as how they compare to similar homes. They will also include practical tips on how to save energy moving forward. The program also includes an online component that allows customers to engage even further through weekly challenges and personalized saving plans.

Approximately 1,000 customers were randomly selected as participants in this program. Program participants broadly reflect the composition of Hydro’s customer base in heating type and geographical distribution. No financial incentive is offered for this program.

Commercial takeCHARGE Rebate Programs

Commercial Lighting Incentive Program

In 2016, the existing Commercial Lighting Program was incorporated under the Business Efficiency Program (Prescriptive). The former Commercial Lighting Program targeted energy reductions through more efficient lighting technologies for commercial buildings by offering incentives to reduce the cost differential for upgrading to higher efficiency lighting products.

Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency and demand reduction projects.

This program is available for existing commercial facilities that can save energy or reduce demand by installing more efficient equipment and systems. The program includes custom project incentives and prescriptive rebates for specific measures on a per unit basis.

Isolated Systems Business Efficiency Program (ISBEP) – Hydro Program

The ISBEP was launched in 2012 and targets commercial customers in the Isolated Diesel and L'Anse au Loup Systems. The program provides a custom approach to finding energy efficiency solutions and financial assistance for feasibility studies and for retrofit projects. It has the same program design and offerings as the joint utility Business Efficiency Program, but has higher incentive levels for retrofit work because of the higher avoided cost of generation in these systems.

Industrial Energy Efficiency Program (IEEP)

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings, and other supports to enable industrial facilities to identify and implement efficiency and conservation opportunities. This program is a custom program to respond to the unique needs of the industrial market, rather than a prescriptive technology approach.

Appendix B

Five-Year Conservation Plan: 2016 - 2020

FIVE-YEAR CONSERVATION PLAN: 2016 – 2020

newfoundland labrador hydro
a nalcor energy company

NEWFOUNDLAND POWER
A FORTIS COMPANY

October 2015

CONTENTS

1.0 EXECUTIVE SUMMARY

Newfoundland and Labrador Hydro ("Hydro") and Newfoundland Power have offered customer energy conservation programs on a joint and coordinated basis under the *takeCHARGE* brand since 2009. These programs provide a range of information and financial supports to help customers manage their energy usage.

The joint *Five-Year Conservation Plan: 2016-2020* (the "2016 Plan") builds on this experience, and continues to reflect the principles underlying two previous joint, multi-year conservation plans developed by Hydro and Newfoundland Power (the "Utilities").[1] It reflects refinement of the opportunities identified in a recently updated conservation potential study (the "2015 CPS") through in-depth local market research and program cost benefit analysis.

The 2016 Plan represents both growth and evolution of the Utilities' joint customer energy conservation program portfolio. It includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. The approach outlined in this plan will remain flexible to address the changing provincial landscape, in terms of customer expectations, market conditions for energy efficient products, and electrical system costs. The 2016 Plan also addresses customer support and education, program planning and evaluation processes, as well as the Utilities' costs and cost recovery arrangements.

The total estimated energy savings for 2016 through 2020 are 883 GWh.[2] Total estimated costs through this period are $41.1 million.

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[1] The *Five-Year Energy Conservation Plan: 2008-2013* was filed with the Board on June 27, 2008. The *Five-Year Energy Conservation Plan: 2012-2016* was filed on September 14, 2012.

[2] The energy savings indicated throughout the *Five-Year Energy Conservation Plan: 2016-2020* represent *gross* energy savings achieved by customers. These savings reflect all technologies installed by participating customers since program implementation. *Net* energy savings would reflect adjustments for: (i) the timing of customer installations giving rise to the energy savings; and (ii) program *free ridership* (an estimate of participants who would have chosen the more efficient product without the program).

2.0 BACKGROUND

2.1 Planning Context

Hydro and Newfoundland Power have collaborated on customer energy conservation program planning and delivery for the past 8 years. The programs offered jointly under the takeCHARGE brand have included a variety of information and financial supports which help customers manage their energy usage. The Utilities' provision of energy conservation programming is responsive to customer expectations, supports efforts to be responsible stewards of electrical energy resources and is consistent with provision of least cost, reliable electricity service. Initiatives address conservation opportunities for customers in each sector: residential, commercial and industrial.

The Utilities' practice has been to refresh their joint strategic plans for customer conservation programming every three to four years. This ensures programs achieve long term goals while being responsive to changes in customer expectations, market barriers, technology developments, and economics. Current program offerings are based on the Five Year Energy Conservation Plan: 2012-2016 ("the 2012 Plan").

One of the key inputs into the 2016 Plan was the outcome of the Conservation Potential Study ("CPS"), completed by the Utilities in 2015. The CPS identified cost-effective energy and demand reduction measures, outlined general parameters for program development, and quantified achievable energy savings potential by sector and end-use. The results of the CPS are considered with the Utilities' experience and other factors in the local market to determine potential programs and energy saving targets for the 2016 Plan.

The Utilities' conservation planning is coordinated with overall planning for the electrical system. Significant changes to the Island Interconnected System are anticipated to occur in this planning period. Interconnection of the Muskrat Falls hydroelectric development is forecast for 2018 and will include the Island's first connection to the

North American grid. As a result, there is uncertainty with respect to the marginal cost of energy and capacity on the Island Interconnected System beyond 2017.

Schedule A provides the current forecast marginal cost of energy and capacity for 2015-2035.[3] The forecast indicates a decrease in the marginal cost of energy beginning in 2018. This effectively reduces the value of energy savings arising from customer energy conservation programming, and limits the types of programs that can be cost effectively offered.

Costs of electricity supply additions are expected to be incorporated into customer rates starting in 2018, putting upward pressure on customers' rates. This is expected to increase customers' motivation to conserve energy to manage their electricity costs. Also, the recent economic slowdown is anticipated to continue into this planning period and will influence customer behaviour with regards to conservation.

The 2008 and 2012 Five Year Conservation and Demand Management Plans, delivered jointly by the Utilities, had focused primarily on energy conservation. This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Generating Station) which justified such a focus. The events of recent winters have since brought to light issues with peak load and generation capacity on the Island Interconnected System which are anticipated to continue into this planning period. The 2016 Plan therefore considers demand management opportunities as well as energy conservation.

The Utilities have been offering some form of customer energy conservation programming since 1991, and have achieved significant energy savings over this time. The current forecast, particularly for insulation, anticipates diminishing returns. For example, the remaining potential for energy savings through insulation upgrades has

[3] The marginal costs used to determine cost effectiveness of the customer energy conservation programs are based on the most recent marginal cost forecast as projected by Hydro in February 2015. These estimates are currently under review by Hydro to incorporate the forecast interconnection with the North American grid. Once more current estimates are available, they will be incorporated in the screening process.

been impacted by changes to the National Building Code requiring basement insulation in new homes, as well as barriers to retrofitting many of the eligible existing homes. This is consistent with experience in other North American jurisdictions where utility programming has harvested the "low hanging fruit" and subsequently has moved on to address more challenging and costly opportunities.

Energy conservation programming has also been affected by technology advancements and changes to standards. Lighting product standards changes have effectively eliminated availability of incandescent bulbs for consumers. At the same time, LED technology has advanced and become more affordable and available. The pace of this change has been even faster than anticipated in the 2012 Plan. This is demonstrated by higher than projected uptake in the Utilities' Instant Rebate component of the Small Technologies program.

The Utilities continue to work with the Provincial Government, through the Office of Climate Change and Energy Efficiency, regarding policy development for energy conservation and efficiency, and particularly potential impacts and approaches to building codes, product standards and broader market transformation objectives.

Many of the influences on the provincial energy conservation market can be seen in other North American jurisdictions. In recent years, many jurisdictions have experienced decreasing marginal costs of energy and increasing program costs due to maturing conservation programs. As a result, utilities and program administrators have revised their approach to economic analysis of energy conservation. The Utilities have conducted research on current economic evaluation practices. A summary of this research is provided in Schedule B. It indicates that Canadian jurisdictions use the Total Resource Cost ("TRC") test as their primary benefit cost test for program screening, with the Program Administrator Cost test as a secondary test. Only one of the seven Canadian utilities researched used Ratepayer Impact Measure as a primary benefit cost test for program screening. In the United States, most jurisdictions follow

similar practices with over 70% using TRC as the primary benefit cost test and 2% using Ratepayer Impact Measure for program screening.

2.2 Energy Conservation Programs

Based on the 2012 Plan, the Utilities have jointly offered customer energy conservation programs which provide both information and financial incentives to encourage customer installation of energy efficient technologies.[4] In addition, Hydro has offered programming for its customers, such as incentives for commercial customers in its isolated system service territories, where market conditions and system costs differ.

Table 1 shows, by sector, the portfolio of programs that have been offered under the 2012 Plan.[5]

Table 1
Conservation Programs
By Sector

Residential	**Commercial**	**Industrial**
Insulation Thermostat ENERGY STAR Window[6] HRV Block Heater Timer Small Technologies Isolated Systems Community Program	Lighting Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

4 Once installed, these more energy efficient technologies provide energy savings for the customer throughout the life of the product. For example, an HRV has an estimated life of 15 years and will result in energy savings benefits throughout that period.

5 The Utilities also engage in demand management activities, including Newfoundland Power's Curtailable Service Rate Option and Hydro's interruptible load arrangements with its Industrial Customers.

6 The ENERGY STAR Window Program concluded at the end of 2014.

Schedule D summarizes the energy savings and costs for the customer energy conservation programs offered by the Utilities from 2009 through 2015.

Residential Programs

Table 2 provides a summary of residential customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).[7]

Table 2
Residential Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	2.5	7.1	18.6	28.5	38.4	51.5	65.7	**212.3**

The takeCHARGE residential programs are expected to result in aggregate energy savings of approximately 212.3 GWh by the end of 2015.[8]

Insulation Program

As a result of the updates to the National Building Code in 2012, several changes were made to the Insulation Program. New homes are no longer eligible and the minimum R-value requirements for existing homes have been increased. As well, the rebate structure was revised to provide a higher, easy-to-calculate rebate. Customers can receive an incentive of 75% of basement wall or ceiling insulation material costs up to $1,000, and 50% of attic insulation material costs up to $1,000.

[7] Energy savings include savings arising from all technologies installed by all participants since program implementation. This reflects the fact that these technologies provide energy savings benefits for the customer throughout the life of the product.

[8] Since implementation in 2009, there have been approximately 36,650 participants and over 638,000 at-the-cash rebates were provided on energy efficient products in the takeCHARGE residential customer programs.

Thermostat Program

High efficiency programmable and electronic thermostat replacements allow customers to conserve energy at relatively low cost and effort. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage.

ENERGY STAR Window Program

This program concluded at the end of 2014. After 5 years, and over 9,200 participating customers, the program had achieved its objective of making more efficient windows the standard in the local market.

Heat Recovery Ventilator Program

This program promotes the installation of high efficiency heat recovery ventilators ("HRVs"). HRVs have been widely used in new home construction in the province since the 1990s, to control humidity and air quality. The HRV program has experienced lower than projected participation since its launch in late 2013.[9] There has been improvement in 2015, and the Utilities will continue to monitor and evaluate this program in order to find opportunities to increase participation.

Block Heater Timer Program

Hydro provided giveaways and at-the-cash coupons for block heater timers to customers in Hydro's Labrador Interconnected System from 2012-2014. While vehicle engine block heaters are used extensively in this area, timers are rarely used. Instead of using electricity throughout the night, block heater timers allow vehicle owners to reduce the amount of time that electricity is used to warm the vehicle engine. Due to lack of participation this program was not continued past 2014 but commercial customers can take advantage of this technology through the Business Efficiency Program ("BEP") or the Isolated Systems Business Efficiency Program ("ISBEP").

9 The Utilities have received feedback regarding low customer knowledge of home ventilation, with many customers being unaware of the purpose of a HRV in their home and how it can save energy. Also, there are complexities in the supply chain for acquiring a high efficiency HRV which can be problematic for potential participants.

Small Technologies

The small technologies program is supported by retail partners and appeals to a broad customer group as it does not involve a major home renovation. The program uses different marketing approaches for two different groups of energy efficient products.

The Instant Rebate component offers relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home.[10] Participation and energy savings results in the first two years of the program have exceeded the forecast in the 2012 plan. The Appliance and Electronics component offers incentives that are relatively higher value and available by mail-in and online application throughout the year.[11]

Isolated Systems Community Program

Following two pilot programs in 2010 and 2011, Hydro launched a full-scale, energy efficiency direct install program in 2012. The program includes direct installations of energy efficient products at no cost to homes and businesses.[12] The program also focuses on customer education and building capacity in the communities by hiring and training local representatives. These representatives work in their own communities to promote the program, provide information on energy use, and install the products.

[10] Products include LED lighting, motion sensors, timers, dimmer switches, smart power strips and more.

[11] Products include energy efficient clothes washers, full-size refrigerators, full-size freezers and TVs.

[12] Products include low-flow showerheads and aerators, CFLs, smart power strips, and hot water tank and pipe insulation.

Commercial Programs

Table 3 provides a summary of commercial customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).

Table 3
Commercial Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	0.2	0.9	2.4	3.3	3.9	6.5	11.4	**28.6**

The takeCHARGE commercial programs will result in estimated aggregate energy savings of approximately 28.6 GWh by the end of 2015.[13]

Commercial Lighting Program

The Commercial Lighting Program targets reduced energy use through efficient lighting in commercial buildings, including high performance T8 and T5 fluorescent lighting and LED exit signs. This program has primarily been promoted through local lighting distributors by discounting lighting products at time of purchase.

The Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings from custom projects, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency improvement projects. It also includes rebates for specific measures on a per unit basis.

[13] Since implementation in 2009, there have been over 1,050 participants in the takeCHARGE commercial customer programs.

Isolated Systems Business Efficiency Program

This program is targeted toward commercial customers located in Hydro's isolated system communities. This custom program provides incentives based on the energy savings from efficiency improvement projects. This allows customers to implement energy efficient technologies that are suitable for their specific buildings, equipment and operations.

Industrial Programs

Table 4 provides a summary of industrial customer energy savings achieved through Utility customer energy conservation programs from 2009 through 2015(F).

Table 4
Industrial Program Energy Savings
2009 through 2015(F)
(GWh)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Energy Savings	-	-	0.2	3.3	3.3	25.6	25.6	58.0

The takeCHARGE Industrial Energy Efficiency program will result in estimated aggregate energy savings of approximately 58.0 GWh by the end of 2015.[14]

The Industrial Energy Efficiency Program is a custom program that responds to the unique needs of Hydro's transmission level industrial customers. This program provides financial support for engineering feasibility studies of efficiency projects and for project implementation costs. The Industrial program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011 and the last being submitted in 2013. No projects were completed in 2013 as focus was put on feasibility studies for work to be completed in 2014. The program then underwent an assessment by an external third party in 2014 and was re-launched as a full program in 2015.

[14] Since implementation in 2009, there have been 5 projects completed under the takeCHARGE Industrial Energy Efficiency Program.

2.3 Education & Support

The Utilities continue to provide energy efficiency education and support to customers through a variety of channels, which include a joint website, outreach activities, school presentations and partnerships with other organizations.

Table 5 shows the number of customer-initiated contacts with the Utilities for energy conservation information from 2010 through 2015 YTD.

Table 5
Customer Contacts for
Energy Conservation Information

	2010	2011	2012	2013	2014	2015YTD
Contact Centre Inquiries	11,704	12,624	9,793	9,630	10,830	5,328
Website Visits	52,013	72,996	49,202	76,278	186,003	197,973

The majority of customers chose electronic means of communication with the Utilities to obtain information on energy conservation and rebate programs. This is consistent with promotion of the takeCHARGE website as the primary resource for customer inquiries and information. Customer visits to the takeCHARGE website grew by 144% from 2013 to 2014. Activity in the first eight months of 2015 shows continued growth, with approximately 80% of website visits via a mobile device. This increase is related to increased promotion, changes to existing programs, and addition of new programs.

The Utilities have participated in an average of 214 community outreach events each year since 2012. This included presentations to retailers and suppliers, senior citizens, trade allies and other groups. takeCHARGE information booths were displayed at home shows, trade fairs, and retail stores across the province. The Utilities also offer a number of outreach events, such as the annual takeCHARGE of Your Town Challenge and Energy Efficiency Week. Through these outreach activities, members of the takeCHARGE team assisted customers with their energy efficiency questions, while raising awareness of energy conservation and the takeCHARGE rebate programs.

Over the last three years the takeCHARGE *Kids in Charge* K-I-C Start school program, has provided energy efficiency and conservation education support to students throughout Newfoundland and Labrador. This has included delivering in classroom presentations and an annual contest for primary and elementary students. In 2014, takeCHARGE partnered with the Provincial Office of Climate Change and Energy Efficiency to extend this program through the Hotshots pilot program.[15] As a result, in 2014-15 school year, over 11,000 students in 106 schools throughout the province participated in 448 presentations about energy conservation.

Trade allies play an integral role in helping customers make knowledgeable decisions regarding energy conservation and related home improvements. Retail partners display information about takeCHARGE programs and energy efficiency products in their stores and in flyers, as well as during special promotional events.[16] Similarly, the Utilities are continuing to grow a network of business to business service providers and suppliers that support the commercial and industrial sectors.[17]

The Utilities have also developed partnerships with a variety of other organizations that share common goals for the province's conservation market, including the Association of Newfoundland and Labrador Realtors, the Canadian Home Builders Association, Newfoundland and Labrador Housing Corporation, and the Canadian Mortgage and Housing Corporation.

[15] Through the HotShots pilot, the Province provided funding and support for additional in-class presentations, curriculum linked teacher materials, and a contest for high school students.
[16] The Utilities continue to work with over 160 retail store partners, 11 manufacturers/distributors, and approximately 50 HRV installers.
[17] These include lighting equipment manufacturers and distributors, electrical and HVAC contractors, and engineering firms.

Table 6 shows costs for education and support for the period 2009-2015(F).

Table 6
Conservation Education & Support
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Education	666	486	428	426	501	647	693	3,847
Support	236	206	219	222	186	174	158	1,401
Total	**902**	**692**	**647**	**648**	**687**	**821**	**851**	**5,248**

2.4 Planning & Evaluation

Planning

The focus of the Utilities' CDM planning process is to develop a 5-year plan for the implementation of comprehensive customer energy conservation and demand management programs around the technologies that were determined to have conservation potential in the provincial market. The completion of the CPS in 2015 effectively initiated the development of the 2016 Plan.

Programs are developed and revised through consultation with the various market stakeholders, such as government, trade allies and local interest groups, to gather feedback on program delivery strategy.

Table 7 shows costs for conservation planning for the period 2009-2015(F).[18]

Table 7
Conservation Planning
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Planning	401	429	509	404	462	958	1,202	4,365

Variations in annual conservation planning costs primarily reflect the periodic nature of the Utilities' program planning and research activities.

Research

In 2013, the Utilities completed a joint Commercial Facility Equipment Inventory ("CFEI") on 54 commercial facilities.[19] This research provided information on how commercial customers use electricity, through an inventory and analysis of all mechanical and electrical equipment in each facility.[20] This data was used as a direct input into the CPS conducted in 2015.

In 2014, Newfoundland Power and Hydro jointly conducted a survey to gather information regarding electricity end uses in the residential sector. The information gathered was used to assess potential electricity savings opportunities, and was used as a direct input into the current planning cycle. These results are also being taken into account in making adjustments to the *takeCHARGE* programs. For example, because

[18] Conservation planning costs include costs related to surveys and research, development of the potential study and the five-year plan, and general administration.
[19] The CFEI was completed by CBCL Limited, a consultant that conducted on-site facility audits for participating commercial customers. CBCL Limited is a leading employee owned multidisciplinary engineering and environmental consulting firm in Atlantic Canada.
[20] The CFEI found, for example, that the food retail sector are the largest users of electricity on a square footage basis of the customers audited, followed by the manufacturing/fish processing sector.

of survey findings regarding the prevalence of CFLs, these have been removed from the Instant Rebates Program beginning in the fall of 2015.[21]

Newfoundland Power completed research on ductless mini-split heat pumps ("MSHP") from 2013 to 2015. The objectives of this research were to assess the current MSHP market in Newfoundland, the use of the MSHP as a supplementary heat source and the potential impact of MSHPs on the electricity system. The results indicate that MSHP are more efficient and do save energy compared to electric baseboard heat.[22] This analysis also shows that there is not likely to be peak demand reduction on the electricity system from installation of MSHPs.[23] Customer demand for MSHP products has grown significantly in recent years and continues to be strong. However, there are issues with availability of qualified installers and customer understanding of product quality requirements.

In the fall of 2014, Newfoundland Power launched a pilot program to assess the economic, market, and technical feasibility of direct load control to reduce overall peak demand. This pilot was initiated in response to the constraints on system capacity that became evident after the events in January of 2013 and 2014. The pilot involved controlling hot water tanks in approximately 500 customer homes in Paradise and Mount Pearl. Demand reduction achieved by the direct load control events on average was 0.6 kW per participant, and for events that included all participants, approximately

21 Customers were asked what types of lighting they use in areas of their house where they spend the most time: 63% reported that they use incandescent bulbs, 53% CFLs, and 18% LEDs (multiple responses allowed). In another question, 31% of respondents claimed to have changed all their bulbs to more energy efficient types, and 45% indicated that they have begun to change to more energy efficient types.

22 Approximately half of the homes in the study recorded energy savings after installation of the MSHP. In these homes, electricity usage declined by an average of 5,300 kWh or 19% per year, with savings ranging from 7% to 50%. The remaining homes recorded an increase or no change in energy usage. This appears to reflect factors such as heating of additional living space, fuel switching, or operational issues with the MSHP.

23 Savings at time of system peak are dependent on a number of factors such as the efficiency and defrost cycle of the MSHP system, and temperature. A high efficiency MSHP may be capable of providing peak savings in warmer parts of the province but not in colder regions, while a less efficient MSHP may not be capable of providing peak savings in any region. On colder weekdays, the study observed little difference in the load profile of the MSHP homes vs. electric baseboard homes, and occasionally the MSHP homes' peak load was slightly higher.

298 kW of demand reduction was achieved. The Pilot results also indicate that a full scale provincial program does not meet the economic requirements.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project, which is supported by the Utilities and administered by Hydro, began in September 2014 and aims to assess whether real time display of energy use has a positive effect on electricity conservation behavior. The pilot involves approximately 750 customers: 250 with an in-home display device, 250 with an in-home display device as well as electricity conservation information in a monthly mail out, and 250 with only the electricity conservation information. Monitoring of participants will continue until January 2016 and the final report will be submitted to Government by end of March 2016.

Evaluation

The customer energy conservation programs are continuously evaluated by the Utilities on their energy savings, market impacts and delivery process effectiveness. Additional review by external third party evaluators has also been conducted. Program evaluation findings are used to refine program design and implementation details on an ongoing basis, as well as support further planning.

For example, the third party residential program evaluation in 2013 found that two-thirds of windows sold in the province were ENERGY STAR, which supported the Utilities' decision to conclude the ENERGY STAR Windows Program.[24]

Economic and energy savings evaluation of the customer energy conservation programs is performed annually. Program participants are required to provide certain information on program rebate applications. This information ranges from technical data, such as the R-value of installed insulation, or efficiency rating of a HRV to the type of heating in the home and its geographic location. Analysis of this data allows the

[24] The 2013 residential program evaluation was conducted DNV GL- Energy, headquartered in Burlington, Massachusetts, and specializing in evaluating programs that promote energy efficiency, demand response, and distributed generation.

Utilities to accurately estimate the energy savings for each program and perform industry standard economic cost-benefit tests.

2.5 CDM Costs & Cost Recovery

Table 8 provides a summary of the customer energy conservation program and general costs of the Utilities from 2009 through 2015(F).[25]

Table 8
Conservation Costs
2009 through 2015 (F)
($000s)

	2009	2010	2011	2012	2013	2014	2015F	Total
Programs								
Residential	1,386	2,322	3,473	3,436	3,921	4,277	5,188	24,003
Commercial	79	95	216	214	355	926	1,388	3,273
Industrial	57	226	103	173	89	1,244	19	1,910
Total Programs	1,522	2,643	3,791	3,823	4,365	6,447	6,595	29,186
General	1,303	1,121	1,156	1,052	1,149	1,779	2,054	9,614
Total	**2,825**	**3,764**	**4,947**	**4,875**	**5,514**	**8,226**	**8,649**	**38,800**

The Utilities' costs related to conservation programs have increased from approximately $2.8 million in 2009 to $8.6 million in 2015. This primarily reflects the addition of new customer energy conservation programs in 2013, specifically the Small Technologies Program and the Business Efficiency Program. This also reflects the increased levels of customer participation and rebates related to the joint takeCHARGE program portfolio. The expansion of customer programs has also resulted in increasing energy savings.

25 This cost summary does not include (i) costs related to programs offered independently by the Utilities prior to June 2009; (ii) costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management); and (iii) costs related to Hydro's interruptible service arrangements with its Industrial Customers.

Details of the Utilities' customer energy conservation program and general costs are provided in Schedule C.

The Utilities each bear the costs related to the provision of customer energy conservation programming in their own service territory. General conservation and program costs, such as customer rebates and costs related to responding to customer inquiries are incurred directly by each utility. Costs which are incurred jointly, such as provincial mass media advertising, are split on an 85% / 15% basis between Newfoundland Power and Hydro, respectively.[26]

Cost Recovery

Newfoundland Power's current conservation cost recovery practice reflects Board Order No. P.U. 13 (2013). Conservation program costs are deferred and amortized over a seven-year period. Through the annual operation of the Company's Rate Stabilization Adjustment, customer rates are adjusted to reflect any difference between the conservation program costs included in the most recent test year and the costs actually incurred. Newfoundland Power's annually recurring general conservation costs related to providing general customer information, community outreach and planning are expensed in the year in which the costs are incurred.

Hydro's current customer rates, as approved by the Board in Order No. P.U. 8 (2007), include recovery of approximately $0.4 million in costs related to management and planning of conservation programming. In each year from 2009 to 2014, inclusive, Hydro has deferred recovery of direct program costs related to the expansion of customer energy conservation programming under the 2008 Plan and 2012 Plan.[27] As of August 14, 2015, associated with a general rate application filed by Hydro on July 30, 2013, and an amended general rate application filed by Hydro on November 10, 2014,

[26] This approach to division of jointly incurred costs reflects the proportion of customers served by each utility.
[27] The deferred recovery of these costs in 2009, 2010, 2011, 2012, 2013, and 2014 were approved by the Board in Order Nos. P.U. 14(2009), P.U. 13(2010), P.U. 4(2011), P.U. 3(2012), P.U. 35(2013), and P.U. 43(2014), respectively.

the Consumer Advocate, Newfoundland Power, the Industrial Customer Group and Vale, with participation by Board Hearing Counsel, have engaged in negotiations with Hydro. As a result, these parties agreed that "Hydro's proposal to defer and amortize annual customer energy conservation program costs, commencing in 2015, over a discrete seven year period in a Conservation and Demand Management (CDM) Cost Deferral Account should be approved."[28]

3.0 PLAN: 2016-2020

3.1 Conservation Potential & Program Selection

The programs included in the 2016 Plan have been selected based on a number of considerations. Opportunities identified in the 2015 CPS are a key input and these have been further assessed by the Utilities in terms of engineering, market and economic viability. Consideration has also been given to the experience of the Utilities and others in the local marketplace, feedback from customers, as well as experience shared from other Canadian jurisdictions.

Conservation Potential Study

In June 2015, a comprehensive study was completed of electricity conservation and demand management potential for the province.[29] This Conservation Potential Study estimated the potential for electrical energy and demand savings by sector and by electricity system from 2015-2029. It also identified specific technologies available to assist in achieving that potential. The CPS essentially provides a framework, consistent with current North American practices, within which to assess conservation programming. The findings enabled the Utilities to quickly focus on cost effective technologies and begin assessment of market characteristics to guide program concept development.

28 Newfoundland and Labrador Hydro – Amended General Rate Application – Parties' Settlement Agreement dated August 14, 2015.

29 ICF International (previously called Marbek) conducted Conservation Potential Studies for the Utilities in 2007 and 2015. ICF International is a leading environmental and energy management consultancy and has extensive experience conducting Conservation Potential Studies in Canada.

Electrical system marginal costs of supply are used in the CPS to screen the economic viability of more efficient technologies.[30] For the current CPS, these costs were based on the most recent marginal cost forecast as projected by Hydro in February 2015.[31] These estimates are currently under review. Once Hydro's marginal cost study is completed, the CPS results will be reassessed. If such a review results in changes to the list of cost effective technologies with conservation potential, these will be considered in future updates to the 2016 Plan.

Figure 1 shows the baseline provincial energy usage forecast which was input to the 2015 CPS (the reference case), and the upper and lower achievable potentials estimated by the Potential Study.[32]

30 Technologies are considered to be economically viable when the cost of saving one kWh or kW of electricity is equal to, or less than, the marginal cost of supplying the electricity.

31 The 2015 CPS included an analysis of the sensitivity of potential technologies to changes in marginal costs. The analysis was based on a range of + 30% to – 10% of the February 2015 forecast marginal costs. It indicated a modest level of variability in technology viability and resulting conservation results. Please see CPS, section 7.5 Energy Efficiency Supply Curve, filed with the Board September 15, 2015.

32 The reference case is based on the provincial energy usage forecast from 2014. After this study was completed the energy usage forecast decreased due to the economic downturn, mainly in the industrial sector. The achievable potential is defined as the portion of the economic conservation potential that is achievable through utility interventions and programs given institutional, economic and market barriers. The upper achievable potential is considered to be the best case scenario with all market barriers removed, such as capital cost and product accessibility. The lower achievable potential is considered a business as usual scenario with the existing market barriers remaining in place.

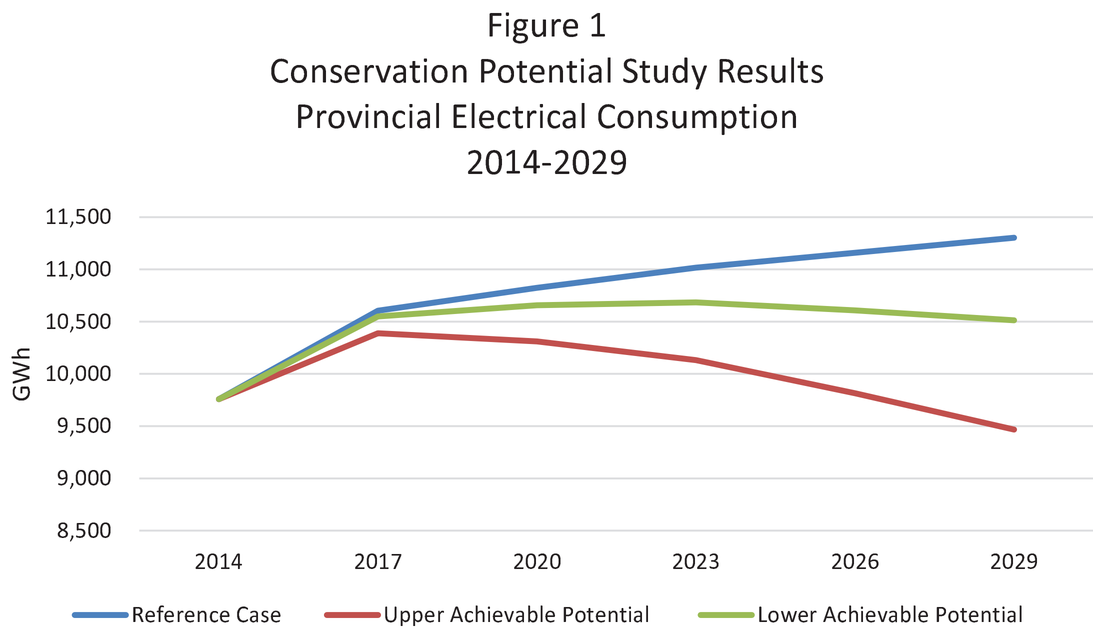


Figure 1 shows that, over time, the cumulative effects of implementing cost effective efficient technologies can significantly reduce forecast growth in electricity usage.[33]

Figures 2 and 3 show the results of the CPS regarding achievable demand reduction potential from energy efficiency measures ("Energy Efficiency") and from demand response specific measures ("Demand Response") by 2020.[34]

[33] At the end of the first estimation interval, in 2017, the CPS shows a range of 55 GWh for the lower achievable potential savings and 215 GWh for the upper achievable potential savings. This compares with annual savings of approximately 116 GWh currently estimated in the Plan for the same timeframe.

[34] The Commercial and Industrial sector includes Hydro's large transmission level Industrial customers as well as Newfoundland Power's general service customers.

Figure 2
Lower Achievable Demand Reduction Potential
Island Interconnected System
2020
(MW)

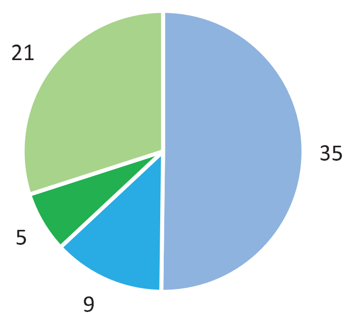
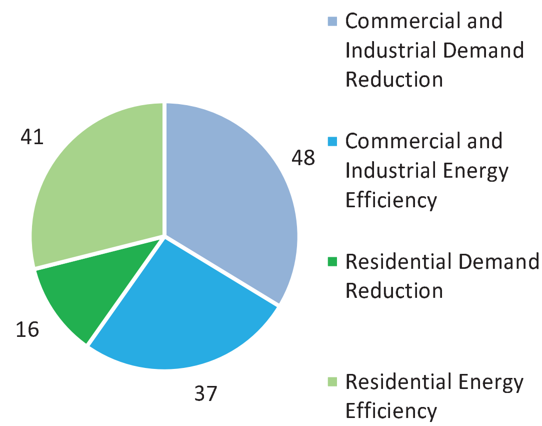


Figure 3
Upper Achievable Demand Reduction Potential
Island Interconnected System
2020
(MW)



Figures 2 and 3 show 70 MW for the lower potential and 142 MW for the upper potential demand reduction on the Island Interconnected System.[35] Installation of energy efficiency measures that reduce consumption during times of peak demand account for approximately 43% and 55% of the lower and upper achievable demand reduction, respectively, by 2020.[36]

The majority of the demand reduction potential was identified in the Commercial and Industrial sectors. Specifically, the Industrial sector represents about 87% and 74% of the total lower and upper achievable demand reduction, respectively. The demand reduction technologies identified through the CPS as having the most potential included curtailable load arrangements with commercial and industrial customers and direct load control of residential hot water tanks.

[35] 21+35+9+5=70 and 41+16+37+48= 142
[36] (21+9)/70=43% and (37+41)/142=55%.

Selection

The technologies that passed the economic screening of the CPS were reviewed in detail to assess their possible inclusion in the 2016 Plan. Local market research was conducted to identify barriers to broader adoption of more efficient technologies, such as capital cost, market availability and awareness. This included consultation with market stakeholders and trade allies, as well as discussions with other utilities.

Once existing market barriers were identified, a program strategy was then developed to attempt to overcome those barriers. Costs associated with the program were considered and the cost effectiveness of the program determined.[37] This more detailed review of program costs and benefits can cause a technology that had passed economic screening in the CPS to fail the economic tests required of CDM programs.

Economic Screening

The Utilities' economic screening of the customer energy conservation programs has previously required a positive result for both the Total Resource Cost ("TRC") and Ratepayer Impact Measure ("RIM") cost-benefit tests.[38] Recent research indicates Canadian and U.S. utility practice has changed to focus on the TRC and Program Administrator Cost ("PAC") tests.[39]

The Utilities recommend adoption of the TRC as the primary means of program economic screening, and the PAC as a secondary means. This is consistent with current North American practice, and is appropriate based on the electrical system marginal costs and program objectives in this jurisdiction. Based on this recommendation the programs included in the 2016 Plan passed economic screening

[37] Program cost estimates include marketing, delivery and administration, incentives, measurement and verification, and evaluation.

[38] In Order No. P.U.7 (1996-97), the Board required customer conservation programs to be evaluated with respect to rate impact, as well as the total resource costs. The Utilities' have interpreted this Order to require a TRC of 1.0 and a RIM of 0.8 as described in *Newfoundland Power Inc. – 2009 Conservation Cost Deferral Application, Section 2: Proposed Customer Program Portfolio* filed with the Board October 29, 2008.

[39] See Section 2.1, page 4, and Schedule B.

based on the TRC and PAC.[40] The Utilities' will continue to monitor changes to economic screening practices to appropriately reflect evolving program characteristics and electrical system costs.

3.2 Conservation & Demand Management Programs

The 2016 Plan builds on the outcomes of the 2012 plan as well as the experience of the Utilities. Programs included in the 2016 Plan address conservation opportunities in all three sectors: residential, commercial, and industrial. The 2016 Plan includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. These conservation programs are broadly consistent with programs offered by utilities in other jurisdictions.

Table 9 shows, by sector, the portfolio of programs to be offered under the 2016 Plan.

Table 9
Conservation Programs
By Sector

Residential	Commercial	Industrial
Insulation Thermostat HRV Small Technologies Isolated Systems Community Program Benchmarking	Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

40 Application of the RIM test would result in elimination of a number of programs, including Benchmarking, HRV, and Small Technologies.

Residential Programs

Insulation, Thermostat and HRV Programs

These existing joint incentive programs primarily target space heating energy savings, and will continue to be offered as part of the 2016 Plan. The remaining eligible market for the Insulation and Thermostats programs has been declining in recent years. The HRV program has had limited participation due to barriers related to customer understanding and market complexity. These programs will be continuously evaluated to ensure program cost effectiveness.

Small Technology Program

The jointly offered Small Technologies program will continue to use different marketing approaches for the two different groups of energy efficient products.

The Instant Rebate component will continue to offer relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home. As part of the 2016 Plan, Instant Rebates will include additional technologies.[41] It is anticipated that this component will end during 2018 as LED lighting becomes the norm in the residential lighting market.[42] Most of the energy savings benefits in this program are related to customers' early adoption of LED lighting from less efficient technologies, and energy savings from non-lighting products are not expected to be sufficient to offset the program delivery costs.

Incentives for the Appliance and Electronics component will continue to be available through 2017. At that time, anticipated reductions in marginal costs on the electricity system will effectively reduce the value of energy saving benefits, causing the program to fail economic screening.

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[41] As part of the 2016 Plan, Instant Rebates will include additional technologies, such as faucet aerators, door bottom weather stripping, door adhesive weather stripping, window insulation kits, electrical outlet gaskets, and caulking.

[42] The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Isolated Systems Community Program

The existing format for this program will continue to be offered to customers in Hydro's isolated system communities through 2017. Information and feedback collected in 2014 and 2015, particularly for the direct install component, will be used to evaluate and plan for the Isolated Systems Community Program beyond 2017.

An Appliance Retirement component will be added to this program beginning in 2016, targeting at least one community. Older inefficient appliances will be removed from participating homes and routed for appropriate disposal.[43]

Benchmarking

This new joint program will promote customer behaviour changes to encourage more efficient energy use. Benchmarking involves using social norms to encourage neighbourly competition to reduce electricity consumption. This program will include comparison of participant households' energy consumption with their energy history and that of similar households. Participants will also receive personalized home energy reports that provide household specific electricity usage information and savings tips to help them reduce energy use and lower their electricity bills. This program will be available to customers from 2016 to 2019.

Commercial Programs

Lighting Program

Beginning in 2016, existing commercial lighting program products will become prescriptive rebates under the Business Efficiency Program, including the fluorescent high bay, high performance T8 fluorescent lamp and LED exit sign. This change will allow for more specific marketing initiatives and increased awareness of the rebates available for these technologies.

[43] This component will be evaluated to determine whether a broader program would be cost effective.

Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts have become the market standard. Industry partners indicate that approximately 55% of ballasts sold in the province in 2014 meet the program efficiency criteria.[44]

Business Efficiency Program

The Business Efficiency Program, offered jointly by the Utilities, will continue to provide custom and prescriptive incentives to commercial customers for energy efficiency improvements. Continued growth in customer participation and energy savings are anticipated for this program. The Utilities will increase the customer education and awareness component of this program to include sector-based identification of energy efficiency opportunities. New technologies will also be added to the program's list of prescriptive incentives.[45]

Isolated Systems Business Efficiency Program

This program will continue through 2020, and will be offered to Hydro's commercial customers located in isolated system communities. The program will continue to provide incentives based on the energy savings of customer projects, similar to the Business Efficiency Program.

Industrial Programs

Industrial Energy Efficiency Program

Through 2020, this customized program will continue to offer support and financial incentives based on energy savings for retrofit of industrial process equipment for Hydro's transmission level industrial customers.[46]

44 Note that U.S. Federal Regulations are now equivalent to this ballast efficiency specification.
45 These include: LED screw-in lamps, high bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems, and low flow pre-rinse spray valves.
46 The Industrial Energy Efficiency Program's cost effectiveness and potential energy savings will be evaluated on a year to year basis.

Customer Energy Savings

Table 10 shows forecast customer energy reduction estimates for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 10
2016 Plan Energy Reduction Estimates
2016 through 2020
(GWh)

	2016	2017	2018	2019	2020	Total
Residential	80.4	102.7	118.1	123.5	111.7	536.4
Commercial	18.7	27.6	37.5	48.6	61.4	193.8
Industrial	30.6	30.6	30.6	30.6	30.6	153.0
Total	129.7	160.9	186.2	202.7	203.7	883.2

The programs in the 2016 Plan will result in estimated aggregate customer energy savings of approximately 883.2 GWh from 2016 through 2020. Customer energy savings are forecast to increase annually through 2020, due to expansion of the program portfolio and the addition of program technologies for the residential and commercial sectors.

Several program offerings are expected to be concluded during the planning period. These include the Small Technologies program and the Benchmarking program. Design of alternate programming for the residential sector is anticipated through the Utilities' program planning in 2018.

Demand Management

The previous conservation and demand management plans have focused primarily on energy conservation.[47] However, the Utilities' customer energy conservation programs have resulted in quantifiable demand savings.

The technologies identified through the CPS as having the most potential for demand reduction included direct load control of residential hot water tanks and curtailable load arrangements with commercial and industrial customers. Recent research has identified issues with the cost effectiveness of residential load control on the Island Interconnected System. As a result, this measure is not included in the 2016 Plan.[48] The Utilities will continue to pursue curtailment opportunities with their larger customers.[49]

A new component will also be added to the Business Efficiency Program ("BEP") to include a custom incentive for demand reduction measures that are economically viable and that provide measureable demand reduction during peak times.[50]

[47] This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Station) which justified such a focus.

[48] Although residential load control on the Island Interconnected System does not make economic sense, Hydro's isolated communities served by diesel generation have higher marginal costs which may make the program cost effective.

[49] Hydro currently has interruptible load arrangements with its Industrial Customers which have potential for more than 90 MW of capacity assistance. Newfoundland Power currently has 16 customers participating in its Curtailable Rate Option, providing 10.4 MW of potential load reduction.

[50] More information on the custom demand component of the BEP can be found in Schedule C.

Table 11 shows forecast customer demand reduction estimates for the customer energy conservation programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 11
2016 Plan Demand Reduction Estimates
2016 through 2020[51]
(MW)

	2016	2017	2018	2019	2020	Total
Residential	3.3	4.7	5.0	4.3	1.4	18.6
Commercial	2.1	2.0	2.3	2.5	2.8	11.7
Total	5.4	6.7	7.3	6.8	4.2	30.3

The Utilities' takeCHARGE customer energy conservation programs are forecast to achieve approximately 30.3 MW in peak demand reduction through 2020. This demand reduction will occur annually for the life of the installed technologies.[52]

[51] Hydro does not forecast demand reduction for their transmission level industrial customers.
[52] For example, a customer who installs basement insulation in 2014 will achieve approximately 0.9 kW of annual peak demand reduction for the next 20 years.

2016 Plan Program Costs

Table 12 shows forecast costs for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 12
2016 Plan Program Costs Estimates
2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Residential	5,987	6,308	4,540	3,048	2,042	21,925
Commercial	1,628	1,906	1,933	2,258	2,301	10,026
Industrial[53]	667	10	10	10	10	707
Total	8,282	8,224	6,483	5,316	4,353	32,658

The Utilities' costs related to programs in the 2016 Plan are forecast to be approximately $32.7 million over the five-year planning period. Forecast changes in program costs primarily reflect the expansion of programs and additional technology offerings anticipated from 2016 to 2018, and the conclusion of certain programs through the planning period.

3.3 Education & Support

The Utilities' customer education and support activities will continue to evolve to support changes in customer energy conservation programs and in the broader conservation market. The Utilities will continue to provide customer support and be responsive to customer expectations. Current activities, including customer outreach events, the takeCHARGE website and partnerships with industry stakeholders will be key elements of customer education.

[53] Forecasted Industrial program costs after 2016 are associated with program promotion and customer engagement. Given the small number of transmission level customers in the province, there is a high degree of uncertainty for participation in the program year to year. The forecasted amounts after 2016 will increase if customers avail of the program for feasibility assessments or incentives for energy efficiency retrofits. Projects will continue to be screened based on cost effectiveness to ensure the program remains above minimum economic thresholds.

The Utilities' educational initiatives will be expanded to include a program promoting mini-split heat pumps. The program components will include financing, education and marketing initiatives directed towards customers, and direct engagement with certified installers and suppliers. A marketing campaign will be launched to raise customer awareness of the benefits of this technology, how to choose a high quality product, as well as the necessity of having the system installed by qualified contractors. The eligibility criteria for on-bill financing of these systems will encourage the installation of high efficiency units, installed by qualified contractors.[54]

The Utilities will continue to build upon their experience offering the takeCHARGE K-I-C Start School Program. Marketing will continue to build awareness of the program amongst school boards and teachers. Teaching aids will be developed and be made available on the takeCHARGE website to assist in furthering conservation education after presentations are conducted. Updates will also be made to strengthen the message of conservation for younger students, and awareness-building contests will be offered for all age groups.

Table 13 shows forecast costs for conservation education and support for the period 2016 to 2020.

Table 13
Conservation Education & Support
Costs 2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Education	770	791	827	851	873	4,112
Support	171	175	181	184	191	902
Total	941	966	1,008	1,035	1,064	5,014

54 Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016.

3.4 Planning & Evaluation

Planning

The 2016 Plan incorporates research and analysis required for the next iteration of multi-year conservation portfolio planning by the Utilities.

Table 14 shows forecast planning costs included in the 2016 Plan.

Table 14
Conservation Planning Costs 2016-2020(F)
($000s)

	2016	2017	2018	2019	2020	Total
Planning	527	596	767	863	644	3,397

Variability in annual planning costs reflects the Utilities' multi-year planning cycle for customer conservation programs.

The Utilities anticipate development of the next multi-year plan for customer energy and demand conservation programming in 2018. Further clarity regarding electrical system cost dynamics is expected to be a factor in the next planning cycle.[55] Further assessment and adjustments to the programming contained in the 2016 Plan may also be required within the next three years as marginal cost forecasts are updated.

Research

The next update of the study of conservation potential in the province is being planned for 2020. In advance of this study, the Utilities will undertake a number of research projects regarding electricity end-use trends and the state of the local market for efficient technologies. For the residential sector, customer surveys will gather details on

55 An updated marginal cost study is expected to be a key input to the next conservation plan in 2018 and the next CPS in 2019-2020.

the type of electrical equipment that customers have in their homes, as well as their energy-related behaviour and motivation. Research for the commercial sector will include on-site facility audits to collect data on mechanical and electrical equipment being used.

The residential lighting market will be evaluated in 2017 to determine whether the Small Technologies program should continue. This research is expected to include a socket saturation study, with onsite inventories, as well as customer surveying. This will provide the Utilities with detailed data regarding the remaining potential for energy efficient lighting replacements.

Hydro is currently investigating the implementation of an Isolated System Direct Load Control Pilot in the community of Postville, Labrador.[56] The community of Postville is served by diesel generation. The objective of this pilot will be to reduce the peak load in the community and defer investment in electrical system upgrades. The Utilities will also continue to coordinate conservation planning with electrical system planning, and will evaluate potential for conservation initiatives targeted in specific areas or communities that may provide a lower-cost alternative to electrical system upgrades.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project is ongoing and the final report will be submitted to Government by end of March 2016. The results of this pilot project will be used to assess whether this type of technology may be considered as part of future energy conservation programming.

During this planning period, the Utilities will also monitor developments in North American practices for economic evaluation and screening of conservation programs.[57]

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56 The pilot will involve commercial and residential customers. It will include installing load controllers on hot water tanks, and commercial electric heating circuits, for commercial customers. Load controllers will only be activated during maximum system peak events. The customers that participate will receive incentives such as credits at the local store in Postville.

57 While reliance on the TRC and PAC tests for primary economic screening is currently the norm in North American jurisdictions, modifications to the TRC methodology are being considered in a number of cases. These modifications primarily involve inclusion of customers' non-energy benefits from efficiency upgrade projects.

Evaluation

The customer program portfolio will continue to be evaluated in terms of its energy savings, market impacts and delivery process effectiveness. Additional review by third party evaluators is expected, reflecting the expanded program portfolio and delivery methods.[58] Program evaluation findings will be used to refine program design and implementation details on an ongoing basis, as well as support further planning.

Specific evaluation objectives in the 2016 Plan are to monitor market saturation of particular technologies as well as cost effectiveness of the programs. For example, the Instant Rebates component of the Small Technologies program will be evaluated and an exit strategy designed based on research into the pace and impact of LED sales growth in the local lighting market.

Similarly, the Utilities will continue to closely monitor the Insulation, Thermostat and HRV programs. These programs have unique challenges and barriers to program participation.[59] Evaluation of these programs will ensure they continue to satisfy cost effectiveness requirements.

In the case of new program introductions, post-implementation evaluations will be conducted within 12 months of program launch to ensure full assessment of program design assumptions, as well as marketing and delivery process effectiveness.

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58 Evaluation costs are primarily reflected in the costs for each specific program.
59 For the Insulation and Thermostat Programs, these barriers primarily reflect the inherent difficulty in renovating existing living spaces and the remaining market being increasingly hard-to-reach. For the HRV program, this reflects the low level of customer understanding and slow adoption by the supply chain.

3.5 Costs & Cost Recovery

Table 15 provides a summary of the Utilities' customer energy conservation program and general costs from 2016 through 2020.[60]

Table 15
Conservation Costs
2016 through 2020
($000s)

	2016	2017	2018	2019	2020
Program					
Residential	5,987	6,308	4,540	3,048	2,042
Commercial	1,628	1,906	1,933	2,258	2,301
Industrial	667	10	10	10	10
Total Programs	8,282	8,224	6,483	5,316	4,353
Education	770	791	827	851	873
Support	171	175	181	184	191
Planning	527	596	767	863	644
Total General Costs	1,468	1,562	1,775	1,898	1,708
Total	9,750	9,786	8,257	7,214	6,061

Costs related to the customer energy conservation programs outlined in the 2016 Plan are forecast to be $9.8 million in 2016 and 2017.[61] This increase primarily reflects the addition of a new program, and enhanced program technology offerings. Costs begin to decrease in 2018 from $8.3 million to $6.0 million in 2020. This decrease primarily reflects the conclusion of the Small Technologies program in 2018 and the conclusion of the Benchmarking program in 2019.

60 This cost summary does not include costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management) and costs related to Hydro's interruptible load arrangements.

61 All customer energy conservation programs outlined in the 2016 Plan are cost effective, and are justified on a cost of service basis.

Schedule E provides a summary of forecast energy savings, cost estimates and cost effectiveness analysis results for the programs in the 2016 Plan.[62]

Cost Recovery

The Utilities propose conservation cost recovery based on amortizing customer energy conservation program costs over seven years.[63] The amortization of program costs over a seven-year period is considered appropriate because of the extended nature of the energy savings benefits provided by program technologies.

The Utilities' annually recurring general conservation costs would continue to be expensed as incurred.[64]

4.0 OUTLOOK

The Utilities anticipate significant changes in the electrical system serving the province within the five years considered in this plan. The Muskrat Falls hydroelectric development and related interconnection to the North American grid will affect system operations and costs, as well as customer prices. The next iteration of multi-year conservation program planning is anticipated in 2018, to coincide with these events.

In the interim, the approach outlined in the 2016 Plan will remain flexible to address ongoing changes. The initiatives in the 2016 Plan are cost effective based on current information, and were assessed for sensitivity to changes in system costs. As the Utilities implement the program changes outlined in this Plan, they will continue to evaluate program offerings to ensure they create economic benefits and are responsive to evolving customer expectations and market conditions.

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62 Cost forecasts can be expected to be refined as detailed program design progresses in 2016.

63 Newfoundland Power has used this approach since 2013, based on Order No. P.U. 13 (2013). Hydro has proposed this approach in its ongoing general rate application, and the proposal has been agreed to by the parties to settlement negotiations in that matter.

64 While general customer energy conservation costs provide benefits to customers in terms of information, knowhow and advice, those benefits are not transparently quantifiable in the same manner as program benefits.

With growing customer awareness of conservation, and of the takeCHARGE brand, the Utilities will continue to seek opportunities to partner with complementary organizations and trade allies for customers' advantage. Information sharing and policy coordination with the Province will also continue, primarily through the Office of Climate Change and Energy Efficiency.

Table A-1 shows most recent marginal cost forecast as projected by Newfoundland and Labrador Hydro in February 2015.

Table A-1
Marginal Cost Projection
for the
Island Interconnected System
2015 - 2035

	Energy ($/MWh)	Capacity ($/KW – Yr)
2015	108	51
2016	133	70
2017	134	74
2018	47	98
2019	50	99
2020	54	108
2021	56	112
2022	59	115
2023	62	119
2024	65	123
2025	68	126
2026	70	126
2027	73	125
2028	76	125
2029	78	124
2030	81	124
2031	85	121
2032	88	118
2033	92	116
2034	96	113
2035	100	110

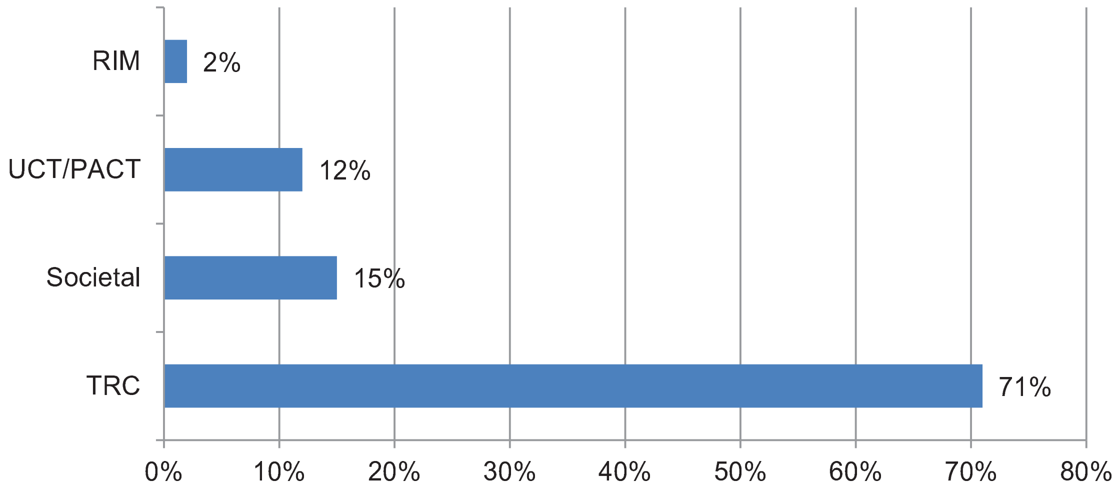
Notes:
1. Modeled as per NERA Economic Consulting marginal cost approach (2006).
2. Fuel costs per NLH corporate assumptions, January 2015.
3. Excludes transmission marginal costs.
4. Projection is at customer bulk delivery point.
5. Island Interconnected costs beyond 2017 reflect opportunity cost as per NERA approach.

Table B-1
Current Canadian
Utility Practice
Economic Evaluation Practices

Province	**Economic Test**				
	TRC	PAC	RIM	PCT[1]	SCT[2]
British Columbia	X[3]				
Ontario	X	X			
Nova Scotia	X	X			
Manitoba[4]	X		X	X	X
Saskatchewan	X	X			
Quebec	X		X[5]		
Prince Edward Island	X	X[6]		X	X[6]

1 Participant Cost Test ("PCT").
2 Societal Cost Test ("SCT").
3 British Columbia uses a modified TRC that includes non-energy benefits that are not traditionally included in the TRC.
4 Manitoba also considers the levelized resource cost, net utility benefit, utility net present value, levelized utility cost, and simple customer payback calculation.
5 Quebec considers the RIM as a secondary test.
6 Prince Edward Island considers the PAC and SCT as secondary tests.

Chart B-1
Current American Utility Practice
Economic Evaluation Practices
(Percent of States)



[7]

n=43

[7] Research conducted by the American Council for an Energy Efficient Economy (February 2012) "A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs".

Insulation Program

Program Description
The objective of this program is to increase the insulation level in residential basements, crawl spaces and attics. Increasing the insulation R-value in a home will result in space heating energy savings. The program components include rebates and financing, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.
Target Market: Residential
This program targets residential customers completing retrofit projects. Changes to the National Building Code of Canada implemented in December 2012 mandated that all new homes install basement insulation and increased the R-Value requirements in the attic. As a result, this program is only offered to existing homes (i.e. connected to the electricity grid before January 1, 2014) to exclude minimum building code compliance in new homes. Eligibility will continue to be limited to electrically-heated homes.
Eligible Measures
Eligible measures in this program include insulation upgrades to basements, crawl spaces and attics. Technical requirements will be approximately aligned with National Building Code of Canada.
Delivery Strategy
Delivery of this program will continue to be bundled with Thermostat, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio. Marketing initiatives include partnering with retailers and trade allies in the renovation industry, and target both do-it-yourself and professional installers. Tools and tactics will include retail point-of-sale materials, advertising, website, tradeshows, community outreach and trade ally activities. Rebates and financing will be processed through mail and online customer applications.

Insulation Program

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the impact on space heating energy, the practical difficulties of renovating an existing living space and a decreasing number of eligible participants. Experience with the existing program has shown participation to be responsive to awareness-building marketing activities.

Incentive Strategy

Incentives for this program include rebates and financing. In August 2014, the rebate structure was simplified and increased. Customers can now get a rebate of 75% of the cost of materials installed in the basement and 50% of the cost of materials in the attic. Rebates amounts are capped at $1,000.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation and cost effectiveness. A representative sample of installations will be inspected. Formal external evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,187	1,207	1,202	1,197	1,223	6,018
Estimated Cumulative Energy Savings (GWh)	30.0	33.1	36.1	38.9	41.8	180
Total Resource Cost						**2.5**

Thermostat Program

Program Description

The objective of this program is to encourage installation of programmable and high performance electronic thermostats in homes. Programmable and high performance electronic thermostats allow customers to better control the temperature of their homes and to set back the temperature during the night or while away. The program components consist of rebates, financing options, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.

Target Market: Residential

This program targets residential customers, including home retrofit and new home construction. Eligibility will continue to be limited to electrically-heated homes.

Eligible Measures

Eligible measures in this program include both programmable and high performance electronic thermostats. All thermostats must have a setting precision of +/- 0.5 degrees Celsius or less.

Delivery Strategy

The delivery strategy for this program remains unchanged. Delivery of this program will continue to be bundled with the Insulation, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio.

Marketing initiatives include partnering with retailers, electrical contractors, homebuilders and real estate professionals, to educate consumers regarding the energy savings and comfort benefits of programmable & high performance electronic thermostats. Tools and tactics include retail and model home point-of-sale materials, website, tradeshows, community outreach and trade ally activities. Rebates will be processed through mail and online customer applications.

Thermostat Program

Market Considerations

Barriers to installation of programmable and high performance electronic thermostats include lack of awareness of the potential for energy savings, difficulty programming, and reluctance to pay for an electrician to install the thermostats, and a decreasing number of eligible participants.

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $5 per high performance electronic thermostat and $10 per programmable thermostat. This continues to reflect incremental cost of the more efficient options. A time limit is no longer required for incentive redemption.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation, and cost effectiveness, and a representative sample of installations will be inspected. Formal evaluations will be conducted every two years during program operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	517	555	539	557	552	2,720
Estimated Cumulative Energy Savings (GWh)	9.7	11.1	12.5	13.8	15.2	62
Total Resource Cost						**2.8**

Small Technologies Program

Program Description

The objective of this program is to increase home energy efficiency and awareness by offering instant rebates on a variety of energy efficient technologies as well as online and mail in rebates for eligible appliances and electronics. This program also includes promotional events to raise awareness of the technologies and to engage the public.

Target Market: Residential

This program is marketed toward all residential customers province wide. All customers are eligible to participate regardless of age of home or heat source. A variety of marketing techniques such as TV news sponsorships, print, radio, online, website, as well as social media channels are used to engage customers.

Eligible Measures

Eligible measures in this program will vary over time and will be selected based on cost effectiveness, energy saving potential and market conditions. Instant rebates are available for small energy efficient items such as LEDs and smart power bars, and online and mail in customer applications are required for qualifying models of full-size refrigerators, clothes washers, TVs and full-size Energy Star freezers.

Six new measures will be added to the technology list in 2016. They are:

- Faucet aerators
- Door bottom weather stripping
- Door adhesive
- Window insulation kit
- Electrical outlet gaskets
- Caulking

Small Technologies Program

Delivery Strategy

Partnerships have been made with both chain and independent retailers to offer instant rebates to customers on a number of energy efficient products. Efforts to engage both urban and rural retailers have been made in order to ensure rebated products are available in all areas of the province.

Campaigns are held in the spring and fall each year. During each campaign, the Utilities set up in-store events at the participating locations to raise customer's awareness of the rebates and encourage use of energy efficient products.

Market Considerations

The technologies included in the program do not involve a major renovation. This program will allow the Utilities to reach customers that may not have been able to participate in the other incentive programs.

Incentive Strategy

Incentives for this program include instant rebates for small energy efficient items that will vary by year and campaign. Online and mail in customer applications are available for eligible appliances and electronics. The rebate value will be different for each technology offered, and will reflect incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. Exit interviews will be conducted during selected retail events. Formal evaluations will be conducted after the first year of implementation, and biannually during operation.

It is anticipated that this program will end after 2018. The Utilities expect that LEDs will make up the majority of bulbs that are sold in the province. If this occurs, the economics of the program will no longer be cost effective. The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Small Technologies Program

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	3,113	2,879	1,578	-	-	7,570
Estimated Cumulative Energy Savings (GWh)	23.8	33.3	38.2	37.4	36.5	169
Total Resource Cost						**1.3**

HRV Program

Program Description

The objective of this program is to increase the installation of higher efficiency Heat Recovery Ventilators ("HRV"). The program components include rebates and financing, and a variety of education and marketing tools.

Target Market

This program targets all residential customers regardless of heat source or age of home. Eligibility is available to all homes that install or replace an HRV.

Eligible Measures

Eligible measures in this program include all HRV models that have an SRE of 70% or more and meet the minimum fan efficacy requirements.

Delivery Strategy

Delivery of this program will be bundled with other takeCHARGE residential programs as part of the overall portfolio. Marketing initiatives include partnering with trade allies in the home building and renovation industry, particularly Heating Refrigeration and Air conditioning Institute certified installers. Tools and tactics include website presence, tradeshows, and trade ally activities. Rebates and financing will be processed through customer application.

Market Considerations

The market includes new construction and existing HRV replacement with an emphasis on existing replacements. Early HRV installations of the 1990s are at or near the end of their useful life, so many of these require replacement.

This program has faced a number of barriers such as understanding of what a HRV is and its purpose in the home, initial cost, and awareness of the benefits of selecting more efficient HRVs.

HRV Program

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $175 for qualifying HRV units. This reflects the incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. This program has experienced challenging barriers to program participation. Attempting to overcome these barriers can be administratively costly and may outweigh the benefits of program delivery. This program will be monitored to ensure that the participation goals are being met in each year to ensure the program remains cost effective. A representative sample of installations will be inspected. Formal evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	223	218	232	231	267	1,171
Estimated Cumulative Energy Savings (GWh)	0.7	1.0	1.3	1.6	2.0	7
Total Resource Cost						**1.3**

Benchmarking Program

Program Description

Energy social benchmarking is the analysis of a household's energy consumption and the comparison of its performance with its energy history and that of other similar households. Historic consumption information, tracking over time and comparisons with other households can encourage customers to reduce energy consumption. A printed paper report is delivered to participating customers via mail. These reports include a normative comparison that compares the customer to similar neighbors. The printed Home Energy Report is supplemented by access to an online web portal allowing for increased customer energy usage information and tips and resources to facilitate energy use reduction.

Target Market: Residential

The Benchmarking program is marketed to residential customers across the province. Customers will be selected into the program and can withdraw (opt-out) at any time.

Eligible Measures

A home's energy use is compared anonymously to the usage patterns of other homes in the vicinity that are of similar size, age, heating type, etc. The Home Energy Report is designed to provide new information to help home owners understand their energy use and find ways to make the home more efficient.

Delivery Strategy

The program is delivered largely by a third party service provider that develops and issues the Home Energy Report and maintains the online web portal. takeCHARGE will oversee all aspects of the program to ensure greater customer insight into their home energy use. The program is available year round and will be supported with takeCHARGE marketing and communication efforts.

Benchmarking Program

Market Considerations

This program will allow the Utilities to reach customers that have not been able to participate in the other incentive programs. It will also allow takeCHARGE actively engage with customers using direct home energy consumption information. This program also allows for the cross promotion of existing takeCHARGE rebate programs as methods to reduce household consumption and to drive participation in these programs.

Incentive Strategy

No monetary incentive will be offered. It has been demonstrated that for this type of program that using social norm comparisons drives the greatest and longest lasting changes to household energy consumption.

Program Monitoring & Evaluation

The program is monitored for participation levels, service quality and cost effectiveness. Formal evaluation will be conducted very two years during operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	530	1,034	989	1,063	-	3,616
Estimated Cumulative Energy Savings (GWh)	0.3	8.0	13.8	15.6	-	38
Total Resource Cost						**1.0**

Mini Split Heat Pump Educational Initiative

Program Description

The objective of the program is to encourage customers to choose high efficiency mini split heat pumps (MSHP), installed by qualified contractors. When installed correctly, a high efficiency MSHP will provide space heating energy savings. The program components include financing, education and marketing initiatives directed towards customers, and direct engagement of certified installers. Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016, however the eligibility criteria for MSHP will be updated to support the uptake of high efficiency units.

Target Market

This program targets residential customers. New home construction and retrofit customers with electric baseboard heat are considered to have the greatest potential for participation, however customer eligibility to participate in financing will not be limited by heating fuel, age or type of dwelling.

Eligible Measures

Financing will now be limited to MSHP with an estimated Heating Seasonal Performance Factor (HSPF) of 9.6 or higher. This is aligned with the minimum HSPF required for certification of units meeting the “ENERGY STAR® Most Efficient 2015” designation. To qualify for financing the installation must be performed by a contractor that has the necessary permits and certification to perform electrical and refrigeration work in the province.

Delivery Strategy

Delivery will be a two pronged approach including marketing to customers and engaging eligible installers.

Marketing initiatives will include information on the takeCHARGE website as well as bill inserts and mass media advertising regarding the benefits of choosing the right heat pump and installer. Installer engagement will include information sessions, contests, and maintaining relationships with qualified installers.

Financing applications will be processed through customer application via the existing customer service channels (online or by phone).

An incentive could not be offered for this program because it does not pass the economic analysis.

Mini Split Heat Pump Educational Initiative

Market Considerations

One of the biggest barriers is a lack of customer awareness and availability of certified installers in rural areas. In order to achieve significant energy savings, the unit must be appropriate for the Newfoundland climate, properly installed and operated.

Other major barriers include identifying what to look for in an installer (i.e. what certification should be required) and difficulty of customers to find qualified installers. The upfront cost of highly efficient units is also a barrier for some customers.

Program Monitoring & Evaluation

This program will be monitored for participation level, and service quality. The criteria for eligible models and installers will also be continually reviewed to ensure the program is promoting units and installers that will provide customers the highest achievable energy savings at a reasonable cost.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	119	100	103	102	104	529

Business Efficiency Program

Program Description

The objective of the Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.

Target Market: Commercial

This program targets business owners and property managers who have an interest in making their businesses more energy efficient. The program includes a custom project approach which appeals primarily to large commercial customers. In 2016, the program will also include rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting, which appeal to small and medium sized customers as well.

Eligible Measures

The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in electrical energy and demand savings. The program excludes alternative energy and fuel switching.

Beginning in 2016 the custom stream of the Business Efficiency Program will also include incentives for demand reduction based on the options available at the customer's facilities as well as the amount of demand they are able to reduce during peak times.

Also beginning in 2016, the existing fluorescent High Bay program and the current Commercial lighting program (including high performance T8 fluorescent lamps and LED exit signs) will become prescriptive rebates under the Business Efficiency Program.[1] Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts are now considered to be the market standard.

The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems and low flow pre-rinse spray valves will be added to the prescriptive list of incentives.

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1 Prescriptive incentive program are customer energy conservation programs that have per unit rebates for installing certain defined technologies. For example, providing a predefined rebate amount for a LED light bulb;

Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. A walk through audit can help customers identify efficiency opportunities.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing and through industry associations such as the Building Owners and Managers Association. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, retail point-of-sale materials, website and advertising in trade publications. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the program and available incentives, budget & planning cycles, technical know-how, and customer time constraints.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at 10 cents/kWh for first year savings or project demand savings at $100 per kW per month over the December to March period. Demand saving projects require a minimum of 50 kW savings and be sustainable over 5 years. Incentives of up to $50,000 per site help garner interest and lower customer project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online submissions.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy or demand savings achieved are consistent with incentives paid.

Business Efficiency Program

Estimated Costs & Energy Savings						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,519	1,791	1,813	2,133	2,171	9,427
Estimated Cumulative Energy Savings (GWh)	18.2	26.9	36.7	47.6	60.2	190
Total Resource Cost						**2.4**

Industrial Energy Efficiency Program

Program Description

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings and other supports to enable industrial facilities to identify and implement efficiency and conservation projects. This program is a custom program to respond to the unique needs of the Newfoundland and Labrador industrial market, rather than a prescriptive technology approach.

Target Market: Industrial

This program targets existing, transmission level, industrial customers served by Newfoundland and Labrador Hydro.

Eligible Measures

Eligibility of projects is based on engineering review and confirmation of estimated energy savings impact. Technologies include, but are not limited to, compressed air, pump systems, process equipment and process controls.

Delivery Strategy

The program is managed internally, with external engineering services used as required. The utility takes the role of facilitator and consultant in providing methods for industrial customers to complete project proposals and implement approved projects.

This program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011, and closed to new projects in 2013. The industrial pilot was reviewed in 2014 by an external party for performance; the review indicated the program matched or exceeded performance of comparable industrial CDM programs relative to the size of the industrial sector in the Newfoundland and Labrador market. The program was officially re-launched as an ongoing program in 2015, with the same structure as the pilot program.

Industrial Energy Efficiency Program

Market Considerations

This market requires a one-on-one approach to project design and delivery. The program builds on the work already completed by the industrial customers, and addresses their unique barriers to improved efficiency, which include, but are not limited to, access to capital and human resources.

The lifecycle for each program transaction will be measured in months rather than weeks because of the need for review, contract development, budgeting and implementation timelines, and post-installation evaluation. This type of program requires that facilities have financial and business stability to continue operations for a time period appropriate to achieve cost effective savings.

Incentive Strategy

Incentives for this program include an initial comprehensive energy audit for the site, funding assistance for feasibility studies, and financial assistance for project implementation based on energy savings.

Program Monitoring & Evaluation

The program will be regularly monitored for participation level, service quality, and cost effectiveness, including engineering review and inspection of all projects and assessment of long-term impact on customer processes.

Industrial Energy Efficiency Program

Estimated Costs & Energy Savings[2]

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	667	10	10	10	10	707
Estimated Cumulative Energy Savings (GWh)	30.6	30.6	30.6	30.6	30.6	153
Total Resource Cost						**1.7**

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2 While Customer audits have confirmed that there are several potential projects at Hydro's customers' sites, savings for the Industrial Energy Efficiency Program (IEEP) have only been forecasted for 2016 because there are only five transmission level industrial customers in Newfoundland and Labrador and participation depends on each company's capital budgets and focus for the year. As a result of such a small market and budget considerations, participation is extremely variable from year to year and difficult to forecast. The costs from 2017-2020 are the fixed administration costs associated with program promotion and customer engagement in the IEEP. The majority of costs are incurred after a project is submitted and passes economic screening. Projects for the Industrial EE Program will be evaluated on a yearly basis and projects with a TRC of 1.0 or greater will be completed.

Isolated Business Efficiency Program

Program Description

The objective of the Isolated Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.

Target Market: Commercial

This program targets business owners and property managers in Hydro's isolated diesel and L'Anse au Loup systems who have an interest in making their businesses more energy efficient. The program includes a custom project approach and also rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting.

Eligible Measures

The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in economical electrical energy savings. The program excludes alternative energy and fuel switching. The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, Electrically Commutated Motors for Evaporator fans, Cold climate air source heat pump systems and Low Flow Pre-rinse spray valves will be added to the prescriptive list of incentives.

Isolated Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. The custom track involves a walkthrough audit and feasibility analysis to determine savings and eligible incentive. This allows for a wide range of eligible technologies and projects.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, and a website. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to efficiency in the commercial market include financial and human resource concerns. Incentives will assist in making energy efficiency upgrades more accessible. Human resource concerns are around awareness and knowledge of the technology options as well as time to develop the business case for retrofit projects.

The isolated systems have additional challenges with access to products and access to specific technical skill sets in the evaluation of projects and technology. Hydro's program staff will assist in addressing these gaps.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at the lesser of $0.4/kWh for first year savings or 80% of eligible project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online customer applications.

Isolated Business Efficiency Program

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy savings achieved are consistent with incentives paid.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	106	112	117	122	128	585
Estimated Cumulative Energy Savings (GWh)	0.5	0.7	0.8	1.0	1.2	4
Total Resource Cost						**1.6**

Isolated Systems Community Program

Program Description

The objective of this program is to provide a portfolio of technologies and opportunities to help residential and commercial customers in isolated diesel communities save electrical energy and to promote energy efficiency awareness.

Target Market

This program targets both residential and commercial customers in Hydro's isolated systems. This includes Isolated Diesel systems on the Island, in Labrador, and the L'Anse au Loup system.

Eligible Measures

Measures will range from efficient lighting products, hot water saving products, pipe insulation, hot water tank insulation, commercial LED exit signs, and others that may be applicable.

An Appliance Retirement program is being planned for at least one community. Old inefficient appliances will be removed from participating homes and routed for appropriate disposal. This will save energy and money for the homeowner. This component will be evaluated to determine if it is economic to develop into a broader program.

The Isolated systems T12 replacement program will take place in 2-3 Isolated communities. This project will offer, free of charge to commercial customers, the supply and install of new High Performance T8 lamps and ballasts.

Delivery Strategy

Hydro has engaged Summerhill Group to deliver this program. They are using a number of delivery strategies, including hiring and training local representatives, to engage residential and commercial customers. Direct installs will be completed, whereby the customer receives the technology in their home or business at no cost. During the direct install visit, customers also receive information on energy usage and efficiency options.

Isolated Systems Community Program

Market Considerations

Availability and awareness of energy efficient technologies continues to be an issue in rural communities and often technologies available are at a higher price than in urban markets. This program will address the barriers of availability. There is a heavy electric hot water heating penetration and opportunities exist in plug load and behavior based areas.

Commercial customers tend to be smaller businesses and as such find it challenging to find the time and resources to address energy consumption issues; this program will provide the one on one interaction needed to assist these customers. The technologies included in the program do not involve a major renovation. This program will allow the utility to reach customers that may not have been able to participate in the other incentive programs.

Following the 2015 direct install component, information collected in 2014 and 2015 will be used to plan for Isolated Systems Community programming beyond 2017. Costs and energy savings will be estimated once the technologies have been determined.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. A representative sample of direct installs will be surveyed for confirmation of continued installation and use. Formal evaluations will be conducted after each year of operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	415	415	-	-	-	830
Estimated Cumulative Energy Savings (GWh)	5.2	5.5	5.5	5.5	5.5	27
Total Resource Cost						**2.7**

Table D-1
Conservation Programs
Energy Reductions: 2012 – 2015(F)
by Sector
(GWh)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	15.8	20.6	24.0	27.0	87.4
Thermostat Program	4.5	5.8	7.0	8.4	25.7
ENERGY STAR Window Program	6.1	8.6	10.1	10.1	34.9
Coupon Program	0.3	0.3	0.3	0.3	1.2
HRV	0.0	0.0	0.2	0.4	0.6
Small Technologies	0.0	0.0	5.5	14.4	19.9
Isolated Systems Community Program	1.7	2.8	4.1	4.8	13.4
Block Heater Timer Program	-	0.3	0.3	0.3	0.9
Total Residential Portfolio	**28.4**	**38.4**	**51.5**	**65.7**	**184.0**
Commercial					
Lighting Rebate Program	3.3	3.9	5.8	6.5	19.5
BEP	-	-	0.6	4.5	5.1
Isolated Systems Business Efficiency Program	-	-	0.1	0.4	0.5
Total Commercial Portfolio	**3.3**	**3.9**	**6.5**	**11.4**	**25.1**
Industrial					
Industrial Energy Efficiency Program	3.3	3.3	25.6	25.6	57.8
Total Portfolio	**35.0**	**45.6**	**83.6**	**102.7**	**266.9**

Table D-2
Conservation Programs
Program Costs: 2012 – 2015(F)
by Sector
($000s)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	882	1,092	796	1,039	3,809
Thermostat Program	492	253	227	454	1,426
ENERGY STAR Window Program	1,173	1,634	698	7	3,512
Coupon Program	-	-	-	-	-
HRV	-	59	56	225	340
Small Technologies	-	4	1,877	2,884	4,765
Isolated Systems Community Program	858	871	615	579	2923
Block Heater Timer Program	31	8	8	-	47
Total Residential Portfolio	**3,436**	**3,921**	**4,277**	**5,188**	**16,822**
Commercial					
Lighting Rebate Program	121	128	373	790	1,412
BEP	-	112	457	532	1,101
Isolated Systems Business Efficiency Program	93	115	96	66	370
Total Commercial Portfolio	**214**	**355**	**926**	**1,388**	**2,883**
Industrial					
Industrial Energy Efficiency Program	173	89	1,244	19	1,525
Total Portfolio	**3,823**	**4,365**	**6,447**	**6,595**	**21,230**

Table E-1
Conservation Programs
Energy Reduction Estimates: 2016 – 2020
by Sector
(GWh)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	30.0	33.1	36.1	38.9	41.8	179.9
Thermostat Program	9.7	11.1	12.5	13.8	15.2	62.3
ENERGY STAR Window Program	10.1	10.1	10.1	10.1	10.1	50.5
Coupon Program	0.3	0.3	0.3	0.3	0.3	1.5
Isolated Systems Community Program	5.2	5.5	5.5	5.5	5.5	27.2
Small Technology Program	23.8	33.3	38.2	37.4	36.5	169.1
HRV Program	0.7	1.0	1.3	1.6	2.0	6.6
Benchmarking	0.3	8.0	13.8	15.6	-	37.7
Block Heater Timer Program	0.3	0.3	0.3	0.3	0.3	1.5
Total Residential Portfolio	**80.4**	**102.7**	**118.1**	**123.5**	**111.7**	**536.4**
Commercial						
Isolated Systems Business Efficiency Program	0.5	0.7	0.8	1.0	1.2	4.3
Business Efficiency Program	18.2	26.9	36.7	47.6	60.2	189.6
Total Commercial Portfolio	**18.7**	**27.6**	**37.5**	**48.6**	**61.4**	**193.8**
Industrial						
Industrial Energy Efficiency Program	30.6	30.6	30.6	30.6	30.6	153.0
Total Portfolio	**129.7**	**160.9**	**186.2**	**202.7**	**203.7**	**883.2**

Table E-2
Conservation Programs
Program Cost Estimates: 2016 – 2020
by Sector
($000s)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	1,189	1,207	1,202	1,197	1,223	6,018
Thermostat Program	517	555	539	557	552	2,720
Isolated Systems Community Program	415	415	-	-	-	830
Small Technology Program	3,113	2,879	1,578	-	-	7,570
HRV Program	223	218	232	231	267	1,171
Benchmarking Program	530	1,034	989	1,063	-	3,616
Total Residential Portfolio	**5,987**	**6,308**	**4,540**	**3,048**	**2,042**	**21,925**
Commercial						
Isolated Systems Business Efficiency Program	106	112	117	122	128	585
Business Efficiency Program	1,522	1,794	1,816	2,136	2,173	9,441
Total Commercial Portfolio	**1,628**	**1,906**	**1,933**	**2,258**	**2,301**	**10,026**
Industrial						
Industrial Energy Efficiency Program	667	10	10	10	10	707
Total Programs Portfolio	**8,282**	**8,224**	**6,483**	**5,316**	**4,353**	**32,658**

Table E-3
Conservation Programs
Total Resource Cost Test Results
by Sector

	TRC Results
Residential	
Insulation Program	2.5
Thermostat Program	2.8
Isolated Systems Community Program	2.7
Small Technology Program	1.3
HRV Program	1.3
Benchmarking	1.0
Commercial	
Isolated Systems Business Efficiency Program	1.6
Business Efficiency Program	2.4
Industrial	
Industrial Energy Efficiency Program	1.7

2017 Conservation and Demand Management Report

March 29, 2018

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador
hydro
a nalcor energy company

TABLE OF CONTENTS

1.0 Introduction

The Conservation and Demand Management (CDM) activities undertaken by Newfoundland and Labrador Hydro (Hydro) in 2017 included joint utility programs offered by Hydro and Newfoundland Power through the takeCHARGE partnership, as well as programs specifically targeted to Hydro's customers. This report focuses primarily on the costs and initiatives for Hydro's portion of program implementation.

Hydro's programs achieved 2,512 MWh of annual incremental energy savings in 2017, and, since 2009, have accumulated energy savings of 40,971 MWh. This is primarily a reflection of the continued growth and enhancement of takeCHARGE initiatives.

2.0 Coordination and Context

2.1 Utility Planning

Energy conservation was addressed during Hydro's 2006 General Rate Application (GRA). Subsequent to the GRA, a CDM Potential Study was completed in 2008. Following the 2008 CDM Potential study, a five-year strategic plan which outlined proposed energy conservation initiatives to be implemented jointly by Newfoundland Power and Hydro (the Utilities) was developed.[1] The Utilities have since designed and implemented a joint utility portfolio of programs for electricity customers in Newfoundland and Labrador. Currently, programs offered through the joint utility model are available for residential, commercial, and industrial customers and provide rebate options to address energy savings for electricity customers.

In 2012, an updated strategic plan was developed.[2] The new plan continued to focus on joint utility programs, but also outlined additional programs identified and implemented by Hydro to address opportunities in higher avoided cost isolated diesel systems. In 2012, Hydro launched the Isolated Systems Community Program and the Isolated Systems Business Efficiency Program

[1] The *Five Year Energy Conservation Plan: 2008-2012* was filed with the Board on June 27, 2008.

[2] The *Five Year Energy Conservation Plan: 2012-2016* was filed with the Board on September 14, 2012.

for business customers served from Isolated Diesel Systems. In late 2013, the Business Efficiency Program was launched for business customers served from Interconnected Systems through the joint utility partnership. Hydro has been developing programs outside the joint utility process to provide customers with additional opportunities to conserve and to provide feedback for expanded offerings of joint utility programs. For example, Hydro's retailer coupon program offered in 2010-2011 was the impetus for the Small Technology program launched provincially in 2014. This program provides point-of-purchase and mail-in coupons for a range of technologies, including lighting and appliances.

Initially, the joint utility CDM plans were focused on high marginal cost energy savings that translated into fuel savings, and working towards a culture of conservation that will be sustained in the long-term. In 2015, a new CDM Potential Study was completed to guide future initiatives related to energy conservation and demand management. Following the 2015 CDM Potential Study, a new Five-Year Conservation Plan was completed, which will continue to be implemented jointly by the Utilities over the 2016 to 2020 period.[3]

Three new technologies - Rooftop Air Source Heat Pumps, Pre-Rinse Spray Valves, and Electrically Commutated Motors - were launched under the Business Efficiency Program prescriptive path in 2017. These technologies expand the prescriptive list, allowing customers easier access to rebates through mail-in applications.

Conservation and Demand Management activities undertaken in 2017 included a new Energy Efficiency Loan Program with the Government of Newfoundland and Labrador, expansion of existing commercial programs, reshaping or discontinuation of several programs, and continuation of the custom industrial program. An overview of the programs offered during 2017 is included in Appendix A. It includes current programs offered through both the joint

[3] The *Five-Year Conservation Plan: 2016-2020* was filed as Appendix B of Schedule 3, Appendix H – *2015 Conservation Cost Deferral and Program Expansion Report* of the Amended 2015 Cost Deferral Application filed with the Board on November 12, 2015.

utility partnership and those specific to Hydro's customers. The Five Year Conservation Plan 2016-2020 is included in Appendix B.

The Utilities continuously evaluate the customer conservation programs and periodically undertake third party program evaluations to refine program design and support future planning. For example, in 2014, DNV GL-Energy completed a market and process evaluation of the residential joint utility programs.[4] This work supported the Utilities decision to conclude the ENERGY STAR® Windows Program at the end of 2014 due to market transformation.

During 2017, several external evaluations and surveys were completed to measure customer awareness, interest, and uptake in current programs:

- Socket saturation survey - to determine usage of LEDs in lighting sockets in customers' homes, as a means of informing future program planning;
- Annual marketing survey - to assess home energy use and energy saving practices, as well as awareness of, and participation in, the takeCHARGE program;
- Residential end use survey – to provide a detailed overview of home energy usage through the collection of specific information on home construction, home heating sources, appliance and electronic usage and lighting;
- Hydro's home energy use benchmarking program was evaluated to assess program effectiveness, participation uplift, satisfaction and net energy and demand savings versus targeted energy and demand savings. This program allows participating households to compare their net energy usage with similar homes in their neighborhood;
- Insulation and thermostat rebate program was evaluated to assess the adequacy of the program relative to its objectives, identify barriers and trends, and assess the energy and demand savings associated with the program; and

[4] DNV-GL Energy is recognized within the energy efficiency sector, providing program evaluation and assessments.

- Business Efficiency Program – an evaluation of the impact of program processes, existing markets, and savings was started in 2018 and will continue into 2018.

2.2 Government Engagement

In October 2017, Hydro and Newfoundland Power introduced a new Energy Efficiency Loan Program to assist residential customers improve their home energy consumption. The program is supported by the Government of Newfoundland and Labrador and offers on-bill financing for insulation, heat pumps and home energy assessments. Through the Energy Efficiency Loan Program, eligible applicants can receive low-interest financing for up to $10,000 over a maximum of five years.

Late in 2017, Hydro was invited by the Provincial Office of Climate Change to assist in the development of a comprehensive assessment of the opportunities and challenges associated with increasing electric vehicle penetration in Newfoundland and Labrador. In response to increased customer interest in electric vehicles, the province has invited special interest groups to identify requirements to facilitate growth of this market with an anticipated benefit of reduced greenhouse gas emissions.

Hydro continues to have a positive working relationship with the Provincial Office of Climate Change, and remains engaged in dialogue on potential programming, policy, and partnership opportunities.

2.3 Nunatsiavut Government

In 2017, Hydro supported the Nunatsiavut Government with the Nain Wind-Storage-Diesel Micro-Grid Project, which is a part of the Nunatsiavut Government's Energy Security Plan. This project will integrate wind energy, energy storage, and a micro-grid controller interfacing with the existing baseload diesel generator set. It will also include smart meters for the community of Nain, which is the largest diesel-reliant community in Atlantic Canada. The Nain Wind-Storage-Diesel Micro-Grid Project will serve as a prototype for similar clean energy infrastructure installations in the other remote Nunatsiavut communities on the North Coast of Labrador (Makkovik, Rigolet, Hopedale, and Postville) promoting technology diffusion and efficient project development.

3.0 CDM Programs

3.1 Portfolio Level Program Costs and Energy Savings

Table 1 and Table 2 describe Hydro's total CDM expenses and energy savings from 2009 to 2017 across all of Hydro's systems, including the Labrador Interconnected System. This report provides further detail and breakdown of the costs that will be recovered through the CDM Deferral Account[5] and the associated energy reductions in section 6, Regulated Program Energy Savings and Program Costs.

Table 1 Hydro's CDM Portfolio Spending[6] ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Windows	44	48	80	117	169	38	2		
Insulation	40	60	140	126	157	92	70	61	102
Thermostats	13	19	31	47	51	35	20	22	55
Residential Benchmarking								49	45
Coupon Program		140	135						
Commercial Lighting	13	12	59	20	29	15	18		
Industrial	57	221	103	173	89	1,244	(102)	28	41
Block Heater Timer				31	8	8			
Isolated Systems Community				858	871	615	530	451	936
Isolated Systems Business Efficiency Program				93	115	96	7	45	41
Heat Recovery Ventilator					11	7	6	6	7
Small Technologies					1	252	239	247	159
Business Efficiency (Prescriptive)								22	28
Business Efficiency (Custom)					45	101	152	183	127
Appliance Retirement Pilot							56	(12)	
Isolated Load Control Pilot							6	158	17
Total	**167**	**500**	**548**	**1,465**	**1,546**	**2,503**	**1,004**	**1,260**	**1,558**

[5] The CDM Cost Deferral Account is meant to defer the program costs for regulated Hydro (excludes program costs for the Labrador Interconnected System).
[6] Credits are due to an overstated accrual in the preceding year.

Table 2 Hydro's CDM Portfolio Annual Energy Savings (MWh)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Life to Date
Windows	13	37	61	136	99	85	10			441
Insulation	35	126	404	382	795	142	105	72	155	2,216
Thermostats	9	35	30	53	24	38	34	44	59	326
Residential Benchmarking									131	131
Coupon Program		64	256							320
Commercial Lighting	3	10	227	95	99	79	124			637
Industrial			165	3,172		22,258		177		25,772
Block Heater Timer					288					288
Isolated Systems Community				1,676	1,096	1,357	1,426	512	1,141	7,208
Isolated Systems Business Efficiency Program				3	26	111	67	241	24	472
Heat Recovery Ventilator						6	5	5	4	20
Small Technology Program						148	164	191	90	593
Business Efficiency Program(Prescriptive)							22	147	676	845
Business Efficiency Program(Custom)						107	775	588	232	1,702
Total	**60**	**272**	**1,143**	**5,517**	**2,427**	**24,331**	**2,732**	**1,977**	**2,512**	**40,971**

3.2 Residential Programs

Hydro's residential portfolio included five programs; insulation, thermostats, heat recovery ventilators (HRV), small technologies and the Residential Benchmarking Program offered jointly by the Utilities and one offered solely by Hydro during 2017. In addition, the Energy Efficiency Loan Program was launched in November 2017. Throughout 2017, Hydro continued to promote the takeCHARGE programs and technologies. Local advertising and building strong partnerships with retailers remains a priority and is an integral factor in the promotion of customer rebate programs.

The Isolated Systems Community Energy Efficiency Program is a program specifically targeted to residential and commercial customers in Hydro's Isolated Diesel systems. The objective of the program is to provide outreach, education, and energy efficient products free of charge to residential and business customers in the remote diesel system communities within Newfoundland and Labrador. From 2012 to 2017, the program operated in 42 remote communities, installed 94,250 energy efficient products, saved a total of over 7.2 GWh of electricity, and provided employment for over 55 residents of these communities.

The Isolated Systems Community Energy Efficiency Program includes residential and commercial direct installations and focuses on building knowledge and capacity in the communities by hiring and training local representatives. These representatives work within their own communities to promote the program, provide useful information on energy use, and provide direct installation of energy efficient products, including low flow showerheads, faucet aerators, LED lamps, specialty size light bulbs, smart power strips, and hot water tank and pipe insulation.

In 2017, 1,007 residential and business customers received direct installation of 17,275 products consisting of water saving technologies and LED specialty bulbs for lighting needs. While this work was ongoing, information was collected about the type of lighting, heating, and appliances in the homes and businesses, which will be used for future program planning.

The Kids in Charge school program was also delivered in 2017. This is an interactive presentation on saving energy, designed for students from kindergarten to grade 6. Trained representatives visited 7 schools and delivered 16 presentations to a total of 178 students in isolated communities.

3.3 Commercial Programs

Hydro's Business Efficiency Programs, which include prescriptive product rebates for heating and lighting controls and a custom program for individual customer facilities, continued to be delivered to business customers in the company's interconnected and isolated areas in 2017. These programs provide technical support to identify economical energy efficiency opportunities and provide financial support for capital upgrades. The total energy savings achieved as a result of Hydro's prescriptive and custom business programs in 2017 was 932 MWh.

Prior to 2016, the commercial lighting program was offered solely through lighting distributors. As such, there was little to no direct customer contact. In 2016, the Commercial Lighting

Program was incorporated into the Business Efficiency (Prescriptive) Program making rebates available directly to participating customers. This change facilitated more direct contact with business customers for program support and promotion. Hydro continues to engage with lighting distributors to promote the sale of high performance lighting products. Hydro enhanced its Business Efficiency Program in 2017 by expanding the list of energy efficient products eligible for mail-in rebate to include electrically commutated motors, rooftop air source heat pumps, and pre-rinse spray valves.

Commercial facility audits continue to be utilized to engage customers in the Isolated Systems Business Efficiency Program and the Business Efficiency Program. Since 2012, approximately 90 walkthrough audits have been conducted for Hydro's isolated and interconnected business customers. The intent of the audits is to facilitate opportunity identification, technical analysis, and project completion. In 2017, two commercial facility audits were completed in the interconnected system and 23 facility audits were completed in the isolated systems to inform customers of opportunities for incentives. Ten customers completed projects involving upgrades and improvements to LED lighting, building automation controls, insulation, and thermostats.

3.4 Industrial Program

Since 2010, Hydro has delivered the Industrial Energy Efficiency Program, which offers support and financial incentives for Hydro's industrial customers based on projects for lighting retrofits, process improvements, equipment changes, loss prevention (e.g. heat, steam energy), and funding for energy audit consultant reports. Participation in the Industrial Energy Efficiency Program has been variable as there are few industrial customers in the province. Promotion of the Industrial Energy Efficiency Program is now included under Hydro's Key Account Management framework to minimize variability, and to support improved project planning and scheduling. Within the Key Account framework, the five industrial customers are directly engaged with their Key Account Manager to assist with them with the Industrial Energy Efficiency Program. This also permits Hydro to better understand the customers' facilities, processes, plans and schedules for potential efficiency improvement projects. In 2017, three industrial customers initiated lighting retrofit projects which will be supported by approximately $50,000 in program funding. Hydro anticipates this investment will generate approximately 500 MWh of energy savings annually.

4.0 Planning and Evaluation

During 2017, several external evaluations and surveys were completed to measure customer awareness, interest, and uptake in current programs, including a socket saturation survey, a marketing survey, a residential end use survey, a benchmarking program evaluation, and an insulation and thermostat evaluation. Finally, during 2017, the Business Efficiency Program evaluation was started and will continue into 2018. This will evaluate the impact of program processes, existing markets, and savings.

The socket saturation survey was done to determine the level of saturation for LED bulbs in the marketplace. This information will inform decisions regarding the continuation of the instant rebate campaign. This program is also being evaluated by a third party consultant who will complete a process, market and impact evaluation.

MQO Research was contracted in 2017 to complete the residential energy use survey on behalf of the Utilities. The research provides a detailed overview of home energy usage through the collection of specific information on home construction, home heating sources, appliance and electronic usage and lighting to help inform estimates of energy use in the future. The population for the survey included all residents of Newfoundland and Labrador. The survey was completed with one of the primary decision makers in each household to ensure that the survey respondent was able to provide as much detailed information as possible on their home construction and various sources of energy usage.

An impact evaluation of the Benchmarking Program was completed in 2017. The impact evaluation reviewed the energy and demand savings associated with the program, effects such as free-ridership and spillover, and the ability of the program to achieve its targets.

An evaluation of the Business Efficiency Program is ongoing. Its scope includes process, market and impact evaluation. The process evaluation will review the adequacy of the program relative to its objectives, the program's ability to access the appropriate customers, customer satisfaction, the program's funding and how it is used. It will also identify opportunities to improve the effectiveness of the program and its activities and outputs. The market evaluation will review the barriers to adopting or implementing certain technologies, products or regulations, trends in energy efficiency use and consumption, the baseline for current and future evaluations, and the degree of implementation or penetration of products or technologies. The impact evaluation will review the energy and demand savings associated with the program, effects such as free-ridership and spillover, and the ability of the program to achieve its savings targets.

During 2017, the Utilities continued to execute the Five-Year Conservation Plan 2016-2020 (see Appendix B). The second year of this plan included the launch and expansion of existing commercial programs.

The Island Interconnected System is undergoing substantial change, as it will be interconnected with the North American Grid for the first time in 2018 via the Maritime Link and Labrador-Island Link. Furthermore, the 824 MW Muskrat Falls hydroelectric development is forecast to be commissioned in 2020. As a result of these material changes to Hydro's system, there is significant uncertainty as to the future marginal cost of energy and capacity. Recent estimates of the 2019 average hourly marginal cost vary between 4 to 8 ¢/kWh, depending on the time of year. Hydro intends to update its marginal cost projection prior to filing its Cost of Service Methodology Review, which is anticipated to be filed in the third quarter of 2018. Once the marginal cost projections are updated, the cost effectiveness of existing customer energy conservation programs on the Island Interconnected System will be reevaluated.

5.0 Outreach and Support

During 2017, Hydro continued to partner with Newfoundland Power to deliver the takeCHARGE program which offers customer education and conservation awareness activities, primarily through promotion of its takeCHARGE rebate programs and outreach activities. Residential and Business programs are promoted through activities including mass media marketing, targeted promotions, community outreach, school programming, trade ally development, partnerships, and events.

The advertising campaign includes newspaper, radio, online and social media advertisements. Campaigns run throughout the year for insulation, thermostats, HRVs, instant rebates and appliances, and the Business Efficiency Program. The media is chosen based on the time of year that programs are in market and consumer purchasing behaviours.

takeCHARGE is also active in social media through a joint utility Facebook page, YouTube channel, Twitter account, and website. To date, approximately 13,587 Facebook users have "liked" the takeCHARGE Facebook fan page, and YouTube views are continuing to increase through direct links to videos from other takeCHARGE social media channels. takeCHARGE currently has 2,947 Twitter followers and continues to increase. The takeCHARGE website number count of page views continues to increase year over year. In 2016, there were 423,298 page views, compared to 629,447 in 2017, which is a 49% year-over-year increase.

Hydro engages with retailers, suppliers, students, and other groups through presentations, and interactive booth displays to promote programs, answer questions and promote energy conservation. The takeCHARGE Town Challenge initiative has awarded $70,000, to date, to winning towns. Its purpose is to encourage residents and municipalities to reduce their energy use. Each year, municipalities are invited to submit proposals that will support their efforts to develop or improve energy conservation or energy efficiency projects. Projects have to demonstrate a positive effort to conserve energy that benefits the entire community. The takeCHARGE school contests for kindergarten to grade 6 classes and grade 7 to grade 12 classes were run with a goal to enable students to understand and be able to explain why saving energy is important, and demonstrate what they can do to conserve energy.

takeCHARGE held the 9th annual Energy Efficiency Week from September 25 to October 1, 2017 and marked the 25th anniversary of the first insulation rebate. Energy Efficiency Week is dedicated to providing customers with information to enable them to save energy and money. During the week, takeCHARGE teams were visible throughout the province at special events, television advertising was undertaken, and a full social media plan was executed.

Table 3 provides Hydro's costs to provide education, outreach, support, and planning for its CDM programs.

Table 3 Hydro's Support Costs ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Education	262	106	212	200	135	158	154	138	111
Support	53	48	43	53	27	52	68	42	40
Planning	176	180	304	127	152	224	442	250	251
Total	**491**	**334**	**559**	**380**	**314**	**434**	**664**	**430**	**402**

6.0 Regulated Program Energy Savings and Program Costs

Table 4 provides the estimated annual energy savings from Hydro customers in relation to programming associated with the annual regulated deferral request.

Table 4 Energy Savings from Island Interconnected and Isolated Systems CDM Program Activities[7] (MWh)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Life to date
Windows	8	14	38	50	43	40	4			197
Insulation	29	63	229	126	123	100	52	40	111	873
Thermostats	2	16	16	28	14	16	23	33	43	191
Residential Benchmarking									131	131
Coupon Program		47	166							213
Commercial Lighting	3		92	25	19	22	46			207
Industrial			165	3,172		22,258		177		25,772
Block Heater Timer										0
Isolated Systems Community				1,676	1,096	1,357	1,426	512	1,141	7,208
Isolated Systems Business Efficiency Program				3	26	111	67	241	24	472
Heat Recovery Ventilator					1	1		1		3
Small Technology Program						80	71	21	9	181
Business Efficiency Program(Prescriptive)							21	131	503	655
Business Efficiency Program(Custom)						73	773	588	220	1,654
Total	**42**	**140**	**706**	**5,080**	**1,322**	**24,058**	**2,483**	**1,744**	**2,182**	**37,757**

The costs associated with the delivery of the CDM program portfolio provided in Table 4 includes direct costs for advertising, salaries, rebates and other expenses directly associated with a specific program. These costs are recovered from customers through the CDM Cost Recovery Adjustment and vary depending on the uptake of the program and the number of programs offered.

Table 5 provides a breakdown of annual CDM program costs included in the CDM Deferral Account.

[7] Hydro's CDM Cost Deferral Account does not capture spending associated with CDM programs offered to customers on the Labrador Interconnected system, therefore Table 4 does not reflect energy savings associated with these programs.

Table 5 CDM Program Costs Included in the CDM Deferral Account[8] ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Windows	44	41	69	102	150	31	1		
Insulation	40	53	116	108	112	87	62	57	93
Thermostats	13	18	25	43	47	32	19	21	53
Residential Benchmarking								49	45
Coupon Program		113	123						
Commercial Lighting	13		43	10	17	10	11		
Industrial	57	190	98	170	88	1,243	(115)	27	41
Block Heater Timer									
Isolated Systems Community				858	871	615	530	451	936
Isolated Systems Business Efficiency Program				93	115	96	7	45	41
Heat Recovery Ventilator					8	3	4	4	5
Small Technologies					1	219	186	143	104
Business Efficiency (Prescriptive)								14	12
Business Efficiency (Custom)					40	92	134	193	126
Isolated Load Control Pilot							6	158	17
Appliance Retirement Pilot							56	(12)	-
Total	**167**	**415**	**474**	**1,384**	**1,449**	**2,428**	**901**	**1,150**	**1,473**

7.0 Program Participation and Savings

Table 6 provides statistics on participation for each of Hydro's programs. The transaction units are specific to each program. The Residential Energy Star Window, Insulation, Thermostat and HRV Programs reflect approved rebates. The Coupon Program reflects numbers of coupons redeemed. The Commercial Lighting and Small Technology Programs each reflect the number of products rebated through the programs. The Block Heater Timer Program reflects the number of timers determined to be installed through post-giveaway surveys or coupon redemption. The Isolated Systems Business Efficiency Program, Business Efficiency Program, and Industrial Efficiency Programs reflect the number of completed retrofit projects. The Isolated Systems Program denotes the number of residential and commercial customer premises that received direct installations. Finally, the Residential Benchmarking Program indicates the number of customers included in the treatment group.

[8] Credits are due to an overstated accrual in the preceding year.

Table 6 Life-to-Date Program Participation

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Windows	11	19	41	61	48	24	7			211
Insulation	14	24	104	50	53	22	35	31	39	372
Thermostats	4	28	32	45	23	20	15	63	56	286
Residential Benchmarking								1,000	1,000	2,000
Coupon Program		3,178	5,832							9,010
Commercial Lighting	27	74	470	320	339	377	323			1,930
Industrial			1	1		3		1		6
Block Heater Timers					629					629
Isolated Systems Community				1,355	1,153	1,181	965	345	1,007	6,006
Isolated Systems Business Efficiency Program				1	1	4	1	5	3	15
Heat Recovery Ventilator					1	11	9	8	7	36
Small Technology Program						6,920	4,551	26,601	9,764	47,836
Business Efficiency Program(Prescriptive)							4	173	2,309	2,486
Business Efficiency Program(Custom)						4	3	10	7	24
Total	**56**	**3,323**	**6,480**	**1,833**	**2,247**	**8,566**	**5,913**	**28,237**	**14,192**	**70,847**

8.0 Levelized Utility Costs

The Levelized Utility Cost (LUC) is a method used to compare the costs associated with conservation programs to the value of energy saved. The LUC represents the economic cost to the utility (₵ per kWh) to generate energy savings. It is an industry metric which is calculated by discounting future energy savings resulting from conservation programs to a present value. Table 7 provides the levelized utility cost for Hydro's programs for 2017. The energy savings represent the annual savings resulting from the individual program participation during 2017.

Table 7 Hydro Program Participation, Savings and Levelized Utility Cost 2017

	Participation	Energy Savings (MWh)	Non-coincident Demand Savings (kW)	2017 Levelized Utility Costs (¢/kWh)	Life to date Levelized Utility Cost (¢/kWh)
Windows	-	-	-	-	15.5
Insulation	39	155	26	6.6	3.6
Thermostats	56	59	-	10.3	10.1
Residential Benchmarking	1,000	131	19	34.6	34.6
Coupon Program	-	-	-	-	-
Industrial	-	-	-	-	-
Block Heater Timer	-	-	-	-	-
Isolated Systems Community	1,007	1,141	352	18.7	11.9
Isolated Systems Business Efficiency Program	3	24	8	22.1	11.9
Heat Recovery Ventilator	7	4	1	20.3	23.5
Business Efficiency (Custom and Prescriptive)	2,316	908	129	2.6	4.2
Small Technology Program	9,764	90	28	19.4	17.4

9.0 Conclusion

Hydro has continued its efforts to promote energy conservation and demand management throughout 2017. Hydro continues to work with Newfoundland Power to develop and execute programs that are accessible to all customers of the Utilities. The takeCHARGE programs have been successful in providing education and fostering the development of a culture of energy conservation. In addition, Hydro continues to work with its customers to understand their needs and drivers of their electrical consumption, ultimately supporting the achievement of sustainable energy savings through the various programs described in this report. Hydro will continue to work towards the completion and implementation of the Five-Year Conservation Plan 2016-2020 and remains committed to adapting its programs as the needs of its customers continue to evolve. Overall, Hydro's efforts supported annual incremental energy savings of 2,512 MWh in 2017 and accumulated energy savings of 40,971 MWh since 2009.

Appendix A

CDM Program Descriptions

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1.0 Residential takeCHARGE Rebate Programs

Program incentives are processed primarily through customer applications. The programs are promoted in partnership with trade allies in the retail, home building and renovation industries.

1.1 Insulation Rebate Program

The objective of this program is to provide incentives to increase the insulation R-value in residential basements, crawl spaces and attics, thereby increasing the efficiency of the home's building envelope. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects are eligible. Customers can receive an incentive of 75% of basement wall and ceiling insulation materials up to $1,000, and 50% of attic insulation material costs up to $1,000.

1.2 Thermostat Rebate Program

This program encourages installation of programmable and electronic thermostats to allow customers better control of the temperature in their home and to save energy. These high performance thermostats allow customers to set back the temperature during the night or when they are away. Eligibility for the program is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects and new home developments are eligible. Incentives of $10 for each programmable thermostat and $5 for each electronic high performance thermostat are offered.

1.3 HRV Rebate Program

This program encourages customers to purchase a high efficiency HRV to improve the efficiency of their home. Eligible measures in this program include HRV models that have a Sensible Recovery Efficiency of 70% or more. Customers who purchase a high efficiency HRV can receive a rebate of $175. All customers are eligible for this program regards of age of home or heat source.

1.4 Isolated System Community Energy Efficiency Program – Hydro Program

This program includes both residential and commercial components targeting customers in Isolated Diesel and L'Anse au Loup Systems. The focus is on residential customers through the direct install of a kit of technologies, at-cash coupons on small technologies and mail-in rebates on energy efficient appliances. Commercial customers also receive a direct install of a kit of technologies. The kit includes items for water savings, draft proofing, lighting and other measures.

Homeowners receive education on energy efficiency and information on the existing takeCHARGE rebate programs. Community events, social media promotions and exchanges held to promote the program and energy efficiency awareness.

1.5 Block Heater Timer Program – Hydro Program

This program targeted customers in the Labrador Interconnected System to encourage the purchase of energy saving Block Heater Timers through in-store discounts offered at partnering retailers. The program launched with a giveaway of the technology to create awareness of the product as there was little or no use of the technology before the program. The incentive was offered over two winter seasons (2012-2013 and 2013-2014) and ended in spring 2014.

1.6 Small Technologies Program

1.6.1 Instant Rebates

This program promotes a variety of smaller technologies, such as LED lighting, and smart power bars, through instant rebates available at the cash register of participating retailers. All customers are eligible for this program regardless of age of home or heat source.

1.6.2 Appliances and Electronics

This program encourages customers to purchase high efficiency appliances. Participants receive incentives of $100 for select energy efficient washers, freezers, and $20 for eligible TVs. All customers are eligible for this program regardless of age of home or heat source. This program ended December 31, 2017.

1.7 Residential Benchmarking Program

This program encourages customers to adopt energy efficient behavioural changes. Participants receive Home Energy Reports that provide insight into their home's electricity use. The reports help customers understand changes in their usage over time, as well as how they compare to similar homes. They will also include practical tips on how to save energy moving forward. The program also includes an online component that allows customers to engage even further through weekly challenges and personalized saving plans.

Approximately 1,000 customers were randomly selected as participants in this program. Program participants broadly reflect the composition of Hydro's customer base in heating type and geographical distribution. No financial incentive is offered for this program.

1.8 Energy Efficient Loan Program

This is a program offered by the Government of Newfoundland and Labrador and takeCHARGE, making it easier to save energy and money. On-bill financing with a reduced interest rate by 2.5% from standard utility financing rates, is available on insulation, heat pumps and home energy assessments. Through EELP, eligible applicants can receive low-interest financing for up to $10,000 over a maximum of five years.

2.0 Commercial takeCHARGE Rebate Programs

2.1 Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency and demand reduction projects.

This program is available for existing commercial facilities that can save energy or reduce demand by installing more efficient equipment and systems. The program includes custom project incentives and prescriptive rebates for specific measures on a per unit basis.

2.2 Isolated Systems Business Efficiency Program (ISBEP) – Hydro Program

The ISBEP was launched in 2012 and targets commercial customers in the Isolated Diesel and L'Anse au Loup Systems. The program provides a custom approach to finding energy efficiency solutions and financial assistance for feasibility studies and for retrofit projects. It has the same program design and offerings as the joint utility Business Efficiency Program, but has higher incentive levels for retrofit work because of the higher avoided cost of generation in these systems.

3.0 Industrial Energy Efficiency Program (IEEP)

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings, and other supports to enable industrial facilities to identify and implement efficiency and conservation opportunities. This program is a custom program to respond to the unique needs of the industrial market, rather than a prescriptive technology approach.

Appendix B

Five-Year Conservation Plan: 2016 - 2020

FIVE-YEAR CONSERVATION PLAN: 2016 – 2020

newfoundland labrador hydro
a nalcor energy company

NEWFOUNDLAND POWER
A FORTIS COMPANY

October 2015

CONTENTS

1.0 EXECUTIVE SUMMARY

Newfoundland and Labrador Hydro ("Hydro") and Newfoundland Power have offered customer energy conservation programs on a joint and coordinated basis under the *takeCHARGE* brand since 2009. These programs provide a range of information and financial supports to help customers manage their energy usage.

The joint *Five-Year Conservation Plan: 2016-2020* (the "2016 Plan") builds on this experience, and continues to reflect the principles underlying two previous joint, multi-year conservation plans developed by Hydro and Newfoundland Power (the "Utilities").[1] It reflects refinement of the opportunities identified in a recently updated conservation potential study (the "2015 CPS") through in-depth local market research and program cost benefit analysis.

The 2016 Plan represents both growth and evolution of the Utilities' joint customer energy conservation program portfolio. It includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. The approach outlined in this plan will remain flexible to address the changing provincial landscape, in terms of customer expectations, market conditions for energy efficient products, and electrical system costs. The 2016 Plan also addresses customer support and education, program planning and evaluation processes, as well as the Utilities' costs and cost recovery arrangements.

The total estimated energy savings for 2016 through 2020 are 883 GWh.[2] Total estimated costs through this period are $41.1 million.

[1] The *Five-Year Energy Conservation Plan: 2008-2013* was filed with the Board on June 27, 2008. The *Five-Year Energy Conservation Plan: 2012-2016* was filed on September 14, 2012.

[2] The energy savings indicated throughout the *Five-Year Energy Conservation Plan: 2016-2020* represent *gross* energy savings achieved by customers. These savings reflect all technologies installed by participating customers since program implementation. *Net* energy savings would reflect adjustments for: (i) the timing of customer installations giving rise to the energy savings; and (ii) program *free ridership* (an estimate of participants who would have chosen the more efficient product without the program).

2.0 BACKGROUND

2.1 Planning Context

Hydro and Newfoundland Power have collaborated on customer energy conservation program planning and delivery for the past 8 years. The programs offered jointly under the takeCHARGE brand have included a variety of information and financial supports which help customers manage their energy usage. The Utilities' provision of energy conservation programming is responsive to customer expectations, supports efforts to be responsible stewards of electrical energy resources and is consistent with provision of least cost, reliable electricity service. Initiatives address conservation opportunities for customers in each sector: residential, commercial and industrial.

The Utilities' practice has been to refresh their joint strategic plans for customer conservation programming every three to four years. This ensures programs achieve long term goals while being responsive to changes in customer expectations, market barriers, technology developments, and economics. Current program offerings are based on the Five Year Energy Conservation Plan: 2012-2016 ("the 2012 Plan").

One of the key inputs into the 2016 Plan was the outcome of the Conservation Potential Study ("CPS"), completed by the Utilities in 2015. The CPS identified cost-effective energy and demand reduction measures, outlined general parameters for program development, and quantified achievable energy savings potential by sector and end-use. The results of the CPS are considered with the Utilities' experience and other factors in the local market to determine potential programs and energy saving targets for the 2016 Plan.

The Utilities' conservation planning is coordinated with overall planning for the electrical system. Significant changes to the Island Interconnected System are anticipated to occur in this planning period. Interconnection of the Muskrat Falls hydroelectric development is forecast for 2018 and will include the Island's first connection to the

North American grid. As a result, there is uncertainty with respect to the marginal cost of energy and capacity on the Island Interconnected System beyond 2017.

Schedule A provides the current forecast marginal cost of energy and capacity for 2015-2035.[3] The forecast indicates a decrease in the marginal cost of energy beginning in 2018. This effectively reduces the value of energy savings arising from customer energy conservation programming, and limits the types of programs that can be cost effectively offered.

Costs of electricity supply additions are expected to be incorporated into customer rates starting in 2018, putting upward pressure on customers' rates. This is expected to increase customers' motivation to conserve energy to manage their electricity costs. Also, the recent economic slowdown is anticipated to continue into this planning period and will influence customer behaviour with regards to conservation.

The 2008 and 2012 Five Year Conservation and Demand Management Plans, delivered jointly by the Utilities, had focused primarily on energy conservation. This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Generating Station) which justified such a focus. The events of recent winters have since brought to light issues with peak load and generation capacity on the Island Interconnected System which are anticipated to continue into this planning period. The 2016 Plan therefore considers demand management opportunities as well as energy conservation.

The Utilities have been offering some form of customer energy conservation programming since 1991, and have achieved significant energy savings over this time. The current forecast, particularly for insulation, anticipates diminishing returns. For example, the remaining potential for energy savings through insulation upgrades has

[3] The marginal costs used to determine cost effectiveness of the customer energy conservation programs are based on the most recent marginal cost forecast as projected by Hydro in February 2015. These estimates are currently under review by Hydro to incorporate the forecast interconnection with the North American grid. Once more current estimates are available, they will be incorporated in the screening process.

been impacted by changes to the National Building Code requiring basement insulation in new homes, as well as barriers to retrofitting many of the eligible existing homes. This is consistent with experience in other North American jurisdictions where utility programming has harvested the "low hanging fruit" and subsequently has moved on to address more challenging and costly opportunities.

Energy conservation programming has also been affected by technology advancements and changes to standards. Lighting product standards changes have effectively eliminated availability of incandescent bulbs for consumers. At the same time, LED technology has advanced and become more affordable and available. The pace of this change has been even faster than anticipated in the 2012 Plan. This is demonstrated by higher than projected uptake in the Utilities' Instant Rebate component of the Small Technologies program.

The Utilities continue to work with the Provincial Government, through the Office of Climate Change and Energy Efficiency, regarding policy development for energy conservation and efficiency, and particularly potential impacts and approaches to building codes, product standards and broader market transformation objectives.

Many of the influences on the provincial energy conservation market can be seen in other North American jurisdictions. In recent years, many jurisdictions have experienced decreasing marginal costs of energy and increasing program costs due to maturing conservation programs. As a result, utilities and program administrators have revised their approach to economic analysis of energy conservation. The Utilities have conducted research on current economic evaluation practices. A summary of this research is provided in Schedule B. It indicates that Canadian jurisdictions use the Total Resource Cost ("TRC") test as their primary benefit cost test for program screening, with the Program Administrator Cost test as a secondary test. Only one of the seven Canadian utilities researched used Ratepayer Impact Measure as a primary benefit cost test for program screening. In the United States, most jurisdictions follow

similar practices with over 70% using TRC as the primary benefit cost test and 2% using Ratepayer Impact Measure for program screening.

2.2 Energy Conservation Programs

Based on the 2012 Plan, the Utilities have jointly offered customer energy conservation programs which provide both information and financial incentives to encourage customer installation of energy efficient technologies.[4] In addition, Hydro has offered programming for its customers, such as incentives for commercial customers in its isolated system service territories, where market conditions and system costs differ.

Table 1 shows, by sector, the portfolio of programs that have been offered under the 2012 Plan.[5]

Table 1
Conservation Programs
By Sector

Residential	**Commercial**	**Industrial**
Insulation Thermostat ENERGY STAR Window[6] HRV Block Heater Timer Small Technologies Isolated Systems Community Program	Lighting Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

4 Once installed, these more energy efficient technologies provide energy savings for the customer throughout the life of the product. For example, an HRV has an estimated life of 15 years and will result in energy savings benefits throughout that period.

5 The Utilities also engage in demand management activities, including Newfoundland Power's Curtailable Service Rate Option and Hydro's interruptible load arrangements with its Industrial Customers.

6 The ENERGY STAR Window Program concluded at the end of 2014.

Schedule D summarizes the energy savings and costs for the customer energy conservation programs offered by the Utilities from 2009 through 2015.

Residential Programs

Table 2 provides a summary of residential customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).[7]

Table 2
Residential Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	2.5	7.1	18.6	28.5	38.4	51.5	65.7	**212.3**

The takeCHARGE residential programs are expected to result in aggregate energy savings of approximately 212.3 GWh by the end of 2015.[8]

Insulation Program

As a result of the updates to the National Building Code in 2012, several changes were made to the Insulation Program. New homes are no longer eligible and the minimum R-value requirements for existing homes have been increased. As well, the rebate structure was revised to provide a higher, easy-to-calculate rebate. Customers can receive an incentive of 75% of basement wall or ceiling insulation material costs up to $1,000, and 50% of attic insulation material costs up to $1,000.

[7] Energy savings include savings arising from all technologies installed by all participants since program implementation. This reflects the fact that these technologies provide energy savings benefits for the customer throughout the life of the product.

[8] Since implementation in 2009, there have been approximately 36,650 participants and over 638,000 at-the-cash rebates were provided on energy efficient products in the takeCHARGE residential customer programs.

Thermostat Program

High efficiency programmable and electronic thermostat replacements allow customers to conserve energy at relatively low cost and effort. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage.

ENERGY STAR Window Program

This program concluded at the end of 2014. After 5 years, and over 9,200 participating customers, the program had achieved its objective of making more efficient windows the standard in the local market.

Heat Recovery Ventilator Program

This program promotes the installation of high efficiency heat recovery ventilators ("HRVs"). HRVs have been widely used in new home construction in the province since the 1990s, to control humidity and air quality. The HRV program has experienced lower than projected participation since its launch in late 2013.[9] There has been improvement in 2015, and the Utilities will continue to monitor and evaluate this program in order to find opportunities to increase participation.

Block Heater Timer Program

Hydro provided giveaways and at-the-cash coupons for block heater timers to customers in Hydro's Labrador Interconnected System from 2012-2014. While vehicle engine block heaters are used extensively in this area, timers are rarely used. Instead of using electricity throughout the night, block heater timers allow vehicle owners to reduce the amount of time that electricity is used to warm the vehicle engine. Due to lack of participation this program was not continued past 2014 but commercial customers can take advantage of this technology through the Business Efficiency Program ("BEP") or the Isolated Systems Business Efficiency Program ("ISBEP").

[9] The Utilities have received feedback regarding low customer knowledge of home ventilation, with many customers being unaware of the purpose of a HRV in their home and how it can save energy. Also, there are complexities in the supply chain for acquiring a high efficiency HRV which can be problematic for potential participants.

Small Technologies

The small technologies program is supported by retail partners and appeals to a broad customer group as it does not involve a major home renovation. The program uses different marketing approaches for two different groups of energy efficient products.

The Instant Rebate component offers relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home.[10] Participation and energy savings results in the first two years of the program have exceeded the forecast in the 2012 plan. The Appliance and Electronics component offers incentives that are relatively higher value and available by mail-in and online application throughout the year.[11]

Isolated Systems Community Program

Following two pilot programs in 2010 and 2011, Hydro launched a full-scale, energy efficiency direct install program in 2012. The program includes direct installations of energy efficient products at no cost to homes and businesses.[12] The program also focuses on customer education and building capacity in the communities by hiring and training local representatives. These representatives work in their own communities to promote the program, provide information on energy use, and install the products.

[10] Products include LED lighting, motion sensors, timers, dimmer switches, smart power strips and more.
[11] Products include energy efficient clothes washers, full-size refrigerators, full-size freezers and TVs.
[12] Products include low-flow showerheads and aerators, CFLs, smart power strips, and hot water tank and pipe insulation.

Commercial Programs

Table 3 provides a summary of commercial customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).

Table 3
Commercial Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	0.2	0.9	2.4	3.3	3.9	6.5	11.4	**28.6**

The takeCHARGE commercial programs will result in estimated aggregate energy savings of approximately 28.6 GWh by the end of 2015.[13]

Commercial Lighting Program

The Commercial Lighting Program targets reduced energy use through efficient lighting in commercial buildings, including high performance T8 and T5 fluorescent lighting and LED exit signs. This program has primarily been promoted through local lighting distributors by discounting lighting products at time of purchase.

The Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings from custom projects, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency improvement projects. It also includes rebates for specific measures on a per unit basis.

[13] Since implementation in 2009, there have been over 1,050 participants in the takeCHARGE commercial customer programs.

Isolated Systems Business Efficiency Program

This program is targeted toward commercial customers located in Hydro's isolated system communities. This custom program provides incentives based on the energy savings from efficiency improvement projects. This allows customers to implement energy efficient technologies that are suitable for their specific buildings, equipment and operations.

Industrial Programs

Table 4 provides a summary of industrial customer energy savings achieved through Utility customer energy conservation programs from 2009 through 2015(F).

Table 4
Industrial Program Energy Savings
2009 through 2015(F)
(GWh)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Energy Savings	-	-	0.2	3.3	3.3	25.6	25.6	58.0

The takeCHARGE Industrial Energy Efficiency program will result in estimated aggregate energy savings of approximately 58.0 GWh by the end of 2015.[14]

The Industrial Energy Efficiency Program is a custom program that responds to the unique needs of Hydro's transmission level industrial customers. This program provides financial support for engineering feasibility studies of efficiency projects and for project implementation costs. The Industrial program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011 and the last being submitted in 2013. No projects were completed in 2013 as focus was put on feasibility studies for work to be completed in 2014. The program then underwent an assessment by an external third party in 2014 and was re-launched as a full program in 2015.

[14] Since implementation in 2009, there have been 5 projects completed under the takeCHARGE Industrial Energy Efficiency Program.

2.3 Education & Support

The Utilities continue to provide energy efficiency education and support to customers through a variety of channels, which include a joint website, outreach activities, school presentations and partnerships with other organizations.

Table 5 shows the number of customer-initiated contacts with the Utilities for energy conservation information from 2010 through 2015 YTD.

Table 5
Customer Contacts for
Energy Conservation Information

	2010	2011	2012	2013	2014	2015YTD
Contact Centre Inquiries	11,704	12,624	9,793	9,630	10,830	5,328
Website Visits	52,013	72,996	49,202	76,278	186,003	197,973

The majority of customers chose electronic means of communication with the Utilities to obtain information on energy conservation and rebate programs. This is consistent with promotion of the takeCHARGE website as the primary resource for customer inquiries and information. Customer visits to the takeCHARGE website grew by 144% from 2013 to 2014. Activity in the first eight months of 2015 shows continued growth, with approximately 80% of website visits via a mobile device. This increase is related to increased promotion, changes to existing programs, and addition of new programs.

The Utilities have participated in an average of 214 community outreach events each year since 2012. This included presentations to retailers and suppliers, senior citizens, trade allies and other groups. takeCHARGE information booths were displayed at home shows, trade fairs, and retail stores across the province. The Utilities also offer a number of outreach events, such as the annual takeCHARGE of Your Town Challenge and Energy Efficiency Week. Through these outreach activities, members of the takeCHARGE team assisted customers with their energy efficiency questions, while raising awareness of energy conservation and the takeCHARGE rebate programs.

Over the last three years the takeCHARGE *Kids in Charge* K-I-C Start school program, has provided energy efficiency and conservation education support to students throughout Newfoundland and Labrador. This has included delivering in classroom presentations and an annual contest for primary and elementary students. In 2014, takeCHARGE partnered with the Provincial Office of Climate Change and Energy Efficiency to extend this program through the Hotshots pilot program.[15] As a result, in 2014-15 school year, over 11,000 students in 106 schools throughout the province participated in 448 presentations about energy conservation.

Trade allies play an integral role in helping customers make knowledgeable decisions regarding energy conservation and related home improvements. Retail partners display information about takeCHARGE programs and energy efficiency products in their stores and in flyers, as well as during special promotional events.[16] Similarly, the Utilities are continuing to grow a network of business to business service providers and suppliers that support the commercial and industrial sectors.[17]

The Utilities have also developed partnerships with a variety of other organizations that share common goals for the province’s conservation market, including the Association of Newfoundland and Labrador Realtors, the Canadian Home Builders Association, Newfoundland and Labrador Housing Corporation, and the Canadian Mortgage and Housing Corporation.

[15] Through the HotShots pilot, the Province provided funding and support for additional in-class presentations, curriculum linked teacher materials, and a contest for high school students.

[16] The Utilities continue to work with over 160 retail store partners, 11 manufacturers/distributors, and approximately 50 HRV installers.

[17] These include lighting equipment manufacturers and distributors, electrical and HVAC contractors, and engineering firms.

Table 6 shows costs for education and support for the period 2009-2015(F).

Table 6
Conservation Education & Support
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Education	666	486	428	426	501	647	693	3,847
Support	236	206	219	222	186	174	158	1,401
Total	**902**	**692**	**647**	**648**	**687**	**821**	**851**	**5,248**

2.4 Planning & Evaluation

Planning

The focus of the Utilities' CDM planning process is to develop a 5-year plan for the implementation of comprehensive customer energy conservation and demand management programs around the technologies that were determined to have conservation potential in the provincial market. The completion of the CPS in 2015 effectively initiated the development of the 2016 Plan.

Programs are developed and revised through consultation with the various market stakeholders, such as government, trade allies and local interest groups, to gather feedback on program delivery strategy.

Table 7 shows costs for conservation planning for the period 2009-2015(F).[18]

Table 7
Conservation Planning
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Planning	401	429	509	404	462	958	1,202	4,365

Variations in annual conservation planning costs primarily reflect the periodic nature of the Utilities' program planning and research activities.

Research

In 2013, the Utilities completed a joint Commercial Facility Equipment Inventory ("CFEI") on 54 commercial facilities.[19] This research provided information on how commercial customers use electricity, through an inventory and analysis of all mechanical and electrical equipment in each facility.[20] This data was used as a direct input into the CPS conducted in 2015.

In 2014, Newfoundland Power and Hydro jointly conducted a survey to gather information regarding electricity end uses in the residential sector. The information gathered was used to assess potential electricity savings opportunities, and was used as a direct input into the current planning cycle. These results are also being taken into account in making adjustments to the *takeCHARGE* programs. For example, because

18 Conservation planning costs include costs related to surveys and research, development of the potential study and the five-year plan, and general administration.

19 The CFEI was completed by CBCL Limited, a consultant that conducted on-site facility audits for participating commercial customers. CBCL Limited is a leading employee owned multidisciplinary engineering and environmental consulting firm in Atlantic Canada.

20 The CFEI found, for example, that the food retail sector are the largest users of electricity on a square footage basis of the customers audited, followed by the manufacturing/fish processing sector.

of survey findings regarding the prevalence of CFLs, these have been removed from the Instant Rebates Program beginning in the fall of 2015.[21]

Newfoundland Power completed research on ductless mini-split heat pumps ("MSHP") from 2013 to 2015. The objectives of this research were to assess the current MSHP market in Newfoundland, the use of the MSHP as a supplementary heat source and the potential impact of MSHPs on the electricity system. The results indicate that MSHP are more efficient and do save energy compared to electric baseboard heat.[22] This analysis also shows that there is not likely to be peak demand reduction on the electricity system from installation of MSHPs.[23] Customer demand for MSHP products has grown significantly in recent years and continues to be strong. However, there are issues with availability of qualified installers and customer understanding of product quality requirements.

In the fall of 2014, Newfoundland Power launched a pilot program to assess the economic, market, and technical feasibility of direct load control to reduce overall peak demand. This pilot was initiated in response to the constraints on system capacity that became evident after the events in January of 2013 and 2014. The pilot involved controlling hot water tanks in approximately 500 customer homes in Paradise and Mount Pearl. Demand reduction achieved by the direct load control events on average was 0.6 kW per participant, and for events that included all participants, approximately

[21] Customers were asked what types of lighting they use in areas of their house where they spend the most time: 63% reported that they use incandescent bulbs, 53% CFLs, and 18% LEDs (multiple responses allowed). In another question, 31% of respondents claimed to have changed all their bulbs to more energy efficient types, and 45% indicated that they have begun to change to more energy efficient types.

[22] Approximately half of the homes in the study recorded energy savings after installation of the MSHP. In these homes, electricity usage declined by an average of 5,300 kWh or 19% per year, with savings ranging from 7% to 50%. The remaining homes recorded an increase or no change in energy usage. This appears to reflect factors such as heating of additional living space, fuel switching, or operational issues with the MSHP.

[23] Savings at time of system peak are dependent on a number of factors such as the efficiency and defrost cycle of the MSHP system, and temperature. A high efficiency MSHP may be capable of providing peak savings in warmer parts of the province but not in colder regions, while a less efficient MSHP may not be capable of providing peak savings in any region. On colder weekdays, the study observed little difference in the load profile of the MSHP homes vs. electric baseboard homes, and occasionally the MSHP homes' peak load was slightly higher.

298 kW of demand reduction was achieved. The Pilot results also indicate that a full scale provincial program does not meet the economic requirements.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project, which is supported by the Utilities and administered by Hydro, began in September 2014 and aims to assess whether real time display of energy use has a positive effect on electricity conservation behavior. The pilot involves approximately 750 customers: 250 with an in-home display device, 250 with an in-home display device as well as electricity conservation information in a monthly mail out, and 250 with only the electricity conservation information. Monitoring of participants will continue until January 2016 and the final report will be submitted to Government by end of March 2016.

Evaluation

The customer energy conservation programs are continuously evaluated by the Utilities on their energy savings, market impacts and delivery process effectiveness. Additional review by external third party evaluators has also been conducted. Program evaluation findings are used to refine program design and implementation details on an ongoing basis, as well as support further planning.

For example, the third party residential program evaluation in 2013 found that two-thirds of windows sold in the province were ENERGY STAR, which supported the Utilities' decision to conclude the ENERGY STAR Windows Program.[24]

Economic and energy savings evaluation of the customer energy conservation programs is performed annually. Program participants are required to provide certain information on program rebate applications. This information ranges from technical data, such as the R-value of installed insulation, or efficiency rating of a HRV to the type of heating in the home and its geographic location. Analysis of this data allows the

[24] The 2013 residential program evaluation was conducted DNV GL- Energy, headquartered in Burlington, Massachusetts, and specializing in evaluating programs that promote energy efficiency, demand response, and distributed generation.

Utilities to accurately estimate the energy savings for each program and perform industry standard economic cost-benefit tests.

2.5 CDM Costs & Cost Recovery

Table 8 provides a summary of the customer energy conservation program and general costs of the Utilities from 2009 through 2015(F).[25]

Table 8
Conservation Costs
2009 through 2015 (F)
($000s)

	2009	2010	2011	2012	2013	2014	2015F	Total
Programs								
Residential	1,386	2,322	3,473	3,436	3,921	4,277	5,188	24,003
Commercial	79	95	216	214	355	926	1,388	3,273
Industrial	57	226	103	173	89	1,244	19	1,910
Total Programs	1,522	2,643	3,791	3,823	4,365	6,447	6,595	29,186
General	1,303	1,121	1,156	1,052	1,149	1,779	2,054	9,614
Total	**2,825**	**3,764**	**4,947**	**4,875**	**5,514**	**8,226**	**8,649**	**38,800**

The Utilities' costs related to conservation programs have increased from approximately $2.8 million in 2009 to $8.6 million in 2015. This primarily reflects the addition of new customer energy conservation programs in 2013, specifically the Small Technologies Program and the Business Efficiency Program. This also reflects the increased levels of customer participation and rebates related to the joint takeCHARGE program portfolio. The expansion of customer programs has also resulted in increasing energy savings.

[25] This cost summary does not include (i) costs related to programs offered independently by the Utilities prior to June 2009; (ii) costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management); and (iii) costs related to Hydro's interruptible service arrangements with its Industrial Customers.

Details of the Utilities' customer energy conservation program and general costs are provided in Schedule C.

The Utilities each bear the costs related to the provision of customer energy conservation programming in their own service territory. General conservation and program costs, such as customer rebates and costs related to responding to customer inquiries are incurred directly by each utility. Costs which are incurred jointly, such as provincial mass media advertising, are split on an 85% / 15% basis between Newfoundland Power and Hydro, respectively.[26]

Cost Recovery

Newfoundland Power's current conservation cost recovery practice reflects Board Order No. P.U. 13 (2013). Conservation program costs are deferred and amortized over a seven-year period. Through the annual operation of the Company's Rate Stabilization Adjustment, customer rates are adjusted to reflect any difference between the conservation program costs included in the most recent test year and the costs actually incurred. Newfoundland Power’s annually recurring general conservation costs related to providing general customer information, community outreach and planning are expensed in the year in which the costs are incurred.

Hydro’s current customer rates, as approved by the Board in Order No. P.U. 8 (2007), include recovery of approximately $0.4 million in costs related to management and planning of conservation programming. In each year from 2009 to 2014, inclusive, Hydro has deferred recovery of direct program costs related to the expansion of customer energy conservation programming under the 2008 Plan and 2012 Plan.[27] As of August 14, 2015, associated with a general rate application filed by Hydro on July 30, 2013, and an amended general rate application filed by Hydro on November 10, 2014,

[26] This approach to division of jointly incurred costs reflects the proportion of customers served by each utility.

[27] The deferred recovery of these costs in 2009, 2010, 2011, 2012, 2013, and 2014 were approved by the Board in Order Nos. P.U. 14(2009), P.U. 13(2010), P.U. 4(2011), P.U. 3(2012), P.U. 35(2013), and P.U. 43(2014), respectively.

the Consumer Advocate, Newfoundland Power, the Industrial Customer Group and Vale, with participation by Board Hearing Counsel, have engaged in negotiations with Hydro. As a result, these parties agreed that "Hydro's proposal to defer and amortize annual customer energy conservation program costs, commencing in 2015, over a discrete seven year period in a Conservation and Demand Management (CDM) Cost Deferral Account should be approved."[28]

3.0 PLAN: 2016-2020

3.1 Conservation Potential & Program Selection

The programs included in the 2016 Plan have been selected based on a number of considerations. Opportunities identified in the 2015 CPS are a key input and these have been further assessed by the Utilities in terms of engineering, market and economic viability. Consideration has also been given to the experience of the Utilities and others in the local marketplace, feedback from customers, as well as experience shared from other Canadian jurisdictions.

Conservation Potential Study

In June 2015, a comprehensive study was completed of electricity conservation and demand management potential for the province.[29] This Conservation Potential Study estimated the potential for electrical energy and demand savings by sector and by electricity system from 2015-2029. It also identified specific technologies available to assist in achieving that potential. The CPS essentially provides a framework, consistent with current North American practices, within which to assess conservation programming. The findings enabled the Utilities to quickly focus on cost effective technologies and begin assessment of market characteristics to guide program concept development.

28 Newfoundland and Labrador Hydro – Amended General Rate Application – Parties' Settlement Agreement dated August 14, 2015.

29 ICF International (previously called Marbek) conducted Conservation Potential Studies for the Utilities in 2007 and 2015. ICF International is a leading environmental and energy management consultancy and has extensive experience conducting Conservation Potential Studies in Canada.

Electrical system marginal costs of supply are used in the CPS to screen the economic viability of more efficient technologies.[30] For the current CPS, these costs were based on the most recent marginal cost forecast as projected by Hydro in February 2015.[31] These estimates are currently under review. Once Hydro's marginal cost study is completed, the CPS results will be reassessed. If such a review results in changes to the list of cost effective technologies with conservation potential, these will be considered in future updates to the 2016 Plan.

Figure 1 shows the baseline provincial energy usage forecast which was input to the 2015 CPS (the reference case), and the upper and lower achievable potentials estimated by the Potential Study.[32]

[30] Technologies are considered to be economically viable when the cost of saving one kWh or kW of electricity is equal to, or less than, the marginal cost of supplying the electricity.

[31] The 2015 CPS included an analysis of the sensitivity of potential technologies to changes in marginal costs. The analysis was based on a range of + 30% to – 10% of the February 2015 forecast marginal costs. It indicated a modest level of variability in technology viability and resulting conservation results. Please see CPS, section 7.5 Energy Efficiency Supply Curve, filed with the Board September 15, 2015.

[32] The reference case is based on the provincial energy usage forecast from 2014. After this study was completed the energy usage forecast decreased due to the economic downturn, mainly in the industrial sector. The achievable potential is defined as the portion of the economic conservation potential that is achievable through utility interventions and programs given institutional, economic and market barriers. The upper achievable potential is considered to be the best case scenario with all market barriers removed, such as capital cost and product accessibility. The lower achievable potential is considered a business as usual scenario with the existing market barriers remaining in place.

Figure 1
Conservation Potential Study Results
Provincial Electrical Consumption
2014-2029

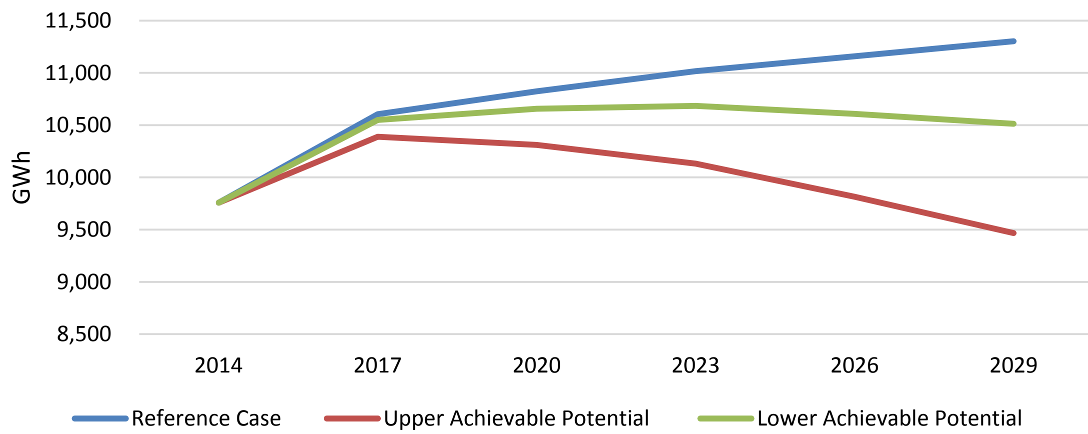


Figure 1 shows that, over time, the cumulative effects of implementing cost effective efficient technologies can significantly reduce forecast growth in electricity usage.[33]

Figures 2 and 3 show the results of the CPS regarding achievable demand reduction potential from energy efficiency measures ("Energy Efficiency") and from demand response specific measures ("Demand Response") by 2020.[34]

33 At the end of the first estimation interval, in 2017, the CPS shows a range of 55 GWh for the lower achievable potential savings and 215 GWh for the upper achievable potential savings. This compares with annual savings of approximately 116 GWh currently estimated in the Plan for the same timeframe.

34 The Commercial and Industrial sector includes Hydro's large transmission level Industrial customers as well as Newfoundland Power's general service customers.

Figure 2
Lower Achievable Demand Reduction Potential
Island Interconnected System
2020
(MW)

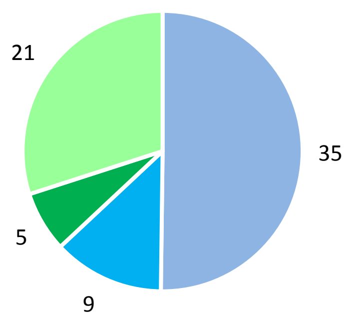
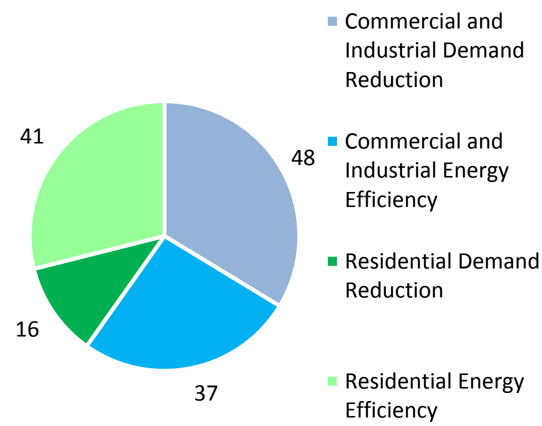


Figure 3
Upper Achievable Demand Reduction Potential
Island Interconnected System
2020
(MW)



Figures 2 and 3 show 70 MW for the lower potential and 142 MW for the upper potential demand reduction on the Island Interconnected System.[35] Installation of energy efficiency measures that reduce consumption during times of peak demand account for approximately 43% and 55% of the lower and upper achievable demand reduction, respectively, by 2020.[36]

The majority of the demand reduction potential was identified in the Commercial and Industrial sectors. Specifically, the Industrial sector represents about 87% and 74% of the total lower and upper achievable demand reduction, respectively. The demand reduction technologies identified through the CPS as having the most potential included curtailable load arrangements with commercial and industrial customers and direct load control of residential hot water tanks.

[35] 21+35+9+5=70 and 41+16+37+48= 142
[36] (21+9)/70=43% and (37+41)/142=55%.

Selection

The technologies that passed the economic screening of the CPS were reviewed in detail to assess their possible inclusion in the 2016 Plan. Local market research was conducted to identify barriers to broader adoption of more efficient technologies, such as capital cost, market availability and awareness. This included consultation with market stakeholders and trade allies, as well as discussions with other utilities.

Once existing market barriers were identified, a program strategy was then developed to attempt to overcome those barriers. Costs associated with the program were considered and the cost effectiveness of the program determined.[37] This more detailed review of program costs and benefits can cause a technology that had passed economic screening in the CPS to fail the economic tests required of CDM programs.

Economic Screening

The Utilities' economic screening of the customer energy conservation programs has previously required a positive result for both the Total Resource Cost ("TRC") and Ratepayer Impact Measure ("RIM") cost-benefit tests.[38] Recent research indicates Canadian and U.S. utility practice has changed to focus on the TRC and Program Administrator Cost ("PAC") tests.[39]

The Utilities recommend adoption of the TRC as the primary means of program economic screening, and the PAC as a secondary means. This is consistent with current North American practice, and is appropriate based on the electrical system marginal costs and program objectives in this jurisdiction. Based on this recommendation the programs included in the 2016 Plan passed economic screening

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[37] Program cost estimates include marketing, delivery and administration, incentives, measurement and verification, and evaluation.

[38] In Order No. P.U.7 (1996-97), the Board required customer conservation programs to be evaluated with respect to rate impact, as well as the total resource costs. The Utilities' have interpreted this Order to require a TRC of 1.0 and a RIM of 0.8 as described in *Newfoundland Power Inc. – 2009 Conservation Cost Deferral Application, Section 2: Proposed Customer Program Portfolio* filed with the Board October 29, 2008.

[39] See Section 2.1, page 4, and Schedule B.

based on the TRC and PAC.[40] The Utilities' will continue to monitor changes to economic screening practices to appropriately reflect evolving program characteristics and electrical system costs.

3.2 Conservation & Demand Management Programs

The 2016 Plan builds on the outcomes of the 2012 plan as well as the experience of the Utilities. Programs included in the 2016 Plan address conservation opportunities in all three sectors: residential, commercial, and industrial. The 2016 Plan includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. These conservation programs are broadly consistent with programs offered by utilities in other jurisdictions.

Table 9 shows, by sector, the portfolio of programs to be offered under the 2016 Plan.

Table 9
Conservation Programs
By Sector

Residential	Commercial	Industrial
Insulation Thermostat HRV Small Technologies Isolated Systems Community Program Benchmarking	Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

40 Application of the RIM test would result in elimination of a number of programs, including Benchmarking, HRV, and Small Technologies.

Residential Programs

Insulation, Thermostat and HRV Programs

These existing joint incentive programs primarily target space heating energy savings, and will continue to be offered as part of the 2016 Plan. The remaining eligible market for the Insulation and Thermostats programs has been declining in recent years. The HRV program has had limited participation due to barriers related to customer understanding and market complexity. These programs will be continuously evaluated to ensure program cost effectiveness.

Small Technology Program

The jointly offered Small Technologies program will continue to use different marketing approaches for the two different groups of energy efficient products.

The Instant Rebate component will continue to offer relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home. As part of the 2016 Plan, Instant Rebates will include additional technologies.[41] It is anticipated that this component will end during 2018 as LED lighting becomes the norm in the residential lighting market.[42] Most of the energy savings benefits in this program are related to customers' early adoption of LED lighting from less efficient technologies, and energy savings from non-lighting products are not expected to be sufficient to offset the program delivery costs.

Incentives for the Appliance and Electronics component will continue to be available through 2017. At that time, anticipated reductions in marginal costs on the electricity system will effectively reduce the value of energy saving benefits, causing the program to fail economic screening.

[41] As part of the 2016 Plan, Instant Rebates will include additional technologies, such as faucet aerators, door bottom weather stripping, door adhesive weather stripping, window insulation kits, electrical outlet gaskets, and caulking.

[42] The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Isolated Systems Community Program

The existing format for this program will continue to be offered to customers in Hydro's isolated system communities through 2017. Information and feedback collected in 2014 and 2015, particularly for the direct install component, will be used to evaluate and plan for the Isolated Systems Community Program beyond 2017.

An Appliance Retirement component will be added to this program beginning in 2016, targeting at least one community. Older inefficient appliances will be removed from participating homes and routed for appropriate disposal.[43]

Benchmarking

This new joint program will promote customer behaviour changes to encourage more efficient energy use. Benchmarking involves using social norms to encourage neighbourly competition to reduce electricity consumption. This program will include comparison of participant households' energy consumption with their energy history and that of similar households. Participants will also receive personalized home energy reports that provide household specific electricity usage information and savings tips to help them reduce energy use and lower their electricity bills. This program will be available to customers from 2016 to 2019.

Commercial Programs

Lighting Program

Beginning in 2016, existing commercial lighting program products will become prescriptive rebates under the Business Efficiency Program, including the fluorescent high bay, high performance T8 fluorescent lamp and LED exit sign. This change will allow for more specific marketing initiatives and increased awareness of the rebates available for these technologies.

[43] This component will be evaluated to determine whether a broader program would be cost effective.

Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts have become the market standard. Industry partners indicate that approximately 55% of ballasts sold in the province in 2014 meet the program efficiency criteria.[44]

Business Efficiency Program

The Business Efficiency Program, offered jointly by the Utilities, will continue to provide custom and prescriptive incentives to commercial customers for energy efficiency improvements. Continued growth in customer participation and energy savings are anticipated for this program. The Utilities will increase the customer education and awareness component of this program to include sector-based identification of energy efficiency opportunities. New technologies will also be added to the program's list of prescriptive incentives.[45]

Isolated Systems Business Efficiency Program

This program will continue through 2020, and will be offered to Hydro's commercial customers located in isolated system communities. The program will continue to provide incentives based on the energy savings of customer projects, similar to the Business Efficiency Program.

Industrial Programs

Industrial Energy Efficiency Program

Through 2020, this customized program will continue to offer support and financial incentives based on energy savings for retrofit of industrial process equipment for Hydro's transmission level industrial customers.[46]

[44] Note that U.S. Federal Regulations are now equivalent to this ballast efficiency specification.
[45] These include: LED screw-in lamps, high bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems, and low flow pre-rinse spray valves.
[46] The Industrial Energy Efficiency Program's cost effectiveness and potential energy savings will be evaluated on a year to year basis.

Customer Energy Savings

Table 10 shows forecast customer energy reduction estimates for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 10
2016 Plan Energy Reduction Estimates
2016 through 2020
(GWh)

	2016	2017	2018	2019	2020	Total
Residential	80.4	102.7	118.1	123.5	111.7	536.4
Commercial	18.7	27.6	37.5	48.6	61.4	193.8
Industrial	30.6	30.6	30.6	30.6	30.6	153.0
Total	129.7	160.9	186.2	202.7	203.7	883.2

The programs in the 2016 Plan will result in estimated aggregate customer energy savings of approximately 883.2 GWh from 2016 through 2020. Customer energy savings are forecast to increase annually through 2020, due to expansion of the program portfolio and the addition of program technologies for the residential and commercial sectors.

Several program offerings are expected to be concluded during the planning period. These include the Small Technologies program and the Benchmarking program. Design of alternate programming for the residential sector is anticipated through the Utilities' program planning in 2018.

Demand Management

The previous conservation and demand management plans have focused primarily on energy conservation.[47] However, the Utilities' customer energy conservation programs have resulted in quantifiable demand savings.

The technologies identified through the CPS as having the most potential for demand reduction included direct load control of residential hot water tanks and curtailable load arrangements with commercial and industrial customers. Recent research has identified issues with the cost effectiveness of residential load control on the Island Interconnected System. As a result, this measure is not included in the 2016 Plan.[48] The Utilities will continue to pursue curtailment opportunities with their larger customers.[49]

A new component will also be added to the Business Efficiency Program ("BEP") to include a custom incentive for demand reduction measures that are economically viable and that provide measureable demand reduction during peak times.[50]

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47 This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Station) which justified such a focus.

48 Although residential load control on the Island Interconnected System does not make economic sense, Hydro's isolated communities served by diesel generation have higher marginal costs which may make the program cost effective.

49 Hydro currently has interruptible load arrangements with its Industrial Customers which have potential for more than 90 MW of capacity assistance. Newfoundland Power currently has 16 customers participating in its Curtailable Rate Option, providing 10.4 MW of potential load reduction.

50 More information on the custom demand component of the BEP can be found in Schedule C.

Table 11 shows forecast customer demand reduction estimates for the customer energy conservation programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 11
2016 Plan Demand Reduction Estimates
2016 through 2020[51]
(MW)

	2016	2017	2018	2019	2020	Total
Residential	3.3	4.7	5.0	4.3	1.4	18.6
Commercial	2.1	2.0	2.3	2.5	2.8	11.7
Total	5.4	6.7	7.3	6.8	4.2	30.3

The Utilities' takeCHARGE customer energy conservation programs are forecast to achieve approximately 30.3 MW in peak demand reduction through 2020. This demand reduction will occur annually for the life of the installed technologies.[52]

51 Hydro does not forecast demand reduction for their transmission level industrial customers.
52 For example, a customer who installs basement insulation in 2014 will achieve approximately 0.9 kW of annual peak demand reduction for the next 20 years.

2016 Plan Program Costs

Table 12 shows forecast costs for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 12
2016 Plan Program Costs Estimates
2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Residential	5,987	6,308	4,540	3,048	2,042	21,925
Commercial	1,628	1,906	1,933	2,258	2,301	10,026
Industrial[53]	667	10	10	10	10	707
Total	8,282	8,224	6,483	5,316	4,353	32,658

The Utilities' costs related to programs in the 2016 Plan are forecast to be approximately $32.7 million over the five-year planning period. Forecast changes in program costs primarily reflect the expansion of programs and additional technology offerings anticipated from 2016 to 2018, and the conclusion of certain programs through the planning period.

3.3 Education & Support

The Utilities' customer education and support activities will continue to evolve to support changes in customer energy conservation programs and in the broader conservation market. The Utilities will continue to provide customer support and be responsive to customer expectations. Current activities, including customer outreach events, the takeCHARGE website and partnerships with industry stakeholders will be key elements of customer education.

[53] Forecasted Industrial program costs after 2016 are associated with program promotion and customer engagement. Given the small number of transmission level customers in the province, there is a high degree of uncertainty for participation in the program year to year. The forecasted amounts after 2016 will increase if customers avail of the program for feasibility assessments or incentives for energy efficiency retrofits. Projects will continue to be screened based on cost effectiveness to ensure the program remains above minimum economic thresholds.

The Utilities' educational initiatives will be expanded to include a program promoting mini-split heat pumps. The program components will include financing, education and marketing initiatives directed towards customers, and direct engagement with certified installers and suppliers. A marketing campaign will be launched to raise customer awareness of the benefits of this technology, how to choose a high quality product, as well as the necessity of having the system installed by qualified contractors. The eligibility criteria for on-bill financing of these systems will encourage the installation of high efficiency units, installed by qualified contractors.[54]

The Utilities will continue to build upon their experience offering the takeCHARGE K-I-C Start School Program. Marketing will continue to build awareness of the program amongst school boards and teachers. Teaching aids will be developed and be made available on the takeCHARGE website to assist in furthering conservation education after presentations are conducted. Updates will also be made to strengthen the message of conservation for younger students, and awareness-building contests will be offered for all age groups.

Table 13 shows forecast costs for conservation education and support for the period 2016 to 2020.

Table 13
Conservation Education & Support
Costs 2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Education	770	791	827	851	873	4,112
Support	171	175	181	184	191	902
Total	941	966	1,008	1,035	1,064	5,014

54 Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016.

3.4 Planning & Evaluation

Planning

The 2016 Plan incorporates research and analysis required for the next iteration of multi-year conservation portfolio planning by the Utilities.

Table 14 shows forecast planning costs included in the 2016 Plan.

Table 14
Conservation Planning Costs 2016-2020(F)
($000s)

	2016	2017	2018	2019	2020	Total
Planning	527	596	767	863	644	3,397

Variability in annual planning costs reflects the Utilities' multi-year planning cycle for customer conservation programs.

The Utilities anticipate development of the next multi-year plan for customer energy and demand conservation programming in 2018. Further clarity regarding electrical system cost dynamics is expected to be a factor in the next planning cycle.[55] Further assessment and adjustments to the programming contained in the 2016 Plan may also be required within the next three years as marginal cost forecasts are updated.

Research

The next update of the study of conservation potential in the province is being planned for 2020. In advance of this study, the Utilities will undertake a number of research projects regarding electricity end-use trends and the state of the local market for efficient technologies. For the residential sector, customer surveys will gather details on

55 An updated marginal cost study is expected to be a key input to the next conservation plan in 2018 and the next CPS in 2019-2020.

the type of electrical equipment that customers have in their homes, as well as their energy-related behaviour and motivation. Research for the commercial sector will include on-site facility audits to collect data on mechanical and electrical equipment being used.

The residential lighting market will be evaluated in 2017 to determine whether the Small Technologies program should continue. This research is expected to include a socket saturation study, with onsite inventories, as well as customer surveying. This will provide the Utilities with detailed data regarding the remaining potential for energy efficient lighting replacements.

Hydro is currently investigating the implementation of an Isolated System Direct Load Control Pilot in the community of Postville, Labrador.[56] The community of Postville is served by diesel generation. The objective of this pilot will be to reduce the peak load in the community and defer investment in electrical system upgrades. The Utilities will also continue to coordinate conservation planning with electrical system planning, and will evaluate potential for conservation initiatives targeted in specific areas or communities that may provide a lower-cost alternative to electrical system upgrades.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project is ongoing and the final report will be submitted to Government by end of March 2016. The results of this pilot project will be used to assess whether this type of technology may be considered as part of future energy conservation programming.

During this planning period, the Utilities will also monitor developments in North American practices for economic evaluation and screening of conservation programs.[57]

[56] The pilot will involve commercial and residential customers. It will include installing load controllers on hot water tanks, and commercial electric heating circuits, for commercial customers. Load controllers will only be activated during maximum system peak events. The customers that participate will receive incentives such as credits at the local store in Postville.

[57] While reliance on the TRC and PAC tests for primary economic screening is currently the norm in North American jurisdictions, modifications to the TRC methodology are being considered in a number of cases. These modifications primarily involve inclusion of customers' non-energy benefits from efficiency upgrade projects.

Evaluation

The customer program portfolio will continue to be evaluated in terms of its energy savings, market impacts and delivery process effectiveness. Additional review by third party evaluators is expected, reflecting the expanded program portfolio and delivery methods.[58] Program evaluation findings will be used to refine program design and implementation details on an ongoing basis, as well as support further planning.

Specific evaluation objectives in the 2016 Plan are to monitor market saturation of particular technologies as well as cost effectiveness of the programs. For example, the Instant Rebates component of the Small Technologies program will be evaluated and an exit strategy designed based on research into the pace and impact of LED sales growth in the local lighting market.

Similarly, the Utilities will continue to closely monitor the Insulation, Thermostat and HRV programs. These programs have unique challenges and barriers to program participation.[59] Evaluation of these programs will ensure they continue to satisfy cost effectiveness requirements.

In the case of new program introductions, post-implementation evaluations will be conducted within 12 months of program launch to ensure full assessment of program design assumptions, as well as marketing and delivery process effectiveness.

[58] Evaluation costs are primarily reflected in the costs for each specific program.

[59] For the Insulation and Thermostat Programs, these barriers primarily reflect the inherent difficulty in renovating existing living spaces and the remaining market being increasingly hard-to-reach. For the HRV program, this reflects the low level of customer understanding and slow adoption by the supply chain.

3.5 Costs & Cost Recovery

Table 15 provides a summary of the Utilities' customer energy conservation program and general costs from 2016 through 2020.[60]

Table 15
Conservation Costs
2016 through 2020
($000s)

	2016	**2017**	**2018**	**2019**	**2020**
Program					
Residential	5,987	6,308	4,540	3,048	2,042
Commercial	1,628	1,906	1,933	2,258	2,301
Industrial	667	10	10	10	10
Total Programs	8,282	8,224	6,483	5,316	4,353
Education	770	791	827	851	873
Support	171	175	181	184	191
Planning	527	596	767	863	644
Total General Costs	1,468	1,562	1,775	1,898	1,708
Total	9,750	9,786	8,257	7,214	6,061

Costs related to the customer energy conservation programs outlined in the 2016 Plan are forecast to be $9.8 million in 2016 and 2017.[61] This increase primarily reflects the addition of a new program, and enhanced program technology offerings. Costs begin to decrease in 2018 from $8.3 million to $6.0 million in 2020. This decrease primarily reflects the conclusion of the Small Technologies program in 2018 and the conclusion of the Benchmarking program in 2019.

[60] This cost summary does not include costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management) and costs related to Hydro's interruptible load arrangements.

[61] All customer energy conservation programs outlined in the 2016 Plan are cost effective, and are justified on a cost of service basis.

Schedule E provides a summary of forecast energy savings, cost estimates and cost effectiveness analysis results for the programs in the 2016 Plan.[62]

Cost Recovery

The Utilities propose conservation cost recovery based on amortizing customer energy conservation program costs over seven years.[63] The amortization of program costs over a seven-year period is considered appropriate because of the extended nature of the energy savings benefits provided by program technologies.

The Utilities' annually recurring general conservation costs would continue to be expensed as incurred.[64]

4.0 OUTLOOK

The Utilities anticipate significant changes in the electrical system serving the province within the five years considered in this plan. The Muskrat Falls hydroelectric development and related interconnection to the North American grid will affect system operations and costs, as well as customer prices. The next iteration of multi-year conservation program planning is anticipated in 2018, to coincide with these events.

In the interim, the approach outlined in the 2016 Plan will remain flexible to address ongoing changes. The initiatives in the 2016 Plan are cost effective based on current information, and were assessed for sensitivity to changes in system costs. As the Utilities implement the program changes outlined in this Plan, they will continue to evaluate program offerings to ensure they create economic benefits and are responsive to evolving customer expectations and market conditions.

[62] Cost forecasts can be expected to be refined as detailed program design progresses in 2016.
[63] Newfoundland Power has used this approach since 2013, based on Order No. P.U. 13 (2013). Hydro has proposed this approach in its ongoing general rate application, and the proposal has been agreed to by the parties to settlement negotiations in that matter.
[64] While general customer energy conservation costs provide benefits to customers in terms of information, knowhow and advice, those benefits are not transparently quantifiable in the same manner as program benefits.

With growing customer awareness of conservation, and of the takeCHARGE brand, the Utilities will continue to seek opportunities to partner with complementary organizations and trade allies for customers' advantage. Information sharing and policy coordination with the Province will also continue, primarily through the Office of Climate Change and Energy Efficiency.

Table A-1 shows most recent marginal cost forecast as projected by Newfoundland and Labrador Hydro in February 2015.

Table A-1
Marginal Cost Projection
for the
Island Interconnected System
2015 - 2035

	Energy ($/MWh)	Capacity ($/KW – Yr)
2015	108	51
2016	133	70
2017	134	74
2018	47	98
2019	50	99
2020	54	108
2021	56	112
2022	59	115
2023	62	119
2024	65	123
2025	68	126
2026	70	126
2027	73	125
2028	76	125
2029	78	124
2030	81	124
2031	85	121
2032	88	118
2033	92	116
2034	96	113
2035	100	110

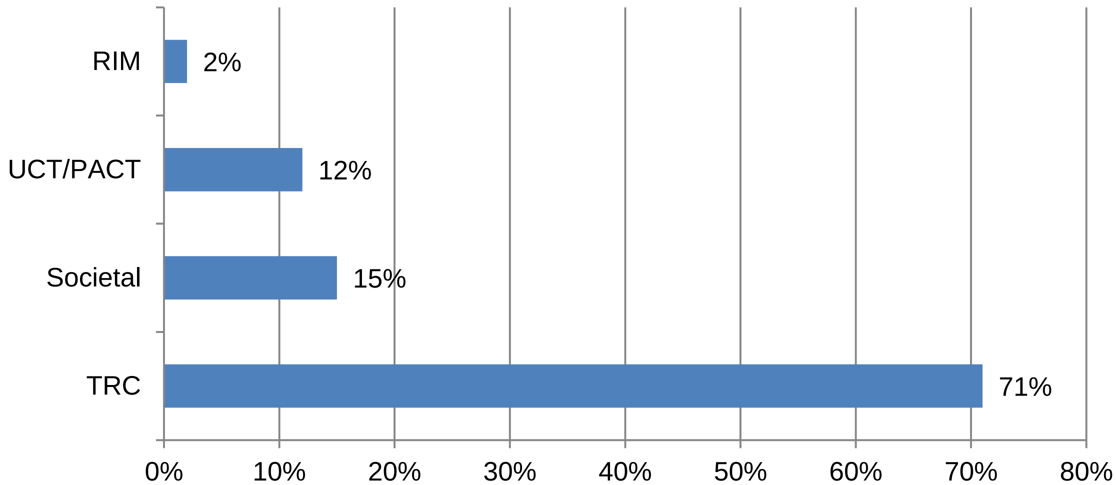
Notes:
1. Modeled as per NERA Economic Consulting marginal cost approach (2006).
2. Fuel costs per NLH corporate assumptions, January 2015.
3. Excludes transmission marginal costs.
4. Projection is at customer bulk delivery point.
5. Island Interconnected costs beyond 2017 reflect opportunity cost as per NERA approach.

Table B-1
Current Canadian
Utility Practice
Economic Evaluation Practices

Province	Economic Test				
	TRC	PAC	RIM	PCT[1]	SCT[2]
British Columbia	X[3]				
Ontario	X	X			
Nova Scotia	X	X			
Manitoba[4]	X		X	X	X
Saskatchewan	X	X			
Quebec	X		X[5]		
Prince Edward Island	X	X[6]		X	X[6]

1 Participant Cost Test ("PCT").
2 Societal Cost Test ("SCT").
3 British Columbia uses a modified TRC that includes non-energy benefits that are not traditionally included in the TRC.
4 Manitoba also considers the levelized resource cost, net utility benefit, utility net present value, levelized utility cost, and simple customer payback calculation.
5 Quebec considers the RIM as a secondary test.
6 Prince Edward Island considers the PAC and SCT as secondary tests.

Chart B-1
Current American Utility Practice
Economic Evaluation Practices
(Percent of States)



[7]

n=43

[7] Research conducted by the American Council for an Energy Efficient Economy (February 2012) "A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs".

Insulation Program

Program Description
The objective of this program is to increase the insulation level in residential basements, crawl spaces and attics. Increasing the insulation R-value in a home will result in space heating energy savings. The program components include rebates and financing, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.
Target Market: Residential
This program targets residential customers completing retrofit projects. Changes to the National Building Code of Canada implemented in December 2012 mandated that all new homes install basement insulation and increased the R-Value requirements in the attic. As a result, this program is only offered to existing homes (i.e. connected to the electricity grid before January 1, 2014) to exclude minimum building code compliance in new homes. Eligibility will continue to be limited to electrically-heated homes.
Eligible Measures
Eligible measures in this program include insulation upgrades to basements, crawl spaces and attics. Technical requirements will be approximately aligned with National Building Code of Canada.
Delivery Strategy
Delivery of this program will continue to be bundled with Thermostat, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio. Marketing initiatives include partnering with retailers and trade allies in the renovation industry, and target both do-it-yourself and professional installers. Tools and tactics will include retail point-of-sale materials, advertising, website, tradeshows, community outreach and trade ally activities. Rebates and financing will be processed through mail and online customer applications.

Insulation Program

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the impact on space heating energy, the practical difficulties of renovating an existing living space and a decreasing number of eligible participants. Experience with the existing program has shown participation to be responsive to awareness-building marketing activities.

Incentive Strategy

Incentives for this program include rebates and financing. In August 2014, the rebate structure was simplified and increased. Customers can now get a rebate of 75% of the cost of materials installed in the basement and 50% of the cost of materials in the attic. Rebates amounts are capped at $1,000.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation and cost effectiveness. A representative sample of installations will be inspected. Formal external evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	1,187	1,207	1,202	1,197	1,223	6,018
Estimated Cumulative Energy Savings (GWh)	30.0	33.1	36.1	38.9	41.8	180
Total Resource Cost						**2.5**

Thermostat Program

Program Description

The objective of this program is to encourage installation of programmable and high performance electronic thermostats in homes. Programmable and high performance electronic thermostats allow customers to better control the temperature of their homes and to set back the temperature during the night or while away. The program components consist of rebates, financing options, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.

Target Market: Residential

This program targets residential customers, including home retrofit and new home construction. Eligibility will continue to be limited to electrically-heated homes.

Eligible Measures

Eligible measures in this program include both programmable and high performance electronic thermostats. All thermostats must have a setting precision of +/- 0.5 degrees Celsius or less.

Delivery Strategy

The delivery strategy for this program remains unchanged. Delivery of this program will continue to be bundled with the Insulation, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio.

Marketing initiatives include partnering with retailers, electrical contractors, homebuilders and real estate professionals, to educate consumers regarding the energy savings and comfort benefits of programmable & high performance electronic thermostats. Tools and tactics include retail and model home point-of-sale materials, website, tradeshows, community outreach and trade ally activities. Rebates will be processed through mail and online customer applications.

Thermostat Program

Market Considerations

Barriers to installation of programmable and high performance electronic thermostats include lack of awareness of the potential for energy savings, difficulty programming, and reluctance to pay for an electrician to install the thermostats, and a decreasing number of eligible participants.

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $5 per high performance electronic thermostat and $10 per programmable thermostat. This continues to reflect incremental cost of the more efficient options. A time limit is no longer required for incentive redemption.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation, and cost effectiveness, and a representative sample of installations will be inspected. Formal evaluations will be conducted every two years during program operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	517	555	539	557	552	2,720
Estimated Cumulative Energy Savings (GWh)	9.7	11.1	12.5	13.8	15.2	62
Total Resource Cost						**2.8**

Small Technologies Program

Program Description
The objective of this program is to increase home energy efficiency and awareness by offering instant rebates on a variety of energy efficient technologies as well as online and mail in rebates for eligible appliances and electronics. This program also includes promotional events to raise awareness of the technologies and to engage the public.
Target Market: Residential
This program is marketed toward all residential customers province wide. All customers are eligible to participate regardless of age of home or heat source. A variety of marketing techniques such as TV news sponsorships, print, radio, online, website, as well as social media channels are used to engage customers.
Eligible Measures
Eligible measures in this program will vary over time and will be selected based on cost effectiveness, energy saving potential and market conditions. Instant rebates are available for small energy efficient items such as LEDs and smart power bars, and online and mail in customer applications are required for qualifying models of full-size refrigerators, clothes washers, TVs and full-size Energy Star freezers. Six new measures will be added to the technology list in 2016. They are: • Faucet aerators • Door bottom weather stripping • Door adhesive • Window insulation kit • Electrical outlet gaskets • Caulking

Small Technologies Program

Delivery Strategy
Partnerships have been made with both chain and independent retailers to offer instant rebates to customers on a number of energy efficient products. Efforts to engage both urban and rural retailers have been made in order to ensure rebated products are available in all areas of the province. Campaigns are held in the spring and fall each year. During each campaign, the Utilities set up in-store events at the participating locations to raise customer's awareness of the rebates and encourage use of energy efficient products.
Market Considerations
The technologies included in the program do not involve a major renovation. This program will allow the Utilities to reach customers that may not have been able to participate in the other incentive programs.
Incentive Strategy
Incentives for this program include instant rebates for small energy efficient items that will vary by year and campaign. Online and mail in customer applications are available for eligible appliances and electronics. The rebate value will be different for each technology offered, and will reflect incremental cost of the more efficient options.
Program Monitoring & Evaluation
The program will be monitored for participation level, service quality, and cost effectiveness. Exit interviews will be conducted during selected retail events. Formal evaluations will be conducted after the first year of implementation, and biannually during operation. It is anticipated that this program will end after 2018. The Utilities expect that LEDs will make up the majority of bulbs that are sold in the province. If this occurs, the economics of the program will no longer be cost effective. The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Small Technologies Program

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	3,113	2,879	1,578	-	-	7,570
Estimated Cumulative Energy Savings (GWh)	23.8	33.3	38.2	37.4	36.5	169
Total Resource Cost						**1.3**

HRV Program

Program Description
The objective of this program is to increase the installation of higher efficiency Heat Recovery Ventilators ("HRV"). The program components include rebates and financing, and a variety of education and marketing tools.
Target Market
This program targets all residential customers regardless of heat source or age of home. Eligibility is available to all homes that install or replace an HRV.
Eligible Measures
Eligible measures in this program include all HRV models that have an SRE of 70% or more and meet the minimum fan efficacy requirements.
Delivery Strategy
Delivery of this program will be bundled with other takeCHARGE residential programs as part of the overall portfolio. Marketing initiatives include partnering with trade allies in the home building and renovation industry, particularly Heating Refrigeration and Air conditioning Institute certified installers. Tools and tactics include website presence, tradeshows, and trade ally activities. Rebates and financing will be processed through customer application.
Market Considerations
The market includes new construction and existing HRV replacement with an emphasis on existing replacements. Early HRV installations of the 1990s are at or near the end of their useful life, so many of these require replacement. This program has faced a number of barriers such as understanding of what a HRV is and its purpose in the home, initial cost, and awareness of the benefits of selecting more efficient HRVs.

HRV Program

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $175 for qualifying HRV units. This reflects the incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. This program has experienced challenging barriers to program participation. Attempting to overcome these barriers can be administratively costly and may outweigh the benefits of program delivery. This program will be monitored to ensure that the participation goals are being met in each year to ensure the program remains cost effective. A representative sample of installations will be inspected. Formal evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	223	218	232	231	267	1,171
Estimated Cumulative Energy Savings (GWh)	0.7	1.0	1.3	1.6	2.0	7
Total Resource Cost						**1.3**

Benchmarking Program

Program Description

Energy social benchmarking is the analysis of a household's energy consumption and the comparison of its performance with its energy history and that of other similar households. Historic consumption information, tracking over time and comparisons with other households can encourage customers to reduce energy consumption. A printed paper report is delivered to participating customers via mail. These reports include a normative comparison that compares the customer to similar neighbors. The printed Home Energy Report is supplemented by access to an online web portal allowing for increased customer energy usage information and tips and resources to facilitate energy use reduction.

Target Market: Residential

The Benchmarking program is marketed to residential customers across the province. Customers will be selected into the program and can withdraw (opt-out) at any time.

Eligible Measures

A home's energy use is compared anonymously to the usage patterns of other homes in the vicinity that are of similar size, age, heating type, etc. The Home Energy Report is designed to provide new information to help home owners understand their energy use and find ways to make the home more efficient.

Delivery Strategy

The program is delivered largely by a third party service provider that develops and issues the Home Energy Report and maintains the online web portal. takeCHARGE will oversee all aspects of the program to ensure greater customer insight into their home energy use. The program is available year round and will be supported with takeCHARGE marketing and communication efforts.

Benchmarking Program

Market Considerations

This program will allow the Utilities to reach customers that have not been able to participate in the other incentive programs. It will also allow takeCHARGE actively engage with customers using direct home energy consumption information. This program also allows for the cross promotion of existing takeCHARGE rebate programs as methods to reduce household consumption and to drive participation in these programs.

Incentive Strategy

No monetary incentive will be offered. It has been demonstrated that for this type of program that using social norm comparisons drives the greatest and longest lasting changes to household energy consumption.

Program Monitoring & Evaluation

The program is monitored for participation levels, service quality and cost effectiveness. Formal evaluation will be conducted very two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	530	1,034	989	1,063	-	3,616
Estimated Cumulative Energy Savings (GWh)	0.3	8.0	13.8	15.6	-	38
Total Resource Cost						**1.0**

Mini Split Heat Pump Educational Initiative

Program Description

The objective of the program is to encourage customers to choose high efficiency mini split heat pumps (MSHP), installed by qualified contractors. When installed correctly, a high efficiency MSHP will provide space heating energy savings. The program components include financing, education and marketing initiatives directed towards customers, and direct engagement of certified installers. Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016, however the eligibility criteria for MSHP will be updated to support the uptake of high efficiency units.

Target Market

This program targets residential customers. New home construction and retrofit customers with electric baseboard heat are considered to have the greatest potential for participation, however customer eligibility to participate in financing will not be limited by heating fuel, age or type of dwelling.

Eligible Measures

Financing will now be limited to MSHP with an estimated Heating Seasonal Performance Factor (HSPF) of 9.6 or higher. This is aligned with the minimum HSPF required for certification of units meeting the “ENERGY STAR® Most Efficient 2015” designation. To qualify for financing the installation must be performed by a contractor that has the necessary permits and certification to perform electrical and refrigeration work in the province.

Delivery Strategy

Delivery will be a two pronged approach including marketing to customers and engaging eligible installers.

Marketing initiatives will include information on the takeCHARGE website as well as bill inserts and mass media advertising regarding the benefits of choosing the right heat pump and installer. Installer engagement will include information sessions, contests, and maintaining relationships with qualified installers.

Financing applications will be processed through customer application via the existing customer service channels (online or by phone).

An incentive could not be offered for this program because it does not pass the economic analysis.

Mini Split Heat Pump Educational Initiative

Market Considerations

One of the biggest barriers is a lack of customer awareness and availability of certified installers in rural areas. In order to achieve significant energy savings, the unit must be appropriate for the Newfoundland climate, properly installed and operated.

Other major barriers include identifying what to look for in an installer (i.e. what certification should be required) and difficulty of customers to find qualified installers. The upfront cost of highly efficient units is also a barrier for some customers.

Program Monitoring & Evaluation

This program will be monitored for participation level, and service quality. The criteria for eligible models and installers will also be continually reviewed to ensure the program is promoting units and installers that will provide customers the highest achievable energy savings at a reasonable cost.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	119	100	103	102	104	529

Business Efficiency Program

Program Description
The objective of the Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.
Target Market: Commercial
This program targets business owners and property managers who have an interest in making their businesses more energy efficient. The program includes a custom project approach which appeals primarily to large commercial customers. In 2016, the program will also include rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting, which appeal to small and medium sized customers as well.
Eligible Measures
The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in electrical energy and demand savings. The program excludes alternative energy and fuel switching. Beginning in 2016 the custom stream of the Business Efficiency Program will also include incentives for demand reduction based on the options available at the customer's facilities as well as the amount of demand they are able to reduce during peak times. Also beginning in 2016, the existing fluorescent High Bay program and the current Commercial lighting program (including high performance T8 fluorescent lamps and LED exit signs) will become prescriptive rebates under the Business Efficiency Program.[1] Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts are now considered to be the market standard. The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems and low flow pre-rinse spray valves will be added to the prescriptive list of incentives.

[1] Prescriptive incentive program are customer energy conservation programs that have per unit rebates for installing certain defined technologies. For example, providing a predefined rebate amount for a LED light bulb;

Business Efficiency Program

Delivery Strategy
The delivery strategy for this program is mainly through individual customer interactions. A walk through audit can help customers identify efficiency opportunities. Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products. The program will also target commercial property owners through direct marketing and through industry associations such as the Building Owners and Managers Association. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, retail point-of-sale materials, website and advertising in trade publications. Demonstration projects will be selected from program participants.
Market Considerations
Barriers to increased market penetration include initial cost, awareness of the program and available incentives, budget & planning cycles, technical know-how, and customer time constraints.
Incentive Strategy
Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at 10 cents/kWh for first year savings or project demand savings at $100 per kW per month over the December to March period. Demand saving projects require a minimum of 50 kW savings and be sustainable over 5 years. Incentives of up to $50,000 per site help garner interest and lower customer project costs. Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online submissions.
Program Monitoring & Evaluation
The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy or demand savings achieved are consistent with incentives paid.

Business Efficiency Program

Estimated Costs & Energy Savings						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,519	1,791	1,813	2,133	2,171	9,427
Estimated Cumulative Energy Savings (GWh)	18.2	26.9	36.7	47.6	60.2	190
Total Resource Cost						**2.4**

Industrial Energy Efficiency Program

Program Description

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings and other supports to enable industrial facilities to identify and implement efficiency and conservation projects. This program is a custom program to respond to the unique needs of the Newfoundland and Labrador industrial market, rather than a prescriptive technology approach.

Target Market: Industrial

This program targets existing, transmission level, industrial customers served by Newfoundland and Labrador Hydro.

Eligible Measures

Eligibility of projects is based on engineering review and confirmation of estimated energy savings impact. Technologies include, but are not limited to, compressed air, pump systems, process equipment and process controls.

Delivery Strategy

The program is managed internally, with external engineering services used as required. The utility takes the role of facilitator and consultant in providing methods for industrial customers to complete project proposals and implement approved projects.

This program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011, and closed to new projects in 2013. The industrial pilot was reviewed in 2014 by an external party for performance; the review indicated the program matched or exceeded performance of comparable industrial CDM programs relative to the size of the industrial sector in the Newfoundland and Labrador market. The program was officially re-launched as an ongoing program in 2015, with the same structure as the pilot program.

Industrial Energy Efficiency Program

Market Considerations

This market requires a one-on-one approach to project design and delivery. The program builds on the work already completed by the industrial customers, and addresses their unique barriers to improved efficiency, which include, but are not limited to, access to capital and human resources.

The lifecycle for each program transaction will be measured in months rather than weeks because of the need for review, contract development, budgeting and implementation timelines, and post-installation evaluation. This type of program requires that facilities have financial and business stability to continue operations for a time period appropriate to achieve cost effective savings.

Incentive Strategy

Incentives for this program include an initial comprehensive energy audit for the site, funding assistance for feasibility studies, and financial assistance for project implementation based on energy savings.

Program Monitoring & Evaluation

The program will be regularly monitored for participation level, service quality, and cost effectiveness, including engineering review and inspection of all projects and assessment of long-term impact on customer processes.

Industrial Energy Efficiency Program

Estimated Costs & Energy Savings[2]						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	667	10	10	10	10	707
Estimated Cumulative Energy Savings (GWh)	30.6	30.6	30.6	30.6	30.6	153
Total Resource Cost						**1.7**

[2] While Customer audits have confirmed that there are several potential projects at Hydro's customers' sites, savings for the Industrial Energy Efficiency Program (IEEP) have only been forecasted for 2016 because there are only five transmission level industrial customers in Newfoundland and Labrador and participation depends on each company's capital budgets and focus for the year. As a result of such a small market and budget considerations, participation is extremely variable from year to year and difficult to forecast. The costs from 2017-2020 are the fixed administration costs associated with program promotion and customer engagement in the IEEP. The majority of costs are incurred after a project is submitted and passes economic screening. Projects for the Industrial EE Program will be evaluated on a yearly basis and projects with a TRC of 1.0 or greater will be completed.

Isolated Business Efficiency Program

Program Description
The objective of the Isolated Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.
Target Market: Commercial
This program targets business owners and property managers in Hydro's isolated diesel and L'Anse au Loup systems who have an interest in making their businesses more energy efficient. The program includes a custom project approach and also rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting.
Eligible Measures
The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in economical electrical energy savings. The program excludes alternative energy and fuel switching. The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, Electrically Commutated Motors for Evaporator fans, Cold climate air source heat pump systems and Low Flow Pre-rinse spray valves will be added to the prescriptive list of incentives.

Isolated Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. The custom track involves a walkthrough audit and feasibility analysis to determine savings and eligible incentive. This allows for a wide range of eligible technologies and projects.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, and a website. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to efficiency in the commercial market include financial and human resource concerns. Incentives will assist in making energy efficiency upgrades more accessible. Human resource concerns are around awareness and knowledge of the technology options as well as time to develop the business case for retrofit projects.

The isolated systems have additional challenges with access to products and access to specific technical skill sets in the evaluation of projects and technology. Hydro's program staff will assist in addressing these gaps.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at the lesser of $0.4/kWh for first year savings or 80% of eligible project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online customer applications.

Isolated Business Efficiency Program

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy savings achieved are consistent with incentives paid.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	106	112	117	122	128	585
Estimated Cumulative Energy Savings (GWh)	0.5	0.7	0.8	1.0	1.2	4
Total Resource Cost						**1.6**

Isolated Systems Community Program

Program Description
The objective of this program is to provide a portfolio of technologies and opportunities to help residential and commercial customers in isolated diesel communities save electrical energy and to promote energy efficiency awareness.
Target Market
This program targets both residential and commercial customers in Hydro's isolated systems. This includes Isolated Diesel systems on the Island, in Labrador, and the L'Anse au Loup system.
Eligible Measures
Measures will range from efficient lighting products, hot water saving products, pipe insulation, hot water tank insulation, commercial LED exit signs, and others that may be applicable. An Appliance Retirement program is being planned for at least one community. Old inefficient appliances will be removed from participating homes and routed for appropriate disposal. This will save energy and money for the homeowner. This component will be evaluated to determine if it is economic to develop into a broader program. The Isolated systems T12 replacement program will take place in 2-3 Isolated communities. This project will offer, free of charge to commercial customers, the supply and install of new High Performance T8 lamps and ballasts.
Delivery Strategy
Hydro has engaged Summerhill Group to deliver this program. They are using a number of delivery strategies, including hiring and training local representatives, to engage residential and commercial customers. Direct installs will be completed, whereby the customer receives the technology in their home or business at no cost. During the direct install visit, customers also receive information on energy usage and efficiency options.

Isolated Systems Community Program

Market Considerations

Availability and awareness of energy efficient technologies continues to be an issue in rural communities and often technologies available are at a higher price than in urban markets. This program will address the barriers of availability. There is a heavy electric hot water heating penetration and opportunities exist in plug load and behavior based areas.

Commercial customers tend to be smaller businesses and as such find it challenging to find the time and resources to address energy consumption issues; this program will provide the one on one interaction needed to assist these customers. The technologies included in the program do not involve a major renovation. This program will allow the utility to reach customers that may not have been able to participate in the other incentive programs.

Following the 2015 direct install component, information collected in 2014 and 2015 will be used to plan for Isolated Systems Community programming beyond 2017. Costs and energy savings will be estimated once the technologies have been determined.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. A representative sample of direct installs will be surveyed for confirmation of continued installation and use. Formal evaluations will be conducted after each year of operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	415	415	-	-	-	830
Estimated Cumulative Energy Savings (GWh)	5.2	5.5	5.5	5.5	5.5	27
Total Resource Cost						**2.7**

Table D-1
Conservation Programs
Energy Reductions: 2012 – 2015(F)
by Sector
(GWh)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	15.8	20.6	24.0	27.0	87.4
Thermostat Program	4.5	5.8	7.0	8.4	25.7
ENERGY STAR Window Program	6.1	8.6	10.1	10.1	34.9
Coupon Program	0.3	0.3	0.3	0.3	1.2
HRV	0.0	0.0	0.2	0.4	0.6
Small Technologies	0.0	0.0	5.5	14.4	19.9
Isolated Systems Community Program	1.7	2.8	4.1	4.8	13.4
Block Heater Timer Program	-	0.3	0.3	0.3	0.9
Total Residential Portfolio	**28.4**	**38.4**	**51.5**	**65.7**	**184.0**
Commercial					
Lighting Rebate Program	3.3	3.9	5.8	6.5	19.5
BEP	-	-	0.6	4.5	5.1
Isolated Systems Business Efficiency Program	-	-	0.1	0.4	0.5
Total Commercial Portfolio	**3.3**	**3.9**	**6.5**	**11.4**	**25.1**
Industrial					
Industrial Energy Efficiency Program	3.3	3.3	25.6	25.6	57.8
Total Portfolio	**35.0**	**45.6**	**83.6**	**102.7**	**266.9**

Table D-2
Conservation Programs
Program Costs: 2012 – 2015(F)
by Sector
($000s)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	882	1,092	796	1,039	3,809
Thermostat Program	492	253	227	454	1,426
ENERGY STAR Window Program	1,173	1,634	698	7	3,512
Coupon Program	-	-	-	-	-
HRV	-	59	56	225	340
Small Technologies	-	4	1,877	2,884	4,765
Isolated Systems Community Program	858	871	615	579	2923
Block Heater Timer Program	31	8	8	-	47
Total Residential Portfolio	**3,436**	**3,921**	**4,277**	**5,188**	**16,822**
Commercial					
Lighting Rebate Program	121	128	373	790	1,412
BEP	-	112	457	532	1,101
Isolated Systems Business Efficiency Program	93	115	96	66	370
Total Commercial Portfolio	**214**	**355**	**926**	**1,388**	**2,883**
Industrial					
Industrial Energy Efficiency Program	173	89	1,244	19	1,525
Total Portfolio	**3,823**	**4,365**	**6,447**	**6,595**	**21,230**

Table E-1
Conservation Programs
Energy Reduction Estimates: 2016 – 2020
by Sector
(GWh)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	30.0	33.1	36.1	38.9	41.8	179.9
Thermostat Program	9.7	11.1	12.5	13.8	15.2	62.3
ENERGY STAR Window Program	10.1	10.1	10.1	10.1	10.1	50.5
Coupon Program	0.3	0.3	0.3	0.3	0.3	1.5
Isolated Systems Community Program	5.2	5.5	5.5	5.5	5.5	27.2
Small Technology Program	23.8	33.3	38.2	37.4	36.5	169.1
HRV Program	0.7	1.0	1.3	1.6	2.0	6.6
Benchmarking	0.3	8.0	13.8	15.6	-	37.7
Block Heater Timer Program	0.3	0.3	0.3	0.3	0.3	1.5
Total Residential Portfolio	**80.4**	**102.7**	**118.1**	**123.5**	**111.7**	**536.4**
Commercial						
Isolated Systems Business Efficiency Program	0.5	0.7	0.8	1.0	1.2	4.3
Business Efficiency Program	18.2	26.9	36.7	47.6	60.2	189.6
Total Commercial Portfolio	**18.7**	**27.6**	**37.5**	**48.6**	**61.4**	**193.8**
Industrial						
Industrial Energy Efficiency Program	30.6	30.6	30.6	30.6	30.6	153.0
Total Portfolio	**129.7**	**160.9**	**186.2**	**202.7**	**203.7**	**883.2**

Table E-2
Conservation Programs
Program Cost Estimates: 2016 – 2020
by Sector
($000s)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	1,189	1,207	1,202	1,197	1,223	6,018
Thermostat Program	517	555	539	557	552	2,720
Isolated Systems Community Program	415	415	-	-	-	830
Small Technology Program	3,113	2,879	1,578	-	-	7,570
HRV Program	223	218	232	231	267	1,171
Benchmarking Program	530	1,034	989	1,063	-	3,616
Total Residential Portfolio	**5,987**	**6,308**	**4,540**	**3,048**	**2,042**	**21,925**
Commercial						
Isolated Systems Business Efficiency Program	106	112	117	122	128	585
Business Efficiency Program	1,522	1,794	1,816	2,136	2,173	9,441
Total Commercial Portfolio	**1,628**	**1,906**	**1,933**	**2,258**	**2,301**	**10,026**
Industrial						
Industrial Energy Efficiency Program	667	10	10	10	10	707
Total Programs Portfolio	**8,282**	**8,224**	**6,483**	**5,316**	**4,353**	**32,658**

Table E-3
Conservation Programs
Total Resource Cost Test Results
by Sector

	TRC Results
Residential	
Insulation Program	2.5
Thermostat Program	2.8
Isolated Systems Community Program	2.7
Small Technology Program	1.3
HRV Program	1.3
Benchmarking	1.0
Commercial	
Isolated Systems Business Efficiency Program	1.6
Business Efficiency Program	2.4
Industrial	
Industrial Energy Efficiency Program	1.7

2015 Isolated Systems Energy Efficiency Program - Final Report

February 22, 2016

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1.0 Program Overview

Newfoundland and Labrador Hydro's Isolated Systems Energy Efficiency Program (the Program) is a Demand Side Management (DSM) program managed by Summerhill. Year Four of the Program is summarized in this report.

There were two components implemented in Year Four of the Program, including:

- Direct Install (DI) – Residential and Commercial
- Appliance Retirement Pilot

Achieved energy savings for 2015 are shown in Table 1. Savings targets were based on results in 2014 and from discussions between Summerhill and Newfoundland and Labrador Hydro (NLH) during the 2015 planning phase. The result of this process led to a NLH-approved savings target of 650 MWh and an opportunity target of 1,000 MWh. However, the opportunity target was dependent upon maximizing participation throughout the program.

The total net energy savings achieved during Year Four was 1,426.10 MWh. This figure does not include savings achieved through the Appliance Retirement Pilot. The net energy savings are based on free-ridership, installation rate, and net electric savings rate per unit. *Appendix B: Direct Install Results by Product Type* provides a breakdown of products by component.

Table 1 - Total Net Direct Install Energy Savings

	Total Net Energy Savings (MWh)	Total Products Installed	Total Installs/ Participants
Residential	1,091.17	20,234	871
Commercial	334.93	2,235	94
Total	**1,426.10**	**22,469**	**965**

The Direct Install component was conducted in thirteen isolated diesel systems across twenty two communities in Newfoundland & Labrador. 965 customers (871 residential and 94 commercial) received an installation. *Appendix E: Completion Status for 2015 Participating Communities* provides additional insight on the installation rates for communities that received installs in 2015. Post-installation audits were completed with 78 customers to verify installed products.

Six customers on Fogo Island participated in the Appliance Retirement Pilot. The pilot resulted in five refrigerators and one freezer being retired, which created a total energy savings of 5.68 MWh. However, this pilot had participation levels below the anticipated target of 25 - 50 appliances. As a result, a research survey is currently being conducted to review the impact of various elements of the program structure and to explore ways to improve the service offerings to increase participation in future program efforts.

1.1 Delivering on Success Factors

The following table summarizes key areas of success across the program year.

Table 2 - Achieved Success

Approach	Achieved Success
Strong education to homeowners and businesses on energy efficiency	• 100% of audit respondents indicated that representatives were knowledgeable or very knowledgeable in regard to energy efficiency.
Strong engagement with homeowners and businesses through cost-effective community outreach activities	• Door-to-door, phone calls, and posters were cost-effective modes of advertising in Direct Install systems. • TV and $200 Visa gift card prizes offered for a Direct Install, and a bonus prize entry for completing a building information survey increased participation for both initiatives. • Radio advertising (free) through a local network in Nain. • Representatives reached out to their networks, including Facebook.
Maximize program participation	• Maximized number of installs with the available program budget for purchasing products and related shipping expenses, and available time to complete installs. • Additional installs were restricted primarily to budget constraints for products and shipping, as well as time constraints for completing installs.
Hire local staff and deliver cost-effective training	• Hired 18 installers, 1 area coordinator/installer. • All employees completed online training modules.
High satisfaction among all customers with installation and program experience	• Averaged 4.68/5 for program satisfaction and 4.90 for representative satisfaction, according to audit calls. The overall program satisfaction for all customers was 4.46/5, according to the install visit surveys. • Anecdotal feedback was very positive.
Move customers along the sustainability continuum	• 71% of audit respondents confirmed they learned something new from their representative about saving energy through lighting, water conservation, and heating.
Collect energy use and building information for future program planning	• As part of direct installs, installers collected energy use and building information that will assist in the planning of future programs.

1.2 Program Challenges

The following table summarizes challenges experienced during the 2015 program year.

Table 3 - Program Challenges

Challenge	Opportunity for Improvement
Maintaining adequate inventory levels	• Install opportunities and longer than expected shipping times contributed to challenges with maintaining the required amount of inventory. • **Recommended solution**: Raise thresholds of when to reorder product and work with suppliers to create clear timelines of when product will be received to reduce delays as much as possible.
Staffing in certain communities	• Communities such as Postville and Hopedale had turnover after the program launch, and the re-staffing process caused delays in these communities. • **Recommended solution**: Give special consideration in difficult-to-staff communities, and begin consulting with community contacts earlier in the staffing process.
Online training difficulties	• Online training was used in a fashion that contained analytical capabilities on progress and training results, and was more engaging. However, weak internet connections in some communities caused delays for training completion dates. • **Recommended solution**: In addition to the online training modules, we will create alternative training delivery options before training is administered to reduce potential delays caused by weak internet connections.
CFL perception	• Although there is regular education through takeCHARGE programs, skepticism toward CFL lamps still exists in many communities. • **Recommended solution**: Produce one or two marketing pieces that target the stigmas surrounding CFLs, and provide support for this type of lighting. These pieces should reference reputable experts and/or scientific studies to increase legitimacy of the support for CFL's. Please note: this may not be necessary if CFLs are discontinued in future programs.
Security concerns over homeowners with substance abuse issues	• Reps indicated that they experienced difficulties during installs with some homeowners who had substance abuse issues. An attempt was made to create a reporting structure to account for this, but reps did not record the information as planned. • **Recommended solution**: Create a training module on how to deal with customers in these situations, and develop a reporting structure to effectively record and address these events before the program launch.

1.3 Resource Use

Summerhill managed all Year Four resources for the Program. Billed expenses for the January 1st to December 31st, 2015 period are listed below in *Table 4 – Program Budget*. These amounts include resources from the Appliance Retirement pilot.

Table 4 - Program Budget

Category	Expenses ($)	2015 Budget Estimate ($)	Difference ($)
Program Management	$234,000.00	$225,000.00	$9,000.00
Marketing & Communications	$1,649.00	$11,500.00	-$9,851.00
Program Incentives	$87,446.15	$86,250.00	$1,196.15
Program Representatives	$168,741.91	$186,748.50	-$18,006.59
Program Delivery Expenses	$43,483.33	$39,100.00	$4,383.33
Total	**$535,320.39**	**$548,598.50**	**-$13,278.11**

The overall 2015 expenses were under the budget estimate. Reductions in labour costs from Field Representatives occurred in the direct install portion of the program due to a few exceptional employees with higher install rates, as well as decreased labour hours in Postville during a re-staffing process in that community. Travel expenses were also minimized through efficient transportation by Field Representatives and from not requiring long distance travel for in-person training sessions. Overall, program delivery expenses ended above budget due to product shipment costs being higher than anticipated.

Overall expenses were also lower than expected as a result of the low results from the Appliance Retirement pilot. Other cost efficiencies from the Appliance Retirement program included using low-cost print and television advertising. Total costs for shipping and logistics were also below the budgeted amount due to the lower amount of appliances that were retired. Additionally, research on the Appliance Retirement program was also conducted after the pilot was completed, resulting in program management fees being above the original budget value.

1.4 Total Resource Cost

The Total Resource Cost (TRC) is positive at 5.31 for the 2015 program year. Electric heat and electric water heating customers are factored into product install numbers. The TRC includes:

- Fixed management costs to December 31st; and
- Payroll and delivery costs to end of the 2015 program year.

Table 5 - Summary and TRC Results: Direct Install

Summary and TRC Results	2015
Benefits	$2,097,926.41
Measures TRC Costs	-$31,890.66
Program Costs	$456,906.69
Program TRC (Net Present Value)	**$1,672,910.38**
Program TRC (Ratio)	**4.94**

2.0 Detailed Results by Component

As stated in Section 1.0, the generalized savings target for the 2015 Program was 1,000 MWh. This target was based on results in 2014 and from discussions between Summerhill and NLH during the 2015 planning phase.

Milestones:

Table 6 - Program Milestones

Milestone	Target Date	Result
Launch direct install, in 22 communities, of energy efficient bulbs in sockets that were not changed over during previous installations	August 4, 2015	Achieved
Develop and implement an Appliance Retirement pilot for homes in Fogo Island	September 17, 2015	Achieved

2.1 Direct Install

Direct installation of energy efficient products is an effective method for achieving savings, ensuring products are installed, and maximizing customer education. In 2015, efforts were focused in isolated system communities across Newfoundland and Labrador. *Appendix A: Direct Install Results by Community* provides a list of each participating community.

The achieved energy savings and participation are summarized below:

Table 7 - Direct Install Achieved Energy Savings and Participants

Component	Total Net Energy Savings (MWh)	Total Products Installed	Total Installs/ Participants
Direct Install - Residential	1,091.17	20,234	871
Direct Install - Commercial	334.93	2,235	94
Total	**1,426.10**	**22,469**	**965**

For detailed breakdowns of installations by community and by product types, refer to *Appendix A: Direct Install Results by Community* and *Appendix B: Direct Install Results by Product Type*.

In 2015, we revisited communities that had previously received kits in 2012 and 2013, as well as other communities that were not completed in 2014. The kits offered a limited number of efficient products to each home and business leaving considerable opportunity to get further electricity savings by installing additional products. Due to the great success in 2014, we opted for an "a la carte" direct install model to maximize savings opportunities. Field Representatives were not limited to a certain number of products per house under this model, rather they replaced any inefficient product for which they had an efficient alternative.

Additionally, information provided from audits in 2014 helped to identify the most common lamp types and average number per household of each product. This information was used to determine the product lines and initial product orders.

The 2015 product line included:

Table 8 – 2015 Product Line

Product	Deemed kWh Savings/ Product - Residential	Deemed kWh Savings/ Product - Commercial
13 Watt Regular CFL	32.91	154.54
23 Watt Regular CFL	36.37	170.98
Low-flow Bathroom Faucet Aerators	170.78	170.78
Low-flow Kitchen Faucet Aerators	170.78	170.78
LED Exit Sign	-	276.20
23 Watt R40 Flood Lamp	82.07	233.60
7 Watt CFL Chandelier	31.92	119.73
14 Watt CFL Vanity Globe	39.95	39.95
23 Watt Specialty CFL – Dimmable	82.86	184.13
Low Flow Showerheads	365.25	-

Overall, customers were very satisfied with this component and with the products. Quality issues are discussed in section 4.0 Quality Assurance.

2.2 Appliance Retirement Pilot

The *2015 Appliance Retirement Pilot* was undertaken in Fogo Island from September 17th to November 20th. Appointments for picking up inefficient refrigerators and freezers took place on November 13th and 20th. The target for the pilot was to retire 25 - 50 appliances. In total, five refrigerators and one freezer were retired through this pilot.

The achieved energy savings and participation are summarized below:

Table 9 – Appliance Retirement Achieved Energy Savings and Participants

Appliance	Deemed Energy Savings (kWh)	Total Products Retired	Total Net Energy Savings (MWh)
Refrigerator	930.05	5	4.65
Freezer	1034.73	1	1.03
Total		**6**	**5.68**

The pilot began with a marketing campaign to advertise the pilot offerings. Advertising methods included:

- Direct Mail (postcards)
- Pilot Posters
- TV (advertisement on the local Information Channel)
- Paid Facebook Advertising
- Engagement Event at Riff's Ltd (November 14th)
    - Included a sign-up sheet

All advertising methods contained information about the program, including the types of eligible appliances, monetary savings per year, a $50 incentive for retiring an appliance, and a toll-free number to call to make an appointment. A pull strategy was used to have customers call the toll-free number if they were interested in participating in the pilot.

Summerhill received phone calls from interested individuals and took them through a screening process to ensure that they had an eligible appliance for the pilot. If eligible, an appointment was made at the end of the phone call for the appliance to be picked up on either November 13th or 20th. Friday pick-ups were selected as this was one of two days that the recycling facility was open, and the only day it was open from 9:00 AM – 5:00 PM. A third-party contractor, Dennis Fudge Contracting Ltd., went to homes where an appliance was, removed it from inside the home or elsewhere on the property, and loaded it onto their truck to be transported to the recycling facility in Stag Harbour. Once Summerhill confirmed that the appliances were delivered to the waste management facility, the Program Manager emailed customer and appliance information to NLH to have the $50 incentive applied to the customers' accounts.

Results

Summerhill received a total of 16 inquiries regarding the appliance retirement pilot. Of those inquiries, appointments were made to retire five refrigerators and one freezer. *Table 10 – Appliance Retirement Inquiries – No Appointment* provides a breakdown of reasons why the other inquiries did not result in an appliance being retired:

Table 10: Appliance Retirement Inquiries – No Appointment

Customer Name	Inquiry (Appliance Type)	Reason for Not Retiring an Appliance
Martin Foley	Refrigerator	Ineligible – was not in working condition or in regular use.
Sean Dicker (Care of Edward Dicker)	Refrigerator	Ineligible – was unplugged, sitting outside of the home. Customer also recently replaced the old refrigerator with a new one.
Joseph Dwyer	Refrigerator	Ineligible – was not in working condition or in regular use.
Gloria Penton	Refrigerator	Ineligible - was not in working condition or in regular use.

Leonard McGrath	Freezer	Appointment cancelled and could not be rescheduled.
Judy Smith	Hot Water Tank	Ineligible – outside of pilot's scope.
Thomas (last name not provided)	Dishwasher	Ineligible – outside of pilot's scope.
Ronald Tobin	Microwave	Ineligible – outside of pilot's scope.
Douglas Gublan	Stove and Dishwasher	Ineligible – outside of pilot's scope.
Cecil Penney	Unknown	Several call attempts made to respond to the customer's brief messages, but the customer could not be reached by phone.

Post-Pilot Survey Research

Overall, there was a low response to the pull strategy that was implemented, with only 16 inquiries and six appliances being eligible for retirement. As a result, Summerhill will be conducting post-pilot survey research to review various facets of the pilot's design and implementation with the purpose of determining how it can be improved for future efforts. A target of 100 homeowners will be contacted for this study, and a report will be created to summarize the research findings and to create recommendations for future appliance retirement efforts in this region. This sample size will provide results with a confidence level of 95% and a confidence interval of 9.6%. *Appendix F: Appliance Retirement Research – Survey Questions* outlines the questions that will be asked to citizens residing on Fogo Island.

3.0 Marketing

The 2015 program saw a decrease in the overall marketing costs as program awareness is now at a level where minimal marketing is required to achieve the desired results. Print media, such as the community posters, still prove to be effective in raising awareness in the participating communities. However, the greatest impact appears to come from personal social media (posts on Facebook pages) and general word of mouth.

The marketing tactics employed in 2015 included:

- Social media (Facebook posts);
- Community posters;
- Door-to-door;
- Phone calls;
- Radio (local station in Nain);
- Participation prizes (TVs and VISA gift cards); and
- Website content.

The Direct Install community poster was available in English and Inuktitut in Nain, Hopedale, and Postville, and in English in all other 2015 Direct Install communities.

In 2014, launch events were held on Canada Day at sites where local celebrations occurred as a way of getting exposure to larger audiences who were already attending community events. However, it was decided in 2015 to move the program launch ahead by one month, and launch events were not held as this exposure was unlikely to be achieved. Additionally, feedback from the 2014 representatives indicated that traffic at these events was not always high, and that it was not always worth the time and effort to host a launch event.

Representatives were given the option to have an event in their community if they felt that it would have an impact for getting participants to sign up for an appointment. After a final group meeting, representatives put up posters in strategically-placed locations throughout the community that have higher traffic (e.g., Town Hall, post office, gas station, etc.). These posters contained a summarized description of the 2015 program offerings, as well as the contact information of the local representative to make an appointment with representatives with a Facebook account also made posts to advertise the program and identified themselves as the local representative. The takeCHARGE website was updated for the 2015 year. Additionally, one of the representatives in Nain also worked at a local radio station that broadcasted in English and Inuktitut. Her anecdotal feedback indicated that this was an effective way of reaching Inuit and elderly citizens in the region.

Following the initial advertising efforts, representatives used call lists provided by Summerhill to contact community members by phone and to make door-to-door visits. These were the two most successful methods of securing appointments. Using different modes of advertising to raise awareness and increase word of mouth marketing, followed up by a phone call or a door-to-door visit, proved to be an effective method for securing appointments in these communities.

To encourage customers to participate in the program, prizes were offered to those who agreed to have an installation completed in their home or business. Additionally, customers had the opportunity to increase their chances of winning a prize by receiving a second entry if they had an audit completed after the installation. Prizes were offered in each of the community regions, and consisted of the following:

- Grand Prize: 48" Samsung LED HDTVs
    - Two grand prizes (one for Newfoundland and one for Labrador)
- Second Prize: 32" Samsung LED HDTVs
    - Total prizes issued: 11
- Third Prize: $200 Visa gift cards
    - Total prizes issued: 11

Winners have been drawn for all prizes and Summerhill is finishing the verification of mailing addresses before sending the prizes within the coming weeks. To support a local retailer, the TV prizes were purchased through Cohen's Furniture in Forteau. The order for the TVs has been placed and they will be held by the retailer until addresses of prize winners have been verified. Cohen's Furniture will be delivering the TVs to prize recipients, while Summerhill will be mailing the Visa gift cards.

4.0 Quality Assurance

4.1 Direct Install Survey Results

100% of Direct Install customers completed a survey after receiving an installation to verify the quantity and type of installed products, collected marketing and attitude data, and collected data on household energy use and building information. A total of 965 surveys were collected. For a summary of customer responses to the marketing and attitude questions, see *Appendix C: Direct Install Result Summary*.

On average, survey respondents indicated a high degree of satisfaction with the program, rating it at 4.46/5. Less than 12% of customers rated the program as fair (2/5) or neither satisfied/dissatisfied (3/5), and no customers responded that their satisfaction was poor (1/5). The most effective method for reaching customers was calling (37%) and knocking on the door (19.2%), but word of mouth (17.9%) and posters (11%) were also notably effective methods. This highlights the importance of using local representatives to engage customers in these small communities. Saving money by saving energy was the greatest motivator for customer participation, with 86.8% of customers identifying it as the number one reason to participate. Each of the attitudes towards energy efficient products (i.e., safety, cost, reducing impact, paying more, payback period) were very positive, with a minimum of 80% of customers agreeing or strongly agreeing to statements describing their attitudes (maximum of 95%). With the exception of purchasing LED holiday lights, most customers are taking low- or no-cost steps to save energy, such as turning off lights and/or appliances when they are not in use.

4.2 Direct Install Audits

Program quality was monitored through routine follow-ups with town contacts and by conducting post-installation audits with Direct Install customers. Each of the three stages (i.e., August, September, and October-November) received a series of post-installation quality assurance calls to 8% of the participants. A total of 78 calls were made for the 965 installs that took place. The audits verified satisfaction with the products, program, and representatives. Other questions were asked to identify existing understanding for energy efficiency and how effective the representatives were at educating participants. Participants responded with an average greater than 4/5 for each of the questions. Notably, awareness of the appliance rebates decreased from 75% in 2014 to 52% in 2015; however, Summerhill provided additional education to respondents who were not aware of the rebates during the QA calls. For the summarized audit results, refer to *Appendix D: Direct Install Audit Results Summary*.

Program managers followed up on negative feedback from customers and from town contacts. Anecdotal feedback was generally very positive. See below for some excerpts.

"Ramea loves this program. It is a great thing being done for Newfoundlanders." – Ramea Broadcasting Company, Ramea

"I think the takeCHARGE program is a great program and I am sure that it has helped to create a lot of awareness for energy efficiency and has helped many people save on their energy use." – Clyde Dominie, Ramea

"Just… Thank you!" – Donna Flowers, Hopedale

"Surprised with all of the additional saving measures." – Laura Keefe, Black Tickle

Ethel O'Brien showing a customer how to adjust the water flow settings on a high efficiency shower head.

Angeline Scott after explaining the differences between an incandescent bulb and its CFL equivalent.

Todd Penney with his daily inventory.

5.0 Final Thoughts on 2015 Program Delivery

Overall, the 2015 Program was a notable success seeing higher than expected savings while remaining under budget. Major factors contributing to this success include the continued implementation of an "a la carte" model and using cost-effective methods for delivering the program in the direct install communities. Interest in the program remains high and both the surveys and audits done this year indicate that the people in these communities hope to see a continuation of these programs in the future.

The collection of the standard direct install survey results, coupled with building audit information, has continued to provide additional information on homes and businesses in the participating communities. This adds to the existing portfolio of information, which includes the 2014 information on building envelope, household energy use, consumer behaviour survey, and other information gathered from 2012-2014 installs. Together, this provides a foundation for designing future programs that will meet the unique needs of these communities.

Appendices

Appendix A: Direct Install Results by Community

The 2015 products installed by representatives by community are indicated in the table below.

Community	TOTAL PARTICIPANTS	TOTAL ENERGY SAVINGS (MWh)	Total Energy Savings (KWh)	Total Installed Products
Commercial	**94**	**334.93**	**334929.85**	**2235**
Black Tickle	16	38.59	38585.83	260
Cartwright	4	6.69	6686.81	48
Charlottetown	3	9.42	9420.42	54
English Point	0	0.00	0.00	0
Forteau	14	43.87	43872.54	280
Francois	4	12.86	12856.09	79
Grey River	1	4.89	4892.48	29
Hopedale	5	19.97	19967.25	120
L'Anse Amour	0	0	0	0
L'Anse au Clair	6	60.80	60797.24	495
L'Anse au Loup	1	3.27	3271.21	20
Little Bay Islands	2	9.60	9596.46	61
McCallum	5	9.17	9166.96	59
Nain	4	11.37	11367.55	76
Pinware	0	0	0	0
Port Hope Simpson	2	37.97	37972.10	252
Postville	1	0.65	651.04	4
Ramea	10	34.03	34034.81	202
Red Bay	0	0	0	0
St. Brendan's	12	20.96	20964.05	131
St. Lewis	4	10.83	10827	65
West St. Modeste	0	0	0	0
Residential	**871**	**1091.17**	**1091168.19**	**20234**
Black Tickle	57	72.99	72987.36	1194
Cartwright	10	8.41	8410.15	145
Charlottetown	11	15.97	15968.90	329
English Point	4	4.90	4895.24	92
Forteau	11	12.14	12143.97	239
Francois	49	60.70	60704.99	1087
Grey River	27	46.19	46187.78	837
Hopedale	93	136.02	136015.88	2269
L'Anse Amour	4	5.03	5027.58	109

Community	TOTAL PARTICIPANTS	TOTAL ENERGY SAVINGS (MWh)	Total Energy Savings (KWh)	Total Installed Products
L'Anse au Clair	20	30.95	30951.80	582
L'Anse au Loup	53	59.94	59942.11	1250
Little Bay Islands	70	78.52	78524.21	1609
McCallum	37	34.29	34287.07	642
Nain	107	137.04	137036.55	2562
Pinware	1	1.23	1227.91	28
Port Hope Simpson	9	12.92	12918.63	228
Postville	25	32.37	32369.27	654
Ramea	145	193.90	193902.43	3578
Red Bay	2	4.57	4572.59	86
St. Brendan's	96	86.66	86658.35	1652
St. Lewis	35	50.88	50880.70	954
West St. Modeste	5	5.55	5554.72	108
Total	**965**	**1426.10**	**1426098.04**	**22469**

Appendix B: Direct Install Results by Product Type

Information on products installed in 2015 are indicated in the table below.

2015 Products per Community	Total Installed Units	13W Regular CFL	23W Regular CFL	23W Specialty Dimmable CFL	Low Flow Shower-head	Faucet Aerators	Kitchen Aerators	LED Exit Sign Retrofit	23W R40 Flood	7W Chandelier	14W Vanity Globe
Commercial	**94**	**891**	**685**	**0**	**94**	**156**	**72**	**25**	**99**	**33**	**180**
Black Tickle	16	78	86	0	3	17	10	0	22	4	40
Cartwright	4	30	6	0	6	3	3	0	0	0	0
Charlottetown	3	0	49	0	0	1	1	0	3	0	0
English Point	0	0	0	0	0	0	0	0	0	0	0
Forteau	14	91	141	0	8	10	11	0	7	0	12
Francois	4	51	21	0	0	2	2	0	3	0	0
Grey River	1	4	24	0	0	1	0	0	0	0	0
Hopedale	5	24	82	0	2	5	4	0	3	0	0
L'Anse Amour	0	0	0	0	0	0	0	0	0	0	0
L'Anse au Clair	6	177	82	0	45	41	10	2	24	0	114
L'Anse au Loup	1	0	10	0	0	0	0	0	6	0	4
Little Bay Islands	2	16	21	0	0	2	2	0	4	16	0
McCallum	5	23	12	0	0	4	5	0	2	13	0
Nain	4	51	7	0	0	11	1	0	0	0	6
Pinware	0	0	0	0	0	0	0	0	0	0	0
Port Hope Simpson	2	146	26	0	28	28	2	21	0	0	1
Postville	1	2	2	0	0	0	0	0	0	0	0
Ramea	10	96	52	0	1	19	14	0	20	0	0
Red Bay	0	0	0	0	0	0	0	0	0	0	0
St. Brendan's	12	77	31	0	1	10	4	2	3	0	3
St. Lewis	4	25	33	0	0	2	3	0	2	0	0
West St. Modeste	0	0	0	0	0	0	0	0	0	0	0
Residential	**871**	**10343**	**4952**	**22**	**507**	**747**	**678**	**1**	**667**	**876**	**1441**
Black Tickle	57	467	368	0	44	59	43	0	61	42	110
Cartwright	10	78	46	0	3	9	9	0	0	0	0
Charlottetown	11	161	74	0	5	9	7	1	19	32	21
English Point	4	48	26	0	2	5	2	0	2	0	7

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2015 Products per Community	Total Installed Units	13W Regular CFL	23W Regular CFL	23W Specialty Dimmable CFL	Low Flow Shower-head	Faucet Aerators	Kitchen Aerators	LED Exit Sign Retrofit	23W R40 Flood	7W Chandelier	14W Vanity Globe
Forteau	11	100	80	0	7	3	4	0	12	14	19
Francois	49	684	133	0	32	51	38	0	21	46	82
Grey River	27	489	179	0	23	32	31	0	28	9	46
Hopedale	93	1113	656	0	82	106	91	0	82	44	95
L'Anse Amour	4	37	42	0	1	3	2	0	4	8	12
L'Anse au Clair	20	251	149	0	11	21	18	0	34	14	84
L'Anse au Loup	53	501	324	0	20	19	32	0	62	137	155
Little Bay Islands	70	832	381	0	26	38	47	0	64	101	120
McCallum	37	285	160	0	7	30	33	0	24	39	64
Nain	107	1429	781	0	76	102	68	0	17	18	71
Pinware	1	12	10	0	0	1	1	0	0	4	0
Port Hope Simpson	9	100	72	0	8	6	9	0	7	11	15
Postville	25	330	186	11	14	9	17	0	24	26	37
Ramea	145	2040	589	11	87	148	124	0	101	148	330
Red Bay	2	37	33	0	2	3	2	0	5	0	4
St. Brendan's	96	915	287	0	31	61	66	0	60	137	95
St. Lewis	35	396	336	0	24	28	31	0	38	46	55
West St. Modeste	5	38	40	0	2	4	3	0	2	0	19
Total	**965**	**11234**	**5637**	**22**	**601**	**903**	**750**	**26**	**766**	**909**	**1621**

Appendix C: Direct Install Results Summary

The following results were collected during the installation visit survey for the Direct Install component.

Survey Question	Responses	
Are you a Residential or Commercial customer?	Residential	90.16%
	Commercial	9.84%
	No Response	0%
How did you FIRST hear about the program?	Bill Insert	0%
	Community event	0%
	Door-hanger	0%
	Other	1.45%
	Posters	10.98%
	Radio	0.62%
	Representative called me to book appointment	36.99%
	Representative came to my door	19.17%
	takeCHARGE website	0.41%
	Town Bulletin Board	7.25%
	Town Facebook	5.18%
	Town Meeting	0%
	Word of Mouth	17.93%
What is the #1 reason you're participating in the program?	Help the community to reduce our use of Hydro plant	3.42%
	It's convenient to have the products installed	1.24%
	Receive free products	0.93%
	Reduce my impact on the environment	7.05%
	Save money by saving energy	86.84%
	To enter the contest to win a prize	0.52%

What describes your view of energy efficient products?	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
They are safe and effective.	38.86%	55.13%	6.01%	0%	0%
I would like to install more of them in my home.	36.99%	56.99%	5.70%	0.21%	0.10%
I think that the money I save on my electricity bill makes up for the higher cost of the energy saving products I've purchased in the past.	31.92%	52.02%	15.75%	0.31%	0%
It is important to use energy saving products to reduce my environmental impact.	40.41%	54.30%	5.18%	0%	0.10%

Survey Question	Responses				
I am willing to pay more for an energy saving product.	27.05%	52.44%	17.82%	2.38%	0.31%
In the past 12 months, have you taken any of the following actions to reduce your energy use at home? (Check all that apply).	Bought or used Energy Star appliances				35.13%
	Installed Energy Star windows				13.16%
	Installed high performance or programmable thermostats				7.05%
	Installed new or upgraded insulation				12.95%
	Turned down heat at night or when not at home				85.70%
	Turned off lights and/or appliances when not in use				96.88%
	Used LED holiday lights				52.75%
	Washed laundry in cold water				83.11%
Please rate your satisfaction with your experience in this Hydro Program. (1=Poor, 5=Excellent)	1 – Poor				0%
	2 – Fair				0.93%
	3 – Good				10.27%
	4 – Very Good				31.22%
	5 – Excellent				57.57%
Please indicate your gender.	Female				45.68%
	Male				54.32%
Please indicate your age range.	19 or under				0%
	20-29				5.50%
	30-39				10.90%
	40-49				17.35%
	50-64				39.68%
	65+				26.56%
What is your main heating source? (Check one).	Electric				26.01%
	Oil				35.75%
	Wood furnace				15.65%
	Wood stove				21.14%
	No Response				1.45%

Appendix D: Direct Install Audit Results Summary

The following results were collected during the post-installation audit surveys with Direct Install participants. The installation verification totals are included in the Direct Install results.

Audit Question	Responses	
Are you a Residential or Commercial customer?	Residential	90.16%
	Commercial	9.84%
Are the new items working to your satisfaction?	Yes	100%
	No	0%
How knowledgeable are you about saving energy and electricity in your home and at work?	Expert	7.69%
	Very knowledgeable	24.36%
	Some knowledge	46.15%
	Low knowledge	16.67%
	No knowledge	5.13%
Did you learn any new information on energy efficiency during the visit?	Yes	70.77%
	No	29.23%
How energy efficient would you say your home is?	Very efficient	24.36%
	Moderately efficient	47.44%
	Needs improvement	20.51%
	Not very efficient	7.69%
In what areas do you think your home's energy efficiency needs improvement?	Windows	27.27%
	Doors	18.18%
	Insulation	32.73%
	Light fixtures	3.64%
	Energy efficient appliances	7.27%
	Energy efficient electronics	0.00%
	Air tightness	3.64%
	Electric heating controls and thermostats	7.27%
	Electric hot water heating control	0.00%
	Other	0.00%
If Hydro were to offer other programs or incentives in the future, what incentives would interest you?	**Suggestion**	**Number of requests**
	Appliance rebates	5
	Anything that lowers bills or saves money	13
	Better commercial rate	0
	Energy conservation advice	0
	Thermostats/heating control/heating	5
	Home/Business energy audits	0
	Hot water heating tank replacement	1
	Insulation (attic, basement, house)	24
	Redo basement	0
	Roof replacement	0
	Solar/renewable energy product (e.g. solar panels, wind energy)	0
	Additional lighting	2

Audit Question	Responses	
	Window/door replacement or rebates	31
In the next 12 months, do you plan to take any of the below actions* to reduce your energy use at home?	Yes	43.59%
	No	55.13%
	No Response	1.28%
Are you aware of Hydro's mail-in appliance rebates?	Yes	51.95%
	No	48.05%
Are you planning to use the mail-in appliance rebates in the next 12 months?	Yes	44.83%
	No	55.17%
	Unsure	0%
Rate your level of satisfaction with the takeCHARGE program.	Very satisfied	69.23%
	Somewhat satisfied	29.49%
	Neither satisfied nor dissatisfied	1.28%
	Dissatisfied	0.00%
	Very dissatisfied	0.00%
Rate your level of satisfaction with the representative's service.	Very satisfied	92.31%
	Somewhat satisfied	5.13%
	Neither satisfied nor dissatisfied	2.56%
	Dissatisfied	0.00%
	Very dissatisfied	0.00%
Did the representative appear knowledgeable about energy efficiency?	Yes	100.00%
	No	0.00%

**Actions include the below list:*

Buy Energy Star appliances
Install Energy Star windows
Install high performance or programmable thermostats
Install new or upgraded insulation
Turn down heat at night or when not at home
Turn off lights and/or appliances when not in use
Use LED holiday lights
Wash laundry in cold water
Other

Appendix E: Completion Status for 2015 Participating Communities

Community	# of 2014 Installs	# of 2015 Installs	Total # of Installs (2014-2015)	Total # of Kits Installed (2011-2013)	Percentage Complete for Each Community (2014-2015 vs. 2011-2013)
Total	**1131**	**965**	**2096**	**3104**	**67.53%**
Nain	0	111	111	472	23.52%
Hopedale	0	98	98	132	74.24%
L'Anse au Clair	46	26	72	85	84.71%
Red Bay	76	2	78	83	93.98%
West St. Modeste	46	5	51	65	78.46%
L'Anse au Loup	135	54	189	221	85.52%
St. Lewis	0	39	39	72	54.17%
Charlottetown	49	14	63	117	53.85%
Grey River	0	28	28	54	51.85%
Postville	0	26	26	62	41.94%
Port Hope Simpson	99	11	110	140	78.57%
Pinware	23	1	24	25	96.00%
Capstan Island	24	0	24	20	120.00%
Ramea	0	155	155	155	100.00%
St. Brendan's	0	108	108	121	89.26%
Black Tickle	30	73	103	62	166.13%
Little Bay Islands	0	72	72	80	90.00%
Francois	0	53	53	40	132.50%
McCallum	0	42	42	55	76.36%
Cartwright	217	14	231	241	95.85%
L'Anse Amour	3	4	7	4	175.00%
Lodge Bay	22	0	22	28	78.57%
Makkovik	36	0	36	130	27.69%
Mary's Harbour	97	0	97	288	33.68%
Paradise River	15	0	15	23	65.22%
Pinsent's Arm	23	0	23	21	109.52%
Rigolet	93	0	93	135	68.89%
William's Harbour	13	0	13	21	61.90%
Forteau Area*	84	29	113	152	74.34%

*Forteau Area includes English Point, Buckle's Point, and Forteau.

Appendix F: Appliance Retirement Research – Survey Questions

Appliance Retirement Survey Questions
1. Customer's name:
2. Customer's address:
3. Phone number:
4. Were you aware that NL Hydro offered an appliance retirement program on Fogo Island in November of last year (2015)?
5. (If "Yes" to #4): How did you hear about the appliance retirement program?
6. (If "Yes" to #4): Could you explain what the appliance retirement program was in your own words (i.e., how would you describe it to someone who never heard of it before)?
7. Why did you not participate in the appliance retirement program?
8. How many refrigerators and freezers do you own?
9. How old is your refrigerator(s)?
10. How old is your freezer(s)?
11. What is the main use of your extra refrigerators and freezers?
12. I would be willing to retire my extra fridge or freezer if… (check top two answers).
13. One alternative to an appliance "retirement" program would be an appliance "replacement" program. Under this "replacement" program, you would purchase a new energy efficient fridge or freezer. This would be delivered to your home, setup, and then your old fridge or freezer would be removed at the same time. Given the two options for your old, inefficient refrigerator(s) and/or freezer(s), would you prefer the appliance "retirement" or "replacement" program?
14. Do you think you would like to participate in the appliance retirement program if it was offered again?
15. Which days of the week would you typically prefer to schedule an appointment to retire or replace an appliance if you were to do so (i.e., which days are you typically more available)? Check all that apply.
16. What times of the day would you be more likely to be available for such appointments? Check all that apply.
17. Do you have any general comments on the appliance retirement program, or other comments on how to improve this program for Fogo Island residents?

2016 Isolated Systems Energy Efficiency Program - Final Report

March 24, 2017

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1.0 Program Overview

Newfoundland and Labrador Hydro's Isolated Systems Energy Efficiency Program (the Program) is a Demand Side Management (DSM) program managed by Summerhill. Year Five of the Program is summarized in this report.

There were four components implemented in Year Five of the Program:

- Direct Install (DI) – Residential and Commercial
- Commercial Lighting Direct Install
- Smart Peak Demand Response Pilot
- Freeaire Commercial Audits

Achieved energy savings for 2016 are shown in Table 1. A savings target was established between Summerhill and Newfoundland and Labrador Hydro (NLH) during the 2016 planning phase. As a result of this process, NLH approved the savings target of 375 MWh for the DI component.

The total net energy savings achieved during Year Five was 512.38 MWh. This amount includes the Direct Install, Commercial Lighting and Heavy-Duty Timer Giveaway components. It does not include Smart Peak or Freeaire. The net energy savings are based on free-ridership, installation rate, and net electric savings rate per unit. *Appendix A: Direct Install Results by Product Type* provides a breakdown of products by component.

Table 1 - Total Net Direct Install Energy Savings

	Total Net Energy Savings (MWh)	Total Products Installed	Total Installs/ Participants
Residential	393.56	5,431	458
Commercial	118.82	10,168	32
Total	**512.38**	**15,588**	**490**

The combined Direct Install and Commercial Lighting components were conducted in seven isolated diesel systems across in NLH communities. Overall, between the two components, 340 customers (308 residential and 32 commercial) received an installation, while 150 customers received a free heavy-duty timer. *Appendix F: Completion Status for 2016 Participating Communities* provides additional insight on the installation rates for communities that received installs in 2016. Post-installation audits were completed with 34 customers to verify installed products.

Two pilot programs took place in 2016; the Smart Peak Demand Response and Freeaire Commercial Audits. Unique to Postville, the Smart Peak Demand Response program involved the installation of 14 Electric Thermal Storage (ETS) heating systems in commercial properties, and hot water control units in 15 residential properties. The Freeaire Commercial Audits program used a combination of research and audits to determine if the Freeaire technology would be beneficial to pursue in the cold Newfoundland and Labrador isolated communities.

1.1 Delivering on Success Factors

The following table summarizes key areas of success across the 2016 program year.

Table 2 - Achieved Success

Approach	Achieved Success
Creating community leaders in energy efficiency	• According to 100% of audit respondents, all of the representatives were very knowledgeable with respect to energy efficiency.
Strong engagement with homeowners and businesses through cost-effective community outreach activities	• Traditional advertising methods (i.e. door-to-door, phone calls, and posters) proved cost-effective for Direct Install activities. • Prizes were a very effective incentive that helped to increase participation and build trust within the communities. • Free radio advertising and representatives' active social media promotional were effective are reaching a diverse group of customers.
Minimize expenditure on direct install products	• Decreased the amount of "new" product purchased by consolidating small stockpiles of unused products from communities participating in the program in 2015 and shipping them to participating communities.
Hire local staff and deliver cost-effective training	• Hired 12 local staff. • Most employees completed online training modules.
High satisfaction among all customers with installation and program experience	• According to QA audit calls, program satisfaction averaged 4.41/5 and satisfaction with representatives was 4.65. • With respect to the install visit surveys, the overall program satisfaction for all customers was 4.08/5. • Anecdotal feedback was very positive.
Continuing to advance the knowledge of sustainability	• 59% of audit respondents confirmed they learned something new from their installation visit. Many noted their new knowledge for saving energy through lighting, water conservation, and heating.
Collect energy use and building information for future program planning	• As part of direct installs, installers collected energy use and building information that will assist in the planning of future programs.

1.2 Program Challenges

The following table summarizes challenges experienced during the 2016 program year.

Table 3 - Program Challenges

Challenge	Opportunity for Improvement
Prize shipments	• Prizes from the year before were not shipped by the local retailer (citing difficulty with winter logistics). After discussing with NLH team members it was decided to ship prizes to prize winners, rather than purchase from local retailer. However, some of the prizes were not what was ordered. • **Recommended solution**: Take a more hands on approach with the shipping of prizes and track the arrival until received.
Staffing in certain communities	• Some communities, specifically Nain and Postville, had issues hiring staff. Limited hiring pools led to hiring some staff that did not meet our preferred level of professionalism and reliability. • **Recommended solution**: In areas where reliable reps are not returning, begin the hiring stages early. Explore community options for identifying reliable and interested candidates.
Online training difficulties	• Online training modules were provided to the representatives. This tool allowed for managers to monitor training progress, results on quizzes, and time spent per slide. In many of our communities, the intermittency of internet connection created frustration for representatives and delays in completion. Some representatives had poor computer skills. • **Recommended solution**: Creating printed slides will help to reduce the issue going forward. Commencing training earlier will also help to reduce issues with dates.
CFL perception	• Despite our continual education of CFL safety protocol, perception of danger remains for some customers. • **Recommended solution**: Continual education of the disposal methods and data supporting CFL safety. Note: Given the plan to move to LED for future campaigns, this is anticipated to become less of an issue.
Reaching product saturation	• Most of the communities have had at least one kit-style install program and one or two rounds of the direct installation. This has resulted in communities nearing saturation and less opportunity existing than expected. • **Recommended solution:** Advance from CFL products to LEDs and include deeper saving measures with installation (e.g., heating controls, specialty lighting).

Logistics in isolated communities	• Many shipping companies (e.g., UPS and Purolator) have difficulty shipping in Northern Labrador areas. • **Recommended solution:** Have a more hands-on approach with logistics and tracking. Establish a relationship with companies and specific individuals that ship to these communities. Research disposable GPS tracking devices.
Storing product	• Some of the NL Hydro plant employees voiced displeasure with receiving and storing products on their property (citing space as an issue). • **Recommended solution:** Communicate (by phone and email) that product will be arriving and the estimated date. Include the DSR Supervisor in email circulation.
Communication	• Often, an electrician in these isolated communities will be quite busy and hard to make contact with. In some cases, communication can be broken for several days and even weeks. • Recommended **solution:** Research possible methods for remote communication.

1.3 Resource Use

Summerhill managed all Year Five resources for the Program. Billed expenses for the January 1st to December 31st, 2016 period are listed below in *Table 4 – Program Budget*. These amounts include resources from the Smart Peak pilot.

Table 4 - Program Budget

Category	2016 Budget Estimate ($)	Expense ($)	Difference ($)
Program Management	$186,500.00	$176,766.25	-$9,733.75
Marketing & Communications	$300.00	$282.90	-$17.10
Program Incentives	$136,433.70	$128,532.67	-$7,901.03
Program Representatives	$94,349.14	$99,278.35	$4,929.21
Program Delivery Expenses	$99,823.13	$95,889.84	-$3,933.29
Recycling	$0.00	$6.192.46	$6,192.46
Total	**$517,405.97**	**$506,942.47**	**-$10,463.50**

The overall 2016 expenses were under the budget estimate. Three categories – Program Management, Program Incentives, and Program Delivery – were notably less than their predicted amounts, while Labour Costs and Recycling were higher than expected. In the initial estimate, recycling fees were not separated from the Program Delivery Expense. Despite Recycling fees being slightly more than expected these two categories came close to balancing out. In 2016, we used a large portion of existing product for the Direct Install component that helped to reduce the cost of incentives.

Many of the 2016 participating communities began nearing product saturation points during the program. This resulted in a greater dependence on Field Representatives and Program Coordinator time and effort to reach customers and organize appointments, which increased the Program Representatives cost.

1.4 Total Resource Cost

In a meeting with NLH on March 15th, it was determined that information used to calculate the program Total Resource Cost (TRC), such as marginal cost and discount rate, needed to be updated. A TRC ratio and supporting information will be provided once updated information has been received and a third party evaluator, Dunsky Energy Consulting, has reviewed and verified TRC inputs. Once completed, an amendment with TRC results will be provided for this report.

2.0 Detailed Results by Component

As stated in Section 1.0, the generalized savings target for the 2016 Program was 375 MWh. This target was based on the estimated remaining opportunity after 2014-2015 direct install projects and from discussions between Summerhill and NLH during the 2016 planning phase.

Milestones:

Table 6 - Program Milestones

Milestone	Target Date	Result
Launch direct install, in 5 communities, targeting homes and businesses that did not receive full installations in previous years	July 16th, 2016	Achieved (July 21st)
Launch energy efficient tube lighting and ballast replacement appointments (commercial lighting)	August 1st, 2016	Achieved (September 28th)
Launch installation of hot water heaters and controls in Postville	October 11th, 2016	Achieved

2.1 Direct Install

Direct installation of energy efficient products provides an excellent opportunity to have trained local leaders in efficiency, achieve energy savings, educate the public, and identify further saving opportunities. In 2016, efforts were focused in Nunatsiavut isolated system communities in Northern Labrador along with two additional communities. *Appendix B: Direct Install Results by Community* provides a list of each participating community.

This year, the direct installation program included two subcomponents. These included the following:

a. Residential and commercial direct installation (basic suite of energy efficient products).
b. Heavy-duty timer giveaway.

The achieved energy savings and participation are summarized below:

Table 7 - Direct Install Achieved Energy Savings and Participants

Component	Total Net Energy Savings (MWh)	Total Products Installed	Total Installs/ Participants
Direct Install - Residential	295.68	5,281	308
Direct Install - Commercial	69.76	442	23
Giveaway Event	97.88	150	150
Total	**463.32**	**5,873**	**481**

For detailed breakdowns of installations by community and by product types, refer to *Appendix B: Direct Install Results by Community* and *Appendix A: Direct Install Results by Product Type*.

Residential and Commercial Direct Installation

Year 5 (2016) marked the last year of a five-year plan for the direct install in these communities. These were the remaining communities who had previously received kits in 2012 and 2013, as well as a full (a la carte) installation in 2014 and 2015. The kits offered a limited number of efficient products to each home and business leaving considerable opportunity to get further electricity savings by installing additional products. Due to the consecutive success, in 2014 and 2015, we opted for an "a la carte" direct install model to take advantage of any of the remaining opportunities that were missed. The team of Field Representatives were informed of the unconfined model, and were able to replace any inefficient product for which they had an efficient alternative.

Using the data from the two previous years, we were able to assess the expected amounts of each product per residence in each of the communities. In previous years, there had been product remaining at the end of the program. In an effort to be more sustainable and reduce program incentive costs, Summerhill arranged to have all remaining products sent to the active communities in 2016. Information on residences and remaining product was used to determine which product lines would be selected for 2016 product orders.

The 2016 product mix included:

Table 8 – 2016 Product Line

Product	Deemed kWh Savings/ Product – Residential	Deemed kWh Savings/ Product – Commercial
13 Watt Regular CFL	32.91	154.54
23 Watt Regular CFL	36.37	170.98
Low-flow Bathroom Faucet Aerators	170.78	170.78
Low-flow Kitchen Faucet Aerators	170.78	170.78
23 Watt R40 Flood Lamp	82.07	233.60
7 Watt CFL Chandelier	31.92	119.73
14 Watt CFL Vanity Globe	39.95	39.95
23 Watt Specialty CFL – Dimmable	82.86	184.13
Low Flow Showerheads	365.25	365.25 (hotel)

Overall, customers were very satisfied with this component and with the products. Quality issues are discussed in section 4.0 Quality Assurance.

Heavy Duty Timer Giveaway

In 2016, the program included a Heavy Duty Timer Giveaway event. The decision to hold a giveaway event, to boost savings above the determined target, was reached between Summerhill and NL Hydro. In many northern communities car-block heaters are used day and night to ensure the car engine is prepared to run when needed. This can draw a severe amount of energy, but can be resolved by using a timer for the car-block heater. The timer can be set to turn on only 2-3 hours prior to car use, which will drastically reduce energy demand. By using these timers, and signing pledges, customers are showing an interest in changing their behavior around energy efficiency.

Five communities were selected (see Table 9), and the giveaway events took place between November 19th - December 13th. Communities and amounts were selected based on the prevalence of car block heater use in the winter, as described by field representatives in these communities. The deemed savings for a single heavy-duty timer used for a car-block heater is 652.5 kWh.

Table 9 – Heavy Duty Timer Giveaway Events

Community	Event Date	Timer	Savings (MWh)
Nain	November29th	35	22.84
Hopedale	December 12th	15	9.79
Cartwright	November 19th	25	16.31
Ramea	December 12th	25	16.31
Forteau	November 24th	50	32.63

Field Representatives were informed that they were to set up an event in a public space, provide ample advertisement (using media discussed in Section 3) for equal opportunity, and host a giveaway event. Each participant was limited to one heavy-duty timer each, and they were required to sign a pledge indicating that they would use the timer for a car-block heater (see pledge in Appendix G). People wishing to participate, but that did not receive a timer due to limited quantities, had the opportunity to sign a wait-list expressing their interest. The signed pledges and wait-lists were sent back to Summerhill.

All of the timers were given away, there were none remaining at the end of the events. Each of the Field Representatives mentioned that the event was a great success and they enjoyed it thoroughly. Some of the Representatives suggested that this type of event could have further success as part of a direct installation (i.e. Ramea, Cartwright, and Forteau), while others felt that there would be no further interest in their community (i.e. Hopedale).

A customer in Hopedale signing the pledge to receive her new heavy-duty timer.

Our Rep (Ethel) receiving a signed pledge and giving a timer.

2.2 Commercial Lighting

The Commercial Lighting component in 2016 was an extension of the pilot program that took place in 2015. The focus of this program was to hire an electrician to replace existing t-12 lamps, associated ballasts, and sockets with more energy efficient t-8 tube lamps and more energy efficient ballasts. There are electricity savings with both the lamp and the ballast replacements, but not the sockets (see Table 10). As this was a continuation of the 2015 pilot program, the communities remained the same, focusing on Northern Labrador Nunatsiavut communities (i.e. Hopedale, Makkovik, Nain, Postville, and Rigolet).

Table 10: Associated Savings for Commercial Lighting Products

Product Type	Deemed savings (kWh/year)
T-8 tube lamp	11.5
Replacement ballast	17.6

Replacement socket	0

The opportunities were identified by a combination of our electrician team, field representatives, and research by Summerhill. For 2016, the opportunities consisted of 3 installations that were planned from the year before (but were not completed), and 10 additional installations. In total there were 13 installations planned for the 2016 campaign. The list of opportunities can be seen in *Appendix H: Commercial Lighting Opportunities 2016*.

Not all of the planned installations were completed in 2016. Some business were not in operation and it was determined that they should not be completed. However, there was a new opportunity discovered and completed by the electrician team in Makkovik. Overall, there were 9 installations completed in 2016, they amount to a total of 49.07 MWh in savings to the program (see Table 11). Currently, there is one outstanding installation that has been completed, but the associated installation amount has not yet been reported.

Table 11: Commercial Lighting Energy Savings

Business name	Town	T-8 Lamps	Ballasts	Sockets	Savings (MWh/year)
Big land Grocery	Makkovik	248	107	476	4.76
Torngait Fish Plant	Makkovik	526	263	2104	10.68
Jens Haven Memorial	Nain	939	406	1978	17.94
Torngait Fish Co-Op	Nain	258	130	520	5.26
LGH Clinic	Hopedale	204	102	408	4.14
LGH Clinic	Makkovik	162	81	324	3.29
Rigolet Medical Clinic	Rigolet	68	34	136	1.38
Sheppards Store	Postville	72	36	144	1.46
Makkovik Hotel	Makkovik	8	4	16	0.16
Total		**2485**	**1163**	**6106**	**49.07**

Opportunities still remain in several of these communities. The electrician team informed Summerhill of 3 new opportunities that could receive an installation in future years, as well as some of the opportunities that were missed in 2016.

2.3 Smart Peak Demand Response Pilot

The Smart Peak Pilot was a shared initiative by Summerhill and NL Hydro. The aim of this pilot was to install and test Steffes demand response technology in the isolated systems. The technology is designed to reduce demand for electricity during peak times, by occasionally powering down heaters and hot water tanks. Electric thermal storage (ETS) heaters were used in order to ensure continuous heat flow despite electricity cut-off, this reduces the impact on program participants. Well insulated hot water tanks can maintain their heat for hours after electricity is shut-off which makes them a good candidate for direct load control applications.

We sought to install fourteen controlled ETS units in the community center in Postville, NL, and 15 hot water control units in residential homes. In the end, eight heaters were installed at the community center, while the remaining six were not installed due to aesthetic concerns from community center staff. Fourteen hot water controllers were installed in residences throughout Postville. The six outstanding ETS units are expected to be installed early 2017 in the Nunatsiavut Government building.

One of the challenges Summerhill faced was moving the heavy material from the drop-off point on the dock to the installation site. Fortunately, the town of Postville was able to supply a forklift allowing local staff to move the material. Local reps, diesel operators, and our electrician all played a role in making the move a success.

Communication with local contractors was also a challenge. Summerhill had a difficult time contacting the electrician prior to installation and had trouble confirming a schedule for installation. This led to concerns that the installation would be delayed and deadlines would be missed. Fortunately, the contractor was able to perform the installation within the required timeline. Contractors working in the northern communities are in high demand and are regularly without access to phone and internet services. Despite these communication difficulties, the work was successfully completed and work quality was high. The contractor received great reviews from program participants.

Summerhill has learned that it can be unrealistic to expect the same levels of communication that we experience working in more urban areas. Attempting to force the issue can place strain on valuable relationships. Therefore, it is best to accept the natural pace and allow for more time to complete activities. In the end we learned that to reduce risk associated with independent contractors it is critical to schedule work well ahead of time to allow for timeline drift.

Table 12: Smart Peak Installation

Location	Product Type	Quantity Expected	Quantity Completed
Residential	Hot water controller	15	14

Community Centre	ETS Heating Units	14	8
Other Commercial	ETS Heating Units	0	N/A (6)

2.4 Freeaire audits

Freeaire is a refrigeration product that draws cool air from outside during cold winter months to reduce electricity consumption associated with artificial cooling. Freeaire also leverages "smart", highly efficient evaporator fans, compressors, and motors to reduce consumption when cold outside air is not available. Summerhill trained six representatives to scout opportunities for Freeaire installations in Ramea, Grey River, Cartwright, Forteau, St. Brendan, Mary's Harbor, and Port Hope Simpson. Audits submitted were as follows:

Table 13: FreeAire Audits

Town	Audits completed
Ramea/Grey River	1
Cartwright	6
Forteau	3
St. Brendan	3
Mary's Harbor	1
Port Hope Simpson	1
Total	**15**

After reviewing the 15 submissions, Earle's Grocery in Forteau was selected as a candidate for a pilot project. Factors in the decision included: refrigeration opportunity, presence of local, knowledgeable staff, and a strong relationship with the business owner. Using the Freeaire calculator and in coordination with the Freeaire team we estimated the cost and energy savings associated with a full Polar Power Package installation at Earle's Grocery:

Table 14: Freeaire savings calculator

Total refrigeration before Freeaire (kWh)	Total refrigeration after Freeaire (kWh)	Savings (kWh)
102,244	87,675	14,569

Total estimated cost of Freeaire installation	Savings on electricity per year	Payback period (years)
$23,870.00	$991.00	24.09

Though there were significant savings associated with the installation, it was not cost effective. Installation requires skilled labor, and expensive parts leading to an overall high project cost. In this instance, the payback period calculated was 24.09 years – much longer than we had hoped.

After conversing with the Freeaire team about the results, they informed us that the slow payback was due to the size of the refrigerators. The savings associated with Freeaire installation grow exponentially as refrigerator size increases, and larger units have a much shorter payback period. Since Earle's Grocery has relatively large refrigeration units for the area, NL Hydro and Summerhill came to the conclusion that the Freeaire technology may not be applicable to the smaller scale refrigeration uses of the isolated systems. At this time it was decided to cease efforts on the Freeaire Pilot.

Though the technology does not work for widespread use in the isolated systems, some opportunity could still exist. More research can be done in the future in order to identify and target large scale refrigeration units (i.e. fish plants, industrial settings, etc.) to find candidates that would be better suited for the technology. Under the right circumstances, the technology package provides very good savings and could be highlighted as an innovative approach to conserving electricity, creating a good public relations opportunity for NL Hydro.

3.0 Marketing

In 2016, we continued many of the low-cost methods of engaging the public, such as leveraging social media. This resulted in a decrease of overall marketing costs. As these programs have occurred several times in each town, the overall awareness of how they work and what is involved is relatively high. Once again, print media is becoming less and less influential in its effectiveness at raising awareness in the participating communities. Customer surveys indicate that the greatest impact appears to come from personal connections (e.g. social media and Facebook posting, and calling customers).

The marketing tactics employed in 2016 included:

- Social media (Facebook posts);
- Community posters;
- Door-to-door;
- Phone calls;
- Radio (local station in Nain); and,
- Participation prizes (TV, iPads, and VISA gift cards).

The Direct Install community poster was available in English and Inuktitut in all five Nunatsiavut communities (Nain, Hopedale, Makkovik, Rigolet, and Postville). English posters were used in the two additional communities (Cartwright and Ramea).

After several years of operating these programs, we have developed robust lists of participating customers in these communities. Along with the posters, representatives were provided with a call list for each of their respective communities. These call lists were based on participants in the original "kit-style" program who did not participate in the most recent "a la carte" style program. They were divided into residential and commercial sections, while Summerhill encouraged the representatives to connect with potential commercial customers first. It appears that using the dual method of marketing (Posters followed up with phone calls and house visits) helped to secure appointments for many of our representatives. Returning representatives were highly valuable in this process, as they developed a rapport within their community, knew which customers remained, and assumed the role of a community champion of our programs.

To help encourage customers to participate in the program, prizes were offered to those who agreed to have an installation completed in their home or business. Additionally, customers had the opportunity to increase their chances of winning a prize by receiving a second entry if they had an audit completed after the installation. Prizes were offered in each of the community regions, and consisted of the following:

- Grand Prize: 48" Samsung LED SMART TV
    - One grand prize (one winner from all participants)
- Second Prize: iPad Mini 2
    - Total prizes issued: 6 (One winner between Cartwright and Postville based on low participation)
- Third Prize: $200 Visa gift cards
    - Total prizes issued: 7

Winners have been drawn for all prizes. Summerhill has completed the verification of mailing addresses and all prizes have been mailed to their respective winners. While Summerhill wishes to support local retailers, past experience has resulted in the requirement of extra care for shipping and logistics. All prizes were purchased online and sent to the Summerhill office to be handled and shipped. The order for the TV and iPads were sent using parcel mail and Visa gift cards were sent using letter mail. All prizes have been received by prize winners at this time.

4.0 Quality Assurance

To ensure that the quality of our service remains high, both with established and new programs, Summerhill conducted quality assurance reviews. In two components of the Program, the Direct Install and Commercial Lighting, we conducted two levels of quality assurance respectively.

4.1 Direct Install

Install Survey Results

All of the 331 Direct Install customers completed a survey after receiving the installation to verify the total quantities of product that were installed. The initial questions on the survey (i.e. customer information, installed products, marketing, attitudes, household energy use, and building information) were all required questions to be answered. Additional questions on deeper household energy use were not considered required, but representatives were encouraged to collect this information. If the customer was a return visit (based on missed or new products) they were not required to answer all of these additional questions as this information would have been collected in the previous visit. A total of 274 customers completed the full survey, whereas 57 participants only filled in the required base questions. For a summary of customer responses to the marketing and attitude questions, see *Appendix C: Direct Install Result Summary*.

On average, survey respondents indicated that they were pleased with the program, rating it at 4.08/5. Over 69.2% of customers indicated that they were either very satisfied (5/5) or satisfied (4/5) with the program. One customer rated their satisfaction with the program as poor (1/5). However, after communicating with this customer, it became clear that a language barrier prevented this customer from fully understanding the question. Less than 2% of customers rated the program as fair (2/5) and just over 28% said that they were neither satisfied/nor dissatisfied (3/5).

The most effective method for reaching customers was word of mouth (31%) and calling (26.3%), but knocking on doors (19%) and Facebook (12.7%) were also notably effective methods. All other methods (including posters) were less than 4%. By communicating with representatives, it was clear that each had their own way of connecting with customers, but for most social media was a helpful resource. This highlights the importance of using local representatives to engage customers in these small communities. Saving money by saving energy was the greatest motivator for customer participation; with 73.6% of customers identifying it as the number one reason to participate (increases were seen for helping the Hydro plant and reducing the impact on environment). Each of the attitudes towards energy efficient products (i.e., safety, cost, reducing impact, paying more, payback period) were very positive, with a minimum of 70% of customers agreeing or strongly agreeing to statements describing their attitudes (maximum of 86%). It appears that most customers are taking low-or no-cost measures at saving energy in their homes (75% in all three categories); however, several customers are showing an interest in higher cost saving measures, including purchasing Energy Star appliances and using holiday lights.

Telephone Audits

While Install Surveys are effective at gathering information, some people were less comfortable with expressing their thoughts in person and feel more comfortable doing so over the phone. Program quality was monitored through routine telephone follow-ups with town contacts and by conducting post-installation audits with Direct Install customers. Each month, a series of telephone audits were completed (i.e. July, August, September, October, and November-December). The goal was to conduct an audit with 10% of customers for each representative every month, and approximately 10% of installs overall. Using this process we were able to complete an audit with over 10% of all installations. A total of 34 calls were made for the 331 installs that took place. The audits verified satisfaction with the products, program, and representatives. Other questions were asked to identify existing understanding for energy efficiency and how effective the representatives were at educating customers. Participants responded with an average greater than 91% saying they were either satisfied (4/5) or very satisfied (5/5) with the program and 100% of customers saying that they were at least satisfied or more with the representatives. For the summarized audit results, refer to *Appendix D: Direct Install Audit Results Summary*.

Program managers followed up on negative feedback from customers and from representatives. Anecdotal feedback was generally very positive. See below for some excerpts.

> *"Loved how she offered to install everything, and was very informative. She answered all of my questions, and was very nice and helpful with the customer survey."* – Tracy Dicker, Hopedale
>
> *"It's nice having reps replace bulbs for us, helps us out as we are busy with kids"* – Patrick Goudie, Nain
>
> *"They knew exactly what they were doing, they were quick and efficient. [The representatives were] not just knowledgeable and informative, but also very polite and hardworking young men. Thank you for making a program like this is our town."* – Doreen Barbour, Nain
>
> *"He's (Gary) number 1 for sure. Great guy, great work."* – Hank Andersen, Makkovik
>
> *"Products this year worked a lot better, I wasn't always a fan before, but this stuff is really good. Gary was very, very helpful, he explained everything and answered all of my questions!"* – Jackie Penney, Makkovik

In addition to this, Summerhill asked customers if they could think of any way we could improve this program in future years. The common recommendations included: continue cycling back to communities every couple of years, additional savings measures (e.g. specialty lighting, dimmable bulbs), focus on air tightness/heat loss prevention, and heat pumps.

4.2 Commercial Lighting

Electrician Install Forms

In order to maintain better tracking and reliable installation information, Summerhill created an installation form for the Commercial Lighting component. The installation form was to be provided to the electrician(s) for each location. The electrician team was informed that they would be responsible for filling out all of the information on the form (including: customer details, dates, installation amounts, notes, and signatures) and send a copy back to Summerhill. The installation forms were filled out and received for 8 of the 9 installations that were reported as complete in 2016. The outstanding form was not submitted, but verbal confirmation of the installation numbers were provided over the phone and recorded For further observation of the installation form, refer to Appendix I: Commercial Lighting Installation Form.

Follow-up Phone Calls

Similar to the telephone audits performed for the Direct Install component, follow-up calls were made to Commercial Lighting program participants. Whereas the amount of installs were a small sample size, Summerhill planned to follow-up with each customer that participated. As stated above in Section 3.2, there were 9 installations completed. Of these, 6 customers completed the follow-up quality assurance survey (~67%). To see the participants, view Table 15.

Table 15: Participants in Commercial Lighting QA

Business	Town	QA survey (Y/N)	If 'no', then why?
Big Land Grocery	Makkovik	N	Refused survey
Torngait Fish Plant	Makkovik	Y	
Jens Haven Memorial School	Nain	Y	
Torngait Fish Co-op	Nain	N	Not Available
LGH Clinic	Hopedale	Y	
LGH Clinic	Makkovik	Y	
Rigolet Medical Clinic	Rigolet	Y	
Sheppards Store	Postville	N	Not Available
Makkovik Hotel	Makkovik	Y	

These audits helped verify customer satisfaction with the electrician, products, and the program. All 6 of the respondents said that the new items are working to their satisfaction. The overall satisfaction rate with the program (4.67/5) and the electricians (4.83/5) were very high. Neither the program, nor the electricians received a rating lower than 4/5. All of the respondents said that the electricians appeared very knowledgeable about the products and energy efficiency. Some of the customer comments can be read below:

> "*Programs like these encourage people to save. Phil [the electrician] explained full process, showed me how this helps to save on energy (physically showed the difference in ballasts and tubes)"* - Pete Crocker, Torngait Fish Plant, Makkovik.
>
> "*They did their job very efficiently and didn't cause any disruption of regular work hours.*" – Jim Feltham, LGH Clinic, Hopedale.
>
> *"They were really good, answered all the questions I had."* – Barry Sheppard, LGH Clinic, Rigolet.

One unique recommendation that Summerhill received from the follow-up survey was to re-introduce a hot water recovery program (Makkovik Hotel).

To view the results from the Commercial Lighting follow-up surveys, see *Appendix E: Commercial Lighting Quality Assurance Survey Results*.

5.0 Final Thoughts on 2016 Program Delivery

Overall, the 2016 Program was successful in terms of achieving targets. There were several challenges faced along the way, but quick and decisive decision making lead to each one of the sub-components reaching the desired targets. The major factor challenge that was faced was the communication with local electricians. Based on our experience this year, we will be sure to commence projects earlier and give greater opportunity for the electrician to complete the tasks on a desired time frame. Due to the saturation of products in some communities, the high interest in participation did not yield as high of a savings as desired. Including new products, based on discussions with NLH and representatives, future years should result in a rejuvenated savings output.

The information from the direct install customer surveys has yielded valuable data towards opportunities in each of our communities. Using this information in the planning of future years has been a strong asset towards narrowing in on accurate customer counts and provides the prospect to conduct research towards new programs.

Appendices

Appendix A: Direct Install Results by Product Type

Information on products installed in 2016 are indicated in the table below.

2016 Products per Community	Total Participants	13W Regular CFL	23W Regular CFL	Low Flow Shower-head	Faucet Aerators	Kitchen Aerators	23W R40 Flood	7W Chandelier	14W Vanity Globe
Commercial	**23**	**250**	**96**	**13**	**23**	**10**	**12**	**0**	**38**
Nain	4	131	10	8	3	1	4	0	4
Makkovik	5	47	26	5	4	2	0	0	0
Hopedale	4	3	0	0	6	1	0	0	0
Rigolet	3	25	12	0	5	4	0	0	0
Postville	0	0	0	0	0	0	0	0	0
Cartwright	5	12	33	0	4	1	4	0	30
Ramea	2	32	15	0	1	1	4	0	4
Mary's Harbour	0	0	0	0	0	0	0	0	0
Residential	**308**	**3,363**	**949**	**188**	**145**	**215**	**109**	**134**	**178**
Nain	122	2,045	272	71	50	85	32	37	59
Makkovik	67	343	190	29	5	44	2	19	15
Hopedale	40	406	271	28	33	34	28	25	30
Rigolet	39	139	76	32	19	17	0	6	12
Postville	9	9	9	9	9	9	9	9	9
Cartwright	9	44	33	4	4	4	12	12	0
Ramea	21	338	98	15	25	22	26	26	53
Mary's Harbour	1	40	0	0	0	0	0	0	0
Total	**331**	**3,613**	**1,045**	**201**	**168**	**225**	**121**	**134**	**216**

Appendix B: Direct Install Results by Community

The 2016 products installed by representatives by community are indicated in the table below.

Community	TOTAL PARTICIPANTS	TOTAL ENERGY SAVINGS (MWh)	Total Energy Savings (KWh)	Total Installed Products
Commercial	**23**	**69.75**	**69,753.89**	**442**
Nain	4	26.65	26,653.92	161
Makkovik	5	14.56	14,559.85	84
Hopedale	4	1.66	1,659	10
Rigolet	3	7.45	7,452.35	46
Postville	0	0	0	0
Cartwright	5	10.48	10,483	84
Ramea	2	8.95	8,945.77	57
Mary's Harbour	0	0	0	0
Residential	**308**	**295.69**	**295,684.61**	**5,281**
Nain	122	132.35	132,351.54	2651
Makkovik	67	38.5	38,497.21	646
Hopedale	40	49.18	49,183.19	855
Rigolet	39	25.85	25,846.26	301
Postville	9	8.37	8,370.42	72
Cartwright	9	6.84	6,844	113
Ramea	21	33.28	33,275.51	603
Mary's Harbour	1	1.32	1,316.48	40

Appendix C: Direct Install Results Summary

The following results were collected during the installation visit survey for the Direct Install component.

Survey Question	Responses	
Are you a Residential or Commercial customer?	Residential	93.05%
	Commercial	6.95%
	No Response	0%
How did you FIRST hear about the program?	Bill Insert	0%
	Community event	0%
	Door-hanger	0.30%
	Other	2.11%
	Posters	3.93%
	Radio	1.21%
	Representative called me to book appointment	26.28%
	Representative came to my door	19.03%
	takeCHARGE website	0.6%
	Town Bulletin Board	2.72%
	Town Facebook	12.69%
	Town Meeting	0%
	Word of Mouth	31.12%
What is the #1 reason you're participating in the program?	Help the community to reduce our use of Hydro plant	6.67%
	It's convenient to have the products installed	2.12%
	Receive free products	6.36%
	Reduce my impact on the environment	8.79%
	Save money by saving energy	73.64%
	To enter the contest to win a prize	2.42%

What describes your view of energy efficient products?	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
They are safe and effective.	36.25%	47.43%	14.8%	0.91%	0.30%
I would like to install more of them in my home.	34.14%	51.66%	13.29%	0.00%	0.60%
I think that the money I save on my electricity bill makes up for the higher cost of the energy saving products I've purchased in the past.	32.63%	45.92%	19.34%	1.51%	0.3%
It is important to use energy saving products to reduce my environmental impact.	37.76%	48.64%	12.99%	0%	0.30%
I am willing to pay more for an energy saving product.	24.77%	45.32%	23.56%	5.14%	0.91%

Survey Question	Responses	
In the past 12 months, have you taken any of the following actions to reduce your energy use at home? (Check all that apply).	Bought or used Energy Star appliances	40.79%
	Installed Energy Star windows	6.95%
	Installed high performance or programmable thermostats	4.53%
	Installed new or upgraded insulation	14.20%
	Turned down heat at night or when not at home	80.66%
	Turned off lights and/or appliances when not in use	89.73%
	Used LED holiday lights	50.45%
	Washed laundry in cold water	75.23%
Please rate your satisfaction with your experience in this Hydro Program. (1=Poor, 5=Excellent)	1 – Poor	0%
	2 – Fair	1.81%
	3 – Good	28.40%
	4 – Very Good	28.10%
	5 – Excellent	41.09%
Please indicate your gender.	Female	52.27%
	Male	46.83%
Please indicate your age range.	19 or under	0%
	20-29	11.18%
	30-39	22.96%
	40-49	19.64%
	50-64	30.21%
	65+	12.39%
What is your main heating source? (Check one).	Electric	17.52%
	Oil	37.46%
	Wood furnace	7.25%
	Wood stove	34.74%

Appendix D: Direct Install Audit Results Summary

The following results were collected during the post-installation audit surveys with Direct Install participants. The installation verification totals are included in the Direct Install results.

Audit Question	Responses	
Are you a Residential or Commercial customer?	Residential	96.5%
	Commercial	6.95%
Are the new items working to your satisfaction?	Yes	97.06%
	No	2.94%
How knowledgeable are you about saving energy and electricity in your home and at work?	Expert	14.71%
	Very knowledgeable	38.24%
	Some knowledge	35.29%
	Low knowledge	8.82%
	No knowledge	2.94%
Did you learn any new information on energy efficiency during the visit?	Yes	58.82%
	No	41.18%
How energy efficient would you say your home is?	Very efficient	8.82%
	Moderately efficient	38.24%
	Somewhat efficient	41.18%
	Inefficient	5.88%
	Very Inefficient	5.88%
In what areas do you think your home's energy efficiency needs improvement?	Windows	23.53%
	Doors	23.53%
	Insulation	26.47%
	Light fixtures	8.82%
	Energy efficient appliances	5.88%
	Energy efficient electronics	0.00%
	Air tightness	20.59%
	Electric heating controls and thermostats	0.00%
	Electric hot water heating control	0.00%
	Other	0.00%
If Hydro were to offer other programs or incentives in the future, what incentives would interest you?	**Suggestion**	**Number of requests**
	Appliance rebates	3
	Anything that lowers bills or saves money	6
	Better commercial rate	0
	Energy conservation advice	0
	Thermostats/heating control/heating	7
	Home/Business energy audits	0
	Hot water heating tank replacement	0
	Insulation (attic, basement, house)	12
	Redo basement	0
	Roof replacement	0
	Solar/renewable energy product (e.g. solar panels, wind energy)	0
	Additional lighting	3

Audit Question	Responses	
	Window/door replacement or rebates	13
In the next 12 months, do you plan to take any of the below actions* to reduce your energy use at home?	Yes	38.24%
	No	35.29%
	No Response	26.47%
Rate your level of satisfaction with the takeCHARGE program (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	5	50.00%
	4	41.18%
	3	8.82
Rate your level of satisfaction with the representative's service (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	5	64.71%
	4	35.29%
Did the representative appear knowledgeable about energy efficiency?	Yes	100%
	No	0.00%

**Actions include the below list:*

Buy Energy Star appliances
Install Energy Star windows
Install high performance or programmable thermostats
Install new or upgraded insulation
Turn down heat at night or when not at home
Turn off lights and/or appliances when not in use
Use LED holiday lights
Wash laundry in cold water
Other

Appendix E: Commercial Lighting Quality Assurance Survey Results

The following results were collected during the post-installation audit surveys with Direct Install participants. The installation verification totals are included in the Direct Install results.

Audit Question	Responses	
Are the new items working to your satisfaction?	Yes	6
	No	0
How knowledgeable are you about saving energy and electricity at work?	Expert	1
	Very knowledgeable	2
	Some knowledge	3
	Low knowledge	0
	No knowledge	0
Did you learn any new information on energy efficiency during the visit?	Yes	3
	No	3
How energy efficient would you say your business is?	Very efficient	0
	Moderately efficient	2
	Somewhat efficient	2
	Inefficient	2
	Very Inefficient	0
In what areas do you think your business need improvement in terms of its energy use?	Windows	2
	Doors	2
	Insulation	3
	Light fixtures	0
	Energy efficient appliances	1
	Energy efficient electronics	0
	Air tightness	2
	Electric heating controls and thermostats	0
	Electric hot water heating control	0
	Other	1
In the next 12 months, do you plan to take any actions to reduce your energy use at work?	Yes	2
	No	3
	No Response	1
Rate your level of satisfaction with the takeCHARGE program (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	5	4
	4	2
Rate your level of satisfaction with the	5	5

Audit Question	Responses	
electrician's service (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	4	1
Did the representative appear knowledgeable about energy efficiency?	Yes	6
	No	0

Appendix F: Completion Status for 2016 Participating Communities

Community	# of 2014 Installs	# of 2015 Installs	# of 2016 Installs	Total # of Installs (2014- 2016)	Total # of Kits Installed	Percentage Complete (2014-2016 v. 2011-
Total	**1131**	**965**	**331**	**2427**	**3104**	**78.19%**
Nain*	0	111	126	237	472	50.21%
Hopedale	0	98	44	142	132	107.58%
L'Anse au Clair	46	26	0	72	85	84.71%
Red Bay	76	2	0	78	83	93.98%
West St. Modeste	46	5	0	51	65	78.46%
L'Anse au Loup	135	54	0	189	221	85.52%
St. Lewis	0	39	0	39	72	54.17%
Charlottetown	49	14	0	63	117	53.85%
Grey River	0	28	0	28	54	51.85%
Postville	0	26	9	35	62	56.45%
Port Hope Simpson	99	11	0	110	140	78.57%
Pinware	23	1	0	24	25	96.00%
Capstan Island	24	0	0	24	20	120.00%
Ramea	0	155	23	178	155	114.84%
St. Brendan's	0	108	0	108	121	89.26%
Black Tickle	30	73	0	103	62	166.13%
Little Bay Islands	0	72	0	72	80	90.00%
Francois	0	53	0	53	40	132.50%
McCallum	0	42	0	42	55	76.36%
Cartwright	217	14	14	245	241	101.66%
L'Anse Amour	3	4	0	7	4	175.00%
Lodge Bay	22	0	0	22	28	78.57%
Makkovik	36	0	72	108	130	83.08%
Mary's Harbour	97	0	1	98	288	34.03%
Paradise River	15	0	0	15	23	65.22%
Pinsent's Arm	23	0	0	23	21	109.52%
Rigolet	93	0	42	135	135	100.00%
William's Harbour	13	0	0	13	21	61.90%
Forteau Area*	84	29	0	113	152	74.34%

*Nain does not appear to have as great of an opportunity as believed. Based on rep feedback the town has been completed.
**Forteau Area includes English Point, Buckle's Point, and Forteau.
Note: Indicated in yellow are communities where potential savings opportunities still exist.

Appendix G: Heavy Duty Timer Pledge

Pledge

By accepting this Free heavy duty timer I ____ (please print your name clearly) makes the following pledges.

I will use this timer for my car-block heater. Please check inside the box ☐

I will set up an appointment to have a direct install of energy efficient products in my home. Please check inside the box ☐

Phone number: ___________________________

Mailing Address: __________________________

Signature: _______________________________

Appendix H: Commercial Lighting Opportunities 2016

Location	Community
Big Land grocery	Hopedale
Big Land grocery	Makkovik
Torngait Fish Plant	Makkovik
Jens Haven Memorial School	Nain
Jacques Convenience	Nain
Ray Ford Construction	Nain
Torgait Fish Co-op	Nain
Old Day Care	Nain
Nunatsiavut After School Building	Nain
LGH Clinic	Hopedale
LGH Clinic	Makkovik
Rigolet Medical Clinic	Rigolet
Sheppards Store	Postville

Appendix I: Commercial Lighting Installation Form 2016

Location	
Community	
Address	
Property Contact Name	
Contact Phone Number	
Electrician Name	
Installation Date	

Quantity of Products Installed

Product Type	Predicted Quantity	Actual Installed Quantity	Notes/Comments
1 Tube Ballast			
2 Tube Ballast			
3 Tube Ballast			
4 Tube Ballast			
U Lamp Ballast			
Bulbs 4ft T8			
Bulbs F28T8			
Bulbs (U-lamp)			
Sockets			

Completed Installation

Revisit needed (Y/N)		
Electrician Signature		
Property Contact Signature		

take CHARGE!
Saving Energy Starts Here

2017 Isolated Systems Energy Efficiency Program - Final Report

February 23rd, 2016

Summerhill
Leaders in Energy Efficiency

Summerhill
1329 Barrington Street, Halifax, NS B3J 1Y9

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Summerhill

1.0 Program Overview

Newfoundland and Labrador Hydro's Isolated Systems Energy Efficiency Program (the Program) is a Demand Side Management (DSM) program managed by Summerhill. Year one of a remodeled plan and the sixth year of isolated community work is summarized in this report.

There were eight projects implemented in Year Six of the Program, including:

- Direct Install (DI) – Residential and Commercial
- Spring Giveaway Events
- Commercial Lighting Direct Install
- Kids-In-Charge
- Residential Audits and Air Sealing
- Isolated Small Business Efficiency Program (ISBEP) Support
- Nain LED Street lights
- Research Documents

A savings target was established between Summerhill and Newfoundland and Labrador Hydro (NL Hydro) during the 2017 planning phase. As a result of this process, NL Hydro approved the savings target of 375 MWh for the DI project. All other projects had an estimated amount of savings that were planned, but no specific target was determined. Achieved energy savings for 2017 are shown in Table 1.

In 2017, there were four projects that generated directly calculable savings: Direct Install, Giveaway Events, Commercial Lighting, and Residential Audits and Air Sealing. The total net energy savings achieved during Year Six was 1,148.97 MWh. The net energy savings are based on free-ridership, installation rate, and net electric savings rate per unit. *Appendix A: Direct Install Results by Product Type* provides a breakdown of installed products for the DI project.

Table 1 - Total Net Direct Install Energy Savings

Project	Residential Savings (MWh)	Commercial Savings (MWh)	Total Net Energy Savings (MWh)	Total Products Installed	Total Installs/ Participants
Direct Install	799.18	190.92	990.10	18,227	1,008
Giveaway Events	41.72	0	41.72	405	405
Commercial Lighting	0	109.03	109.03	2,436	38
Residential Air Sealing and Audits	8.12	0	8.12	67	20
Total	**849.02**	**299.95**	**1,148.97**	**221,135**	**1,471**

The Direct Install project was conducted in seven isolated diesel systems across in NLH communities. 1,008 customers (899 residential and 109 commercial) received an installation. *Appendix B: Completion Status for 2017 Participating Communities* provides additional insight on the installation rates for communities that received installs in 2017 relative to the estimated opportunity, based on previous installation years. Post-installation audits were completed with 98 customers to verify installed products.

Many of the projects that were part of the program in 2017 were not based around yielding direct savings. The Kids-In-Charge project was education focused, in elementary schools. ISBEP Support was concentrated on informing commercial operations about the ISBEP funding program by NL Hydro. Summerhill also conducted research to identify future opportunities and projects.

1.1 Delivering on Success Factors

The following table summarizes key areas of success across the program year.

Table 2 - Achieved Success

Approach	Achieved Success
Making community leaders in energy efficiency.	• According to 96.8% of audit respondents, the representatives were knowledgeable with respect to their education of energy efficiency.
Strong engagement with homeowners and businesses through cost-effective community outreach activities	• Social media and telephone calls were successful methods for outreach. • Prize recipients were very surprised and appreciative when informed that they had been selected.
Maximize program participation	• Providing representatives with a detailed opportunity list based on previous years' worth of customer participants.
Hire local staff and deliver cost-effective training	• Hired 9 installers and 11 field ambassadors. • DI employees completed online training modules.
High satisfaction among all customers with installation and program experience	• According to QA audit calls, program satisfaction averaged 4.6/5 and representative satisfaction was 4.9/5. • With respect to the install visit surveys, the overall program satisfaction for all customers was 4.53/5. • Higher results may be due to the change from CFL to LED replacements. • Anecdotal feedback was very positive.
Continuing to advance the knowledge of sustainability	• 50% of audit respondents confirmed that they learned new information from their installation visit. Many noted that they learned about energy efficient LEDs.
Collect energy use and building information for future program planning	• Previous building information surveys were helpful in providing accurate estimates for 2017 opportunities. • Accurate data collection helped to create the two auditing programs in 2017.

1.2 Program Challenges

The following table summarizes challenges experienced during the 2017 program year.

Table 3 - Program Challenges

Challenge	Opportunity for Improvement
Inventory	• Shipments of product were based on the low uptake in 2016. Representatives, in 2017, were constantly running out of product and we shipped on an as needed basis. • **Recommended solution**: Order more product in initial orders and have excess waiting to be shipped from Halifax.
Staffing in certain communities	• Postville does not have a reliable paid employee. This was an issue in 2016 and will likely be in 2018. • **Recommended solution**: Explore option of travelling staff members.
Online tool difficulties	• Some representatives do not have access to adequate internet services. • **Recommended solution**: Creating printed material will help to reduce the issue going forward. Regular communication with these communities to ensure deadlines are not being missed and data is being accounted for.
LED perception	• The negative connotations of "energy efficient bulbs" related to CFLs has skewed the opinions of some customers about LEDs. • **Recommended solution**: Continual education about the differences between CFL and LED products.
Reaching saturation	• 2017 received a high uptake from potential customers, this is expected to continue in 2018. Beyond 2018, we anticipate seeing a decrease in opportunity for some existing projects. • **Recommended solution:** Explore/research projects outside of the direct installation realm.
Time frame of program	• In some of the fishing communities (e.g., Mary's Harbour, Port Hope Simpson) their busy season has coincided with our DI schedule. Resulting in some customers not being available for the program. • **Recommended solution:** Communicate with representatives about best times for community availability in early spring.
Storing product	• Some of the NL Hydro Plant employees voiced displeasure with receiving and storing products on their property (citing space as an issue). • **Recommended solution:** Communicate (by phone

	and email) that product will be arriving and the estimated date. Include the DSR Supervisor in email circulation.

1.3 Resource Use

Summerhill managed all Year Six resources for the Program. Billed expenses for the January 1st to December 31st, 2017 period are listed below in *Table 4 – Program Budget*.

Table 4 - Program Budget

Category	2017 Budget Estimate ($)	Expense ($)	Difference ($)
Program Management	$350,000.00	$350,000.45	$0.45
Marketing & Communications	$40,000.00	$78.20	-$39,921.80
Program Incentives	$150,000.00	$166,351.81	$16,351.81
Program Representatives	$200,000.00	$187,100.60	-$12,899.40
Program Delivery Expenses	$200,000.00	$223,190.97	$23,190.97
Recycling	$30,000.00	$11,377.15	-$18,622.85
Total	**$970,000.00**	**$938,099.18**	**-$31,300.82**

The overall 2017 expenses were under the budget estimate. Three categories (i.e., Program Management, Program Incentives, and Program Delivery) were greater than the predicted amounts, while Labour Costs and Recycling were less than expected. Marketing costs were minimal as it was decided to not proceed with print advertising for the Direct Install project or Giveaway.

1.4 Total Resource Cost

The Total Resource Cost (TRC) is positive at 2.72 for the 2017 program year. Electric heat and electric water heating customers are factored into product install numbers. The TRC includes:

- Fixed management costs to December 31st; and
- Payroll and delivery costs to end of the 2017 program year.

Table 5 - Summary and TRC Results: Direct Install

Summary and TRC Results	2017
Benefits	$2,013,715.98
Measures TRC Costs	-$31,473.43
Program Costs	$772,607.13
Program TRC (Net Present Value)	**$1,272,582.27**
Program TRC (Ratio)	**2.72**

In 2017, the Public Utility Board (PUB) in Newfoundland reviewed the Isolated Systems program. One additional area that was requested was the Ratepayer Impact Measure test (RIM). Upon examination of this test, it was determined that the 2017 program year yields a positive RIM ratio at 1.15.

2.0 Detailed Results by Component

As stated in Section 1.0, the savings target for the 2017 Program was 375 MWh. This target was based on opportunities identified in existing in communities in previous years. This value was based on the discussions between Summerhill and NL Hydro during the 2017 planning phase in the spring season.

Summerhill recognizes the importance of good and reliable representatives to having successful programs. It is critical to provide our representatives with a continuous opportunity for employment in order to maintain their engagement in our programs. In 2017, we decided to split the projects by community (Table 6) in order to provide a relatively even amount of work for all staff across the 3-year plan. Communities either received a Direct Installation project or a suite of Non-Direct Installation projects (e.g., Giveaway, Commercial Lighting, and Kids-in-Charge).

Table 6 - Division of Communities

Community	2017 Project Category (DI/Non-DI)
Black Tickle	Direct Install
Cartwright and Paradise River	Direct Install
Charlottetown and Pinsent's Arm	Direct Install
Francois	Non-Direct Install
Grey River	Non-Direct Install
Hopedale	Non-Direct Install
Little Bay Islands	Non-Direct Install
Makkovik	Non-Direct Install
Mary's Harbour and Lodge Bay	Direct Install
McCallum	Non-Direct Install
Nain	Non-Direct Install
Port Hope Simpson	Direct Install
Postville	Non-Direct Install
Ramea	Non-Direct Install
Rigolet	Non-Direct Install
St. Brendan's	Non-Direct Install
St. Lewis	Direct Install
The Straits (Pinware-Red Bay)	Direct Install

Milestones:

Table 7 - Program Milestones

Milestone	Target Date	Result
Launch direct install – Southern Labrador	July 5th, 2017	Achieved
Launch energy efficient tube lighting and ballast replacement appointments (commercial lighting)	June 5th, 2017	Achieved
Launch Giveaway events	July 1st, 2017	Achieved

2.1 Direct Install

Direct installation of energy efficient products provide an excellent opportunity to have trained local leaders in efficiency, achieve energy savings, educate the public, and identify further saving opportunities. As indicated in Table 6, there was a division of Direct Installation work for 2017.

This year, the direct installation component of the Program included two initiatives. These included the following:

- Residential direct installation.
- Commercial direct installation (basic suite of energy efficient products).

The achieved energy savings and participation are summarized below:

Table 8 - Direct Install Achieved Energy Savings and Participants

Component	Total Net Energy Savings (MWh)	Total Products Installed	Total Installs/ Participants
Direct Install – Residential	799.18	15,696	899
Direct Install – Commercial	190.92	1,694	109
Total	**990.10**	**17,390**	**1,008**

For detailed breakdowns of installations by community and by product types, refer to *Appendix A: Direct Install Results by Product Type and Appendix C: Direct Install Results by Community*.

Year 6 (2017) marked the first year of a new three-year plan for the direct install in these communities. The goal was to provide a rotation of half the communities in years 2017 and 2018 for Direct Install and Non-Direct Install programs, while 2019 serves as a cleanup year for all direct installation programs.

2017 Product Suite

In 2017, we introduced LED light bulbs as a replacement for incandescent or halogen light bulbs for the first time. Representatives were informed that they were only permitted to replace incandescent bulbs for an LED, but not replacing CFL bulbs for an LED. During the training period, prior to installations, representatives were equiped with appropriate customer messaging, explaining why we would not be replacing the CFL bulbs (e.g., energy savings). This was developed after acknowledgment of the challenge representatives face when a customer become frustrated CFL bulbs are not replaced.

In addition to the switch from CFL to LED, more specialty products were added to the program. These specialty products included: LED lighting (e.g., Gu10, Par 30, and chandelier), hot water pipe wrap, surge protecting smart power bars, and heat loss prevention measures (e.g., window shrink wrap, caulking, weather stripping, and outlet gaskets). The heat loss prevention measures were installed in the second phase of installations that occurred in the fall. A list of all eligible customers (i.e., those with electrically heated homes) was generated by Summerhill and sent to all of the representatives.

The 2017 product mix included:

Table 9 – 2017 Product Line

Product	Deemed kWh Savings/ Product – Residential	Deemed kWh Savings/ Product – Commercial
10W LED A-Lamp	38.6	98.65
18W LED A-Lamp	57.2	159.02
LED Gu10	42.38	170.98
LED Par30	82.07	233.6
LED Chandelier	31.92	144.02
Showerhead	365.25	365.25
Faucet Aerator/Swivel Aerator	170.79	170.79
Smart Powerbar	56.5	56.5
Pipe Wrap	8.4	8.4
Weather Stripping	120	120
Shrink Wrap	480	480
Caulking (tube)	496	496
Outlet Gaskets	7	7

Based on the success of the “a la carte” model of program delivery, we elected to continue using this model for 2017 with one exception. The standard A-lamp style bulbs would have a limit of 5 per household each to reduce the risk of customers replacing their CFL bulbs with incandescent bulbs in an effort to qualify for LED replacements. Representatives were informed that when homes were indicated on the call sheet as having previously received a “full installation” the A-lamp limit should be applied. However, the homes on the call list that were indicated as only having received the "kit-style" version of the program in a previous year, or any homes not on the call list (e.g., new or never visited) were eligible for full product replacement.

Estimated Opportunity

Using the data from the three previous years, we were able to estimate the expected amounts of each product per residence for each of the communities (Table 10). This information was used to determine the product lines that would be selected, and establish initial product orders. In an effort to be more sustainable and reduce program incentive costs, we arranged to have all remaining products from previous years sent to the active communities in 2017.

It was anticipated that there would be an average of 5 bulbs in each home that were not replaced in previous installations, based on several possible reasons. These may include: visible fixture, on dimmer switches, lamps, next fixtures, or just missed product.

Table 10 - Expected Opportunity per Household

Product	Quantity	Estimated Amount
10W LED A-Lamp	3 (15)	5,352
18W LED A-Lamp	1 (3)	1,328
LED Gu10	0.25	218
LED Par30	0.1	87
LED Chandelier	0.5	436
Showerhead	0.1 (0.8)	247
Faucet Aerator/Swivel Aerator	0.1 (0.8)	494
Smart Powerbar	0.1	87
Pipe Wrap (per ft)	5	4,360
Weather Stripping	0.25	26.16
Shrink Wrap	0.25	105
Caulking	0	0
Outlet Gaskets	0	0

Note: Indicated in brackets are for the "full install" amounts.

Based on the average installations per household, we were able to provide a conservative estimate of the total savings in 2017. Based on reaching 50% of the population, we anticipated achieving a total 747.42 MWh from the Direct Installation portion of the 2017 Program.

Overall, customers were very satisfied with this project and related products. Quality issues are discussed in section 4.0 Quality Assurance.

Mary's Harbour Shrimp Festival Event

On July 27th, our Mary's Harbour representative informed us that the Mary's Harbour Crab Festival coordinator had requested our presence at the event. Quick cooperation between the representative, the event coordinator, Summerhill, and NL Hydro divulged a plan, and proceed with a raffle bag at the event. The raffle bag included (Figure 1):

- takeCHARGE duffel bag
- 3 - LED 9W bulbs

- 1 - 3' Arm of Pipe Wrap
- 4 - Window Wraps
- 2 - Rolls of Weather Stripping
- 1 - Tube of Caulking
- 1 – Energy Saving Power strip
- Energy Efficiency Information
- Stickers
- Magnets
- Take Charge Water Bottle
- Take Charge Lunch bag
- Take Charge winter hat

Figure 1 - Contents of Mary's Harbour Crab Festival Giveaway

The event took place over the weekend of August 4th to 6th in Mary's Harbour. A table was set up with the takeCHARGE decoration. Our representative set up the raffle basket and showcased the contents for event goers to see (Figure 2). Customers were given the opportunity to have their name entered into the draw for this raffle bag by signing a pledge to practice energy-saving behavior in their homes (Appendix D).

Figure 2 - Mary's Harbour Crab Festival booth

Several participants entered into the draw, and the winner of the raffle was Annette Tachell (Figure 3). This event yielded a lot of praise from community members and event coordinators. According to our representative, a handful of DI appointments were a direct result of the Crab Festival information booth and event.

Figure 3 - Raffle Winner

2.1 Spring Giveaway Events

Giveaway Events have shown to have a high level of popularity with customers and representatives. They have also provided a surprisingly reliable amount of savings when designed appropriately. This year, we conducted Giveaway Events for medium-duty clothesline kits in the Non-Direct Installation communities. Clothesline kits yield a savings of 103 kWh/year each. In total, there were 405 kits given away in 11 communities. Allocated amounts were determined based on past participation in programs and local populations.

Table 11 - Clothesline Kit Giveaway Events

Community	Kits	Savings (MWh)
Francois	25	2.575
Grey River	20	2.060
Hopedale	50	5.150
Little Bay Islands	21	2.163
Makkovik	50	5.150
McCallum	20	2.060
Nain	64	6.592
Postville	20	2.060
Ramea	45	4.635

Rigolet	50	5.150
St. Brendan's	40	4.120
Total:	**405**	**41.72**

Field Representatives were informed that they were to set up an event in a public space, provide ample advertisement (using media discussed in Section 3) for equal opportunity, and host a giveaway event. Each customer was only to receive one clothesline kit each, and they were required to sign a pledge indicating that they would use the clothesline instead of their dryer (see pledge in Appendix E). Any additional customers who did not receive a timer had the opportunity to sign a waitlist expressing their interest. Representatives sent back the signed pledges and waitlists to Summerhill.

Partway through the project, Summerhill was informed of a safety issue involving clotheslines being attached to the power line poles. In short time, a sticker (see Appendix E) was designed, agreed upon with NL Hydro, printed, and sent up to the representatives. These labels were put on the clothesline kit boxes in all remaining communities to inform customers of the importance of not attaching clotheslines to the power line poles. For all of those who had completed their giveaway event before the stickers were sent, a telephone call was made to each program participant. Summerhill used this as an opportunity to conduct quality assurance calls with customers and remind them to install their kits (in safe locations).

All of the kits were given away, none were remaining at the end of the events. Each of the field representatives mentioned that the event was a great success and they enjoyed it thoroughly. Some representatives indicated that there was greater interest from community members (e.g., St. Brendan's, Little Bay Islands, McCallum, and Francois).

Field Representatives were instructed to take photographs of their events. Here are some examples of events:

Our representative (Debbie) In Little Bay Islands matching Canada Day celebrations with bottled water and a clothesline kit to help saving energy.

Christine engaging the youth in Francois about energy saving with a nice new clothesline kit!

2.3 Commercial Lighting Direct Install

As an extension to the 2015 and 2016 Northern Labrador Commercial Lighting project, 2017 moved to the Non-Direct Installation communities that reside in the Island region. The focus communities included: Francois, Grey River, Ramea, McCallum, and St. Brendan's. The Commercial Lighting project was rebranded in 2017 to not conflict with other projects presented by NL Hydro (e.g., ISBEP) or previous years of the Commercial Lighting project. The new branding included focusing on the replacement of 4-foot fluorescent T12 fixtures with new T8 LED's.

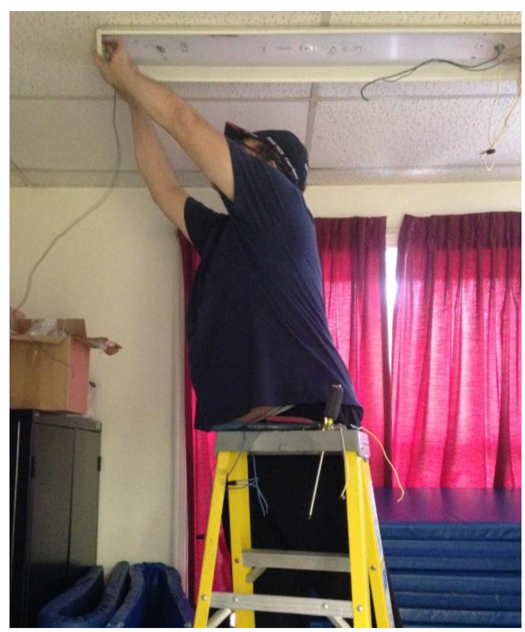
Local representatives were provided with a list of known commercial properties in their community and received training to perform tube lighting audits in these buildings. Representatives were also encouraged to seek other opportunities outside of these lists. Each representative was provided with a discriminator device and was trained on how to identify if the ballast was electronic or magnetic.

The option of using easy snap-in LED upgrade technology was explored. This technology would have allowed Summerhill to exclusively use the representatives to conduct installations and bypass the need for electricians. The snap-in products are compatible with the electronic ballasts and not magnetic. However, the majority of opportunities identified by the representatives were magnetic; eliminating the snap-in technology as a viable option. Electricians were hired to replace the existing fluorescent T-12 lamps (40W), associated ballasts, and sockets with more energy efficient LED T-8 tube lamps (15-18W) and more energy efficient ballasts. The representatives helped to facilitate the product management, assisted the electrician during the installation, and organized the packing and preparation of old products to be shipped for recycling.

Table 12 - Electrical Contractors

Contractor Company	Region Worked	Contact Information
Ingram's Electrical (Devin)	Ramea, Francois, Grey River	Ingramselectrical1@gmail.com
Powell's Electrical (Jim)	St. Brendan's, McCallum	sparkey@nf.sympatico.ca

Powells Electrical team replacing T12 bulbs for T8 LED's in McCallum.



Devin Ingram, replacing the tube lights in a fixture in Grey River.

Summerhill

There are associated savings with both the lamp and the ballasts replacements, but not the sockets (see Table 13). A further opportunity was discovered part-way through the program, and a local supplier was selected to help supply products. As this was a marginally different product, there was a slight alteration to the savings for those installations.

Table 13 - Associated Savings for Commercial Lighting Products

Product Type	Deemed savings (kWh/year)
T8 tube lamp (Rexel)	52.62
T8 tube lamp (Guillevin)	40.48
Replacement ballast	8.10
Replacement socket	0.00

All planned installations were completed, including later added opportunities in Ramea and Grey River. Overall, there were 38 installations completed in 2017, they amount to a total of 109.03 MWh in savings to the program (see Table 14). For a more in-depth analysis of savings, see Appendix F.

Table 14 - Commercial Lighting Energy Savings

Community	Installations	T-8 Lamps	Ballasts	Sockets	Savings (MWh/year)
Francois	6	370	177	63	20.903
Grey River	3	166	83	3	8.064
McCallum	6	275	135	17	15.564
Ramea	17	1,100	474	302	56.932
St. Brendan’s	6	134	63	6	7.561
Total	**38**	**2,045**	**932**	**391**	**109.024**

The representatives were responsible for packing up and organizing all of the removed products. They were provided with steel drums to store the old ballasts and sockets, and cardboard boxes for storing the replaced fluorescent tubes. These products were shipped to an environmental recycling company in Quebec to be disposed of ethically and responsibly.

"*Your representative, Tammy, was very helpful and you couldn't have picked a better person for the job*" – Jim Powell, Powells Electrical

2.4 Kids-In-Charge

Education is a foundation to success in our programs, almost as important as achieving savings. We are attempting to change the social norms towards being more energy conscious and making energy saving a keystone value within these communities. The youth in these communities are critical in driving this messagin. If we are able to reach them at a young age it could be very impactful for the future.

The Kids-in-Charge program paired local Isolated Systems representatives with isolated community schools. This project has been on-going in other on-grid communities of the NL Hydro jurisdiction and was expanded to the isolated communities in 2017. This project focused on the non-DI communities for 2017 (Table 15).

Table 15 - Kids-In-Charge locations

Community	Participated (Y/N)
Nain	Yes
Hopedale	Yes
Makkoik	No – School did not confirm date/time.
Postville	Yes
Rigolet	No– Local representative declined.
Little Bay Islands	No – No school on the island
St. Brendan’s	Yes
McCallum	No – Scheduling conflict (plan for 2018)
Francois	Yes
Grey River	Yes
Ramea	Yes

Schools and representatives confirmed interest with Summerhill and were scheduled in for presentation dates. Representatives prepared for classroom presentations by familiarizing themselves with the material. Among our staff, we had a retired elementary teacher (St. Brendan’s), and a Canada Junior Rangers Leader (Postville and Hopedale). Packages provided to each of the participating representatives, included:

- Jump-drive containing all presentation materials
- NL Hydro Booklets for each student (including certification cards)
- Home Energy Inspection forms (homework activity)
- Presentation Teacher Evaluations
- Teacher appreciation takeaway kits

Each presentation was about 30 minutes to 1 hour long and was facilitated by the local representative. Lessons were divided into two grade categories (K-3 and 4-6) with similar messaging but a slight variation in the theme. Representatives engaged the students and ensured that this was an interactive learning opportunity for the classes. To ensure that the events were not inundated with children, there was a limit of 30 children in each class. Teachers were requested to complete the “Teacher Evaluation Form” at the end of each presentation (see Appendix G).

Overall, we had 6 representatives that visited a total of 7 schools. There were eleven K-3 presentations and five 4-6 presentations, which amounted to 178 students. Some of the smaller schools combined all of their students into one presentation (including those older than the two age groups). There was a great deal of positive feedback from teachers, parents, and representatives.

“One mother messaged me to let me know her daughter came home and lectured them all when she saw the lights and tv were being used but no one was in the room, and that she went and powered off her stepfather's cell phone.” – Angeline, Ramea Representative

"*I liked how you* (Ryan and Josh) *took turns and helped each other during the presentation*"- Teacher, Nain

"*Great interaction with the students, She* (Christine) *gave everyone a chance to talk and participate*" – Teacher, Francois

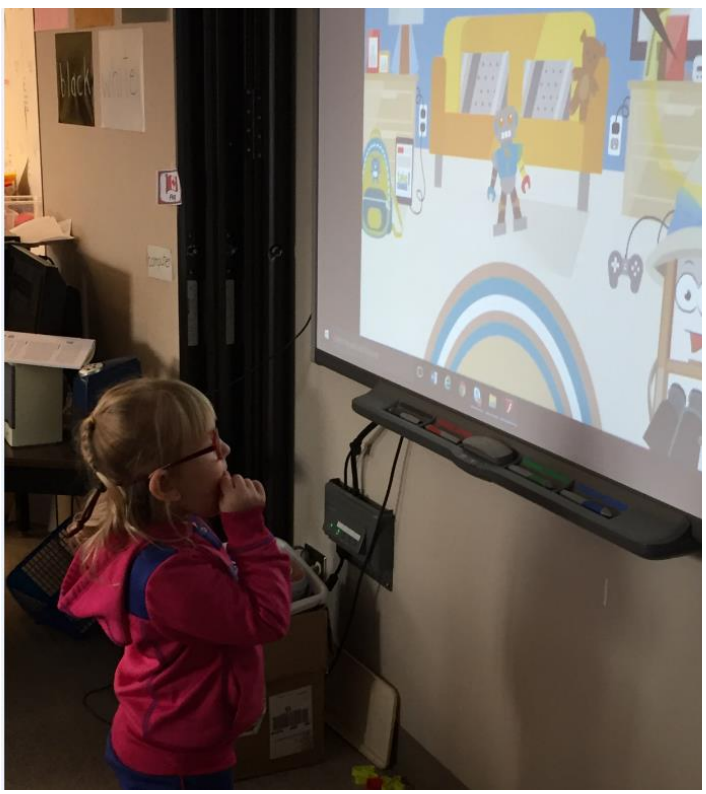
"*Students enjoyed it and learned to be active participants in conserving energy*" – Teacher, Postville.

Table 16 - Kids-In-Charge presentations

Community	K-3 Presentations	K-3 Students	4-6 Presentations	4-6 Students
Francois	1	4	1	1
Grey River	1	7	1	2
Hopedale	1	11	1	9
Nain	4	68	N/A	N/A
Postville	2	47	1	17
Ramea	1	8	0	0
St. Brendan's	1	2	1	2
Total	**11**	**147**	**5**	**31**

New Energy Efficiency Superheros taking notes in Grey River.

Students in Nain participating in the conversation.



Young Energy Explorer in Postville is bravely leading the way for her classmates to join in!

2.5 Residential Audits and Air Sealing

The Straits region has one of the highest rates of electrically heated homes. Several of the communities boast 25-50% of the population residing in an electrically heated home. As it is one of the most populated regions and has relatively good access to non-isolated communities, this has created an opportunity to explore deeper savings measures in these homes.

Summerhill, in conjunction with Clean Foundation, performed 20 residential audits in this region during the summer of 2017. Participants were identified using home surveys that had been completed during previous direct installations. Clean Foundation was provided with the list, which they used to call residents and book appointments. Some appointments were not booked until the auditor was on site and communicating with the local representative.

The purpose was to identify upgrade opportunities beyond the direct installation program. Air sealing measures (e.g., weather stripping, caulking, and outlet gaskets) were installed in each of the homes that had a qualifing air-change per hour (ACH). During the installation, the local representative and auditor educated the customer on the process and visually demonstrated the areas for opportunity. They also provided a carbon monoxide alarm in homes that presented a potential need for them.

Only 2 of the 20 homes had an ACH that was not deemed to be lower than the home's threshold. The upgrades that were installed resulted in a savings of 27.7 Million BTU (approximately 8.12 MWh). In addition to this, there were a total of 12 carbon monoxide alarms installed. For further results, see *Appendix H: Residential Air Sealing Results*.

Reports were completed and sent out to each of the participants. These listed the current EnerGuide rating and indicated primary opportunities to further improve the home's efficiency and score. Each opportunity's savings potential and estimated payback period was included. The main opportunities consisted of:

- Heat Pumps
- Mechanical Ventilation
- Insulation (attic, walls, basements and headers)
- Other (windows/doors, hot water tank insulation, dehumidifiers)

In the fall of 2017, the local representative was provided with a release form (requesting the ability to release reports to Summerhill) and an information pamphlet about the Energy Efficiency Loan Program (EELP). All but one report has been issued for viewing. Clean has followed up with a telephone call to each customer to discuss the opportunities for participating in the EELP for insulation or heat pump programs.

2.6 ISBEP Support: Commercial Audits

To generate further opportunities for the Isolated Systems Business Efficiency Program (ISBEP), Summerhill explored several options. One of these options was to have 20 commercial audits completed in the Southern Straits region of Labrador. The goal of these audits was to gather information about the commercial buildings for future projects and to have at least 1-2 ISBEP applications filed and completed in 2017.

Summerhill put together a request for proposals to have subcontractors bid on the opportunity to complete this work. In the end, based on experience and price, Thermalwise was selected as the company to conduct the audits. This work was put together in 4 phases: generating opportunities, conducting the audits, creating the reports, and follow-up conversations.

Generating the opportunities

As we have discussed, our local representatives are very critical of the work we do in our Isolated Diesel Systems. They have a profound knowledge of the region and provide us with assistance on many decisions made for future projects. We reached out to our representative in the Straits to gather an understanding of who has expressed interest in performing upgrades in the past and who may be interested in having an audit done. An extensive discussion about each commercial building/operation in the Southern Straits region resulted in a list of strong candidates and several possible options.

Conducting the audits

The list of opportunities and the contact information for the local representative were passed along to Thermalwise. Their staff and the local representative gathered electricity release information forms before and during the audits. This information was passed along to NL Hydro for the release of electricity usage data. The Thermalwise team and the local representative established appointments and conducted full commercial audits at each of the 21 selected locations (Table 17). Audits took from 2-6 hours to complete (dependent on the building size) and were all completed over a 3-week period.

Table 17 - List of Commercial Audit participants

Audit Number	Community	Commercial Location
001	Red Bay Store and Restaurant	Red Bay
002	Mount Nascopi Ski Club	Forteau
003	SLDA Taylor Building	Forteau
004	Food Chopper and Seaview Restaurant	Forteau
005	Northern Lights Inn	L'Anse au Clair
006	Hancock's Timbermart	Forteau
007	Turnbulls Home Hardware	L'Anse au Clair
008	John A Dumaresque Town Hall	Foteau

009	RSK Grocery	L'Anse au Clair
010	Clockz Enterprises	L'Anse au Loup
011	Oceanview Resort	Weste St. Modeste
012	Napolean's Town Centre	Pinware
013	Johannas Jacob Town Center	Weste St. Modeste
014	Forteau Sales and Services	Forteau
015	Earles Grocery Limited	L'Anse au Loup
016	O'Brien's Sales and Service	L'Anse au Loup
017	Our Lady of Labrador Church	Weste St. Modeste
018	Lawrence O'Brien Town Hall	L'Anse au Loup
019	L'Anse au Loup Swimming Pool	L'Anse au Loup
020	Labrador Straits Arena	L'Anse au Loup
021	Fast Freddy's	L'Anse au Loup

Creating reports

Upon their return to Nova Scotia, Thermalwise began compiling the audit information into a report format. A format that had the suggested upgrades (based on cost, savings, and simplicity) on the front page was agreed upon by all parties. This format would help draw the customer's attention to the suggested opportunities while reducing the risk of them being lost in the depths of the report. Generating the reports involved extensive research on price quoting for materials and services in the region. The reports identified the ISBEP as a pivotal funding opportunity for completing the suggested upgrades, provided information about how the funding works, and where they can find more information. Final reports have been shared with the customer, NL Hydro, and Summerhill.

Follow-up conversations

For an additional fee, the additional follow up calls were made to the customers. These calls were based on the reports and had the intention of drawing focus on some potential upgrades that may be taken into fulfillment. Each customer was contacted at least once, and those that expressed interest received further communication and collaboration with an ISBEP application. Several candidates expressed interest in following through with some of the recommendations including two that have begun the application process (Table 18).

Table 18 - Promising ISBEP projects

Audit Number	Community	Upgrade	Status
003	SLDA Taylor Building	Heat Pump and insulation	Interested
004	Food Chopper and Seaview	N/A	Interested

	Restaurant		
005	Northern Lights Inn	N/A	Interested
006	Hancock's Timbermart	N/A	Interested
007	Turnbulls Home Hardware	Lighting	Applied
009	RSK Grocery	Heat Pump	Quoting
011	Oceanview Resort	N/A	Interested
013	Johannas Jacob Town Center	N/A	Interested
016	O'Brien's Sales and Service	Lighting	Approved

Currently, there has only been one application for the ISBEP program from the list in Table 18, O'Brien's Sales and Service. Based on our calculations, performing this upgrade will result in 10.66 MWh of savings, and they will receive an incentive of almost $2,900.

2.7 ISBEP Support: Deeper Measures and Fish Plants

In 2012, building audits were completed in 16 commercial locations in Nain and Mary's Harbour. Summerhill representatives performed these audits, and the information was used to generate a report that was presented to the customers. In 2017, we revisited these reports and reconnect with the customers to identify how the reports were received and identify if any recommendations were completed.

Table 19 - 2012 Commercial Audits list

Mary's Harbour	Nain
Acreman's *	Big Land Grocery – Nain
Battle Harbour Assisted Living *	Haynes Store
Battle Harbour RDA	Labrador Grenfell Health
Department of Works	Nunatsiavut Government Building
Lab. Fisherman's Union	OK Society
Lodge Bay Recreation Committee	
Mary's Harbour Craft Shop	
Mary's Harbour Town Council	
Mona's Place	
Noels Lodging	
Riverlodge Hotel	

*Note: * indicates those who refused to participate in the initial calls.*

Telephone calls to all participants were completed in the spring of 2017. Nearly half (43%) of the contacts on the reports are no longer the best person to communicate with about upgrades. About 79% of participants claimed to have completed at least one recommended upgrade (e.g., lighting, windows, heating). The major obstacles to completing upgrades were money/funding, awareness, and time. Most customers (10) expressed interest in having their reports reviewed and receiving a follow-up conversation.

Secondary calls were attempted at each of the Mary's Harbour customers to discuss their reports and introduce the opportunity for funding from the ISBEP program. Summerhill intended to acquire 1-2 opportunities and assist the customers through the ISBEP application to completion of an upgrade. Three key locations surfaced as expressing immediate interest and received the focus of the attention: Mona's Place, Mary's Harbour Community Centre, and the Mary's Harbour Fish Plant. Other Mary's Harbour businesses heard about the process and reached out to the local representative to learn about the project and receive an assessment.

Large industrial operations have provided several opportunities in the past for ISBEP program savings. Summerhill conducted telephone calls to each of the fish plants in the isolated communities, leaning on the support of our field staff. Calls were intended to communicate with the plant manager and educate them about the ISBEP program. Following that, existing operations and upgrade opportunities were communicated. Some of the plant managers strongly expressed their appreciation for the service of reaching out to them. From this, a few additional leads were generated.

Table 20 - ISBEP Opportunities discovered

Location/Building	Upgrade	Potential Savings (MWh)	Progress
Mona's Place	76 8"T12; 84 4"T12	24.11	Partially Complete
MH Community Centre	60 T12; 166 T8	12.59	Approved
HarbourView Manor	132 T8's; 4 U-lamps	14.54	2018 Commercial Lighting
MH Fish Plant	45 metal halides	22.03	2018
Torngait Fish Plants	Condenser, evaporators, pumps	Unknown	2018
Charlottetown Fish Plant	15 Metal Halides	Unknown	2018

2.8 Nain LED Street lights: Customer survey

Summerhill conducted customer feedback surveys based on the 2015 installation of new LED streetlights in Nain. The purpose of the study is to gauge residents' perception of the LED streetlights. Emphasis was placed on collecting feedback from members of the Town Council. Results from the survey will inform NL Hydro when evaluating similar projects in other isolated communities.

Summerhill generated a survey and directed local representatives to conduct surveys within their community. In total, 99 surveys were completed, which included 6 Town Council members. Overall, most respondents gave positive feedback about the new LED lights effectiveness and benefits. Increased visibility and brightness were two of the significant benefits indicated in the survey. When asked how the lights held up in severe weather events, the average response was a 4.2/5 for extreme cold, heavy rain, and high wind events. The average score for snowy conditions dropped to 4.1/5.

2.9 Research Documents

In 2017, Summerhill planned on conducting four research-based projects that would be used in future planning and potentially develop a project. The first three projects listed below have been completed, and a formal report was supplied to NL Hydro (for greater detail, please see these reports).

Energy Management Training

The Energy Management Training project will be focused on providing energy management training for facilities management staff/managers at targeted commercial facilities across the NL Hydro territory. Participants will attend and complete training to develop energy auditing and management skills. This training will allow participants to identify areas of energy saving opportunities or efficient technology upgrade opportunities at their site. The goal of this project is to establish trained on-site energy leaders who are actively looking for upgrade opportunities.

Summerhill identified 11 commercial candidates that had either a relatively large operation or multiple sites. Surveys were completed with 3 of the 11 identified locations to establish their interests and availabilities when it comes to selecting a training platform. Based on the survey results, a major restriction is the loss of time from work by the on-site staff. We recommend communicating with additional businesses in 2018 to have a stronger understanding of the interest from local companies.

Several training platforms have been identified as potential candidates. Based on the feedback from the respondents, it appears that having the training in a local area may result in the best buy-in from businesses. While several training opportunities have been identified, it is recommended to remain neutral until identifying confirmed participants and what suits their needs best.

Community Ambassador

The success of our programs is heavily based on the strength and quality of our representatives. Many of our representatives already act as a local ambassador to our programs, NL Hydro, and energy efficiency. People in their communities look to our representatives for clarification and answers to their energy saving needs. The Community Ambassador project would recognize their efforts and create more structure to the support these representatives give us. This type of initiative may help to sustain our representatives during lull periods of work and maintain their engagement with us and saving energy.

We have identified 10 service options that our representatives could complete as part of the project:

- 1-on-1 consultations or coffee/tea talks
- Radio discussions
- Energy efficiency how-to training session
- Thermal leak detection
- Articles in local media
- Distributing newsletters
- Community meetings
- Local competitions
- Community surveys
- Photo stories

Funding Opportunities

Upon performing a funding scan, there were several opportunities identified that relate to the existing and future energy efficiency projects operated by NL Hydro. Our findings indicated that most of these opportunities would not apply to NL Hydro on their own. An additional external source may be required as a partner for NL Hydro to pair up with to receive funding.

We recommend that NL Hydro pair up with the Nunatsiavut government for the application of several funding sources. This may provide the greatest likelihood that funding will be granted to specific projects.

Youth Electrician

Based on time constraints, the Youth Electrician project was not pursued in great depth.

3.0 Marketing

As we have been noticing over the past three years, print media has been less influential when trying to market the program to community members. Additionally, with a major change in the product line (CFL to LED), the posters would have required a complete reconstruction. This was deemed to have little value to the program, and it was agreed upon that we would not move forward with print marketing in 2017.

In 2017, we continued many of the historically effective methods of engaging the public. As a result, there was a decrease in overall marketing costs. As these programs have occurred several times in each town, the overall awareness of how these programs work and what is involved is relatively high.

The marketing tactics employed in 2017 included:

- Social media (Facebook posts)
- Door-to-door visits
- Phone calls
- Word of Mouth
- Participation prizes (TV, IPads, and VISA gift cards).

After several years of completing these programs, we have compiled substantial lists of participating customers in these communities. Each representative received a call list for each of their respective communities. These call lists were based on participants in the original "kit-style" program and those who participated in the more recent "a la carte" style program. These lists were divided into residential and commercial sections, while Summerhill encouraged the representatives to connect with potential commercial customers first. Returning representatives were essential in this process, as they developed a rapport with their community, knew which customers remained, and assumed the role of a community leader for our programs.

To encourage customers to participate in the program, those who had an installation completed became eligible for prizes. Prize quantities were determined at the beginning of the year based on previous installation quantities. Prizes were offered in each of the community regions, and consisted of the following:

- Grand Prize: 43" Samsung 470 LED Hospitality TV
  - One grand prize (one winner from all participants)
- Second Prize: Apple iPad 32 GB
  - Total prizes issued: 12
    - 1 each (Black Tickle, Charlottetown/Pinsent's Arm, Mary's Harbour/Lodge Bay, Port Hope Simpson, and St. Lewis)
    - 2 to Cartwright residents
    - 5 to the Straits (L'Anse au Clair to Red Bay)
- Third Prize: $200 Visa/Mastercard gift cards
  - Total prizes issued: 12
    - 1 each (Black Tickle, Charlottetown/Pinsent's Arm, Mary's Harbour/Lodge Bay, Port Hope Simpson, and St. Lewis)
    - 2 to Cartwright residents
    - 5 to the Straits (L'Anse au Clair to Red Bay)

Winners were drawn for all prizes, and all prizes have been mailed up to the respective winners. While Summerhill wishes to support local retailers, our past experience with these companies has resulted in the requirement of extra care for shipping and logistics. All prizes were purchased online and sent to the Summerhill office to be handled and shipped. The order for the

TV and iPads were sent using parcel mail (for trusted tracking), and gift cards were sent using letter mail.

As a result of issues in previous years, all gift cards were activated in advance of shipping and representatives were instructed to inform winners.

4.0 Quality Assurance

To ensure that the quality of our service remains high, both with established and new programs, we conducted quality assurance reviews of all work. For the Direct Install, Commercial Lighting, and Giveaway projects we conducted two levels of quality assurance respectively. The first phase was an on-site survey conducted at the point of contact, while the secondary level of quality assurance was completed over telephone calls. Using a two-level approach assisted with gathering more information and helped to eliminate response bias from customers.

4.1 Direct Install

Install Survey Results

In the 2017 Direct Install program, 1,002 surveys were completed by customers after receiving the installation. Customers who received the "a la carte" installation in the past were able to complete a shortened customer survey (875 customers), while those who were receiving the installation for the first time were asked to complete the full extended home survey (127 customers). Both surveys included basic information about the customer, home, attitude, and satisfaction. The extensive full survey included more in-depth information about customer's home construction, appliances, water heaters and heating sources.

Customer satisfaction with the program was an average of 4.53/5. Over 88% of customers indicated that they were either very satisfied (5/5) or satisfied (4/5) with the program. Two customers rated their satisfaction with the program as very dissatisfied (1/5). Less than 1% of customers rated the program as dissatisfied (2/5), and just over 11% said that they were neither satisfied/nor dissatisfied (3/5).

Representative interaction was seen as the most effective method for reaching customers. The two most effective methods were: a) representatives calling to book an appointment (37.6%), and b) the representatives knocking on customer's doors (37.4%). These were followed by word of mouth (18.2%). All other methods were less than 7%.

Customers identified their greatest motive for participating in the program to be saving money by saving energy (78.8%). Customer attitudes towards energy efficient products (i.e., safety, cost, reducing impact, paying more, payback period) were very positive. 84.4% of customers agreed or strongly agreed that the money saved on electricity bills makes up for the higher cost of energy saving products; 97.4% were in agreeance that these products are safe and effective. An additional question provided customers the opportunity to leave a comment for the program, most responses praised the program, while some showed an interest in incentives for heat pumps and programmable thermostats for future programs.

Telephone Audits

In addition to the surveys collected by representatives, Summerhill conducted follow-up quality assurance phone audits. The purpose of this was to monitor program quality and provide customers an opportunity to provide feedback after the audit. It also allowed the customers to give honest feedback on representative.

Following the installs each month, 10% of the customers serviced by each representative were surveyed. Using this process we were able to complete an audit of approximately 10% of all installations. A total of 98 calls were made for the 1002 installs that took place (taking into consideration the 22 revisit entries).

When asked about the products installed, 99% of customers said that they were satisfied. One customer mentioned that they were not sure if they liked the LED that was installed in their touch lamp. In regards to program satisfaction, participants responded with an average greater than 94% saying they were either satisfied (4/5) or very satisfied (5/5) with the program, the remaining 6% neither satisfied/nor dissatisfied (3/5). 99% of customers saying that they were at least satisfied or better with the representatives, the remaining 1% were neither satisfied/nor dissatisfied (3/5).

Customers were asked to provide feedback about the program, below are some of the comments collected via install surveys and phone audits.

"*The representative (Benita) is from the community, she is very friendly and showed how things work, very happy with that*" – Port Hope Simpson, Elizabeth Turnbull

"*We need to be cutting back on our energy consumption, I was very happy with the program - the whole community seems to be jumping on board to participate. Ethel was very patient and helpful - especially with the owner of the house who is hard of hearing*" Red Bay (Frank Browns home, family member answered survey on his behalf)

"*Both reps were very knowledgeable, and did an awesome job, they promoted the products very well, and the replacement products were first class*" Black Tickle (Daughter of Albert Keefe)

"*Sandra was very knowledgeable, I felt very comfortable having her in my home and I was impressed by the quality of the energy efficient products*" Mary's Harbour (wife of Dwight Russell)

"(Very happy with) the fact that there is a program like this and it has come to our community" Cartwright (wife of Joshua Burdett)

"*I am very pleased with this program, service & representative.*" West St Modeste, Kathleen O'Brien

"*Excellent program. Ethel is an exceptional hydro rep.*" Forteau, Barbara Toms

4.2 Commercial Lighting

Electrician Install Forms

To maintain better tracking and reliable installation information, Summerhill created an installation form for the Commercial Lighting project. The installation form was provided to the electrician(s) for each location. The electrician team was informed that they were responsible for filling out all of the information on the form (including customer details, dates, installation amounts, notes, and signatures) and send a signed copy back to Summerhill.

An installation form was received from each of the 38 audits completed. For further observation of the installation form, refer to *Appendix I: Commercial Lighting Installation Form*.

Follow-up Phone Calls

The commercial lighting program consisted of 38 audits. Quality assurance for our commercial lighting program was conducted on over 70% of program participants. The 23 phone audits completed to contact 28 participating businesses; multiple businesses had the same point of contact. 100% of participants stated they were satisfied with the products installed. Program satisfaction was also rated as either satisfied (4/5) or very satisfied (5/5) with the program and the electricians. The average rating for both the program and electrician was 4.91/5.

Overall, participants were satisfied with the program. As a part of the quality assurance calls, customers were invited to provide comments on their experience with the program. Some of these comments have been included below:

"(both the electrician and representative were) very friendly and knowledgeable about what they were doing, they did a real good job, cleaned up and left no debris behind" Paul Green, Lion Club/Community Center/Fire Hall/Department/St. Boniface Church, Ramea

"The big positive thing is the new lighting systems has really brightened the lodge, community members have commented on how much brighter the lights are during cards and bingo" Leslie Cutler, Royal Orange Lodge , Ramea

"Program is environmentally friendly, energy efficient, very pleased with it" Aloysius Mullins, NL Hydro Power Plant, Ramea

"I was really impressed with the lighting, the people (representative and electrician) were excellent, friendly and quick" Kevin Wellman, McCallum Community Fishing Shed, McCallum

"The electrician was very informative, the post office is beyond bright, I'm very pleased with it all" Margaret Hynes, Canada Post, St Brenden's

Participants were asked to provide suggestions on how the program could be improved in the future. Suggestions included:

- provide a choice between daylight and soft light bulbs to participants,
- replace 8 foot bulbs in addition to 4 foot T12 fluorescents, and
- arrange installation times around class times when working in schools as this can provide a distraction to students.

To view the results from the Commercial Lighting follow-up surveys, see *Appendix J: Commercial Lighting Quality Assurance Survey Results*.

4.3 Giveaway

On-site Survey

During the giveaway events, recipients were asked to fill out surveys regarding their usage of clothes dryers and clotheslines. In total, we received 304/405 surveys; Hopedale, Makkovik, and Postville surveys were not received.

Quality Assurance Calls

Phone audits took place for quality assurance purposes after the giveaway events. 51 phone audits were completed, representing for over 10% of giveaway participants. 94% of recipients stated they were "satisfied" with their clothesline, with the remaining 6% being "unsure" as they had not set up their clothesline at the time. Summerhill staff encouraged these individuals to have their clothesline installed. Over 92% of recipients would be interested in a future event with an indoor clothes rack giveaway.

5.0 Final Thoughts on 2017 Program Delivery

In 2017, we added several new projects and research initiatives to our existing portfolio of projects. Summerhill addressed and corrected issues with the electricians and representatives communication from previous years, which guided the program towards a more successful campaign.

Summerhill we successful at exceeding the annual savings targets. Adding more structure to the Commercial Lighting project and shifting from CFLs to LEDs helped to increase the customer participation rates and savings amounts. This contributed to a nearly tripling of the program savings target.

Information gathered from previous direct install customer surveys yielded valuable data that will continue to be used to identify new opportunities for 2017 and beyond. Using this information has helped us to narrow in on accurate customer counts and provided us with an excellent tool to assist with residential audits and potential candidates for exterior cladding project planning.

Appendices

Appendix A: Direct Install Results by Product Type

Information on products installed in 2017 are indicated in the table below.

2017 Products per Community	Total Installed Units	9W LED A-lamp	17W LED A-Lamp	7.5 W LED Gu 10	Pipe Insulation	Low Flow Shower-head	Faucet Aerators	Kitchen Aerators	10 W LED Par 30	5W Chandelier	Smart Bar PowerStrip	Outlet Gasket	Exit Light	Weather Stripping Kit	Shrink Wrap Window
Commercial	1,675	764	335	19	155	15	24	19	109	46	59	93	6	15	16
Black Tickle	214	57	50	7	62	0	0	0	14	1	6	8	0	4	5
Capstan Island	10	5	5	0	0	0	0	0	0	0	0	0	0	0	0
Cartwright	404	152	30	8	42	9	15	13	18	0	14	77	6	10	10
Charlottetown	34	14	1	0	3	1	7	3	0	0	5	0	0	0	0
Forteau	41	25	15	0	0	0	0	0	1	0	0	0	0	0	0
L'Anse au Loup	94	32	48	0	0	0	0	0	7	0	7	0	0	0	0
Lodge Bay	14	0	3	0	0	0	0	0	11	0	0	0	0	0	0
Mary's Harbour	367	241	31	0	12	1	0	0	31	44	7	0	0	0	0
Pinsent's Arm	37	18	18	0	0	0	0	0	0	0	1	0	0	0	0
Pinware	49	17	16	0	3	0	0	0	8	0	3	0	0	1	1
Port Hope Simpson	156	83	48	2	6	1	2	2	3	1	8	0	0	0	0
Red Bay	46	24	18	0	0	2	0	1	0	0	1	0	0	0	0
St. Lewis	49	28	16	0	0	0	0	0	0	0	5	0	0	0	0
West St Modeste	160	68	36	2	27	1	0	0	16	0	2	8	0	0	0
Residential	15,62	7,28	2,115	57	1,76	23	20	275	7	1,0	5	69	0	69	91

2017 Products per Community	Total Installed Units	9W LED A-lamp	17W LED A-Lamp	7.5 W LED Gu 10	Pipe Insulation	Low Flow Shower-head	Faucet Aerators	Kitchen Aerators	10 W LED Par 30	5W Chandelier	Smart Bar PowerStrip	Outlet Gasket	Exit Light	Weather Stripping Kit	Shrink Wrap Window
	2	8		8	8	3	4		31	04	72	4			
Black Tickle	1,275	372	203	4	467	5	9	5	78	47	50	12	0	11	12
Capstan Island	428	154	68	26	84	6	1	9	24	15	19	8	0	7	7
Cartwright	2,123	773	272	25	396	41	63	74	72	87	120	136	0	19	45
Charlottetown	887	582	70	17	15	30	16	18	39	69	25	0	0	1	0
Forteau	804	273	159	36	77	8	0	3	24	20	27	168	0	3	6
L'Anse Armour	61	45	7	0	0	2	0	0	0	3	4	0	0	0	0
L'Anse au Clair	629	154	108	57	30	6	0	6	27	24	24	179	0	8	6
L'Anse au Loup	1,899	1,035	170	148	40	6	1	7	157	266	55	10	0	2	2
Lodge Bay	360	204	26	3	42	8	11	13	26	19	8	0	0	0	0
Mary's Harbour	1,397	632	166	45	208	18	24	38	110	108	48	0	0	0	0
Paradise River	111	43	39	0	18	1	1	2	2	0	5	0	0	0	0
Pinsent's Arm	218	122	37	3	0	9	9	11	0	15	12	0	0	0	0
Pinware	829	411	117	47	57	16	2	16	16	42	25	78	0	2	0
Port Hope Simpson	1,579	982	212	39	69	22	44	30	36	93	52	0	0	0	0
Red Bay	1,339	673	195	57	94	23	5	14	49	85	45	73	0	7	8

2017 Products per Community	Total Installed Units	9W LED A-lamp	17W LED A-Lamp	7.5 W LED Gu 10	Pipe Insulation	Low Flow Shower-head	Faucet Aerators	Kitchen Aerators	10 W LED Par 30	5W Chandelier	Smart Bar PowerStrip	Outlet Gasket	Exit Light	Weather Stripping Kit	Shrink Wrap Window
St. Lewis	417	267	48	17	3	13	14	14	10	17	14	0	0	0	0
West St Modeste	1,282	566	218	54	168	19	4	15	61	94	39	30	0	9	5
Total	18,227	8,052	2,450	597	1,923	248	228	294	840	1,050	631	787	6	84	107

Appendix B: Completion Status for 2017 Participating Communities

Community	Full Install Opportunity	Limited Install Opportunity	Total Opportunity	Total Installations	Percentage Complete
Total	**1288**	**456**	**1744**	**1007**	**57.74%**
Black Tickle	91	15	106	79	74.5%
Capstan Island	25	3	28	22	78.57%
Cartwright	307	0	307	222	72.31%
Charlottetown	64	69	133	44	33.08%
Forteau	104	87	191	28	14.65%
L'Anse Armour	0	4	4	4	100%
L'Anse au Clair	75	39	114	24	21.05%
L'Anse au Loup	177	52	229	159	69.43%
Lodge Bay	23	7	30	22	73.33%
Mary's Harbour	99	38	137	121	88.32%
Paradise River				15	
Pinsent's Arm	23	1	24	16	66.66%
Pinware	23	15	38	32	84.21%
Port Hope Simpson	110	48	158	68	43.03%
Red Bay	79	28	107	82	76.6%

Community	Full Install Opportunity	Limited Install Opportunity	Total Opportunity	Total Installations	Percentage Complete
St. Lewis	39	34	73	17	23.28%
West St Modeste	49	20	69	52	75.36%

Appendix C: Direct Install Results by Community

The 2017 products installed by representatives by community are indicated in the table below.

Community	TOTAL PARTICIPANTS	TOTAL ENERGY SAVINGS (MWh)
Commercial	109	190.92
Black Tickle	18	21.21
Capstan Island	1	1.288
Cartwright	31	45.143
Charlottetown	5	4.621
Forteau	1	5.085
L'Anse au Loup	3	12.372
Lodge Bay	1	3.046
Mary's Harbour	19	41.742
Pinsent's Arm	3	4.694
Pinware	3	6.648
Port Hope Simpson	12	18.558
Red Bay	3	6.187
St. Lewis	3	5.589
West St Modeste	6	14.73
Residential	899	799.18
Black Tickle	61	51.38
Capstan Island	21	23.159
Cartwright	191	132.148
Charlottetown	39	53.747
Forteau	27	32.662
L'Anse Armour	4	3.189
L'Anse au Clair	24	28.454

Community	TOTAL PARTICIPANTS	TOTAL ENERGY SAVINGS (MWh)
L'Anse au Loup	156	84.965
Lodge Bay	21	20.218
Mary's Harbour	103	71.145
Paradise River	15	5.366
Pinsent's Arm	13	14.812
Pinware	29	38.649
Port Hope Simpson	56	80.978
Red Bay	79	68.069
St. Lewis	14	25.482
West St Modeste	46	64.811

Appendix D: Raffle Bag Pledge

take! CHARGE

hydro

NL Hydro Take Charge Raffle Bag Pledge

In signing my name to this pledge I vow to do a minimum of 4 of the following energy reduction practices at home and at work (select all that apply):

- ☐ Installed new or upgraded insulation
- ☐ Turned down heat or air conditioning at night or when not at home
- ☐ Turned off lights and/or appliances when not in use
- ☐ Washed laundry in cold water
- ☐ Bought or used ENERGY STAR® appliances
- ☐ Installed high performance or programmable thermostats
- ☐ Installed ENERGY STAR® windows
- ☐ Used LED holiday lights

I will not only practice energy saving techniques, but I will become a leader in my community by communicating how to save with my friends and family.

Name: ______________________________

Signature: ______________________________

Date: ______________________________

Appendix E: Giveaway

Clotheline Kit Pledge

Pledge

By accepting this Free clothesline kit I, ______________________________________
(please print your name clearly) makes the following pledges.

Required: I will use this clothesline for drying laundry and reduce the amount that I use the dryer. Please check inside the box ☐

Required: I will set up an appointment to have a direct install of energy efficient products in my home next year. Please check inside the box ☐

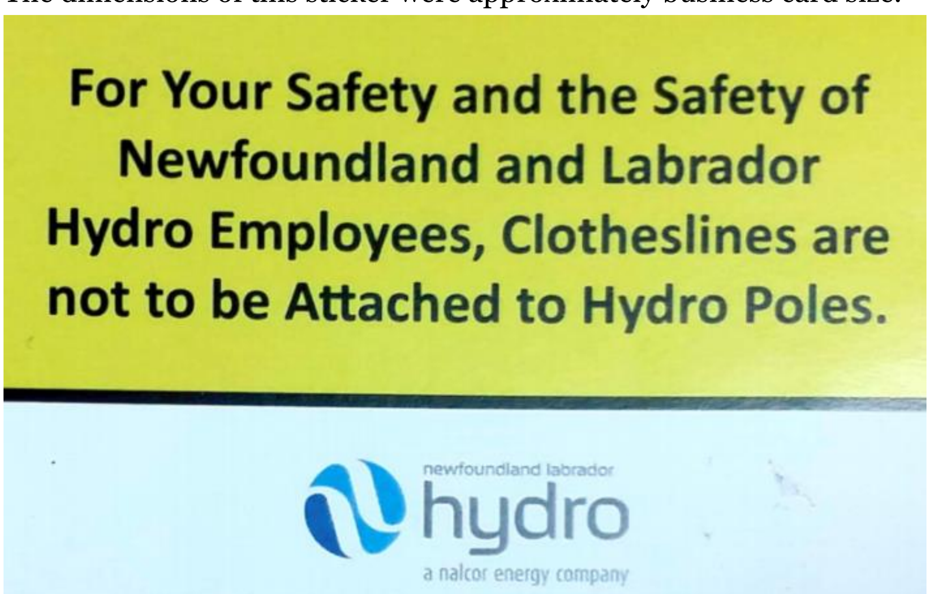
Phone number: ____

Mailing Address: ____

Signature: ____

Safety Sticker

The dimensions of this sticker were approximately business card size.



Appendix F: Commercial Lighting Opportunities 2016

Community	Building	T-8 Lamps	Ballasts	Sockets	Savings (MWh/year)
Francois	NL Hydro Plant	46	17	12	2.558
Francois	Medical Clinic	56	28	5	3.174
Francois	Community Centre	8	4	0	0.453
Francois	SSSJ Academy	222	109	21	12.565
Francois	Firehall	16	8	7	0.907
Francois	Canada Post	22	11	18	1.247
Grey River*	Western Health Clinic	24	12	1	1.166
Grey River*	AS Grade School	128	64	1	6.218
Grey River*	NL Hydro Plant	14	7	1	0.680
McCallum	NL Hydro Plant	23	5	3	1.283
McCallum	Community Fishing shed	43	17	6	1.927
McCallum	Fudges Store	43	17	0	1.927
McCallum	Community Centre	24	12	0	1.360
McCallum	SPAG School	160	80	8	9.087
Ramea	Lions Club/CC	56	28	9	3.174
Ramea	Loyal Orange Lodge	110	55	37	6.234
Ramea	Town Hall	36	18	13	2.041
Ramea	Firehall	52	18	12	2.882
Ramea	Ramea Broadcasting	24	12	5	1.360
Ramea	Canada Post	32	16	0	1.813
Ramea	Eastern Outdoors	52	26	12	2.945
Ramea	Rock Island Convenience	146	69	0	8.241
Ramea*	Water	34	17	0	1.652

	Treatment Plant				
Ramea*	Coley's Store	18	9	8	0.874
Ramea*	Senior Puffins Club	54	27	6	2.623
Ramea*	NL Hydro Plant	112	20	45	5.295
Ramea*	Nuwave Hairstyles	20	10	13	0.972
Ramea*					
Ramea*					
St. Brendan's	Fire Hall	12	6	1	0.680
St. Brendan's	Community Health Clinic	24	12	1	1.360
St. Brendan's	St. Brendan's Convenience	4	2	3	0.227
St. Brendan's	NL Hydro Plant	24	8	0	1.328
St. Brendan's	Community Centre	48	24	0	2.720
St. Brendan's	Canada Post	22	11	1	1.247
Total					

*Note: Those that are indicated with a * are based on the Guillevin savings amounts.*

Appendix G: Kids-In-Charge Teacher Evaluation Form Results

Topic	Question	Average grade (out of 5)
Please indicate if you thought the presentation was:	Enjoyable	4.57
	Engaging	4.79
	At appropriate level for age group	4.79
	Started on time	4.79
	Completed on time	4.86
Please indicate if you thought the presenter was:	Introduced themselves/explained topic	4.79
	Strong understanding of content	4.64
	Was organized	4.57
	Clear voice with good pace	4.57
	Engaged with children	4.71

Note: Questions were asked in qualitative format, for generating averages we applied quantitative figures (1-Poor, 2-Fair, 3-Average, 4-Good, 5-Very Good)

Appendix H: Residential Air Sealing Results

Customer	Air Sealing Measures	Air Saving Savings (Mil. BTU)
Andrew Cabot	Door weather stripping; 9 tubes of caulking; hatch weather stripping; foam receptacles (20); CO alarm	13.3
Jessie Normore	Seal old flue penetration, weatherstrip attic hatch (2); foam receptacle (20); CO alarm	14.4
Dennis Normore	N/A	N/A
Grace Normore	CO alarm	N/A
Sarah Normore	CO alarm	N/A
Francis Barney	N/A	N/A
Eben Humber	N/A	N/A
Russel Pilgrim	N/A	N/A
Ethel O'Brien	N/A	N/A
Foreen Belben	CO alarm	N/A
Lavender Barney	CO alarm	N/A
Blake Barney	CO alarm	N/A

James Cabot	CO alarm (x2)	N/A
Caroline O'Brien	N/A	N/A
Dorman Fowler	CO alarm	N/A
Delbert O'Dell	CO alarm	N/A
Terrance Barney	CO alarm	N/A
Darrell O'Brien	BNA	N/A
Hollis Buckle	CO alarm	N/A
Jayne Layden	N/A	N/A

Note: For more information about the recommendations, please see the Summary Report-Isolated Systems EE Program document.

Appendix I: Commercial Lighting Installation Form

Commercial Lighting Installation Form 2017

Location	
Community	
Address	
Property Contact Name	
Contact Phone Number	
Electrician Name	
Installation Date	

Quantity of Products Installed

Product Type	Predicted Quantity	Actual Installed Quantity	Notes/Comment s
Bulbs 4ft T8			
Sockets			
Ballasts Removed			

Completed Installation

Revisit needed (Y/N)		
Electrician Signature		
Property Contact Signature		

Appendix J: Commercial Lighting Quality Assurance Survey Results

The following results were collected during the post-installation audit surveys with Commercial Lighting participants. The installation verification totals are included in the Commercial Lighting results.

Audit Question	Responses	
Are the new items working to your satisfaction?	Yes	100%
	No	0%
Rate your level of satisfaction with the takeCHARGE program (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	5	91.3
	4	8.7%
Rate your level of satisfaction with the electrician's service (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	5	90.9%
	4	9.1%
Did the representative appear knowledgeable about energy efficiency?	Yes	100%
	No	0%

Appendix K: Direct Install Results Summary

The following results were collected during the installation visit survey for the Direct Install component.

<table>
<tr><th>Survey Question</th><th colspan="5">Responses</th></tr>
<tr><td rowspan="3">Are you a Residential or Commercial customer?</td><td colspan="4">Residential</td><td>89.1%</td></tr>
<tr><td colspan="4">Commercial</td><td>10.9%</td></tr>
<tr><td colspan="4">No Response</td><td>0%</td></tr>
<tr><td rowspan="11">How did you FIRST hear about the program?</td><td colspan="4">Town Meeting</td><td>0.09%</td></tr>
<tr><td colspan="4">Community event</td><td>0.10%</td></tr>
<tr><td colspan="4">Door-hanger</td><td>0.19%</td></tr>
<tr><td colspan="4">Other</td><td>1.58%</td></tr>
<tr><td colspan="4">Posters</td><td>0.59%</td></tr>
<tr><td colspan="4">Word of Mouth</td><td>18.47%</td></tr>
<tr><td colspan="4">Representative called me to book appointment</td><td>37.63%</td></tr>
<tr><td colspan="4">Representative came to my door</td><td>37.20%</td></tr>
<tr><td colspan="4">takeCHARGE website</td><td>1.39%</td></tr>
<tr><td colspan="4">Town Bulletin Board</td><td>0.59%</td></tr>
<tr><td colspan="4">Town Facebook</td><td>1.88%</td></tr>
<tr><td rowspan="6">What is the #1 reason you're participating in the program?</td><td colspan="4">Help the community to reduce our use of Hydro plant</td><td>6.25%</td></tr>
<tr><td colspan="4">It's convenient to have the products installed</td><td>0.49%</td></tr>
<tr><td colspan="4">Receive free products</td><td>0.89%</td></tr>
<tr><td colspan="4">Reduce my impact on the environment</td><td>13.50%</td></tr>
<tr><td colspan="4">Save money by saving energy</td><td>78.74%</td></tr>
<tr><td colspan="4">To enter the contest to win a prize</td><td>0.09%</td></tr>
<tr><td>What describes your view of energy efficient products?</td><td>Strongly Agree</td><td>Agree</td><td>Neutral</td><td>Disagree</td><td>Strongly Disagree</td></tr>
<tr><td>They are safe and effective.</td><td>39.12%</td><td>57.89%</td><td>2.78%</td><td>0.09%</td><td>0.09%</td></tr>
<tr><td>I would like to install more of them in my home.</td><td>38.43%</td><td>57.89%</td><td>3.47%</td><td>0.09%</td><td>0.09%</td></tr>
<tr><td>I think that the money I save on my electricity bill makes up for the higher cost of the energy saving products I've purchased in the past.</td><td>26.81%</td><td>57.59%</td><td>14.69%</td><td>0.39%</td><td>0.49%</td></tr>
</table>

Survey Question	Responses				
It is important to use energy saving products to reduce my environmental impact.	40.21%	57.19%	2.38%	0.09%	0.09%
I am willing to pay more for an energy saving product.	27.80%	59.48%	10.12%	1.98%	0.59%
In the past 12 months, have you taken any of the following actions to reduce your energy use at home? (Check all that apply).	Bought or used Energy Star appliances				43.49%
	Installed Energy Star windows				11.91%
	Installed high performance or programmable thermostats				7.54%
	Installed new or upgraded insulation				15.39%
	Turned down heat at night or when not at home				77.85%
	Turned off lights and/or appliances when not in use				94.63%
	Used LED holiday lights				58.78%
	Washed laundry in cold water				78.74%
Please rate your satisfaction with your experience in this Hydro Program. (1=Poor, 5=Excellent)	1 – Poor				0.19%
	2 – Fair				0.49%
	3 – Good				11.12%
	4 – Very Good				22.24%
	5 – Excellent				65.93%
Please indicate your gender.	Female				56.03%
	Male				43.76%
Please indicate your age range.	19 or under				0.30%
	20-29				2.80%
	30-39				10.72%
	40-49				21.64%
	50-64				33.96%
	65+				30.46%
What is your main heating source? (Check one).	Electric				27.28%
	Oil				25.79%
	Wood furnace				28.17%
	Wood stove				17.85%

Appendix L: Direct Install Audit Results Summary

The following results were collected during the post-installation audit surveys with Direct Install participants. The installation verification totals are included in the Direct Install results.

Audit Question	Responses	
Are the new items working to your satisfaction?	Yes	100%
	No	0%
How knowledgeable are you about saving energy and electricity in your home and at work?	Expert	3.03%
	Very knowledgeable	2.02%
	Some knowledge	20.2%
	Low knowledge	41.41%
	No knowledge	33.33%
Did you learn any new information on energy efficiency during the visit?	Yes	51%
	No	49%
How energy efficient would you say your home is?	Very efficient	17.17%
	Moderately efficient	45.45%
	Somewhat efficient	32.32%
	Inefficient	6.06%
	Very Inefficient	0%
If Hydro were to offer other programs or incentives in the future, what incentives would interest you?	**Suggestion**	**Number of requests**
	Air Tightness	81
	Appliances	82
	Doors	82
	Electric Heating Controls and Thermostats	81
	Insulation	87
	Light Fixtures	79
	Windows	81
In the next 12 months, do you plan to take any of the below actions* to reduce your energy use at home?	Yes	55.55%
	No	45.45%
	No Response	0%
Rate your level of satisfaction with the takeCHARGE program (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	5	68.36%
	4	25.51%
	3	6.12%
Rate your level of	5	91.48%

Summerhill

Audit Question	Responses	
satisfaction with the representative's service (Scale 1-5, 1=Very dissatisfied and 5=Very satisfied).	4	7.44%
	3	1.06%
Did the representative appear knowledgeable about energy efficiency?	Yes	92.92%
	No	3.03%
	No Response	5.05%

**Actions include the below list:*

Buy Energy Star appliances
Install Energy Star windows
Install high performance or programmable thermostats
Install new or upgraded insulation
Turn down heat at night or when not at home
Turn off lights and/or appliances when not in use
Adding weather stripping & seals to windows and doors

INSULATION REBATE PROGRAM EVALUATION

NEWFOUNDLAND POWER AND NEWFOUNDLAND AND LABRADOR HYDRO

Final Report

July 21, 2017

ECONOLER

ACRONYMS

CRA	Corporate Research Associates
EUL	Effective useful life
LUC	Levelized Utility Cost
NLH	Newfoundland and Labrador Hydro
NP	Newfoundland Power
NTGR	Net-to-gross ratio
PAC	Program Administrator Cost
TRC	Total Resource Cost

DEFINITIONS

Confidence interval	The estimated range of values, which is likely to include the unknown population parameters.
Evaluated savings	Gross and net savings calculated by the Evaluator using the parameters (unitary savings values, installation rates, net-to-gross ratio, etc.) validated or measured during the evaluation process.
Free-ridership	Percentage of savings attributable to participants who would have implemented the same or similar energy-efficient measures, with no change in timing, in the absence of the program.
Gross energy savings	Energy savings generated by energy-efficient measures, before applying the net-to-gross ratio.
Internal spillover	Savings attributable to participants who continue to implement the energy efficiency measures introduced by a program after participating in it once, without participating in the program a second time.
Margin of error	The amount of random sampling error.
Net energy savings	Energy savings that can be reliably attributed to a program. They are obtained after applying the net-to-gross ratio.
Net-to-gross ratio	The ratio between the net energy savings and gross energy savings that includes effects, such as free ridership and spillover, that affect positively or negatively the energy savings generated by a program.
Peak demand savings	The demand savings that coincide in time with the peak demand of the electricity system.
Sample size	The number of observations or replicates included in a statistical sample.
Tracked savings	Gross and net savings calculated by the utility in its internal tracking, based on various parameters such as number of participants, unitary savings values, installation rates, interactive effects, net-to-gross ratio.

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EXECUTIVE SUMMARY

This report presents the results of the process and impact evaluation of the Insulation Rebate Program offered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH). The Insulation Rebate Program offers rebates or financing for basement, crawl space and attic insulation upgrades. This evaluation covers the 2015 and 2016 program years.[1]

Summary of Evaluation Assignment

Econoler was hired to perform the evaluation of the Insulation Rebate Program and achieve the following objectives:

- Assessing the effectiveness of program design, administration and implementation;
- Determining the gross and net electricity energy and demand savings;
- Assessing program cost-effectiveness;
- Providing recommendations to improve the program.

The Insulation Rebate Program evaluation was carried out based on the information and results obtained from a review of the program documentation and database, in-depth interviews with participating installers, a participant survey, a project review and a cost-effectiveness analysis.

Summary of Evaluation Findings

Participants and installers were interviewed to gather feedback on various aspects of the program, including the sources of program awareness, reasons for participation, satisfaction with the program and program staff, barriers to program delivery and recommendations for program improvement. What follows are some of the main findings from the survey and interviews with participants and installers:

- Saving money and reducing energy bills was the most important reason for participating in the program among participants. The rebate influenced a vast majority of participants in their decision to add insulation to their home.
- Almost all surveyed participants were satisfied with the program and found the participation process easy. The four interviewed installers also expressed very high satisfaction with the program, the promotional materials, as well as NP and NLH staff.
- According to installers, most customers do not ask about the Insulation Rebate Program when seeking insulation upgrade services.
- Television was the most important source of program awareness among participants. Installers were not identified by participants as a source of awareness.

[1] For NP, a program year corresponds to their fiscal year, notably the 2015 and 2016 fiscal years ran from January 28, 2015 to February 8, 2016 and from February 9, 2016 to January 5, 2017 respectively. For NLH, a program year corresponds to a calendar year.

› Installers all said they use the promotional materials provided by the program, along with other materials in some cases, and find it helpful and straightforward. However, they asked for in-person visits from program representatives to go over details on products and rebates to better understand the program.
› Installers believe upfront costs are a key barrier to customers making insulation upgrades. Lack of funds were identified as a barrier to making energy-efficient upgrades by one-third of surveyed participants, 20 percent of whom identified this as a major barrier.

A review of 30 project applications was conducted to verify the quality of program tracked data and validate how engineering calculations were applied. The project review revealed that participants generally filled out the application form correctly. Most of the applications were processed and tracked correctly by program staff, but a few erroneous entries affecting project energy savings or actual eligibility were found. These findings, along with survey results and a re-creation of program HOT2000 simulation models, were used to revise gross savings.

Free-ridership and spillover were assessed through the participant survey to determine program net savings. The results revealed a free-ridership level of 27 percent and a spillover level of two percent. This results in a net-to-gross ratio (NTGR) of 0.75. When applying this NTGR to the revised gross savings, it was found that the Insulation Rebate Program generated total net electricity energy savings at the meter of 5.755 GWh (5.577 GWh for NP and 0.178 GWh for NLH) for the 2015 and 2016 program years. A reduction of 2.438 MW was achieved for electricity peak demand savings (2.367 MW for NP and 0.071 MW for NLH).

INTRODUCTION

Evaluation Scope

Econoler (hereinafter referred to as the “Evaluator”) was hired to perform the process and impact evaluation of the Insulation Rebate Program offered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH). The evaluation involved conducting a review of the program documentation and database, interviews with participating installers and a retailer, a participant survey, a project review and a cost-effectiveness analysis.

The key research themes addressed for the process evaluation include:

› Assessing the effectiveness of program design and delivery, and overall program performance;
› Identifying the barriers to program delivery;
› Assessing participant and partner satisfaction with the program;
› Assessing the effectiveness and comprehensiveness of program tracking;
› Identifying areas of improvement.

The impact evaluation addressed the following objectives:

› Determining the gross energy and demand savings;
› Determining the net-to-gross ratio (NTGR);
› Determining the net energy and demand savings;
› Assessing program cost-effectiveness.

This evaluation covers the 2015 and 2016 program years.[2]

Presentation of the Team

To complete this evaluation, Econoler worked with Corporate Research Associates (CRA). Tasks were divided as follows:

› Econoler served as team leader and was in charge of coordinating and supervising all evaluation activities, developing data collection instruments, as well as preparing and reviewing the evaluation report. Econoler also led the process and impact evaluation work.
› CRA conducted the participant survey and interviews with installers and one retailer.

Throughout this report, this team is referred to as the “Evaluator”.

[2] For NP, a program year corresponds to their fiscal year, notably the 2015 and 2016 fiscal years ran from January 28, 2015 to February 8, 2016 and from February 9, 2016 to January 5, 2017 respectively. For NLH, a program year corresponds to a calendar year.

1 PROGRAM DESCRIPTION

The Insulation Rebate Program aims to increase the insulation level in residential basements, crawl spaces and attics by providing Newfoundland and Labrador residential customers with rebates or financing for their insulation upgrades. Customers can receive an incentive of 75 percent of the basement wall or ceiling insulation material costs up to $1,000, and 50 percent of the attic insulation material costs up to $1,000. Incentives are applied as credit on the customers' electricity bills.

The primary eligibility criteria for the program are the following:

› The participant must be a homeowner and have an active electricity account.
› The participant's primary source of heat must be electric, or the home must have a minimum annual electricity usage of 15,000 kWh if an additional heating source is used.
› The participating home must be on a foundation and intended as a residence, and built and connected to the electrical system before January 1, 2014.

Furthermore, the R-Value of the insulation installed must follow the following requirements for the project to be eligible.

Table 1: R-Value Requirements

Insulation Location	R-Value Requirements	
	Minimum	Maximum
Basement and Crawl Space Walls	18	25
Basement and Crawl Space Ceilings	30	35
Attics	50	55 (60 in Labrador)

Rebates are offered for basement crawl space walls or ceilings, but not both.

Since 2009, the program has been jointly offered by NP and NLH under the takeCHARGE brand. The program is delivered through partnerships with participating retailers and other partners, such as installers.

2 METHODOLOGY

This section presents the methodology employed and the activities carried out for the Insulation Rebate Program evaluation. Figure 1 presents the various evaluation activities carried out.

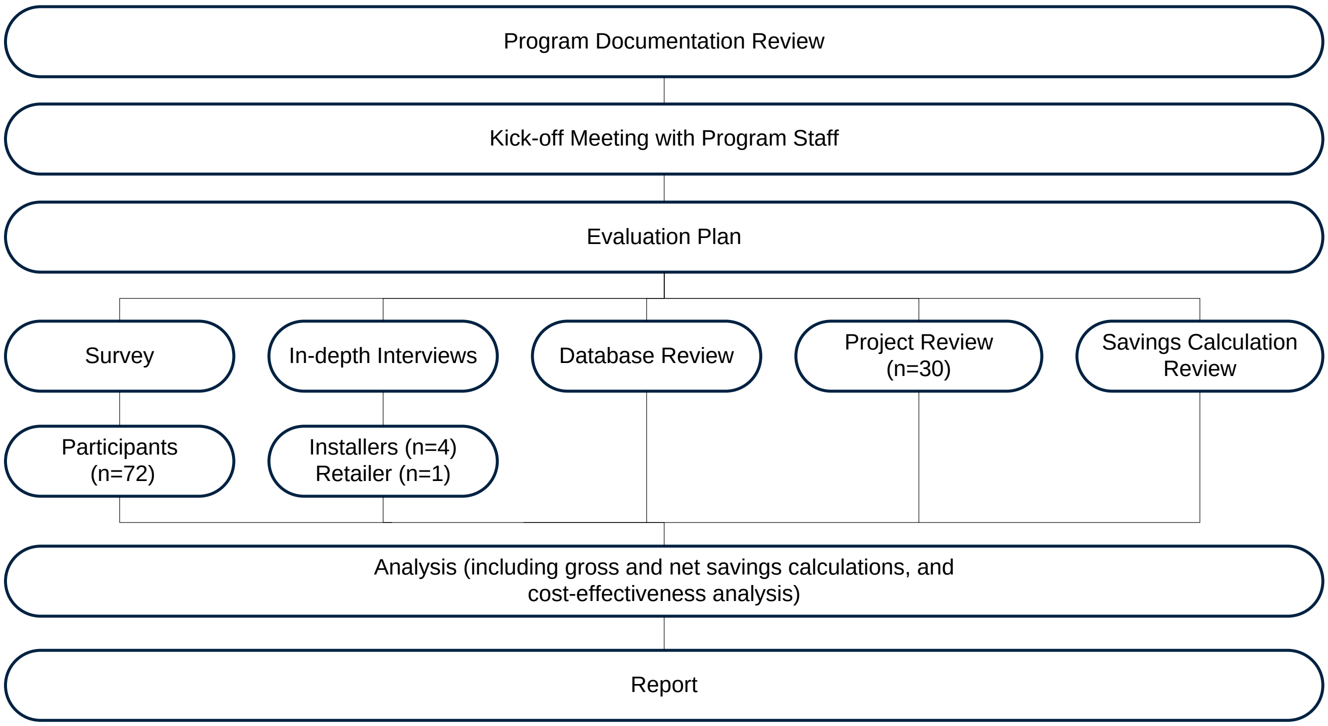


Figure 1: Methodological Model

The Evaluator first reviewed program documentation and then conducted a kick-off meeting with program staff to learn about the main program components and mechanisms. Based on the information obtained during this meeting and the program documentation review, a detailed evaluation plan was developed, which included program information, in addition to the evaluation scope, methodology, data collection and timeline. Data collection activities were then carried out.

2.1 Participant Survey

In April 2017, CRA conducted a telephone survey with a total of 72 participants, using computer-assisted telephone interviewing technology. The average length of the survey was 10 minutes.

The participant survey was meant to collect feedback on the following aspects:

- Program awareness;
- Reasons for participation;
- Satisfaction with the program and participation process;
- Barriers to implementing energy efficiency upgrades;
- Free-ridership;
- Spillover;
- Recommendations for program improvement;
- Demographics.

The total number of participants was 1,715 for the 2015 and 2016 fiscal years. Drawing a random sample of 72 from a population of 1,715 yields a margin of error of 9.5 percent at a 90 percent confidence level.

The survey questionnaire and respondent demographic profiles are provided in Appendix I and Appendix II respectively.

2.2 Interviews with Installers

In April 2017, CRA conducted four interviews with participating installers to collect feedback regarding the following aspects of the Insulation Rebate Program:

- Interactions with customers and their program awareness;
- Installer program promotion;
- Use of and satisfaction with program information and promotional materials;
- Participation level among potential participants and reasons for non-participation;
- Satisfaction with the program, program support, and relationship with NP and NLH;
- Barriers to program delivery;
- Recommendations for improvements.

The guide used for conducting the interviews with installers is provided in Appendix III.

Interviews with participating retailers were conducted by the Evaluator as part of the Thermostat Rebate Program evaluation which was concurrently completed with this evaluation. The Evaluator took this opportunity to ask one retailer involved in both programs about their satisfaction with the Insulation Rebate Program, the barriers to program delivery, and their recommendations for program improvements.

2.3 Database Review

The Evaluator reviewed the program’s database to assess its components and mechanisms, as well as to understand and gather information essential to the impact evaluation calculations. More specifically, the review was done to achieve the following objectives: (1) to understand how it is being used by all the parties and what information is tracked; (2) to verify whether it provides the complete information needed for program monitoring and evaluation in line with the industry's best practices; and (3) to assess the level of consistency among the various data-entry fields and detect abnormalities that would need to be addressed.

2.4 Project Review

The Evaluator reviewed 30 project applications to: (1) verify that data were correctly tracked; (2) verify the availability of project documentation; and (3) validate how engineering calculations were applied. The review included the application forms and insulation material invoices.

2.5 Savings Calculation Review

The methodology and assumptions used by NP and NLH to calculate energy and demand savings were reviewed to ensure their validity. First, the assumption made in the building simulations provided by NP and NLH were analyzed with a focus on those parameters that most affect energy consumption. The Evaluator then recreated a set of energy models, following best practices and ensuring that each building component was modelled as accurately as possible. These new energy models were then used to establish the revised savings coefficient for each insulation level.

3 PROCESS EVALUATION

This section presents the findings of the Insulation Rebate Program process evaluation, which has been carried out based on the information gathered from the participant survey, the interviews with participating installers and the database review.

3.1 Participant Survey

This section presents the main results of the participant survey. Survey respondents include both NP and NLH customers.

3.1.1 Sources of Awareness and Reasons for Participation

The most popular method of learning about the existence of the program is through television, mentioned by one-third of respondents (34%). Others also mentioned learning about it through word of mouth (18%), online advertising (16%), or bill inserts (10%).

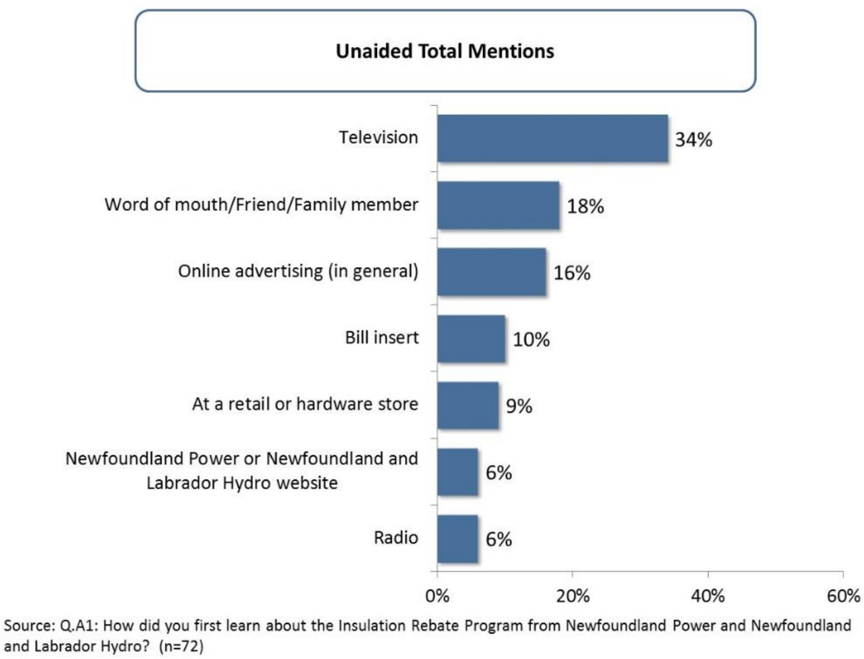
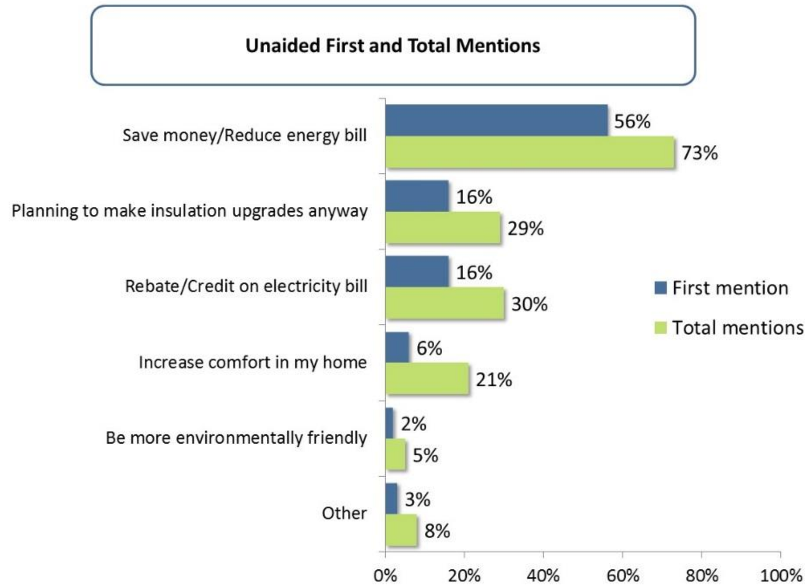


Figure 2: First Learned About the Insulation Rebate Program

Reducing energy bills and saving money was the single most important reason for participating in the program for more than one-half of respondents (56%). Participants were then asked if there were other important reasons for participating in the program. Overall, three-quarters of participants (73%) mentioned saving money and reducing energy bills as an important reason for participating in the program. Close to one-third participated because they were interested in a rebate on their electricity bill (30%).



Source: Q.A2: What was the SINGLE most important reason you were interested in participating in the program?/ Q.A3: Were there any other reasons? (n=72)

Figure 3: Reasons for Participating in the Program

3.1.2 Program Influence

Using a scale from '0' to '10', where '0' indicates *no influence* and '10' indicates *great influence*, participants were asked to rate three different factors on their decision to add insulation in their home.

The first assessed factor was the rebate offered with the program. Of note, four in ten (42%) cited this to be of *great influence*. Overall, seven in ten (71%) cited this as having influenced their decision (provided a rating of 8 or higher), while only one in ten (9%) felt little to no influence (a rating of 4 or lower). In comparison to the other two factors assessed, the rebate had the highest level of influence.

The second assessed factor explored how the information provided by the program on home insulation, such as the brochure and the how-to videos, may have influenced the participants' decision to upgrade. Nearly one-half (47%) provided a rating of eight or higher. Of note, three in ten (31%) felt this had little to no influence (a rating of 4 or lower).

The third assessed factor was a previous experience with the Insulation Rebate Program or another takeCHARGE program. While one-quarter (27%) felt this had *great influence* on their decision to add insulation, a similar proportion (33%) expressed that it had *no influence* on their decision. This consideration was found to have had the lowest overall level of influence.

3.1.3 Program Satisfaction and Recommendations

Commendably, almost all participants (99%) are *very* or *somewhat satisfied* with the Insulation Rebate Program (using a scale of 'very satisfied', 'somewhat satisfied', 'neither satisfied nor dissatisfied', 'somewhat dissatisfied', and 'very dissatisfied'). In fact, 89 percent cited being *very satisfied* with the Insulation Rebate Program. One-half (49%) attributed this satisfaction to the fact they received a rebate for their participation. Participants also expressed satisfaction because they were able to save money (22%), they were in need of an upgrade (19%), and it was easy to participate in the program (17%).

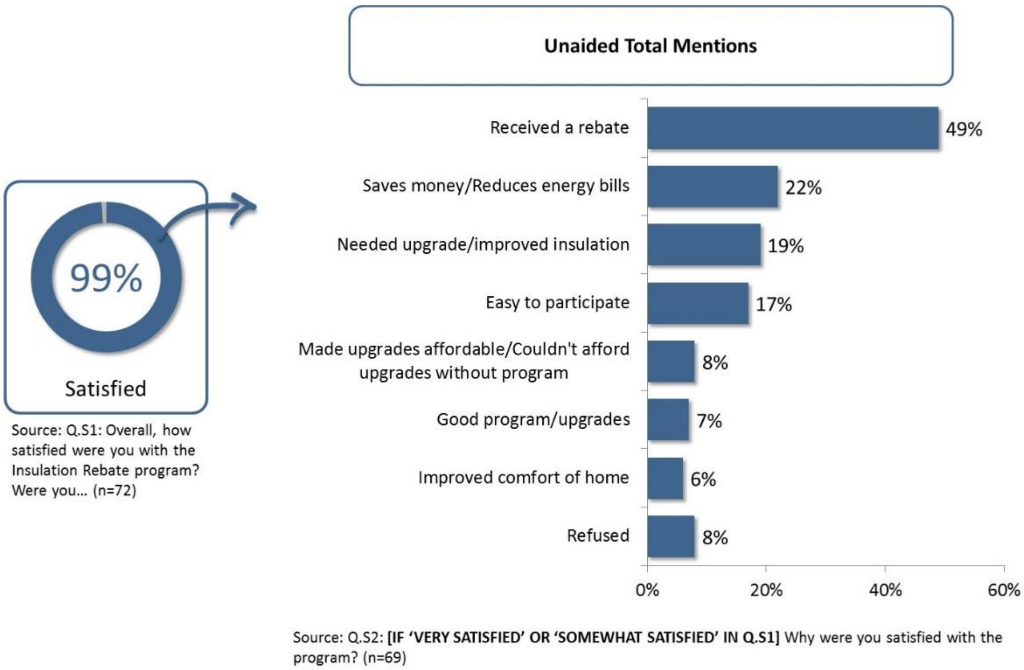
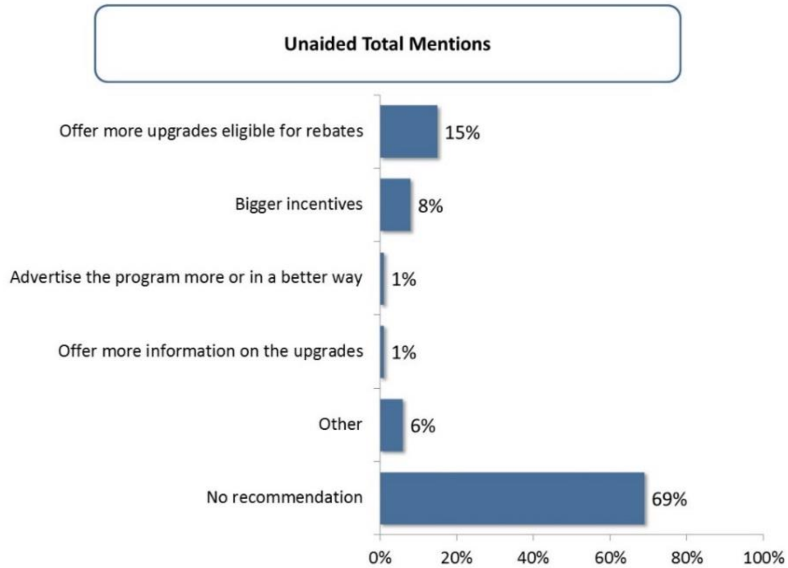


Figure 4: Overall Satisfaction with the Program and Reasons for Satisfaction

Almost all participants (99%) found the application process *very* or *somewhat easy* (with 86% finding it *very easy*) (using a scale of 'very easy', 'somewhat easy', 'neither easy nor difficult', 'somewhat difficult', and 'very difficult'). Less than one-half applied online (47%), while over one-third applied via mail (36%). Five percent applied both online and by mail.

The majority of respondents (69%) were unable to offer recommendations on how to improve the program. Of the few who did provide suggestions, the most common was to offer more upgrades eligible for rebates (15%).



Source: Q.S7: Do you have any recommendations for improving the Insulation Rebate program? Anything else? (n=72)

Figure 5: Recommendations to Improve the Program

3.1.4 Barriers to Implementing Energy-efficient Upgrades

Participants were asked to rate a series of aspects that might have prevented them from implementing energy-efficient upgrades in their home. Aspects were rated using a 10-point scale, where '0' indicated that it was *not at all a barrier*, and '10' indicated it was a *major barrier*.

As demonstrated by Figure 6, financial challenges are the greatest barrier, with two in ten (19%) stating that these challenges pose a *major barrier*. One-third (33%) cited lack of funds as being a significant barrier (a rating of 8 or higher). Perhaps not surprisingly, those with an annual household income of less than $80,000 were more likely to cite this is as being a *major* barrier (31% versus 4%).

Being unable to conduct the work themselves or needing to hire a contractor is *a major barrier* to implementing energy efficiency upgrades for 12 percent of participants. One-quarter of participants provided a rating of eight or higher (27%), while more than one-third (35%) feel it is *not at all a barrier*.

Being unconvinced of the economic value these upgrades provide is a barrier for two in ten participants (20%), while four in ten (40%) feel that this was *not at all a barrier* to upgrading.

Time constraints were expressed to be less of a barrier with three in ten (30%) indicating this is *not at all a barrier*, while one in seven (15%) feel it is a barrier (a rating of 8 or higher).

Lack of information about possible energy efficiency rebates or programs is, similar to time constraints, a relatively minor barrier for most participants. Despite a minority (15%) expressing it is a barrier (ratings of 8 or higher), one-quarter of participants (25%) feel this is *not at all a barrier* to making upgrades.

Relative to the other factors explored, a lack of information about energy-efficient upgrades was the lowest barrier. Specifically, only six percent consider it a barrier.

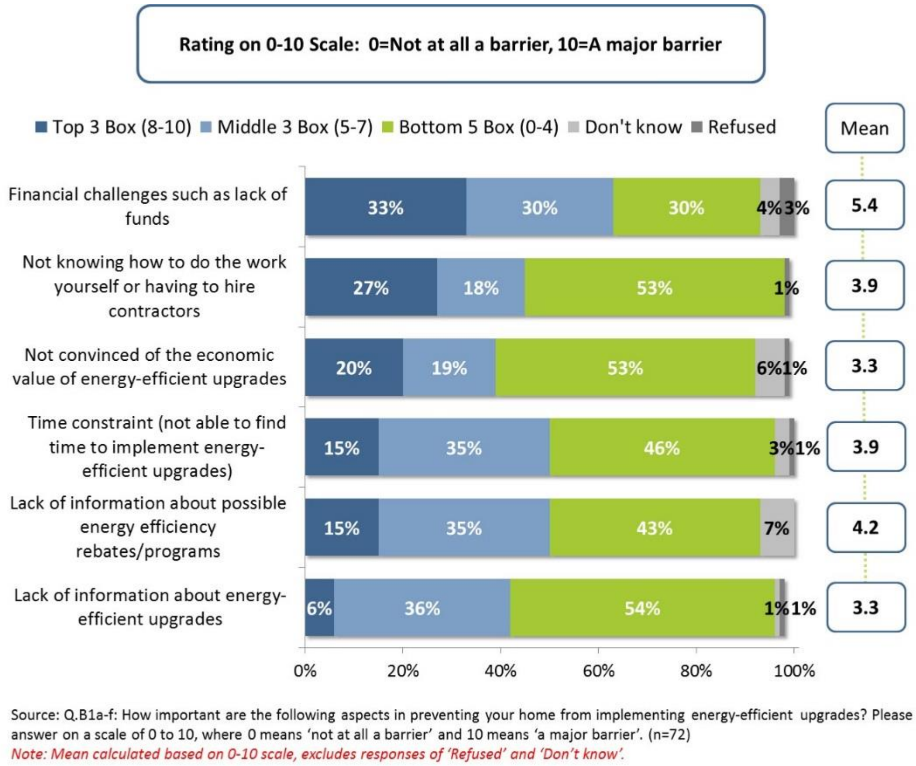


Figure 6: Importance of Factors in Preventing the Implementation of Energy-efficient Home Upgrades

3.2 Interviews with Installers

As part of the Insulation Rebate Program evaluation, four interviews were conducted with local installers. All four interviewed installers sold insulation products rebated under the Insulation Rebate Program and each had between three and six years of experience with the program. In addition, one retailer interviewed for the Thermostat Rebate Program answered a smaller subset of questions about the Insulation Rebate Program. When appropriate, responses from this retailer were included in the analysis.

3.2.1 Program Awareness and Promotion

Installers learned of the Insulation Rebate Program in a number of different ways. The Internet, television ads, and word of mouth were primary ways installers learned of the program. In addition, two installers mentioned they had been contacted by an NP and/or NLH representative. Of note, all installers mentioned having learned of the program via multiple sources and word of mouth. Three of the four installers received the takeCHARGE Installer Newsletter. Indeed, the program staff started sending newsletters to the installers in 2017. The goal is to send four issues per year to further involve installers in the program; so far, two issues of the newsletter have been sent.

Installers reported that most customers do not ask about the Insulation Rebate Program when seeking insulation upgrade services, but installers were quick to point out that they promote it to their customers. Three of the four installers indicated that a customer mentioned the program to them about once a week, while one indicated it was rare for a customer to mention it.

Installers promote the program by educating their customers verbally about the program and referring customers to the program website. They also provide customers with the literature provided by NP or NLH (brochures, forms), and utilize signs and truck decals. Finally, using social media (for example mentioning the program on their company Facebook page), and providing information about the program on their company website are other means of raising program awareness.

All interviewed installers use takeCHARGE promotional materials and three of four installers were ‘very satisfied’ with the promotional materials provided by the program, while one was ‘somewhat satisfied’ (using a scale of ‘very satisfied’, ‘somewhat satisfied’, ‘neither satisfied nor dissatisfied’, ‘somewhat dissatisfied’, and ‘very dissatisfied’). Reasons for satisfaction included the perception that installers had been given what they needed to deliver the program effectively. The promotional materials are considered helpful and straightforward. One installer prefers using only online resources, while the other three use all promotional materials provided by the program. In-person visits from program representatives to go over details on products and rebates were the only suggestion to increase understanding the program. Installer engagement has been a priority for NP and NLH this year. Along with the Installer Newsletter, phone calls and events planned for later this year, there has been a focus on getting installers more involved in the program and keeping them informed about the program details. However, in-person visits have taken place mostly at the retailers’ premises because quite a number of installers are small businesses that do not have an office to receive such visits.

In terms of challenges in promoting the Insulation Rebate Program, one spray foam installer finds it difficult to predict whether a customer will receive a rebate, and thus is upfront that a rebate might not be approved and advises that this be verified before purchase.

Estimation of program participation rates varied by installer, from 50 to 100 percent of customers opting to participate once made aware of the program. Reasons for customers not participating include uncertainty as to whether they will qualify for a rebate and high upfront costs. Additionally, one installer mentioned that some customers opt to pay cash or do the upgrade under the table to avoid paying tax. In such instances, the customer would not qualify for the rebate. Of note, it was this installer's opinion that cash deals are fewer, however, since the inception of the Insulation Rebate Program because the rebate incentive counteracts the savings that cash deals would provide.

3.2.2 Satisfaction with the Program

Overall satisfaction with the Insulation Rebate Program was generally high, with three of the four installers and the one retailer stating they were 'very satisfied' with the program, while one was 'somewhat satisfied' (using a scale of 'very satisfied', 'somewhat satisfied', 'somewhat dissatisfied', and 'very dissatisfied'). Reasons for the high level of satisfaction included that the program helps drive sales and offers value to their customers. Installers also cited a positive experience with NP or NLH program representatives as a reason for high satisfaction.

The 'somewhat satisfied' installer installs spray foam and finds it difficult to achieve the R-Value required for rebates whilst keeping it affordable for the client. They are not able to recommend what they think would be needed for the work because the rebates do not align with what they would normally provide in terms of R-Value. For example, attics need an R-50 to qualify for a rebate, but a lot of attics in older homes are the full footprint of the house, thus requiring a lot of spray foam. In this case, this installer would normally offer an R-20 to R-25 value, which would not qualify for a rebate under the Insulation Rebate Program. This installer believes customers install less efficient insulation (Batt insulation rather than spray foam) to qualify for a rebate. Two installers are of the opinion that the R-Value required for rebates is too high for smaller spaces like crawl spaces, and recommend that the R-Value for each eligible insulation location be reviewed. However, it should be noted that the program's eligibility criteria are in line with the National Building Code of Canada requirements. Furthermore, rebates seem inconsistent for one installer, with some customers receiving a rebate and others not, all things being equal. This installer asked for guidance from the NP or NLH representative, but did not receive a conclusive answer. Factors, such as the home type and the heating source, can impact the amount of incentive provided. Because of confidentiality concerns, NP and NLH cannot share information about participants with installers.

3.2.3 Satisfaction with NP and NLH

Overall satisfaction with NP and NLH was generally high. Three of the four installers were 'very satisfied' with the support from NP and NLH, while one was 'somewhat satisfied'. Installers mentioned a positive experience with program representatives, who are considered helpful and reliable. Additionally, information is provided in a timely manner (often same day) and installers usually have no trouble obtaining information when required.

The frequency of communication with NP or NLH varied by installer, from a couple of times per year to a couple of times per month. Reasons for communication included clarification of invoices and verification of work, as well as requests for program information and promotional materials.

3.2.4 Barriers and Recommendations

Installers believe that cost prevents customers from undertaking insulation upgrades, particularly upfront costs which can be substantial. Older homes in particular, which are common in the province, need a considerable amount of insulation to bring the house up to current standards. In addition, upgrading home insulation sometimes requires installing vents, thereby rendering the cost of the project more challenging for some, particularly those on a fixed income. In terms of convincing customers to upgrade the insulation in their home, installers believe the information on the benefits of insulation upgrades is readily available, so awareness is not the issue.

When asked to identify what, if anything, impedes the delivery of the Insulation Rebate Program, the cost of undertaking the upgrades was again mentioned by two of the four installers. Customers shop around for cheaper labour, which results in the use of installers who do not necessarily install insulation properly and thus do not attain the level of energy efficiency promised. To overcome this barrier, it was suggested that providing the rebate directly to the installer would enable the cost savings to be immediately passed on to the customer at the beginning of the upgrade process. Although installers recognized that they would temporarily carry the cost of this while awaiting reimbursement, the perceived increase in business due to the automatic customer rebate was worth the risk. According to installers, this would increase business for reputable companies that charge more for installation for better service. Since providing the rebate directly to installers would require NP and NLH to confirm participants' eligibility with these installers, doing so would cause confidentiality issues. Furthermore, the rebate would be paid out to installers based on the assumption that the installation is completed. A select supplier list on the takeCHARGE website, similar to the heat pump installer list, was also suggested for this program. Actually, such a list is going to be displayed on the NP website.

3.3 Database Review

The Evaluator reviewed the contents of the database developed for the Insulation Rebate Program to verify whether it provided complete, consistent and coherent information needed for this program evaluation. This review was not only an opportunity to assess possible improvements meant to facilitate both internal program management and program monitoring and evaluation, but also an essential part of preparing energy savings calculations for the impact evaluation.

The program database consists of two Excel spreadsheets (one per utility), containing participant and administrative information as well as technical data about projects. Since the program is offered by two utilities (NP and NLH), customer tracking is not centralized. NP and NLH each track customer data using their own Excel spreadsheets which were both provided to the Evaluator.

The Evaluator noticed differences in the templates used by NP and NLH, and these differences led to different data being tracked by the two utilities. These differences can be especially challenging when an impact evaluation is involved and values based on the database need to be established with great precision. For example, one utility compiles all the information related to an application on the same line while the other utility uses multiple lines for different surfaces insulated. In addition, the Evaluator found differences in the descriptive and labelling terms used in the two Excel spreadsheets. For example, each utility identifies the types of insulation measures differently and under columns named differently, which prevents the Evaluator from consolidating both spreadsheets into one database for more effective analysis without a risk of making an error. Although a standard template for program tracking would greatly facilitate program monitoring and evaluation, the Evaluator understands that each utility manages its own customer base and that participant data is not shared between utilities, thus making common tracking guidelines unnecessary for internal program management.

The Evaluator observed a number of good practices when reviewing the database. For instance, customer contact information was systematically included in the database, which facilitates the completion of surveys and interviews. The Evaluator observed that the overall level of consistency among the various data-entry fields of the database was good and that the fields of the database were almost systematically filled out. However, the savings coefficient (in kWh/ft^2, selected as a function of the added insulation R-Value) identified for each insulation project sometimes lacked consistency. For example, some projects with R-Values ranging from R-5 to R-22 had a savings coefficient of 2.205 kWh/ft^2, while most projects ranging from R-5 to R-25 had a savings coefficient of 0.94 kWh/ft^2 which should have resulted in more savings.

The Evaluator recommends that the information described below be tracked and documented mostly to validate participant eligibility and facilitate impact evaluation. This includes information that is already collected through the application form. Please note that further details about the impact evaluation methodology are presented in Section 4.

- One of the main purposes of the database is to compile the program energy savings claimed by the program administrator, so the resulting savings for each participant should be clearly identified. This information was only found in the NP spreadsheet.
- The savings coefficient identified for each insulated surface should be included since it helps understand and verify the energy savings tracked. The height, width, and length of the insulated surfaces should be listed, not only the resulting area coverage. This would help provide a better overview of each project and identify erroneous entries. This data was partially tracked in the spreadsheets or tracked in other files.
- The primary and secondary heating type, along with the annual electricity consumption, should be included as these data are needed to confirm that eligibility requirements are met. The building age should also be tracked as it helps validate reported R-Values before insulation. This data was partially tracked in the spreadsheets or tracked in other files.

› During the project review, which is further discussed in Subsection 4.1.1, the Evaluator saw notes in the project application documents. The Evaluator understands that these notes are from follow-up calls made to clarify ambiguous applications. Adding this valuable information to the database would centralize information for both program staff and the Evaluator.

To improve current tracking processes, the Evaluator also recommends the following:

› The savings tracked by NP include an estimation of the number of applications that are expected to be received toward the end of a given fiscal year, but only approved after the end of that fiscal year. NP uses such a projection because the application reception date is not tracked, while the approval date is. Since the application processing and approval times are approximately the same year-over-year, they have little impact on the number of applications claimed for each fiscal year. Therefore, the Evaluator recommends using a single known date, such as the project approval date, to determine in which program year the savings of each project should be tracked. This methodology is currently used by NLH. Then, the program year with which each project and its savings are associated should be clearly identified.
› Identifying units associated with each numerical column would reduce the risk of misinterpretation, especially for values commonly expressed in both metric and imperial system units, such as area and thermal resistance.

4 IMPACT EVALUATION

This section presents the gross and net energy and peak demand savings achieved by the Insulation Rebate Program for the 2015 and 2016 program years.

4.1 Gross Savings

This section presents the findings of the project and gross savings calculation methodology review, followed by the revised gross savings.

4.1.1 Project Review

The Evaluator reviewed 30 project applications, 25 of which were NP and five were NLH projects, to verify tracked data and the availability of project documentation, as well as validate how engineering calculations were applied.

The Evaluator noted that participants generally filled out the application form correctly. Only one application had missing entries for mandatory fields (primary heating type and age of home) which prevented the Evaluator from validating that all the eligibility requirements were met. When information to confirm eligibility is missing, the Evaluator recommends contacting the participant to obtain the information, which the program staff already does. The Evaluator's discussions with the program staff about this finding revealed that probably such information had been confirmed with the participant and tracked in the database, but had not been corrected in the paper copy of the application form.

The data entered by NP and NLH employees in the program database generally corresponds to data in the application form. Three erroneous entries were found that significantly affected the energy savings claimed. The first concerns an R-52 value entered instead of the R-32 value on the application. This difference assigned 8.34 kWh/ft^2 in energy savings to this project instead of the actual 7.74 kWh/ft^2. The second erroneous entry concerns an incorrect area. The application shows two walls of 36 inches in height and 43 feet in length and two walls of 36 inches in height and 30 feet in length (total of 438 ft^2), but two walls of 36 feet in height and 43 feet in length (total of 3,096 ft^2) were entered in the database. This difference leads to seven times more claimed savings for this project than the correct savings. For the third project, the database shows two walls with different initial and final R-Values, which total 1,350 ft^2, while the application shows four walls of different sizes totalling 882 ft^2. The Evaluator understands that two separate entries were made in the database to more accurately represent the two types of insulation used. However, the difference in the insulated area between the application and the database remains unexplained.

Only two reviewed projects were not eligible because they failed to meet the minimum requirement of R-50 for attic insulation. The first project had a final R-40 value, while the second had an R-32 value on the application form, but an R-52 value was entered in the database. The project with a final R-40 value was probably completed under the previous version of the program, which had different R-Value criteria. The project with the R-52 value should not have been approved, but its approval can probably be explained by the data-entry error. This application was completed using an older version of the form on which the minimum requirement was R-32, which might also explain the discrepancy.

The Evaluator observed that for many approved projects, the annual electricity consumption values in the database were low compared to typical electrically-heated houses with low insulation. In some cases, the claimed electricity savings were higher than the energy consumption reported. At the Evaluator's request, the utilities reviewed the energy consumption of the applications with energy consumption under 15,000 kWh per year and provided explanations for each project with low consumption. Each application was explained by one of the following reasons:

› Energy usage history did not correspond to a complete year since the home was recently purchased;
› Small homes with only electric heating;
› Problems with rental-home data acquisition (landlord property consumption instead of tenant's);
› Keying error of annual kWh;
› Rebate requires further investigation.

More than 80 percent of these approvals were explained by the short energy usage history or the small size of the home. Despite this, yearly energy consumption data could be used as a quality assurance tool by systematically verifying the applications from consumers with low consumption (less than 15,000 kWh) to ensure the houses serve as a main residence and are mainly electrically heated.

4.1.2 Calculation Methodology Review

This section first presents the methodology used by NP and NLH to calculate savings. Second, participant survey findings relevant to the impact evaluation are listed. Finally, the revised savings calculation methodology is presented, which builds on the approach used by NP and NLH and survey results.

Original Methodology

For the Insulation Rebate Program, NP and NLH calculate gross energy savings using the following equation:

$$Gross\ Energy\ Savings = Savings\ Coefficient \times Insulated\ Surface$$

The savings coefficient corresponds to the amount of energy saved over a one-year period by installing insulation over an area of one sq. ft. Expressed in kWh/sq. ft., this savings coefficient varies in accordance with the initial and final thermal resistance (R-Value) and insulated area type (attic, basement ceiling, or basement wall). Table 1 lists the program savings coefficient values by insulated area type and the initial and final R-Values. For example, a basement wall with an initial R of 0 and a new R of 12 generates 2.62 kWh/sq. ft.

Table 1: Savings Coefficient by Insulated Area Type and R-Value Range

Insulated Area Type	Nominal[3] R-Value Range	Savings Coefficient (kWh/sq. ft.)
Basement and Crawl Space Wall Insulation	R-0 to R-12	2.62
	R-12 to R-16	0.75
	R-16 to R-20	0.10
	R-20 to R-25	0.09
	More than R-25	0
Basement and Crawl Space Ceiling Insulation	R-0 to R-12	3.70
	R-12 to R-29	0.60
	R-29 to R-35	0.18
	More than R-35	0
Attic Insulation	R-0 to R-3	0
	R-3 to R-8	3.42
	R-8 to R-12	1.53
	R-12 to R-20	1.68
	R-20 to R-32	1.11
	R-32 to R-49	0.37
	R-49 to R-55	0.23
	More than R-55	0

The value used for each project is the sum of all the coefficient values included in a project's R-Value range. For example, a basement wall with an initial R-0 and a new R-16 generates 3.37 kWh/sq. ft.; the value of 2.62 kWh/sq. ft. is associated with the R-Value range from R-0 to R-12, and an additional value of 0.75 kWh/sq. ft. is associated with the R-Value range from R-13 to R-16.

[3] Nominal R-Values refer to the thermal resistance of the insulation material. For instance, if three inches of mineral wool with an R-Value of 3 per inch are added to a wall, the nominal R-Value is R-9. Nominal
R-Values are opposed to effective R-Values which take into account parts of the wall where no insulation is present, such as wood studs.

Moreover, if the initial R-Value is in the middle of the range, the value of this range is not included. For example, a basement wall with an initial R-9 and a new R-19 generates 0.85 kWh/sq. ft. The value of 0.75 kWh/sq. ft. is associated with the R-Value range from R-13 to R-16 and an additional value of 0.1 kWh/sq. ft. is associated with the R-Value range from R-17 to R-20; but the value of 2.62 kWh/sq. ft. associated with the R-Value range from R-0 to R-12 is not included since it starts in the middle of this range.

Each of the program's savings coefficient values were established using the HOT2000 simulation tool.[4] To do so, the energy consumption of a standard house with various insulation levels was simulated and compiled. The difference in energy consumption between each level of insulation was calculated and divided by the square footage of insulated surface to obtain the savings coefficient values.

Survey Findings

Survey results were used to verify where insulation was added and how heating set-point temperatures were affected by insulation improvements.

Basement vs. Crawl Space Insulation

Application forms do not collect information on whether a basement or crawl space is being insulated. Hence, the survey served to provide insight on the proportion of each type of wall insulation measure implemented. As described in the following section, the Evaluator then compared simulation results for basement and crawl space insulation.

Table 2: Type of Below-grade Space per Envelope Component Insulated

Type of Below-grade Space	Insulated Walls		Insulated Ceilings	
	Number of Respondents	Percentage of Respondents	Number of Respondents	Percentage of Respondents
Basement	24	75%	14	39%
Crawl space	6	19%	21	58%
(Don't know/Refused)	2	6%	1	3%
Total	**32**	**100%**	**36**	**100%**

Walls were mostly insulated in basements. For ceiling insulation, the measures were more evenly spread out between basement and crawl spaces, though crawl spaces constituted the majority of cases.

[4] HOT2000 is an energy simulation and design tool for low-rise residential buildings. This software is widely used across Canada to support program, policy, and regulatory development and implementation. HOT2000 is developed and managed by the Office of Energy Efficiency at Natural Resources Canada.

Insulation Location and Heating Set Points

The survey was also used to verify whether the right walls or ceiling were insulated to maximize savings. This was accomplished by comparing heating set points (before and after adding insulation) to the spaces where insulation was added. Since participants had the option of upgrading insulation themselves, the Evaluator felt it was important to verify whether insulation was added in the most effective locations. All savings coefficient values were obtained based on the assumption that insulation was installed either between a heated room and an unheated room (i.e. for ceiling insulation) or between a heated room and outdoors (i.e. for wall and attic insulation). For instance, if some participants insulated a ceiling between a heated basement and their main floor, the savings would be lower than anticipated.

Table 3 presents the survey results related to heating set points for participants who insulated their ceiling.

Table 3: Heating Set Point Before and After Insulating Ceiling

Heating Set Point Before Insulating Ceiling	Heating Set Point After Insulating Ceiling			
	Above 18°C	Between 10°C and 18°C	Not heated at all	(Don't know)
Above 18°C	0	1	1	0
Between 10°C and 18°C	2	6	1	0
Not heated at all	0	4	14	1
(Don't know)	0	1	1	3

This indicates that a majority of participants kept their basement or crawl space unheated or stopped heating it after adding insulation (a total of 15 out of the 29 participants who were able to answer both questions). Two participants stated they increased their basement or crawl space temperature after insulating the ceiling; this is not logical, but the Evaluator considered these answers were not worrisome since they were given by a marginal number of participants.

The same analysis was conducted for participants who insulated basement walls or crawl space walls. The Evaluator also paid special attention to the variation in heating set points before and after insulation because NP and NLH savings coefficient values are based on the assumption that heating set points increase after insulation was added to uninsulated basements walls or crawl space walls. This assumption could result in underestimated savings if this condition was not met for most participants. Table 4 presents surveyed participant answers when asked about their heating set points before and after insulating walls.

Table 4: Heating Set Point Before and After Insulating Walls

Heating Set Point Before Insulating Walls	Heating Set Point After Insulating Walls			
	Above 18°C	Between 10°C and 18°C	Not heated at all	(Don't know)
Above 18°C	3	1	0	0
Between 10°C and 18°C	5	6	0	1
Not heated at all	0	4	4	1
(Don't know)	0	2	1	2

These results indicate that 9 of the 23 participants (39%) who were able to answer the questions for both before and after set points had in fact increased their heating set point after improving their basement or crawl space wall insulation. In six of these nine cases, the initial R-Value was nil. To be conservative in the estimation of savings coefficient values, the Evaluator therefore chose to apply a heating set point of 15°C for uninsulated basements and increase this set point to 18°C for insulated walls.

This table also demonstrates that four participants stated their basement was not heated at all even after the installation of additional insulation. This suggests that their energy savings would be minimal. The added insulation would only slightly increase the temperature of the basement, which in turn would result in less cold air being exchanged with the main floor. However, this would have a very limited impact on overall heating energy consumption.

Since only 23 participants who insulated their walls could answer these questions, the Evaluator does not believe there is sufficient evidence to apply a downward adjustment to the savings coefficient values. These results, however, warrant additional investigation and preventive measures to ensure the program reaches its full energy savings potential. Further investigation and monitoring can be done during the on-site quality-assurance inspections conducted by the program staff, or through participant surveys similar to the one conducted for this evaluation.

Validation of Simulation Models

The original HOT2000 models used to establish savings were no longer available at the time of evaluation. However, program administrators were able to provide models based on memory which yielded savings coefficient values similar to those used by NP and NLH. The Evaluator reviewed the models re-created by NP and NLH and found that most building parameters were correctly modelled, but that some improvement could be made to more accurately represent a common home. The Evaluator therefore rebuilt the models following energy modelling best practices.

Four major changes were made to the models. First, the Evaluator added windows because none was included in the original model. Four above-grade windows were added to the front and back of the house, and two windows to both sides, as well as six basement windows. All windows were assumed double glazed, as well as with air space, no low-emissivity, and vinyl frames. Second, the basement was modelled so that floor joists were 16 inches above-grade, which corresponds to standard construction practices; this change had a fairly significant and positive impact on energy savings for basement walls and ceilings. Third, for crawl space insulation measures, the crawl space was modelled using the crawl space function of HOT2000, rather than modelling it as a basement with reduced wall height. Fourth, the Evaluator used the default value for a moderately air-tight building envelope (4.55 air changes per hour at 50 Pa), instead of the 5.24 air-changes-per-hour value originally used. This reduced overall energy consumption since infiltration has a direct impact on space heating, but had a limited impact on energy savings.

A detailed description of the energy models, simulation results, and coefficient calculations are found in Appendix IV. For basement and crawl space wall insulation, the Evaluator chose to use the savings coefficient obtained from the simulation of a full basement. These values were more conservative than crawl space simulation results. Furthermore, as presented in Table 2, 75 percent of participants who insulated their walls have a basement rather than a crawl space.

For ceiling insulation measures, the Evaluator used the average of the values obtained from basement ceiling and crawl space ceiling energy models. These two values were similar and the participant survey revealed that a significant proportion of insulated ceilings were located in basements, despite the majority (about 58%) of ceilings being located in crawl spaces.

Table 5 presents the original savings coefficient values compared with the revised values obtained from the Evaluator's simulations.

Table 5: Original and Revised Savings Coefficient Values

Insulated Area Type	Nominal R-Value Range	Original Savings Coefficient Values (kWh/sq. ft.)	Revised Savings Coefficient Values (kWh/sq. ft.)
Basement and Crawl Space Wall Insulation	R-0 to R-6	2.62	4.19
	R-6 to R-12		2.06
	R-12 to R-16	0.75	0.50
	R-16 to R-20	0.1	0.23
	R-20 to R-25	0.09	0.13
	More than R-25	0	0
	Total	**3.56**	**7.11**
Basement and Crawl Space Ceiling Insulation	R-0 to R-6	3.7	3.47
	R-6 to R-12		1.59
	R-12 to R-29	0.6	1.30
	R-29 to R-35	0.18	0.34
	More than R-35	0	0
	Total	**4.48**	**6.70**
Attic Insulation	R-0 to R-3	0	0
	R-3 to R-8	3.42	3.66
	R-8 to R-12	1.53	1.55
	R-12 to R-20	1.68	1.81
	R-20 to R-32	1.11	1.05
	R-32 to R-49	0.37	0.63
	R-49 to R-55	0.23	0.13
	More than R-55	0	0
	Total	**8.34**	**8.83**

The savings coefficient values calculated by the Evaluator were higher than the values used by NP and NLH for all insulated area types. The attic insulation savings were the closest, being only six percent higher. The crawl space/basement ceiling insulation savings were 50 percent higher, while the crawl space/basement wall insulation savings were twice as high.

Also, the Evaluator decided to divide the R-0 to R-12 range into two, since the most significant savings occur within this range, to improve accuracy.

Peak Demand Savings

Peak demand savings correspond to the demand savings that coincide (in time) with the peak demand of the electricity system. The winter peak in Newfoundland and Labrador is from 7 a.m. to noon in the morning period and from 4 p.m. to 8 p.m. in the evening period on the four coldest days, from December to March. This is a total of 36 hours per year.

Peak demand savings are calculated by NP and NLH based on a methodology detailed in their Conservation and Demand Management Potential Study[5] to calculate peak demand savings. This methodology results in annual energy savings being divided by 3,241 hours to obtain peak demand savings, which is equivalent to a peak-demand-to-energy ratio of 0.309 MW/GWh.

The Evaluator chose to use the output of the energy simulations to estimate peak demand savings with more precision. The HOT2000 simulation reports provide the heat loss at design temperature (defined as -15°C for St. John's), which approximately corresponds to weather conditions during peak periods, because this temperature coincides with the coldest days of the year. Therefore, peak demand savings coefficient values were calculated using the same approach as for energy savings coefficient values. The detailed simulation outputs are presented in Appendix IV. Table 6 below lists the peak demand savings coefficient values obtained from the energy simulation outputs.

[5] ICF International. *Newfoundland and Labrador Conservation and Demand Management Potential Study: 2015. Residential Sector Final Report*, presented to Newfoundland Power Inc. and Newfoundland and Labrador Hydro, 2015, p. B-2 to B-3.

Table 6: Peak Demand Savings Coefficient Values

Insulated Area Type	Nominal R-Value Range	Peak Demand Savings Coefficient Values (W/sq. ft.)
Basement and Crawl Space Wall Insulation	R-0 to R-6	2.16
	R-6 to R-12	0.26
	R-12 to R-16	0.21
	R-16 to R-20	0.08
	R-20 to R-25	0.07
	More than R-25	0.00
	Total	**2.78**
Basement and Crawl Space Ceiling Insulation	R-0 to R-6	2.61
	R-6 to R-12	1.08
	R-12 to R-29	0.84
	R-29 to R-35	0.22
	More than R-35	0.00
	Total	**4.40**
Attic Insulation	R-0 to R-3	0.00
	R-3 to R-8	1.45
	R-8 to R-12	0.31
	R-12 to R-20	0.86
	R-20 to R-32	0.33
	R-32 to R-49	0.20
	R-49 to R-55	0.06
	More than R-55	0.00
	Total	**3.20**

4.1.3 Revised Gross Savings

The Evaluator applied the revised savings coefficient values presented above to obtain the total gross savings per measure type and per utility.

Table 7: Revised Gross Energy and Demand Savings for NP

	Attic		Basement/Crawl Space Walls		Basement/Crawl Space Ceilings		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Number of applications	455	371	409	305	176	134	988	767
Insulated area (ft²)	525,988	445,933	392,684	238,172	155,969	119,675	1,074,641	803,781
Energy Savings								
Gross Energy Savings – at the Meter (GWh)	1.387	1.028	2.294	1.308	0.809	0.611	4.490	2.947
Peak Demand Savings								
Gross Peak Demand Savings – at the Meter (MW)	0.493	0.365	0.868	0.495	0.531	0.401	1.892	1.261

Table 8: Revised Gross Energy and Demand Savings for NLH

	Attic		Basement/Crawl Space Walls		Basement/Crawl Space Ceilings		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Number of applications	24	22	8	8	7	3	35	30
Insulated area (ft²)	32,486	26,708	5,668	4,948	6,718	1,492	44,872	33,148
Energy Savings								
Gross Energy Savings – at the Meter (GWh)	0.093	0.059	0.028	0.023	0.031	0.003	0.153	0.084
Peak Demand Savings								
Gross Peak Demand Savings – at the Meter (MW)	0.033	0.021	0.010	0.008	0.021	0.002	0.064	0.031

4.2 Net-to-gross Ratio

The net-to-gross ratio (NTGR) is used to determine net savings, i.e. the energy savings that can be reliably attributed to a program. More precisely, the NTGR represents the positive or negative effects on the gross savings. For the Insulation Rebate Program, two effects are considered, namely free-ridership and internal spillover.

4.2.1 Free-ridership

Free-ridership can occur when participants would have still implemented energy efficiency upgrades and measures in the absence of a program. The assessment of the free-ridership level for this program was based on a self-report approach, which involved asking participants a set of questions during a telephone survey which was conducted on a sample of 72 participants. The questionnaire included questions to assess both the participants' intention of insulating their homes in the absence of the program and the influence of the program elements on their decision.

The feedback collected from the participant survey was converted into an overall free-ridership level using the algorithm presented in Appendix V. The algorithm results revealed a free-ridership level of 27 percent.

This result is of the same magnitude as other residential envelope improvement programs, though those programs can be difficult to compare since their delivery processes largely vary. The Insulation Rebate Program result is similar to the free-ridership level obtained by the Efficiency Nova Scotia Home Energy Assessment program (28% in 2016);[6] this program, however, differs from the Insulation Rebate Program because it offers an energy audit service to identify potential energy efficiency improvements (with a focus on envelope measures). Another similar program is the Maine Residential Direct Install Program which primarily offers incentives for the insulation of foundations and air-sealing measures in single-family houses. It also includes the free installation of energy-efficient products such as efficient lighting. For this program, the free-ridership level was measured at 18 percent.[7]

The survey provided some insight into the participants' decision-making process. Of the surveyed participants, 69 percent already had plans to insulate their homes before hearing about the program. However, as is often the case when evaluating free-ridership, the program and rebate influenced customers' decision to actually undertake and implement the upgrade, in this case adding insulation. The offered rebate influenced participants' decision to add insulation to their home, with an average score of 8.2 out of 10 using a scale from 0 to 10, where "0" means "No influence" and "10" means "Great influence").

4.2.2 Spillover

The participant survey was also used to assess internal spillover, which can occur when participants implement additional energy efficiency measures after their participation in the program. For the Insulation Rebate Program, only the insulation added to above-grade walls was considered to establish spillover. Indeed, it was unlikely that a participant who had already installed insulation rebated by the program would either (1) install insulation on another eligible wall or ceiling without asking for the rebate, or (2) install additional insulation to the walls for which they had already obtained an insulation rebate.

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[6] Econoler. 2017. *Existing Residential Program 2016 DSM Evaluation*. Report presented to Efficiency Nova Scotia. p. 26.
[7] Opinion Dynamics. 2013. *Evaluation of the Efficiency Maine Trust Pace, PowerSaver, and RDI program. Final Evaluation Report. Volume II: Residential Direct Install Program*. Report presented to Efficiency Main Trust. p. 23-25.

Therefore, the Evaluator considered that the most likely spillover would be that participants insulated above-grade walls at the same time or after their participation in the Insulation Rebate Program. The algorithm used to calculate the level of internal spillover is presented in Appendix VI.

The survey questions allowed gathering information on the type of walls that were insulated, the initial and final thermal resistance, and the area insulated. Based on this information, the Evaluator used the following engineering equation to calculate resulting energy savings:

$$Energy\ Savings\ (kWh/m^2) = \frac{HDD \times 24h/day}{HCF \times \eta} \times \left\{ \left(\frac{1}{CF \times R_{BEF} + R_{ADJ}} \right) - \left(\frac{1}{CF \times R_{AFT} + R_{ADJ}} \right) \right\}$$

Where:

- › *HDD*: Heating Degree Days (°F.day), 8,559 for St. John's;
- › *HCF*: Heating Conversion Factor (3,412 Btu/kWh);
- › *η*: Heating Efficiency (100% for electrical resistance heating);
- › *CF*: Construction Factor (dimensionless), estimated at 0.85, to take into account thermal bridging of the wall wood structure;
- › R_{BEF}: nominal R-Value prior to re-insulation (ft².°F.hr/Btu);
- › R_{AFT}: nominal R-Value after re-insulation (ft².°F.hr/Btu);
- › R_{ADJ}: R-Value for standard building materials for a wall (ft².°F.hr/Btu), estimated at R-3.4 to account for materials such as gypsum and exterior sheeting.

The survey results revealed an internal spillover level of two percent. Of the 72 surveyed participants, four declared they had insulated above-grade walls on their own. They attributed the program an average level of influence of 54 percent.

4.2.3 NTGR Calculation

The NTGR is calculated using the following equation:

NTGR = (1 – % free-ridership + % internal spillover)

Using the free-ridership and spillover levels established for the Insulation Rebate Program, the NTGR value is estimated at 0.75.

4.3 Net Savings

The net savings were obtained by applying the NTGR to the gross savings established by the Evaluator. The following two tables separately present the evaluated net savings for NP and NLH.

Table 9: Revised Net Energy and Demand Savings for NP

	Attic		Basement/Crawl Space Walls		Basement/Crawl Space Ceilings		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Energy Savings								
Revised Gross Energy Savings – at the Meter (GWh)	1.387	1.028	2.294	1.308	0.809	0.611	4.490	2.947
NTGR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Net Energy Savings – at the Meter (GWh)	1.040	0.771	1.720	0.981	0.607	0.458	3.367	2.210
Peak Demand Savings								
Revised Gross Peak Demand Savings – at the Meter (MW)	0.493	0.365	0.868	0.495	0.531	0.401	1.892	1.261
NTGR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Net Peak Demand Savings – at the Meter (MW)	0.369	0.274	0.651	0.371	0.398	0.301	1.419	0.945

Table 10: Revised Net Energy and Demand Savings for NLH

	Attic		Basement/Crawl Space Walls		Basement/Crawl Space Ceilings		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Energy Savings								
Revised Gross Energy Savings – at the Meter (GWh)	0.093	0.059	0.028	0.023	0.031	0.003	0.153	0.084
NTGR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Net Energy Savings – at the Meter (GWh)	0.070	0.044	0.021	0.017	0.024	0.002	0.115	0.063
Peak Demand Savings								
Revised Gross Peak Demand Savings – at the Meter (MW)	0.033	0.021	0.010	0.008	0.021	0.002	0.064	0.031
NTGR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Net Peak Demand Savings – at the Meter (MW)	0.025	0.016	0.007	0.006	0.015	0.002	0.048	0.023

4.4 Summary of Results

The following table summarizes and compares the reported results to those obtained by the Evaluator.

Table 11: Summary of Evaluation Results for 2015 and 2016 Program Years

Parameters	Utility	Reported Results[8]		Evaluation Results	
		2015	2016	2015	2016
Gross Electricity Energy Savings – at the Meter (GWh)	NP	2.748	2.144	4.490	2.947
	NLH	0.105	0.072	0.153	0.084
	Total	**2.853**	**2.216**	**4.643**	**3.031**
Gross Electricity Peak Demand Savings – at the Meter (MW)	NP	0.848	0.662	1.892	1.261
	NLH	0.025	0.017	0.064	0.031
	Total	**0.873**	**0.679**	**1.956**	**1.292**
NTGR	**Total**	**0.90**	**0.90**	**0.75**	**0.75**
Net Electricity Energy Savings – at the Meter (GWh)	NP	2.473	1.930	3.367	2.210
	NLH	0.95	0.065	0.115	0.063
	Total	**2.568**	**1.995**	**3.482**	**2.273**
Net Electricity Peak Demand Savings – at the Meter (MW)	NP	0.763	0.596	1.419	0.945
	NLH	0.023	0.015	0.048	0.023
	Total	**0.765**	**0.597**	**1.467**	**0.968**

4.5 Program Cost-effectiveness

As part of this evaluation, the Evaluator assessed program cost-effectiveness by performing the Levelized Utility Cost (LUC) test. Because the value of the avoided energy cost—a key parameter in conducting a standard cost-effectiveness analysis—was not yet known when this evaluation was conducted, a sensitivity analysis was performed using the Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests. The Evaluator did not calculate TRC and PAC ratios but instead used the TRC and PAC formulas to determine the minimum avoided cost required for the TRC and PAC ratios to be above 1, therefore for the program to be cost effective.

Furthermore, effective useful life (EUL) values and incremental costs of the rebated products that had been determined by NP and NLH were reviewed by the Evaluator when conducting this cost-effectiveness analysis. Some of the evaluation results were also essential to the cost-effectiveness analysis, including program savings which were obtained through the impact evaluation. It should be

[8] The reported gross values were provided by NP and NLH. To obtain the reported net values, the Evaluator multiplied the gross values by the NTGR (0.90).

noted that non-energy benefits were neither quantified nor included in this cost-effectiveness analysis. The Evaluator used the assumptions made by NP and NLH for the discount and inflation rates (7% and 2% respectively).

4.5.1 Effective Useful Life

The financial benefits and revenue losses resulting from the Insulation Rebate Program are expected to persist over multiple years. The period over which they persist (defined as the EUL) is factored into the calculation of the Lifetime Energy Savings and the Utility Marginal Benefits. In their cost-benefit analysis, NP and NLH defined the EUL as 25 years for insulation of all types of areas. The Evaluator conducted a literature review to compare the EUL values used by NP and NLH with those applied by other jurisdictions in North America. As displayed in the following table, the Evaluator found that some jurisdictions, such as California and Minnesota, use an EUL of 20 years, while most other jurisdictions use an EUL of 25 years. Therefore, the Evaluator considers the EUL of 25 years used by NP and NLH still appropriate.

Table 12: Literature Review Summary

Document	EUL	Source
California TRM 2016 [9]	20	California Public Utilities Commission. Database for Energy Efficient Resources (DEER), Version 10.1.2008.
Maine TRM Res 2017 [10]	25	GDS Associates, Inc. Prepared for The New England State Program Working Group. *Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures*. June 2007.
Massachusetts TRM 2016-18 [11]	25	GDS Associates, Inc. Prepared for The New England State Program Working Group. *Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures*. June 2007.
Illinois TRM 2016 [12]	25	GDS Associates, Inc. Prepared for The New England State Program Working Group. *Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures*. June 2007.
Mid-Atlantic TRM 2016 [13]	25	GDS Associates, Inc. Prepared for The New England State Program Working Group. *Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures*. June 2007.
Minnesota TRM 2017-19[14]	20	California Public Utilities Commission. Database for Energy Efficient Resources (DEER), Version 2008.2.04
Wisconsin TRM 2015	20	Wisconsin PSC EUL Database. 2013. (Attic insulation has an EUL of 25 and air sealing an EUL of 20. So, 20 years was used to avoid over-counting lifecycle savings.)

[9] Energy & Resource Solutions. *Savings Estimation Technical Reference Manual for the California Municipal Utilities Association*, June 2016, pp. 12-1 and 12-5.
[10] Efficiency Maine. *Retail/Residential Technical Reference Manual Version 2017.1*, July 2016, pp. 58, 62 and 64.
[11] Mass Save. Massachusetts Technical Reference Manual, October 2015, p. 143.
[12] Illinois Stakeholder Advisory Group. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 5.0, Volume 3: Residential Measures, 2016, p. 278.
[13] Northeast Energy Efficiency Partnerships. Mid-Atlantic Technical Reference Manual Version 6.0 Final, May 2016, p. 260.
[14] Minnesota Department of Commerce, Division of Energy Resources. State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 2.0, January 1, 2017, p. 427.

4.5.2 Incremental Product Cost

Since the program incentivizes the installation of insulation, the baseline is based on a scenario in which no insulation is added and consequently incurs zero cost. Therefore, the incremental cost of an insulation project is the total cost of the measure.

In the cost-benefit analysis, NP and NLH used the following incremental cost values: $740 for attic insulation, $990 for basement/crawlspace wall insulation, and $770 for basement/crawlspace ceiling insulation. The Evaluator calculated an average project cost for each area type using the participant database. All project costs are well documented in the NP database since project costs were needed by the utilities to determine participants' rebates. Since the NLH database did not include project cost information, its projects' total incremental product cost values were calculated by multiplying (1) NP's reported average cost by (2) NLH's total number of projects completed each year. The following table lists the incremental cost values used by the utilities (estimated) and those calculated by the Evaluator (reported).

Table 13: Incremental Product Costs

	Estimated Cost per Project	Average Reported Cost per Project
Attic Insulation	$740	$835
Basement/Crawlspace Wall Insulation	$990	$963
Basement/Crawlspace Ceiling Insulation	$770	$973
AVERAGE	-	$909

4.5.3 Program Administrator Cost Test

The PAC is performed using the following equation:

$$PAC = \frac{PV(Marginal\ Benefits)}{PV(Total\ Program\ Administration\ Cost + Incentives)}$$

This test compares the avoided electricity supply-side resource costs (benefits) with the costs incurred by the program administrator to design and deliver the program. Therefore, it demonstrates the program's cost-effectiveness only from the program administrator's perspective.

By applying the revised EUL, the evaluated net savings and the administration and incentive costs provided by NP and NLH, the Evaluator has concluded that for the PAC ratio value to be above unity, the value of the avoided cost (given a first year of EUL in 2016) must be at least 0.021 $/kWh in 2015 and 0.032 $/kWh in 2016.

Table 14: Analysis of Program Administrator Cost Test

	NP		NLH		Total	
	2015	**2016**	**2015**	**2016**	**2015**	**2016**
Incentives ($)	515,693	441,125	20,397	14,039	536,090	455,164
Total Program Admin. Cost ($)	225,030	329,339	49,953	47,182	274,983	376,521
Lifetime Energy Savings (kWh)	84,186,544	55,247,700	1,250,588	1,582,125	85,437,132	56,829,825
Minimum Value of Avoided Energy ($/kWh) on First Year	0.019	0.030	0.053	0.084	0.021	0.032

4.5.4 Total Resource Cost Test

The TRC test is performed using the following equation:

$$TRC = \frac{PV(Marginal\ Benefits)}{PV(Incremental\ Product\ Cost + Total\ Program\ Administration\ Cost)}$$

This test establishes the ratio of the avoided electricity supply-side resource cost (benefits) to the cost incurred both by the program administrator (administration costs) and the customer (incremental product cost). Therefore, this test is a more comprehensive analysis of the cost-effectiveness of the program, since it also takes into account the customer’s perspective.

By applying the revised EUL and incremental cost values, the evaluated net savings and the administration cost values provided by NP and NLH, the Evaluator has concluded that for the TRC ratio value to be above unity, the value of the avoided cost (given a first year of EUL in 2016) must be at least 0.029 $/kWh in 2015 and 0.041 $/kWh in 2016.

Table 15: Analysis of Total Resource Cost Test

	NP		NLH		Total	
	2015	**2016**	**2015**	**2016**	**2015**	**2016**
Total Incremental Cost ($)	958,476	761,954	34,555	28,993	993,031	790,587
Total Program Admin. Cost ($)	225,030	329,339	49,953	47,182	274,983	376,521
Lifetime Energy Savings (kWh)	84,186,544	55,247,700	2,867,269	1,582,125	87,053,813	56,829,825
Minimum Value of Avoided Energy ($/kWh) on First Year	0.028	0.039	0.059	0.096	0.029	0.041

4.5.5 Levelized Utility Cost Test

The LUC test is performed by dividing (1) the cost incurred by the program administrator to design and deliver a program by (2) the lifetime energy savings generated by the program.

By applying the revised EUL, the evaluated net savings and the administration and incentive costs provided by NP and NLH, the LUC value was calculated for each year and each utility, as shown in the following table.

Table 16: Levelized Utility Cost Test Results

	NP		NLH		Total	
	2015	2016	2015	2016	2015	2016
Incentives ($)	515,693	441,125	20,397	14,039	536,090	455,164
Total Program Admin. Cost ($)	225,030	329,339	49,953	47,182	274,983	376,521
Lifetime Energy Savings (kWh)	84,186,544	55,247,700	1,250,588	1,582,125	85,437,132	56,829,825
LUC ($/kWh)	0.009	0.014	0.025	0.039	0.009	0.015

CONCLUSIONS AND RECOMMENDATIONS

The main objectives of this first third-party evaluation of the Insulation Rebate Program were to assess program gross and net energy and peak demand savings, as well as evaluate program design, delivery, implementation, and tracking by gathering feedback from participants and partners and reviewing program documentation.

Satisfaction with the program is very high among participants and installers. Almost all surveyed participants expressed satisfaction with the program, and all four installers said they were satisfied with the program, the promotional materials, and the quality of their interactions with NP and NLH staff.

The most popular method participants learned about the program was through television, followed by word of mouth and online advertising. Installers were not mentioned by participants as a source of awareness. Installers learned of the Insulation Rebate Program a number of different ways, but only two mentioned first learning about it from NP and NLH.

Although installers mentioned promoting the program and said they have everything they need to promote it, they do not seem to fully understand the program and its eligibility criteria to properly explain it to customers. For instance, one installer mentioned finding it difficult to predict whether a customer would receive a rebate. Furthermore, installers mentioned that in-person meetings from program representatives to go over details on products and rebates would help improve their understanding of the program. Such visits could be very useful given that installers do not communicate often with NP and NLH staff (varies from a couple of times per month, to a couple of times per year). The installers' role as program ambassadors is increasingly important given that, according to them, a majority of customers do not ask about the program when seeking insulation upgrade services.

Installers believe that the main reasons customers do not participate in the program include uncertainty as to whether they will qualify for a rebate and high upfront costs. Lack of funds was expressed as a major barrier to making energy-efficient upgrades by close to 20 percent of surveyed participants. Increased promotion of the financing option available under the program to help with upfront insulation costs could be considered as a way of alleviating this issue.

The project review revealed that participants generally filled out the application form correctly. Most applications were processed and tracked correctly by program staff, but a few erroneous entries affecting project energy savings or actual eligibility were detected.

To establish revised gross savings, the Evaluator used an approach similar to that used by NP and NLH, which consists of extracting energy consumption from HOT2000 energy simulations designed to represent a typical single-family house. The Evaluator created a new set of HOT2000 energy models which meet industry best practices. The participant survey, during which questions were asked concerning where insulation was installed and the heating set points of living spaces, also provided information on how to best model the insulation upgrades completed by participants. The resulting energy savings coefficient values were found to be higher than the values used for tracking, especially in the case of basement or crawl space walls and ceilings. The same energy models were used to estimate peak demand savings coefficient values, based on heat losses of the house on the coldest days of the year. This also resulted in higher savings than what was tracked.

Free-ridership and spillover were assessed through the participant survey. To assess free-ridership, participants were asked questions about the influence of the program and its various aspects on their decision to add insulation. The rebate and the information provided by the program were influential for almost three-quarters and half of the participants respectively. A previous experience with the Insulation Rebate Program or another takeCHARGE program had a lower level of influence on participants' decision to add insulation. The survey results revealed a free-ridership level of 27 percent and a spillover level of two percent. This results in an NTGR of 0.75. When applying this NTGR to the revised gross savings, it was found that the Insulation Rebate Program generated total net electricity energy savings at the meter of 5.755 GWh (5.577 GWh for NP and 0.178 GWh for NLH) for the 2015 and 2016 program years. A reduction of 2.438 MW was achieved for electricity peak demand savings (2.367 MW for NP and 0.071 MW for NLH).

In light of the process and impact evaluation results, the Evaluator makes the following recommendations to optimize the program. These recommendations aim at improving data quality, evaluation techniques, savings calculations, as well as program design and implementation while also affording due consideration to NP's and NLH's goals and objectives to increase the efficiency of program delivery, overcome participation barriers, and build stronger relationships with program partners.

1. Use the parameters derived from this impact evaluation for program tracking

The Evaluator recommends that NP and NLH use the parameters defined in this evaluation for program tracking going forward, including the revised savings coefficient values and NTGRs.

2. Provide participants with more information on the best ways to insulate basements and crawl spaces

As described in Subsection 4.1.2, some participants stated that they had installed insulation between two heated spaces (e.g. insulating the ceiling of a heated basement), increased the heating set point in a basement after the ceiling was insulated, or insulated the walls of an unheated basement. These actions result in lower savings than the cases modelled to estimate savings coefficient values and do not provide maximum benefits to participants. It is therefore recommended that information be provided to participants to help them make the right decisions as to which surface to insulate based on their projected usage of the space. This could be provided in the form of a video similar to those already available on the takeCHARGE website, or as a checklist of items to consider before choosing where to install insulation. To ensure that this information is consulted by participants prior to renovation work, it could be added to the “How to Buy & Install” section of the program website or, if presented in the form of a checklist, added to the application form.

3. Establish a more proactive communication channel with installers

As previously mentioned, there is a potential for installers to better understand and further promote the program to residential customers who seek insulation upgrade services. To improve installers’ knowledge of program eligibility criteria, rebates and details, various actions can be taken by NP and NLH. Installers can be a difficult group to engage, so NP’s and NLH’s actions would have to be proactive. These actions could include in-person information visits or training sessions, regular follow-up calls, or the creation of a list of approved installers to whom carefully structured and presented information on the program, including information on any program changes or updates, would be given.

4. Improve the content of the database

The program database contained all the information needed for the process evaluation. That said, key pieces of information for the impact evaluation were missing. The Evaluator recommends that the following information be tracked henceforth for more efficient impact evaluations and internal program monitoring:

- Project energy savings (Data was found in only the NP spreadsheet.);
- The savings coefficient value identified for each surface insulated (Data was not found in either NP's or NLH's spreadsheet.);
- The height, width, and length of the insulated surfaces to complement the resulting area coverage, which is already in the database (Data was not found in either NP's or NLH's spreadsheet.);
- The primary and secondary heating types, along with the annual electricity consumption (Data was not found in either NP's or NLH's spreadsheet.);
- Measurement units for values of area and thermal resistance (Data was found only in the NP spreadsheet.);
- All the notes written in the application forms by the program staff during the processing period (Data was not found in either NP's or NLH's spreadsheet.).

Some of the above information is already being tracked by the utilities using other files. The Evaluator recommends that each utility document all program-related data in a single spreadsheet to facilitate internal program-monitoring and information-sharing with the Evaluator.

Furthermore, the Evaluator recommends that NP and NLH use the same method for calculating savings and number of participants that should go under a given program year. For instance, a single parameter, such as the application approval date, should be used to determine in which program year participants and energy savings are tracked. This is the approach currently used by NLH, and the Evaluator deems it appropriate and straightforward. Then, the program year associated to each project should be clearly tracked in the database.

The Evaluator also recommends using the information stored in the database to implement quality control checks during the application processing phase. For instance, the program eligibility criterion requiring a minimum annual electricity usage of 15,000 kWh for homes with secondary heating systems should systematically be verified, but this threshold should also be used to trigger additional verifications for homes that are identified as 100 percent electrically heated. This recommendation has already been implemented by the program staff.

Appendix I
PARTICIPANT SURVEY QUESTIONNAIRE

Key Research Area	Related Questions
Sources of program awareness and reasons for participation	A1-A3
Satisfaction with the program and recommendations	S1, S2, S3, S6
Difficulties related to the participation process	S4, S5
Free-ridership	FR1-FR4
Spillover	SO1-SO6
Barriers to implementing energy-efficient upgrades	B1
Demographics	D1-D6

Hello may I please speak with [INSERT NAME]?

1. Yes [GO TO INTRODUCTION]
2. No [SAY “Perhaps you can help me anyway.” GO TO INTRODUCTION]

INTRODUCTION

Hello, my name is _________ and I am calling from Corporate Research Associates. We are performing an evaluation of energy efficiency programs provided by Newfoundland Power and Newfoundland and Labrador Hydro. According to our records, you participated in the takeCHARGE Insulation Rebate Program in 2015, 2016 or 2017. As part of this program, you received a rebate for insulation upgrades that you made. Are you the person in the household who is most familiar with this program?

1. Yes [CONTINUE]
2. No [ASK TO SPEAK TO THE APPROPRIATE PERSON AND RESTART AT INTRODUCTION]
3. Does not recall participating [PROMPT: “Are you sure? Our records indicate that you participated in the program in <MONTH and YEAR>. Your household received a rebate as a credit on your electricity bill for insulation upgrades that you made.”[IF PERSIST AS NO, THANK, TERMINATE AND RECORD]
4. Don’t know/Refused [PROBE: “Is there someone else in the household who would know about having participated in the Insulation Rebate Program?”] [IF YES, ASK TO SPEAK TO THE APPROPRIATE PERSON AND RESTART AT INTRODUCTION. IF PERSISTS AS NO, THANK, TERMINATE AND RECORD.]

We would appreciate your help in answering questions about your participation in this program. The information you provide will help Newfoundland Power and Newfoundland and Labrador Hydro improve the program. Is now a good time to conduct this short survey? The survey will take about 10 minutes to complete.

1. Yes [CONTINUE]
2. No/Refused [ASK "Can we schedule a more convenient time for you to conduct this survey?"] [SCHEDULED, IF NECESSARY, FOR: ______________________________]

PROGRAM AWARENESS AND REASONS FOR PARTICIPATION (A SERIES)

A1. How did you first learn about the Insulation Rebate Program from Newfoundland Power and Newfoundland and Labrador Hydro? [DO NOT READ; ALLOW MULTIPLE RESPONSES BUT DO NOT PROBE FOR MULTIPLE]

1. (Television)
2. (Radio)
3. (Online advertising (in general))
4. (Brochure)
5. (Through a contractor)
6. (At a retail or hardware store)
7. (Newfoundland Power or Newfoundland and Labrador Hydro website)
8. (takeCHARGE website)
9. (Facebook, Twitter or YouTube)
10. (Newspaper)
11. (Magazine)
12. (Word of mouth/Friend/Family member)
13. (Through a participation in another Newfoundland Power or Newfoundland and Labrador Hydro program)
14. Through my home energy report or online portal account.
96. (Other [SPECIFY__________________])
98. (Don't know)

A2. What was the SINGLE most important reason you were interested in participating in the program? [DO NOT READ – CODE ONE ONLY]

1. (Rebate/Credit on electricity bill)
2. (Save money/Reduce energy bill)
3. (Planning to make insulation upgrades anyway)
4. (Be more environmentally friendly)
5. (Increase comfort in my home)
96. (Other) [SPECIFY_______________])
98. (Don't know) [GO TO SECTION S]
99. (Refused) [GO TO SECTION S]

A3. Were there any other reasons? [SAME LIST AS IN A2] [DO NOT READ. ACCEPT MULTIPLE RESPONSES]

97 None/no other reasons

SATISFACTION (S SERIES)

S1. Overall, how satisfied were you with the Insulation Rebate program? Were you… [READ]

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied
98. (Don't know)
99. (Refused)

S2. [IF S1= 1 or 2] Why were you satisfied with the program?
(RECORD VERBATIM: ___________________)
98. (Don't know)
99. (Refused)

S3. [IF S1= 4 or 5] Why were you dissatisfied with the program?
(RECORD VERBATIM: ___________________)
98. (Don't know)
99. (Refused)

S4. How did you apply for the Insulation Rebate program? [READ IN ORDER]

1. Mail
2. Online
3. Both mail and online
4. In person
98. (Don't know)
99. (Refused)

S5. How easy was the process to apply for the Insulation Rebate program? Was it… [READ]

1. Very easy
2. Somewhat easy
3. Neither easy nor difficult
4. Somewhat difficult
5. Very difficult
98. (Don't know)
99. (Refused)

S6. [IF S5=4 or 5] What was difficult about applying for the rebate? [MULTIPLE RESPONSE – RECORD VERBATIM] Probe: Anything else?

98. (Don't know)
99. (Refused)

S7. Do you have any recommendations for improving the Insulation Rebate Program? PROBE: Anything else? [DO NOT READ. ACCEPT MULTIPLE]

1. (Offer more upgrades eligible for rebates)
2. (Offer more information on the upgrades)
3. (Advertise the program more or in a better way)
4. (Bigger incentives)
5. (No recommendation)
96. (Other [SPECIFY________________])
98. (Don't know)
99. (Refused)

USAGE (U SERIES)

[ASK U SERIES IF BASE-CRAWL WALLS=1 OR BASE-CRAWL CEILING =1]

U1. Our record shows that your basement or crawlspace was insulated through the program. Was the space that you insulated a basement or a crawlspace? (IF NEEDED: A crawlspace is an enclosed space that is less than 6.5 feet high between the underside of a floor, and the ground below.)

1. Basement
2. Crawlspace
3. (Did not insulate basement nor crawlspace) [SKIP TO FR SERIES]
98. (Don't know)
99. (Refused)

U2. At what temperature did you heat your [basement/crawlspace] before it was insulated?

1. Above 18 °C (IF NEEDED: Above 64 °F)
2. Between 10 and 18 °C (IF NEEDED: Between 50 °F and 64 °F)
3. Not heated at all
98. (Don't know)
99. (Refused)

U3. Now that the [basement/crawlspace] is insulated, at what temperature is it heated?

1. Above 18 °C (IF NEEDED: Above 64 °F)
2. Between 10 °C and 18 °C (IF NEEDED: Between 50 °F and 64 °F)
3. Not heated at all
98. (Don't know)
99. (Refused)

U4. [ASK IF BASE-CRAWL CEILING =1 AND U1=1 AND U3=1 OR 2] Our records show that you insulated the ceiling of the basement. Did you install your insulation on the ceiling or was it instead installed on the floor of the basement?

1. On the basement ceiling
2. On the basement floor
98. (Don't know)
99. (Refused)

FREE-RIDERSHIP (FR SERIES)

Moving along to another topic…

FR1. Did you have plans to add insulation to your home before you learned about the Insulation Rebate Program? [DO NOT READ. CODE ONLY ONE.]

1. Yes
2. No [Go to FR4]
98. (Don't know) [Go to FR4]
99. (Refused) [Go to FR4]

FR2. You received a rebate of $[TOTAL REBATE] for the insulation you installed in your home. If you had not received this rebate from the program, what is the likelihood that you would have paid for the full cost of the insulation installed? Please answer using a scale from 0 to 10, with a 0 indicating that you "Definitely Would Not Have Paid" and a 10 indicating that you "Definitely Would Have Paid." [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

FR3. Now I would like to ask you to consider what actions you would have taken if the Insulation Rebate Program had NOT been available. I will read you a few options. For each one, please answer on a scale from 0 to 10, with a 0 indicating that it is "Very Unlikely," and a 10 indicating that it is "Very Likely." [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED. DO NOT RANDOMIZE.]

a. If the program had not been offered, what is the likelihood that you would have installed the same thickness of insulation?

b. If the program had not been offered, what is the likelihood that you would have insulated the same amount of walls or ceilings that was insulated through the Insulation Rebate Program?

c. [Ask if FR2>5] If the program had not been offered, what is the likelihood that you would have postponed adding insulation to your home by at least one year?

FR4. Using a scale from 0 to 10 where 0 means "No influence" and 10 means "Great influence", please rate the influence of each of the following factors on your decision to add insulation to your home. [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED. ROTATE]

a. The rebate offered by the program

b. The information provided by the program on home insulation, such as the brochure and the How-To videos

c. A previous experience with the Insulation Rebate Program or another takeCHARGE program by Newfoundland Power or Newfoundland and Labrador Hydro

SPILLOVER (SO SERIES)

I will now ask you questions about insulation you may have installed after your participation in the Insulation Rebate Program.

SO1. Since your participation in the Insulation Rebate Program, have you added insulation to the above-ground walls of your home? The above-ground walls exclude the basement and the attic. [DO NOT READ. CODE ONLY ONE.]

1. Yes
2. No [Go to B Series]
98. (Don't know) [Go to B Series]
99. (Refused) [Go to B Series]

SO2. Before you added this insulation, was there any insulation in your above-ground walls? [DO NOT READ. CODE ONLY ONE.]

1. Yes
2. No
98. (Don't know)
99. (Refused)

SO3. What insulation material did you install in your above-ground walls? [CODE ONLY ONE. PROBE IF NEEDED.]

1. Mineral or Fiberglass Wool
2. Blown-in Cellulose
3. Polystyrene
4. Sprayed polyurethane
96. (Other: Please Specify: _____________)
98. (Don't know)
99. (Refused)

SO4a. What thickness of [INSERT ANSWER IN SO3] was added?

Record answer in inches or centimeters _________ cm OR _________ inches

98. (Don't know)
99. (Refused)

SO4b. [IF SO4a=98] What R-value was added?

Record answer _________

98. (Don't know)
99. (Refused)

SO5a. Approximately, how much above-grade wall area, in square feet, was insulated?
Record answer in square feet _________
98. (Don't know)
99. (Refused)

SO5b. [IF SO5a=98] What length of above-grade walls was insulated?
Record answer either in metres or feet _________ metres OR _________ feet
98. (Don't know)
99. (Refused)

SO5c. [IF SO5b=98] How many above-grade walls were insulated?
Record number of walls _________
98. (Don't know)
99. (Refused)

SO5d. [IF SO5c<>98 OR 99] To the best of your knowledge, what is the square footage of your home?
Record answer _________
98. (Don't know)
99. (Refused)

SO6. Using a scale from 0 to 10 where 0 means “No influence” and 10 means “Great influence”, how influential was your experience with the Insulation Rebate Program in deciding to later install insulation in your above-ground walls? [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

BARRIERS TO COMPLETING ENERGY EFFICIENCY PROJECTS (B SERIES)

B1. How important are the following aspects in preventing your home from implementing energy-efficient upgrades? Please answer on a scale of 0 to 10, where 0 means ‘not at all a barrier’ and 10 means ‘a major barrier’. [ROTATE. RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

a. Financial challenge such as lack of funds

b. Time constraint, that is, not able to find time to implement energy-efficient upgrades

c. Lack of information about possible energy efficiency rebates or programs

d. Lack of information about energy-efficient upgrades

e. Not convinced of the economic value of energy-efficient upgrades

f. Not knowing how to do the work yourself or having to hire contractors

DEMOGRAPHICS (D SERIES)

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

D1. What type of residence do you live in? [READ RESPONSES, SELECT ONE RESPONSE]

1. Detached single-family home
2. Semi-detached house
3. Townhouse or duplex with shared adjacent walls
4. Row house
96. (Other [SPECIFY: ________________________])
98. (Don't know)
99. (Refused)

D2. Including yourself, how many people live in this residence on a full-time basis?

Number of people: ______________

D3. In what age category do you fall? Are you… [READ]

1. 18 to 24
2. 25 to 34
3. 35 to 44
4. 45 to 54
5. 55 to 64
6. 65 or over
99. (Refused)

D4. What is the highest level of education you have completed? [DO NOT READ]

1. (Less than high school graduation certificate)
2. (High school graduation certificate and/or some post-secondary)
3. (Trades certificate or diploma)
4. (College certificate or diploma)
5. (University certificate or diploma)
98. (Don't know)
99. (Refused)

D5. Which of the following income categories best describes your total annual household income before taxes in 2016? Stop me when I reach the right category. [READ LIST; SELECT ONE RESPONSE]

1. Less than $15,000
2. $15,000 - $24,999
3. $25,000 - $34,999
4. $35,000 - $49,999
5. $50,000 - $69,999
6. $70,000 - $79,999
7. $80,000 or more
98. (Don't know)
99. (Refused)

D6. [DO NOT READ] Gender:

1. Male
2. Female

TESTIMONIAL (T SERIES)

T1. Newfoundland Power and Newfoundland and Labrador Hydro are looking for participants who are interested in sharing their experience with the program. Would you be interested in doing a testimonial for the program?

1. Yes
2. No

READ IF NEEDED: The testimonial would be a video posted on our website.

T2. [IF YES in T1] Please provide your full name and a phone number of your choice, so Newfoundland Power or Newfoundland and Labrador Hydro can reach you. This information will only be used for the purpose of this testimonial.
FULL NAME: _________
Phone number: ________

END. Those are all the questions I have for you. I thank you very much for your time and cooperation.

Appendix II
PARTICIPANT DEMOGRAPHICS

This appendix presents the demographic profile of the survey respondents.

Almost all respondents live in a single-family detached home.

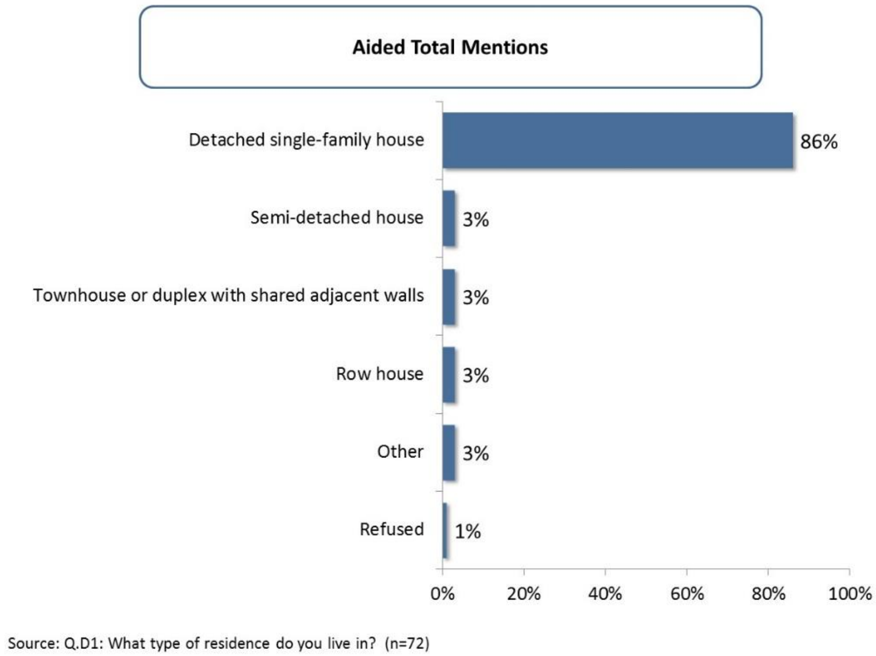


Figure 7: Type of Residence

One-half of participants (49%) live with one other individual on a full-time basis. Meanwhile, one-third (32%) live in a home consisting of three or more individuals.

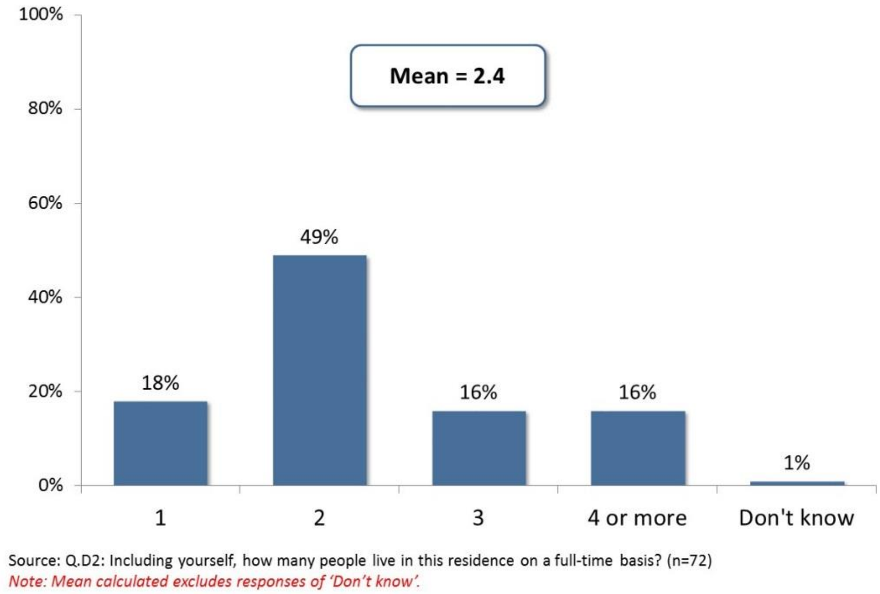


Figure 8: Number of People Living in Residence on Full-time Basis

The majority of participants (72%) are 45 years of age or older.

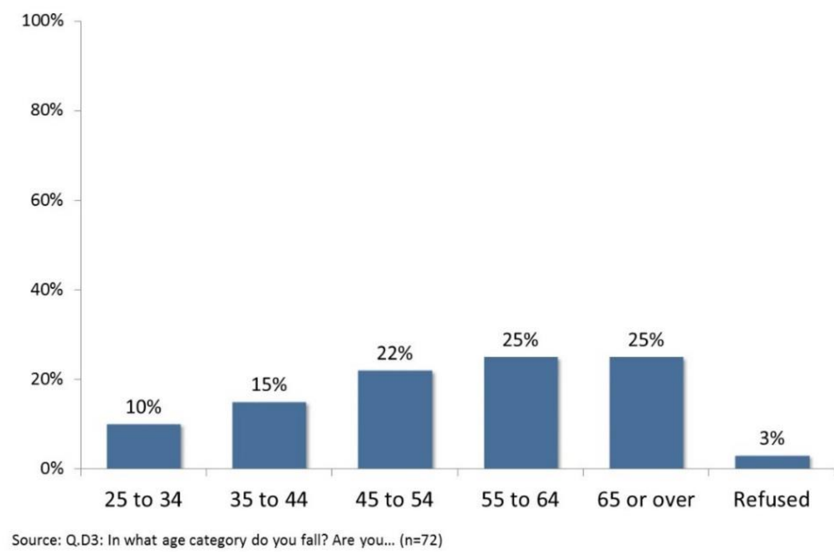
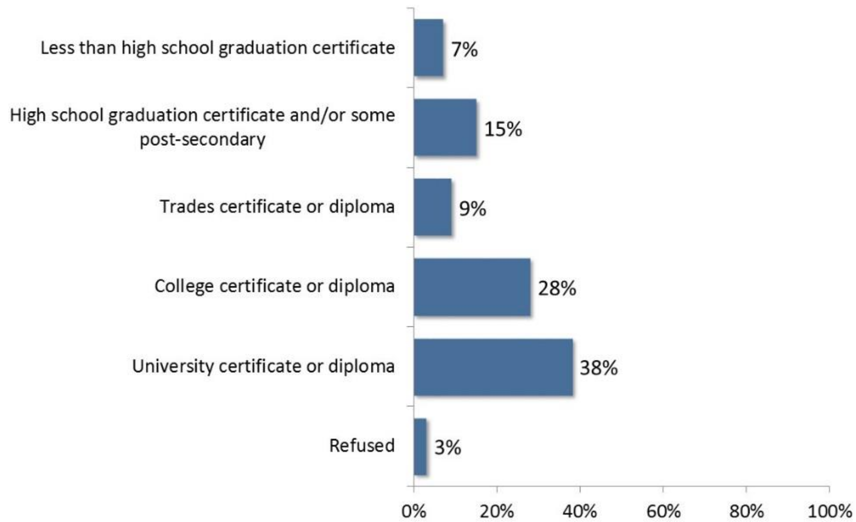


Figure 9: Age of Participant

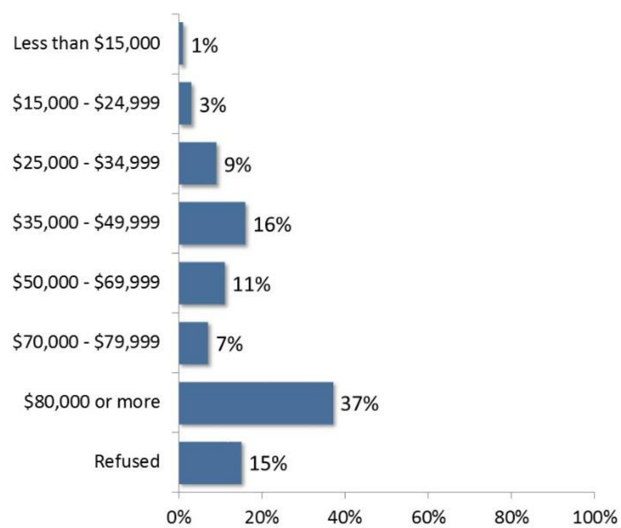
The majority of participants are highly educated, with three in ten (28%) having completed a college diploma and four in ten (38%) a university degree.



Source: Q.D4: What is the highest level of education you have completed? (n=72)

Figure 10: Highest Level of Education Completed

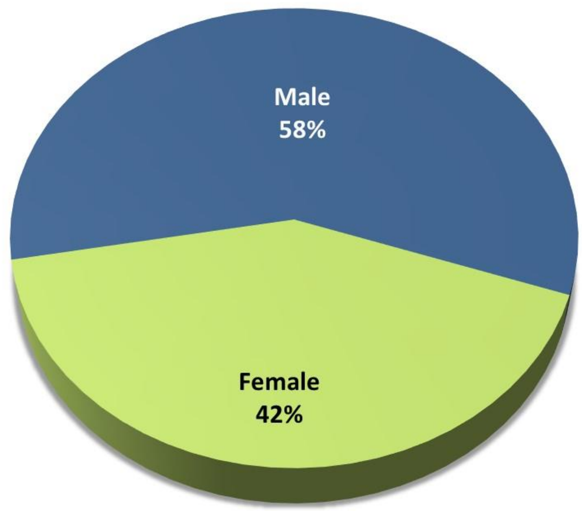
Household income levels vary among participants, however, nearly four in ten (37%) have annual household incomes of $80,000 or more.



Source: Q.D5: Which of the following income categories best describes your total annual household income before taxes in 2016? (n=72)

Figure 11: Annual Household Income in 2016

Participants are slightly more likely to be male than female.



Source: Q.D6: Gender. (n=72)

Figure 12: Gender

Appendix III
INSTALLER INTERVIEW GUIDE

Date	
Company name	
Name	
Area code and phone number	
Email	
Interview length	

Key Research Area	Related Questions
Involvement in the program and awareness	A1, A2, A3
Customer awareness of the program	B1
Program promotion	B2a-b-c-d-e, B4
Use of and satisfaction with promotional materials	B3a-b
Participation level among potential participants and reasons for non-participation	B5, B6
Relationship with NFP and NLH/Program support	C1, C2, C3, C5, C6
Satisfaction with program support	C4
Satisfaction with the program	D1
Barriers and recommendations for improvement	D2, D3, D4, D5

Introduction

Hello, I am with CRA, Corporate Research Associates, an Atlantic Canadian research company. We are conducting an evaluation of energy efficiency programs provided by Newfoundland Power and Newfoundland and Labrador Hydro. As part of this research, we are looking to speak with contactors and installers who are involved in the Insulation Rebate Program. We would appreciate your feedback regarding your involvement in this program, to help Newfoundland Power and Newfoundland and Labrador Hydro improve the program. The interview should last about 15 minutes. Are you the person we should be speaking with regarding your organization's involvement in the program? **IF NOT, REINTRODUCE WITH NEW CONTACT – SCHEDULE INTERVIEW**

Please note that the interview will be recorded for transcription purposes only. The recording will remain strictly confidential—no names will ever be mentioned in the evaluation report.

Do you have any questions before we begin?

Partner Involvement

A1. How long have you worked with the program?

A2. How did you first become aware of the program?

A3. Do you sell insulation as part of your business?

Yes
No

Program Outreach

B1. How often do customers ask you about the program?

B2a. Do you promote the program to your customers?

Yes
No

B2b. [IF YES IN B2a] How do you promote it? [Probe if necessary: Do you mention it in your own ads? Do you encourage customers to buy insulation with a high R-value?]

B2c. [IF YES IN B2a] What challenges, if any, have you experienced when promoting the program to your customers?

B2d. [IF NO IN B2a] What prevents you from promoting the program to your customers?

B2e. How can Newfoundland Power and Newfoundland and Labrador Hydro work with companies like yours to promote participation in the Insulation Rebate Program and energy efficiency in general?

B3a. Do you use any materials provided by takeCHARGE to promote the program to customers [Probe if necessary: Do you offer your customers rebate program brochures, applications? Do you use the vehicle signage provided by takeCHARGE?]

Yes
No

B3b. [IF YES IN B3a] Overall, how satisfied are you with the promotional materials provided by the program?

Very satisfied
Somewhat satisfied
Neither satisfied nor dissatisfied
Somewhat dissatisfied
Very dissatisfied

Explain response:

B4. What type of training, information or promotional materials, if any, are missing to help you better understand or promote the program?

B5. Of all the customers you approach about participating in the program, what percent elect to participate and what percent do not participate?

B6. Why do customers choose not to participate?

Program Support

C1. I want to understand more about your working relationship with Newfoundland Power and/or Newfoundland and Labrador Hydro. How often, if at all, do you communicate with someone from the program?

C2. What do you communicate about with the program staff and are you able to get your questions answered well and in a timely manner?

C3. What service or support, if any, would you like to see from Newfoundland Power and/or Newfoundland and Labrador Hydro to better help you with the program? Why?

C4. Overall, how satisfied have you been with Newfoundland Power and/or Newfoundland and Labrador Hydro in terms of providing you with the service and support you need to deliver the program to your customers? Why? [PROBE: Have you received information you need in a timely manner? Are staff easy to work with?]

Very satisfied
Somewhat satisfied
Neither satisfied nor dissatisfied
Somewhat dissatisfied
Very dissatisfied

Explain response:

C5a. Do you receive the takeCHARGE Installer Newsletter?

Yes
No

C5b. [IF NO IN C5] Are you interested in receiving it?

Yes
No

Program Satisfaction, Barriers and Recommendations

D1. Overall, how satisfied are you with the Insulation Rebate Program? Why?

Very satisfied
Somewhat satisfied
Neither satisfied nor dissatisfied
Somewhat dissatisfied
Very dissatisfied

Explain response:

D2. What prevents customers from upgrading insulation in their home?

D3. What could be done to convince customers to upgrade insulation in their home?

D4. In your opinion, what impedes the delivery of the Insulation Rebate Program? Please list barriers in order of importance, with the first one listed being the greatest impediment.

D5. What suggestions do you have to improve the program?

Thank you very much for your time and co-operation.

Appendix IV
ENERGY MODEL DESCRIPTION AND RESULTS

This appendix presents details of the energy model used to obtain revised savings coefficient values for each insulation measure, as well as the results of the energy simulations.

General Energy Model

Table 17: Energy Model Description

Variable	Input	Notes
Storey	One Storey	
Occupants	2 Adults 50% and 2 Children 50%	
Main Floor Heating Set Point - Daytime	21°C	
Main Floor Heating Set Point - Nighttime	21°C	
Basement Heating Set Point	18°C	Heated basements in CSA F280 Standard are set at 18°C or 64.4°F
Crawl Space Heating Set Point	15°C	Heated basements in CSA F280 Standard are set at 15°C or 59°F
Electric Baseloads	As defined in NP and NLH energy model	
Heating System	Electric Baseboards	
Air Tightness	Default 4.55 ACH at 50 Pa	
Ventilation Rate	Used calculated value of 127.1 CFM on HRV	The 127.1 value comes from the F326 Standard which uses default CFM rates per occupied room.
HRV Efficiency	55% at rated 0°C and 45% at rated -25°C	
Above-ground Windows	Four to both the front and back, two to both ends. Windows were assumed to be double glazed, with air space, no low-e, vinyl frame. Windows are 3'x4'	
Basement Windows	Two to both the front and back, one to both ends. Windows were assumed to be double glazed, with air space, no low-e, vinyl frame. Windows are 2'x1'	
Above-ground Walls	Used 2x4 studs, 16" O.C., 1/2 sheathing, gyprock, vinyl siding	
Basement Walls	8" Concrete	

Variable	Input	Notes
Crawl Space Walls	8" Concrete	
Floors	2x8, 16" O.C., 3/4" Plywood	
Attic	2x4 framing, 24" O.C., Non-insulated strapping with 1/2" gyprock	

Attic Insulation

Attic insulation was modelled using Batt insulation for all cases.

Table 18: Energy Simulation Results for Insulated Attic

Nominal Insulation Level	Insulation Description	Total Heating Energy (kWh)	Energy Savings (kWh)	Energy Savings Coefficient (kWh/ft²)	Total Heat Losses at -15°C (W)	Peak Demand Savings (W)	Peak Demand Savings Coefficient (W/ft²)
R-3 (Minimum)	¾'' EPS (R-3)	37,021	-	-	14,518	-	
R-8	R-8 Batt	32,804	4,217	3.66	12,845	1,673	1.45
R-12	R-12 Batt	31,018	1,786	1.55	12,493	352	0.31
R-20	R-20 Batt	28,932	2,086	1.81	11,501	992	0.86
R-32	R-28 Batt and 1" EPS II (R4)	27,727	1,205	1.05	11,121	380	0.33
R-49	2 Layers of R-24 Batt	27,006	721	0.63	10,896	225	0.20
R-55	R-51 Blown Cellulose and 1'' EPS II (R-4)	26,859	147	0.13	10,832	64	0.06

Wall Insulation

The following two tables present the energy simulation results for insulated walls in a heated basement and crawl space respectively. The results for a heated basement were used for savings coefficients as they are more conservative.

Table 19: Energy Simulation Results for Insulated Walls in a Heated Basement

Nominal Insulation Level	Insulation Description	Basement Heating Set Point (°C)	Total Heating Energy (kWh)	Energy Savings (kWh)	Savings Coefficient (kWh/ft²)	Total Heat Losses at -15°C (W)	Peak Demand Savings (W)	Peak Demand Savings Coefficient (W/ft²)
No insulation	-	15	45,435	-	-	18,978	-	-
R-6	1.5" EPS (R-6)	18	40,604	4,831	4.19	16,485	2,493	2.16
R-12	R-12 Batt	18	38,231	2,372	2.06	16,190	295	0.26
R-16	R-12 Batt and 1" EPS II (R4)	18	37,658	574	0.50	15,949	241	0.21
R-20	R-12 Batt and 2" EPS II (R-8)	18	37,397	261	0.23	15,858	91	0.08
R-25	R-14 Batt and 2" PolyIso (R-11)	18	37,251	145	0.13	15,780	78	0.07

Table 20: Energy Simulation Results for Insulated Walls in a Heated Crawl Space

Nominal Insulation Level	Insulation Description	Crawl Space Heating Set Point (°C)	Total Heating Energy (kWh)	Energy Savings (kWh)	Savings Coefficient (kWh/ft²)	Total Heat Losses at -15°C (W)	Peak Demand Savings (W)	Peak Demand Savings Coefficient (W/ft²)
No insulation	-	15	41,171	-	-	21,185	-	-
R-6	1.5" EPS (R-6)	15	33,881	7,290	12.85	16,637	4,548	8.02
R-12	R-12 Batt	15	33,647	234	0.41	16,172	465	0.82
R-16	R-12 Batt and 1" EPS II (R4)	15	33,261	386	0.68	15,967	205	0.36
R-20	R-12 Batt and 2" EPS II (R-8)	15	33,021	240	0.42	15,848	119	0.21
R-25	R-14 Batt and 2" PolyIso (R-11)	15	32,807	214	0.38	15,768	80	0.14

Ceiling Insulation

Table 21 and Table 22 present the simulation results for an insulated ceiling in an unheated basement or crawl space. For the basement simulation, the heat loss at -15°C could not be used to directly calculate peak demand savings. Since the basement is still considered within the interior volume of the house even if it is not heated, the heat loss value provided by HOT2000 remained the same independently of the insulation level of the ceiling. The Evaluator instead used the peak-demand-to-energy-ratio for each corresponding simulation of the crawl space ceiling to convert the basement ceiling energy savings to peak demand.

The average of those two cases was used to establish revised savings coefficient values for ceiling insulation.

Table 21: Energy Simulation Results for Insulated Ceilings in an Unheated Crawl Space

Nominal Insulation Level	Insulation Description	Total Heating Energy (kWh)	Energy Savings (kWh)	Savings Coefficient (kWh/ft²)	Total Heat Losses at -15°C (W)	Peak Demand Savings (W)	Peak Demand Savings Coefficient (W/ft²)
No insulation	-	38,474	-	-	19,841	-	-
R-6	1.5" EPS (R-6)	34,979	3,495	3.03	17,178	2,663	2.31
R-12	R-12 Batt	33,032	1,947	1.69	15,905	1,273	1.11
R-29	R-24 Batt and 1" EPS II (R4)	31,380	1,653	1.43	14,912	993	0.86
R-35	R-24 Batt and 2" PolyIso (R-11)	30,937	442	0.38	14,658	254	0.22

Table 22: Energy Simulation Results for Insulated Ceilings in an Unheated Basement

Nominal Insulation Level	Insulation Description	Total Heating Energy (kWh)	Energy Savings (kWh)	Savings Coefficient (kWh/ft²)	Corresponding Peak-Demand-to-Energy Savings from Crawl Spaces (W/kWh)	Peak Demand Savings Coefficient (W/ft²)
No insulation	-	42,290	-	-	-	-
R-6	1.5" EPS (R-6)	37,781	4,509	3.91	0.76	2.98
R-12	R-12 Batt	36,058	1,723	1.50	0.65	0.98
R-29	R-24 Batt and 1" EPS II (R4)	34,706	1,352	1.17	0.60	0.71
R-35	R-24 Batt and 2" PolyIso (R-11)	34,361	345	0.30	0.57	0.17

Appendix V
FREE-RIDERSHIP ALGORITHM

FR1. Did you have plans to add insulation to your home before you learned about the Insulation Rebate Program?	IF 1. yes → CONTINUE IF 2. no → Go to FR4 IF 98 OR 99 → Go to FR4
FR2. If you had not received the rebate for your insulation, what is the likelihood that you would have paid for the full cost of the insulation installed? (Scale 0 to 10)	FR2 = Answer x 10% IF 98 OR 99: FR2 = EMPTY
FR3a. If the program had not been offered, what is the likelihood that you would have installed the same thickness of insulation? (Scale 0 to 10)	FR3a = Answer x 10% IF 98 OR 99: FR3a = EMPTY
FR3b. If the program had not been offered, what is the likelihood that you would have insulated the same quantity of surface that was insulated through the Insulation Rebate program? (Scale 0 to 10)	FR3b = Answer x 10% IF 98 OR 99: FR3b = EMPTY
FR3c. [Ask if FR2>5] If the program had not been offered, what is the likelihood that you would have postponed adding insulation to home by at least one year? (Scale 0 to 10)	FR3c = (10 − Answer) x 10% IF 98 OR 99 : FR3c = EMPTY
Inconsistency Test – FR2	IF (FR2-FR4a)≥ 50% FR2 =FR2/2
Intention Score:	**IF FR1 = NO → 0% ELSE → MEAN VALUE OF: (FR2; MEAN (FR3a, FR3b, FR3c))**
FR4a. Level of influence of the rebate offered by the program to insulate your home. (Scale 0 to 10)	FR4a = (10 – Answer) x 10% IF 98 OR 99: FR4a = EMPTY
FR4b. Level of influence of the information provided by the program on home insulation, such as the brochure and the How-To videos. (Scale 0 to 10)	FR4b = (10 – Answer) x 10% IF 98 OR 99: FR4b = EMPTY
FR4c. Level of influence of a previous experience with the Insulation Rebate programm or with another TakeCHARGE programs (Scale 0 to 10)	FR4c = (10 – Answer) x 10% IF 98 OR 99: FR4c = EMPTY
Influence Score:	**IF FR1 = NO → 0% ELSE → MIN OF: (FR4a; FR4b; FR4c)**
Free-ridership	**MEAN VALUE OF : (Intention Score; Influence Score)**

Appendix VI
SPILLOVER ALGORITHM

SO1. Since your participation to the Insulation Rebate Program, did you install insulation in the exterior walls of your home without receiving any incentives or rebate from a TakeCHARGE program?	IF 1. yes → Go to SO2 IF 2. no → END IF 99 → END
SO2. Was there any insulation previous to the one you added to your exterior walls?	IF 1. yes → SO2 = Default Value (R-10) IF 2. no → SO2 = 0 IF 99 → SO2 = Default Value
SO3. What material was used to insulate your exterior walls? 1. Batt 2. Blown in Cellulose 3. ICF Blocks 4. Rigid Board 5. Spray Foam 6. Other 99. (Don't know / Refused)	SO3 = R-value of material
SO4. What thickness of [SO3] was added?	SO4 = Answer (in inches)
SO5a. What area of exterior walls, in square feet, was insulated?	IF 99. Don't know → Ask SO5b ELSE → SO5 = Answer AND Go to SO6
SO5b. What length of walls was insulated?	IF 99. Don't know → Ask SO5c ELSE → SO5 = Answer x 9 ft AND Go to SO6
SO6. How influential was your experience with the Insulation Rebate Program on installing this additional insulation? (Scale 0 to 10)	SO6 = Answer x 10% IF 98 OR 99: SO6 = EMPTY

$$\textbf{Final Spillover Level} = \frac{\text{SUM of (Added insulation Energy Saving x SO6) for All Respondents}}{\text{SUM of Program Savings for All Respondents}}$$

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THERMOSTAT REBATE PROGRAM EVALUATION

NEWFOUNDLAND POWER AND NEWFOUNDLAND AND LABRADOR HYDRO

Final Report

July 21, 2017

ECONOLER

ACRONYMS

CRA	Corporate Research Associates
EUL	Effective useful life
HDD	Heating degree days
LUC	Levelized Utility Cost
NLH	Newfoundland and Labrador Hydro
NP	Newfoundland Power
NTGR	Net-to-gross ratio
PAC	Program Administrator Cost
TRC	Total Resource Cost
TRM	Technical reference manual

DEFINITIONS

Confidence interval	The estimated range of values which is likely to include the unknown population parameters.
Evaluated savings	Gross and net savings calculated by the Evaluator using the parameters (unitary savings values, installation rates, net-to-gross ratio, etc.) validated or measured during the evaluation process.
Free-ridership	Percentage of savings attributable to participants who would have implemented the same or similar energy-efficient measures, with no change in timing, in the absence of the program.
Gross energy savings	Energy savings generated by energy-efficient measures, before applying the net-to-gross ratio.
Internal spillover	Savings attributable to participants who continue to implement the energy efficiency measures introduced by a program after participating in it once, without participating in the program a second time.
Margin of error	The amount of random sampling error.
Net energy savings	Energy savings that can be reliably attributed to a program. They are obtained after applying the net-to-gross ratio.
Net-to-gross ratio	The ratio between the net energy savings and gross energy savings that includes effects, such as free ridership and spillover, that affect positively or negatively the energy savings generated by a program.
Peak demand savings	The demand savings that coincide in time with the peak demand of the electricity system.
Sample size	The number of observations or replicates included in a statistical sample.
Tracked savings	Gross and net savings calculated by the utility in its internal tracking, based on various parameters such as number of participants, unitary savings values, installation rates, interactive effects, net-to-gross ratio.
Unitary savings	Energy or demand savings established on a unitary basis. This unit can either be a product (e.g., a thermostat or a light bulb), a capacity (e.g., one-ton capacity of an air-source heat pump) or a participant (e.g., one participant taking part in a behaviour-based program).

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EXECUTIVE SUMMARY

This report presents the results of the process and impact evaluation of the Thermostat Rebate Program offered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH). The Thermostat Rebate Program offers customers rebates or financing for the purchase of eligible non-programmable and programmable electronic thermostats sold at participating retailers. This evaluation covers the 2015 and 2016 program years.[1]

Summary of Evaluation Assignment

Econoler was hired to perform the evaluation of the Thermostat Rebate Program and achieve the following objectives:

› Assessing the effectiveness of program design, administration and implementation;
› Determining the gross and net energy and demand savings;
› Assessing program cost-effectiveness;
› Providing recommendations to improve the program.

The Thermostat Rebate Program evaluation was carried out based on the information and results obtained from a review of the program documentation and database, in-depth interviews with participating retailers, a participant survey, a unitary savings review and a cost-effectiveness analysis.

Summary of Evaluation Findings

Participants and retailers were interviewed to gather feedback on various aspects of the program, including the sources of program awareness, reasons for participation, satisfaction with the program and program staff, barriers to program delivery and recommendations for program improvement. What follows are some of the main findings from the survey and interviews with participants and retailers:

› The television and retail or hardware stores are the two major sources of program awareness among participants.
› The takeCHARGE brand is well known by customers according to retailers, but awareness of the Thermostat Rebate Program itself is lower.
› Saving money and reducing energy bills was the most important reason for participating in the program according to participants. The rebate influenced a majority of participants in their decision to purchase energy-efficient thermostats.

[1] For NP, a program year corresponds to their fiscal year, notably the 2015 and 2016 fiscal years ran from January 28, 2015 to February 8, 2016 and from February 9, 2016 to January 5, 2017 respectively. For NLH, a program year corresponds to a calendar year.

- Almost all surveyed participants were satisfied with the program and found the participation process easy. The four interviewed retailers also expressed very high satisfaction with the program, promotional materials, and NP and NLH staff.
- Participants were most likely to install the purchased thermostats themselves. Nearly two in ten hired a professional.
- Half of the participants who purchased non-programmable electronic thermostats through the program adjust their thermostat during the day. A large proportion—about three-quarters—of programmable thermostat owners have programmed their thermostats to automatically adjust the temperature throughout the day.
- Most participants are unfamiliar with smart thermostats. Of the participants who plan on purchasing additional thermostats in the next twelve months, only one percent are considering purchasing smart thermostats. Three of the four retailers carry smart thermostats.
- Retailers believe price and installation are the key factors participants consider when purchasing thermostats. Although participants did identify financial challenges as the most important barrier to implementing energy efficiency upgrades, this barrier, along with other barriers which include the need to hire a contractor or other professionals, yielded an overall average score below five out of ten (using a 0 to 10 scale, where '0' meant that it was *not at all a barrier* and '10' meant it was a *major barrier*).

Free-ridership and spillover were assessed through the participant survey. The results revealed a free-ridership level of 34 percent for non-programmable electronic thermostats and 19 percent for programmable thermostats, and a level of spillover of two percent. Perhaps not surprisingly, the level of free-ridership is higher for non-programmable electronic thermostats. The latter product is more mature than programmable thermostats, which can explain the difference in free-ridership. That said, the overall program free-ridership level of 21 percent is considered reasonable.

These levels of free-ridership and spillover result in a net-to-gross ratio (NTGR) of 0.68 for non-programmable thermostats and 0.83 for programmable thermostats. When applying these NTGRs to the revised gross savings, it was found that the Thermostat Rebate Program generated total net energy savings at the meter of 5.883 GWh (5.795 GWh for NP and 0.088 GWh for NLH) for the 2015 and 2016 program years. A reduction of 1.816 MW was achieved for electricity peak demand savings (1.788 MW for NP and 0.028 MW for NLH).

INTRODUCTION

Evaluation Scope

Econoler (hereinafter referred to as the "Evaluator") was hired to perform the process and impact evaluation of the Thermostat Rebate Program offered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH). The evaluation involved conducting a review of the program documentation and database, interviews with participating retailers, a participant survey, a unitary savings review and a cost-effectiveness analysis.

The key research themes addressed for the process evaluation include:

› Assessing the effectiveness of program design and delivery, and overall program performance;
› Identifying the barriers to program delivery;
› Assessing participant and partner satisfaction with the program;
› Assessing the effectiveness and comprehensiveness of program tracking;
› Identifying areas of improvement.

The impact evaluation addressed the following objectives:

› Determining the gross energy and demand savings;
› Determining the net-to-gross ratio (NTGR);
› Determining the net energy and demand savings;
› Assessing program cost-effectiveness.

This evaluation covers the 2015 and 2016 program years.[2]

Presentation of the Team

To complete this evaluation, Econoler worked with Corporate Research Associates (CRA). Tasks were divided as follows:

› Econoler served as team leader and was in charge of coordinating and supervising all evaluation activities, developing data collection instruments, as well as preparing and reviewing the evaluation report. Econoler also led the process and impact evaluation work.
› CRA conducted the participant survey and interviews with retailers.

Throughout this report, this team is referred to as the "Evaluator".

[2] For NP, a program year corresponds to their fiscal year, notably the 2015 and 2016 fiscal years ran from January 28, 2015 to February 8, 2016 and from February 9, 2016 to January 5, 2017 respectively. For NLH, a program year corresponds to a calendar year.

1 PROGRAM DESCRIPTION

The Thermostat Rebate Program aims to encourage the installation of programmable and high-performance non-programmable electronic thermostats by providing Newfoundland and Labrador residential customers with rebates or financing for the purchase of eligible thermostats. Incentives of $5 and $10 are offered for the purchase and installation of eligible non-programmable and programmable electronic thermostats respectively. Incentives are applied as credit on the customers' electricity bills.

Both existing and new homes qualify for the program. The primary eligibility criteria for the program are the following:

› The participant must be a homeowner and have an active electricity account.
› The participant's primary source of heat must be electric, or the home must have a minimum annual electricity usage of 15,000 kWh if an additional heating source is used.
› The participating home must be on a foundation and intended as a residence.

Since 2009, the program has been jointly offered by NP and NLH under the takeCHARGE brand. The program is delivered through partnerships with participating retailers and other partners, such as electricians.

2 METHODOLOGY

This section presents the methodology employed and the activities carried out for the Thermostat Rebate Program evaluation. Figure 1 presents the various evaluation activities carried out.

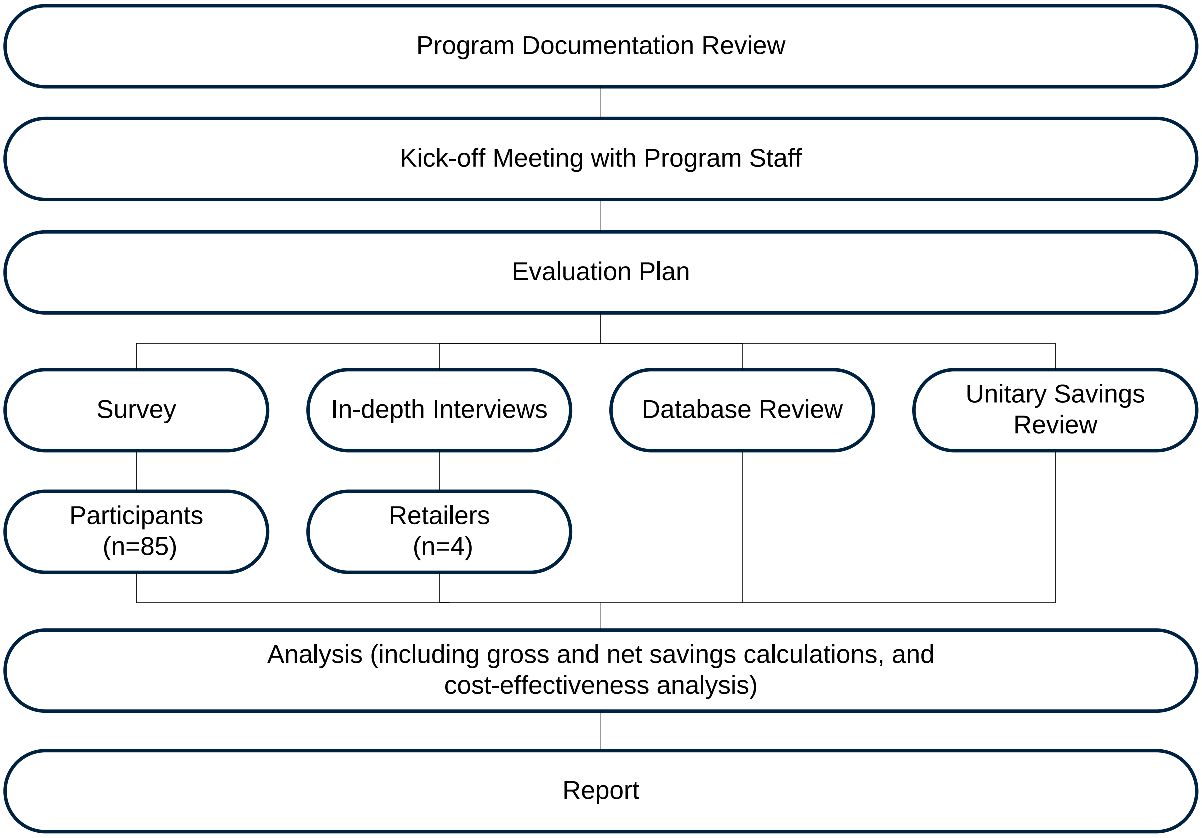


Figure 1: Methodological Model

The Evaluator first reviewed program documentation and then conducted a kick-off meeting with program staff to learn about the main program components and mechanisms. Based on the information obtained during this meeting and the program documentation review, a detailed evaluation plan was developed, which included program information, in addition to the evaluation scope, methodology, data collection and timeline. Data collection activities were then carried out.

2.1 Participant Survey

In April 2017, CRA conducted a telephone survey with a total of 85 participants, using computer-assisted telephone interviewing technology. The average length of the survey was 13 minutes.

The participant survey was meant to collect feedback on the following aspects:

- Sources of program awareness
- Reasons for participation
- Satisfaction with program and participation process
- Thermostat installation, programming and usage behaviours
- Intentions to purchase additional thermostats
- Prevalence of and familiarity with smart thermostats
- Barriers to completing energy efficiency projects or upgrades
- Free-ridership
- Spillover
- Recommendations for program improvement
- Demographics

A total of 4,952 customers participated in the 2015 and 2016 program years. Drawing a random sample of 85 from a population of 4,952 yields a margin of error of 8.8 percent at a 90 percent confidence level.

The survey questionnaire and the survey respondents' demographic profile are provided in Appendix I and Appendix II respectively.

2.2 Interviews with Retailers

In April 2017, CRA conducted four interviews with participating retailers to collect feedback regarding the following aspects of the Thermostat Rebate Program:

- Interactions with customers and their program awareness
- Use of and satisfaction with the program information and promotional materials
- Factors influencing customers' thermostat purchasing decisions
- In-store offer of smart thermostats
- Satisfaction with the program, program support, and relationship with NP and NLH
- Barriers to program delivery
- Recommendations for improvements

The guide used for conducting the interviews with retailers is provided in Appendix III.

2.3 Database Review

The Evaluator reviewed the program's database to assess its components and mechanisms, as well as to understand and gather information essential to the impact evaluation calculations. More specifically, the review was done to achieve the following objectives: (1) to understand how it is being used by all the parties and what information is tracked; (2) to verify whether it provides the complete information needed for program monitoring and evaluation in line with the industry's best practices; and (3) to assess the level of consistency among the various data-entry fields and detect abnormalities that would need to be addressed.

2.4 Unitary Savings Review

The Evaluator conducted a thorough literature review and performed engineering calculations to revise the unitary savings values used by NP and NLH. Technical reference manuals (TRMs) and public evaluation reports of similar jurisdictions and programs were consulted. Results of the participant surveys were also used to determine the usage of thermostats rebated by the program and adjust unitary savings.

3 PROCESS EVALUATION

This section presents the findings of the Thermostat Rebate Program process evaluation, which has been carried out based on the information gathered from the participant survey, the interviews with participating retailers and the database review.

3.1 Participant Survey

This section presents the main results of the participant survey. Survey respondents include both NP and NLH customers.

3.1.1 Sources of Awareness and Reasons for Participation

Participants were most likely to learn about the program via television (37%) or at retail or hardware stores (34%). One in ten became aware of the program by word of mouth (11%), seeing advertising online (10%), or reading brochures (10%), while newspaper, radio and bill inserts were mentioned by fewer participants.

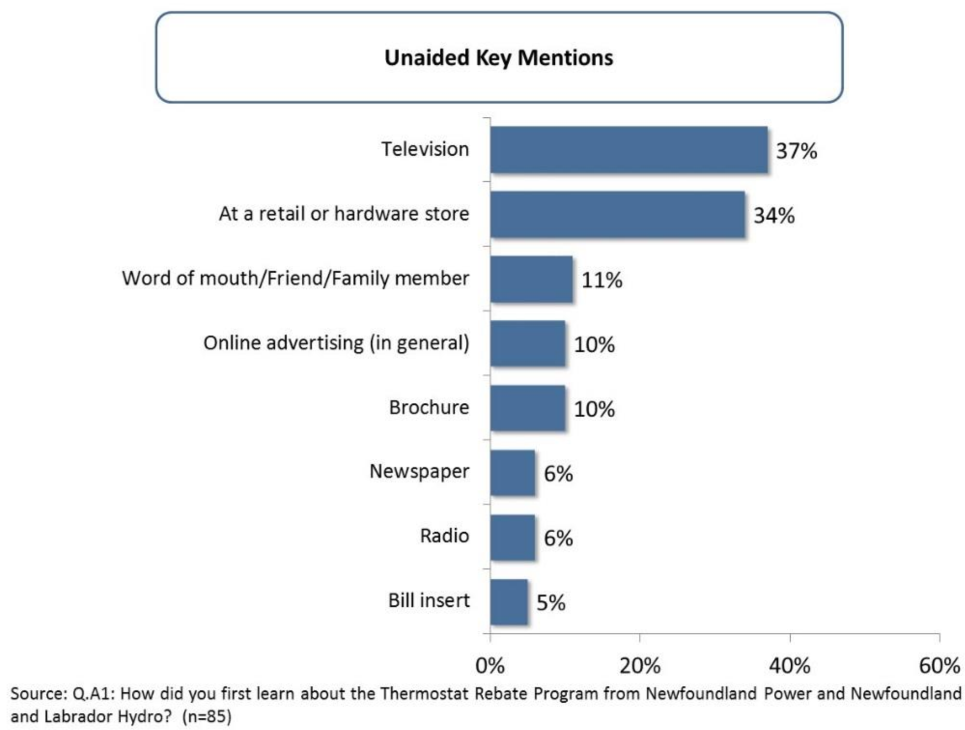


Figure 2: First Learned About the Thermostat Rebate Program

Reducing energy bills or saving money was the single most important reason to participate in the program (63%). Participants were then asked if there were other important reasons for participating in the program. Overall, three-quarters of participants (78%) mentioned saving money and reducing energy bills as an important reason for participating in the program. Close to one-third participated because they were interested in a rebate on their electricity bill (29%).

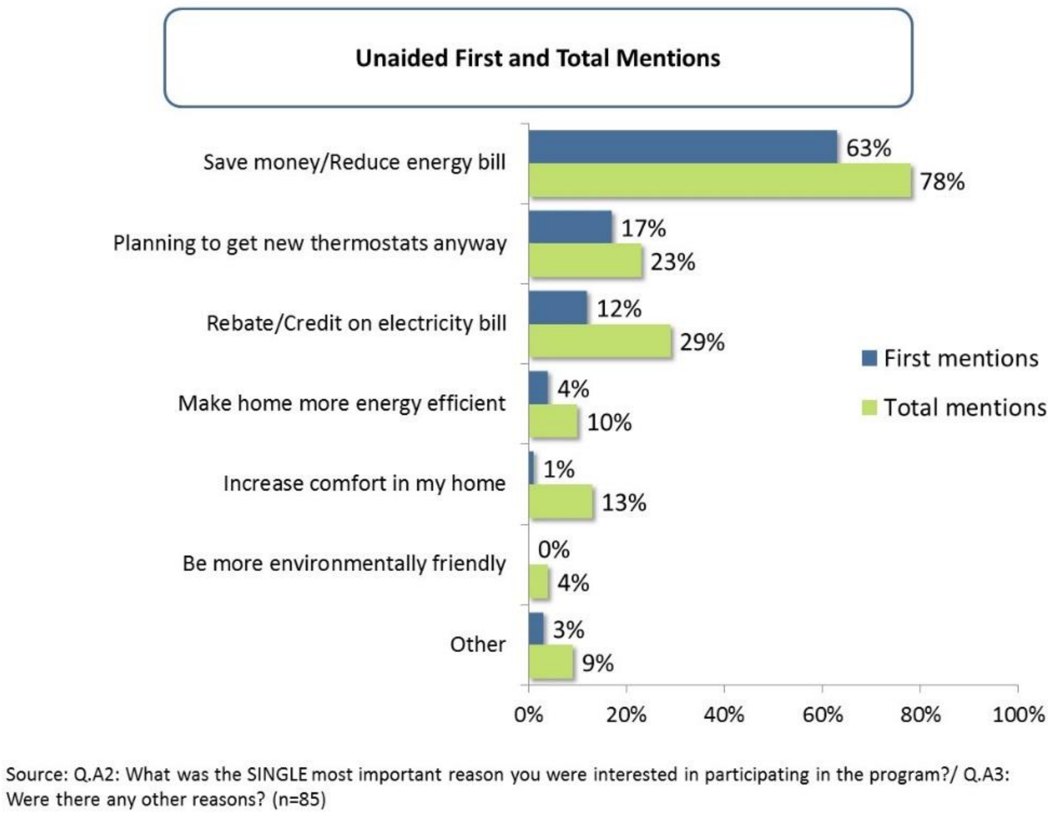


Figure 3: Reasons for Participating in the Program

3.1.2 Program Influence

Using a scale from ‘0’ to ‘10’, where ‘0’ indicates *no influence* and ‘10’ indicates *great influence*, participants were asked to rate the influence of three different factors on their decisions to purchase new programmable or non-programmable electronic thermostats for their home.

Overall, six in ten (59%) believed the rebate was influential in their decisions to purchase a new electronic or programmable thermostat (score of 8 or higher), with one-third (35%) indicating the rebate had *great influence* (a score of 10). Compared to the other factors, participants rated the rebate as having the greatest influence on their decisions, earning an average score of 7.5. Participants with a household income of less than $80,000 rated this factor slightly higher than their respective counterparts.

One-third (33%) of participants believed the information provided by the program on electronic and programmable thermostats was influential in their decisions to purchase a new electronic or programmable thermostat. Indeed, two in ten cited this as being of *great influence* (22%). On average, participants gave this factor an average score of 5.7 out of 10. Participants who were very satisfied with the program were more likely to rate this factor as having great *influence* on their decisions than those who were less than very satisfied (42% versus 9%).

One-third (35%) of participants believed their previous experiences with the Thermostat Rebate Program or another takeCHARGE program were influential in their decisions to purchase a new electronic or programmable thermostat. Indeed, one-quarter cited this as being of *great influence* (25%). Participants on average rate this factor a score of 4.6 out of 10.

3.1.3 Program Satisfaction and Recommendations

The vast majority (95%) of participants expressed satisfaction with the program, the majority of which were *very satisfied* (using a scale of “very satisfied”, “somewhat satisfied”, “neither satisfied nor dissatisfied”, “somewhat dissatisfied” and “very dissatisfied”). The majority attributed their satisfaction to receiving a rebate (64%), while money savings were mentioned by one-quarter of them (26%). Among the small number of participants who were dissatisfied, their main reason was that the rebate was too small.

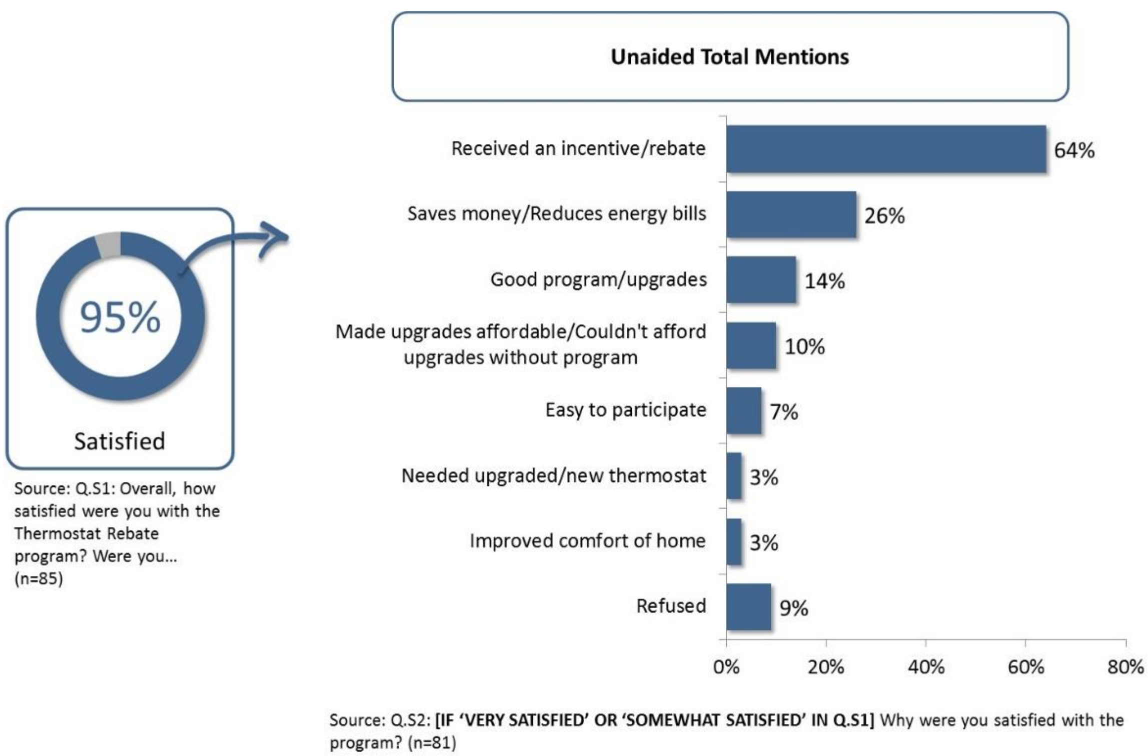


Figure 4: Overall Satisfaction with the Program and Reasons for Satisfaction

Most participants (92%) believed the application process was easy, with most of them indicating that it was *very easy* (using a scale of "very easy", "somewhat easy", "neither easy nor difficult", "somewhat difficult" and "very difficult"). It should be noted that participants who were *very satisfied* with the program were also more likely than those being less than *very satisfied* to believe the application process was *very easy (*83% versus 60%). Over four in ten applied online (44%), while others applied by mail (23%), or in person (12%). Four percent applied both online and by mail.

Participants suggested offering more products for rebates as a way to improve the Thermostat Rebate Program (14%), while continuing to offer the program (8%) and bigger incentives (6%) were also mentioned. Worth mentioning is the fact that the majority of participants provided no recommendations.

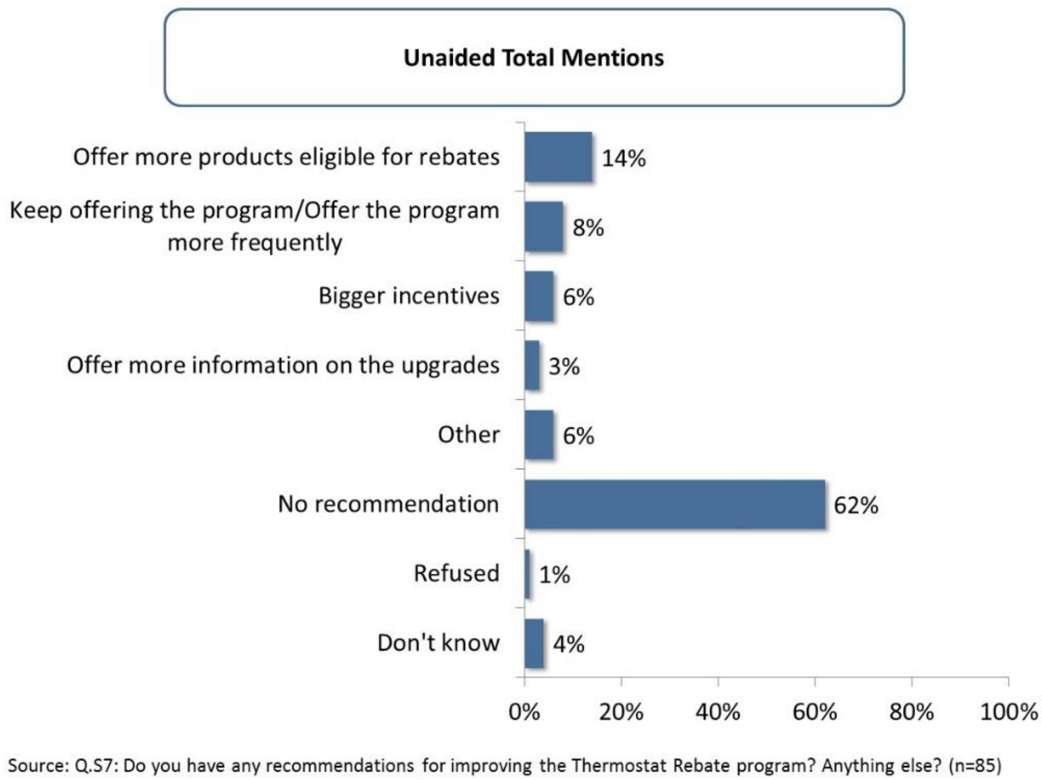
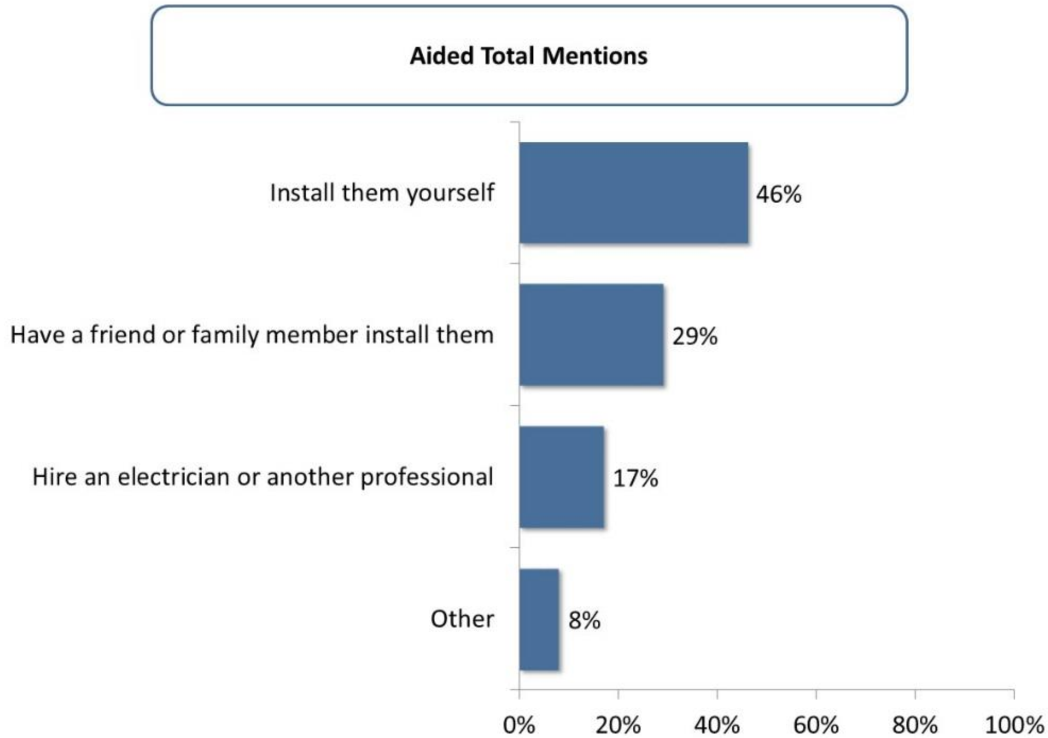


Figure 5: Recommendations to Improve the Program

3.1.4 Thermostat Installation, Programming and Usage Behaviours

Participants were most likely to install the thermostat they purchased as part of the Thermostat Rebate Program themselves (46%), while three in ten (29%) had a friend or family member perform the installation. Nearly two in ten hired a professional (17%).

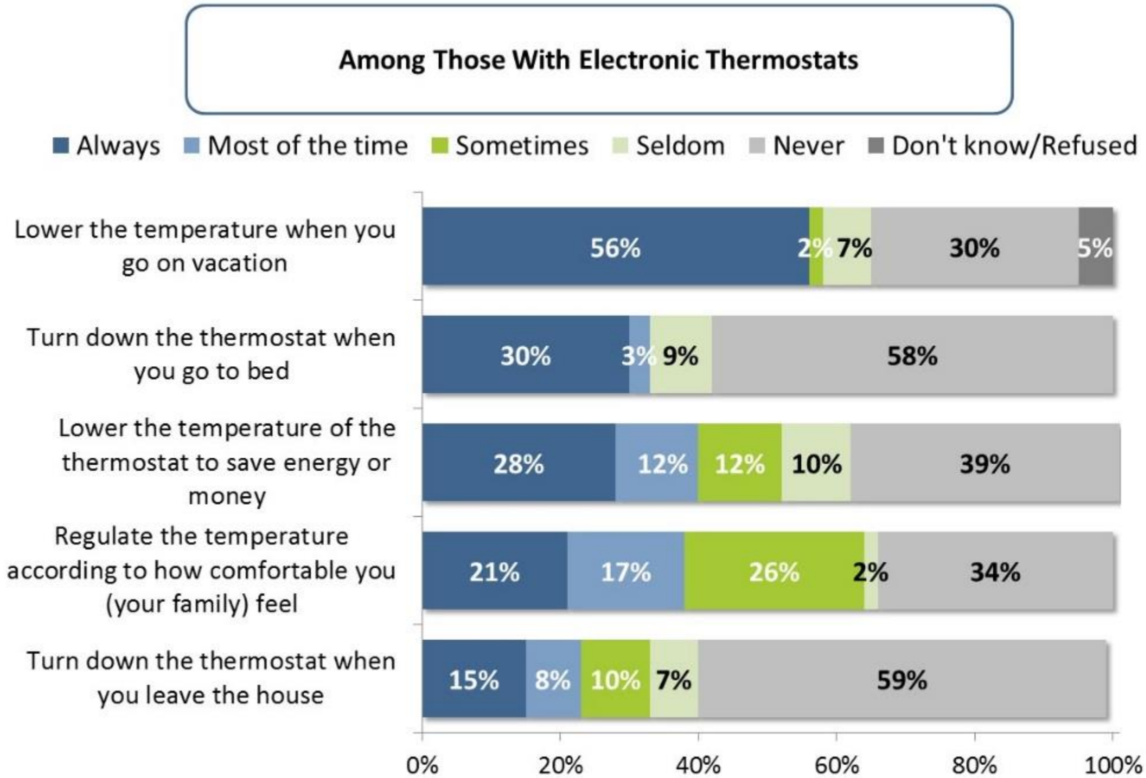


Source: Q.P1: Who installed the thermostats you purchased through the Thermostat Rebate program? Did you... (n=85)

Figure 6: Installation of Thermostats Purchased Through Program

Half of participants who upgraded to non-programmable electronic thermostats (51%) did not adjust their thermostat during the day in winter. However, those who did adjust it, did so either once (13%) or twice (26%) a day.

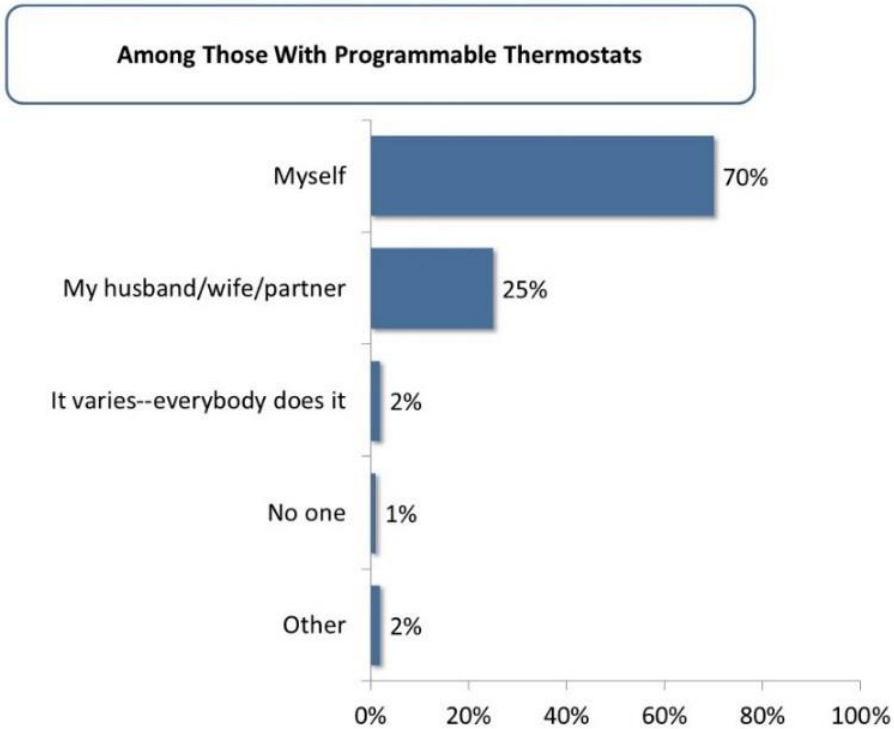
As shown in the next figure, more than half (56%) of participants with non-programmable electronic thermostats *always* lowered the temperature when leaving for vacation during the winter. Considerably less *always* turned down their thermostats when going to bed (30%), or actively tried to save energy or money (28%). Even fewer *always* regulated the temperature based on how they or their families felt in their homes (21%), or turned down the thermostat when leaving the house (15%).



Source: Q.P7a-e: **[AMONG THOSE WITH ELECTRONIC THERMOSTATS]** I have some questions about your habits with electronic non-programmable thermostats. During the winter, how often do you... (n=35)

Figure 7: Frequency of Thermostat Habits in the Winter

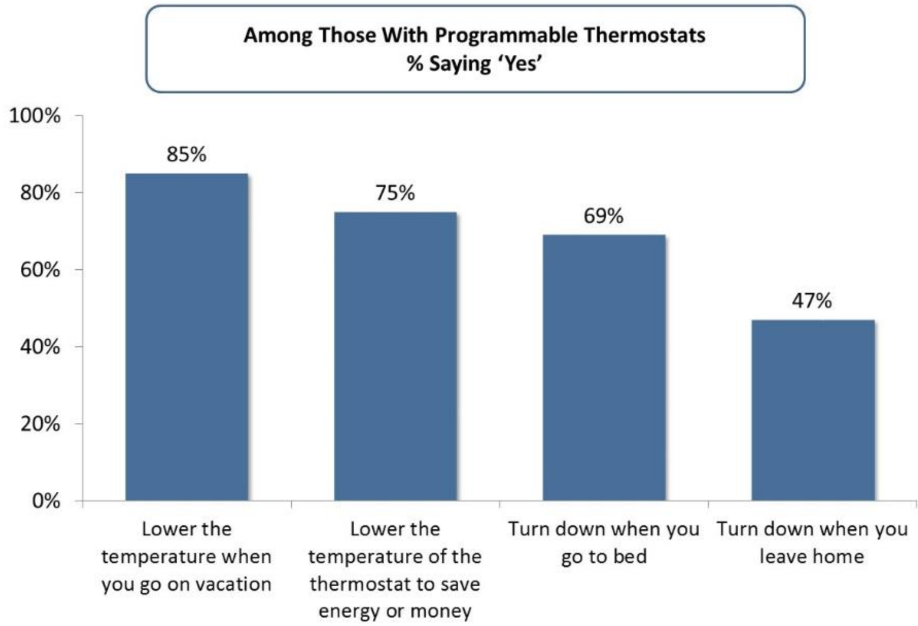
Three quarters (76%) of programmable thermostat owners programmed their thermostats so they would automatically adjust the temperature throughout the day. Seven in ten participants programmed the thermostats themselves (70%), while one-quarter (25%) had their partner or spouse program the device.



Source: Q.P9: **[AMONG THOSE WITH PROGRAMMABLE THERMOSTATS]** Who usually programs the programmable thermostats in your household? (n=58)

Figure 8: Who Programmed the Programmable Thermostat in the Household

During the winter months, nearly half (47%) of participants with programmable thermostats set their thermostat to turn down the temperature when leaving the house. A majority had it programmed to go down when going to bed (69%) or when leaving for vacation (85%). Additionally, three-quarters (75%) of participants lowered the temperature to save energy or money. Participants with a household income of less than $80,000 are more likely to lower the temperature to save energy or money than their respective counterparts (87% versus 60%).



Source: Q.P10a-d: **[AMONG THOSE WITH PROGRAMMABLE THERMOSTATS]** I have some questions about your habits with programmable thermostats. During the winter, do you set your thermostat to... (n=58)

Figure 9: Programmable Thermostat Habits during Winter

3.1.5 Thermostat Purchase Intentions and Behaviours

Using a scale of "very likely", "somewhat likely", "not very likely" and "not at all likely", participants were asked to indicate their intention to purchase additional thermostats for their homes over the next twelve months. Half (52%) of participants are *not at all likely* to purchase additional thermostats, while one-third (33%) are *somewhat* or *very likely* to do so.

Among those *somewhat* or *very likely* to purchase additional thermostats, most of them plan on purchasing programmable thermostats (61%), while one-quarter (25%) would purchase non-programmable electronic thermostats. It should be noted only one percent of these respondents anticipate purchasing smart thermostats.

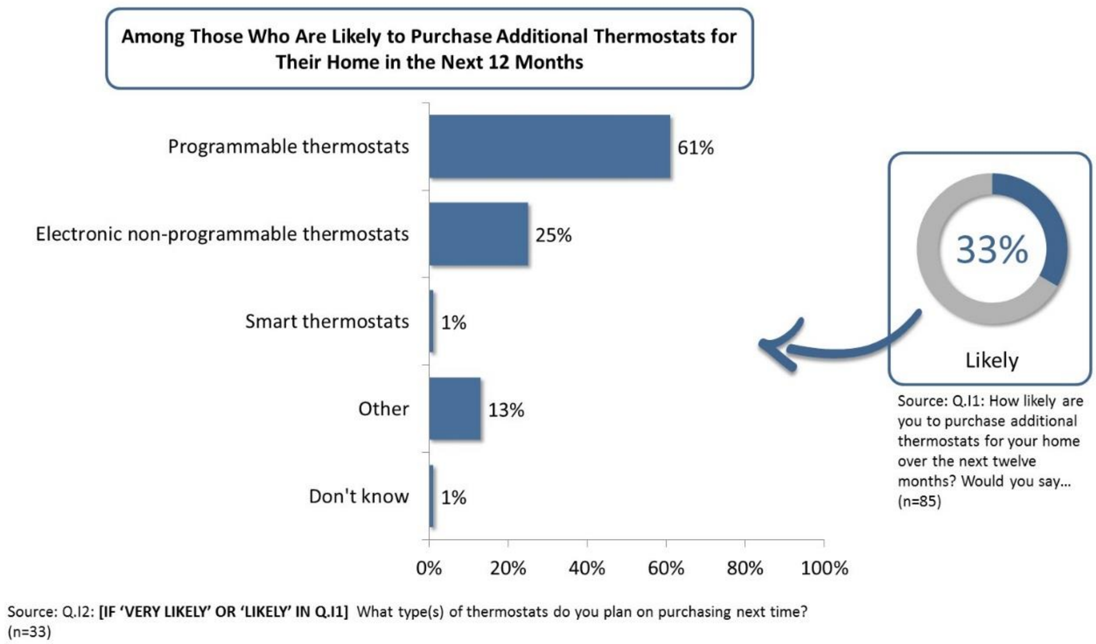
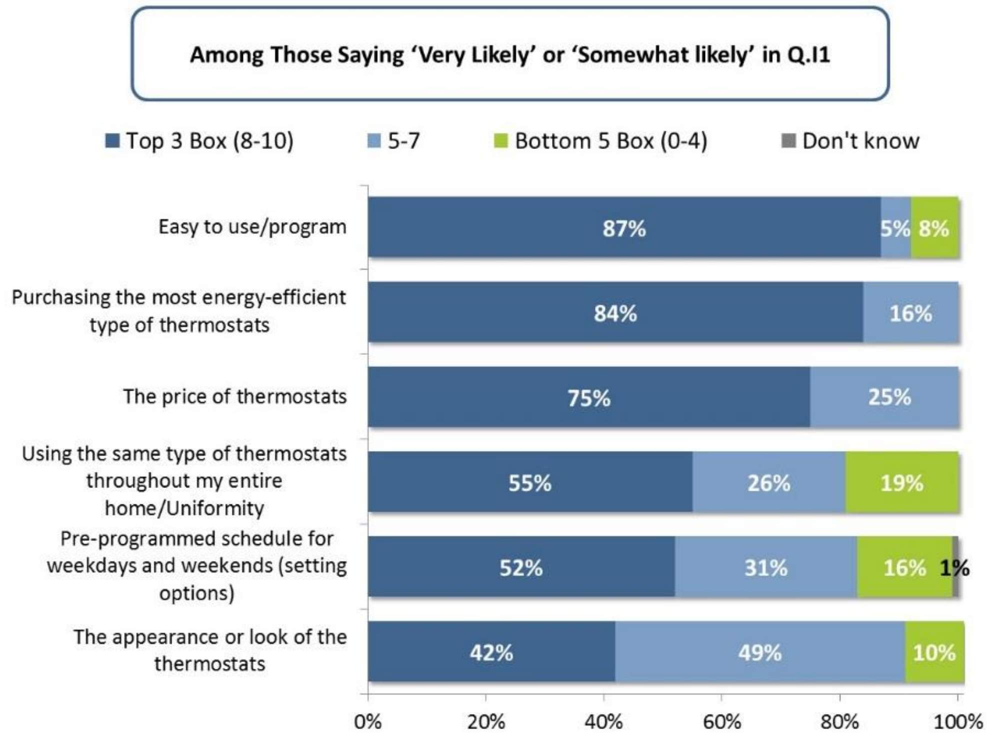


Figure 10: Likelihood of Purchasing Additional Thermostats in Next Twelve Months and Types of Thermostats Likely to Be Purchased Next Time

A majority of participants are either not very (34%) or not at all familiar (39%) with smart thermostats, likely contributing to the small percentage of those who anticipate purchasing smart thermostats in the future. Furthermore, nearly all participants did not currently have smart thermostats installed in their homes.

Using a scale from '0' to '10', where '0' meant it was *not at all important*, and '10' meant it was *extremely important*, participants were asked to rate how important a series of factors were when purchasing thermostats for their homes. Ease of programmability and energy efficiency are most important when purchasing thermostats with more than eight in ten providing a rating of '8' or above, as can be seen in the next figure. Similarly, the price of thermostats was also crucial when purchasing thermostats; three-quarters (75%) of participants provided a rating of '8' or above for this aspect. Using the same type of thermostats throughout the household (55%) and having a preprogrammed schedule (52%) are very important for more than half of participants. Appearance is the least important relative to other options, though it was still rated an '8' or above by four in ten participants (42%). To further convey the importance of price and energy efficiency, no participant provided a level of importance below '5' for either factor.



Source: Q.I5a-f: **[IF 'VERY LIKELY' OR 'LIKELY' IN Q.I1]** How important are the following aspects when purchasing thermostats for your home? Please answer on a scale of 0 to 10, where 0 means 'not at all important' and 10 means 'extremely important'. (n=33)

Figure 11: Important Aspects When Purchasing Thermostats

3.1.6 Barriers to Implementing Energy Efficiency Upgrades

Participants were asked to rate a series of aspects that may have prevented them from implementing energy efficiency upgrades in their homes. Aspects were rated using a 0 to 10 scale, where '0' meant that it was *not at all a barrier* and '10' meant it was a *major barrier*. It should be noted each aspect yielded an overall average below five out of ten.

Financial challenges were found to be the greatest barrier, with the highest overall average of 4.7. Overall, one-quarter (26%) cited financial constraints as being a significant barrier (a rating of 8 or greater). This barrier is followed by barriers related to the lack of information about possible energy efficiency programs and/or upgrades. One quarter (23%) of participants believed that lack of information about possible energy efficiency rebates or programs was a barrier to implementing energy efficiency upgrades (score of 8 or higher). Lack of information about energy efficiency upgrades was seen as a significant barrier for two in ten (20%) participants (score of 8 and above).

Being unable to conduct the work themselves or needing to hire a contractor were seen as barriers for two in ten (18%) participants (score of 8 or higher), while a similar proportion (19%) believed it was *not at all a barrier* (rating of 0).

Being unconvinced of the economic value these upgrades provided was a barrier for two in ten participants (18%), while four in ten (29%) felt that this was not at all a barrier to upgrade. Next to time constraints, this was considered the second smallest barrier to participants. Only one in ten (9%) participants believed that time constraints were a barrier to implementing energy efficiency upgrades (score of 8 or higher). These results are summarized in the following figure.

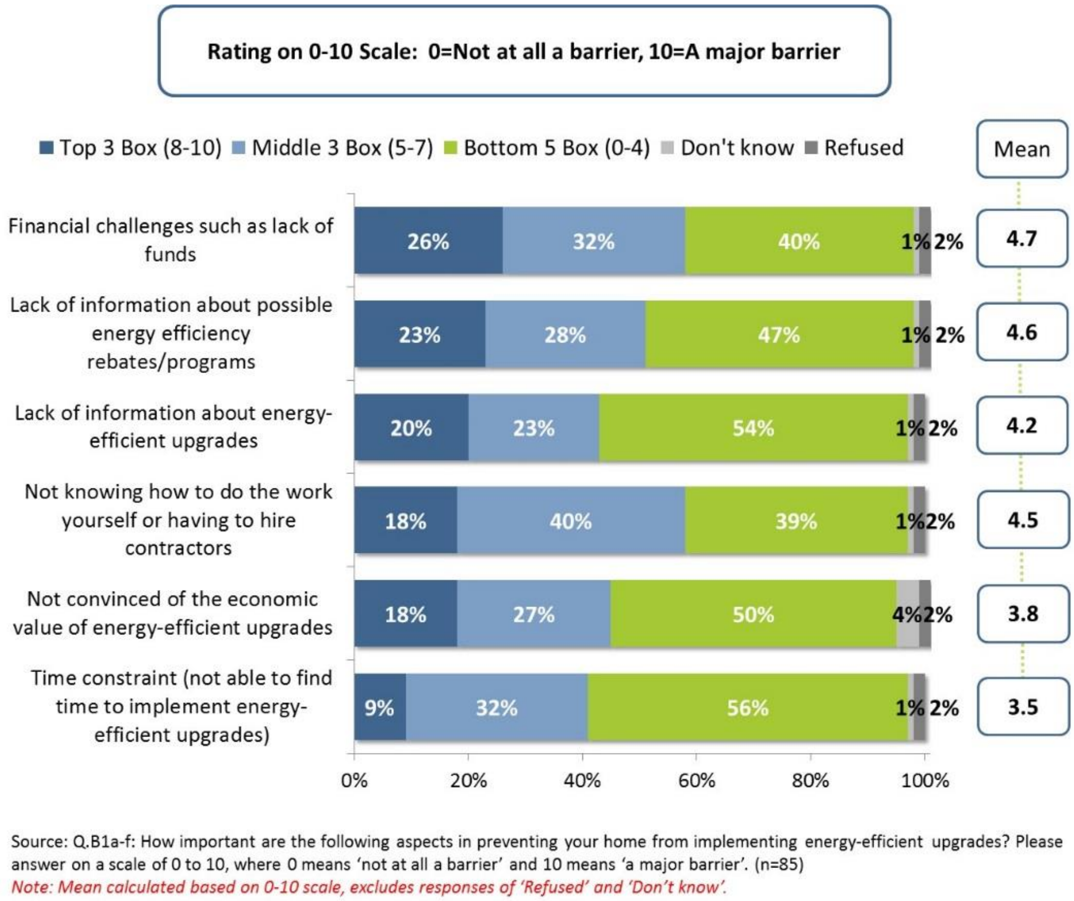


Figure 12: Importance of Factors in Preventing the Implementation of Energy Efficiency Upgrades in Homes

3.2 Interviews with Retailers

As part of the Thermostat Rebate Program evaluation, four interviews were conducted with participating retailers. All four retailers interviewed sold thermostat products rebated under the Thermostat Rebate Program and each had at least two years' experience with the program.

3.2.1 Program Awareness and Promotion

The takeCHARGE brand is well recognized by consumers in the opinion of retailers. The brand is advertised in various media sources (television and radio) and clearly identified on posters and signs inside the stores. Opinions on the awareness level of the Thermostat Rebate Program varied among retailers. It was generally estimated to be lower than that of the takeCHARGE brand. Three of four retailers estimated that approximately 40 to 50 percent of customers coming into their stores are aware of the program, while another retailer indicated that customers do not often walk into the store knowing about it.

All retailers use the materials provided by the program to promote it in-store and do so across all locations. Examples of materials used include shelf labels and signs. Three of the four retailers implemented procedures to ensure that materials are properly and consistently installed throughout the stores. In the case of one retailer, the head office ensures proper sign placement through physical inspections done by store staff. For another retailer, the head office ensures proper installation by providing feedback to store managers and staff through phone calls and emails, while the other retailer interviewed conducts physical inspections personally every couple of days.

Three out of four retailers were “very satisfied” with the promotional materials provided by the Thermostat Rebate Program, while one was “somewhat satisfied” (using a scale of “very satisfied”, “somewhat satisfied”, “neither satisfied nor dissatisfied”, “somewhat dissatisfied” and “very dissatisfied”). Reasons for satisfaction included the perception that retailers had been given what they needed to deliver the program effectively and that the materials are noticeable, convenient and fit into the store’s current displays. One retailer indicated that their store is involved in similar programs in other provinces, and that Newfoundland and Labrador was the only province that provided newspaper advertisements to promote the Thermostat Rebate Program and their stores.

3.2.2 Customer Thermostat Purchase Behaviours

Price and installation are considered key factors in a customer’s decision to purchase a programmable or non-programmable thermostat according to retailers. Programmable thermostats are more expensive and retailers believe that consumers either do not see the value in the higher priced item or they cannot afford it. In addition, programmable thermostats require a level of installation knowledge and should ideally be installed by an electrician. This added cost can be a barrier to purchasing this kind of product. One retailer said that trying to find an electrician is an issue in more remote locations, especially given the small scale and value of the electrical work required. Three of the four retailers interviewed sell smart thermostats. Lack of demand was the reason cited by one retailer for not carrying smart thermostats.

3.2.3 Satisfaction with the Program

Overall satisfaction with the Thermostat Rebate Program was generally high, with three out of four retailers stating they were “very satisfied” with the program, while one was “somewhat satisfied”. Reasons for the high level of satisfaction are that the program helps drive sales and offers value to customers. Retailers also cited a positive experience with program representatives as a reason for high satisfaction. The one retailer that was “somewhat satisfied” cited the fact that the rebate is not instant as the main reason for their opinion, which could put off customers. Indeed, two retailers suggested that thermostat sales would increase if an instant rebate was offered. However, it should be noted that making the rebate an instant rebate would be difficult in the context of this program, because the application form is used to confirm whether the customer meets the program’s eligibility criteria.

Worth noting is that one retailer mentioned that the price points on thermostats that qualified for a rebate are high, and even with a rebate still more expensive than thermostats outside of the program. In response, this retailer dropped the promotional price of thermostats that qualified for the program.

3.2.4 Satisfaction with NP and NLH

Overall satisfaction with NP and NLH was generally high in terms of providing retailers with the service and support they needed to deliver the program to customers. All four retailers were “very satisfied” with the service and support from NP and NLH. A positive experience with program representatives was a primary reason for this opinion. Representatives were described as very helpful and responsive. In addition, communication was positive and information was provided in a timely manner, leading to a positive overall experience with NP and NLH and the program.

In terms of additional services or support that NP and NLH could have provided to help with the Thermostat Rebate Program, one retailer mentioned having more frequent in-store promotions in which NP and NLH representatives could talk to customers face-to-face. It was believed that there is a perceived benefit for customers from hearing the information first-hand rather than from store employees.

3.2.5 Barriers and Recommendations

When asked to identify what, if anything, impedes the delivery of the Thermostat Rebate Program, two of the four retailers could not provide any barriers. They believe the program is straight forward and easy to deliver. The other two retailers mentioned again that an instant rebate would improve participation.

Overall, retailers are very happy with the program and consider they have what they need to properly deliver this program. In addition, feedback from sales staff on the floor has been positive and the program is considered straightforward. Retailers offered a few specific recommendations as to what could be done to improve the Thermostat Rebate Program. One of those suggestions was an in-house training session with retail staff with program representative coming to the store and talking with staff about the programs available from NP and NLH, including the Thermostat Rebate Program, and reviewing the products offered with each program. NP and NLH representatives already conduct informal in-store training sessions and meetings upon request and intend to continue doing so to respond to this retailer feedback.

3.3 Database Review

The Evaluator reviewed the contents of the database developed for the Thermostat Rebate Program to verify whether it provided complete, consistent and coherent information needed for this program evaluation. This review was not only an opportunity to assess possible improvements meant to facilitate both internal program management and program monitoring and evaluation, but also an essential part of preparing energy savings calculations for the impact evaluation.

The program database consists of two Excel spreadsheets (one per utility), containing participant and administrative information as well as technical data about projects. Since the program is offered by two utilities (NP and NLH), customer tracking is not centralized. NP and NLH each track customer data using their own Excel spreadsheets which were both provided to the Evaluator.

The Evaluator noticed differences in the templates used by NP and NLH, and these differences led to different data being tracked by the two utilities. These differences can be especially challenging when an impact evaluation is involved and values based on the database need to be established with great accuracy. For example, one utility compiles all the information related to an application on the same line, while the other utility can use multiple lines for a single applicant. The Evaluator also found differences in the descriptive and labelling terms used in the two Excel spreadsheets. For example, each utility identifies the types of thermostats differently and under columns named differently, which prevents the Evaluator from consolidating both spreadsheets into one database for more effective analysis without a risk of making an error. Although a standard template for program tracking would greatly facilitate program monitoring and evaluation, the Evaluator understands that each utility manages its own customer base and that participant data is not shared between utilities, thus making common tracking guidelines unnecessary for internal program management.

The Evaluator observed a number of good practices when reviewing the database. For instance, customer contact information was systematically included in the database, which facilitates the completion of surveys and interviews. The Evaluator observed that the overall level of consistency among the various data-entry fields of the database was good and that the fields of the database are almost systematically filled out.

The Evaluator recommends that the information described below be tracked and documented mostly to validate participant eligibility and facilitate impact evaluation. This includes information that is already collected through the application form. Please note that further details about the impact evaluation methodology are presented in Section 4.

- One of the main purposes of a database is to compile the program energy savings claimed by the program administrator, so the resulting savings for each participant should be clearly identified. This information was only found in the NP spreadsheet.
- The Evaluator noticed that many applications involved more than 15 thermostats, which is realistic for multi-unit residential buildings. Since energy savings from installing a non-programmable or programmable electronic thermostat are lower for an apartment unit than for a single-family dwelling, for instance, the Evaluator recommends asking for the type of dwelling on the application form and adding this information to the database as to adjust the unitary savings accordingly.

To improve the current tracking processes, the Evaluator also recommends the following:

- The savings tracked by NP include an estimation of the number of applications that are expected to be received toward the end of a given fiscal year, but only approved after the end of that fiscal year. NP uses such a projection because the application reception date is not tracked, while the approval date is. Since the application processing and approval times are approximately the same year-over-year, they have little impact on the number of applications claimed for each fiscal year. Therefore, the Evaluator recommends using a single known date, such as the project approval date, to determine in which program year the savings of each project should be tracked. This methodology is currently used by NLH. Then, the program year with which each project and its savings are associated should be clearly identified.

4 IMPACT EVALUATION

This section presents the gross and net energy and peak demand savings achieved by the Thermostat Rebate Program for the 2015 and 2016 program years.

4.1 Gross Savings

For the thermostat products eligible under the Thermostat Rebate Program, energy savings are established on a unitary basis. Essentially, gross savings are obtained by attributing a unitary savings value to each type of thermostats and multiplying that value by the number of units rebated through the program. The following sections present the unitary savings values used by NP and NLH and the revised values determined by the Evaluator based on information from the participant survey and existing literature.

4.1.1 Unitary Savings Review

NP and NLH use a unitary savings value of 58 kWh/year for non-programmable electronic thermostats and 161 kWh/year for programmable thermostats.

These values are based on a potential study completed in 2008, which determined that three percent of heating energy is saved with an electronic thermostat and six percent with a programmable thermostat[3]. The unitary savings also include an installation factor, based on the assumption that not all customers would program or install their thermostats, thereby reducing the original estimate of savings provided in this study.

Survey Findings

The Evaluator used various findings from the participant survey and conducted a literature review to determine the most accurate study to establish revised values for the Thermostat Rebate Program.

To better evaluate the impact of a new non-programmable or programmable electronic thermostat installed through the program, the Evaluator inserted questions in the participant survey to gather information about the participant usage of their old and new thermostats. More specifically, the following topics were covered:

- Types of replaced thermostats
- Working condition of replaced thermostats
- Programming of new thermostats
- Heating system controlled by thermostats

[3] Marbek Resource Consultants Ltd. *Conservation and Demand Management (CDM) Potential*, report presented to Newfoundland and Labrador Hydro and Newfoundland Power, January 18, 2008.

Baseline

The survey revealed that respectively 96 and 95 percent of the non-programmable and programmable thermostats installed through the program have replaced analog thermostats. Therefore, it is reasonable to use analog thermostats as the baseline to calculate unitary savings for both electronic and programmable thermostats. Furthermore, searching through major hardware store websites also showed that analog thermostats were still readily available.

Heating Systems Controlled

Table 1 lists the results of the survey for the types of heating systems mostly used by survey respondents to heat their homes.

Table 1: Types of Heating Systems

Main Heating System	Number of Respondents	Corresponding Number of Thermostats	Percentage of Thermostats
Electric baseboards	68	403	79%
Electric furnaces or boilers	5	35	7%
Heat pumps	5	34	7%
Other electric room-based systems	2	19	4%
Non-electrical systems	5	16	3%
TOTAL	**85**	**507**	**100%**

The survey results show that the new thermostats were installed in homes that were primarily electrically heated 97 percent of the time. The remaining three percent of thermostats generated negligible electrical savings and therefore a deduction of three percent was applied to the calculation of unitary savings (see Table 5).

Considering the fairly small percentage of heat pumps compared to electrical resistance heating (such as electric baseboards, furnaces and boilers), the Evaluator chose not to account for the higher energy performance (and therefore lower heating energy consumption) of this type of equipment.

Most thermostats (86%) controlling electric heating systems were installed in houses that are heated with room-based heating equipment (such as electric baseboards), while the others had central heating equipment. The savings generated by installing a more efficient thermostat on central heating equipment are considerably higher than those generated by installing a more efficient thermostat on room heating equipment, since the heating energy savings obtained are for the entire house. Consequently, the Evaluator revised unitary savings to obtain separate values for both types of thermostats (room-based and central).

Literature Review

Studies on energy savings related to thermostats are typically conducted specifically for room-based thermostats (which generally control electric baseboards) or central thermostats (controlling a furnace or boiler), but can present savings for both non-programmable and programmable electronic thermostats. Therefore, the literature review was conducted separately for room-based and central thermostats.

Room-based Thermostats

The studies for room-based thermostats the Evaluator considered relevant for its review were all conducted for Hydro-Québec, which has over the years used multiple methodologies and provided results for various types of thermostats and building, as shown in Table 2.

Table 2: Literature Review for Room-based Thermostats

Evaluation Report	Methodology	Thermostat Type			Building Type		Energy Savings per Thermostat
		Electronic	Programmable	Mix of Electronic and Programmable	Existing Building	New Building	
Hydro-Québec Evaluation Report – Electronic Thermostats in Existing Buildings 2008[4]	Billing analysis with a control group	x			x		Net savings of 71.62 kWh
			x		x		Net savings of 101.10 kWh
Hydro-Québec Evaluation Report – Electronic Thermostats in New Construction 2009[5]	Measurement in laboratory for accuracy savings, billing analysis for programming savings	x				x	61 kWh for apartments, 94 kWh for duplexes/triplexes and 121 kWh for single-family homes
			x			x	179 kWh for apartments, 295 kWh for duplexes/triplexes and 221 kWh for single-family homes[6]
Hydro-Québec Evaluation Report – Electronic Thermostats in Existing Building and New Construction 2012[7]	Simulations			x	x	x	102 kWh
Hydro-Québec Evaluation Report – Electronic Thermostats in Existing Building and New Construction 2013[8]	Simulations			x	x	x	107 kWh

[4] SOM Recherches et sondages. *Évaluation du programme des thermostats électroniques – marché existant 2004 à 2006*, report prepared for Hydro-Québec, 2007, p. 92.
[5] Econoler. *Évaluation du programme thermostats électroniques – Volet nouvelle construction au marché résidentiel*, report prepared for Hydro-Québec, 2009, p. 51-56.
[6] These results were edited to be on a per thermostat basis, while the results are presented in the report on a per household basis.
[7] SOM Recherches et sondages. *Programme thermostats électroniques –2007-2009 (BE) et 2008-2009 (NC)*, report prepared for Hydro-Québec, 2012, p. 43.
[8] SOM Recherches et sondages. *Programme des thermostats électroniques – BE et NC (2010-2011)*, report prepared for Hydro-Québec, 2013, p. 42.

The Evaluator first compared Newfoundland and Quebec weather to ensure the savings identified in the Hydro-Québec studies could be used for the Thermostat Rebate Program. This comparison revealed that St. John's had an annual average of 4,755 heating degree days (HDDs)[9], while Quebec (Montreal[10] and Quebec City[11]) had an annual average of 4,751 HDDs. The Evaluator considered these HDDs similar enough to use the Hydro-Québec findings.

The 2009 evaluation report was considered the most appropriate for this evaluation. The Evaluator did not use the two latest evaluation reports (2012 and 2013), as they only provided blended savings values for a mix of electronic and programmable thermostats. As for the 2008 report, results were based on a billing analysis with a control group, so they were expressed in net savings (because the control group included non-participants who had purchased electronic and programmable thermostats without participating in the program, it already included a deduction for free-ridership).

Hydro-Québec's 2009 report on electronic thermostats in residential new constructions[12] differentiates savings from accuracy (non-programmable electronic thermostats) and savings from temperature setback (programmable thermostats). For the calculation of savings generated by the electronic thermostat accuracy, the percentages of savings were based on research supervised by Hydro-Québec's energy technologies laboratory[13]. For the calculation of savings achieved by the temperature setback, the savings per housing resulted from a billing analysis regression which compared the consumption of houses with electronic thermostats and houses with programmable thermostats.

Even though the vast majority of thermostats rebated through the Thermostat Rebate Program were for existing buildings and Hydro-Québec's 2009 report is for new construction, the Evaluator chose to use this study to establish unitary savings. This study is the only one that provides gross savings for electronic and programmable thermostats separately. Also, using savings for new construction yields a conservative estimate, since the heating load of these buildings would typically be lower than that of existing buildings.

To use the Hydro-Québec study values and make them applicable to the Thermostats Rebate Program, an average unitary savings value based on the proportion of housing type among the program participants surveyed was calculated.

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[9] Government of Canada. *Canadian Climate Normals 1981-2010 Station Data, Saint John's Airport Station*. Available at http://climate.weather.gc.ca/climate_normals/index_e.html (Last accessed May 31, 2017)
[10] Government of Canada. *Canadian Climate Normals 1981-2010 Station Data, Montreal Pierre-Elliott Trudeau Station*. Available at http://climate.weather.gc.ca/climate_normals/index_e.html (Last accessed May 31, 2017)
[11] Government of Canada. *Canadian Climate Normals 1981-2010 Station Data, Quebec Jean Lesage Station*. Available at http://climate.weather.gc.ca/climate_normals/index_e.htm> (Last accessed May 31, 2017)
[12] Econoler. *Évaluation du programme thermostats électroniques – Volet nouvelle construction au marché résidentiel*, Final Report presented to Hydro-Québec, February 9, 2009.
[13] Hydro-Québec – Laboratoire des technologies de l'énergie (LTE). *Sommaire exécutif de rapports publiés par Hydro-Québec concernant les économies d'énergie dues aux thermostats électroniques*, October 2004.

Table 3: Unitary Savings Calculation for Room-based Thermostats

Calculation Parameters	Housing Type		
	Single-family	Duplex / Triplex / Townhouse	Apartment
Proportion of Housing Type[14]	85%	12%	3%
Gross Energy Savings per Electronic Thermostat			
Unitary Savings for Electronic Thermostat Accuracy	121 kWh	94 kWh	61 kWh
Average Value for Each Electronic Thermostat	**116 kWh**		
Gross Energy Savings per Programmable Thermostat			
Unitary Savings for Electronic Thermostat Accuracy and Programming	221 kWh	295 kWh	179 kWh
Average Value for Each Programmable Thermostat	**229 kWh**		

A unitary savings value of 116 kWh/year was thus established for electronic thermostats and a unitary savings value of 229 kWh/year for programmable thermostats controlling electrical room-based heating systems.

Central Thermostats

Table 4 gives an overview of recent studies on energy savings associated with central thermostats. All of these studies were performed specifically for programmable thermostats.

[14] The proportion of housing type was calculated from the participant survey results.

Table 4: Literature Review for Central Programmable Thermostats

Study or Evaluation Report	Methodology	Savings
GasNetworks, Northeast of United States, 2006[15]	Billing analysis of 7,000 homes	6.8% of gas heating consumption (or 75 ft³/year) per programmable thermostat (used in Mid-Atlantic TRM and New York TRM)
Northern Indiana Public Service Company, 2013[16]	Billing analysis with a control group; 400 homes (treatment) and 800 homes (control)	7.8% of gas heating consumption (or 57 therms per year)
Gaz Metro, Quebec, 2014[17]	Participant survey (n=301) to determine programming behaviour, along with Natural Resources Canada algorithm to obtain average percentage of savings. Billing analysis of 3,961 homes to determine gas consumption for space heating, to be multiplied by savings percentage.	2.05% of space heating gas consumption (46 m³/year)

The Evaluator elected to use Gaz Métro's study because it was considered the most applicable due to the similarity in climates between Quebec and Newfoundland, as previously described. The other two studies were conducted in warmer climates; the percentage of savings due to a thermostat setback of a few degrees is higher if the outdoor temperature is warmer, meaning these percentages are likely overestimated for Newfoundland's climate. To convert natural gas savings (estimated at 46 m³) to kWh savings, the following equation was used:

$$kWh\ savings = m^3 savings\ \times 10.36\frac{kWh}{m^3} \times 85\%$$

The 10.36 conversion factor was obtained using the average energy content of a cubic meter of natural gas, as defined by Natural Resources Canada. The 85 percent factor is an estimation of the average efficiency of a natural gas heating system. Consequently, the unitary savings for a programmable thermostat installed on a central heating system was estimated at 405 kWh.

No studies assessing savings for non-programmable electronic thermostats controlling central systems were found. To approximate this value, the Evaluator applied the ratio of electronic to programmable thermostat energy savings obtained for room-based thermostat. A value of 205 kWh was obtained as follows:

$$Elect. central\ savings = 405\ kWh \times \frac{116\ kWh}{229\ kWh}$$

[15] RLW Analytics. *Validating the Impact of Programmable Thermostats*, prepared for GasNetworks, January 2007, p. 2.
[16] Cadmus Group Inc. *Evaluation of the 2013-2014 Programmable and Smart Thermostat Program,* Report prepared for Northern Indiana Public Service Company, January 22, 2015.
[17] SOM Recherches et sondages. *Évaluation du Programme de thermostat électronique programmable – PE103*, report prepared for Gaz Métro, 2014.

Results of Unitary Savings Review

Using the literature review and participant survey results previously presented, the following overall unitary savings were established by the Evaluator for electronic and programmable thermostats rebated through the Thermostat Rebate Program.

Table 5: Unitary Savings Values per Thermostat Type

Thermostat Type	Percentage of Non-electric	Percentage of Electric Room-based	Savings Room-based (kWh)	Percentage of Electric Central	Savings Central (kWh)	Overall Unitary Savings (kWh)
Electronic	3%	83%	116	14%	205	**125**
Programmable			229		405	**247**

4.1.2 Peak Demand Savings

Peak demand savings correspond to the demand savings that coincide (in time) with the peak demand of the electricity system. The winter peak in Newfoundland and Labrador is from 7 a.m. to noon in the morning period and from 4 p.m. to 8 p.m. in the evening period on the four coldest days, from December to March. This is a total of 36 hours per year.

The Evaluator used the approach developed by NP and NLH in their Conservation and Demand Management Potential Study[18] to calculate peak demand savings. Five variables were used to determine peak demand savings based on the proportion of annual energy savings that occur during the peak period:

› Annual kWh: annual energy savings generated by the energy efficiency measure
› Month Allocation: percentage of savings occurring during the peak months
› Days in Month: number of days in the peak months
› Weekend Ratio: ratio of savings that occurring on weekend days compared to weekdays
› Peak Day Factor: additional proportion of savings occurring on peak days compared to average days
› Peak Hour % Daily kWh: percentage of peak day savings occurring within the defined peak hours

These variables are obtained by hourly simulations performed for each type of measure. Peak demand savings are then calculated with this equation:

[18] ICF International. Newfoundland and Labrador Conservation and Demand Management Potential Study: 2015 *Residential Sector Final Report*, report presented to Newfoundland Power Inc. and Newfoundland and Labrador Hydro, 2015, p. B-2 to B-3.

$$\begin{aligned} &Peak\ Demand\ Savings \\ &\quad = \frac{Annual\ kWh\ \times Month\ Allocation}{Days\ in\ Month\ \times \left[\frac{5}{7} + \left(\frac{2}{7}\right) \times Weekend\ Ratio\right]} \times Peak\ Day\ Factor \\ &\quad \times Peak\ Hour\ \%\ Daily\ kWh \end{aligned}$$

Using this methodology, it is estimated that annual energy savings can be divided by 3,241 hours to obtain peak demand savings for the Thermostat Rebate Program. This is equivalent to a peak-demand-to-energy ratio of 0.309 MW/GWh, which is applied to gross energy savings.

4.1.3 Evaluated Gross Savings

Gross savings were calculated by the Evaluator based on the revised unitary savings values established for each type of thermostats. The next two tables present the results for NP and NLH separately.

Table 6: Revised Gross Energy and Demand Savings for NP

	Electronic Thermostats		Programmable Thermostats		Total	
	2015	2016	2015	2016	2015	2016
Number of Units	2,311	2,611	13,177	13,049	15,488	15,660
Energy Savings						
Unitary Savings Value (kWh)	125	125	247	247	-	-
Gross Energy Savings – at the Meter (GWh)	0.289	0.326	3.255	3.223	3.544	3.549
Peak Demand Savings						
On-peak Demand-to-Energy Ratio (MW/GWh)	0.309	0.309	0.309	0.309	-	-
Gross Peak Demand Savings – at the Meter (MW)	0.089	0.101	1.004	0.994	1.093	1.095

Table 7: Revised Gross Energy and Demand Savings for NLH

	Electronic Thermostats		Programmable Thermostats		Total	
	2015	2016	2015	2016	2015	2016
Number of Units	44	68	164	222	208	290
Energy Savings						
Unitary Savings Value (kWh)	125	125	247	247	-	-
Gross Energy Savings – at the Meter (GWh)	0.006	0.009	0.041	0.055	0.046	0.063
Peak Demand Savings						
On-peak Demand-to-Energy Ratio (MW/GWh)	0.309	0.309	0.309	0.309	-	-
Gross Peak Demand Savings – at the Meter (MW)	0.002	0.003	0.012	0.017	0.014	0.020

4.2 Net-to-gross Ratio

The net-to-gross ratio (NTGR) is used to determine net savings, i.e. the energy savings that can be reliably attributed to a program. More specifically, the NTGR represents the positive or negative effects on the gross savings. For the Thermostat Rebate Program, two effects are considered, namely free-ridership and internal spillover.

4.2.1 Free-ridership

Free-ridership can occur when participants would have still implemented energy efficiency upgrades and measures in the absence of a program. The assessment of the free-ridership level for this program was based on a self-report approach, which involved asking participants a set of questions during a telephone survey which was conducted using a sample of 85 participants. The questionnaire included questions to assess both the participants' intention of purchasing electronic or programmable thermostats in the absence of the program and the influence of the program elements on their decision.

The feedback collected from the participant survey was converted into an overall free-ridership level using the algorithm presented in Appendix IV. The algorithm results revealed a free-ridership level of 34 percent for non-programmable electronic thermostats and 19 percent for programmable thermostats. These free-ridership levels were applied separately because the margin of error for each of them was calculated to be below five percent, at a confidence interval of 90 percent. This results in an average free-ridership level of 21 percent for the entire program.

This outcome is consistent with what has been observed in other jurisdictions for similar programs. Hydro-Québec[19] estimated their free-ridership level to be at 31 percent for their electronic and programmable thermostat program. Gaz Métro[20] obtained a free-ridership level of 17 percent for their program targeting programmable thermostats for central natural gas heating systems. The average free-ridership level observed for the Thermostat Rebate Program is in between the Hydro-Québec and Gaz Métro values, and is considered reasonable by the Evaluator especially given that non-programmable electronic thermostats can be perceived as a mature product.

The survey questions aimed at assessing the participants' intention to purchase energy-efficient thermostats revealed that a majority of participants (61%) already had plans to make such a purchase before they had heard about the program. However, as it is very often the case when evaluating free-ridership, the program, including its rebate and information, does impact the customers' decisions to actually make the move and purchase the product. The rebate, the information provided by the program and the previous experiences with takeCHARGE programs had an average influence level of 90 percent on the participants' decisions to install efficient thermostats.

4.2.2 Spillover

The participant survey was also used to assess internal spillover, which can occur when participants implement additional energy efficiency measures after their participation in the program. For the Thermostat Rebate Program, only additional electronic or programmable thermostats were considered for the spillover. The methodology used to calculate the level of internal spillover is presented in Appendix V.

The survey results revealed an internal spillover level of two percent for the entire program. Of the 85 participants surveyed, 12 participants declared they had installed 22 electronic and 13 programmable thermostats for a total of 35 additional thermostats. Respondents indicated that, on average, their participation in the Thermostat Rebate Program had had an influence level of 6 out of 10 on their decision to install additional efficient thermostats in their homes (using a scale from 0 to 10 where 0 means "No influence" and 10 means "Great influence").

4.2.3 NTGR Calculation

The NTGR is calculated using the following equation:

[19] SOM Recherches et Sondages. *Rapport d'évaluation, Programme Thermostats électroniques : Bâtiments existants (BE) et Nouvelle construction (NC), Période évaluée Années 2010 et 2011*, report presented to Hydro-Québec Distribution, 2013, p. 36.
[20] SOM Recherches et Sondages. *Rapport d'évaluation, Programme Thermostat électronique programmable (PE103), Période évaluée 2010-2013*, report presented to Gaz Métro, 2014, p. 28.

NTGR = (1 – % free-ridership + % internal spillover)

Using the free-ridership and spillover levels established for the Thermostat Rebate Program, the NTGR value is estimated to be at 0.68 for non-programmable thermostats and 0.83 for programmable thermostats.

4.3 Net Savings

The net savings were obtained by applying the NTGR to the gross savings established by the Evaluator. The next two tables present the evaluated net savings for NP and NLH separately.

Table 8: Revised Net Energy and Demand Savings for NP

	Electronic Thermostats		Programmable Thermostats		Total	
	2015	2016	2015	2016	2015	2016
Energy Savings						
Revised Gross Energy Savings – at the Meter (GWh)	0.289	0.326	3.255	3.223	3.544	3.549
NTGR	0.68	0.68	0.83	0.83	0.82	0.82
Net Energy Savings – at the Meter (GWh)	0.196	0.222	2.701	2.675	2.898	2.897
Peak Demand Savings						
Revised Gross Peak Demand Savings – at the Meter (MW)	0.089	0.101	1.004	0.994	1.093	1.095
NTGR	0.68	0.68	0.83	0.83	0.82	0.82
Net Peak Demand Savings – at the Meter (MW)	0.061	0.068	0.833	0.825	0.894	0.894

Table 9: Revised Net Energy and Demand Savings for NLH

	Electronic Thermostats		Programmable Thermostats		Total Evaluated Results	
	2015	2016	2015	2016	2015	2016
Energy Savings						
Revised Gross Energy Savings – at the Meter (GWh)	0.006	0.009	0.041	0.055	0.046	0.063
NTGR	0.68	0.68	0.83	0.83	0.81	0.81
Net Energy Savings – at the Meter (GWh)	0.004	0.006	0.034	0.046	0.037	0.051
Peak Demand Savings						
Revised Gross Peak Demand Savings – at the Meter (MW)	0.002	0.003	0.012	0.017	0.014	0.020
NTGR	0.68	0.68	0.83	0.83	0.81	0.81
Net Peak Demand Savings – at the Meter (MW)	0.001	0.002	0.010	0.014	0.012	0.016

4.4 Summary of Results

The following table summarizes and compares the reported results to those obtained by the Evaluator.

Table 10: Summary of Evaluation Results for 2015 and 2016 Program Years

Parameters	Utility	Reported Results[21]		Evaluation Results	
		2015	2016	2015	2016
Gross Electricity Energy Savings – at the Meter (GWh)	NP	2.119	2.364	3.544	3.549
	NLH	0.034	0.044	0.046	0.063
	Total	**2.153**	**2.408**	**3.590**	**3.612**
Gross Electricity Peak Demand Savings – at the Meter (MW)	NP	0.654	0.729	1.093	1.095
	NLH	0.009	0.012	0.014	0.020
	Total	**0.663**	**0.741**	**1.107**	**1.115**
NTGR	NP	0.90	0.90	0.82	0.82
	NLH	0.90	0.90	0.81	0.81
Net Electricity Energy Savings – at the Meter (GWh)	NP	1.907	2.127	2.898	2.897
	NLH	0.031	0.040	0.037	0.051
	Total	**1.938**	**2.167**	**2.935**	**2.948**
Net Electricity Peak Demand Savings – at the Meter (MW)	NP	0.589	0.656	0.894	0.894
	NLH	0.008	0.011	0.012	0.016
	Total	**0.597**	**0.667**	**0.906**	**0.910**

4.5 Program Cost-effectiveness

As part of this evaluation, the Evaluator assessed program cost-effectiveness by performing the Levelized Utility Cost (LUC) test. Because the value of the avoided energy cost—a key parameter in conducting a standard cost-effectiveness analysis—was not yet known when this evaluation was conducted, a sensitivity analysis was performed using the Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests. The Evaluator did not calculate TRC and PAC ratios but instead used the TRC and PAC formulas to determine the minimum avoided cost required for the TRC and PAC ratios to be above 1, therefore for the program to be cost effective.

Furthermore, effective useful life (EUL) values and incremental costs of the rebated products that had been determined by NP and NLH were reviewed by the Evaluator when conducting this cost-effectiveness analysis.

[21] The reported gross values were provided by NP and NLH. To obtain the reported net values, the Evaluator multiplied the gross values by the NTGR (0.90).

Some of the evaluation results were also essential to the cost-effectiveness analysis, including program savings which were obtained through the impact evaluation. It should be noted that non-energy benefits were neither quantified nor included in this cost-effectiveness analysis. The Evaluator used the assumptions made by NP and NLH for the discount and inflation rates (7% and 2% respectively).

4.5.1 Effective Useful Life

The financial benefits and revenue losses resulting from the Thermostat Rebate Program are expected to persist over multiple years. The period over which they persist (defined as the EUL) is factored into the calculation the Utility Marginal Benefits and the Lifetime Energy Savings. In their cost-benefit analysis, NP and NLH defined the EUL as 18 years for both electronic and programmable thermostats based on a potential study completed in 2008.[22]

The Evaluator conducted a literature review to compare the EUL values used by NP and NLH to those applied by other jurisdictions in North America. As presented in the following table, the Evaluator found that most jurisdictions use an EUL of 10 or 11 years for programmable thermostats, while some jurisdictions also use a higher (an EUL of 15 years used by Massachusetts) or a lower value (an EUL of 5 years by Illinois). The Evaluator did not find EUL values specific to electronic non-programmable thermostats. The Evaluator considers it reasonable to assume that electronic thermostats offer a lifetime similar to that of programmable thermostats. Therefore, the Evaluator used an EUL of 11 years for both thermostat types, since this is the most common value found in the literature.

[22] Marbek Resource Consultants Ltd. *Conservation and Demand Management (CDM) Potential*, report presented to Newfoundland and Labrador Hydro and Newfoundland Power, January 18, 2008, p.59.

Table 11: Literature Review Summary

Document	EUL	Source
Massachusetts TRM2015 [23]	15	Environmental Protection Agency. *Life Cycle Cost Estimate for ENERGY STAR Programmable Thermostat*. 2010
Illinois TRM 2016 [24]	5	GDS Associates, Inc. Prepared for The New England State Program Working Group. Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. June 2007. Based on equipment life of 10 years and a 50% persistence factor, which gives 5 years.
Mid-Atlantic TRM 2016 [25]	10	GDS Associates, Inc. Prepared for The New England State Program Working Group. Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. June 2007.
Minnesota TRM 2017 [26]	10	GDS Associates, Inc. Prepared for The New England State Program Working Group. Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. June 2007. Navigant. DTE Residential Thermostats, Market Assessment of Advanced Residential Programmable Thermostats. December 2014.
New York TRM 2016 [27]	11	California Public Utilities Commission. Database for Energy Efficient Resources (DEER).
OPA/IESO – Prescriptive Measure Assumption 2015 [28]	11	No reference.
Pennsylvania TRM 2016 [29]	11	California Public Utilities Commission. Database for Energy Efficient. Resources (DEER), Version 2014.5.02

4.5.2 Incremental Product Cost

Since more than 90 percent of the participants stated that all the thermostats they replaced through the program still worked, the Evaluator assumed that, in the absence of the program, most participants would not have purchased any new thermostats. Therefore, the Evaluator has concluded that the incremental product cost is the full cost of the thermostats. In the cost-benefit analysis, NP and NLH used the following incremental cost values: $25 for electronic thermostats and $32 for programmable thermostats.

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[23] Mass Save. *Massachusetts Technical Reference Manual*, October 2015, p. 99.
[24] Illinois Stakeholder Advisory Group. *Illinois Statewide Technical Reference Manual for Energy Efficiency Version 5.0, Volume 3: Residential Measures*, 2016, p. 129.
[25] Northeast Energy Efficiency Partnerships. *Mid-Atlantic Technical Reference Manual Version 6.0 Final*, May 2016, p. 141.
[26] Minnesota Department of Commerce Division of Energy Resources. *State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs,* Version 2.0, January 1, 2017, P. 240.
[27] New York State Joint Utilities. *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs – Residential, Multi-Family, and Commercial/Industrial Measures*, Version 4, April 2016, P. 121.
[28] Ontario Power Authority. *Prescriptive Measures and Assumptions*, Release Version 1, March 2011, 2011, P. 6.
[29] Pennsylvania Public Utility Commission. *Technical Reference Manual*, State of Pennsylvania, June 2016, P. 81.

The Evaluator identified the most popular models from the database for both thermostat types, found their prices on the websites of major retail stores (such as Home Depot, Home Hardware, Rona and Canadian Tire) and calculated a weighted average price for each thermostat type based on these models' popularity. The Evaluator made the necessary efforts to ensure that the selected thermostat models used to calculate the average price of each thermostat type accounted for at least 80 percent of those installed through the program. The following two tables list the selected models, their respective levels of popularity within the program, and the average price of each model.

Table 12: Average Prices of the Most Popular Electronic Thermostats

Brand	Model	Program Sales %	Average Price ($)
Aube	Th209	6%	23.48
Honeywell	Rlv3100	20%	41.99
Honeywell	Rlv3120	18%	33.49
Ouellet	OTH2750	15%	33.50
Ouellet	OTH4000	5%	43.00
Stelpro	STE402NPW+	17%	37.57
TOTAL		**81%**	**36.57**

Table 13: Average Prices of the Most Popular Programmable Thermostats

Brand	Model	Program Sales %	Average Price ($)
Honeywell	Rlv450a	49%	30.00
Honeywell	Rlv4300	28%	39.21
Aube	TH104plus	3%	45.98
Aube	TH106	2%	51.99
Garrison	052-8511-2	2%	39.99
Stelpro	STE402PW+	2%	51.98
TOTAL		**86%**	**34.81**

Based on these average prices for each thermostat type, the Evaluator has decided to keep using the following incremental cost values: $37 for electronic thermostats and $35 for programmable thermostats. Electronic thermostats have a higher average price than the programmable thermostat mainly because many of the most popular programmable thermostats were sold in multi-unit packs, which have considerably reduced the unitary prices.

4.5.3 Program Administrator Cost Test

The PAC is performed using the following equation:

$$PAC = \frac{PV(Marginal\ Benefits)}{PV(Total\ Program\ Administration\ Cost + Incentives)}$$

This test compares the avoided electricity supply-side resource costs (benefits) with the costs incurred by the program administrator to design and deliver the program. Therefore, it represents the program's cost-effectiveness only from the program administrator's perspective.

By applying the revised EUL, the evaluated net savings and the administration and incentive costs provided by NP and NLH, the Evaluator has concluded that for the PAC ratio to be above unity, the value of the avoided cost (given a first year of EUL in 2016) must be of at least 0.016 $/kWh in 2015 and 0.022 $/kWh in 2016.

Table 14: Analysis of Program Administrator Cost Test

	NP		NLH		Total	
	2015	2016	2015	2016	2015	2016
Incentives ($)	134,860	150,630	1,782	2,445	136,642	153,075
Total Program Admin. Cost ($)	163,612	264,449	18,019	19,191	181,631	283,640
Lifetime Energy Savings (kWh)	31,877,463	31,867,923	410,994	564,236	32,287,393	32,432,575
Minimum Value of Avoided Energy ($/kWh) on First Year	0.014	0.019	0.072	0.057	0.015	0.020

4.5.4 Total Resource Cost Test

The TRC test is performed using the following equation:

$$TRC = \frac{PV(Marginal\ Benefits)}{PV(Incremental\ Product\ Cost + Total\ Program\ Admin\ Cost)}$$

This test establishes the ratio of the avoided electricity supply-side resource cost (benefits) to the cost incurred both by the program administrator (administration costs) and the customer (incremental product cost). Therefore, this test is a more comprehensive analysis of the cost-effectiveness of the program, since it also takes into account the customer's perspective.

By applying the revised EUL and incremental cost values, the evaluated net savings and the administration cost values provided by NP and NLH, the Evaluator has concluded that for the TRC ratio value to be above unity, the value of the avoided cost (given a first year of EUL in 2016) must be of at least 0.034 $/kWh in 2015 and 0.037 $/kWh in 2016.

Table 15: Analysis of Total Resource Cost Test

	NP		NLH		Total	
	2015	2016	2015	2016	2015	2016
Total Incremental Cost ($)	546,702	553,322	7,368	10,286	554,070	536,608
Total Program Admin. Cost ($)	163,612	264,449	18,019	19,191	181,631	283,640
Lifetime Energy Savings (kWh)	31,877,463	31,867,923	410,994	564,236	32,287,393	32,432,575
Minimum Value of Avoided Energy ($/kWh) on First Year	0.030	0.035	0.085	0.072	0.031	0.035

4.5.5 Levelized Utility Cost Test

The LUC test is performed by dividing (1) the cost incurred by the program administrator to design and deliver a program by (2) the lifetime energy savings generated by the program.

By applying the revised EUL, the evaluated net savings and the administration and incentive costs provided by NP and NLH, the LUC value was calculated for each year and each utility, as shown in the following table.

Table 16: Levelized Utility Cost Test Results

	NP		NLH		Total	
	2015	2016	2015	2016	2015	2016
Incentives ($)	134,860	150,630	1,782	2,445	136,642	153,075
Total Program Admin. Cost ($)	163,612	264,449	18,019	19,191	181,631	283,640
Lifetime Energy Savings (kWh)	31,877,463	31,867,923	410,994	564,236	32,287,393	32,432,575
LUC ($/kWh)	0.009	0.013	0.048	0.038	0.010	0.013

CONCLUSIONS AND RECOMMENDATIONS

The main objectives of this first third-party evaluation of the Thermostat Rebate Program were to assess the program's gross and net energy and peak demand savings, as well as to evaluate the program design, delivery, implementation and tracking by gathering feedback from participants and partners and reviewing the program documentation.

Satisfaction with the program is very high among participants and participating retailers. Almost all participants expressed satisfaction with the program and found its participation process easy. All four interviewed retailers mentioned being satisfied with the program and with NP and NLH staff.

The takeCHARGE brand is well known by customers in the opinion of retailers. Although the Thermostat Rebate Program itself is not as well known by customers according to retailers, participants still identified retail stores as the second most important source of awareness about the program. All four retailers use the materials provided by the program to promote it in their stores and described it as noticeable and convenient. In terms of what could be done to improve program promotion, in-store promotions or events hosted by program representatives were mentioned by retailers.

When asked about what they perceived to be key factors or barriers in a customer's decision to purchase a programmable or non-programmable thermostat, retailers mentioned price and installation. Although participants did identify financial challenges as the most important barrier to implementing energy efficiency upgrades, this barrier, along with other barriers which include the need to hire a contractor or other professionals, yielded an overall average score below five out of ten (using a 0 to 10 scale, where '0' meant that it was *not at all a barrier* and '10' meant it was a *major barrier*).

To establish revised gross savings, the unitary savings values used by NP and NLH were reviewed. The Evaluator first used the results of the participant survey to gather data on the heating systems controlled by the thermostats rebated through the program. Then, a thorough literature review was conducted to obtain a distinct unitary savings value for room-based and central thermostats, for both electronic and programmable thermostats. The average unitary savings values were calculated to be 125 kWh/year for electronic thermostats and 247 kWh/year for programmable thermostats. Both these values are significantly higher than those tracked by NP and NLH.

Free-ridership and spillover were assessed through the participant survey. To assess free-ridership, participants were asked questions about the influence of the program and its various aspects on their decisions to purchase energy-efficient thermostats. The rebate was influential for almost 60 percent of participants. The information provided by the program, along with previous experience with the Thermostat Rebate Program or another takeCHARGE program, was influential for about one-third of participants in each case. The survey results revealed a free-ridership level of 34 percent for non-programmable electronic thermostats and 19 percent for programmable thermostats, resulting in an average level of 21 percent. Additionally, a level of spillover of two percent was found. This results in an NTGR of 0.68 for non-programmable thermostats and 0.83 for programmable thermostats.

When applying these NTGRs to the revised gross savings, it was found that the Thermostat Rebate Program generated total net energy savings at the meter of 5.883 GWh (5.795 GWh for NP and 0.088 GWh for NLH) for the 2015 and 2016 program years. A reduction of 1.816 MW was achieved for electricity peak demand savings (1.788 MW for NP and 0.028 MW for NLH).

In light of the process and impact evaluation results, the Evaluator makes the following recommendations to optimize the program. These recommendations aim at improving data quality, evaluation techniques, savings calculations and program design and implementation, while also giving due consideration to NP's and NLH's goals and objectives of increasing the efficiency of program delivery, overcoming participation barriers and building stronger relationships with program partners.

1. Using the parameters derived from this impact evaluation for program tracking

The Evaluator recommends that NP and NLH use the parameters defined in this evaluation for program tracking going forward, including unitary savings values and NTGRs.

2. Monitoring and analyzing the market to adjust the thermostat offer

In-store offers for the types of thermostats supported by this program will increase over time and the unit price will decrease, along with the rebate amounts, until the market reaches a level of penetration whereby rebates will no longer be needed. As it stands now, based on a review of the online offer of various hardware stores, there is still a difference in pricing (ranging from $5 to $10 approximately) between non-programmable electronic and programmable thermostats, even after the rebate has been applied. The Evaluator recommends, however, observing the evolution of various market indicators such as in-store offer, prices and free-ridership levels to provide program staff with key information so they can find the appropriate time to lower rebates or remove products from the program as each type of thermostats increases penetration. This is especially true, at this time, for non-programmable electronic thermostats given that the level of free-ridership for this type of thermostat is significantly higher than that of the programmable thermostats, and that applications for non-programmable thermostats were much lower in 2015 and 2016. Furthermore, the vast majority of utilities no longer rebate non-programmable thermostats as part of their energy efficiency programs or initiatives.

3. Improving the content of the database

The program database contained all the information needed for the process evaluation, although key pieces of information for the impact evaluation were missing in the NLH spreadsheet, notably the project energy savings. This information should always be found in a program database for more efficient impact evaluation and internal program monitoring. The Evaluator recommends that each utility document all program-related data in a single spreadsheet to facilitate internal program-monitoring and information-sharing with the Evaluator.

Furthermore, the Evaluator recommends that NP and NLH use the same method for calculating the savings and number of participants that should go under a given program year. For instance, a single parameter, such as the application approval date, should be used to determine in which program year participants and energy savings are tracked. This approach is currently used by NLH, and the Evaluator deems it appropriate and straightforward. Finally, the program year associated with each project should be clearly tracked in the database.

APPENDIX I
PARTICIPANT SURVEY QUESTIONNAIRE

Key Research Area	Related Questions
Sources of program awareness and reasons for participation	A1-A3
Satisfaction with the program and recommendations	S1, S2, S3, S6
Difficulties related to the participation process	S4, S5
Thermostat installation, programming and usage behaviours	P1-P10
Free-ridership	FR1-FR4
Spillover	SO1-SO3
Purchase intentions and behaviours	I1-I5
Barriers to implementing energy-efficient upgrades	B1
Demographics	D1-D6

Hello may I please speak with [INSERT NAME]?

1. Yes [GO TO INTRODUCTION]

2. No [SAY "Perhaps you can help me anyway." GO TO INTRODUCTION]

INTRODUCTION

Hello, my name is _________ and I am calling from Corporate Research Associates. We are performing an evaluation of energy efficiency programs provided by Newfoundland Power and Newfoundland and Labrador Hydro. According to our records, you participated in the takeCHARGE Thermostat Rebate Program in 2015 or 2016. As part of this program, you received a rebate for the purchase of programmable and/or electronic non-programmable thermostat(s). Are you the person in the household who is most familiar with this program?

1. Yes [CONTINUE]
2. No [ASK TO SPEAK TO THE APPROPRIATE PERSON AND RESTART AT INTRODUCTION]
3. Does not recall participating [PROMPT: "Are you sure? Our records indicate that you participated in the program in <MONTH and YEAR>. Your household received a rebate as a credit on your electricity bill for the thermostat(s) that you bought."[IF PERSIST AS NO, THANK, TERMINATE AND RECORD]
4. Don't know/Refused [PROBE: "Is there someone else in the household who would know about having participated in the Thermostat Rebate Program?"] [IF YES, ASK TO SPEAK TO THE APPROPRIATE PERSON AND RESTART AT INTRODUCTION. IF PERSISTS AS NO, THANK, TERMINATE AND RECORD.]

We would appreciate your help in answering questions about your participation in this program. The information you provide will help Newfoundland Power and Newfoundland and Labrador Hydro improve the program. Is now a good time to conduct this short survey? The survey will take about 10 minutes to complete.

1. Yes [CONTINUE]
2. No/Refused [ASK "Can we schedule a more convenient time for you to conduct this survey?"] [SCHEDULED, IF NECESSARY, FOR: ______________________________]

Program Awareness and Reasons for Participation (A Series)

A1. How did you first learn about the Thermostat Rebate Program from Newfoundland Power and Newfoundland and Labrador Hydro? [DO NOT READ; ALLOW MULTIPLE RESPONSE BUT DO NOT PROBE FOR MULTIPLE]

1. (Television)
2. (Radio)
3. (Online advertising (in general))
4. (Brochure)
5. (Through a contractor or builder)
6. (At a retail or hardware store)
7. (takeCHARGE website)
8. (Newfoundland Power or Newfoundland and Labrador Hydro website)
9. (Facebook, Twitter or YouTube)
10. (Newspaper)
11. (Magazine)
12. (Word of mouth/Friend/Family member)
13. (Through a participation in another Newfoundland Power or Newfoundland and Labrador Hydro program)
14. Through my home energy report or online portal account.
96. (Other [SPECIFY__________________])
98. (Don't know)

A2. What was the SINGLE most important reason you were interested in participating in the program? [DO NOT READ – CODE ONE ONLY]

1. (Rebate/Credit on electricity bill)
2. (Save money/Reduce energy bill)
3. (Planning to get new thermostats anyway)
4. (Be more environmentally friendly)
5. (Increase comfort in my home)
96. (Other) [SPECIFY_______________])
98. (Don't know) [GO TO SECTION S]
99. (Refused) [GO TO SECTION S]

A3. Were there any other reasons? [SAME LIST AS IN A2] [DO NOT READ. ACCEPT MULTIPLE RESPONSES]

97 None/no other reasons

Satisfaction (S Series)

S1. Overall, how satisfied were you with the Thermostat Rebate program? Were you… [READ]

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied

98. (Don't know)
99. (Refused)

S2. [IF S1= 1 or 2] Why were you satisfied with the program?
(RECORD VERBATIM: ___________________)

98. (Don't know)
99. (Refused)

S3. [IF S1= 4 or 5] Why were you dissatisfied with the program?
(RECORD VERBATIM: ___________________)

98. (Don't know)
99. (Refused)

S4. Did you apply for the Thermostat Rebate program by…? [READ]

1. Mail
2. Online
3. Both mail and online
4. In-person

98. (Don't know)
99. (Refused)

S5. How easy was the process to apply for the Thermostat Rebate program? Was it… [READ]

1. Very easy
2. Somewhat easy
3. Neither easy nor difficult
4. Somewhat difficult
5. Very difficult

98. (Don't know)
99. (Refused)

S6. [IF S5=4 or 5] What was difficult about applying for the rebate [MULTIPLE RESPONSE – RECORD VERBATIM] Probe: Anything else?

(Record answer)
98. (Don't know)
99. (Refused)

S7. Do you have any recommendations for improving the Thermostat Rebate Program? PROBE: Anything else? [DO NOT READ. ACCEPT MULTIPLE]

1. (Offer more products eligible for rebates)
2. (Offer more information on the products)
3. (Advertise the program more or in a better way)
4. (Bigger incentives)
5. (No recommendation)
96. (Other [SPECIFY_______________])
98. (Don't know)
99. (Refused)

Thermostat Installation, Programming and Usage Behaviours (P Series)

Now, I have questions about the thermostats installed in your home for which you received a rebate through the Thermostat Rebate Program.

P1. Who installed the thermostats you purchased through the Thermostat Rebate Program? Did you… [READ. CODE ONLY ONE.]

1. Install them yourself;
2. Have a friend or family member install them; or
3. Hire an electrician or another professional
96. (Other:_______)
98. (Don't know)
99. (Refused)

P2. [ASK IF n_prog_thermo>0] Of the [n_prog_thermo>0] electronic programmable thermostats you purchased, how many were used to replace…

a. Dial or non-electronic thermostats
b. Electronic <u>non-</u>programmable thermostats
c. Electronic programmable thermostats

READ IF NEEDED:

Dial thermostat: A non-electronic thermostat on which the desired temperature can be selected with a round or sliding dial.

Electronic non-programmable thermostats: A thermostat with an electronic display for setting the temperature.

Electronic programmable thermostats: A thermostat with an electronic display that allow different temperatures to be programmed for different periods of the day and week.

P3. [ASK IF n_elect_thermo>0] Of the [n_elect_thermo>0] electronic non-programmable thermostats you purchased, how many were used to replace…

a. Dial or non-electronic thermostats
b. Electronic non-programmable thermostats
c. Electronic programmable thermostats

P4. Did all the thermostats you replaced still function well when you replaced them? [DO NOT READ. CODE ONLY ONE]

1. Yes
2. No
98. (Don't know)
99. (Refused)

P5. What type of system do you use to heat most of your house? [CODE ONLY ONE. PROBE IF NEEDED.]

1. Electric baseboards
2. Electric furnace or boiler
3. Oil furnace or boiler
4. Natural gas furnace or boiler
5. Wood stove
6. Heat pump
96. (Other, specify:______)
98. (Don't know)
99. (Refused)

ASK P6 AND P7 IF ELECTRONIC THERMOSTATS IN DATABASE

P6. During the winter, approximately how many times per day does anyone in your household adjust the electronic non-programmable thermostats?

(Record answer)
98. (Don't know)
99. (Refused)

P7. I have some questions about your habits with electronic non-programmable thermostats. During the winter, how often do you… [READ EACH CHOICE. ROTATE]

	Always	Most of the time	Sometimes	Seldom	Never	DK/Ref
a. Regulate the temperature according to how comfortable you (your family) feel						
b. Turn down the thermostat when you leave the house						
c. Turn down the thermostat when you go to bed						
d. Lower the temperature when you go on vacation						
e. Lower the temperature of the thermostat to save energy or money						

ASK P8 THROUGH P10 IF PROGRAMMABLE THERMOSTATS IN DATABASE

P8. Have you or someone else in your household programmed your programmable thermostats to be automatically lowered at certain times of day? [DO NOT READ. CODE ONLY ONE.]

1. Yes
2. No
98. (Don't know)
99. (Refused)

P9. Who usually programs the programmable thermostats in your household? [DO NOT READ. ACCEPT ONE ANSWER]

1. Myself
2. My husband/wife/partner
3. My children
4. It varies—everybody does it
5. No one
96. (Other) [SPECIFY_______________])
98. (Don't know)
99. (Refused)

P10. I have some questions about your habits with programmable thermostats. During the winter, do you set your thermostats to… [READ EACH CHOICE. ROTATE]

	Yes	No	DK/Refused
a. Turn down when you leave the house			
b. Turn down when you go to bed			
c. Lower the temperature when you go on vacation			
d. Lower the temperature of the thermostat to save energy or money			

Free-ridership (FR Series)

Moving along to another topic…

FR1. Did you have plans to install electronic or programmable thermostats in your home before you learned about the Thermostat Rebate Program? [DO NOT READ. CODE ONLY ONE.]

1. Yes
2. No [Go to FR4]
98. (Don't know) [Go to FR4]
99. (Refused) [Go to FR4]

FR2. You received a rebate of $[TOTAL REBATE] for the thermostats you installed in your home. If you had not received the rebate for your thermostats, what is the likelihood that you would have paid for the full cost of the thermostats you purchased? Please answer using a scale of 0 to 10, with a 0 indicating that you "Definitely Would Not Have Paid" and a 10 indicating that you "Definitely Would Have Paid." [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

FR3. Now I would like to ask you to consider what actions you would have taken if the Thermostat Rebate Program had not been available. I will read you a few options. For each one, please answer on a scale from 0 to 10, with a 0 indicating that it is "Very Unlikely," and a 10 indicating that it is "Very Likely." [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED. DO NOT RANDOMIZE.]

a. If the program had not been offered, what is the likelihood that you would have installed fewer electronic or programmable thermostats in your home?

b. [ASK IF n_prog_thermo>0 AND IF ≠ ELECTRONIC THERMOSTATS] If the program had not been offered, what is the likelihood that you would have installed electronic non-programmable thermostats instead of the ones installed through the program?

c. [Ask if FR2>5] If the program had not been offered, what is the likelihood that you would have postponed installing these new thermostats by at least one year?

FR4. Using a scale from 0 to 10 where 0 means "No influence" and 10 means "Great influence", please rate the influence of each of the following factors on your decision to purchase new electronic or programmable thermostats for your home. [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED. ROTATE.]

a. The rebate offered by the program

b. The information provided by the program on electronic and programmable thermostats, such as the brochure and "Program Your Comfort" videos

c. A previous experience with the Thermostat Rebate Program or another takeCHARGE program by Newfoundland Power or Newfoundland and Labrador Hydro

Spillover (SO Series)

SO1. Since your participation in the Thermostat Rebate Program, have you installed new electronic or programmable thermostats in your home without receiving any incentives or rebates from a takeCHARGE program? [DO NOT READ. CODE ONLY ONE.]

1. Yes
2. No [Go to I Series]
98. (Don't know) [Go to I Series]
99. (Refused) [Go to I Series]

SO1a. Just to confirm I understand correctly, you have installed electronic or programmable thermostats in your home without receiving or intending to receive any incentives or rebates from Newfoundland Power or Newfoundland and Labrador Hydro?

1. Yes
2. No [Go to I Series]
98. (Don't know) [Go to I Series]
99. (Refused) [Go to I Series]

SO2. How many electronic or programmable thermostats have you installed since your participation in the Thermostat Rebate Program?

Number of electronic non-programmable thermostats _____________

Number of programmable thermostats _____________

98. (Don't know)
99. (Refused)

SO3. Using a scale from 0 to 10 where 0 means "No influence" and 10 means "Great influence", how influential was your experience with the Thermostat Rebate Program on installing these new electronic or programmable thermostats? [RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

Purchase Intentions and Behaviours (I Series)

I1. How likely are you to purchase additional thermostats for your home over the next twelve months? Would you say…? [READ. CHOOSE ONLY ONE ANSWER]

1. Very likely
2. Somewhat likely
3. Not very likely (Go to B Series)
4. Not at all likely (Go to B Series)
98. (Don't know) (Go to B Series)
99. (Refused) (Go to B Series)

I2. [ASK IF 1 OR 2 in I1] What type(s) of thermostats do you plan on purchasing next time? [DO NOT READ. ACCEPT MULTIPLE]

1. Dial thermostats (IF NECESSARY: That is a thermostat with a dial)
2. Electronic non-programmble thermostats
3. Programmable thermostats
4. Smart thermostats (IF NECESSARY: Smart thermostats can be controlled by a smartphone, tablet or computer)
96. (Other) [SPECIFY_______________])
98. (Don't know)
99. (Refused)

I3. Smart thermostats can be controlled by a smartphone, tablet or computer, which makes it easy to program and track your energy use.) How familiar, if at all, are you with smart thermostats? Are you… (IF NECESSARY: CODE ONLY ONE

1. Very familiar
2. Somewhat familiar
3. Not very familiar
4. Not at all familiar
98. (Don't know)

I4. Are there any smart thermostats currently installed at your home? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No
98. (Don't Know)
99. (Refused)

I5. How important are the following aspects when purchasing thermostats for your home? Please answer on a scale of 0 to 10, where 0 means 'not at all important' and 10 means 'extremely important'. [ROTATE. RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

a. The price of the thermostats
b. The appearance or look of the thermostats
c. Using the same type of thermostats throughout my entire home/Uniformity
d. Purchasing the most energy-efficient type of thermostats
e. Easy to use/program
f. Pre-programmed schedule for weekdays and weekends (setting Options)

Barriers to Completing Energy Efficiency Projects (B Series)

B1. How important are the following aspects in preventing your home from implementing energy-efficient upgrades? Please answer on a scale of 0 to 10, where 0 means 'not at all a barrier' and 10 means 'a major barrier'. [ROTATE. RECORD RESPONSE BETWEEN 0 AND 10. 98=DON'T KNOW, 99=REFUSED]

a. Financial challenge such as lack of funds
b. Time constraint, that is, not able to find time to implement energy-efficient upgrades
c. Lack of information about possible energy efficiency rebates or programs
d. Lack of information about energy-efficient upgrades
e. Not convinced of the economic value of energy-efficient upgrades
f. Not knowing how to do the work yourself or having to hire contractors

Demographics (D Series)

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

D1. What type of residence do you live in? [READ RESPONSES, SELECT ONE RESPONSE]

1. Detached single-family home
2. Semi-detached house
3. Mobile home or house trailer
4. Townhouse or duplex with shared adjacent walls
5. Row house (Single story apartment building)
6. Apartment/condo building that have fewer than five stories
7. Apartment/condo building that have five or more stories

96. (Other [SPECIFY: ________________________])
98. (Don't know)
99. (Refused)

D2. Including yourself, how many people live in this residence on a full-time basis?
Number of people: ______________

D3. In what age category do you fall? Are you… [READ]

1. 18 to 24
2. 25 to 34
3. 35 to 44
4. 45 to 54
5. 55 to 64
6. 65 or over

99. (Refused)

D4. What is the highest level of education you have completed? [DO NOT READ]

1. (Less than high school graduation certificate)
2. (High school graduation certificate and/or some post-secondary)
3. (Trades certificate or diploma)
4. (College certificate or diploma)
5. (University certificate or diploma)
98. (Don't know)
99. (Refused)

D5. Which of the following income categories best describes your total annual household income before taxes in 2016? Stop me when I reach the right category. [READ LIST; SELECT ONE RESPONSE]

1. Less than $15,000
2. $15,000 - $24,999
3. $25,000 - $34,999
4. $35,000 - $49,999
5. $50,000 - $69,999
6. $70,000 - $79,999
7. $80,000 or more
98. (Don't know)
99. (Refused)

D6. [DO NOT READ] Gender:

1. Male
2. Female

Testimonial (T Series)

T1. Newfoundland Power and Newfoundland and Labrador Hydro are looking for participants who are in sharing their experience with the program. Would you be interested in doing a testimonial for the program?

1. Yes
2. No

READ IF NEEDED: The testimonial would be a video posted on our website.

T2. [IF YES in T1] Please provide your full name and a phone number of your choice, so Newfoundland Power or Newfoundland and Labrador Hydro can reach you. This information will only be used for the purpose of this testimonial.
FULL NAME: _________
Phone number: ________

END. Those are all the questions I have for you. I thank you very much for your time and cooperation.

APPENDIX II
PARTICIPANT DEMOGRAPHICS

This appendix presents the demographic profile of the survey respondents.

The vast majority of participants live in a single-family detached home.

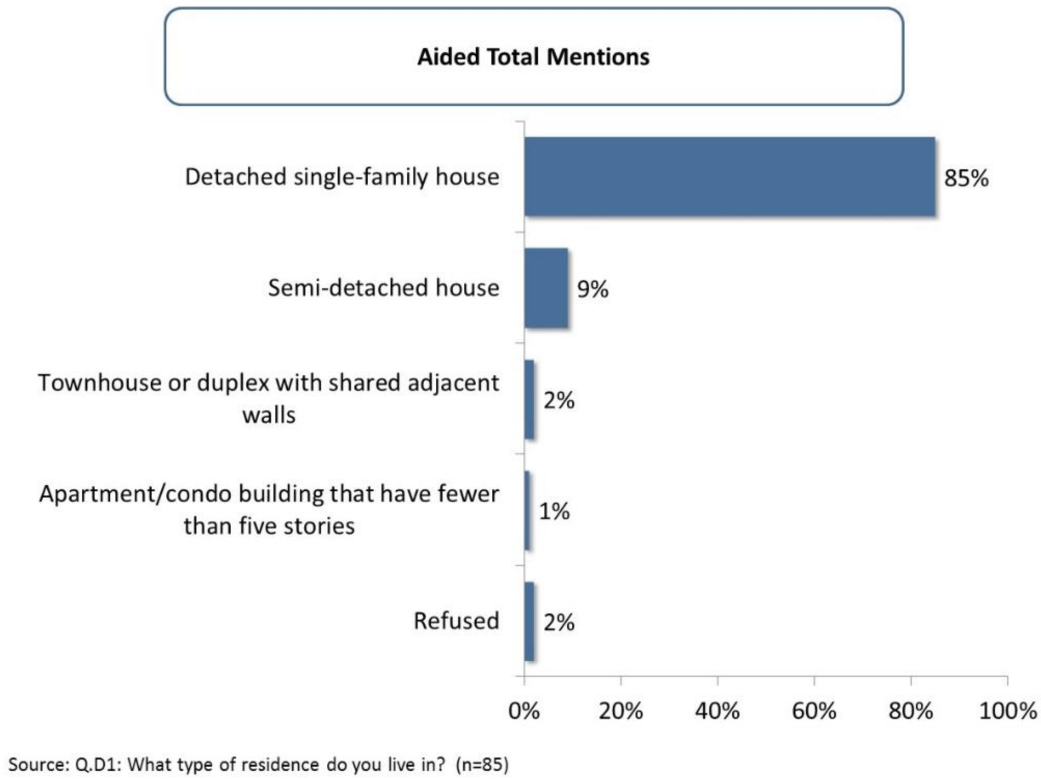


Figure 13: Type of Residence

Including themselves, most participants live in a home consisting of two or more individuals (94%). Four in ten participants live with one other individual.

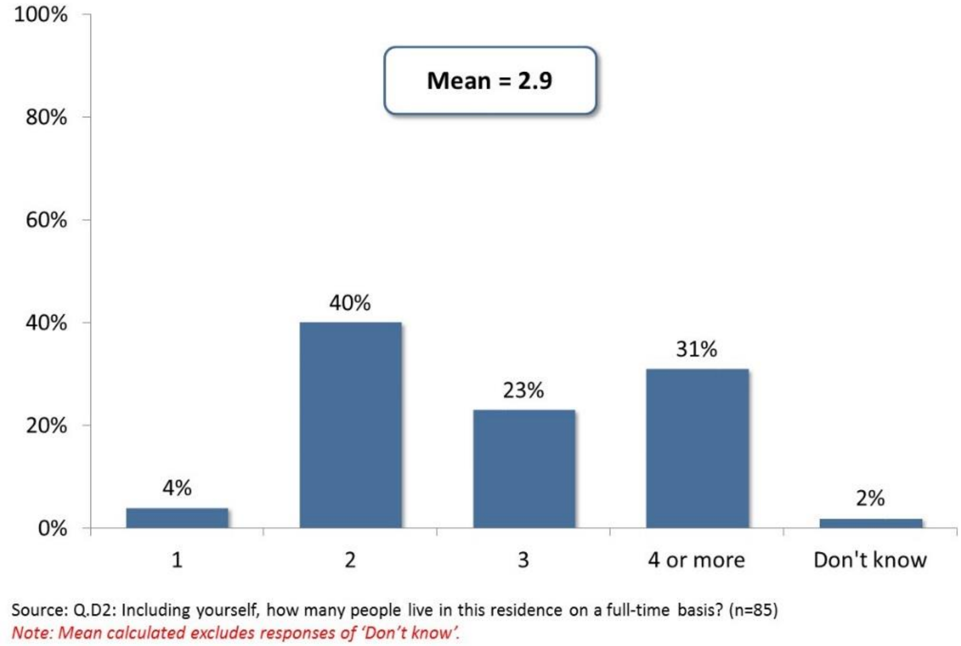


Figure 14: Number of People Living in Residence on Full-time Basis

Slightly over one-half of participants (55%) are between the ages of 45 and 64.

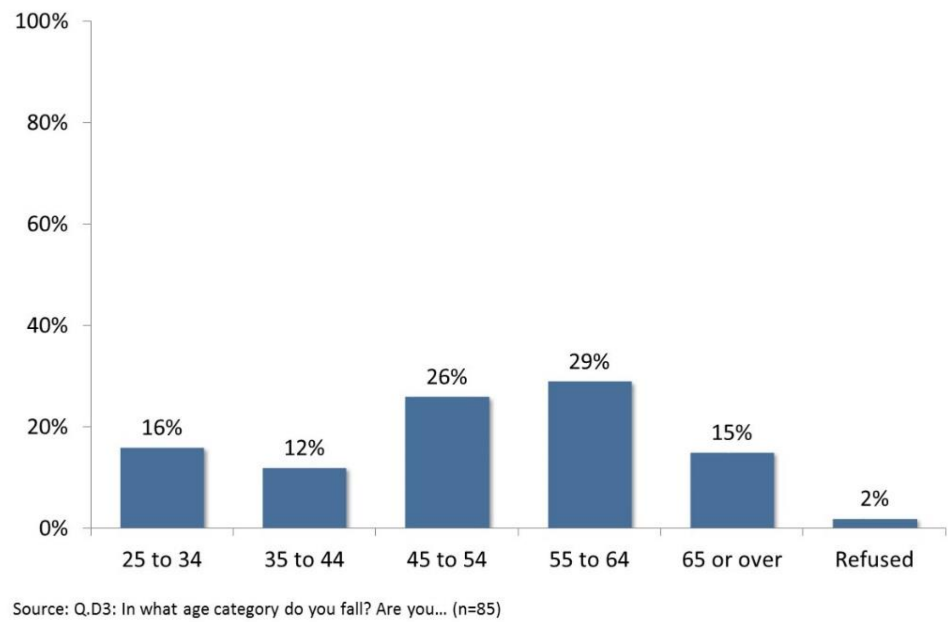
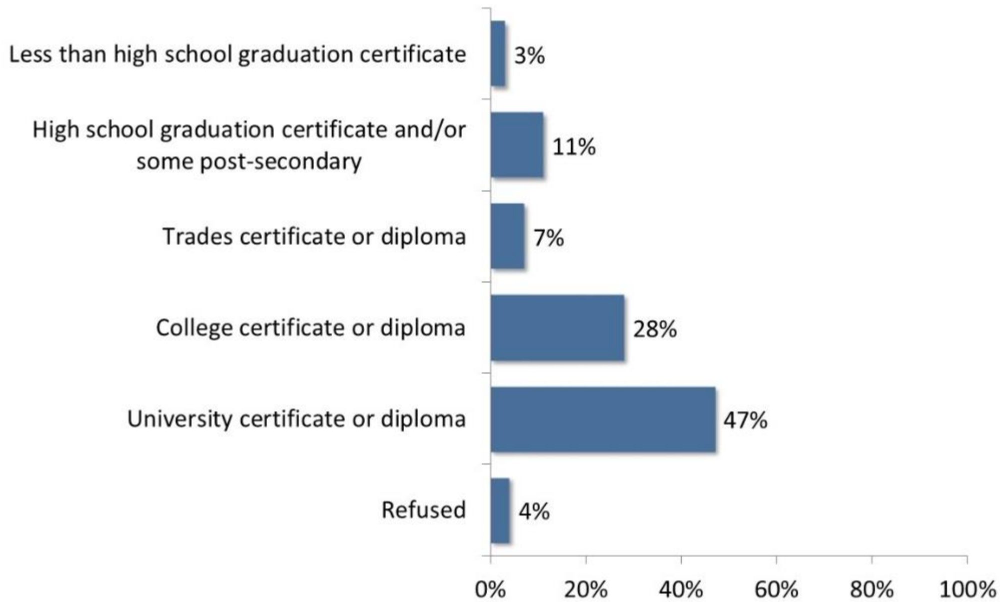


Figure 15: Age Category

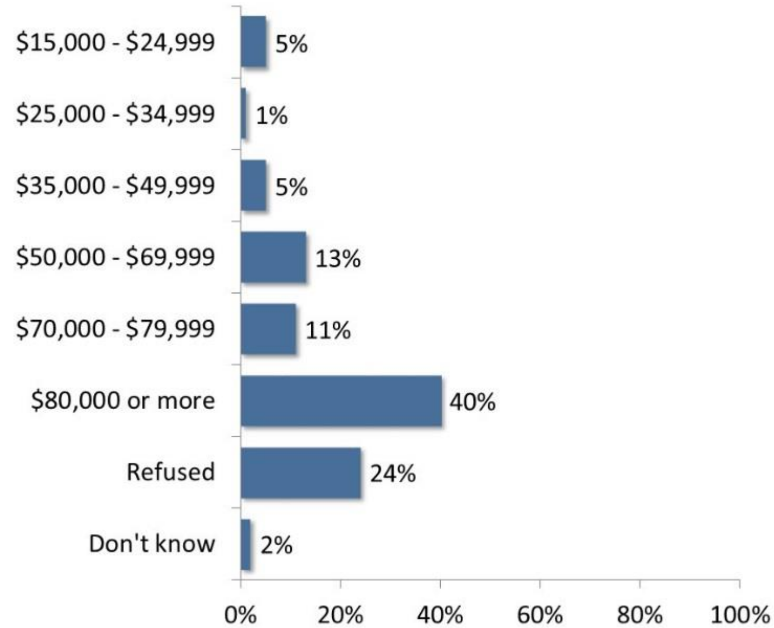
Three-quarters of participants have achieved either a University or College level diploma or certificate, indicating a high level of education among participants.



Source: Q.D4: What is the highest level of education you have completed? (n=85)

Figure 16: Highest Level of Education Completed

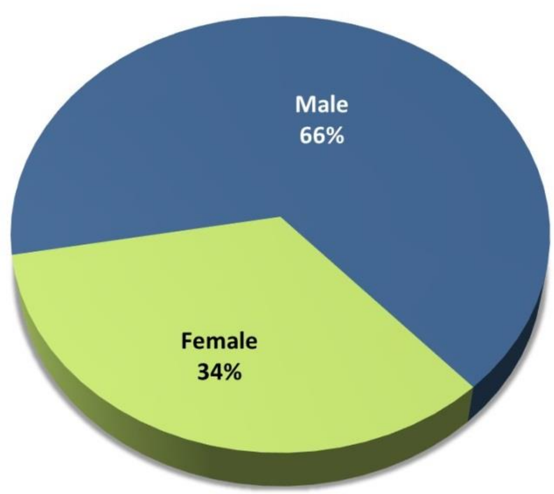
The majority of participants have an annual household income exceeding $50,000 (64%), while four in ten have household incomes exceeding $80,000.



Source: Q.D5: Which of the following income categories best describes your total annual household income before taxes in 2016? (n=85)

Figure 17: Annual Household Income in 2016

Participants are twice as likely to be male than female.



Source: Q.D6: Gender. (n=85)

Figure 18: Gender

APPENDIX III
RETAILER INTERVIEW GUIDE

Date	
Company name	
Name	
Area code and phone number	
Email	
Territory	NFP or NLH, or both
Interview length	

Key Research Area	Related Questions
Involvement in the program	A1, A2
Customer awareness	B1, B2
Use of and satisfaction with promotional materials/Program promotion	B3a-b-c-d, B4, B5
Factors influencing customer purchase decisions	B6
In-store offer and prevalence of smart thermostats	B7a-b
Relationship with NFP and NLH/Program support	C1, C2, C3
Satisfaction with program support	C4
Satisfaction with the program	D1
Barriers and recommendations for improvement	D2, D3, D4
Questions about the Insulation Rebate Program	E1, E2, E3, E4

Introduction

Hello, I am with CRA, Corporate Research Associates, an Atlantic Canadian research company. We are conducting an evaluation of energy efficiency programs provided by Newfoundland Power and Newfoundland and Labrador Hydro. As part of this research, we are looking to speak with retailers who are involved in the Thermostat Rebate Program. We would appreciate your feedback regarding your involvement in this program, to help Newfoundland Power and Newfoundland and Labrador Hydro improve the program. The interview should last about 20 minutes. Are you the person we should be speaking with regarding your organization's involvement in the program? **IF NOT, REINTRODUCE WITH NEW CONTACT – SCHEDULE INTERVIEW**

Recording of the Interview

Please note that the interview will be recorded for transcription purposes only. The recording will remain strictly confidential—no names will ever be mentioned in the evaluation report.

Do you have any questions before we begin?

Partner Involvement

A1. To begin, can you please describe your involvement in the Thermostat Rebate Program?

A2. For how long have you been a participating retailer for the Thermostat Rebate program?

Program Awareness and Promotion

B1. Are consumers recognizing the takeCHARGE brand?

Yes
No

B2. What would you say is the level of awareness of the Thermostat Rebate Program specifically among customers who visit your store(s)?

B3a. Do you use any materials provided by the program to promote the program in your stores?

Yes
No

B3b. [IF NO IN B3a] Why don't you use the promotional materials provided by Newfoundland Power and Newfoundland and Labrador Hydro?

B3c. [IF YES IN B3a] Do you use these materials in all of your stores? If not, why?

Yes
No

B3d. [IF YES IN B3a] Do you have procedures in place to ensure that these materials are properly and consistently installed throughout your participating stores?

Yes
No

B4. [IF YES IN B3a] Overall, how satisfied are you with the promotional materials provided by the program?

Very satisfied
Somewhat satisfied
Neither satisfied nor dissatisfied
Somewhat dissatisfied
Very dissatisfied
Explain response:

B5. What type of training, information or promotional materials, if any, is missing to help store staff better understand or promote the program?

B6. In your opinion, what are the key factors that can make customers hesitate between purchasing programmable and electronic non-programmable thermostats?

B7a. Does your in-store offer of thermostats include smart thermostats?

Yes
No

B7b. [IF NO IN B7a] Why don't you offer smart thermostats?

Program Support

C1. I want to understand more about your working relationship with Newfoundland Power and/or Newfoundland and Labrador Hydro. How often, if at all, do you communicate with someone from the program?

C2. What do you communicate about with the program staff and are you able to get your questions answered well and in a timely manner?

C3. What service or support, if any, would you like to see from Newfoundland Power and/or Newfoundland and Labrador Hydro to help you with the program? Why?

C4. Overall, how satisfied have you been with Newfoundland Power and/or Newfoundland and Labrador Hydro in terms of providing you with the service and support you need to deliver the program to your customers? Why? [PROBE: Have you received information you need in a timely manner? Are staff easy to work with?]

Very satisfied
Somewhat satisfied
Neither satisfied nor dissatisfied
Somewhat dissatisfied
Very dissatisfied

Explain response:

Program Satisfaction, Barriers and Recommendations

D1. Overall, how satisfied are you with the Thermostat Rebate Program? Why?

Very satisfied
Somewhat satisfied
Somewhat dissatisfied
Very dissatisfied

Explain response:

D2. What prevents customers from installing electronic thermostats? [Probe: programmable and non-programmable thermostats]

D3. In your opinion, what impedes the delivery of the Thermostat Rebate Program? Please list barriers in order of importance, with the first one listed being the greatest impediment.

D4. What suggestions do you have to improve the program? This can include feedback from your store staff.

Insulation Rebate Program

Before we finish, I would like to ask you a few questions about the Insulation Rebate Program as I understand you are also involved in that program by Newfoundland Power and Newfoundland and Labrador Hydro.

E1. Overall, how satisfied are you with the Insulation Rebate Program? Why?

Very satisfied
Somewhat satisfied
Somewhat dissatisfied
Very dissatisfied

Explain response:

E2. What prevents customers from upgrading insulation in their home?

E3. In your opinion, what impedes the delivery of the Insulation Rebate Program? Please list barriers in order of importance, with the first one listed being the greatest impediment.

E4. What suggestions do you have to improve the program? This can include feedback from your store staff.

Thank you very much for your time and co-operation.

APPENDIX IV
FREE-RIDERSHIP ALGORITHM

FR1. Did you have plans to install electronic or programmable thermostats in your home before you learned about the Thermostat Rebate Program?	IF 1. yes → CONTINUE IF 2. no → Go to FR4 IF 98 OR 99 → Go to FR4
FR2. If you had not received the rebate for your thermostats, what is the likelihood that you would have paid for the full cost of the thermostats purchased? (Scale 0 to 10)	FR2 = Answer x 10% IF 98 OR 99: FR2 = EMPTY
FR3a. [Ask if n_therm>1] If the program had not been offered, what is the likelihood that you would have installed fewer electronic or programmable thermostats in your home? (Scale 0 to 10)	FR3a = (10 − Answer) x 10% IF 98 OR 99: FR3a = EMPTY
FR3b. [Ask if n_prog_therm>0] If the program had not been offered, what is the likelihood that you would have installed non-programmable electronic thermostats instead of the one installed through the program? (Scale 0 to 10)	FR3b = (10 – Answer) x 10% IF 98 OR 99: FR3b = EMPTY
FR3c. [Ask if FR2>5] If the program had not been offered, what is the likelihood that you would have postponed installing these new thermostats by at least one year? (Scale 0 to 10)	FR3c = (10 − Answer) x 10% IF 98 OR 99 : FR5 = EMPTY
Inconsistency Test – Revised FR2	IF (FR2-FR4a)>50% FR2 = FR2/2
Intention Score:	**IF FR1 = NO → 0% ELSE → MEAN VALUE OF: (FR2; MEAN(FR3a;FR3b;FR3c))**
FR4a. Level of influence of the rebate offered by the program for the purchase of your new thermostats (Scale 0 to 10)	FR4a = (10 – Answer) x 10% IF 98 OR 99: FR4a = EMPTY
FR4b. Level of influence of the information provided by the program on the electronic and programmable thermostats, such as the brochure and the Program Your Comfort videos (Scale 0 to 10)	FR4b = (10 – Answer) x 10% IF 98 OR 99: FR4b = EMPTY
FR4c. Level of influence of a previous experience with the Thermostat Rebate program or with another TakeCHARGE programs (Scale 0 to 10)	FR4c = (10 – Answer) x 10% IF 98 OR 99: FR4c = EMPTY
Influence Score:	**IF FR1 = NO → 0% ELSE → MIN OF: (FR4a; FR4b; FR4c)**
Free-ridership	**MEAN VALUE OF : (Intention Score; Influence Score)**

APPENDIX V
SPILLOVER ALGORITHM

SO1. Since your participation to the Thermostat Rebate Program, did you install electronic or programmable thermostats in your home **without receiving any incentives** or rebate from a TakeCHARGE program?	IF 1. yes → Go to SO2 IF 2. no → CONTINUE IF 98 OR 99 → END
SO1a. Let me make sure I understand correctly, you have installed electronic or programmable thermostats in your home without receiving any incentives or rebate from a TakeCHARGE program and do not intend on asking for a rebate?	IF 1. yes → CONTINUE IF 2. no → END IF 98 OR 99 → END
SO2. How many electronic/progrmmable thermostats did you install? Number of electronic thermostats Number of programmable thermostats	SO2 = (N° Elec Thermo x Unitary Savings) + (N° Prog Thermo x Unitary Savings) IF 98 OR 99: SO2 = EMPTY
SO3. How influential was your experience with the Thermostat Rebate Program on installing these new electronic or programmable thermostats? (Scale 0 to 10)	SO3 = Answer x 10% IF 98 OR 99: SO3 = EMPTY

Final Spillover Level = $\dfrac{\textbf{SUM of (SO2 x SO3) for All Respondents}}{\textbf{SUM of Program Savings for All Respondents}}$

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BENCHMARKING PROGRAM EVALUATION

NEWFOUNDLAND POWER AND NEWFOUNDLAND AND LABRADOR HYDRO

Final Report

November 29, 2017

ECONOLER

ACRONYMS

DID	Difference-in-differences (model)
HER	Home energy report
NLH	Newfoundland and Labrador Hydro
NP	Newfoundland Power
RCT	Randomized controlled trial

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EXECUTIVE SUMMARY

This report presents the results of the first evaluation of the Benchmarking Program. Launched in December 2016, this program is designed to help Newfoundland and Labrador customers reduce their energy consumption by changing their behaviours. The program provides residential customers with home energy reports (HERs) that illustrate their energy usage patterns and provide personalized and targeted energy efficiency tips to help them reduce their energy consumption. The HERs allow participating households to compare their energy usage with similar homes.

In addition, customers have access to a web portal that provides an interactive and individualized experience and more information on energy efficiency to help customers achieve more energy savings.

The impact of such a program on customers' energy efficiency behaviours is assessed by comparing a control group and a treatment group. The treatment group is defined as the group of households which are selected to receive HERs.

The program is jointly administered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH); it is delivered by a third-party service provider.

Summary of Evaluation Assignment

Econoler (hereinafter referred to as "the Evaluator") was hired by NP to evaluate the program during its design and delivery stages. The objectives set for this evaluation include:

- To assess the integrity of the program design by validating the selection of the treatment and control groups;
- To assess the effectiveness of program delivery and implementation;
- To evaluate the effects and impacts of the program on customers;
- To determine the customers' levels of satisfaction with the HERs and the web portal;
- To validate the net energy and peak demand savings;
- To identify areas of improvement and make recommendations on how to improve the program.

Summary of Evaluation Findings

To achieve these objectives, the Evaluator got involved in the program before its launch to first assess whether the service provider had selected the treatment and the control group in a valid and appropriate manner. The Evaluator verified whether the process to randomly assign households into one of the two groups, namely a treatment group and a control group, was done properly so as to avoid any bias in the savings calculations. By examining the data and information about the selected households' energy consumption, demographic profiles and geographical locations, the Evaluator concluded that the treatment and control groups were selected according to industry best practices and that the program could continue to be implemented using this population.

The next evaluation step involved conducting a first assessment of the customers' perceptions of and experiences with the program. This assessment was done through a telephone survey, by which 300 customers from the treatment group were contacted approximately six months after they had received their first HER to gather feedback about their satisfaction and opinions regarding the HERs and the web portal, as well as about the impacts that the HERs had on any new behaviours or energy-related actions at home. What follows is a summary of the main findings from the survey.

About the HERs:

- Four in 10 participants read their HERs thoroughly, while one-quarter read only some of the content. In contrast, only six percent did not read their HERs.
- Of those who had read or at least glanced at their reports, one-half provided a rating of 8, 9, or 10 (on a scale of 0 to 10 where 0 means "not at all satisfied" and 10 means "completely satisfied"). The most common reasons cited for satisfaction with the HERs included that they provided energy-usage information, energy-usage comparisons among the years, good energy-saving tips or information, and comparisons with other houses. Among participants who were less satisfied with their HERs, they cited inaccurate information and the report not being useful as the most common reasons.
- Overall, customers had mixed feelings, however, about the usefulness of the energy efficiency tips and comparisons made to other similar houses, with some customers finding the tips and house comparisons inaccurate.
- On a positive note, the information found in the reports was deemed clear and easy to understand.
- Four in 10 participants indicated the reports increased their understanding of their home's energy use and how to manage it. Three in ten participants admitted that they had a more favourable perception of their utility after receiving the HERs.
- Most participants were already taking at least some of the energy-related actions proposed in the HERs before they received them. It was found, however, that the reports had the biggest impact on prompting customers to start taking the following actions: installing faucet aerators, checking refrigerator or freezer temperatures, and reading their television manual to better understand its features.

About the Web Portal:

- Of those customers who recalled signing up, one in 10 have visited the portal regularly. Four in 10 have used the portal a few times and read at least some or all of the content, while one-third have only browsed it and glanced at the content.
- The level of overall satisfaction with the web portal was similar to that of the HERs, with about one-half of survey respondents providing a rating of 8 or higher. While some customers found the information provided by the portal useful, others wanted more and new information not yet contained in the HERs.
- For more than eight in 10 respondents, the process for signing up and creating an account was simple and straightforward. As with the HERs, the vast majority of customers found the information on the web portal clear and easy to understand. Furthermore, the portal was deemed user-friendly.
- Again, the energy efficiency tips and house comparisons found on the portal received mixed reviews from portal users.

In its evaluation of the program savings, the Evaluator has found that the evaluated energy savings for each of the four months are similar to those calculated and reported by the service provider. Some discrepancies were found, but they are significantly smaller than the margins of error, which means that the evaluated and the reported savings are equivalent within the margin of error. However, it should be noted that NLH's evaluated savings vary widely, leading to big margins of error, which is not surprising, considering that this utility's treatment and control groups have a smaller sample size.

The program's total energy savings are below the original and the updated targets set. Since the savings data for only four months (January, February, March and April 2017) was analyzed, it is still early to come to any definitive conclusion about the program's performance in terms of savings or whether the program is following the typical trend for behavioural programs.

To avoid double-counting the savings already accounted for through the individual takeCHARGE programs themselves, the Evaluator compared the treatment and the control groups regarding their participation in the following programs: (1) the Appliances and Electronics Rebates Program, (2) the Heat Recovery Ventilator Rebate Program, (3) the Insulation Rebate Program, and (4) the Thermostat Rebate Program. In cases where a statistically significant difference was observed between the treatment and the control groups, deductions were made to the evaluated savings. This was the case for NP customers who participated in the Thermostat Rebate Program, the Insulation Rebate Program and the Appliances and Electronics Rebates Program.

The following table summarizes the program savings validation results and compares the evaluated savings with the program's targets and reported savings.

Table 1: Summary of Program Savings from January through April 2017

Parameters	Utility	Targets	Reported Results	Evaluated Results
Energy Savings				
Energy Savings before Program Participation Deductions (GWh)	NP	2.618	2.424	2.468
	NLH	0.024	0.242	0.240
	Total	**2.642**	**2.666**	**2.708**
Program Participation Deductions (GWh)	NP	-	-	0.072
	NLH	-	-	-
	Total	-	-	**0.072**
Net Energy Savings – at the Meter (GWh)	NP	2.618	2.424	2.396
	NLH	0.024	0.242	0.240
	Total	**2.642**	**2.666**	**2.284**
Peak Demand Savings				
Net Peak Demand Savings – at the Meter (MW)	NP	-	0.822	0.426
	NLH	-	0.099	0.035
	Total	**-**	**0.921**	**0.461**

1 OVERVIEW OF THE EVALUATION

Econoler (hereinafter referred to as “the Evaluator”) was hired by Newfoundland Power (NP) to conduct a process and impact evaluation of their Benchmarking Program. This section describes the evaluated program, and the evaluation’s objectives, scope and methodology.

1.1 Program Overview

Launched under the takeCHARGE initiative, the Benchmarking Program helps Newfoundland and Labrador customers reduce their energy consumption by changing their behaviours. It is meant to improve energy efficiency in the province’s homes by increasing customer awareness and knowledge of energy efficiency, as well as by encouraging the adoption of energy-efficient behaviours and the participation in other takeCHARGE programs. Specifically, the program provides over 55,000 residential customers from both NP and Newfoundland and Labrador Hydro (NLH) with home energy reports (HERs) by mail and/or email. HERs are sent to participants to illustrate their energy usage patterns and provide personalized and targeted energy efficiency tips to help them reduce their energy consumption. The reports allow participating households to compare their energy usage with similar homes. The rationale behind the Benchmarking Program is that the reports will encourage the participating households to change their behaviours to reduce their energy consumption when compared to their peers.

In addition, customers have access to a web portal (called the MyHome Portal). This web portal is offered to all customers across the province on an opt-in basis and provides customers with an interactive and individualized experience, which helps them set goals to achieve home energy savings, obtain tips and recommendations to reinforce energy-saving actions, create a savings plan, and compare their home’s energy consumption with similar homes, among other things, to help them reduce their consumption throughout the year.

Such a program uses a control group and a treatment group to assess its impact on customers’ energy efficiency behaviours. The treatment group is defined as the group of households that are selected to receive HERs. The households in the control group do not receive HERs and thereby serve as a comparison group. To be comparable, the two groups must share similar attributes and be selected following to the same criteria. The primary eligibility criteria for selecting the treatment and control groups are that the customers must:

› Be homeowners;
› Have at least 13 continuous months of bill data;
› Have at least a total annual electricity consumption of 12,000 kWh for NP customers and 14,000 kWh for NLH customers.

The NP treatment and control groups consist of 55,987 and 22,408 customers respectively. The NLH treatment and control groups consist of 1,461 and 4,383 customers respectively.

The program was launched in early December 2016 and is scheduled to run until 2019. Since its launch, five reports have been sent to customers in the treatment group (in December, January, February, March and August). More reports are planned for later months in 2017.

Tendril Networks (hereinafter referred to as "Tendril" or "the service provider") was hired by NP and NLH to design and deliver the program. The following table summarizes the two utilities' and Tendril's roles and responsibilities related to the program.

Table 2: The Utilities' and Tendril's Roles and Responsibilities

Organization	Roles and Responsibilities
NP/NLH	› Provide accurate customer data regarding both the control and treatment groups; › Collaborate with the service provider in developing and implementing the program; › Oversee program implementation.
Tendril	› Select a control group and a treatment group; › Design, develop, host, maintain and manage the program and its components; › Design and distribute related marketing materials; › Provide monthly savings reports, with information and data about energy savings and demand reduction; › Provide monthly reports on portal use involvement.

1.2 Evaluation Objectives and Scope

The Evaluator was asked to evaluate the Benchmarking Program at its design stage (before program launch) and after its delivery stage (after program launch). Before program launch, the Evaluator assessed the soundness of the program design by validating whether the treatment and control groups were properly selected.

After the program was launched, the evaluation was carried out to achieve the following objectives:

- To assess the effectiveness of the program delivery and the extent to which the program's implementation is proceeding as planned;
- To evaluate the program's effects and impacts on customers;
- To determine participants' levels of satisfaction with the program and identify areas for improvement;
- To determine the program's net energy and peak demand savings and compare them to the savings reported for the months of January, February, March and April 2017;
- To make recommendations on how to improve the program in general and those components that have not yet yielded the desired outcomes.

1.3 Evaluation Methodology

To achieve the above objectives, the Evaluator followed a methodological process, as illustrated in the following diagram:

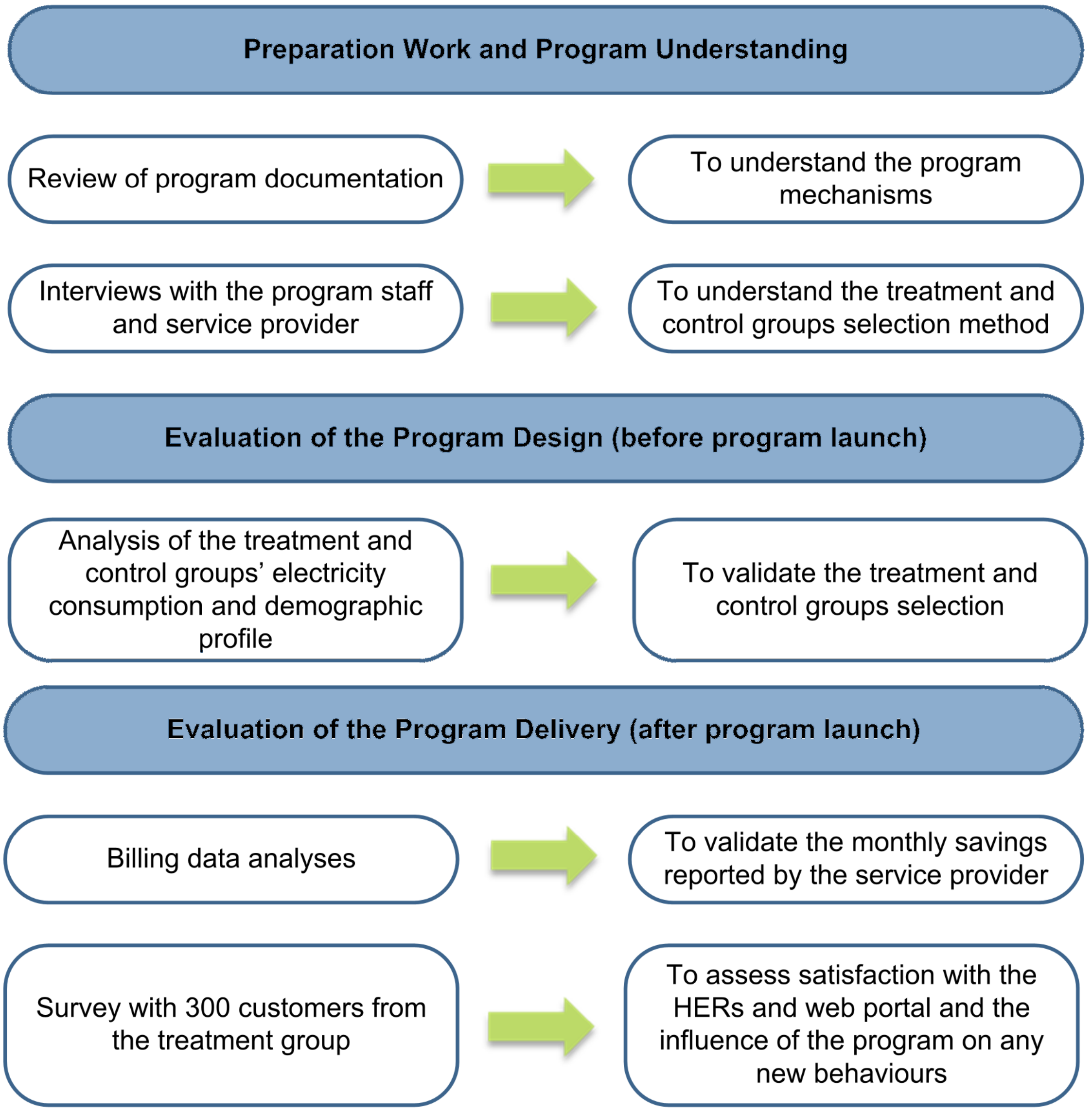


Figure 1: Methodological Process

The Evaluator worked with Corporate Research Associates to carry out the telephone survey.

The following sections present the results of the (1) validation of the treatment and control groups' selection, (2) evaluation of the program's savings, and (3) assessment of program satisfaction and influence.

2 VALIDATION OF THE PROGRAM SELECTION

To ensure that program savings are well calculated and unbiased, it is essential to assess whether the control group selected is comparable to the treatment group. Prior to program launch, the Evaluator validated whether Tendril's selection of the treatment group and the control group was properly carried out based on electricity consumption data. To complete this first analysis and confirm whether the selection approach used followed all the relevant industry best practices, other analyses were performed to verify whether the characteristics of the households and their geographical locations in the treatment group and the control group are similar. The methodology and results of these analyses are discussed in the following subsections.

2.1 Validation of the Selection Based on Electricity Consumption Data

The Evaluator carried out validation to ensure that the electricity consumption values of both treatment and control groups are statistically similar and follow the same trend. To do so, the Evaluator first reviewed the method used by Tendril to randomly assign the households to each group. Then, the Evaluator analyzed the average daily electricity consumption values of each group to ensure that they not only were comparable, but also followed a relatively similar and steady trend in the years leading up to program launch.

2.1.1 Review of Tendril's Selection Method

Tendril carried out three steps to select the treatment and control groups:

- Cleaned up the dataset by dropping duplicates, overlapping or negative readings, apartments and condos (not duplexes), customers with insufficient billing information (billing data for at least 13 months required), outlier accounts with very high electricity consumption, accounts with three or more electric meters, and customers located in Labrador;
- Identified customers with the highest savings potential, i.e., at least an annual total electricity consumption level of 12,000 kWh for NP customers and 14,000 kWh for NLH customers;
- Assigned the customers to one of the two groups randomly, using a randomized controlled trial (RCT) approach;
- Validated the appropriateness of this random selection method by comparing the selected customers' daily consumption levels and verifying whether their geographic distribution was representative.

The Evaluator came to the conclusion that Tendril had made the right choices in identifying the electricity high-users and had made the appropriate selection of households into the treatment and the control groups. The selection methodology followed the main principles for evaluating a behavioural program, as recommended in "The SEE Action Guide: Evaluation, Measurement, and Verification (EM&V) of Residential Behaviour-based Energy Efficiency Programs", and adopted industry best practices for selecting treatment and control groups.

2.1.2 Analysis of the Pre-participation Electricity Consumption Trend

Both the treatment and control groups' pre-participation electricity consumption values were analyzed to ensure that the two groups were similar. In addition, a trend analysis was performed. Year -2 corresponds to the period of 13 to 24 months prior to participant selection; Year -1 represents the period of 0 to 12 months prior to the selection. Since the trend analysis had to cover the billing data for a period up to 24 consecutive months, some of the customers selected by Tendril had to be removed because they had insufficient billing information. In fact, Tendril used a selection criterion requiring available billing data for at least 12 months. The following table summarizes the results of this analysis.

Table 3: Analysis of Two-year Electricity Consumption Trend

Utility	Group	Year -2 (July 2014 to July 2015)		Year -1 (August 2015 to July 2016)		Trend between Year -1 and Year -2
		Average Daily Electricity Consumption (kWh)	Variation between Control and Treatment Groups	Average Daily Electricity Consumption (kWh)	Variation between Control and Treatment Groups	
NP	Control	59.26	-0.11%	58.71	-0.06%	-0.93%
	Treatment	59.18		58.67		-0.88%
NLH	Control	69.80	-0.23%	69.67	-0.70%	-0.19%
	Treatment	69.64		69.18		-0.67%

For each utility, the variation in the average daily electricity consumption values between the control and treatment groups was very low (below 1%), which was deemed acceptable. None of the variations represent a statistically significant difference. As for the trend between Year -2 and Year -1, NP's treatment and control groups showed similar margins of reduction in average electricity consumption (with both below 1%), which was also very low. Since the same trend was observed in both groups, it does not constitute an issue for program savings attribution. Probably because of a smaller sample size, the difference in trends between the two NLH groups was slightly higher than that between the NP groups. However, this NLH difference was not statistically significant and therefore does not constitute an issue in future savings calculations.

2.2 Validation of the Selection Based on Demographic Data

Using the demographic data received from Tendril, the following characteristics were examined for each utility: dwelling type, year of construction, living square footage and location. These demographic data originally came from various sources, including the utilities themselves, Newfoundland and Labrador municipal assessment offices and a local statistics agency.

The demographic data analysis results are shown in the following table.

Table 4: Household Characteristics

Category	NP		NLH	
	Control	Treatment	Control	Treatment
Number of Customers	**22,408**	**55,987**	**4,383**	**1,461**
Dwelling Type[1]				
Single-family	81.6%*	85.6%*	99.3%	99.6%
Multi-family	18.4%*	14.4%*	0.7%	0.4%
Year of Construction				
Before 1960	3.0%*	3.4%*	1.1%	1.2%
1960 to 1969	16.0%	16.4%	1.0%	1.3%
1970 to 1979	28.1%	27.6%	1.7%	1.5%
1980 to 1989	24.7%	25.0%	95.3%	95.2%
1990 to 1999	17.5%	17.3%	0.7%	0.7%
After 2000	10.7%	10.4%	0.2%	0.1%
Living Square Footage				
Less than 1,000	2.7%	2.8%	2.3%	2.5%
1,000 to 1,199	52.1%	52.0%	95.6%	95.2%
1,200 to 1,399	35.3%	35.6%	0.8%	1.0%
1,400 to 1,599	5.1%	5.1%	0.5%	0.5%
1,600 and Over	4.8%	4.6%	0.8%	0.8%
*These differences are statistically significant.				

The Evaluator conducted statistical tests to verify whether the variations in household characteristics between the control and treatment groups of each utility were statistically significant.

[1] The single-family dwelling type includes only detached homes, whereas the multi-family dwelling type includes any structure with shared walls, such as town houses/row houses, duplexes/triplexes and semi-detached homes.

For NLH, all the variations were very low (below 0.4%) and none was statistically significant.

As for NP, some of the variations observed were statistically significant. It should be noted that with very large sample sizes, like those used for the Benchmarking Program, even very small differences can be statistically significant. That said, because this program's energy savings are determined for the entire population, rather than by demographic segment, NP's treatment and control groups selected are valid, given that these two groups' average daily electricity consumption levels were very similar.

2.3 Validation of the Selection Based on Geographical Locations

Using municipal codes provided by NP and a detailed map of the locations of the NLH customers, each utility's treatment and control groups' home locations were analyzed.

The geographical location analysis results for each utility are shown in the following tables.

Table 5: Geographical Locations of NP Customers

Location/Region	NP	
	Control	Treatment
Number of Customers	**22,407**	**55,983**
Avalon	12.7%	12.8%
Bonavista	5.5%	5.3%
Burin	5.8%	5.7%
Corner Brook	7.0%	7.0%
Gander	6.3%	6.2%
Grand Falls	7.7%	8.2%
St. John's	49.5%	49.2%
Stephenville	5.5%	5.6%

Table 6: Geographical Locations of NLH Customers

Location/Region	NLH	
	Control	Treatment
Number of Customers	**4,247**	**1,415**
Central	15.0%	14.5%
Northern	53.8%	52.9%
Southern	31.2%	32.7%

The Evaluator conducted statistical tests to verify whether the variations in household locations between each utility's control and treatment groups were statistically significant. For NLH, none of the variations was statistically significant. For NP, in one case (Grand Falls), the variation was statistically significant. Considering that the variation is very small (below 1%), the Evaluator decided that this difference between NP's two groups is not big enough to affect program savings. As already mentioned about the validation using demographic data, very small differences can be statistically significant for large samples.

2.4 Conclusion about the Validation of the Selection

After completing the three kinds of validation, the Evaluator concluded that Tendril conducted the selection properly. The Evaluator found that the treatment and control groups had similar electricity consumption values and followed the same trend prior to participant selection, and that there was no other trend that could affect either group by introducing bias into the program savings calculations.

3 PROGRAM SAVINGS

This section reports on the program's energy and peak demand savings achieved in the months of January, February, March and April 2017. These savings were established by comparing the treatment group customers' consumption with that of the control group and can be accepted as the net savings, i.e., the changes in energy use specifically attributable to the program. Indeed, by using a control group in the comparison, the savings already include the program's influence on participants' decisions. Therefore, no additional free-ridership or spillover effects need to be applied to the savings established by this comparison. Moreover, because savings are established using the whole house's electricity consumption value, it has already factored in possible interactive effects.

However, one type of savings deduction had to be done to account for the savings due to participation in other takeCHARGE programs. Indeed, the HERs encourage the treatment group customers to participate in other takeCHARGE programs so as to generate savings in these other programs. Since the necessary savings deductions to be made were not taken into account in the savings calculations, these deductions were calculated in this evaluation.

3.1 Energy Savings

3.1.1 Reported Savings

Every month, Tendril, the service provider, conducts a billing analysis to determine the amount of energy savings achieved by the treatment group participants in that month. For the first three months of 2017, Tendril estimated the energy savings using a fixed-effects model. This analytical method combines both cross-sectional and time-series data in a panel dataset to simultaneously control the differences across the households and the differences across the periods in time. The fixed-effects model equation is expressed as follows:

$$ADC_{it} = \alpha_i + \beta_1 Post_t + \beta_2 Treatment_i \cdot Post_t + \beta_3 hdd_t + \beta_4 cdd_t + \varepsilon_{it}$$

Where:

- ADC_{it}= Average daily consumption (kWh) for Household i at Time t
- α_i= Household-specific intercept
- β_1= Coefficient for the change in consumption between pre- and post-participation periods for all customers
- β_2= Coefficient for the change in consumption for the treatment group in the post-participation period compared to the pre-participation period, and to the comparison group
- β_3= Coefficient for the change in consumption associated with a one-unit increase in heating degree-days
- β_4= Coefficient for the change in consumption associated with a one-unit increase in cooling degree-days
- e_{it}= Error term

For the month of April 2017, Tendril started using a simpler yet just as reliable method: the difference-in-differences (DID) model. Therefore, the fixed-effects model was not used by Tendril to estimate the April 2017 program savings. For a given month, the DID model compares the difference in the average daily consumption between the treatment and control groups before and after the program. Though a basic model, it is widely used by many jurisdictions to estimate savings achieved by behaviour-based energy efficiency programs offered to residential customers. Its equation is expressed as follows:

$$Total\ kWh\ Savings = \ [(PostAC_{CG} - PostAC_{TG}\ ) - \ (PreAC_{CG} - PreAC_{TG}\ )\ ]$$

$$\times\ Households_{TG}\ \times\ NumberTreatmentDays$$

Where:

- $PostAC_{CG}$= The control group's average daily consumption (kWh) in the post-program period
- $PostAC_{TG}$= The treatment group's average daily consumption (kWh) in the post-program period
- $PreAC_{CG}$= The control group's average daily consumption (kWh) in the pre-program period
- $PreAC_{TG}$= The treatment group's average daily consumption (kWh) in the pre-program period
- $Households_{TG}$= The total number of households in the treatment group
- $NumberTreatmentDays$ = The total number of treatment days

Tendril thinks that the DID model can establish reliable results similar to those established with the fixed-effects model. The fixed-effects and DID models are similar from a mathematical point of view and both are reliable. The DID model is only simpler to apply. The DID model was applied retroactively to recalculate the savings of the months of January, February and March 2017.

For each given month evaluated, the two surrounding months and that same month of the previous year (in this case 2016), were used to establish monthly consumption. These three months of the previous year are herein defined as the pre-program period, while the given month of the current evaluation year is defined as the post-program period. For instance, to calculate the savings of February 2017, the bills of January, February and March 2016 were used to calculate the average daily consumption in the pre-program period and the bill of February 2017 was used to calculate the average daily consumption in the post-program period. Tendril used this method to normalize the pre-program period average daily consumption and reduce unusual variations within a specific month.

Since billing data often overlap two calendar months, Tendril used the mid-point date of the billing period to determine to which month each bill should be assigned.

After establishing the average daily energy consumption values, the difference in the average daily consumption between the treatment and control groups before and after program participation was multiplied by the number of days of the given month and the number of participants who had available bills in the post-program period of that same given month.

These billing analysis results are submitted to NP and NLH in a monthly report, detailing the energy savings and the average percentages of savings achieved. The following table summarizes the program energy savings reported by Tendril for the months of January through April 2017.

Table 7: Reported Energy Savings of January through April 2017

	Fixed-effects Model				DID Model			
	January	February	March	April	January	February	March	April
NP								
Number of Participants (Treatment Group)	54,095	50,077	53,212	NA	54,095	50,077	53,212	52,598
Total Monthly Savings (kWh)	**314,521**	**453,445**	**1,007,773**	**NA**	**387,839**	**397,165**	**996,686**	**641,915**
Percentage of Monthly Savings (%)*	**0.20%**	**0.30%**	**0.74%**	**NA**	**0.25%**	**0.29%**	**0.76%**	**0.56%**
Margin of Error**	0.17%	0.17%	0.19%	NA	NA	NA	NA	0.11%
NLH								
Number of Participants (Treatment Group)	1,331	1,272	1,378	NA	1,331	1,272	1,378	1,174
Total Monthly Savings (kWh)	**70,173**	**69,137**	**74,269**	**NA**	**65,115**	**96,276**	**69,771**	**11,081**
Percentage of Monthly Savings (%)*	**2.00%**	**1.94%**	**2.26%**	**NA**	**1.86%**	**2.90%**	**2.10%**	**0.47%**
Margin of Error**	1.35%	1.71%	1.26%	NA	NA	NA	NA	0.57%
* For each month, the percentage of monthly savings is calculated by dividing the average daily savings by the average daily consumption of the control group.								
** Margins of error were calculated at a 90% confidence level.								

3.1.2 Evaluated Savings

To validate the monthly energy savings reported by Tendril, the Evaluator conducted billing analyses using the same billing data provided to Tendril by NP and NLH. The billing data contained monthly bills of participants from December 2015 to May 2017.

Before performing the analyses, the Evaluator cleaned the billing data by removing outliers, which were bills with an average daily consumption of 0 kWh or higher than 10,000 kWh per month, and duplicate bills. Sequential bills with the same start or end dates, and therefore a nil energy consumption, were also removed.

Similar criteria were applied by Tendril in cleaning the billing data. It should be noted that, for NP customers, very few bills (less than 1%) were removed after this cleanup. However, for NLH customers, quite a number of duplicates, overlapping sequential bills and bills showing an average daily consumption value of 0 kWh were found and removed from the analysis. Whenever sequential bills overlapped more than five days, the Evaluator retained only the actual billing data for its calculations. Sequential bills that overlapped fewer than five days were kept as is in the analysis.

For each month analyzed, the Evaluator retained the customers who had billing data available for the pre-program period of each month analyzed regardless of whether they had a bill for the given month in the post-program period.

Since billing data often overlap two calendar months, other actions had to be taken to establish the program savings on a calendar-month basis. To do so, after making several tests that showed similar consumption values, the Evaluator decided to use the same calendar-month definition as that used by Tendril. Therefore, the mid-point date of the billing period was used to define to which calendar month each bill belongs.

After cleaning the billing data and establishing the calendar-month bills, the Evaluator used the DID model to calculate the energy savings of each month. When used in a RCT context, as in the case of the Benchmarking Program, the DID model provides unbiased estimates of program energy savings. The difference in the average daily consumption between the pre- and post-program periods calculated for the control group provides a robust estimate of any non-program-related changes in energy consumption observed in the post-program period. Since the DID model not only takes into account all the factors that can cause consumption differences between the control group and the treatment group, but also allows for easy calculations and interpretation, the Evaluator has decided to use the DID model to calculate the program's monthly energy savings.

The Evaluator used the same methodology as Tendril to define the pre-program and post-program periods. Therefore, for each month analyzed, the three surroundings months of the previous year (2016, the pre-program period) were used and the given month of the current program year (2017) was used for the post-program period.

The following table lists the monthly savings figures established by the Evaluator and compares them with those established by Tendril using the DID model.

Table 8: Evaluated Energy Savings from January through April 2017 in Comparison with Those Reported by Tendril

	Evaluated Savings					Reported Savings				
	January	February	March	April	Total	January	February	March	April	Total
NP										
Number of Participants (Treatment Group)	54,242	52,271	53,555	53,397	-	54,095	50,077	53,212	52,598	-
Treatment Group's Average Daily Post-participation Consumption (kWh/participant)	93.7	90.2	82.3	71.7	-	NA	NA	NA	NA	-
Number of Customers in the Control Group	21,716	20,933	21,426	21,373	-	NA	NA	NA	NA	-
Control Group's Average Daily Post-participation Consumption (kWh/customer)	94.1	90.6	83.0	72.2	-	NA	NA	NA	NA	-
Average Monthly Savings (kWh/participant)	**7.1**	**6.9**	**17.8**	**14.0**	**-**	**7.2**	**7.9**	**18.7**	**12.2**	**-**
Margin of Error (kWh/participant)**	±6.2	±5.5	±5.9	±5.5	-	NA	NA	NA	NA	-
Percentage of Monthly Savings (%)*	**0.24%**	**0.27%**	**0.69%**	**0.65%**	**-**	**0.25%**	**0.29%**	**0.76%**	**0.56%**	**-**
Margin of Error (%)**	±0.21%	±0.22%	±0.23%	±0.26%	-	NA	NA	NA	±0.11%	-
Total Monthly Savings (kWh)	**382,707**	**359,885**	**955,180**	**746,771**	**2,444,543**	**387,839**	**397,165**	**996,686**	**641,915**	**2,423,605**
NLH										
Number of Participants (Treatment Group)	1,379	1,259	1,361	1,377	-	1,331	1,272	1,378	1,174	-
Treatment Group's Average Daily Post-participation Consumption (kWh/participant)	81.9	78.8	72.9	63.5	-	NA	NA	NA	NA	-
Number of Customers in the Control Group	4,135	3,792	4,113	4,155	-	NA	NA	NA	NA	-
Control Group's Average Daily Post-participation Consumption (kWh/customer)	83.3	81.1	74.1	63.0	-	NA	NA	NA	NA	-
Average Monthly Savings (kWh/participant)	**47.3**	**67.9**	**39.8**	**14.4**	**-**	**48.9**	**75.7**	**50.6**	**9.4**	**-**
Margin of Error (kWh/participant)**	±31.2	±28.1	±29.8	±23.8	-	NA	NA	NA	NA	-
Percentage of Monthly Savings (%)*	**1.83%**	**2.99%**	**1.73%**	**0.75%**	**-**	**1.86%**	**2.90%**	**2.10%**	**0.47%**	**-**
Margin of Error (%)**	±1.21%	±1.24%	±1.30%	±1.25%	-	NA	NA	NA	±0.57%	-
Total Monthly Savings (kWh)	**65,189**	**85,539**	**54,175**	**19,780**	**224,683**	**65,115**	**96,276**	**69,771**	**11,081**	**242,243**

* For each given month, the percentage of monthly savings is calculated by dividing the average daily savings by the average daily consumption of the control group.

**Margins of error were calculated at a 90% confidence level.

In the case of NP, the savings obtained by the Evaluator for each of the four months are similar to those calculated by Tendril. The small gaps observed can be explained by differences in data treatment. Similar criteria for cleaning data and defining calendar months as Tendril were used by the Evaluator, but it was not possible to reproduce the exact same data processing and analysis. Therefore, the numbers of treatment and control group customers kept for each analysis were different, which resulted in deviations between the savings results. However, all of these deviations are significantly smaller than the margins of error, which means that the evaluated and reported savings are equivalent within the margin of error. That said, the Evaluator still recommends using the evaluated savings for program tracking and monitoring because the Evaluator's methodology and data processing is well documented and all the necessary data to calculate the overall net savings are available.

As for NLH, the differences between the evaluated and reported savings are somewhat bigger. This is not surprising considering that NLH's treatment and control groups have a smaller sample size. Still, the same conclusion can be made about NLH's two groups: since the deviations are smaller than the margins of error, the evaluated and reported savings are deemed equivalent within the margin of error.

However, the margins of error for NLH are sometimes bigger than the savings value itself. This is true for the NLH April savings value. The Evaluator noted that the margins of error obtained for NLH are much higher than those obtained for NP. This is probably due to the smaller sample sizes of both NLH groups since the margins of error are directly linked to sample sizes. Moreover, as mentioned previously, duplicates and overlapping bills were found in the NLH billing data, thus requiring the Evaluator to carry out a number of data cleaning steps with what is already a fairly small sample size for this type of program. An actual savings effect can be seen however when the savings of the four months are added up, which also results in a margin of error that is smaller than the savings value. In the case of NP, there is a clear trend that the average consumption of the treatment group decreases compared to that of the control group. For this reason, the Evaluator concludes that the savings values established for each month can be claimed.

Because only four months passed, it is too soon to draw any definitive conclusions about the program savings. The program was launched later than initially planned. The first report was sent in December 2016 instead of in October 2016, thus leaving less time for participants to implement the measures before the cold period. Moreover, the first four HERs were sent over four consecutive months between December 2016 and March 2017, providing much information to participants, but leaving them not enough time to make real changes to their behaviour. Therefore, the remaining months of 2017 should see more savings and an increase in the gap between the savings and margins of error. Indeed, since the margins of error are directly linked to sample sizes and the differences in savings among the customers, these margins are more stable than the savings. If the savings increase in the subsequent program months, their relative margins of error will probably decrease and stay within a more acceptable range. For NP, it seems that the monthly savings are already showing an upward trend. As for NLH, the savings vary widely from month to month, considering its quite small sample sizes, which could explain the unusual high savings observed in January and February 2017 after the program was just launched and the drop in savings seen in March and April 2017. It will probably always be difficult to come to a definitive conclusion about the program performance of NLH's treatment group participants, and the margins of error will likely remain high. This particular situation will need to be further analyzed during the 2017 annual evaluation to determine how savings should be claimed with confidence for this utility.

3.1.3 Savings Deduction for Participation in Other Residential Programs

One of the goals of the Benchmarking Program is to increase participation in other takeCHARGE programs. Thanks to HERs, the treatment group participants are more encouraged to participate in other takeCHARGE programs than the control group customers.

To avoid double-counting the savings already accounted for through the individual takeCHARGE programs themselves, the Evaluator used the participants' utility account numbers found in the takeCHARGE programs' databases for the first few months of 2017 and compared the treatment and control groups' level of participation in the following programs: (1) the Appliances and Electronics Rebates Program, (2) the Heat Recovery Ventilator Rebate Program, (3) the Insulation Rebate Program and (4) the Thermostat Rebate Program. In cases where a statistically significant difference was observed between the treatment and control groups, deductions were made to the evaluated savings. As shown in the following table, such deductions were made for those NP customers who had participated in the Thermostat Rebate Program, the Insulation Rebate Program and the Appliances and Electronics Rebates Program.

Table 9: Comparison of the Level of Participation in Other takeCHARGE Programs

Program	Participation Level in the Treatment Group	Participation Level in the Control Group	Difference in Participation Level (if significant*)
NP			
Appliances and Electronics Rebates Program	0.77%	0.65%	0.12%
Heat Recovery Ventilator Rebate Program	0.06%	0.07%	-
Insulation Rebate Program	0.28%	0.19%	0.09%
Thermostat Rebate Program	0.71%	0.55%	0.16%
NLH			
Appliances and Electronics Rebates Program	0.00%	0.25%	-
Heat Recovery Ventilator Rebate Program	0.00%	0.00%	-
Insulation Rebate Program	0.07%	0.18%	-
Thermostat Rebate Program	0.34%	0.37%	-
*The Evaluator used a confidence level of 90% for the calculation.			

Savings deductions were therefore calculated for the three cases where a statistically significant difference in participation level was found. To calculate these deductions, the Evaluator estimated an average per-household net savings value associated with each program. Since the Benchmarking Program savings are only claimed for the first four months of 2017, the average savings value to be deducted was adjusted to be on a four-month basis, instead of on an annual basis. A total of 0.072 GWh was deducted from the program savings for the period of January through April 2017.

Table 10: Calculations of Savings Deductions Associated with Participation in Other Programs

	Difference in Participation Level	Number of Active Participants (Treatment Group)[2]	Average Net Savings Value per Participant (kWh)	Net Savings Deduction (GWh)
NP				
Appliances and Electronics Rebates Program	0.12%	53,600	28	0.002
Insulation Rebate Program	0.09%		899	0.043
Thermostat Rebate Program	0.16%		314	0.027
Total	**-**	**-**	**-**	**0.072**

Since the Instant Rebates Program participant information is not tracked in a program database, it was impossible to assess the difference in participation level using this same approach. However, considering that this program only runs over two specific campaign periods in a year and that, during these two periods, general advertising is done at the population level, the treatment and control groups probably will end up with a similar level of participation, though the treatment group is somewhat more exposed to the Instant Rebates Program promotion in their HERs. Therefore, the Evaluator considers it an acceptable choice not to make any deduction associated with participation in the Instant Rebates Program, though the survey results (see Subsection 4.4) show that the Instant Rebates Program was the most popular program in which the Benchmarking Program participants took part in the last six months. To validate the assumption that the treatment and control groups' level of participation is similar, a general population survey should be considered as a future data collection activity.

3.2 Peak Demand Savings

Peak demand savings correspond to the demand savings that coincide (in time) with the peak demand of the electricity system. The winter peak in Newfoundland and Labrador is from 7 a.m. to noon in the morning and from 4 p.m. to 8 p.m. in the evening on the four coldest days from December to March.

[2] At the end of April 2017.

3.2.1 Reported Savings

To calculate the peak demand savings, Tendril uses the assumption that demand reductions achieved by energy efficiency actions have a flat load profile. Based on this assumption, peak demand savings are determined by dividing the reported program energy savings by the total number of hours there are between January 1 and April 30 (2,880 hours). The reported peak demand savings were calculated using a peak demand-to-energy ratio of 0.347 MW/GWh.

3.2.2 Evaluated Savings

The flat-demand-profile approach used by Tendril to establish the program peak demand savings is a simple approach, which can be used in the absence of metering data or information about the measures implemented. This approach is based on the assumption that electricity demand stays quite constant over time.

For this evaluation, a survey was conducted with 300 participants and allowed the Evaluator to collect some information about the measures implemented during the first few months of the program. The Evaluator therefore conducted an analysis based on the specific measures reported by the surveyed participants as implemented and calculated an overall peak demand-to-energy ratio that can be applied to the program's net energy savings to establish the peak demand savings.

A peak demand-to-energy ratio was separately calculated for NP and NLH based on the answers of each group of customers. The 15 most implemented measures were taken into account in the peak demand-to-energy ratio calculations. They include energy efficiency actions recommended in the HERs (aided responses), but also other relevant energy efficiency actions reported by the participants as implemented during the survey (unaided responses).

For most of the energy efficiency actions, the corresponding peak demand-to-energy ratio is based on values provided by NP, which were developed by an external consultant.[3] These values were calculated based on energy and peak demand savings obtained from a technical potential study conducted for Hydro-Québec for similar energy efficiency measures.[4] While Hydro-Québec does not define the peak period similarly to NP, the two provinces nonetheless share similarities such as the system peak load occurring during the coldest days of the year. In the absence of 8,760-load shapes or simulation models developed specifically for Newfoundland and Labrador, the Evaluator considers the use of the peak demand-to-energy ratios provided by NP as adequate. For the few cases that were not covered in these documents, the Evaluator made other assumptions to establish a peak demand-to-energy ratio. For instance, the peak demand-to-energy ratios of the energy efficiency actions concerning programmable thermostats and insulation were based on the 2015-2016 Thermostat Rebate Program Evaluation and the 2015-2016 Insulation Rebate Program Evaluation

[3] Dunsky Energy Consulting, Design and Implementation of Provincial Residential Coupon Based Energy Efficiency Program, February 2012.
[4] Technosim inc., Potentiel techno-économique d'économie d'énergie électrique au Québec – Secteurs résidentiel, commercial et institutionnel (CI) et agricole, Report presented to Hydro-Québec, 2010.

Report. For other energy efficiency actions like turning lights off and unplugging appliances not in use, the Evaluator assumes that most lights or systems still need to be turned on or plugged in during peak hours.

The following table lists the peak demand-to-energy ratios established for all the energy efficiency actions reported by the surveyed participants as implemented. By applying the total number of times each action was implemented, the weighted average peak demand-to-energy ratio was established at 0.178 MW/GWh and 0.145 MW/GWh for NP and NLH respectively.

Table 11: Peak Demand-to-energy Ratios Associated with Energy Efficiency Actions

Energy Efficiency Action	Total Number of Participants who Implemented the Action under the Influence of the Program	Number of NP Participants Who Implemented the Action under the Influence of the Program	Number of NLH Participants Who Implemented the Action under the Influence of the Program	Peak Demand-to-energy Ratio (MW/GWh)	Source
Replace lightbulbs with more efficient LED bulbs	71	58	13	0.193	Newfoundland Power
Use dryer less	54	43	11	0.010	Newfoundland Power
Check the temperature of refrigerator or freezer	42	35	7	0.100	Newfoundland Power
Use caulking to seal gaps around windows, vents and exterior doors	21	19	2	0.689	Newfoundland Power
Install a low-flow showerhead	21	16	5	0.150	Newfoundland Power
Install/use programmable thermostats	19	19	0	0.309	From the 2015-2016 Thermostat Rebate Program Evaluation
Wash clothes in cold water	19	14	5	0.000	Newfoundland Power
Get rid of a second appliance (fridge or freezer)	18	8	10	0.116	Newfoundland Power
Clean the refrigerator condenser coils	17	17	0	0.100	Newfoundland Power
Turn lights off	17	16	1	0.000	Assuming that most lights still need to be turned on during peak hours
Change heating system/Install heat pump/wood stove	17	13	4	0.100	Newfoundland Power
Use outlet and switch insulators	16	14	2	0.424	From the 2015-2016 Insulation Rebate Program Evaluation

Energy Efficiency Action	Total Number of Participants who Implemented the Action under the Influence of the Program	Number of NP Participants Who Implemented the Action under the Influence of the Program	Number of NLH Participants Who Implemented the Action under the Influence of the Program	Peak Demand-to-energy Ratio (MW/GWh)	Source
Install more insulation/Insulate the basement	15	11	4	0.424	From the 2015-2016 Insulation Rebate Program Evaluation
Unplug things not in use	10	8	2	0.000	Assuming that most systems still need to be plugged in during peak hours
Install new windows/doors	9	9	0	0.256	Newfoundland Power
Weighted Average Demand-to-energy Ratio	**-**	**0.178 MW/GWh**	**0.145 MW/GWh**	**-**	**-**

Both the reported and evaluated peak demand savings are likely to contain errors. Advanced metering would be the best approach to estimating peak demand savings with the highest level of accuracy. While not yet perfected, especially because peak demand-to-energy ratios from another province were used and not developed especially for the context of Newfoundland and Labrador, the Evaluator's approach is potentially more accurate. The approach takes into consideration, based on the survey results, the real measures implemented by participants. However, the data should eventually be revised because the implemented measures evolve over time.

3.3 Evaluated Net Program Savings

The evaluated net program savings were calculated by multiplying (1) the average savings value per participant calculated each month using with the DID model by (2) the number of active participants in the treatment group. The savings deductions associated with participation in other programs were then applied to establish the net savings at the meter.

The following table shows the net energy and peak demand savings calculated by the Evaluator for the period of January through April 2017.

Table 12: Evaluated Net Program Savings from January to April 2017

	NP					NLH				
	January	February	March	April	Total	January	February	March	April	Total
Total Number of Active Participants (Treatment Group)	54,396	54,110	53,826	53,600	-	1,415				
Energy Savings										
Average Monthly Savings (kWh/participant)	7.1	6.9	17.8	14	-	47.3	67.9	39.8	14.4	-
Total Monthly Savings (GWh)	**0.386**	**0.373**	**0.958**	**0.750**	**2.468**	**0.067**	**0.096**	**0.056**	**0.020**	**0.240**
Program Participation Deductions (GWh)	-	-	-	-	0.072	-	-	-	-	0.000
Total Net Energy Savings (GWh)	**-**	**-**	**-**	**-**	**2.396**	**-**	**-**	**-**	**-**	**0.240**
Peak Demand Savings										
Peak Demand-to-energy Ratio (MW/GWh)	-	-	-	-	0.178	-	-	-	-	0.145
Total Net Peak Demand Savings (MW)	**-**	**-**	**-**	**-**	**0.426**	**-**	**-**	**-**	**-**	**0.035**

3.4 Summary of Results

The following table summarizes the energy and peak demand savings achieved by the program in the period of January through April 2017, in comparison with the program targets and reported savings. The NP targets are the updated targets provided by Tendril in its savings report for January through April 2017. The NLH targets are the original targets and were also found in Tendril's savings report. In the first quarterly report provided by Tendril, the reported savings for NP were below the targets. Tendril explained that this result was due to a late launch in 2016, but the program later ramped up to the expected level of monthly savings fairly quickly, achieving close to 100 percent of expected savings by March 2017. However, the savings shortfall in January and February 2017 put the program at risk of failing to achieve the annual targets set; so, the original annual targets set for NP were adjusted.

Table 13: Summary of Program Savings from January through April 2017

Parameters	Utility	Targets	Reported Results	Evaluated Results
Energy Savings				
Energy Savings before Program Participation Deductions (GWh)	NP	2.618	2.424	2.468
	NLH	0.024	0.242	0.240
	Total	**2.642**	**2.666**	**2.708**
Program Participation Deductions (GWh)	NP	-	-	0.072
	NLH	-	-	-
	Total	-	-	**0.072**
Net Energy Savings – at the Meter (GWh)	NP	2.618	2.424	2.396
	NLH	0.024	0.242	0.240
	Total	**2.642**	**2.666**	**2.636**
Peak Demand Savings				
Net Peak Demand Savings – at the Meter (MW)	NP	-	0.822	0.426
	NLH	-	0.099	0.035
	Total	**-**	**0.921**	**0.461**

4 PROGRAM INFLUENCE AND SATISFACTION

A total of 300 telephone interviews were conducted in June 2017 with 250 NP customers and 50 NLH customers from the treatment group to evaluate their experiences and perceptions regarding the Benchmarking Program. This sample size of 300 also includes 150 customers who have signed up for the web portal. The survey was intended to gather feedback on the following research themes:

› Behavioural changes and energy efficiency tips implemented due to the HERs and the web portal;
› Barriers to the implementation of energy efficiency tips and behavioural changes;
› Participation in other NP and NLH programs following participation in the Benchmarking Program;
› Satisfaction with the HERs and the web portal;
› Recommendations for improvement.

The following subsections present the main findings about these research themes. When differences between subgroups of respondents are mentioned, these are statistically significant differences. The survey questionnaire and the respondents' demographic profiles can be found in Appendix I and Appendix II respectively.

4.1 Satisfaction with the HERs

To properly assess the customers' level of satisfaction with the HERs and the HERs' impact on customer actions and behaviours, respondents were first asked whether they remembered receiving HERs in the six months prior to the survey. Those who reported not receiving any HER were no longer questioned. Then, those customers who recalled receiving the HERs were asked about their actual use of the reports.

Overall, four in 10 (40%) participants read their HERs thoroughly, while over one-quarter (26%) read only some of the content. In contrast, fewer than one in ten (6%) did not read their HERs.

Between the two utilities, NLH customers were more likely to have not read their HERs, compared with NP customers (18% versus 4%). Among NP customers, web portal users were more likely to have read the content thoroughly (51% versus 30%).

Table 14: Readership of HERs

Readership of HERs	Overall (n=300)	NP (n=250)	NLH (n=50)
Read the content thoroughly	40%	42%	32%
Read only some of the content	26%	27%	22%
Skim some of the content	17%	18%	14%
Glance at the pictures, graphs, or headlines	9%	8%	12%
Not read it at all	6%	4%	18%
Other	1%	1%	0%
Don't know	0%	0%	2%

Of those who had read or at least glanced at their reports, just over one-half (51%) provided a rating of 8, 9, or 10 (on a scale of 0 to 10, where 0 means "not at all satisfied" and 10 means "completely satisfied"). The most common reasons cited for satisfaction with the HERs included that they showed energy-usage information and energy-usage comparisons among the years (31%), good energy-saving tips or information (29%), and comparisons with other houses (26%). Results are similar for customers of both utilities. It should be noted that NP customers who did not use the web portal were more likely to cite "useful energy-usage information" as a reason for this satisfaction. Furthermore, satisfaction was higher among participants who had read their HERs' content thoroughly than those who had not.

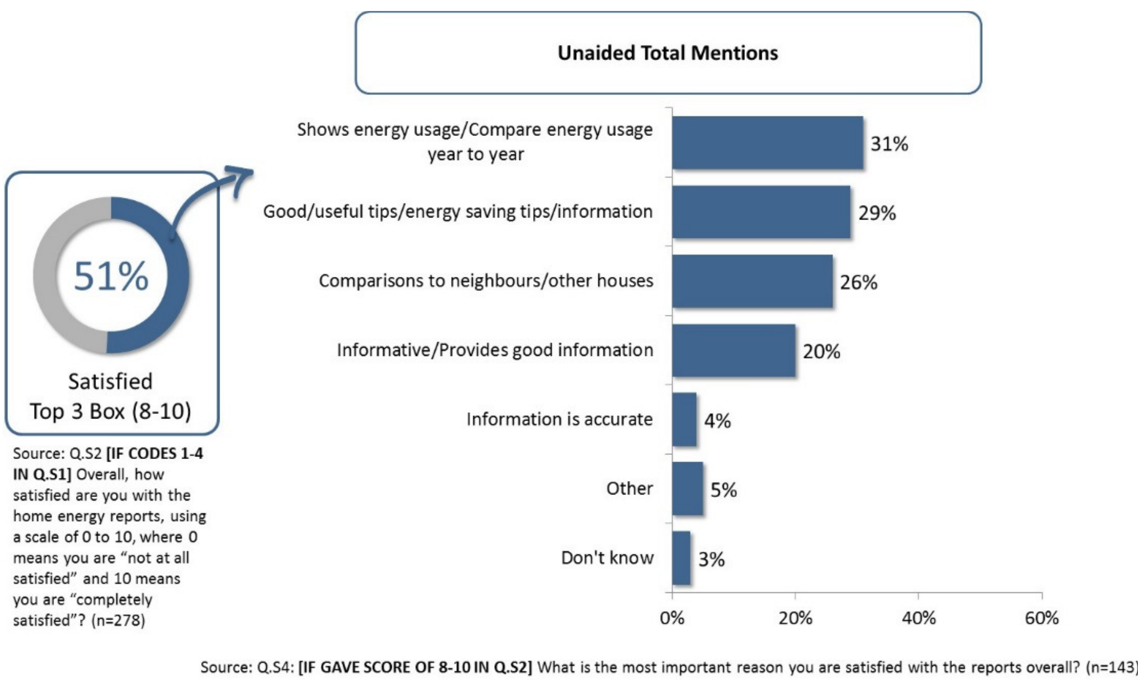


Figure 2: Overall Satisfaction and Reasons for Satisfaction

Among those participants who were less satisfied with their HERs, inaccurate information (24%) and the report not being useful (23%) were the most common reasons cited. These mentions are similar regardless of the utility or whether the web portal was used.

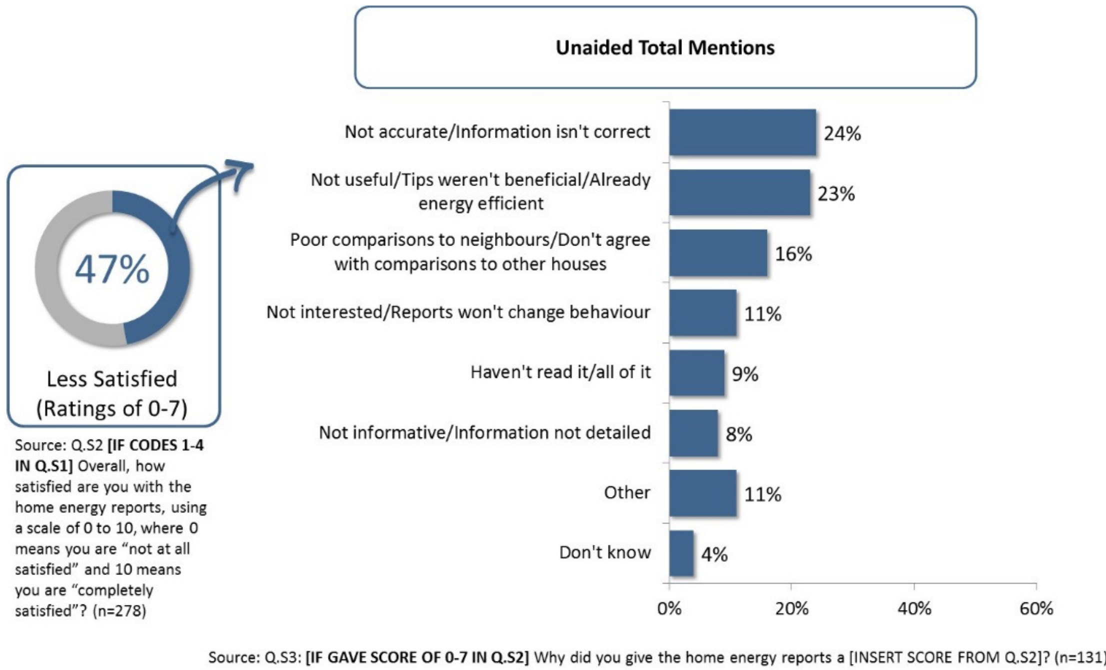


Figure 3: Overall Satisfaction and Reasons for Being Less Satisfied

Then, the participants were asked about the extent to which they agreed or disagreed with various statements surrounding their HERs, including the look of the reports, and the clarity and usefulness of the information provided. Ratings were provided using a scale from 0 to 10, where 0 indicates they "completely disagreed" and 10 indicates they "completely agreed".

Most respondents (81%) agreed that the information provided in the HERs is clear and easy to understand. The majority also agreed that they liked the look of the HERs (68%), they were glad that they had been sent the HERs (62%), and the efficiency tips and advice are useful (60%). One-half (51%) agreed that the HERs helped them make better decisions about how to use and save energy. While there remains potential for increasing this proportion, the program seems on track to reach the objective of helping customers make better decisions about their energy use. Meanwhile, just over four in 10 (43%) agreed that the HERs made reasonable comparisons between their household and similar households. The results were similar for customers of both utilities and among NP's customers who had or had not used the web portal. As could be expected, compared with those less satisfied participants, those participants who reported higher satisfaction with the report overall were more likely to agree with each of the statements.

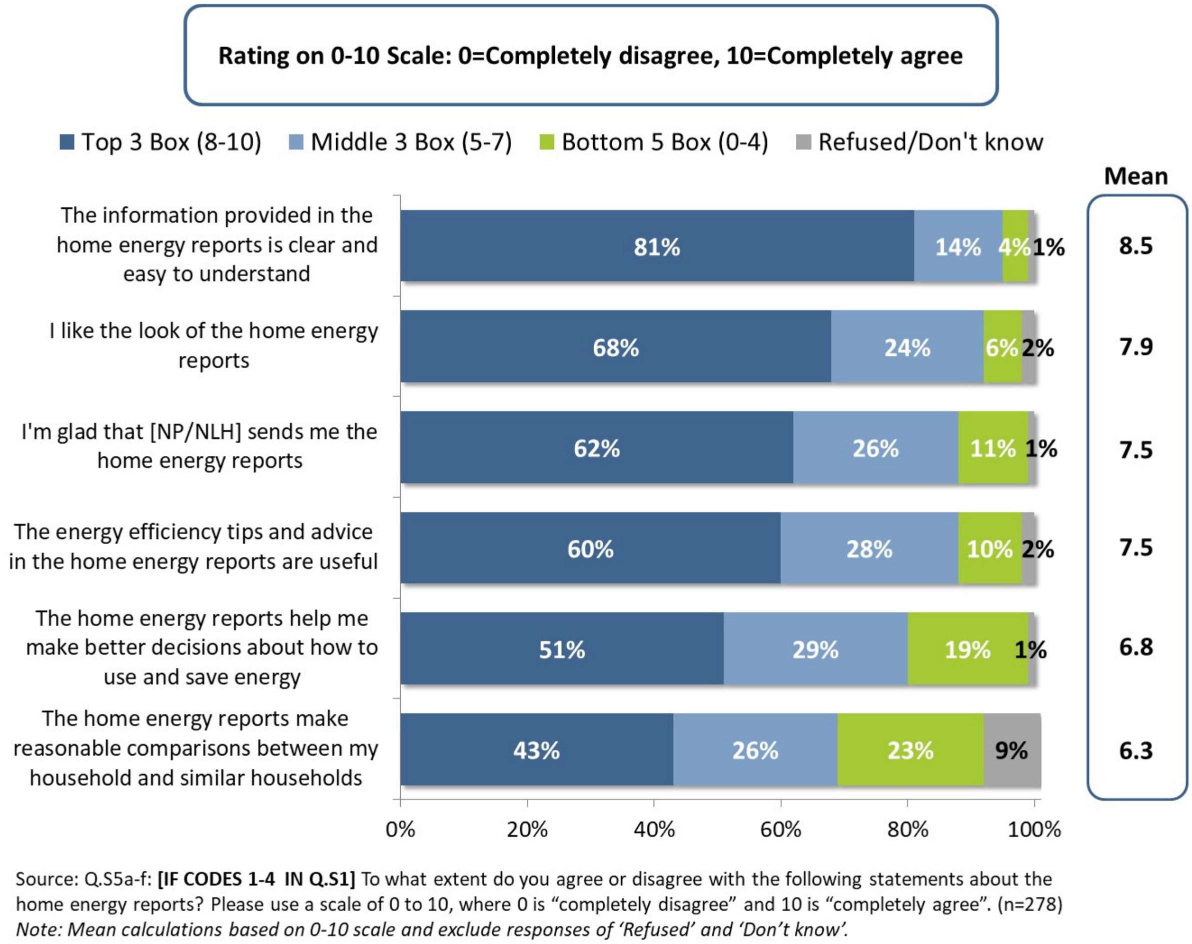


Figure 4: Agreement with Statements about HERs

Overall, the most liked aspects of the HERs were the usefulness of the tips and advice (25%) and the comparison with other similar homes (20%). These opinions were similar among the customers of both utilities, and whether or not they had used the web portal.

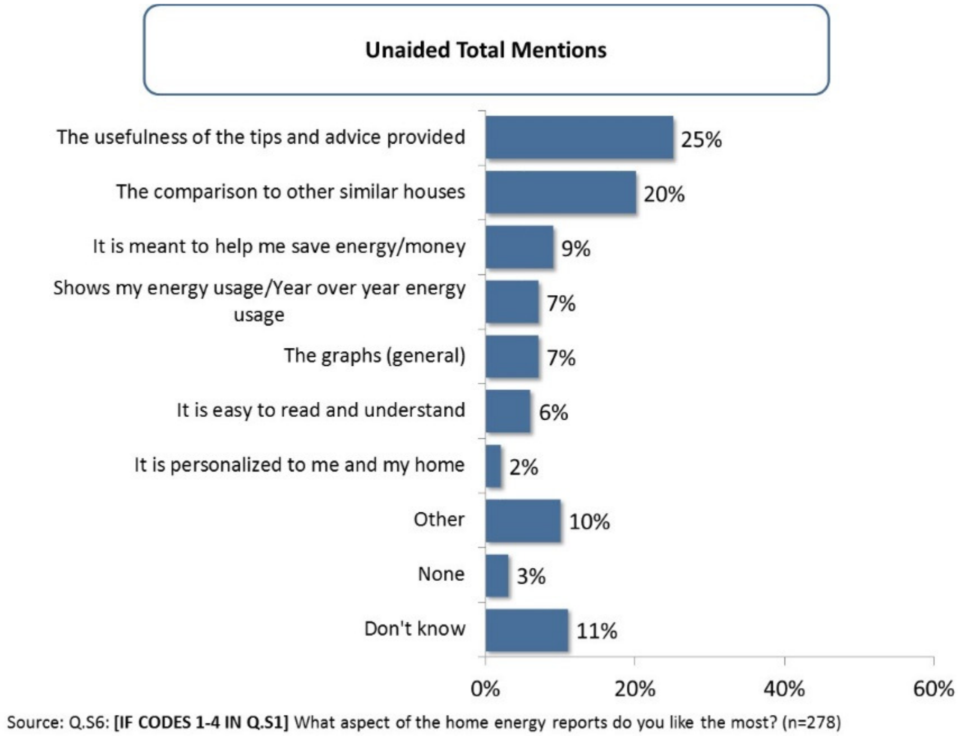
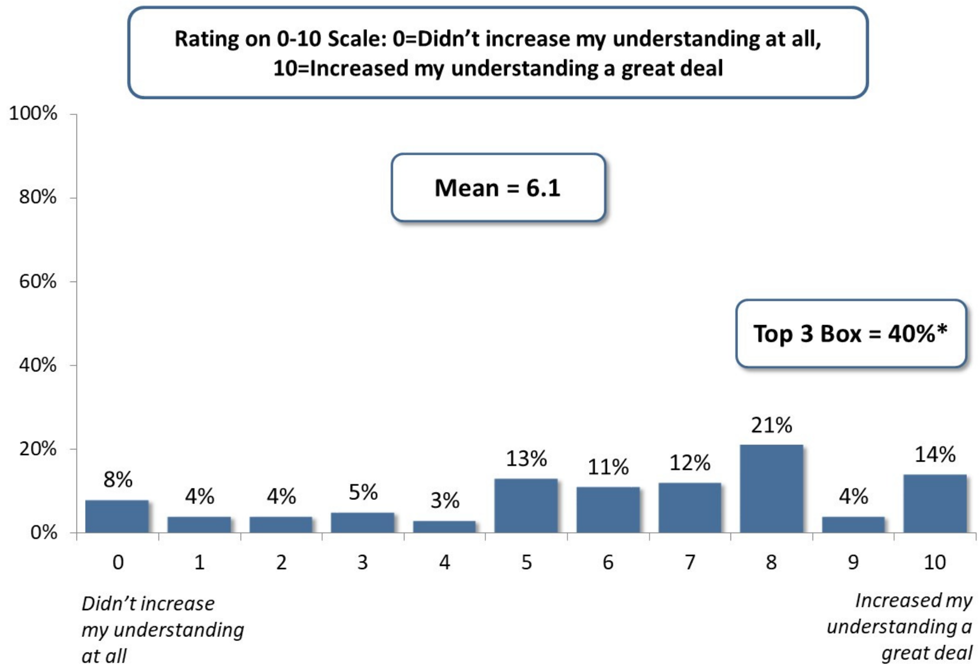


Figure 5: The Most Liked Aspects of HERs

When asked what aspects of the HERs should be improved, most respondents did not provide any recommendation. Among those who did provide a response, improving house comparisons and energy-saving tips were the most common mentions. These opinions were shared among the customers of both utilities, and whether or not they had used the web portal.

4.2 Awareness Generated by the HERs

Four in 10 (40%) respondents said that the reports increased their understanding of their home's energy use and how to manage it. NLH customers were more likely to report an increase in understanding of their home's energy usage, compared with NP customers (55% versus 37%). The opinions were similar, whether or not they had used the web portal.



Source: Q.S9: **[IF CODES 1-4 IN Q.S1]** How much did the information and tips provided in the home energy reports increase your understanding of your home's energy use and how to manage it, using a 0-10 scale where 0 means it "didn't increase my understanding at all" and 10 means the information "increased my understanding a great deal". (n=278)
*Note: Mean calculated based on 0-10 scale, excludes responses of 'Refused' and 'Don't know'. *Due to rounding.*

Figure 6: Understanding of Home Energy Use after Reading HERs

Three in 10 (30%) participants said that their perception of their utility became more favourable since receiving the HERs. Those participants who were satisfied with the HERs and on whom the reports had a greater impact were more likely to report a more favourable perception of their utility.

Table 15: Perception of the Utility since Receiving the HERs

Perception of the Utility since Receiving the HERs	Overall (n=278)	NP (n=238)	NLH (n=40)
Became more favourable	30%	30%	30%
Remained the same	64%	64%	60%
Became less favourable	6%	5%	10%

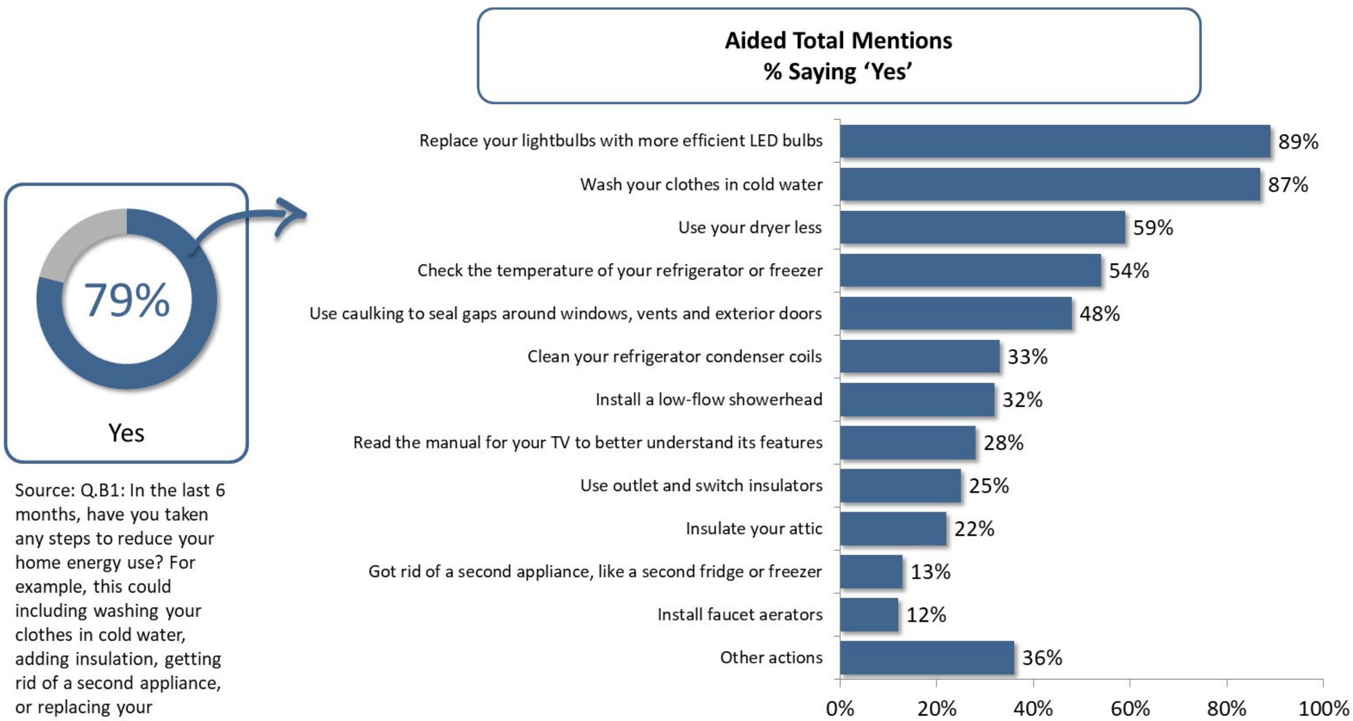
Few participants (3%) called their utility to ask questions about the HERs. Among those who did, their satisfaction with the representative's ability to answer questions about the HERs was high.

Almost a quarter (24%) of the respondents said that the HERs answered those questions about which they had earlier meant to call their utility. NLH customers and respondents reporting high satisfaction with their HERs were more likely to say that the reports answered their questions.

4.3 Behavioural Changes and Tips Implemented Due to HERs

One of the major sections in the survey asked respondents whether they had taken any steps to reduce their energy use in the six months prior to the survey. The survey specifically asked about the energy-related actions that were recommended in the HERs (as provided by Tendril). These actions are presented in the figure below. For each action, survey respondents were asked whether they had done this action or not in the last six months. The majority of respondents (79% overall; 79% for NP and 82% for NLH) answered yes to doing at least one of the listed actions and, on average, performed 4 of the 12 energy-related actions suggested in the HERs.

The energy-related actions most commonly performed were replacing lightbulbs with more energy-efficient LED bulbs (89%) and washing clothes in cold water (87%).



Source: Q.B1: In the last 6 months, have you taken any steps to reduce your home energy use? For example, this could including washing your clothes in cold water, adding insulation, getting rid of a second appliance, or replacing your lightbulbs with more efficient bulbs such as LED bulbs.(n=300)

Source: Q.B2a-m: **[IF 'YES' IN Q.B1]** In the last 6 months, did you do any of these energy-related actions at home? [n=238]

Figure 7: Energy-related Actions Undertaken at Home in the Past Six Months

The actions grouped under the "other actions" category include:

- Installing or using programmable thermostats;
- Changing the heating system or installing a heat pump or a wood stove;
- Turning off lights;
- Insulating the basement;

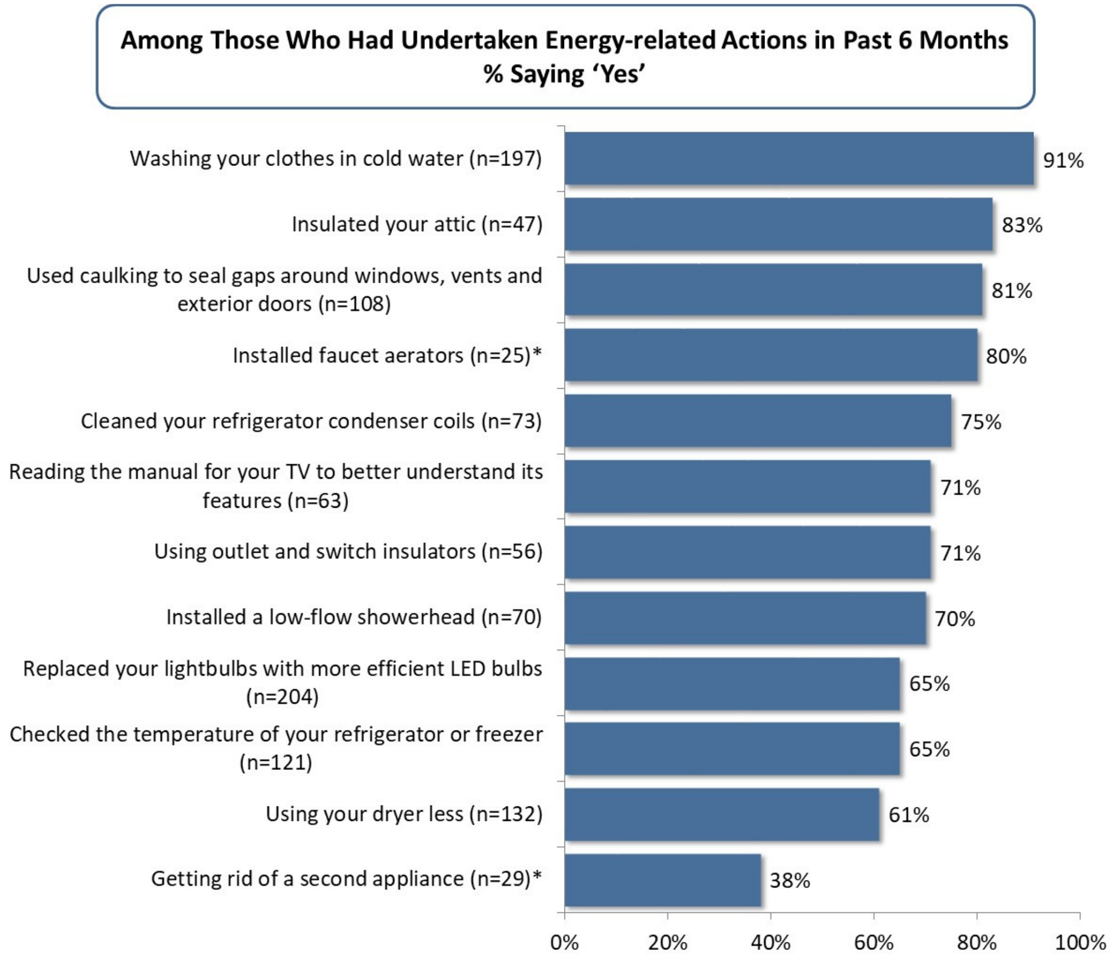
› Unplugging things not in use;
› Installing new windows and doors;
› Turning down the heating systems or the thermostats.

Overall, the number of energy-related actions performed was similar among the customers of both utilities, and whether or not they had used the web portal.

Table 16: Energy-related Actions Undertaken at Home in the Past Six Months by Utility

Energy-related Actions	Overall (n=238)	NP (n=197)	NLH (n=41)
Replace your lightbulbs with more efficient LED bulbs	89%	90%	85%
Wash your clothes in cold water	87%	87%	85%
Use your dryer less	59%	59%	59%
Check the temperature of your refrigerator or freezer	54%	53%	59%
Use caulking to seal gaps around windows, vents and exterior doors	48%	45%	63%
Clean your refrigerator condenser coils	33%	29%	49%
Install a low-flow showerhead	32%	31%	34%
Read the manual for your TV to better understand its features	28%	27%	29%
Use outlet and switch insulators	25%	26%	22%
Insulate your attic	22%	20%	29%
Get rid of a second appliance, like a second fridge or freezer	13%	8%	37%
Install faucet aerators	12%	13%	5%
Other actions	36%	37%	29%

For each corresponding energy-related action, participants were then asked whether they had already performed these actions in the period before the past six months, namely before receiving their HERs. The vast majority were already washing their clothes in cold water (91%), had insulated their attic (83%), had used caulking to seal gaps around windows vents and exterior doors (81%) and had installed faucet aerators (80%). Of all the actions assessed, removing a second appliance was the energy-related action the least undertaken (38%). Overall, these actions were undertaken by a similar proportion of customers for both utilities, and whether or not they used the web portal.

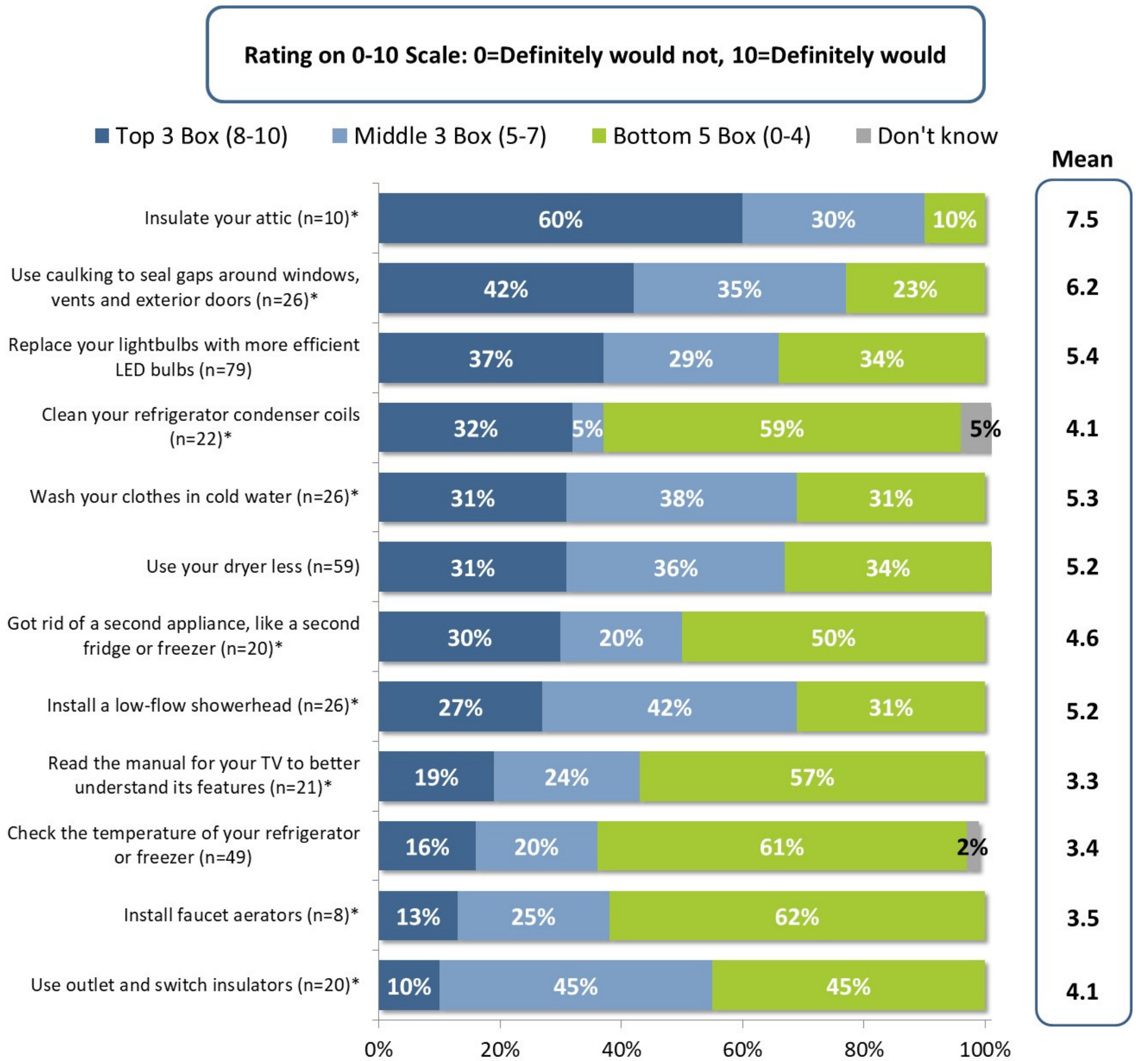


Source: Q.B2ia-l: **[IF 'YES TO CORRESPONDING STATEMENT IN Q.B2a-m]** You mentioned in the past six months you did one or more energy-related actions in your home. Please tell me now if your household had already been doing these actions prior to six months ago.
**Caution: Small sample size.*

Figure 8: Energy-related Actions Already Undertaken Prior to Six Months Ago

Those participants who had not performed these energy-related actions prior to six months ago, but were performing them at the time of the survey were asked the likelihood for them to perform these actions if they had not received the information provided in the HERs. Each action was rated using a scale from 0 to 10, where 0 means that the respondent would have definitely not performed the action without the reports and 10 means that the respondent would have definitely performed the action regardless of the HERs. Therefore, the lower the score there was, the more influence was attributed to the HERs. The reports had the biggest impact on the following actions: the installation of faucet aerators, assessment of refrigerator or freezer temperatures, and reading of television manuals to better understand their features (i.e., the actions with the lowest mean scores).

Please note, however, that the sample sizes varied widely since respondents only rated the actions that they had not yet undertaken prior to six months ago. The findings based on 30 or fewer respondents should be interpreted cautiously. This is why an analysis of these results by utility was not performed.



Source: Q.B3a-l: **[IF 'YES' IN Q.B1 AND IF 'YES' IN CORRESPONDING Q.B2ia-l]** This time using a scale where 0 means "definitely would not" and 10 means "definitely would", how likely would you have been to [INSERT CORRESPONDING RESPONSE FROM Q.B2ia-l], if you did not have the information provided in the home energy reports.
*Note: Mean calculations based on 0-10 scale and exclude responses of Don't know'. *Caution: Small sample size.*

Figure 9: The HERs' Influence on Energy-related Actions

Among those respondents who did not take various energy-saving actions, replacing lightbulbs with more energy-efficient LED bulbs (32%), cleaning refrigerator condenser coils (27%), checking freezer or refrigerator temperatures (24%), caulking of windows, vents and door gaps (23%), as well as washing clothes in cold water (23%) are the actions the most likely to be undertaken in the next six months.

Most participants did not cite any barriers to performing the specific energy-related actions mentioned in the survey, or were simply not interested, or had already performed them and will not do them again (insulating the attic, for example). Those barriers mentioned included: a particular barrier to washing clothes in cold water is the perception that it is unsanitary; financial considerations are a barrier to insulating the attic; not having an alternative option for drying clothes is a reason some would not use their dryer less; a lack of information was identified as a barrier to cleaning refrigerator condenser coils.

4.4 Participation in Other Programs

One in six participants (16%) mentioned having participated in at least one of NP's or NLH's takeCHARGE programs in the last six months. NP customers, higher-household-income earners, and NP customers who have used the web portal were more likely to participate in programs.

This figure of 16 percent is higher than the participation level reported in Subsection 3.1.3, which does not include participation in the Instant Rebates Program. After a further analysis of the data, it was found that half of this 16 percent were customers who mentioned only participating in the Instant Rebates Program in the last six months. After these participants were removed, the participation level established through the survey seems more in line with the level reported in Subsection 3.1.3. However, it still suggests that some survey respondents were thinking beyond the six-month timeframe when answering the question about their takeCHARGE program participation.

Table 17: Participation in the Energy Efficiency Programs in Last Six Months

Participated in NP or NLH Programs in the Last Six Months	Overall (n=300)	NP (n=250)	NLH (n=50)
Yes	16%	18%	6%
No	80%	78%	94%
Don't know	4%	5%	0%

The Instant Rebates Program (49%) was the most cited by survey respondents, followed by the Thermostat Rebate Program (26%) and the Insulation Rebate Program (13%). The Heat Recovery Ventilator Rebate Program (6%) and the Appliances and Electronics Rebates Program (4%) were mentioned by a much smaller proportion of participants.

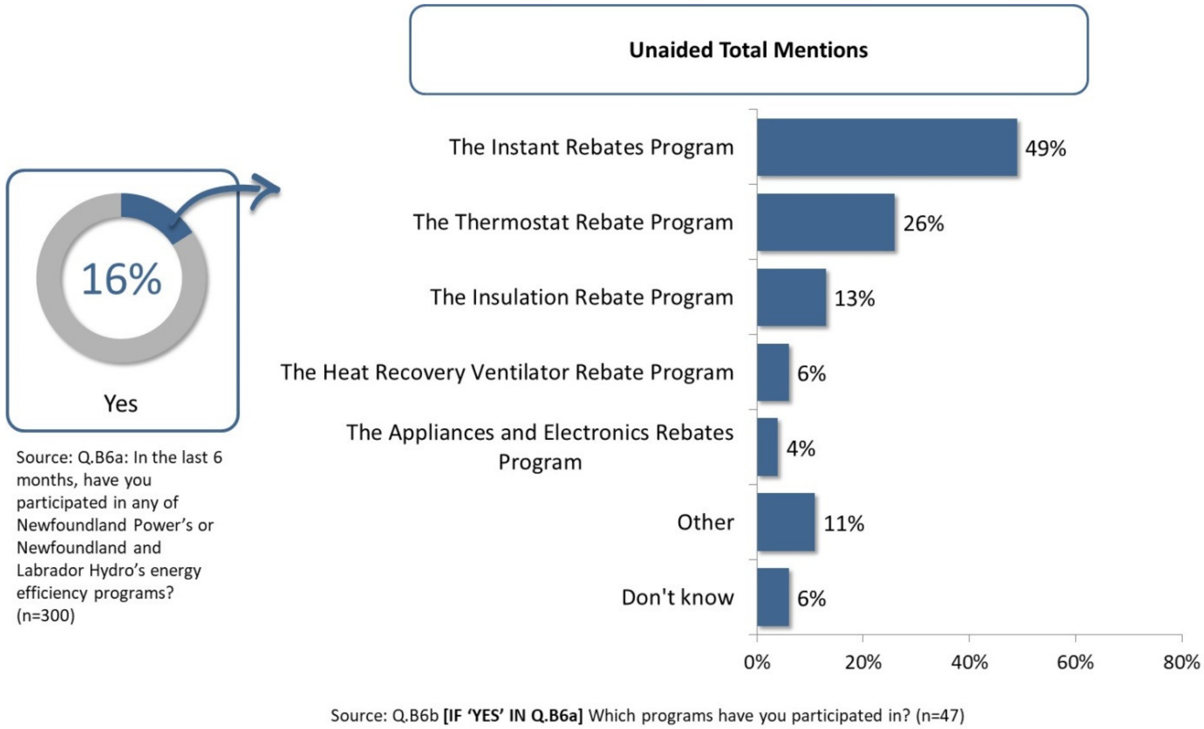


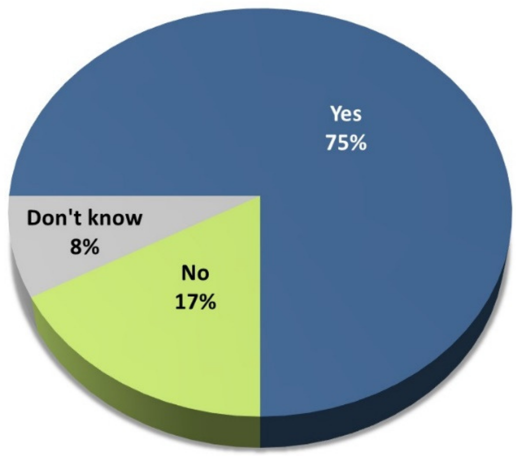
Figure 10: Energy Efficiency Program Participation in the Last Six Months

Once again, the surveyed participants were asked whether they would have participated in these programs if they had not received the HERs. Overall, the opinions were mixed, with almost two in 10 (18%) saying that they definitely would have participated, and almost two in 10 (18%) saying that they definitely would not have. That said, just over one-half (53%) of participants said that they would have probably participated even if they had not received the HERs. These opinions were similar among customers of both utilities.

4.5 Experience with the Web Portal

Customers who had created an account to access the web portal were identified in the survey sample and were first asked about whether they recalled signing up on the takeCHARGE website to access the MyHome portal. The majority of respondents enrolled in the portal recalled having signed up on the takeCHARGE website (75%). That said, a notable one-quarter either did not recall (17%) or were unsure (8%).

It should be noted that because of the small percentage of NLH customers who signed up for the web portal, it was not possible to specifically analyze this utility's web portal-related survey results.



Source: Q.P1: **[IF PORTAL = 'YES' IN SAMPLE]** Do you recall having signed up on the takeCHARGE website to have access to the MyHome online Profile that provides you with additional personal information about your household's electricity usage and ways to help you save energy? (n=150)

Figure 11: Recalled Signing Up to Access the MyHome Web Portal

The most common reasons for signing up included saving money or energy (35%), and getting more information about energy efficiency (24%).

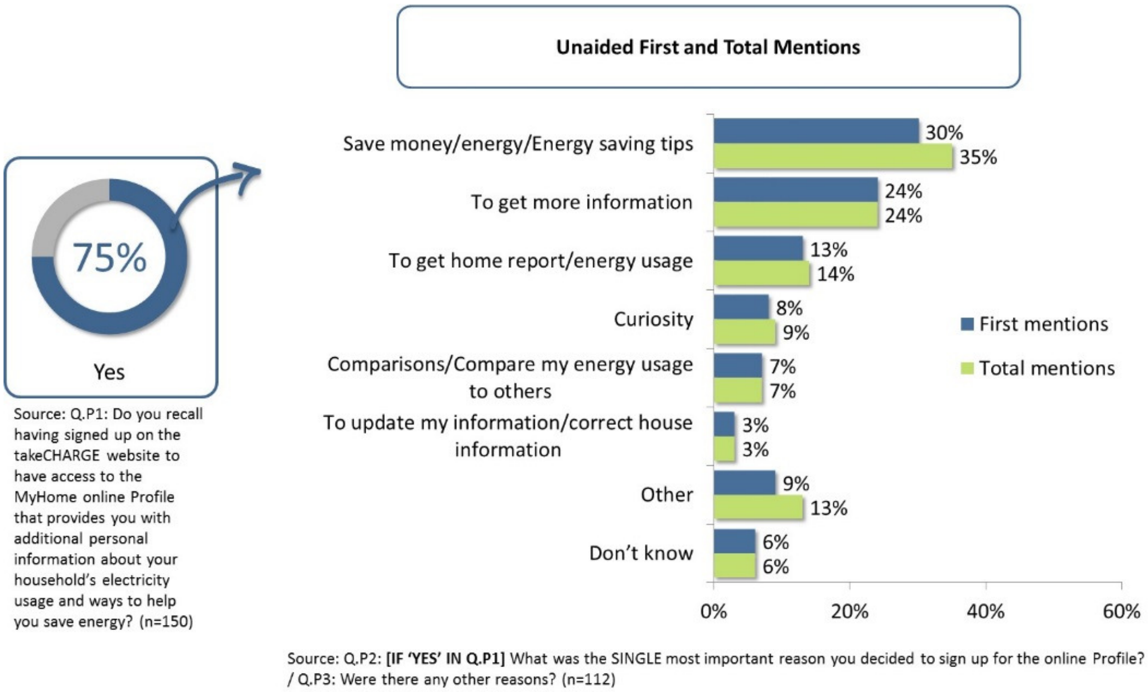


Figure 12: Reasons for Signing Up for the MyHome Web Portal

Most customers who recalled signing up have used the web portal. Four in 10 (42%) have used the portal a few times and read at least some or all of the content, while one-third (34%) have only browsed it and glanced at the content. Fewer than one in 10 (8%) have signed up but have not really taken a look at the content. By contrast, one in 10 (12%) have been visiting the portal regularly.

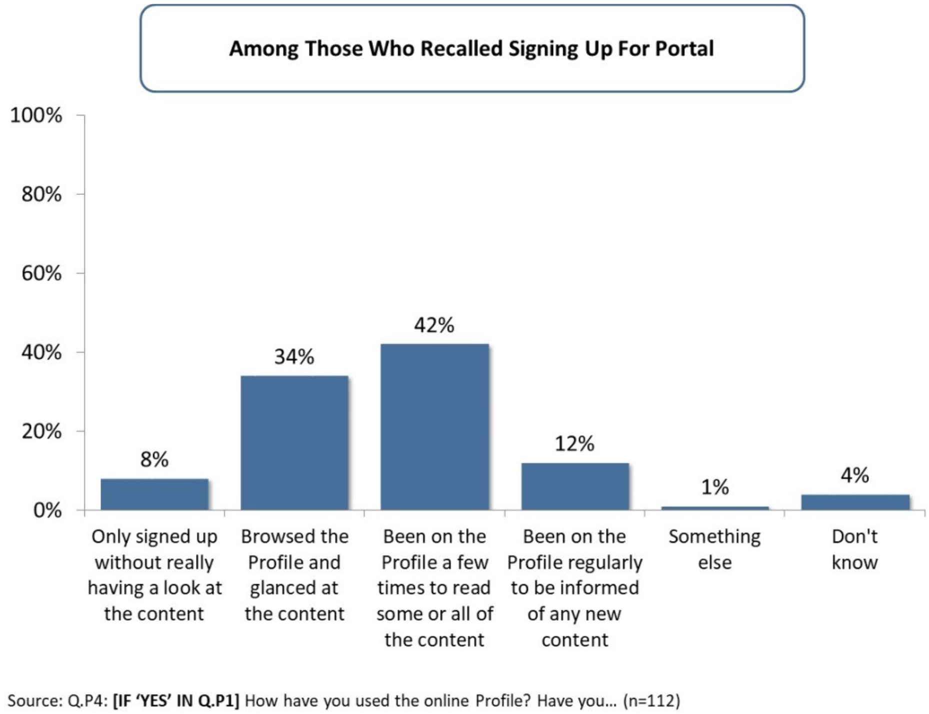
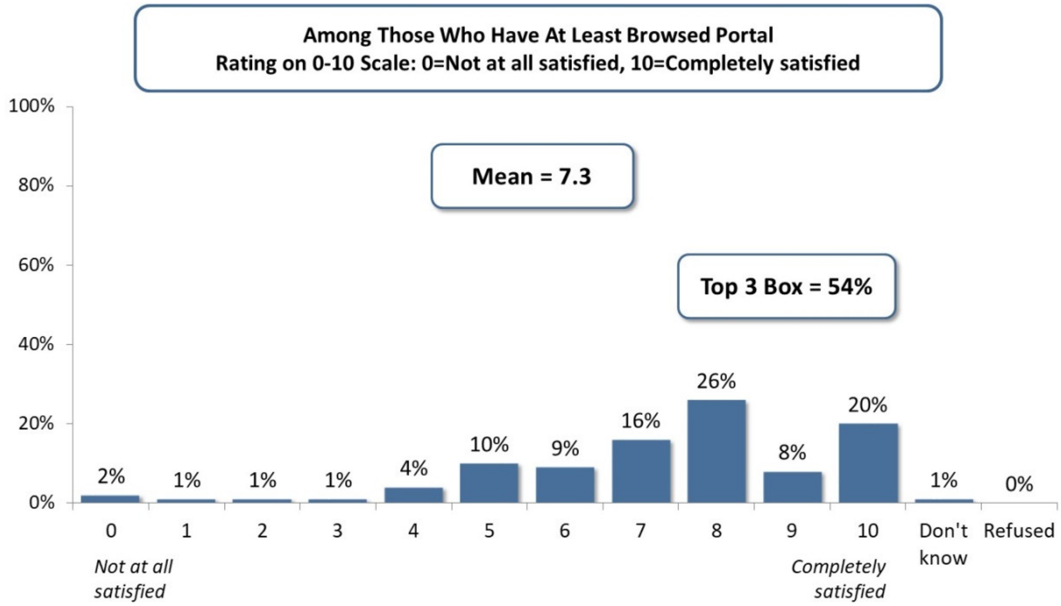


Figure 13: Usage of Web Portal

The level of overall satisfaction with the web portal was similar to that of the HERs, with about one-half (54%) of respondents reporting being satisfied (giving a rating of 8 or higher), while only one in 10 (9%) were dissatisfied (i.e., giving a rating lower than 5).



Source: Q.P5: **[IF CODES 2-4 IN Q.P4]** Overall, how satisfied are you with the online Profile, using a scale of 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied"? (n=98)
Note: Mean calculation based on 0-10 scale, excludes responses of 'Refused' and 'Don't know'.

Figure 14: Satisfaction with the Web Portal

The most commonly cited reason for satisfaction with the portal included that it provides good or useful information (43%). One in six (17%) also cited that it is convenient to use, while other mentions included the ability to compare energy usage year over year (11%), comparisons to other households (11%), and that it is a good resource (9%).

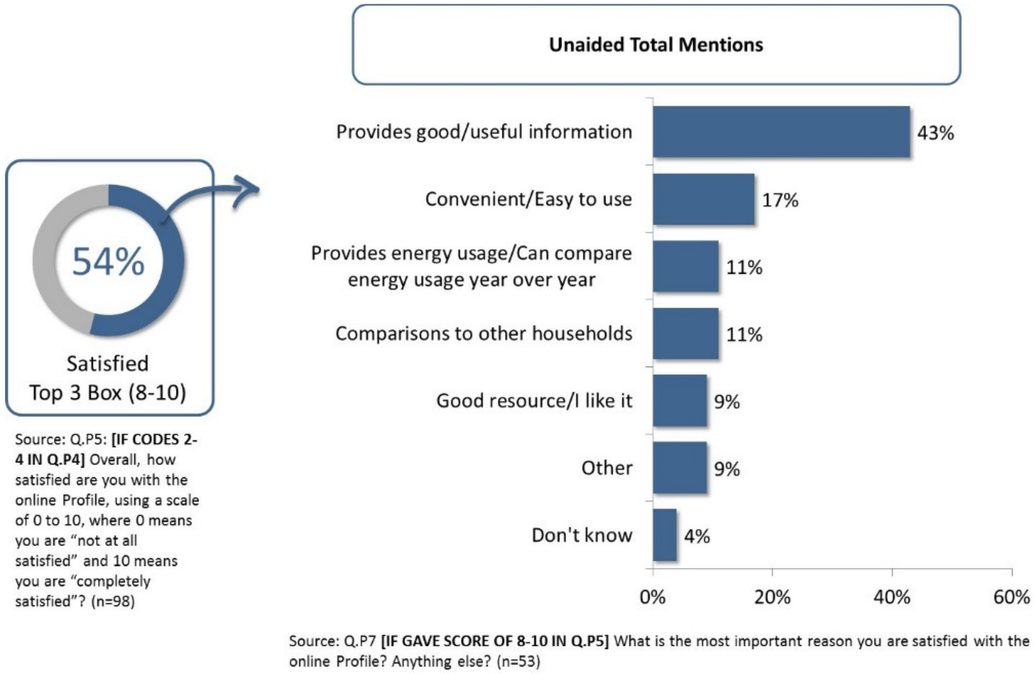
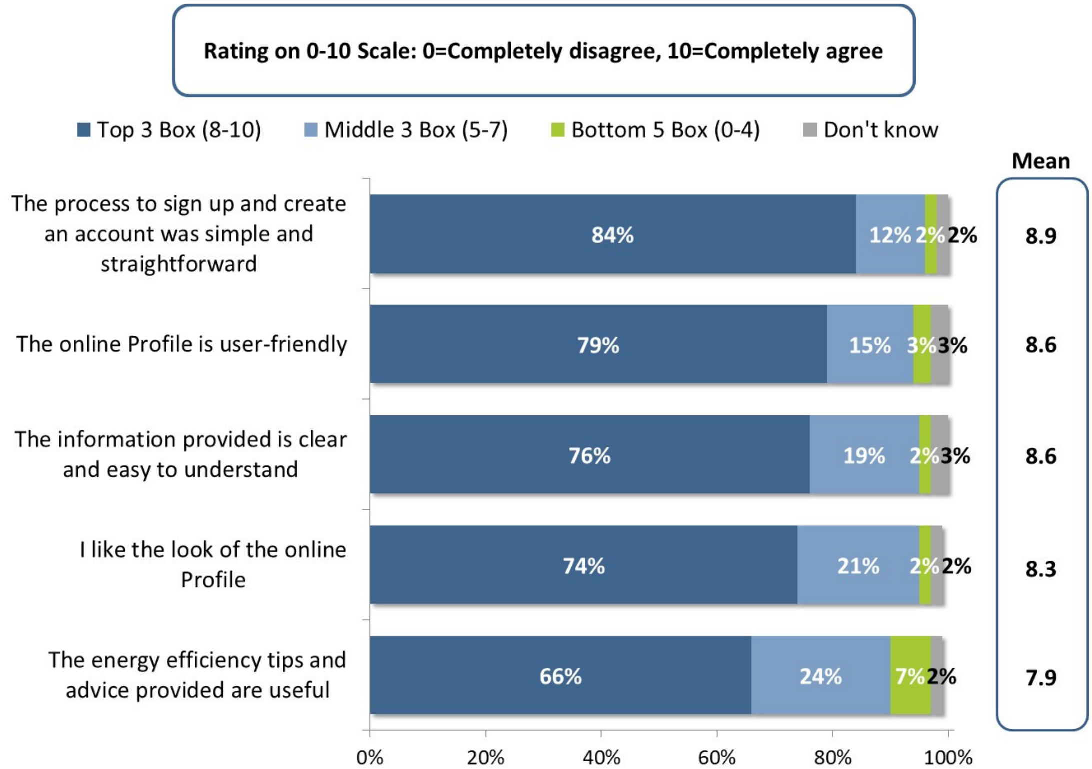


Figure 15: Reasons for Satisfaction with the Web Portal

Among those customers less satisfied with the web portal (i.e., giving a rating of 7 or lower), the most commonly cited reasons included that the web portal needs more added to it, it does not provide any new information (20%), there is room for improvement (14%), and it is not accurate (14%).

Participants were asked whether they agreed to a number of statements about the web portal and the results reveal that the process for signing up and creating an account was simple and straightforward for most respondents (with 84% giving a rating of 8 or higher). Over three-quarters of respondents mentioned that the portal is user-friendly (79%), the information is clear and easy to understand (76%), and they like the look of the portal (74%). Slightly fewer, albeit a majority, agreed that the energy efficiency tips and advice provided are useful (66%). Less than one in 10 participants disagreed with every one of these responses.



Source: Q.P8a-e: **[POSE IF CODES 2-4 IN Q.P4]** To what extent do you agree or disagree with the following statements about the online Profile? Please use a scale of 0 to 10 where 0 is "completely disagree" and 10 is "completely agree". (n=98)
Note: Mean calculations based on 0-10 scale and exclude responses of Don't know'.

Figure 16: Agreement with the Statements about the Web Portal

The vast majority (86%) of respondents did not provide any recommendation on how to improve the web portal. Of the small number who did make recommendations, they recommended improving the accuracy of information (4%), making it easier to update household information (3%), and improving comparisons to other households (3%).

CONCLUSIONS AND RECOMMENDATIONS

The main objectives of this first evaluation of the Benchmarking Program were to (1) validate the savings reported for the program, and (2) make a first-time assessment of the customers' perception and satisfaction regarding the HERs and the web portal, while keeping in mind that the program is still in a somewhat learning phase. Behaviour-based energy efficiency programs like this one are complex and their success relies in large part on customers' will to change their behaviours; so, they have to be adaptable to customer response.

According to the survey results, customers are becoming increasingly aware of energy-related actions, such as installing more efficient light bulbs and washing clothes in cold water. Therefore, the HERs would have less potential for impacting homes where these specific behaviours are already being implemented. It seems that the program has had an overall moderate influence on customers' behaviours so far. Furthermore, savings for the first four months of 2017 were rather low and below both the original and updated program targets set. The program reached energy savings of 2.636 GWh (2.396 GWh for NP and 0.240 GWH for NLH) and peak demand savings of 0.461 MW (0.426 MW for NP and 0.035 MW for NLH). However, it should be kept in mind that the program has been running for less than a year. Behavioural programs typically see their savings ramp up and follow an upward trend during the first year or so until they reach a plateau. The next evaluation of savings after a complete program year will hopefully show that the Benchmarking Program is following this trend.

An analysis of the residential takeCHARGE program databases for the first few months of 2017 has indicated that a larger proportion of customers from the treatment group had participated in some other programs in the last few months, than the control group. The survey results have also highlighted that the Benchmarking Program was a major influence in about 20 percent of customers' decision to participate in other takeCHARGE programs in the last months. Although these findings seem to indicate program uplift, they should be interpreted with caution at this stage of the program, given that participation in some other takeCHARGE programs (e.g., adding insulation) can take several months. Moreover, without surveying customers in the control group, it is difficult to fully attribute participation in other programs to the Benchmarking Program.

Satisfaction with the HERs and the web portal is moderate, with about half of the customers being satisfied with what they have received and read so far. The two main areas about which there were mixed reviews from customers are the house comparisons and the energy efficiency tips.

On a positive note, the information provided in both the HERs and the web portal is clear and easy to understand according to customers. Furthermore, the web portal was considered user-friendly, and the process for signing up was deemed simple and straightforward; these two findings should not be overlooked given that they reveal desirable qualities of a web portal like this one. These two qualities should always be present if the program aims to increase traffic to the portal. So far, approximately six percent of the treatment group customers have signed up for the portal.

In light of these findings, the Evaluator has the following recommendations on how to improve the program:

1. Continue monitoring the program savings each month using the DID model

The program had a slower start than initially expected, but this seems to have improved as time went by. To ensure that the energy savings targets are met, it is necessary to continue monitoring the program savings by analyzing the consumption data of the treatment and control groups each month. The DID model used by Tendril and the Evaluator is a robust and unbiased analytical method, which can be easily used for this kind of analysis. Depending on the level of precision NP and NLH require for their peak demand savings estimates, the utilities could also consider using an approach more in-depth than the one proposed in this evaluation. However, this would require more time and money.

2. Continue looking for appealing ways to encourage customers to update their household information

It is likely for participants in this type of program to criticize the house comparisons and find them irrelevant or inaccurate, as was observed during the survey. This may stem from a lack of understanding of how the house comparisons are done. Using the term “similar home” instead of “neighbouring home” in the HERs is already a step in the right direction to help address this issue. Being aware of the difficulties encountered in collecting customer information during the early stages of the program and to improve the relevance and accuracy of the tips provided to customers, the Evaluator recommends continuing to look for appealing ways to encourage customers to sign up for the portal and update their household information online.

3. Consider using targeted messages to address the barriers perceived by customers to the implementation of tips and behaviours and continue assessing barriers over time

Most survey respondents do not see barriers to implementing the tips and actions recommended in the HERs and not yet implemented. This finding can be reasonably interpreted as a lack of motivation on the customers’ part to change their behaviours. Among those other customers who did mention specific barriers, the main barriers cited are related to a lack of information, financial constraints and misguided perceptions. These types of barriers, along with the lack of motivation just mentioned, should all be considered as “addressable’’ barriers, meaning that something can be done to overcome them, unlike structural barriers (e.g., related to home type or vintage). The Evaluator recommends trying different targeted messages in the HERs to help customers overcome barriers. For instance, a targeted message about how washing clothes in cold water is not unsanitary could be tried.

The barriers should be monitored over time through data collection so that the program’s messages and actions remain as relevant as possible for customers, and that their effectiveness is assessed.

4. Conduct a general population survey to assess program uplift

The purpose of the survey conducted as part of this evaluation was to gather information from customers about the HERs and the web portal so as to provide NP and NLH with rapid feedback about the program. Since it was conducted with only customers from the treatment group, this survey could not be used to assess program uplift. To assess program uplift, data must be collected from customers in both the control group and the treatment group. To effectively assess program uplift, the Evaluator recommends waiting for a few months to give customers enough time to complete a program participation process before conducting a survey with customers from both the treatment and control groups to determine the influence of the HERs on their participation in other takeCHARGE programs.

This type of data collection would allow for assessing not only program uplift for the residential programs, but also the participation level in the Instant Rebates Program, which is something that could not be easily done, given that no customer information is tracked for this program.

APPENDIX I
SURVEY QUESTIONNAIRE

I1. Hello may I please speak with [INSERT NAME]?

1. Yes [GO TO INTRODUCTION]
2. No [SAY "Perhaps you can help me anyway." GO TO INTRODUCTION]

INTRODUCTION

I2. Hello, my name is _________ and I represent Corporate Research Associates, and we are conducting a study on energy efficiency behaviours among households in Newfoundland and Labrador. Our records show that since December 2016 your household has received paper or electronic home energy reports from [Newfoundland Power/Newfoundland and Labrador Hydro] as part of the takeCHARGE initiative. These reports are a two-page document that compares your household's electricity usage to similar homes, illustrates energy usage patterns, and provides you with advice and tips to help you reduce your energy consumption.

Do you remember receiving home energy reports by mail or email in the last 6 months?

1. Yes [CONTINUE]
2. No, I don't recall these reports [PROMPT: "Is there someone else in the household who would know about these reports?'' [ASK TO SPEAK TO THEM AND REPEAT INTRODUCTION—OTHERWISE, THANK, TERMINATE, RECORD AND KEEP DATA]

99. No, Refuses [THANK, TERMINATE, RECORD AND KEEP DATA]

I3. We would like to get some feedback from you about these reports and ask questions related to your household's energy usage patterns, to help Newfoundland Power and Newfoundland and Labrador Hydro improve their energy efficiency services. The survey will take approximately 10 minutes, and it is registered with the national survey registration system. Is this a good time for you?

1. Yes [CONTINUE]
2. No, this is not a good time [ASK "Can we schedule a more convenient time for you to conduct this survey?"

99. No, refuses [THANK, TERMINATE, RECORD AND KEEP DATA]

Satisfaction with the Home Energy Reports (S Series)

My first questions will be about your use of and satisfaction with the home energy reports.

S1. In general, what have you done with the home energy reports? Did you… [READ IN ORDER, ACCEPT ONE RESPONSE]

1. Read the content thoroughly
2. Read only some of the content
3. Skim some of the content
4. Glance at the pictures, graphs, or headlines

~or did you~

5. Not read it at all
6. [DO NOT READ] Other[SPECIFY_______________]

98. (Don't know)
99. (Refused)

S2. [POSE ONLY IF CODES 1-4 IN S1] Overall, how satisfied are you with the home energy reports, using a scale from 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied"? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

S3. [ASK IF SCORE 0-7 IN S2] Why did you give the home energy reports a [INSERT SCORE IN S2]? PROBE FOR SPECIFIC REASONS

96. (RECORD VERBATIM: _________________)

98. (Don't know)
99. (Refused)

S4. [ASK IF SCORE ≥8 IN S2] What is the most important reason you are satisfied with the reports overall? PROBE: Anything else? [PROBE FOR SPECIFIC REASONS.]

96. (RECORD VERBATIM: _________________])
98. (Don't know)
99. (Refused)

S5. [POSE ONLY IF CODES 1-4 IN S1] To what extent do you agree or disagree with the following statements about the home energy reports? Please use a scale of 0 to 10, where 0 is 'completely disagree' and 10 is 'completely agree'. [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE PER STATEMENT. PROBE TO AVOID ACCEPTING A RANGE. RANDOMIZE]

a. I like the look of the home energy reports

b. I'm glad that [Newfoundland Power/Newfoundland and Labrador Hydro] sends me the home energy reports

c. The energy efficiency tips and advice in the home energy reports are useful

d. The information provided in the home energy reports is clear and easy to understand

e. The home energy reports help me make better decisions about how to use and save energy

f. The home energy reports make reasonable comparisons between my household and similar households.

ROTATE S6 AND S7

S6. [POSE ONLY IF CODES 1-4 IN S1] What aspect of the home energy reports do you like the most? [DO NOT READ. CODE ONLY ONE]

1. (The comparison to other similar homes)
2. (The usefulness of the tips and advice provided)
3. (It is personalized to me and my home)
4. (It is easy to read and understand)
5. (It is meant to help me save energy/money)

96. (Other: __________________])
98. (Don't know)
99. (Refused)

S7. [POSE ONLY IF CODES 1-4 IN S1] What aspects of the home energy reports should be improved? PROBE FOR SPECIFIC REASONS

96. (RECORD VERBATIM: __________________])
98. (Don't know)
99. (Refused)

S8. [POSE ONLY IF CODES 1-4 IN S1] Do you have any other recommendations to improve the home energy reports? PROBE: Anything else?

96. (RECORD VERBATIM: __________________])
97. No recommendations
98. (Don't know)
99. (Refused)

S9. [POSE ONLY IF CODES 1-4 IN S1] How much did the information and tips provided in the home energy reports increase your understanding of your home's energy use and how to manage it, using a 0-10 scale where 0 means it "didn't increase my understanding at all" and 10 means the information "increased my understanding a great deal." [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

S10. [POSE ONLY IF CODES 1-4 IN S1] Since receiving the home energy reports, how, if at all, has your perception of [Newfoundland Power/Newfoundland and Labrador Hydro] changed? Has your perception… [READ. CODE ONLY ONE]

1. Become more favourable,
2. Less favourable, OR
3. Remained the same
98. (Don't know)
99. (Refused)

S11. [POSE ONLY IF CODES 1-4 IN S1] Did you call a Newfoundland Power or Newfoundland and Labrador Hydro representative to ask questions about the home energy reports? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No
98. (Don't know)
99. (Refused)

S12. [ASK IF YES IN S11] Using a scale from 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied", overall, how satisfied were you with the representative's ability to answer your questions about the home energy reports? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

S13. [ASK IF SCORE 0-7 IN S12] Why did you give the representative a [INSERT SCORE IN S12]?

96. (RECORD VERBATIM: _________________)
98. (Don't know)
99. (Refused)

S14. [POSE ONLY IF CODES 1-4 IN S1] Did the home energy reports answer questions you had about your energy use for which you were considering calling Newfoundland Power or Newfoundland and Labrador Hydro? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No
98. (Don't know)
99. (Refused)

Behaviour Changes and Tips Implemented (B Series)

Now, I have some questions about energy-related actions that you may have done.

B1. In the last 6 months, have you taken any steps to reduce your home energy use? For example, this could include washing your clothes in cold water, adding insulation, getting rid of a second appliance, or replacing your lightbulbs with more efficient bulbs such as LED bulbs. [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No [GO TO B6a]
98. (Don't Know) [GO TO B6a]
99. (Refused) [GO TO B6a]

B2. In the last 6 months, did you do any of these energy-related actions at home? [ROTATE, EXCEPT ALWAYS POSE ITEM 'm" LAST. CODE ONE ONLY PER OPTION. 1=YES, 2=NO, 98=DON'T KNOW, 99=REFUSED]

a. Get rid of a second appliance, like a second fridge or freezer
b. Read the manual for your TV to better understand its features
c. Wash your clothes in cold water
d. Install a low-flow showerhead
e. Install faucet aerators
f. Insulate your attic
g. Use outlet and switch insulators
h. Use your dryer less
i. Replace your lightbulbs with more efficient LED bulbs
j. Check the temperature of your refrigerator or freezer
k. Clean your refrigerator condenser coils
l. Use caulking to seal gaps around windows, vents and exterior doors
m. Have you started doing or increased doing any other actions? [RECORD EACH ACTION SEPARATELY AS mi, mii, miii, miv, AND SO FORTH]

B2i. [POSE APPLICABLE ***B2ia-l*** STATEMENT FOR EACH CORRESPONDING 'YES' RESPONSE IN ***B2a-l*** SEQUENCE] You mentioned that in the past six months you did one or more energy-related actions in your home. Please now tell me if your household had already been doing these actions prior to six months ago. Prior to six months ago …: [POSE EACH 'YES' STATEMENT FROM B2a-l SEQUENCE] 1=YES, 2=NO, 98=DON'T KNOW, 99=REFUSED]

a. Were you already getting rid of a second appliance, like a second fridge or freezer?
b. Were you already reading the manual for your TV to better understand its features?
c. Were you already washing your clothes in cold water?
d. Had you already installed a low-flow showerhead?

e. Had you already installed faucet aerators?
f. Had you already insulated your attic?
g. Were you already using outlet and switch insulators?
h. Were you already using your dryer less?
i. Had you already replaced your lightbulbs with more efficient LED bulbs?
j. Had you already checked the temperature of your refrigerator or freezer?
k. Had you already cleaned your refrigerator condenser coils?
l. Had you already used caulking to seal gaps around windows, vents and exterior doors?

B3. [ASK FOR EACH ***CODE 2*** IN B2ia-l SEQUENCE] This time using a scale where 0 means "definitely would not'' and 10 means "definitely would',' how likely would you have been to [INSERT B2a-l ACTION], if you did not have the information provided in the home energy reports? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

B4. [ASK FOR EACH CODE 2 IN B2a-m] You said you didn't [INSERT ACTION]. Still using a scale from 0 to 10 where 0 means "definitely would not'' and 10 means "definitely would'', how likely are you to [INSERT ACTION] in the next 6 months? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

B5. [ASK FOR EACH CODE 0-7 IN B4] What barriers, if any, do you see to [INSERT ACTION]? DO NOT READ RESPONSES. ACCEPT MULTIPLE RESPONSES. PROBE: Anything else?

1. (Financial constraint/No money to implement)
2. (Time constraint)
3. (Lack of information)
4. (Lack of interest)
5. (Energy savings would be too small)
6. (None/no barriers)
96. (Other, Specify: _____________)
98. (Don't know)

B6a. In the last 6 months, have you participated in any of Newfoundland Power's or Newfoundland and Labrador Hydro's energy efficiency programs? [DO NOT READ. CODE ONLY ONE]

1. Yes
2. No [GO TO P SERIES]
98. (Don't Know) [GO TO P SERIES]
99. (Refused) [GO TO P SERIES]

B6b. Which program(s) have you participated in? [DO NOT READ. ACCEPT MULTIPLE]

1. The Instant Rebates Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides instant at-the-cash register rebates for the purchase of products such as LED bulbs, dimmer switches, ceiling fans and fixtures, motion sensors, power strips, dehumidifiers, faucet aerators and low-flow showerheads.)
2. The Insulation Rebate Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for basement, crawl space and attic insulation upgrades.)
3. The Thermostat Rebate Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for the purchase of electronic non-programmable and programmable thermostats.)
4. The Appliances and Electronics Rebates Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for the purchase of high efficiency televisions, washers and freezers.)
5. The Heating Recovery Ventilator Rebate Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for the purchase of a high efficiency heat recovery ventilator (HRV).)

96. (Other:________)
98. (Don't Know) [GO TO P SERIES]
99. (Refused) [GO TO P SERIES]

B6c. Using a scale where 0 means "definitely would not'' and 10 means "definitely would,'' how likely would you have been to participate in this or these programs, if you had not received the home energy reports? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

Experience with the Online Portal (P Series)

[ASK RESPONDENTS WITH PORTAL=YES IN SAMPLE]

P1. Do you recall having signed up on the takeCHARGE website to have access to the MyHome online Profile that provides you with additional personalized information about your household's electricity usage and ways to help you save energy? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No [GO TO D SERIES]

98. (Don't Know) [GO TO D SERIES]
99. (Refused) [GO TO D SERIES]

P2. What was the SINGLE most important reason you decided to sign up for the online Profile?

96. (RECORD VERBATIM: ________________])
98. (Don't know)
99. (Refused)

P3. Were there any other reasons?

96. (RECORD VERBATIM: ________________])
97. None/no other reasons

P4. How have you used the online Profile? Have you… [READ IN ORDER, ACCEPT ONE RESPONSE]

1. Only signed up without really having a look at the content
2. Browsed the Profile and glanced at the content
3. Been on the Profile a few times to read some or all of the content
4. Been on the Profile regularly to be informed of any new content
5. [DO NOT READ] Or something else… [SPECIFY______________]
98. (Don't know)
99. (Refused)

P5. [POSE ONLY IF CODES 2-4 IN P4] Overall, how satisfied are you with the online Profile, using a scale from 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied"? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

P6. [ASK IF SCORE 0-7 IN P5] Why did you give the online Profile a [INSERT SCORE IN P5]?

97. (RECORD VERBATIM: ________________)

98. (Don't know)
99. (Refused)

P7. [ASK IF SCORE ≥8 IN P5] What is the most important reason you are satisfied with the online Profile? PROBE: Anything else? [PROBE FOR SPECIFIC REASONS. ACCEPT MULTIPLE]

96. (RECORD VERBATIM: _________________])
98. (Don't know)
99. (Refused)

P8. [POSE ONLY IF CODES 2-4 IN P4] To what extent do you agree or disagree with the following statements about the online Profile? Please use a scale of 0 to 10, where 0 is 'completely disagree' and 10 is 'completely agree'. [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE. RANDOMIZE]

a. I like the look of the online Profile

b. The process to sign up and create an account was simple and straightforward

c. The energy efficiency tips and advice provided are useful

d. The information provided is clear and easy to understand

e. The online Profile is user-friendly

P9. [POSE ONLY IF CODES 2-4 IN P4] Do you have any recommendations to improve the online Profile? PROBE: Anything else?

96. (RECORD VERBATIM: _________________])
97. No recommendations
98. (Don't know)
99. (Refused)

Demographic Characteristics (D Series)

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

D1. What type of residence do you live in? [READ RESPONSES 1-6, THEN 96; SELECT ONE RESPONSE]

1. Apartment building that has fewer than five stories
2. Apartment building that has five or more stories
3. Detached single-family home
4. Semi-detached house or duplex (2 dwellings attached)
5. Mobile home or house trailer
6. Row house or town house with shared adjacent walls (3 or more dwellings attached)
96. Or some other type [SPECIFY: _________________________]
98. (Don't know)

99. (Refused)

D2. Do you own or rent this home?

1. Own/buying
2. Rent/lease
3. Other (Describe) ____
99. (Refused)

D3. Including yourself, how many people live in this residence on a full-time basis?

Number of people: _____________ [NOTE: DON'T ALLOW ZERO FOR A RESPONSE]
99. (Refused)

D4. What is your age group? Are you ....: [READ]

1. 18 to 24
2. 25 to 34
3. 35 to 44
4. 45 to 54
5. 55 to 64
6. 65 or over
99. (Refused)

D5. What is the highest level of education you have completed? [READ IF NECESSARY]

1. (Less than high school graduation diploma)
2. (High school graduation diploma and/or some post-secondary)
3. (Trades certificate or diploma)
4. (College certificate or diploma)
5. (University degree, certificate or diploma)
97. Other (SPECIFY: ____________)
98. (Don't know)
99. (Refused)

D6. Which of the following income categories best describes your total annual household income before taxes in 2016? Stop me when I reach the right category. [READ LIST; SELECT ONE RESPONSE]

1. Less than $15,000
2. $15,000 - $24,999
3. $25,000 - $34,999
4. $35,000 - $49,999
5. $50,000 - $69,999
6. $70,000 - $79,999
8. $80,000 or more
98. (Don't know)
99. (Refused)

D7. [DO NOT READ] Gender:

1. Male
2. Female

END: That is all the questions I have for you. Thank you for taking the time to respond to this survey.

APPENDIX II
SURVEY RESPONDENTS' DEMOGRAPHIC PROFILES

This appendix shows the demographic characteristics of the survey respondents. As previously mentioned, the survey was carried out with 300 customers from the treatment group. The entire treatment group's population is 57,448. Drawing a sample of 300 from a population of 57,448 yields a margin of error of 4.7 percent at a 90 percent confidence level.

The vast majority (86%) of respondents each lived in a detached single-family home. This figure is similar among the customers of both utilities and NP customers who have or have not used the web portal.

Table 18: Types of Homes

Type of Home	Overall (n=300)	NP (n=250)	NLH (n=50)
Detached single-family home	86%	85%	90%
Apartment building that has fewer than five stories	5%	5%	4%
Semi-detached house or duplex (2 dwellings attached)	4%	5%	0%
Row house or town house with shared adjacent walls (3 or more dwellings attached	2%	3%	0%
Mobile home or house trailer	2%	1%	4%
Don't know	0%	0%	2%

Nearly all respondents (95%) own their home as opposed to renting. This figure is similar among the customers of both utilities and NP customers who have or have not used the web portal.

Table 19: Owning or Renting the Home

Owning or Renting the Home	Overall (n=300)	NP (n=250)	NLH (n=50)
Owning	95%	95%	94%
Renting	5%	4%	6%
Refused	1%	1%	0%

The majority of respondents live with at least one other individual on a full-time basis. This figure is similar among the customers of both utilities and NP customers who have or have not used the web portal.

Table 20: Number of People Living at Home on a Full-time Basis

Number of People	Overall (n=300)	NP (n=250)	NLH (n=50)
1	12%	12%	14%
2	42%	43%	36%
3	22%	22%	22%
4 or more	22%	22%	22%
Refused	2%	2%	6%
Mean	2.6	2.6	2.6

Nine in 10 (89%) respondents are above the age of 34, and approximately one-half (52%) are between the ages of 45 and 64. This age distribution patterns are similar among the customers of both utilities and NP customers who have or have not used the web portal.

Table 21: Age Distribution among the Respondents

Age Band	Overall (n=300)	NP (n=250)	NLH (n=50)
18 to 24	0%	0%	0%
25 to 34	9%	10%	0%
35 to 44	20%	21%	16%
45 to 54	26%	25%	32%
55 to 64	26%	27%	24%
65 and over	17%	16%	24%
Refused	1%	0%	4%

The respondents are generally well-educated, with the majority having earned either a college (20%) or university diploma (50%). NP customers are more likely than NLH customers to have a university degree (55% versus 26%), whereas NLH customers are more likely to have less than a high school diploma (22% versus 4%). The education level is similar among the NP customers, whether or not they have used the web portal.

Table 22: Education Level

Highest Level of Education Completed	Overall (n=300)	NP (n=250)	NLH (n=50)
Less than high school graduation diploma	7%	4%	22%
High school graduation diploma and/or some post-secondary	18%	16%	30%
Trade certificate or diploma	5%	4%	8%
College certificate or diploma	20%	22%	12%
University degree, certificate or diploma	50%	55%	26%
Don't know	1%	0%	2%

Just over four in 10 (43%) respondents earn an annual household income of $80,000 or more. Similar to the situation regarding education, the income levels are higher among NP customers. Actually, NP customers are more likely to earn $80,000 or more, than NLH customers (48% versus 18%). The income levels are similar among NP customers, whether or not they have used the web portal.

Table 23: Annual Household Income in 2016

Income Bracket	Overall (n=300)	NP (n=250)	NLH (n=50)
Less than $15,000	2%	2%	2%
$15,000 - $24,999	5%	3%	18%
$25,000 - $34,999	6%	6%	8%
$35,000 - $49,999	9%	7%	18%
$50,000 - $69,999	9%	10%	8%
$70,000 - $79,999	7%	8%	6%
$80,000 or more	43%	48%	18%
Don't know	1%	0%	4%
Refused	18%	18%	18%

In terms of gender, the male and female respondents are almost equal in number. This figure is similar for both utilities and NP customers who have or have not used the web portal.

Table 24: Gender Distribution among the Respondents

Gender	Overall (n=300)	NP (n=250)	NLH (n=50)
Male	47%	47%	46%
Female	53%	53%	54%

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2017 BENCHMARKING PROGRAM EVALUATION

NEWFOUNDLAND POWER AND NEWFOUNDLAND AND LABRADOR HYDRO

Final Report

June 18, 2018

ECONOLER

ACRONYMS

DID	Difference-in-differences (model)
HER	Home energy report
NLH	Newfoundland and Labrador Hydro
NP	Newfoundland Power

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EXECUTIVE SUMMARY

This report presents the results of the 2017 evaluation of the Benchmarking Program. This program is designed to help Newfoundland and Labrador customers reduce their energy consumption by changing their behaviours. The program provides residential customers with home energy reports (HERs) that illustrate their energy usage patterns and provide personalized and targeted energy efficiency tips to help them reduce their energy consumption.

The impact of such a program on customers' energy efficiency behaviours is assessed by comparing a control group and a treatment group. The treatment group is defined as the group of households which are selected to receive HERs.

The program is jointly administered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH), and is delivered by a third-party service provider.

Summary of Evaluation Findings

Econoler (hereinafter referred to as the Evaluator) was hired by NP and NLH to evaluate the 2017 program savings. Specifically, a billing analysis was carried out to assess the electricity consumption of the treatment and control groups during the year. The results of this billing analysis were then compared to: (1) the program savings reported by the program service provider; and (2) program targets.

The energy savings reported by the service provider were calculated using both monthly and cumulative approaches. Using the monthly approach, the evaluated energy savings amounted to 7,295,195 kWh for NP and 174,252 kWh for NLH, compared to reported savings of 7,291,189 kWh for NP and 301,211 kWh for NLH. For NP, the monthly savings obtained by the Evaluator are fairly similar to those calculated by the service provider for most months. In the case of NLH, the differences between evaluated and reported savings are greater.

Using the cumulative approach, the evaluated savings are lower than the reported savings, especially NLH savings. The Evaluator calculated energy savings of 7,127,121 kWh for NP and 131,057 for NLH, compared to reported savings of 7,590,664 kWh for NP and 272,274 kWh for NLH. The Evaluator considers the cumulative approach to be more accurate as well as more inclusive of the various billing scenarios that occur in a year and how they are included in the calculation of savings, i.e. billing situations where customers become inactive or have a gap in their bills, or outlier billing data (bills with an average daily consumption of 0 kWh or a monthly consumption higher than 10,000 kWh).

To avoid double-counting the savings already accounted for through the individual takeCHARGE programs themselves, the Evaluator compared the treatment and the control groups regarding their participation in the following programs: (1) the Appliances and Electronics Rebates Program, (2) the Heat Recovery Ventilator Rebate Program, (3) the Insulation Rebate Program, and (4) the Thermostat Rebate Program. In cases where a statistically significant difference was observed between the treatment and the control groups, deductions were made to the Benchmarking Program evaluated savings. This was the case for NP customers who participated in the Thermostat Rebate Program and the Insulation Rebate Program.

The following table summarizes the 2017 program savings using the cumulative approach and compares the evaluated savings with program targets and reported savings. Program cumulative energy savings are above the updated targets.

Table 1: Summary of Program Savings for 2017

Parameters	Utility	Targets	Reported Results	Evaluated Results
Energy Savings				
Energy Savings before Program Participation Deductions (GWh)	NP	5.600	7.591	7.127
	NLH	0.231	0.272	0.131
	Total	**5.831**	**7.863**	**7.258**
Program Participation Deductions (GWh)	NP	-	-	0.482[1]
	NLH	-	-	-
	Total	**-**	**-**	**0.482**
Net Energy Savings – at the Meter (GWh)	NP	5.600	7.591	6.645
	NLH	0.231	0.272	0.131
	Total	**5.831**	**7.863**	**6.776**
Peak Demand Savings				
Net Peak Demand Savings – at the Meter (MW)	NP	-	0.822	1.183
	NLH	-	0.099	0.019
	Total	**-**	**0.921**	**1.202**

[1] This savings deduction value was calculated using the gross savings tracked in the NP 2017 Insulation and Thermostat Rebate Program databases. The tracked gross savings were converted into net savings using the net-to-gross ratios established during Econoler's 2016-2017 evaluations of the Insulation and Thermostat Rebate Programs.

1 OVERVIEW OF THE EVALUATION

Econoler (hereinafter referred to as the Evaluator) was hired by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH) to evaluate the Benchmarking Program.

A first evaluation was carried out by Econoler in the summer of 2017, the results of which were presented in a report that included: (1) validation of the selection of treatment and control groups; (2) validation of savings for the first four complete months of the program (January through April 2017); and (3) process evaluation findings. That rapid-feedback evaluation was meant to provide NP and NLH with an initial assessment early on in the program to help improve the program and its performance.

This report focuses on the validation of program savings, but for the complete 2017 program year (January through December). The following subsections provide an overview of the program and further details about the evaluation objectives, scope and methodology.

1.1 Program Overview

Launched under the takeCHARGE initiative, the Benchmarking Program helps Newfoundland and Labrador customers reduce their energy consumption by changing their behaviours. It is meant to improve energy efficiency in the province’s homes by increasing customer awareness and knowledge of energy efficiency, as well as by encouraging the adoption of energy-efficient behaviours and the participation in other takeCHARGE programs. Specifically, the program provides over 55,000 residential customers from both NP and NLH with home energy reports (HERs) by mail and/or email. HERs are sent to participants to illustrate their energy usage patterns and provide personalized and targeted energy efficiency tips to help them reduce their energy consumption. The reports allow participating households to compare their energy usage with similar homes. The rationale behind the Benchmarking Program is that the reports will encourage the participating households to change their behaviours to reduce their energy consumption when compared to their peers.

In addition, customers have access to a web portal (called the MyHome Portal). This web portal is offered to all customers across the province on an opt-in basis and provides customers with an interactive and individualized experience, which helps them set goals to achieve home energy savings, obtain tips and recommendations to reinforce energy-saving actions, create a savings plan, and compare their home’s energy consumption with similar homes, among other things, to help them reduce their consumption throughout the year.

Such a program uses a control group and a treatment group to assess its impact on customers’ energy efficiency behaviours. The treatment group is defined as the group of households that are selected to receive HERs. The households in the control group do not receive HERs and thereby serve as a comparison group. To be comparable, the two groups must share similar attributes and be selected following to the same criteria.

The primary eligibility criteria for selecting the treatment and control groups are that the customers must:

- Be homeowners;
- Have at least 13 continuous months of bill data;
- Have at least a total annual electricity consumption of 12,000 kWh for NP customers and 14,000 kWh for NLH customers.

For 2017, the NP treatment and control groups consisted of 55,987 and 22,408 customers respectively. The NLH treatment and control groups consisted of 1,461 and 4,383 customers respectively.

The program was launched in early December 2016 and is scheduled to run until 2019. In 2017, HERs were sent to customers in the treatment group in January, February, March, August, September, October, November and December.

Tendril Networks (hereinafter referred to as “Tendril” or “the service provider”) was hired by NP and NLH to design and deliver the program. The following table summarizes the two utilities’ and Tendril’s roles and responsibilities related to the program.

Table 2: The Utilities’ and Tendril’s Roles and Responsibilities

Organization	Roles and Responsibilities
NP/NLH	› Provide accurate customer data regarding both the control and treatment groups; › Collaborate with the service provider in developing and implementing the program; › Oversee program implementation.
Tendril	› Select a control group and a treatment group; › Design, develop, host, maintain and manage the program and its components; › Design and distribute related marketing materials; › Provide monthly savings reports, with information and data about energy savings and demand reduction; › Provide monthly reports on portal use involvement.

1.2 Evaluation Objectives, Scope and Methodology

The Evaluator was asked to evaluate the Benchmarking Program at the design stage (before program launch) and after the delivery stage (after program launch).

Before program launch, the Evaluator assessed the soundness of the program design by validating whether the treatment and control groups were properly selected. The Evaluator found that the treatment and control groups had similar electricity consumption values and followed the same trends prior to participant selection and that no other trends existed which could affect either group by introducing bias into the program savings calculations.

After program launch, the rapid-feedback evaluation of the Benchmarking Program was conducted after the first four months of program implementation to assess the following:

- Effectiveness of program delivery and components (HERs and web portal);
- Program effects and impacts on customers and their behaviours;
- Participant levels of satisfaction with the program and areas for improvement;
- Program net energy and peak demand savings for the months of January, February, March and April 2017.

This report is meant to once again present an assessment of program net energy and peak demand savings and compare these to the savings reported by the service provider, but this time for the full 2017 program year. The same methodology from the previous evaluation was used, specifically a billing analysis to assess and compare the electricity consumption of the treatment and control groups during the year.

The following section provides further details on this methodology and the evaluation results.

2 PROGRAM SAVINGS

This section reports on the energy and peak demand savings achieved by the Benchmarking Program in 2017. These savings were established by comparing the treatment group customers' consumption with that of the control group and can be accepted as net savings, i.e., the changes in energy use specifically attributable to the program. Indeed, by using a control group in the comparison, the savings already include the program's influence on participants' decisions. Therefore, no additional free-ridership or spillover effects need to be applied to the savings established by this comparison. Moreover, because savings are established using the whole house's electricity consumption value, it has already factored in possible interactive effects.

However, one type of savings deduction had to be performed to account for the savings due to participation in other takeCHARGE programs. HERs encourage the treatment group customers to participate in other takeCHARGE programs so as to generate savings in these other programs. Since the savings generated by participating in these other programs were not taken into account in the Benchmarking Program reported savings, deductions were made in this evaluation.

2.1 Energy Savings

2.1.1 Reported Savings

To report 2017 program savings, Tendril used both monthly and cumulative approaches which are explained below.

Monthly Approach

For the monthly approach, Tendril conducts a billing analysis every month, using the difference-in-differences (DID) model, to determine the amount of energy savings achieved by the treatment group participants in that month. For a given month, the DID model compares the difference in the average daily consumption between the treatment and control groups before and after program participation. The equation is expressed as follows:

$$Total\ kWh\ Savings = [(PostAC_{CG} - PostAC_{TG}) - (PreAC_{CG} - PreAC_{TG})] \times Households_{TG} \times NumberTreatmentDays$$

Where:

- $PostAC_{CG}$= The control group's average daily consumption (kWh) in the post-program period
- $PostAC_{TG}$= The treatment group's average daily consumption (kWh) in the post-program period
- $PreAC_{CG}$= The control group's average daily consumption (kWh) in the pre-program period
- $PreAC_{TG}$= The treatment group's average daily consumption (kWh) in the pre-program period
- $Households_{TG}$= The total number of households in the treatment group
- $NumberTreatmentDays$ = The total number of treatment days

For each given month evaluated, the two surrounding months and that same month of the previous year (in this case 2016), were used to establish monthly consumption. These three months of the previous year are herein defined as the pre-program period, while the given month of the current evaluation year is defined as the post-program period. For instance, to calculate the savings of February 2017, the bills of January, February and March 2016 were used to calculate the average daily consumption in the pre-program period and the bill of February 2017 was used to calculate the average daily consumption in the post-program period. Tendril used this method to normalize the pre-program period average daily consumption and reduce unusual variations within a specific month.

Since billing data often overlap two calendar months, Tendril used the mid-point date of the billing period to determine to which month each bill should be assigned.

After establishing the average daily energy consumption values, the difference in the average daily consumption between the treatment and control groups before and after program participation was multiplied by the number of days of the given month and the number of participants who had available bills in the post-program period of that same given month.

The billing analysis results are submitted to NP and NLH in a monthly report that details the energy savings and the average percentages of savings achieved. The following table summarizes the program energy savings reported by Tendril for the months of 2017.

Table 3: Reported Energy Savings Under the Monthly Approach

	January	February	March	April	May	June	July	August	September	October	November	December	Total
NP													
Number of Participants (Treatment Group)	54,095	50,077	53,212	52,598	52,465	51,493	52,221	51,743	50,785	51,129	51,012	50,737	-
Total Monthly Savings (kWh)	**387,839**	**397,165**	**996,686**	**641,915**	**769,129**	**338,011**	**114,602**	**163,557**	**514,309**	**793,110**	**1,015,933**	**1,158,933**	**7,291,189**
Percentage of Monthly Savings (%)*	**0.25%**	**0.29%**	**0.76%**	**0.56%**	**0.85%**	**0.56%**	**0.26%**	**0.37%**	**1.00%**	**1.11%**	**1.01%**	**0.89%**	**-**
Margin of Error**	NA	NA	NA	±0.11%	±0.18%	±0.47%	±0.43%	±0.41%	±0.34%	±0.25%	±0.17%	±0.13%	-
NLH													
Number of Participants (Treatment Group)	1,331	1,272	1,378	1,174	1,163	1,145	1,306	1,229	1,365	1,351	996	1,342	-
Total Monthly Savings (kWh)	**65,115**	**96,276**	**69,771**	**11,081**	**6,401**	**12,833**	**-990**	**-6,994**	**-16,393**	**5,997**	**22,513**	**35,601**	**301,211**
Percentage of Monthly Savings (%)*	**1.86%**	**2.90%**	**2.10%**	**0.47%**	**0.32%**	**0.75%**	**-0.08%**	**-0.63%**	**-1.09%**	**0.31%**	**1.24%**	**1.11%**	**-**
Margin of Error**	NA	NA	NA	±0.57%	±0.90%	±1.91%	±1.80%	±1.88%	±1.49%	±1.14%	±0.89%	±0.68%	-

* For each month, the percentage of monthly savings is calculated by dividing the average daily savings by the average daily consumption of the control group.

** Margins of error were calculated at a 90% confidence level.

Cumulative Approach

For the cumulative approach, Tendril conducted another billing analysis, also using the DID model, to determine the total energy savings achieved by treatment group participants in 2017. Therefore, a similar equation as that of the monthly approach was used. The main difference between the monthly and cumulative approaches is that the latter takes into account all 2016 and 2017 bills to establish the average daily consumption in the pre-program and post-program periods. The equation used under the cumulative approach to calculate the total savings is presented below:

$$Total\ kWh\ Savings$$
$$= [(PostAC_{CG} - PostAC_{TG}) - (PreAC_{CG} - PreAC_{TG})] \times \sum_{i=1}^{N} NumberTreatmentDays$$

Where:

- $PostAC_{CG}$= The control group's average daily consumption (kWh) in the post-program period
- $PostAC_{TG}$= The treatment group's average daily consumption (kWh) in the post-program period
- $PreAC_{CG}$= The control group's average daily consumption (kWh) in the pre-program period
- $PreAC_{TG}$= The treatment group's average daily consumption (kWh) in the pre-program period
- $NumberTreatmentDays$ = The total number of treatment days of each participant

Another difference between the two approaches is how Tendril calculated the number of treatment days. For the monthly approach, the number of days of a given month was multiplied by the number of participants who had available bills in the post-program period of the given month. For the cumulative approach, Tendril calculated the number of existing bills in 2017 for each treatment group participant and assumed that each bill had 31 days. Therefore, the total number of treatment days was established by multiplying all bills received in 2017 by the value of 31.

Some participants had missing bills in 2017 and others became inactive during the program (for example because they moved). For these participants, Tendril used only the available bills in its calculations.

The following table summarizes the 2017 program energy savings that Tendril reported under the cumulative approach.

Table 4: Reported Energy Savings Under the Cumulative Approach

	NP	NLH
Total Cumulative Savings (kWh)	**7,590,664**	**272,274**
Percentage of Savings (%)*	**0.66%**	**0.90%**
Margin of Error**	±0.19%	±0.90%
* The percentage of cumulative savings is calculated by dividing the average daily savings by the average daily consumption of the control group.		
** Margins of error were calculated at a 90% confidence level.		

2.1.2 Evaluated Savings

To validate the monthly and cumulative energy savings reported by Tendril, the Evaluator conducted its own billing analyses using a similar approach and data cleaning criteria. The billing data was provided by NP and NLH and contained monthly bills of participants from December 2015 to January 2018.

Before performing the billing analyses, the Evaluator cleaned the billing data by removing outliers, which were bills with an average daily consumption of 0 kWh or higher than 10,000 kWh per month, and duplicate bills. Sequential bills with the same start or end dates, and therefore a nil energy consumption, were also removed by the Evaluator.

These criteria were outlined in a methodology that Tendril provided to the Evaluator to explain how they cleaned the billing data for the program. It should be noted that very few bills (less than 1%) were removed for NP customers as result of this cleanup. However, for NLH customers, quite a number of duplicates and overlapping sequential bills were found and removed from the analysis. The Evaluator found that for some NLH customers, the billing data file included both estimated and actual billing data. Whenever sequential bills overlapped more than five days, the Evaluator retained only the actual billing data for its calculations. Sequential bills that overlapped fewer than five days were kept as is in the analysis.

To calculate the monthly energy savings, the Evaluator retained the customers who had billing data available for the pre-program period of each month analyzed regardless of whether they had a bill for the given month in the post-program period. The same approach was used for the cumulative energy savings; the Evaluator retained the customers who had bills in the pre-program period regardless of whether they had bills in the post-program period.

Monthly Approach

Since billing data often overlap two calendar months, the Evaluator used the same calendar-month definition as Tendril and used the mid-point date of the billing period to determine to which month each bill should be assigned.

After cleaning the billing data and assigning a calendar month to each bill, the Evaluator used the DID model to calculate the energy savings of each month. The Evaluator used the same methodology as Tendril to define the pre-program and post-program periods. Therefore, for each month analyzed, the three surroundings months of the previous year (2016, the pre-program period) were used and the given month of the current program year (2017) was used for the post-program period.

The following two tables list the monthly savings figures established by the Evaluator for NP and NLH respectively and compares the values with those established by Tendril.

Table 5: NP Evaluated Energy Savings Compared to Those Reported by Tendril Under the Monthly Approach

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Evaluated Savings													
Number of Participants (Treatment Group)	54,242	52,271	53,555	53,397	52,708	49,981	52,482	51,930	50,487	51,200	51,083	50,817	-
Treatment Group Average Daily Post-participation Consumption (kWh/participant)	93.7	90.2	82.3	71.7	55.1	37.1	27.6	27.5	32.5	44.6	62.5	81.8	-
Number of Customers in the Control Group	21,716	20,933	21,426	21,373	21,073	19,966	20,995	20,794	20,255	20,514	20,475	20,360	-
Control Group Average Daily Post-participation Consumption (kWh/customer)	94.1	90.6	83.0	72.2	55.5	37.4	27.6	27.5	32.7	45.0	63.2	82.7	-
Average Monthly Savings (kWh/participant)	**7.1**	**6.9**	**17.8**	**14.0**	**11.7**	**8.4**	**3.4**	**3.8**	**9.7**	**15.4**	**20.6**	**21.8**	**-**
Margin of Error (kWh/participant)**	±6.2	±5.5	±5.9	±5.5	±4.5	±3.6	±3.1	±2.9	±3.1	±4.1	±4.7	±5.8	-
Percentage of Monthly Savings (%)*	**0.24%**	**0.27%**	**0.69%**	**0.65%**	**0.68%**	**0.75%**	**0.39%**	**0.44%**	**0.99%**	**1.10%**	**1.09%**	**0.85%**	**-**
Margin of Error (%)**	±0.21%	±0.22%	±0.23%	±0.26%	±0.26%	±0.32%	±0.36%	±0.34%	±0.32%	±0.29%	±0.25%	±0.23%	-
Total Monthly Savings (kWh)	**382,707**	**359,885**	**955,180**	**746,771**	**616,689**	**420,429**	**177,088**	**195,426**	**492,095**	**788,670**	**1,051,243**	**1,109,012**	**7,295,195**
Reported Savings													
Number of Participants (Treatment Group)	54,095	50,077	53,212	52,598	52,465	51,493	52,221	51,743	50,785	51,129	51,012	50,737	-
Treatment Group Average Daily Post-participation Consumption (kWh/participant)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Number of Customers in the Control Group	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Control Group Average Daily Post-participation Consumption (kWh/customer)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Average Monthly Savings (kWh/participant)	**7.2**	**7.9**	**18.7**	**12.2**	**14.7**	**6.6**	**2.2**	**3.2**	**10.1**	**15.5**	**19.9**	**22.8**	**-**
Margin of Error (kWh/participant)**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Percentage of Monthly Savings (%)*	**0.25%**	**0.29%**	**0.76%**	**0.56%**	**0.85%**	**0.56%**	**0.26%**	**0.37%**	**1.00%**	**1.11%**	**1.01%**	**0.89%**	**-**
Margin of Error (%)**	NA	NA	NA	±0.11%	±0.18%	±0.47%	±0.43%	±0.41%	±0.34%	±0.25%	±0.17%	±0.13%	-
Total Monthly Savings (kWh)	**387,839**	**397,165**	**996,686**	**641,915**	**769,129**	**338,011**	**114,602**	**163,557**	**514,309**	**793,110**	**1,015,933**	**1,158,933**	**7,291,189**

* For each given month, the percentage of monthly savings is calculated by dividing the average daily savings by the average daily consumption of the control group.

**Margins of error were calculated at a 90% confidence level.

Table 6: NLH Evaluated Energy Savings Compared to Those Reported by Tendril Under the Monthly Approach

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Evaluated Savings													
Number of Participants (Treatment Group)	1,379	1,259	1,361	1,377	1,375	1,341	1,324	1,357	1,340	1,346	1,337	1,345	-
Treatment Group Average Daily Post-participation Consumption (kWh/participant)	81.9	78.8	72.9	63.5	51.7	39.8	29.8	29.0	34.5	44.6	58.5	74.6	-
Number of Customers in the Control Group	4,135	3,792	4,113	4,155	4,145	4,072	4,024	4,083	4,033	4,065	4,047	4,064	-
Control Group Average Daily Post-participation Consumption (kWh/customer)	83.3	81.1	74.1	63.0	52.2	40.0	30.2	29.2	34.8	45.0	58.8	75.4	-
Average Monthly Savings (kWh/participant)	**47.3**	**67.9**	**39.8**	**14.4**	**11.9**	**-7.2**	**-2.8**	**-6.6**	**-8.6**	**-8.0**	**-15.6**	**-0.8**	**-**
Margin of Error (kWh/participant)**	±31.2	±28.1	±29.8	±23.8	±24.7	±18.9	±15.7	±12.6	±14.4	±22.0	±26.2	±28.9	-
Percentage of Monthly Savings (%)*	**1.83%**	**2.99%**	**1.73%**	**0.75%**	**0.73%**	**-0.60%**	**-0.30%**	**-0.73%**	**-0.82%**	**-0.58%**	**-0.89%**	**-0.03%**	**-**
Margin of Error (%)**	±1.21%	±1.24%	±1.30%	±1.25%	±1.53%	±1.58%	±1.68%	±1.39%	±1.38%	±1.58%	±1.48%	±1.24%	-
Total Monthly Savings (kWh)	**65,189**	**85,539**	**54,175**	**19,780**	**16,329**	**-9,704**	**-3,734**	**-8,958**	**-11,520**	**-10,832**	**-20,915**	**-1,097**	**174,252**
Reported Savings													
Number of Participants (Treatment Group)	1,331	1,272	1,378	1,174	1,163	1,145	1,306	1,229	1,365	1,351	996	1,342	-
Treatment Group Average Daily Post-participation Consumption (kWh/participant)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Number of Customers in the Control Group	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Control Group Average Daily Post-participation Consumption (kWh/customer)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Average Monthly Savings (kWh/participant)	**48.9**	**75.7**	**50.6**	**9.4**	**5.5**	**11.2**	**-0.8**	**-5.7**	**-12.0**	**4.4**	**22.6**	**26.5**	**-**
Margin of Error (kWh/participant)**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Percentage of Monthly Savings (%)*	**1.86%**	**2.90%**	**2.10%**	**0.47%**	**0.32%**	**0.75%**	**-0.08%**	**-0.63%**	**-1.09%**	**0.31%**	**1.24%**	**1.11%**	**-**
Margin of Error (%)**	NA	NA	NA	±0.57%	±0.90%	±1.91%	±1.80%	±1.88%	±1.49%	±1.14%	±0.89%	±0.68%	-
Total Monthly Savings (kWh)	**65,115**	**96,276**	**69,771**	**11,081**	**6,401**	**12,833**	**-990**	**-6,994**	**-16,393**	**5,997**	**22,513**	**35,601**	**301,211**

* For each given month, the percentage of monthly savings is calculated by dividing the average daily savings by the average daily consumption of the control group.

**Margins of error were calculated at a 90% confidence level.

For NP, the monthly savings obtained by the Evaluator are fairly similar to those calculated by Tendril for most months. The variations observed can be explained by differences in data treatment. The Evaluator used similar criteria for cleaning data and defining calendar months as Tendril, but it was not possible to reproduce the exact same data processing and analysis. Therefore, the numbers of treatment and control group customers retained for each analysis were different, which resulted in differences between the reported and evaluated savings results. However, all of these differences are lesser than the margins of error, which means that the evaluated and reported savings are equivalent within the margin of error.

In the case of NLH, the differences between the evaluated and reported savings are greater. The differences between reported and evaluated savings for the months of January through October, as well as December are lesser than the margins of error. Therefore, the same conclusion as NP monthly savings can be made; the evaluated and reported savings from January to October and December are deemed equivalent within the margin of error. However, for November savings values, the differences are greater than the margins of error. For November, the Evaluator noticed a decrease in the reported number of treatment group participants compared to October and December, which could explain the difference between the evaluated and reported results for that month.

It should be noted that the margins of error for NLH are sometimes greater than the percentage of monthly savings value itself. The Evaluator noted that the margins of error obtained for NLH are much higher than those obtained for NP. This is probably due to the smaller sample sizes of both NLH groups since the margins of error are directly linked to sample sizes. Moreover, as mentioned previously, duplicates and overlapping bills were found in the NLH billing data, thus requiring the Evaluator to carry out a number of data cleaning steps with what is already a fairly small sample size for this type of program. An actual savings effect can be seen, however, for both utilities when the savings of all months are added up, resulting in 0.65 percent for NP and 0.64 percent for NLH.

Cumulative Approach

To calculate the energy savings under the cumulative approach, the Evaluator conducted another billing analysis using the same billing data as for the monthly approach.

Since some bills overlapped onto two years (for example, a bill that begins in December 2016 and ends in January 2017), the Evaluator had to establish the actual number of days and total electricity consumption value for each year to clearly define the pre-program and post-program periods. First, the Evaluator established the average daily consumption value of these bills. Then, the Evaluator determined how many of the billing days were actually 2016 days and how many were 2017 days and multiplied the number of 2016 and 2017 days by the average daily consumption value to obtain precise 2016 and 2017 savings. This methodology is different from the one used by Tendril which used the mid-date of each bill to assign it to either the pre-program or post-program period. The Evaluator believes that the new method is more accurate and therefore recommends using this method going forward with the program.

After cleaning the billing data and completing the abovementioned data treatment, the Evaluator used the DID model to calculate the cumulative energy savings for both utilities. The same approach as Tendril was used, except for the calculation of the total number of treatment days. For each participant in the treatment group, the Evaluator calculated the total number of treatment days by summing all available 2017 bills. For participants who had one or more gaps in their 2017 billing data (for example, a participant could have not had a July 2017 bill but had bills for all other 2017 months), the Evaluator decided to consider a total treatment days period of 365 since these gaps could have been caused by errors in billing data collection.

For participants who became inactive during the program, the same assumption as Tendril was used, meaning that only the number of days during which the participant was active was considered in the savings calculation.

The following table lists the savings established by the Evaluator and compares these with those established by Tendril under the cumulative approach.

Table 7: Evaluated Energy Savings Compared to Those Reported by Tendril Under Cumulative Approach

	Evaluated Savings		Reported Savings	
	NP	NLH	NP	NLH
Number of Participants (Treatment Group)	54,392	1,404	NA	NA
Treatment Group Average Daily Post-participation Consumption (kWh/participant)	59.5	55.1	NA	NA
Number of Customers in the Control Group	21,774	4,211	NA	NA
Control Group Average Daily Post-participation Consumption (kWh/customer)	59.9	55.7	NA	NA
Average Savings (kWh/participant)	**131**	**93**	**NA**	**NA**
Margin of Error (kWh/participant)	±37	±155	NA	NA
Percentage of Savings (%)	**0.62%**	**0.47%**	**0.66%**	**0.90%**
Margin of Error (%)	±0.18%	±0.80%	±0.19%	±0.90%
Total Savings (kWh)	**7,127,121**	**131,057**	**7,590,664**	**272,274**

As outlined in the table above, the evaluated savings are lower than the reported savings, especially NLH savings. The variations can be explained in part by differences in data treatment but more likely by differences in the methodologies used to process bills that overlap years and to calculate the total number of treatment days. However, for both utilities, all differences observed between the cumulative evaluated and reported results are lesser than the margins of error, which means that the evaluated and reported savings are equivalent within the margin of error.

The Evaluator noticed that the margins of error obtained under the cumulative approach are lower than any margins of error obtained under the monthly approach. However, for NLH cumulative savings, the margin of error is quite high and greater than the percentage of savings value. The reasons provided in the evaluated monthly approach section can also explain this finding.

The Evaluator recommends using the results obtained through the cumulative approach for official program reporting because the margins of error are lower, which improves the accuracy of the results. Furthermore, the cumulative approach is more inclusive of the various billing scenarios that can happen in a year and how they are assessed in the post-program analysis, i.e. billing situations where customers become inactive, have a gap in their bills or outlier billing data (bills with an average daily consumption of 0 kWh, or a monthly consumption higher than 10,000 kWh). By using the monthly approach, these situations and their potential savings could not be considered entirely in the calculation.

2.1.3 Savings Deduction for Participation in Other Residential Programs

One of the goals of the Benchmarking Program is to increase participation in other takeCHARGE programs. Thanks to HERs, the treatment group participants are more encouraged to participate in other takeCHARGE programs than the control group customers.

To avoid double-counting the savings already accounted for through the individual takeCHARGE programs themselves, the Evaluator used the participants' utility account numbers found in the takeCHARGE programs' databases for 2017 and compared the treatment and control groups' level of participation in the following programs: (1) the Appliances and Electronics Rebates Program, (2) the Heat Recovery Ventilator Rebate Program, (3) the Insulation Rebate Program and (4) the Thermostat Rebate Program. In cases where a statistically significant difference was observed between the treatment and control groups, deductions were made to the Benchmarking Program evaluated savings. As shown in the following table, a statistically significant difference in participation level was observed for the Thermostat Rebate Program and the Insulation Rebate Program.

Table 8: Comparison of the Level of Participation in Other takeCHARGE Programs

Program	Participation Level in the Treatment Group	Participation Level in the Control Group	Difference in Participation Level (if significant*)
NP			
Appliances and Electronics Rebates Program	1.41%	1.41%	-
Heat Recovery Ventilator Rebate Program	0.13%	0.12%	-
Insulation Rebate Program	0.78%	0.53%	0.25%
Thermostat Rebate Program	1.98%	1.70%	0.27%
NLH			
Appliances and Electronics Rebates Program	0.07%	0.66%	-
Heat Recovery Ventilator Rebate Program	0.00%	0.00%	-
Insulation Rebate Program	0.34%	0.37%	-
Thermostat Rebate Program	0.62%	0.41%	-
*The Evaluator used a confidence level of 90% for the calculation.			

Savings deductions were therefore calculated for the two cases where a statistically significant difference in participation level was found. To calculate these deductions, the Evaluator estimated an average per-household net savings value associated with each program. To do so, the Evaluator used the gross savings entered in the NP 2017 Insulation and Thermostat Rebate Program databases and converted them into net savings using the net-to-gross ratios established by the Evaluator during the 2016-2017 evaluations of the Insulation and Thermostat Rebate Programs. A total of 0.482 GWh was deducted from the 2017 Benchmarking Program savings.

Table 9: Calculations of Savings Deductions Associated with Participation in Other Programs

	Difference in Participation Level	Number of Active Participants (Treatment Group)[2]	Average Net Savings Value per Participant (kWh)	Net Savings Deduction (GWh)
NP				
Insulation Rebate Program	0.25%	51,008	2539	0.325
Thermostat Rebate Program	0.27%		1125	0.156
Total	**-**	**-**	**-**	**0.482**

Since the Instant Rebates Program participant information is not tracked in a program database, it was impossible to assess the difference in participation level using this same approach. However, considering that this program only runs over two specific campaign periods in a year and that, during these two periods, general advertising is done at the population level, the treatment and control groups probably will end up with a similar level of participation, though the treatment group is somewhat more exposed to the Instant Rebates Program promotion in their HERs. Therefore, the Evaluator considers it an acceptable choice not to make any deduction associated with participation in the Instant Rebates Program. To validate the assumption that the treatment and control groups' level of participation is similar, a general population survey should be considered as a future data collection activity.

2.2 Peak Demand Savings

Peak demand savings correspond to the demand savings that coincide (in time) with the peak demand of the electricity system. The winter peak in Newfoundland and Labrador is from 7 a.m. to noon in the morning and from 4 p.m. to 8 p.m. in the evening on the four coldest days from December to March.

2.2.1 Reported Savings

To calculate the peak demand savings, Tendril uses the assumption that demand reductions achieved by energy efficiency actions have a flat demand profile. Based on this assumption, Tendril determined the peak demand savings by dividing the reported program energy savings by the total number of

[2] At the end of December 2017.

hours in the year (8,760 hours). The reported peak demand savings were calculated using a peak demand-to-energy ratio of 0.114 MW/GWh.

2.2.2 Evaluated Savings

The flat-demand-profile approach used by Tendril to establish the program peak demand savings is a simple approach, which can be used in the absence of metering data or information about the measures implemented. This approach is based on the assumption that electricity demand stays quite constant over time.

During the rapid-feedback evaluation conducted in the summer of 2017, a survey was conducted with 300 participants and allowed the Evaluator to collect some information about the measures implemented during the first few months of the program. The survey questionnaire is found in Appendix I. The Evaluator conducted an analysis based on the specific measures reported by the surveyed participants as implemented and calculated an overall peak demand-to-energy ratio that can be applied to the program's net energy savings to establish the peak demand savings. For this evaluation, the Evaluator used the same measure implementation and peak demand-to-energy ratios determined during the first Benchmarking Program evaluation.

A peak demand-to-energy ratio was calculated separately for NP and NLH based on the answers of each group of customers. The 15 most implemented measures were taken into account in the peak demand-to-energy ratio calculations. They include energy efficiency actions recommended in the HERs (aided responses), but also other relevant energy efficiency actions reported by the participants as implemented during the survey (unaided responses).

For most of the energy efficiency actions, the corresponding peak demand-to-energy ratio is based on values provided by NP, which were developed by an external consultant.[3] These values were calculated based on energy and peak demand savings obtained from a technical potential study conducted for Hydro-Québec for similar energy efficiency measures.[4] While Hydro-Québec does not define the peak period similarly to NP, the two provinces nonetheless share similarities such as the system peak load occurring during the coldest days of the year. In the absence of 8,760-load shapes or simulation models developed specifically for Newfoundland and Labrador, the Evaluator considers the use of the peak demand-to-energy ratios provided by NP as adequate. For the few cases that were not covered in these documents, the Evaluator made other assumptions to establish a peak demand-to-energy ratio. For instance, the peak demand-to-energy ratios of the energy efficiency actions concerning programmable thermostats and insulation were based on the 2015-2016 Thermostat Rebate Program Evaluation and the 2015-2016 Insulation Rebate Program Evaluation Report. For other energy efficiency actions like turning lights off and unplugging appliances not in use,

[3] Dunsky Energy Consulting, Design and Implementation of Provincial Residential Coupon Based Energy Efficiency Program, February 2012.
[4] Technosim inc., Potentiel techno-économique d'économie d'énergie électrique au Québec – Secteurs résidentiel, commercial et institutionnel (CI) et agricole, Report presented to Hydro-Québec, 2010.

the Evaluator assumes that most lights or systems still need to be turned on or plugged in during peak hours.

The following table lists the peak demand-to-energy ratios established for all the energy efficiency actions reported by the surveyed participants as implemented. By applying the total number of times each action was implemented, the weighted average peak demand-to-energy ratio was established at 0.178 MW/GWh and 0.145 MW/GWh for NP and NLH respectively.

Table 10: Peak Demand-to-energy Ratios Associated with Energy Efficiency Actions

Energy Efficiency Action	Total Number of Participants who Implemented the Action under the Influence of the Program	Number of NP Participants Who Implemented the Action under the Influence of the Program	Number of NLH Participants Who Implemented the Action under the Influence of the Program	Peak Demand-to-energy Ratio (MW/GWh)	Source
Replace lightbulbs with more efficient LED bulbs	71	58	13	0.193	Newfoundland Power
Use dryer less	54	43	11	0.010	Newfoundland Power
Check the temperature of refrigerator or freezer	42	35	7	0.100	Newfoundland Power
Use caulking to seal gaps around windows, vents and exterior doors	21	19	2	0.689	Newfoundland Power
Install a low-flow showerhead	21	16	5	0.150	Newfoundland Power
Install/use programmable thermostats	19	19	0	0.309	From the 2015-2016 Thermostat Rebate Program Evaluation
Wash clothes in cold water	19	14	5	0.000	Newfoundland Power
Get rid of a second appliance (fridge or freezer)	18	8	10	0.116	Newfoundland Power
Clean the refrigerator condenser coils	17	17	0	0.100	Newfoundland Power
Turn lights off	17	16	1	0.000	Assuming that most lights still need to be turned on during peak hours
Change heating system/Install heat pump/wood stove	17	13	4	0.100	Newfoundland Power
Use outlet and switch insulators	16	14	2	0.424	From the 2015-2016 Insulation Rebate Program Evaluation
Install more insulation/Insulate the basement	15	11	4	0.424	From the 2015-2016 Insulation Rebate Program Evaluation
Unplug things not in use	10	8	2	0.000	Assuming that most systems still need to be plugged in during peak hours
Install new windows/doors	9	9	0	0.256	Newfoundland Power
Weighted Average Demand-to-energy Ratio	**-**	**0.178 MW/GWh**	**0.145 MW/GWh**	**-**	**-**

Both the reported and evaluated peak demand savings are likely to contain errors. Advanced metering would be the best approach to estimating peak demand savings with the highest level of accuracy. While not yet perfected, especially because peak demand-to-energy ratios from another province were used and not developed especially for the context of Newfoundland and Labrador, the Evaluator's approach is potentially more accurate. The approach takes into consideration, based on the survey results, the real measures implemented by participants. However, the data should eventually be revised because the implemented measures evolve over time.

2.3 Evaluated Net Program Savings

As previously mentioned, the Evaluator recommends using the cumulative approach to report Benchmarking Program savings going forward. The following table shows the 2017 net energy and peak demand savings calculated by the Evaluator using the cumulative approach, including the savings deductions associated with participation in other programs.

Table 11: Evaluated Net Program Savings

	NP	NLH
Total Number of Active Participants (Treatment Group)	54,392	1,404
Energy Savings		
Total Cumulative Savings (GWh)	**7.127**	**0.131**
Program Participation Deductions (GWh)	0.482	0.000
Total Net Energy Savings (GWh)	**6.645**	**0.131**
Peak Demand Savings		
Peak Demand-to-energy Ratio (MW/GWh)	0.178	0.145
Total Net Peak Demand Savings (MW)	**1.183**	**0.019**

2.4 Summary of Results

The following table summarizes the energy and peak demand savings achieved by the program during 2017 using the cumulative approach, and compares them with program targets and reported savings. The NP and NLH targets are the updated targets provided by the utilities.

The total and NP evaluated energy savings are above the updated targets while the reported energy savings are higher than the targets for both utilities.

Table 12: Summary of Program Savings for 2017

Parameters	Utility	Targets	Reported Results	Evaluated Results
Energy Savings				
Energy Savings before Program Participation Deductions (GWh)	NP	5.600	7.591	7.127
	NLH	0.231	0.272	0.131
	Total	**5.831**	**7.863**	**7.258**
Program Participation Deductions (GWh)	NP	-	-	0.482
	NLH	-	-	-
	Total	**-**	**-**	**0.482**
Net Energy Savings – at the Meter (GWh)	NP	5.600	7.591	6.645
	NLH	0.231	0.272	0.131
	Total	**5.831**	**7.863**	**6.776**
Peak Demand Savings				
Net Peak Demand Savings – at the Meter (MW)	NP	-	0.822	1.183
	NLH	-	0.099	0.019
	Total	**-**	**0.921**	**1.202**

CONCLUSIONS AND RECOMMENDATIONS

The main objective of this 2017 evaluation of the Benchmarking Program was to validate the program energy savings after the first full year of program operation. To do so, the Evaluator calculated energy savings using the monthly and cumulative approaches.

Using the monthly approach, the evaluated savings amounted to 7,295,195 kWh for NP and 174,252 kWh for NLH, compared to reported savings of 7,291,189 kWh for NP and 301,211 kWh for NLH, resulting in a 0.05 percent difference in savings for NP and a 42 percent difference for NLH.

Using the cumulative approach, the Evaluator calculated energy savings of 7,127,121 kWh for NP and 131,057 for NLH, compared to reported savings of 7,590,664 kWh for NP and 272,274 kWh for NLH, resulting in a six percent difference in savings for NP and a 52 percent difference for NLH.

Differences between evaluated and reported savings were observed using both approaches, although slightly higher differences were observed for the cumulative approach. These variations might be explained in part by differences in data treatment but more likely by differences in the methodologies used to process bills that overlap years and calculate the total number of treatment days.

In light of these findings, the Evaluator makes the following recommendations:

1. Use savings obtained through the cumulative approach to report official program savings

Although the savings evaluated using the monthly approach are higher than those evaluated using the cumulative approach, the Evaluator considers the cumulative approach more accurate and precise. The cumulative approach generated smaller margins of error for both NP and NLH. Additionally, it served to more precisely and accurately assess various billing scenarios that can occur within a year, i.e. billing situations where customers become inactive or have a gap in their bills, or outlier billing data (bills with an average daily consumption of 0 kWh or a monthly consumption higher than 10,000 kWh).

2. Under the cumulative approach, apply an actual number of days when determining the total number of treatment days and processing bills that overlap two years

This method is meant to establish more precise and accurate savings. To determine the total number of treatment days, the Evaluator suggests calculating the total number of treatment days for each participant by summing all available bills. To process bills that overlap two years, the Evaluator recommends calculating the exact number of days that fall in the pre-program and post-program periods respectively.

APPENDIX I
SURVEY QUESTIONNAIRE

I1. Hello may I please speak with [INSERT NAME]?

1. Yes [GO TO INTRODUCTION]
2. No [SAY "Perhaps you can help me anyway." GO TO INTRODUCTION]

INTRODUCTION

I2. Hello, my name is _________ and I represent Corporate Research Associates, and we are conducting a study on energy efficiency behaviours among households in Newfoundland and Labrador. Our records show that since December 2016 your household has received paper or electronic home energy reports from [Newfoundland Power/Newfoundland and Labrador Hydro] as part of the takeCHARGE initiative. These reports are a two-page document that compares your household's electricity usage to similar homes, illustrates energy usage patterns, and provides you with advice and tips to help you reduce your energy consumption.

Do you remember receiving home energy reports by mail or email in the last 6 months?

1. Yes [CONTINUE]
2. No, I don't recall these reports [PROMPT: "Is there someone else in the household who would know about these reports?'' [ASK TO SPEAK TO THEM AND REPEAT INTRODUCTION—OTHERWISE, THANK, TERMINATE, RECORD AND KEEP DATA]

99. No, Refuses [THANK, TERMINATE, RECORD AND KEEP DATA]

I3. We would like to get some feedback from you about these reports and ask questions related to your household's energy usage patterns, to help Newfoundland Power and Newfoundland and Labrador Hydro improve their energy efficiency services. The survey will take approximately 10 minutes, and it is registered with the national survey registration system. Is this a good time for you?

1. Yes [CONTINUE]
2. No, this is not a good time [ASK "Can we schedule a more convenient time for you to conduct this survey?"

99. No, refuses [THANK, TERMINATE, RECORD AND KEEP DATA]

Satisfaction with the Home Energy Reports (S Series)

My first questions will be about your use of and satisfaction with the home energy reports.

S1. In general, what have you done with the home energy reports? Did you… [READ IN ORDER, ACCEPT ONE RESPONSE]

1. Read the content thoroughly
2. Read only some of the content
3. Skim some of the content
4. Glance at the pictures, graphs, or headlines

~or did you~

5. Not read it at all
6. [DO NOT READ] Other[SPECIFY_______________]

98. (Don't know)
99. (Refused)

S2. [POSE ONLY IF CODES 1-4 IN S1] Overall, how satisfied are you with the home energy reports, using a scale from 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied"? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

S3. [ASK IF SCORE 0-7 IN S2] Why did you give the home energy reports a [INSERT SCORE IN S2]? PROBE FOR SPECIFIC REASONS

96. (RECORD VERBATIM: _________________)
98. (Don't know)
99. (Refused)

S4. [ASK IF SCORE ≥8 IN S2] What is the most important reason you are satisfied with the reports overall? PROBE: Anything else? [PROBE FOR SPECIFIC REASONS.]

96. (RECORD VERBATIM: _________________])
98. (Don't know)
99. (Refused)

S5. [POSE ONLY IF CODES 1-4 IN S1] To what extent do you agree or disagree with the following statements about the home energy reports? Please use a scale of 0 to 10, where 0 is 'completely disagree' and 10 is 'completely agree'. [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE PER STATEMENT. PROBE TO AVOID ACCEPTING A RANGE. RANDOMIZE]

a. I like the look of the home energy reports

b. I'm glad that [Newfoundland Power/Newfoundland and Labrador Hydro] sends me the home energy reports

c. The energy efficiency tips and advice in the home energy reports are useful

d. The information provided in the home energy reports is clear and easy to understand

e. The home energy reports help me make better decisions about how to use and save energy

f. The home energy reports make reasonable comparisons between my household and similar households.

ROTATE S6 AND S7

S6. [POSE ONLY IF CODES 1-4 IN S1] What aspect of the home energy reports do you like the most? [DO NOT READ. CODE ONLY ONE]

1. (The comparison to other similar homes)
2. (The usefulness of the tips and advice provided)
3. (It is personalized to me and my home)
4. (It is easy to read and understand)
5. (It is meant to help me save energy/money)
96. (Other: _________________])
98. (Don't know)
99. (Refused)

S7. [POSE ONLY IF CODES 1-4 IN S1] What aspects of the home energy reports should be improved? PROBE FOR SPECIFIC REASONS

96. (RECORD VERBATIM: _________________])
98. (Don't know)
99. (Refused)

S8. [POSE ONLY IF CODES 1-4 IN S1] Do you have any other recommendations to improve the home energy reports? PROBE: Anything else?

96. (RECORD VERBATIM: _________________])
97. No recommendations
98. (Don't know)
99. (Refused)

S9. [POSE ONLY IF CODES 1-4 IN S1] How much did the information and tips provided in the home energy reports increase your understanding of your home's energy use and how to manage it, using a 0-10 scale where 0 means it "didn't increase my understanding at all" and 10 means the information "increased my understanding a great deal." [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

S10. [POSE ONLY IF CODES 1-4 IN S1] Since receiving the home energy reports, how, if at all, has your perception of [Newfoundland Power/Newfoundland and Labrador Hydro] changed? Has your perception… [READ. CODE ONLY ONE]

1. Become more favourable,
2. Less favourable, OR
3. Remained the same
98. (Don't know)
99. (Refused)

S11. [POSE ONLY IF CODES 1-4 IN S1] Did you call a Newfoundland Power or Newfoundland and Labrador Hydro representative to ask questions about the home energy reports? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No
98. (Don't know)
99. (Refused)

S12. [ASK IF YES IN S11] Using a scale from 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied", overall, how satisfied were you with the representative's ability to answer your questions about the home energy reports? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

S13. [ASK IF SCORE 0-7 IN S12] Why did you give the representative a [INSERT SCORE IN S12]?

96. (RECORD VERBATIM: __________________)
98. (Don't know)
99. (Refused)

S14. [POSE ONLY IF CODES 1-4 IN S1] Did the home energy reports answer questions you had about your energy use for which you were considering calling Newfoundland Power or Newfoundland and Labrador Hydro? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No
98. (Don't know)
99. (Refused)

Behaviour Changes and Tips Implemented (B Series)

Now, I have some questions about energy-related actions that you may have done.

B1. In the last 6 months, have you taken any steps to reduce your home energy use? For example, this could include washing your clothes in cold water, adding insulation, getting rid of a second appliance, or replacing your lightbulbs with more efficient bulbs such as LED bulbs. [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No [GO TO B6a]
98. (Don't Know) [GO TO B6a]
99. (Refused) [GO TO B6a]

B2. In the last 6 months, did you do any of these energy-related actions at home? [ROTATE, EXCEPT ALWAYS POSE ITEM 'm" LAST. CODE ONE ONLY PER OPTION. 1=YES, 2=NO, 98=DON'T KNOW, 99=REFUSED]

a. Get rid of a second appliance, like a second fridge or freezer
b. Read the manual for your TV to better understand its features
c. Wash your clothes in cold water
d. Install a low-flow showerhead
e. Install faucet aerators
f. Insulate your attic
g. Use outlet and switch insulators
h. Use your dryer less
i. Replace your lightbulbs with more efficient LED bulbs
j. Check the temperature of your refrigerator or freezer
k. Clean your refrigerator condenser coils
l. Use caulking to seal gaps around windows, vents and exterior doors
m. Have you started doing or increased doing any other actions? [RECORD EACH ACTION SEPARATELY AS mi, mii, miii, miv, AND SO FORTH]

B2i. [POSE APPLICABLE ***B2ia-l*** STATEMENT FOR EACH CORRESPONDING 'YES' RESPONSE IN ***B2a-l*** SEQUENCE] You mentioned that in the past six months you did one or more energy-related actions in your home. Please now tell me if your household had already been doing these actions prior to six months ago. Prior to six months ago …: [POSE EACH 'YES' STATEMENT FROM B2a-l SEQUENCE] 1=YES, 2=NO, 98=DON'T KNOW, 99=REFUSED]

a. Were you already getting rid of a second appliance, like a second fridge or freezer?
b. Were you already reading the manual for your TV to better understand its features?
c. Were you already washing your clothes in cold water?
d. Had you already installed a low-flow showerhead?
e. Had you already installed faucet aerators?
f. Had you already insulated your attic?
g. Were you already using outlet and switch insulators?
h. Were you already using your dryer less?
i. Had you already replaced your lightbulbs with more efficient LED bulbs?
j. Had you already checked the temperature of your refrigerator or freezer?
k. Had you already cleaned your refrigerator condenser coils?
l. Had you already used caulking to seal gaps around windows, vents and exterior doors?

B3. [ASK FOR EACH ***CODE 2*** IN B2ia-l SEQUENCE] This time using a scale where 0 means "definitely would not" and 10 means "definitely would'.' how likely would you have been to [INSERT B2a-l ACTION], if you did not have the information provided in the home energy reports? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

B4. [ASK FOR EACH CODE 2 IN B2a-m] You said you didn't [INSERT ACTION]. Still using a scale from 0 to 10 where 0 means "definitely would not" and 10 means "definitely would", how likely are you to [INSERT ACTION] in the next 6 months? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

B5. [ASK FOR EACH CODE 0-7 IN B4] What barriers, if any, do you see to [INSERT ACTION]? DO NOT READ RESPONSES. ACCEPT MULTIPLE RESPONSES. PROBE: Anything else?

1. (Financial constraint/No money to implement)
2. (Time constraint)
3. (Lack of information)
4. (Lack of interest)
5. (Energy savings would be too small)
6. (None/no barriers)
96. (Other, Specify: _____________)
98. (Don't know)

B6a. In the last 6 months, have you participated in any of Newfoundland Power's or Newfoundland and Labrador Hydro's energy efficiency programs? [DO NOT READ. CODE ONLY ONE]

1. Yes
2. No [GO TO P SERIES]
98. (Don't Know) [GO TO P SERIES]
99. (Refused) [GO TO P SERIES]

B6b. Which program(s) have you participated in? [DO NOT READ. ACCEPT MULTIPLE]

1. The Instant Rebates Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides instant at-the-cash register rebates for the purchase of products such as LED bulbs, dimmer switches, ceiling fans and fixtures, motion sensors, power strips, dehumidifiers, faucet aerators and low-flow showerheads.)
2. The Insulation Rebate Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for basement, crawl space and attic insulation upgrades.)
3. The Thermostat Rebate Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for the purchase of electronic non-programmable and programmable thermostats.)
4. The Appliances and Electronics Rebates Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for the purchase of high efficiency televisions, washers and freezers.)
5. The Heating Recovery Ventilator Rebate Program (DO NOT READ, USE TO CODE CORRECTLY: This program provides rebates for the purchase of a high efficiency heat recovery ventilator (HRV).)
96. (Other:________)
98. (Don't Know) [GO TO P SERIES]
99. (Refused) [GO TO P SERIES]

B6c. Using a scale where 0 means "definitely would not'' and 10 means "definitely would,'' how likely would you have been to participate in this or these programs, if you had not received the home energy reports? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

Experience with the Online Portal (P Series)

[ASK RESPONDENTS WITH PORTAL=YES IN SAMPLE]

P1. Do you recall having signed up on the takeCHARGE website to have access to the MyHome online Profile that provides you with additional personalized information about your household's electricity usage and ways to help you save energy? [DO NOT READ. CODE ONE ONLY]

1. Yes
2. No [GO TO D SERIES]
98. (Don't Know) [GO TO D SERIES]
99. (Refused) [GO TO D SERIES]

P2. What was the SINGLE most important reason you decided to sign up for the online Profile?

96. (RECORD VERBATIM: _________________])
98. (Don't know)
99. (Refused)

P3. Were there any other reasons?

96. (RECORD VERBATIM: _________________])
97. None/no other reasons

P4. How have you used the online Profile? Have you… [READ IN ORDER, ACCEPT ONE RESPONSE]

1. Only signed up without really having a look at the content
2. Browsed the Profile and glanced at the content
3. Been on the Profile a few times to read some or all of the content
4. Been on the Profile regularly to be informed of any new content
5. [DO NOT READ] Or something else… [SPECIFY_______________]
98. (Don't know)
99. (Refused)

P5. [POSE ONLY IF CODES 2-4 IN P4] Overall, how satisfied are you with the online Profile, using a scale from 0 to 10, where 0 means you are "not at all satisfied" and 10 means you are "completely satisfied"? [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE]

P6. [ASK IF SCORE 0-7 IN P5] Why did you give the online Profile a [INSERT SCORE IN P5]?

97. (RECORD VERBATIM: _________________)

98. (Don't know)
99. (Refused)

P7. [ASK IF SCORE ≥8 IN P5] What is the most important reason you are satisfied with the online Profile? PROBE: Anything else? [PROBE FOR SPECIFIC REASONS. ACCEPT MULTIPLE]

96. (RECORD VERBATIM: ________________])
98. (Don't know)
99. (Refused)

P8. [POSE ONLY IF CODES 2-4 IN P4] To what extent do you agree or disagree with the following statements about the online Profile? Please use a scale of 0 to 10, where 0 is 'completely disagree' and 10 is 'completely agree'. [0-10 SCALE, 98=DON'T KNOW, 99=REFUSED. CODE ONLY ONE. PROBE TO AVOID ACCEPTING A RANGE. RANDOMIZE]

a. I like the look of the online Profile
b. The process to sign up and create an account was simple and straightforward
c. The energy efficiency tips and advice provided are useful
d. The information provided is clear and easy to understand
e. The online Profile is user-friendly

P9. [POSE ONLY IF CODES 2-4 IN P4] Do you have any recommendations to improve the online Profile? PROBE: Anything else?

96. (RECORD VERBATIM: ________________])
97. No recommendations
98. (Don't know)
99. (Refused)

Demographic Characteristics (D Series)

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

D1. What type of residence do you live in? [READ RESPONSES 1-6, THEN 96; SELECT ONE RESPONSE]

1. Apartment building that has fewer than five stories
2. Apartment building that has five or more stories
3. Detached single-family home
4. Semi-detached house or duplex (2 dwellings attached)
5. Mobile home or house trailer
6. Row house or town house with shared adjacent walls (3 or more dwellings attached)
96. Or some other type [SPECIFY: ______________________]

98. (Don't know)
99. (Refused)

D2. Do you own or rent this home?

1. Own/buying
2. Rent/lease
3. Other (Describe) ____
99. (Refused)

D3. Including yourself, how many people live in this residence on a full-time basis?

Number of people: _____________ [NOTE: DON'T ALLOW ZERO FOR A RESPONSE]
99. (Refused)

D4. What is your age group? Are you ....: [READ]

1. 18 to 24
2. 25 to 34
3. 35 to 44
4. 45 to 54
5. 55 to 64
6. 65 or over
99. (Refused)

D5. What is the highest level of education you have completed? [READ IF NECESSARY]

1. (Less than high school graduation diploma)
2. (High school graduation diploma and/or some post-secondary)
3. (Trades certificate or diploma)
4. (College certificate or diploma)
5. (University degree, certificate or diploma)
97. Other (SPECIFY: ___________)
98. (Don't know)
99. (Refused)

D6. Which of the following income categories best describes your total annual household income before taxes in 2016? Stop me when I reach the right category. [READ LIST; SELECT ONE RESPONSE]

1. Less than $15,000
2. $15,000 - $24,999
3. $25,000 - $34,999
4. $35,000 - $49,999
5. $50,000 - $69,999
6. $70,000 - $79,999
8. $80,000 or more
98. (Don't know)
99. (Refused)

D7. [DO NOT READ] Gender:

1. Male
2. Female

END: That is all the questions I have for you. Thank you for taking the time to respond to this survey.

ECONOLER

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BUSINESS EFFICIENCY PROGRAM EVALUATION

NEWFOUNDLAND POWER AND NEWFOUNDLAND AND LABRADOR HYDRO

Final Report

July 12, 2018

ECONOLER

ACRONYMS AND ABBREVIATIONS

AC	Alternating current
BEP	Business Efficiency Program
CEE	Consortium for Energy Efficiency
CFL	Compact fluorescent lamp
COP	Coefficient of performance
CRA	Corporate Research Associates
DLC	DesignLights Consortium
ECM	Electronically-commutated motor
EER	Energy efficiency ratio
EFLH	Equivalent full load hours
EPA	Environmental Protection Agency
EUL	Effective useful life
HID	High intensity discharge
HOUs	Hours of use
HPS	High-pressure sodium
HSPF	Heating seasonal performance factor
HVAC	Heating, ventilation and air-conditioning
IES	Illuminating Engineering Society
IPMVP	International Performance Measurement and Verification Protocol
LBNL	Lawrence Berkeley National Laboratory
LED	Light-emitting diode
LUC	Levelized utility cost
M&V	Measurement and verification
NEEP	Northeast Energy Efficiency Partnerships
NLH	Newfoundland and Labrador Hydro
NP	Newfoundland Power
NTGR	Net-to-gross ratio
OPA	Ontario Power Authority
PAC	Program administrator cost
PDA	Project Development Agreement
PUC	Pennsylvania Utility Commission
SEER	Seasonal energy efficiency ratio
TRC	Total resource cost
TRM	Technical reference manual

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EXECUTIVE SUMMARY

This report presents the results of the 2016-2017 process, market and impact evaluations of the takeCHARGE Business Efficiency Program (BEP). The program was designed to help commercial businesses in Newfoundland and Labrador improve their facilities' electrical energy efficiency. Specifically, the BEP offers (1) financial incentives based on the energy savings achieved by custom projects, (2) other kinds of financial and educational support to help facility staff identify and implement energy efficiency projects, and (3) prescriptive rebates for specific products on a per-unit basis.

Summary of Evaluation Assignment

Econoler (hereinafter the Evaluator) was mandated to perform the BEP evaluation and accomplish the following objectives:

› Assess the effectiveness of program design, administration and implementation;

› Determine the gross and net energy and demand savings;

› Assess program cost-effectiveness;

› Provide recommendations to improve the program.

The BEP evaluation was carried out on the basis of results obtained from a review of the program database, surveys with non-participant and participant businesses, in-depth interviews with partial participants and trade allies, a unitary savings review for prescriptive measures, a project review for custom measures, a literature review and a cost-effectiveness analysis.

Summary of Process and Market Evaluation Findings

BEP participants, non-participants, partial participants and trade allies were interviewed to gather feedback on various aspects of the program, including sources of program awareness, reasons for participation, satisfaction with the program and program staff, barriers to program delivery and recommendations for program improvement. What follows are some of the main findings from the surveys and interviews:

› Six in 10 non-participant businesses surveyed heard of financial incentives being provided to businesses by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH), and a similar proportion heard of the BEP (63%). This result is higher than the level of awareness observed during the 2016 evaluation (34%).

› Although awareness of the program increased, not knowing about the program was identified as the main reason for not participating in the BEP among non-participant businesses that made energy efficiency upgrades in the last two years.

- Six of the 13 trade allies interviewed do not use the promotional materials provided by NP and NLH. Additionally, trade allies do not proactively talk about the BEP to their customers; they instead use it as a way to close sales.
- That said, trade allies are generally satisfied with the program and their relationship with program staff.
- The vast majority of custom and prescriptive participants found the BEP participation process easy. On average, 88 percent of participants were satisfied with the participation process. The three program aspects that were most challenging were conducting measurement and verification (for custom participants), completing the energy efficiency upgrades and reviewing the Project Development Agreement.
- The same proportion of participants (88%) mentioned being satisfied with the BEP overall. Aspects of the program such as the walk-through energy assessment, program documentation and technical support provided were all rated highly by participants. The three program aspects that received the lowest satisfaction ratings from participants – regardless of whether they were custom or prescriptive participants – are the range of eligible equipment, the rebate amounts and the time it took to receive the rebate. Offering more upgrades for rebates was actually mentioned as the main recommendation for program improvement by participants.
- Although trade allies believe there are still untapped market opportunities for the program, they are concerned about the long-term viability of the BEP given its lighting-oriented offer and the increased popularity of LED technology.

Partial participants are defined as customers who have benefited from a walk-through energy assessment but are not identified as participants in the database. The Evaluator wanted to interview these businesses to understand why they did not follow through with the program.

- Partial participants were generally satisfied with the walk-through energy assessment performed in their business. Positive feedback included the timeliness of the process, knowledge and helpfulness of the staff that conducted the assessment and their quick responses to questions after the walk-through.
- On the other hand, less satisfied customers mentioned advice limited to lighting and heating technology, a lower incentive estimate than anticipated, fewer recommendations than desired, and a perceived lack of enthusiasm and expertise from the energy advisor as reasons for dissatisfaction. Those participants were also critical of the recommendations made, mentioning that the cost and savings per upgrade were either not clearly explained or seemed inaccurate, interactive effects did not seem to have been considered in the savings calculations and not enough short, mid and long-term benefits were provided to rationalize the recommendations.

- Seven of the 13 interviewed partial participants chose to make energy efficiency upgrades after the walk-through energy assessment, but only two decided to do so through the program. When asked what could have encouraged them to follow through with the program for these upgrades, partial participants mentioned better explanations of the next steps and follow-up contact to discuss the project.
- For the most part, the decision of the seven partial participants to make upgrades was made before learning more about the program.

Summary of Impact Evaluation Findings

For 2016 and 2017, the BEP aimed to achieve gross energy savings of 7.630 GWh (6.8 GWh for NP and 0.830 GWh for NLH) and 8.786 GWh (8.3 GWh for NP and 0.486 GWh for NLH) respectively. By evaluating only completed projects for which the savings had been measured and verified and a full incentive had been paid in 2016 and/or 2017, the Evaluator found that the program generated gross energy savings of 3.832 GWh and 4.937 GWh in 2016 and 2017 respectively. In comparison, when considering these same projects, tracked gross savings values of 4.265 GWh and 4.876 GWh were observed for 2016 and 2017 respectively (see Table 1).

For the gross savings review, the Evaluator revised the unitary savings values used to estimate savings related to prescriptive measures and calculated adjustments based on a review of custom projects.

For the net-to-gross assessment, free-ridership and spillover levels were established during the evaluation. The results revealed free-ridership levels of 27 percent and 29 percent for the prescriptive and custom components respectively. Spillover was evaluated at 14 percent for the prescriptive component and zero percent for the custom component. These levels of free-ridership and spillover result in net-to-gross ratios (NTGRs) of 0.87 for the prescriptive component and 0.71 for the custom component, and overall program NTGRs of 0.72 for 2016 and 0.78 for 2017. By applying the NTGRs to gross results, for 2016 and 2017 combined the BEP achieved total net energy and peak demand savings of 6.608 GWh and 0.975 MW respectively.

The following table provides an overview of the main impact evaluation results.

Table 1: Summary of 2016 and 2017 BEP Results

Parameters	Utility	Tracked Results[1]		Evaluation Results	
		2016	2017	2016	2017
Gross Electricity Energy Savings – at the Meter (GWh)	NP	2.734	4.454	2.441	4.408
	NLH	1.530	0.422	1.391	0.529
	Total	**4.265**	**4.876**	**3.832**	**4.937**
Gross Electricity Peak Demand Savings – at the Meter (MW)	NP	0.241	0.469	0.268	0.690
	NLH	0.367	0.093	0.232	0.097
	Total	**0.608**	**0.561**	**0.501**	**0.787**
NTGR	NP	0.90	0.90	0.72	0.78
	NLH	0.90	0.90	0.72	0.78
Net Electricity Energy Savings – at the Meter (GWh)	NP	2.461	4.008	1.772	3.392
	NLH	1.377	0.380	0.996	0.448
	Total	**3.838**	**4.388**	**2.587**	**3.840**
Net Electricity Peak Demand Savings – at the Meter (MW)	NP	0.212	0.389	0.197	0.534
	NLH	0.330	0.083	0.164	0.081
	Total	**0.547**	**0.505**	**0.361**	**0.614**

[1] The tracked gross values were calculated by the Evaluator using the program databases but are not equivalent to the savings reported by NP and NLH. The Evaluator used different criteria than NP and NLH to determine which projects were 2016-2017 projects. To obtain the tracked net values, the Evaluator multiplied the gross values by the tracked NTGR (0.90).

INTRODUCTION

Evaluation Scope

Econoler was hired to perform the process, market and impact evaluations of the Business Efficiency Program (BEP) offered by Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH). The evaluation involved conducting (1) a review of the program documentation and databases, (2) surveys with non-participating and participating businesses, (3) in-depth interviews with trade allies and partial participants, (4) a savings review, and (5) a cost-effectiveness analysis. Further details about these activities are provided in the Evaluation Methodology section of this report.

Key research themes addressed for the process and market evaluations include:

- Assessing the level of awareness about the program;
- Assessing the effectiveness of program design and delivery, and overall program performance;
- Identifying challenges in the participation process and program delivery;
- Assessing participant and partner satisfaction with the program;
- Assessing the effectiveness and comprehensiveness of program tracking;
- Identifying reasons for non-participation in and barriers to completing projects under the BEP;
- Determining customer intentions to participate in the BEP in the future;
- Identifying areas of program improvement.

The impact evaluation addressed the following objectives:

- Determining the gross energy and demand savings;
- Determining the net-to-gross ratios (NTGRs);
- Determining the net energy and demand savings;
- Assessing program cost-effectiveness.

This evaluation covers the 2016 and 2017 program years.[2]

Presentation of the Team

To complete this evaluation, Econoler worked with Corporate Research Associates (CRA). Throughout this report, this team is referred to as the Evaluator. Tasks were divided as follows:

- Econoler served as team leader and was in charge of coordinating and supervising all evaluation activities, developing data collection instruments, as well as preparing and reviewing the evaluation report. Econoler also led the process, market and impact evaluation work.
- CRA conducted the surveys and in-depth interviews.

[2] The 2016 and 2017 program savings calculated by the Evaluator do not fully correspond to the savings reported by NP and NLH. The Evaluator used different criteria than NP and NLH to determine which projects were 2016-2017 projects.

1 PROGRAM OVERVIEW

The Business Efficiency Program (BEP) aims to help improve the electrical energy efficiency of commercial facilities in Newfoundland and Labrador. Specifically, the BEP offers (1) financial incentives based on the energy savings achieved by custom projects, (2) financial and educational support to help facility staff identify energy efficiency projects through audits and feasibility studies, and (3) prescriptive rebates for specific products on a per-unit basis.

In October 2013, Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH) jointly launched the BEP. Since then, the two utilities have been operating the program in a concerted effort under the takeCHARGE energy conservation brand.

Participants eligible for the BEP can choose to install energy-efficient products included in the list of prescriptive products or opt for custom solutions. The table below outlines the products eligible under the prescriptive component of the program and their corresponding rebate amounts. Conversely, custom solutions are adapted to each business' needs and include space or hot water heating, lighting, motors, refrigeration, as well as heating, ventilation and air-conditioning (HVAC).

Table 2: List of Prescriptive Products and Their Rebate Amounts

Prescriptive Product	Rebate Amount
LED Light Bulbs	Up to $10 per Bulb
LED High Bay Fixtures	Up to $90 per Fixture ($90 for a 400 watt and $60 for a 250 watt)
LED Exit Signs and Retrofit Kits	$20 per Exit Sign, $15 per Retrofit Kit
LED Wall Packs	$25 Each
Fluorescent High Bay Fixtures	$60 Each
High-performance T8 Lamps	$1 Each
Programmable Thermostats	Rebate Amount Calculated Using Calculations Spreadsheet
Occupancy Sensors	Rebate Amount Calculated Using Calculations Spreadsheet
Rooftop Air-source Heat Pumps	$300 per Ton
Low-flow Showerheads	$15 Each
Pre-rinse Spray Valves	Up to $120 for Each or Free if Installed Through Direct-install
Electronically-commutated Motors (ECMs)	Free Upgrade to an Efficient ECM

In August 2016, the distributor-based lighting program was merged with the BEP. As a result, BEP offerings were updated to include new lighting technologies such as LED bulbs. Additionally, electronic fluorescent ballasts were removed from the program, and any instant rebates previously available through distributors are now available through a mail-in rebate claim process. Also, rooftop air-source heat pumps, ECMs and pre-rinse spray valves were added to the program in May 2017.

Commercial businesses interested in the program, especially in custom solutions, are offered a free walk-through energy assessment performed by a program energy efficiency expert to identify and recommend upgrades designed to reduce energy use. Depending on project complexity, a more detailed energy audit or a feasibility study may be conducted. The program funds 50 percent of the detailed energy audit cost, up to $3,000, and 75 percent of the feasibility study eligible cost, up to $5,000.

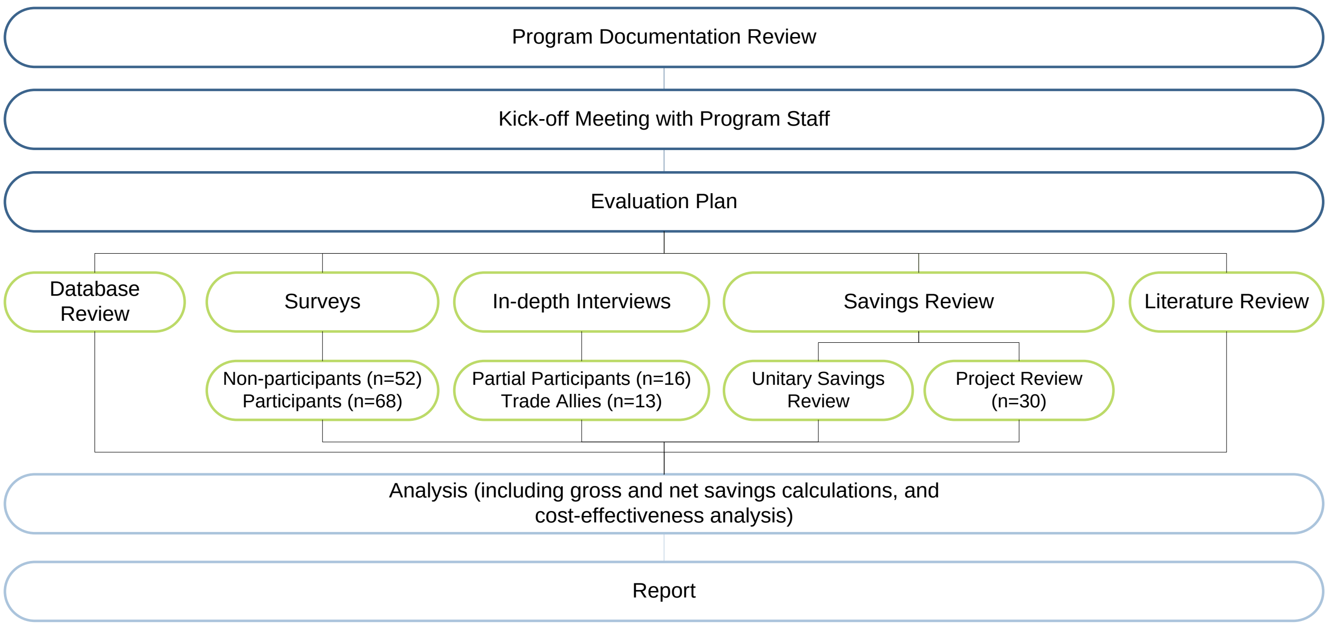
Once the prescriptive or custom options are identified, the project is approved and the Project Development Agreement (PDA) is signed (for custom clients), participants can start installing the energy-efficient products or equipment. Measurement and verification (M&V) is required to quantify the energy savings achieved by custom projects and finalize applicable incentives which are $0.10 per kWh saved during the first year of implementation, up to a maximum of $50,000. Additionally, participants must guarantee that the upgrades installed and incentivized through the program will be in place for at least five years.

The program is delivered through advertising, direct customer contact by NP and NLH, and partnerships with distributors and contractors operating in markets such as lighting, refrigeration and HVAC.

For 2016 and 2017 respectively, the program aimed to achieve gross energy savings of 7.630 GWh (6.8 GWh for NP and 0.830 GWh for NLH) and 8.786 GWh (8.3 GWh for NP and 0.486 GWh for NLH).

2 EVALUATION METHODOLOGY

This section presents the methodology employed and the activities carried out for the 2016-2017 BEP evaluation.



The Evaluator first reviewed program documentation, including the program guidelines and database, and then conducted a kick-off meeting with program staff to learn about the main program components and mechanisms. Based on the information obtained during this meeting and the program documentation review, an evaluation plan was developed, which included program information as well as the evaluation scope, methodology and timeline. Thereafter, data collection activities were carried out.

2.1 Database Review

As part of the evaluation, the Evaluator reviewed the two BEP databases provided by NP and NLH to assess their components and mechanisms. More specifically, the review had the following objectives: (1) verify whether the databases provide the complete information needed for program monitoring and evaluation in accordance with industry best practices; (2) assess the level of consistency among the various data-entry fields and detect abnormalities that need to be addressed; and (3) identify areas for improvement.

2.2 Non-participant Survey

In February and March 2018, CRA conducted a telephone survey with a total of 52 non-participant businesses. The average length of the survey was seven minutes.

The non-participant survey was meant to collect feedback on the following aspects:

- Whether non-participant businesses in Newfoundland and Labrador know about the BEP;
- How they heard about the program;
- If they have recently completed energy-efficient upgrades and why they chose not to participate in the BEP for those upgrades;
- Which barriers or challenges keep their businesses from completing energy efficiency projects;
- Whether they intend to complete energy efficiency projects in the next year and participate in the BEP for those projects.

A total of 239 sample records were available at the time of the survey. Due to this small population, a census approach was adopted rather than a sampling approach. Therefore, a margin of error should not be applied.

The survey questionnaire and the survey respondents' firmographic profile are provided in Appendices I and II respectively.

2.3 Participant Survey

In February and March 2018, CRA conducted a telephone survey with 68 BEP participants. The average length of the survey was 12 minutes.

The survey was meant to collect feedback regarding the following aspects of the program:

- How participants found out about the program;
- What their reasons were for participating in the program;
- How easy or difficult the participation process was;
- How satisfied they are with the program and its various aspects;
- Whether they have any recommendations to improve the BEP;
- How influential the program was on their choice of projects or measures and whether they had the intention to carry out their project before hearing about the program (free-ridership);
- Whether they completed additional energy efficiency projects after participating in the BEP due to program influence (spillover).

A total of 193 sample records were available at the time of the survey. Due to this small population, a census approach was adopted rather than a sampling approach. Therefore, a margin of error should not be applied.

The survey questionnaire and the survey respondents' firmographic profile are provided in Appendices III and IV respectively.

2.4 Interviews with Partial Participants

In February and March 2018, CRA conducted 16 interviews with partial participants who each had a BEP walk-through energy assessment conducted for their businesses. Pursuant to the energy assessments, these customers took different actions. For example, some decided not to participate in the BEP; some implemented the recommended projects but outside the program; and some have not yet decided to participate or are taking their time to implement their projects. These interviews were meant to collect feedback regarding the following aspects:

- How these customers heard about the program;
- How useful the walk-through energy assessment and resulting upgrade recommendations were;
- Whether they implemented any of the recommended upgrades or any other upgrades and whether they plan on applying for incentives for these upgrades;
- Why they have not or will not participate in the BEP for these upgrades;
- How likely they are to carry out other projects in the future and if they plan on participating in the BEP for these.

The guide used for conducting the interviews with these partial participants is provided in Appendix V.

2.5 Interviews with Trade Allies

In February and March 2018, CRA conducted 13 interviews with trade allies to collect feedback regarding the following aspects of the BEP:

- How trade allies are involved in the program;
- How familiar they are with the changes made to the program in the last two years and how these changes have affected them, if at all;
- How they reach out to or identify potential customers and whether they use materials provided by the program to do so;
- How satisfied they are with the program and their relationship with NP and NLH;
- What benefits the program has provided them, and what challenges they have encountered;
- What they think should be improved about the BEP, whether it be in terms of process or offerings.

The guide used for conducting the interviews with trade allies is provided in APPENDIX VI.

2.6 Savings Review

2.6.1 Unitary Savings Review (For Prescriptive Measures)

The Evaluator conducted a literature review and performed engineering calculations to revise the unitary savings values used by NP and NLH. Technical reference manuals (TRMs) and public evaluation reports of similar jurisdictions were consulted with a focus on the most recent and accurate sources.

2.6.2 Project Review (For Custom Measures)

Complete technical reviews of project documentation and on-site visits or in-depth telephone interviews were carried out for a sample of custom participants.

A total of 30 projects were reviewed, which comprised validation of the technical specifications and operating parameters of the new and old equipment. This allowed the Evaluator to verify the gross savings tracked by NP and NLH. The Evaluator also collected information regarding the facilities' characteristics and interviewed participants to assess and quantify free-ridership and spillover.

2.7 Literature Review

In addition to the literature review conducted to verify the program unitary savings values, another literature review was undertaken to validate some of the key parameters used in the cost-effectiveness analysis, namely the effective useful life (EUL) and incremental cost assumptions. Additionally, assumptions used in the gross savings calculations (e.g. baseline parameters and minimal energy performance requirements) were also confirmed or obtained through this literature review.

3 PROCESS AND MARKET EVALUATIONS

This section presents the findings of the BEP process and market evaluations which were carried out on the basis of the information gathered from the database review, non-participant and participant surveys, as well as interviews with partial participants and trade allies.

3.1 Database Review

The Evaluator reviewed the contents of the BEP database to verify whether the provided information was complete, consistent, coherent, and in line with the needs of this program evaluation. This review was not only an opportunity to assess possible improvements meant to facilitate both internal program management and program monitoring and evaluation, but also an essential part of preparing energy savings calculations for the impact evaluation.

The program database consists of two Excel spreadsheets (one per utility), containing participant and administrative information as well as technical data about projects. Since the program is offered by two utilities (NP and NLH), customer tracking is not centralized. NP and NLH each track customer data using their own Excel spreadsheets which were both provided to the Evaluator. The NP custom and prescriptive projects were provided to the Evaluator in separate Excel files, whereas NLH provided custom and prescriptive projects under different tabs of the same Excel document.

First, the Evaluator noticed that improvements were made to the NP and NLH databases after the first BEP evaluation. For instance, the participating facility addresses, path followed by each participant (prescriptive or custom), contact types, important project dates and project numbers were all added to the databases.

However, basic customer information needed for conducting surveys was sometimes missing. The prescriptive databases did not contain any names of prescriptive participants, which affected the survey response rate. Additionally, approximately 12 percent of NP custom projects in the database did not have a phone number, which also complicated the data collection process. For NLH, all custom projects included in the evaluation had a phone number. Having complete participant contact information, including participant names, addresses and phone numbers, is especially important when only a limited number of projects can be used for data collection and/or project reviews.

Customers officially become BEP participants when they sign the PDA. The NP custom database included two tabs titled Opportunities and Projects, where the former is meant to identify customers who are not yet participants and the latter includes actual participants. These tabs were useful to the Evaluator's data collection activities. However, the Opportunities tab included customers with the following project milestones – PDA Signed, Install Complete and Process Complete – which created confusion as to the actual status of these customers. These were finally removed from the Evaluator's sample.

To carry out the various data collection activities required under this assignment, the Evaluator needed to know the status of and program steps completed by each participant; for example, which participants received the walk-through energy assessment. The prescriptive databases did not indicate which prescriptive participants had received a walk-through energy assessment. Although the custom databases included whether or not a walk-through energy assessment had been carried out, there was still ambiguity for some projects, mostly in the NP database where more than one column was used to track the walk-through energy assessment. For example, the NP Project Milestone column indicated that a walk-through had been completed, but there was no confirmation of that in the column titled Walk-through Scheduled. Additionally, the project milestones for some NP and NLH projects did not seem to indicate the current status of participants when compared to information found in other fields of the database. As mentioned about the first BEP evaluation, both NP and NLH should ensure that the status of each participant is kept up to date as much as possible and regularly verified to effectively manage projects, identify the appropriate next steps or actions to be taken, and determine whether particular projects should be removed from the database. If only one Project Milestone column is not enough to clearly and effectively track participant status, a system with multiple columns for each milestone should be considered.

In addition, the Evaluator recommends adding a column in the NP custom database to indicate the project completion date, which is currently tracked by NLH. This date should correspond to the moment when the energy savings have been confirmed and the last portion of the rebate has been granted. This information would help in tracking custom project savings on a yearly basis. Under which year savings should be attributed had to be determined based on the year during which the rebates were intended to be offered, as shown in the screen caption below.

Energy Savings (1)	Rebate (1)	Year1	Energy Savings (2)	Rebate (2)	Year2
		0			0
97499	$ 9 750.00	2016			0
70791	$ 7 079.10	2017			0
181160	$ 18 116.00	2017			0
70337.9	$ 7 033.79	2016	126436.1	$ 12 643.61	2017
44400	$ 4 440.00	2016			0

Figure 1: Screen Capture of the NP Database

Also illustrated in Figure 1, the energy savings per project are currently indicated in two separate columns when rebates are to be offered in two steps (upon project completion and upon reception of the M&V results). NP needs this type of tracking for program reporting. However, for a third-party evaluator, it can lead to confusion when accounting for total energy savings per project. On a related note, the savings values entered in the NP and NLH databases for custom projects were not always the same values found in the M&V report, especially for projects that involved non-lighting measures. The savings in the databases were based on the savings estimates of the PDA and were not always revised using the M&V results after projects had been implemented.

Lastly, the Evaluator acknowledges the amount and quality of the information tracked in the NLH prescriptive database. Indeed, tracked information about the baseline equipment, although not actually used to calculate tracked savings, is usually useful information for the Evaluator to be able to revise the unitary savings estimates. The only downside noted was the lack of clarity in the way these data were presented. To address this issue and facilitate database perusal, NLH should consider using clearer color layouts to regroup the data per category of measure and more precise column descriptions. On a related note, the NP prescriptive database included tracked savings values per project, while the NLH database did not. Conducting an impact evaluation involves revising the utility's tracked savings values, but the program database should include tracked savings values that the Evaluator can use as a starting point.

In light of these findings, the Evaluator recommends the following improvements to the databases:

- Enter the contact names of prescriptive participants found on the application form;
- Ensure that all tracked projects have a corresponding phone numbers;
- For prescriptive projects, include the baseline equipment wattage, type and quantity, as well as project tracked savings, and track this information in a clear manner;
- Keep the Project Milestone field up to date and ensure it is coherent with other database fields;
- For custom projects, add a column to indicate the project completion date and use this date to determine under which year project savings should be tracked;
- For custom projects, revise the savings in the database once M&V results are available.

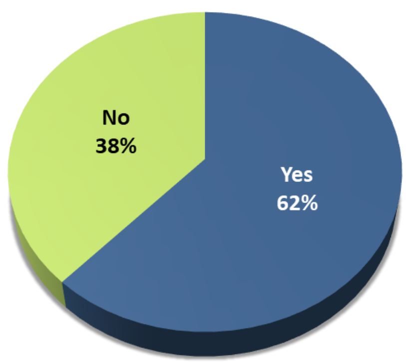
3.2 Non-participant Survey

As part of the evaluation, a survey was conducted with 52 non-participating businesses.

This subsection summarizes the results of the BEP non-participant survey. This survey targeted businesses which did not participate in the program in 2016 or 2017. A total of 52 telephone interviews were conducted with employees involved in making energy efficiency decisions in their organizations. Of the 52 interviews completed, 51 were conducted with NP customers and one was conducted with a NLH customer. Due to the small NLH sample size, survey results are presented together for both utilities.

3.2.1 Program Awareness among Non-participants

Six in 10 non-participating businesses (62%) have heard about financial incentives and technical support provided by NP and NLH.



Source: Q.A1: Before today, had you ever heard about financial incentives and technical support provided by Newfoundland Power and Newfoundland and Labrador Hydro for businesses such as yours to do energy efficiency projects? (n=52)

Figure 2: Awareness of Financial Incentives and Technical Support

Non-participants were then asked about whether they had ever heard of the BEP specifically. A similar number of businesses (63%) have heard of the BEP, which is a higher level of awareness compared with 2016 (34%). The businesses that were aware of the BEP learned about the program in a number of ways, including a power bill insert (18%), a third-party contractor (18%), someone working for NP or NLH (18%), or the Internet in general (18%).

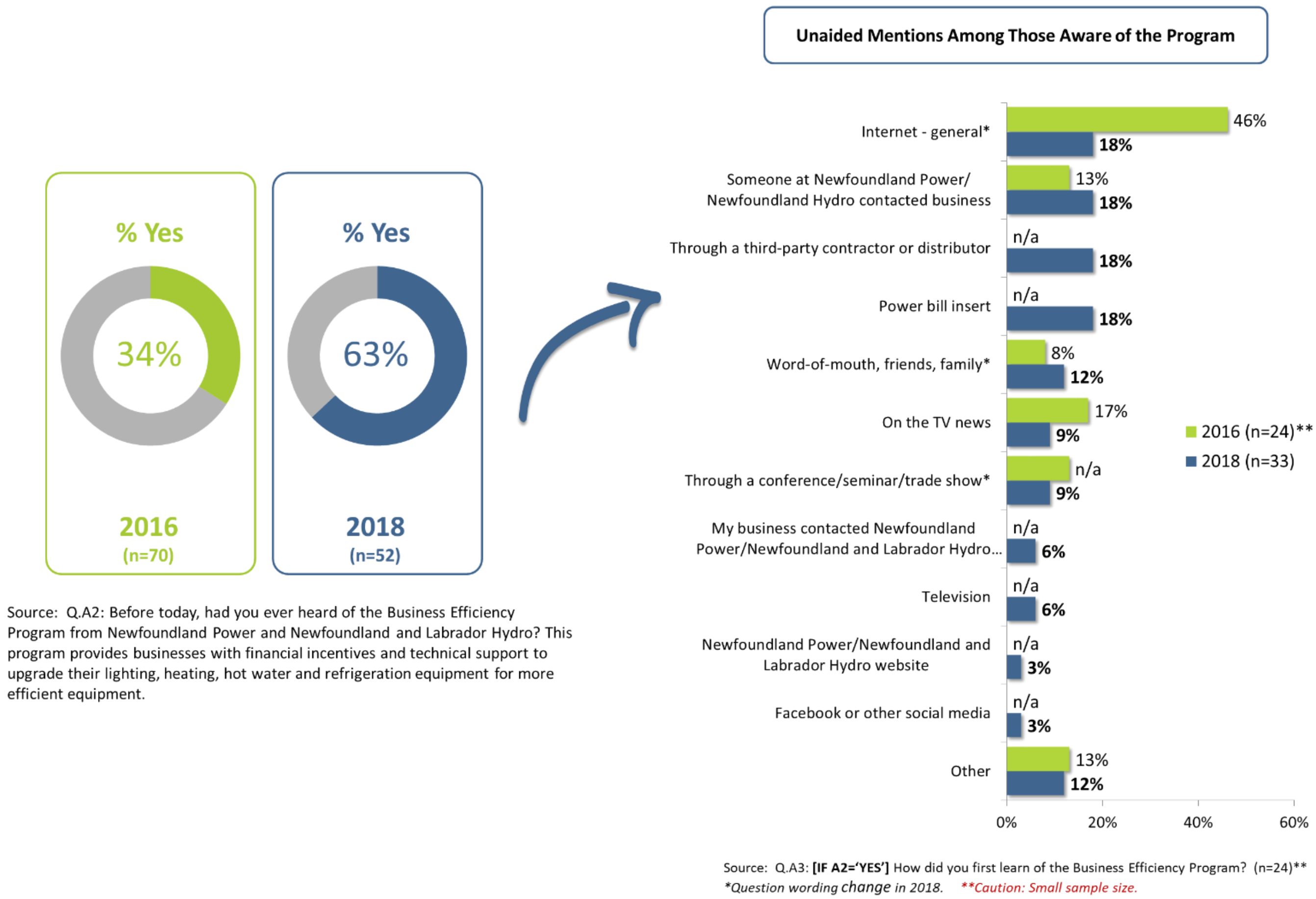
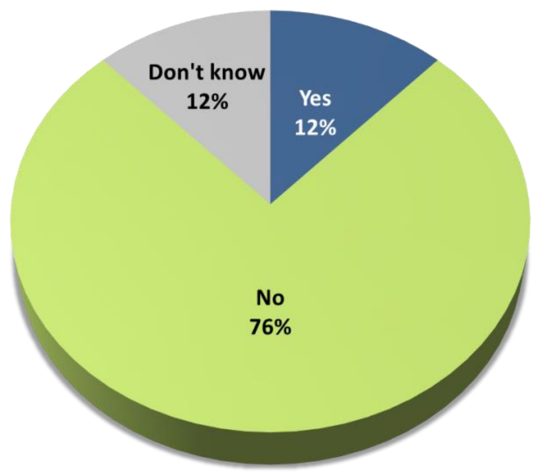


Figure 3: Level of Awareness and Sources of Awareness about the BEP

3.2.2 Reasons for Not Participating in the BEP

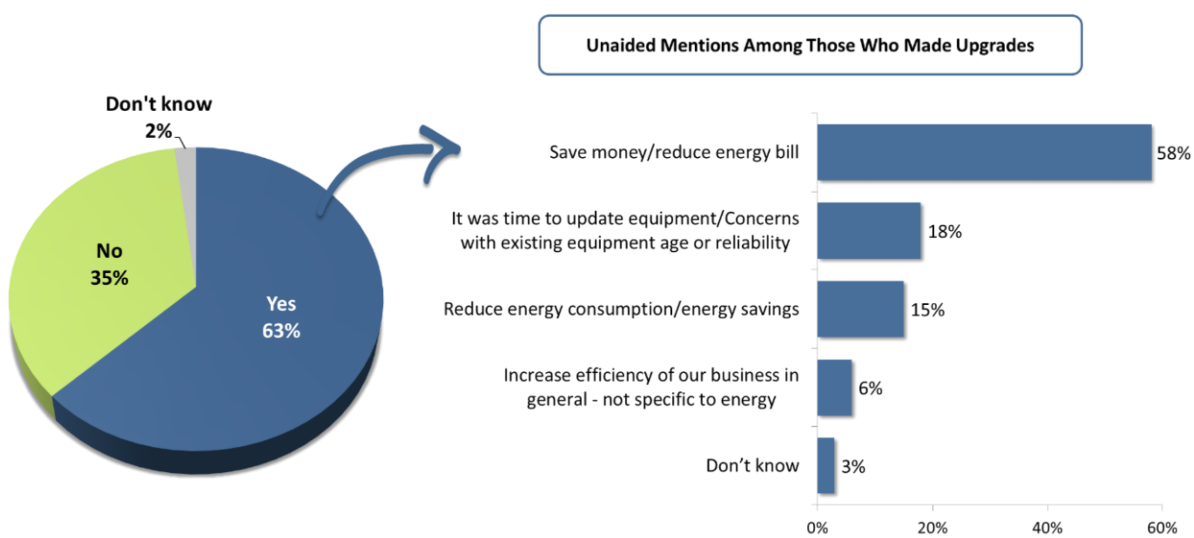
Although these surveyed businesses did not participate in the BEP in 2016 or 2017, one in 10 businesses (12%) had participated in the BEP prior to 2016.



Source: Q.A4: **[IF A2="YES']** According to our information, your business did not participate in the Business Efficiency Program in 2016 or 2017. To the best of your knowledge, did your business participate in the Business Efficiency Program before 2016? (n=33)

Figure 4: Businesses that Participated in the BEP Prior to 2016

Over six in 10 businesses mentioned having made energy efficiency upgrades outside of the BEP since 2016. Reasons for these upgrades included saving money/reducing energy bills (58%), equipment needed updating (18%), or reducing energy consumption (15%).



Source: Q.P1:Since the beginning of 2016, have you or someone else made energy efficiency upgrades in your business? (n=52)

Source: Q.P2: **[IF P1 = 'YES']** What was the single most important reason your business chose to make these energy efficiency upgrades? (n=33)

Figure 5: Businesses that Undertook Energy Efficiency Upgrades and Reasons for Making Upgrades

The businesses had a variety of reasons for not participating in the BEP for the upgrades made since 2016. One third of businesses (33%) did not know about the program. Other key reasons included that other employees make the decisions to participate (9%), a lack of resources to participate (6%), the rebate is too small for the effort required (6%), or lack of time (6%). Surprisingly, just over one in 10 respondents (12%) mentioned participating in the BEP for these upgrades. The same proportion of respondents mentioned having participated in the BEP prior to 2016, so it is possible that they were thinking of a past participation.

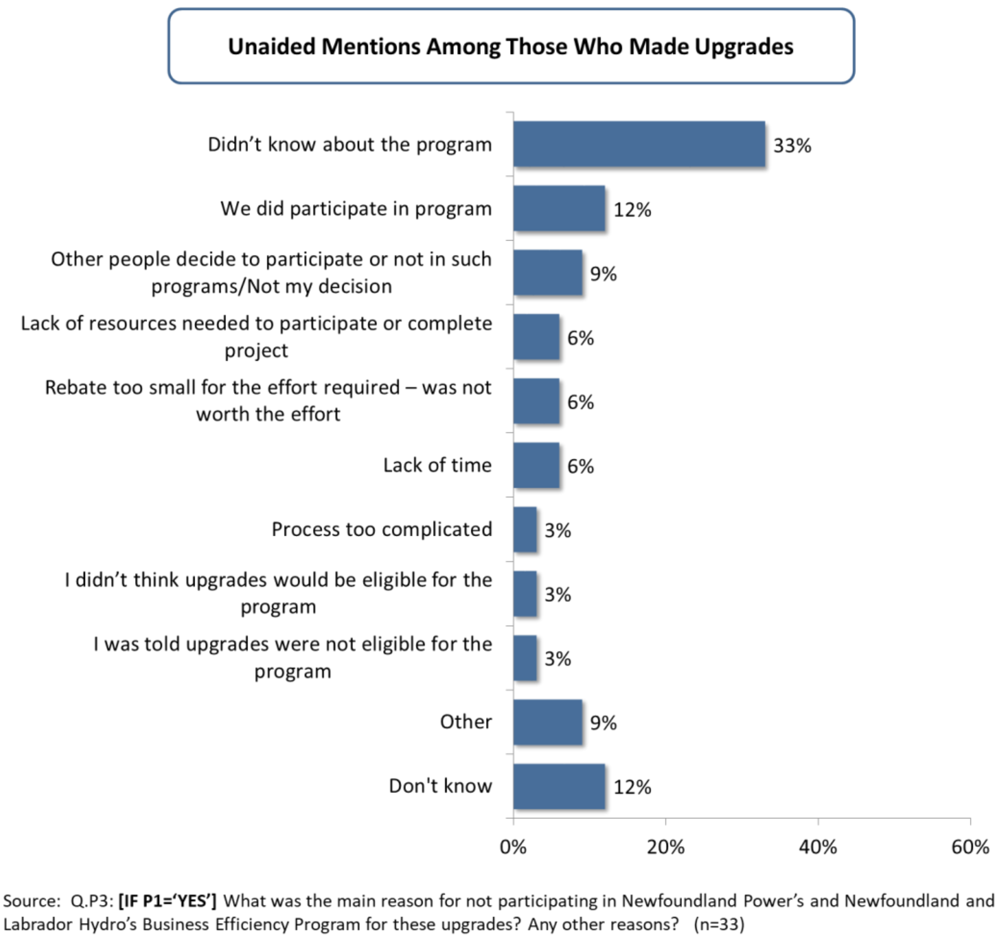
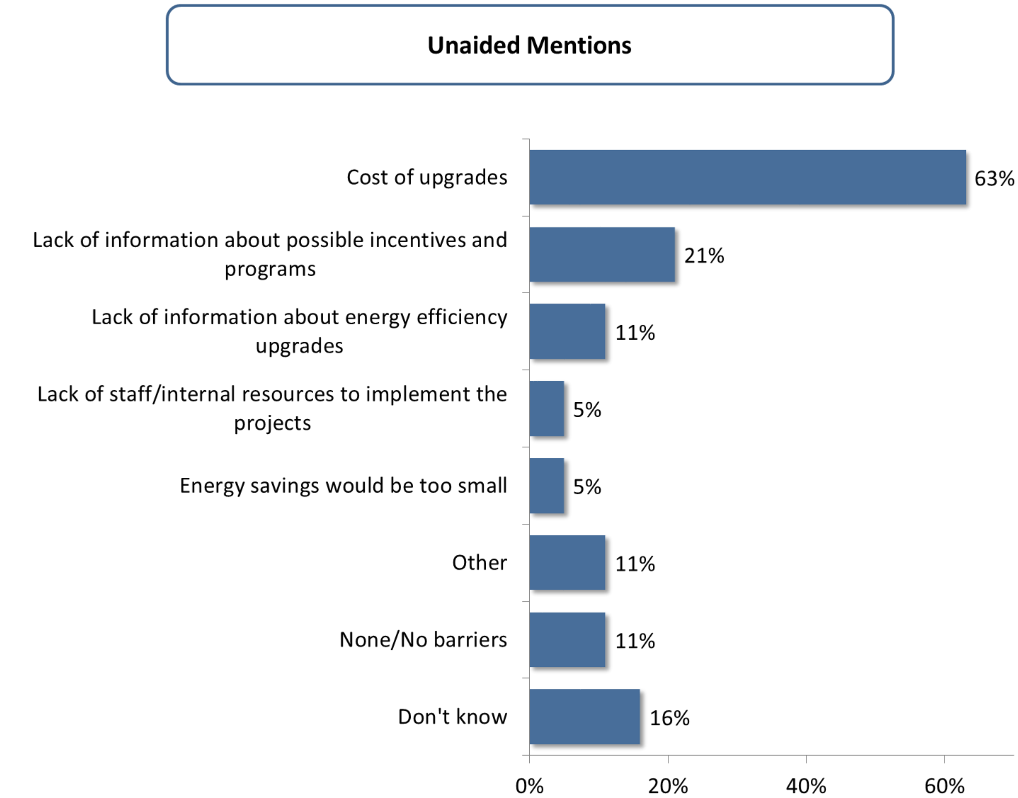


Figure 6: Main Reasons for Not Participating in the BEP

Businesses identify a number of reasons that keep them from making energy-efficient upgrades in general, with the cost of upgrades as the primary reason (63%). Other mentions include lack of information about programs and incentives (21%), lack of information about upgrades (11%), lack of staff/internal resources to implement projects (5%), and energy savings would be too small (5%).

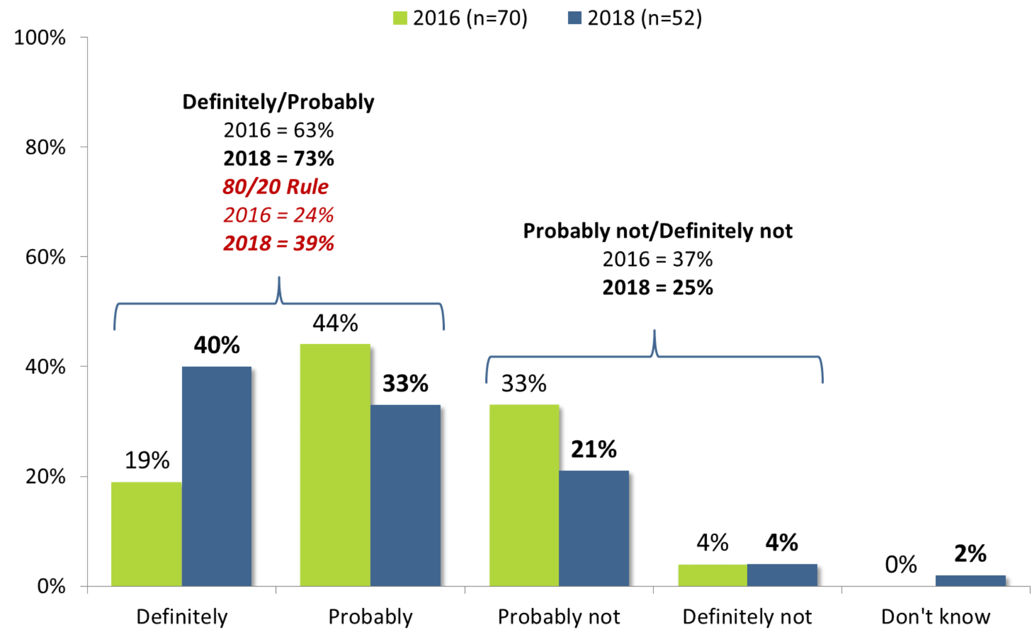


Source: Q.B1: **[ASK IF P1 = 'YES' OR 'DON'T KNOW/REFUSED']** Generally speaking, what do you think keeps your business from making energy efficiency upgrades? Any other reasons? (n=19)*
**Caution: small Sample size.*

Figure 7: Barrier to Implementing Measures

3.2.3 Non-participants' Future Intentions

When asked whether their organizations are likely to implement energy efficiency measures in the next 12 months, nearly three-quarters (73%) indicated they would definitely or probably undertake this activity. When assessing intentions and behavioural patterns, it is advisable to apply the 80/20 rule to survey results as a precaution to establish a more realistic estimate about intentions or behaviours. In this instance, the 80/20 rule suggests that 80 percent of those giving a rating of "definitely" and 20 percent of those giving a rating of "probably" will undertake the activity. By applying this rule, findings suggest that a more realistic 39 percent of the businesses are likely to implement energy efficiency measures or replace existing equipment over the next 12 months. It should be noted that those businesses aware of the BEP are more likely than those unaware to indicate they would "definitely" implement such measures (a result not shown in the figure below).



Source: Q.I1: How likely is your organization to implement energy efficiency measures or to replace existing equipment with more efficient equipment over the next twelve months?

Figure 8: Likelihood of Implementing Energy Efficiency Measures or Replacing Existing Equipment with More Efficient Equipment over the Next 12 Months

Businesses likely to implement energy efficiency measures or replace existing equipment over the next 12 months are most likely to install energy-efficient lighting (63%), followed by space heating (32%).

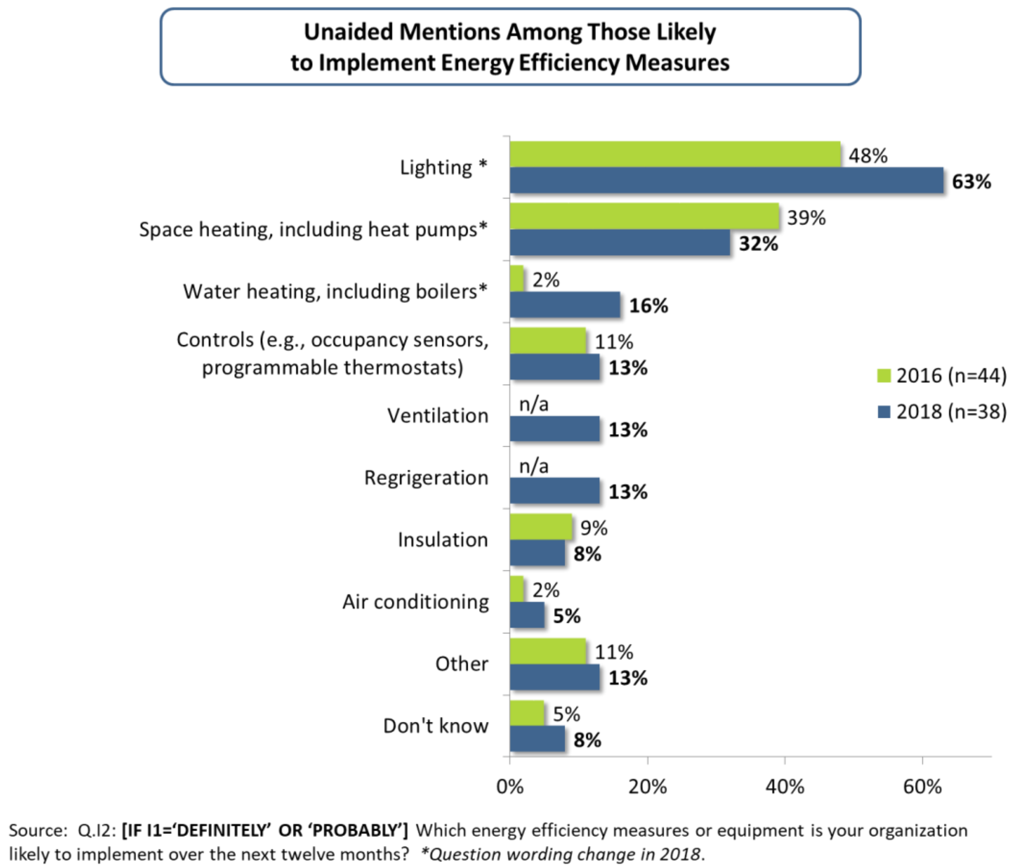
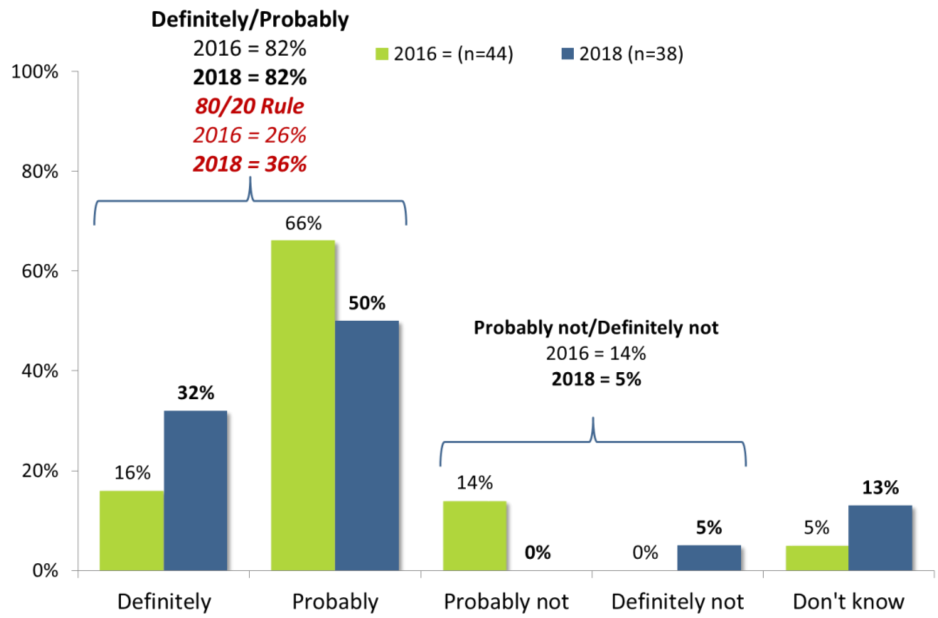


Figure 9: Types of Measures or Equipment Replacements Likely to Be Implemented Over Next 12 Months

The majority of businesses believe they will participate in the BEP to implement energy efficiency measures. Specifically, eight in 10 (82%) indicated they would undertake this activity. However, after applying the 80/20 rule, it is estimated that 36 percent of the businesses are likely to participate in the BEP in the future.



Source: Q.I3: **[IF I1='DEFINITELY' OR 'PROBABLY']** Does your organization definitely, probably, probably not, or definitely not intend to participate in Newfoundland Power and Newfoundland and Labrador Hydro's Business Efficiency Program for the implementation of those energy efficiency measures or equipment?

Figure 10: Intention to Participate in the BEP to Implement Energy Efficiency Measures or Equipment

3.3 Participant Survey

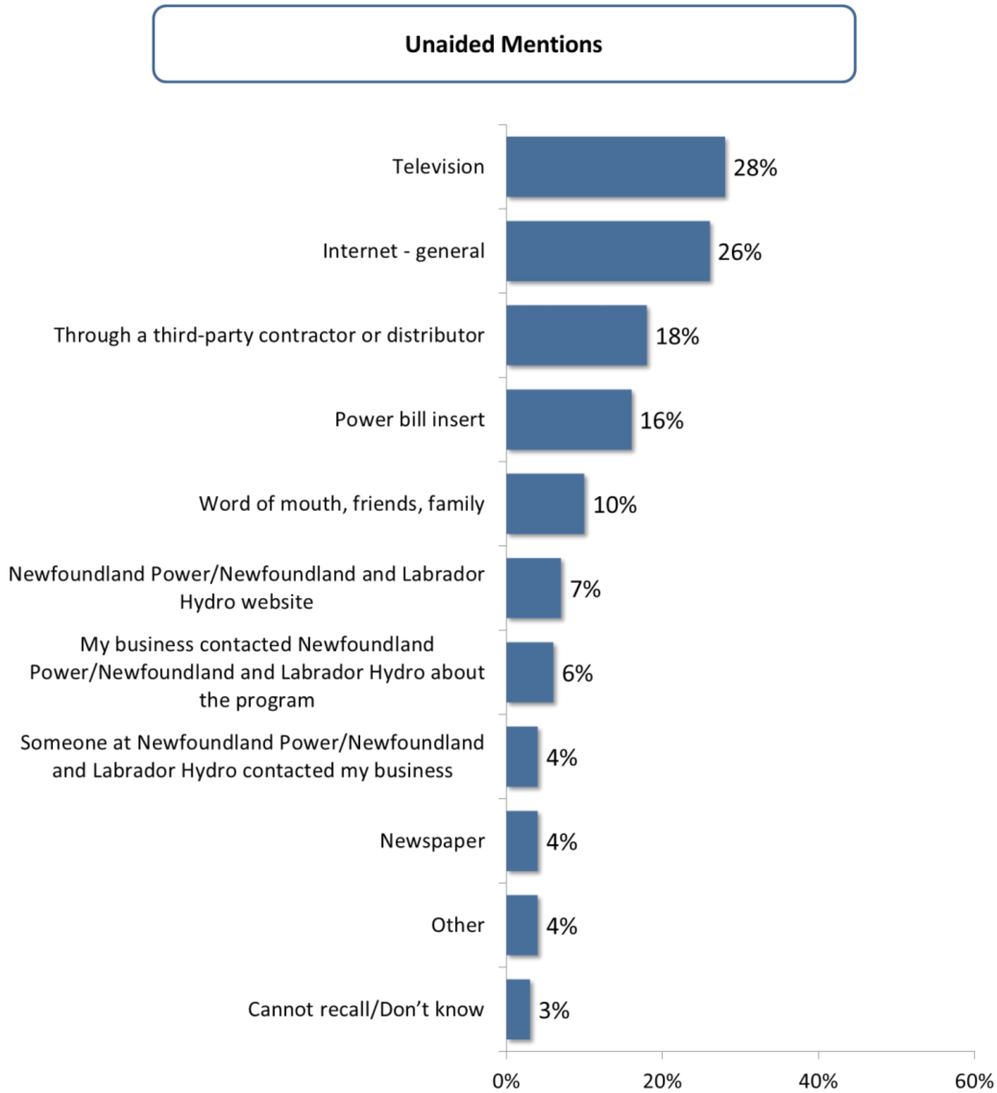
This subsection summarizes the results of the BEP participant survey. Custom and prescriptive participants were included in the sample. In total, 68 interviews were completed with participants involved in making energy efficiency decisions in their organizations. Of these, 28 interviews were conducted with custom participants and 40 with prescriptive participants.

When statistically significant differences were observed between prescriptive and custom participants, they are mentioned in the analysis.

Of the 68 interviews completed, 59 were conducted with NP customers and nine with NLH customers. Due to the small NLH sample size, survey results are presented together for both utilities.

3.3.1 Sources of Program Awareness and Reasons for Participation

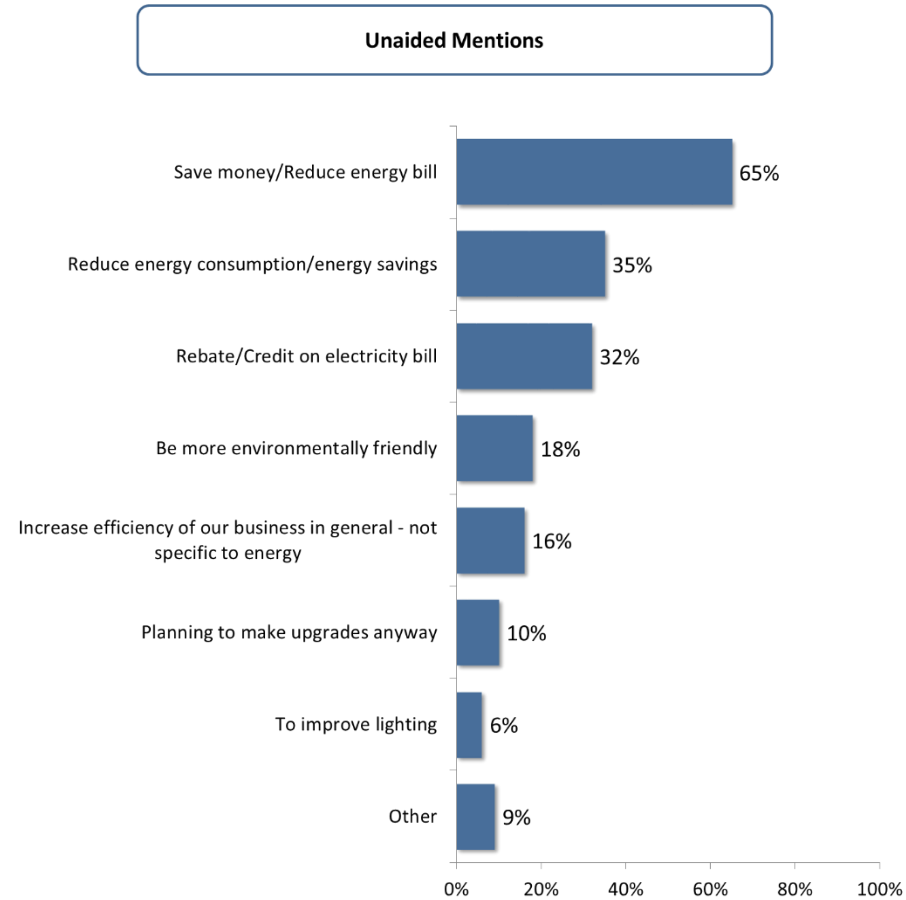
Participants found out about the BEP in a number of ways including television (28%), the Internet (26%), a third-party contractor or distributor (18%), or a power bill insert (16%). Other ways included word of mouth (10%), the NP or NLH website (7%), the business contacted NP or NLH directly (6%), someone from NP or NLH contacted the business (4%), or the newspaper (4%).



Source: Q.A1: How did you first learn about the takeCHARGE Business Efficiency Program? (n=68)

Figure 11: Sources of Program Awareness

Participants offered a number of reasons for participating in the program, with the top reason being to save money or reduce energy bills, followed by reducing energy consumption and receiving a rebate or credit on their electricity bill. Other reasons mentioned by fewer than two in 10 participants include being more environmentally friendly, increasing efficiency in business operations, the organization was planning to make the upgrades anyway, or improving lighting. Custom participants are more likely to participate to reduce energy consumption (50%) compared to prescriptive participants (25%).

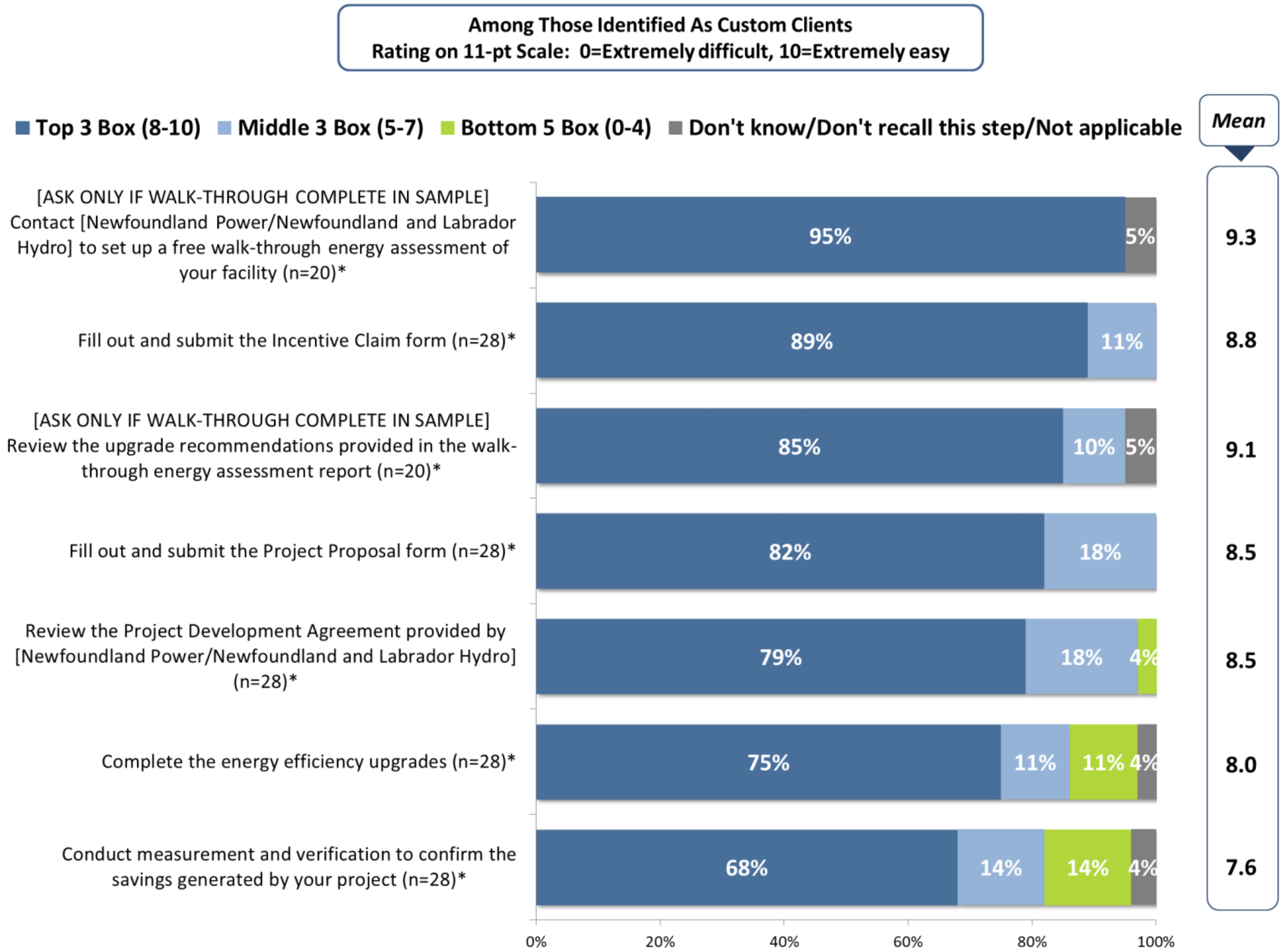


Source: Q.A2: What was the SINGLE most important reason you were interested in participating in the program? Were there any other reasons? (n=68)

Figure 12: Reason for Interest in Participating in the Program

3.3.2 Participation Process and Participant Satisfaction

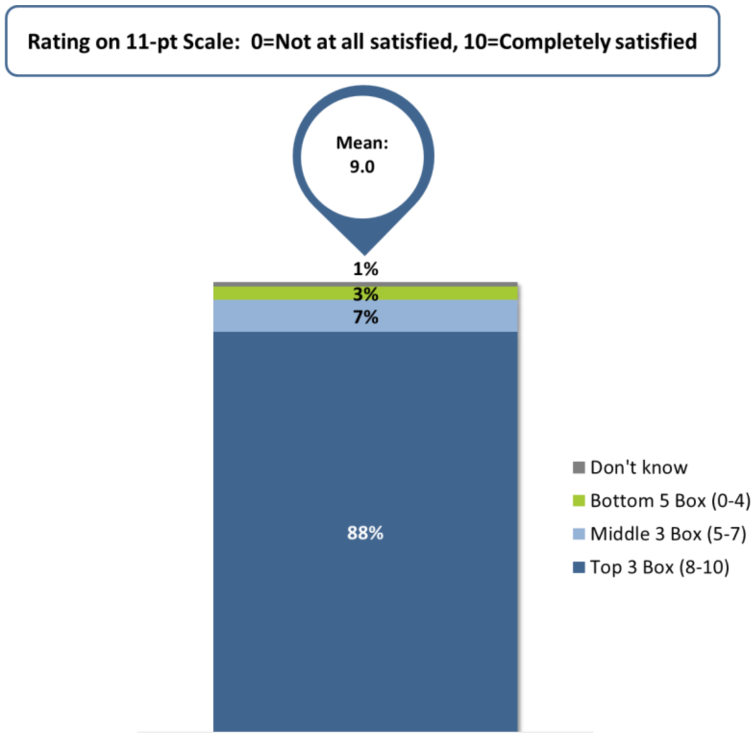
Custom participants did not experience difficulty in completing the steps of the program. Over eight in 10 custom participants considered it easy to contact NP or NLH to schedule a walk-through energy assessment, fill out and submit the Incentive Claim, review upgrade recommendations, or fill out and submit the Project Proposal form. Three quarters considered it easy to complete the upgrades, while seven in 10 believed it was easy to conduct M&V.



Source: Q.S1a-g: **[ASK ONLY IF IDENTIFIED AS CUSTOM CLIENT IN SAMPLE]** Using a scale of 0 to 10, where 0 is 'extremely difficult', and 10 is 'extremely easy', how easy was it for you to complete each of the following program steps? *Note: Mean and median calculation based on 0-10 scale, excluding responses of 'Not applicable' and 'Don't know/Don't recall this step'.* **Caution: Small sample size.*

Figure 13: Completing Program Steps

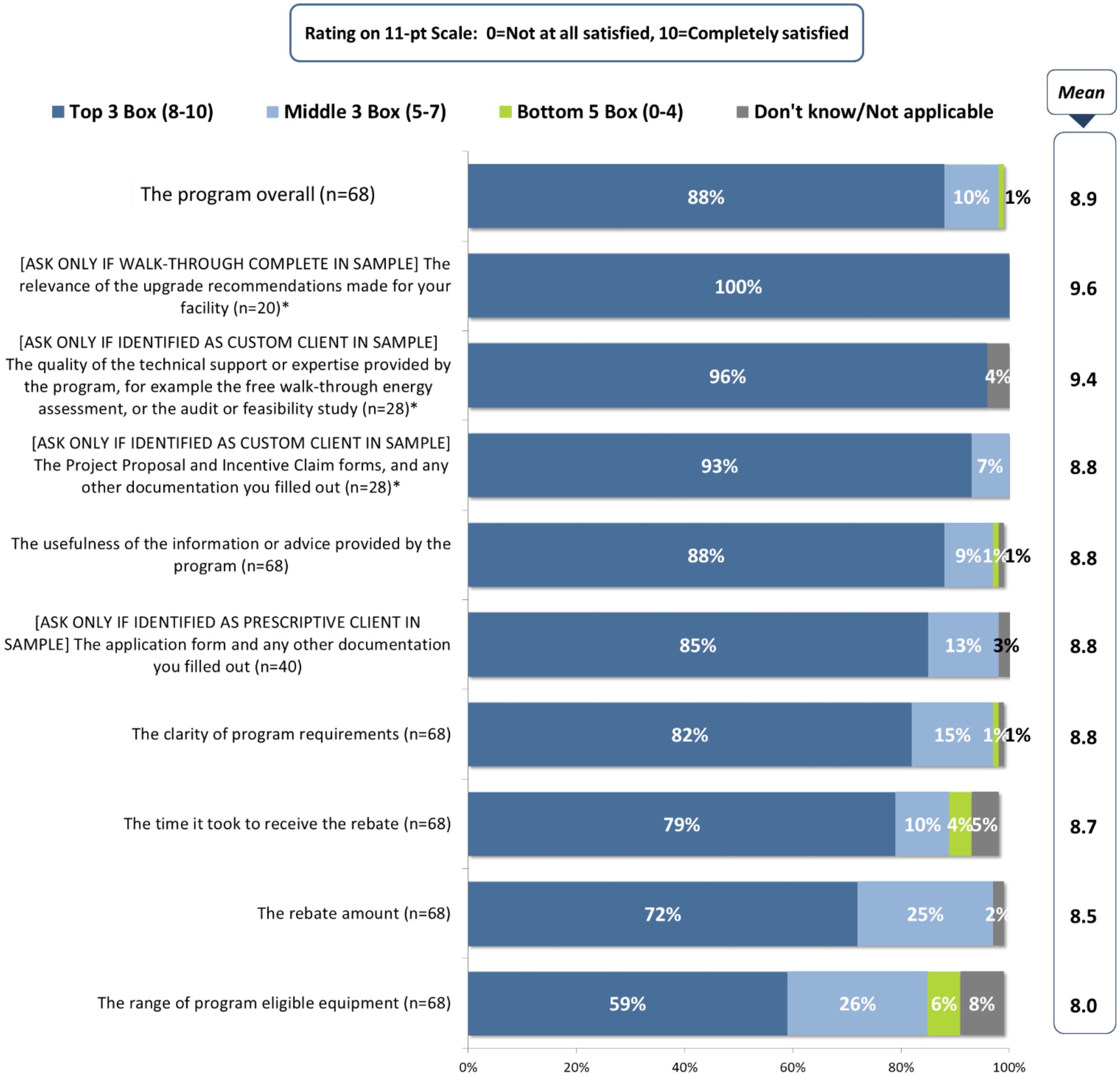
Participants had very high levels of satisfaction with the BEP participation process. Nearly nine in 10 (88%) rated an 8, 9, or 10, where 0 is "not at all satisfied" and 10 is "completely satisfied".



Source: Q.S2: Overall, in thinking back across the program steps, how satisfied are you with the process you went through to participate in the Business Efficiency Program, using a scale of 0 to 10, where 0 is "not at all satisfied", and 10 is "completely satisfied". (n=68)
Note: Mean and median calculation based on 0-10 scale, excluding responses of 'Don't know'.

Figure 14: Satisfaction with BEP Participation Process

Just under nine in 10 participants were satisfied with the program overall, offering a rating of 8, 9, or 10 using the aforementioned 0-10 satisfaction scale. There was high satisfaction with the various elements of the program. All participants who had a walk-through energy assessment performed were satisfied with the relevance of the upgrade recommendations, while nearly all custom participants surveyed were satisfied with not only the quality of technical support or expertise provided by the program, but also the Project Proposal and Incentive Claim forms. Eighty-five percent (85%) of prescriptive participants also mentioned being satisfied with the program documentation they had to complete and provide. The majority of participants were satisfied with the usefulness of the information or advice provided, the clarity of program requirements, and the time it took to receive the rebate. Seven in 10 were satisfied with the rebate amount. Finally, there was somewhat less satisfaction with the range of equipment eligible under the program, with six in 10 being satisfied.



Source: Q.S3a-j: Now, please tell me how satisfied you are with the following aspects of the Business Efficiency Program, using the same scale where 0 means "not at all satisfied" and 10 means "completely satisfied". (n=68)
Note: Mean and median calculation based on 0-10 scale, excluding responses of 'Not applicable' and 'Don't know'. **Caution: Small samples size.*

Figure 15: Satisfaction with the Program

Many participants (62%) were unable to offer any recommendations to improve the program. Just under two in 10 would like to see more upgrades eligible for rebates, while under one in 10 would like more information on the upgrades, bigger incentives, or better program advertising.

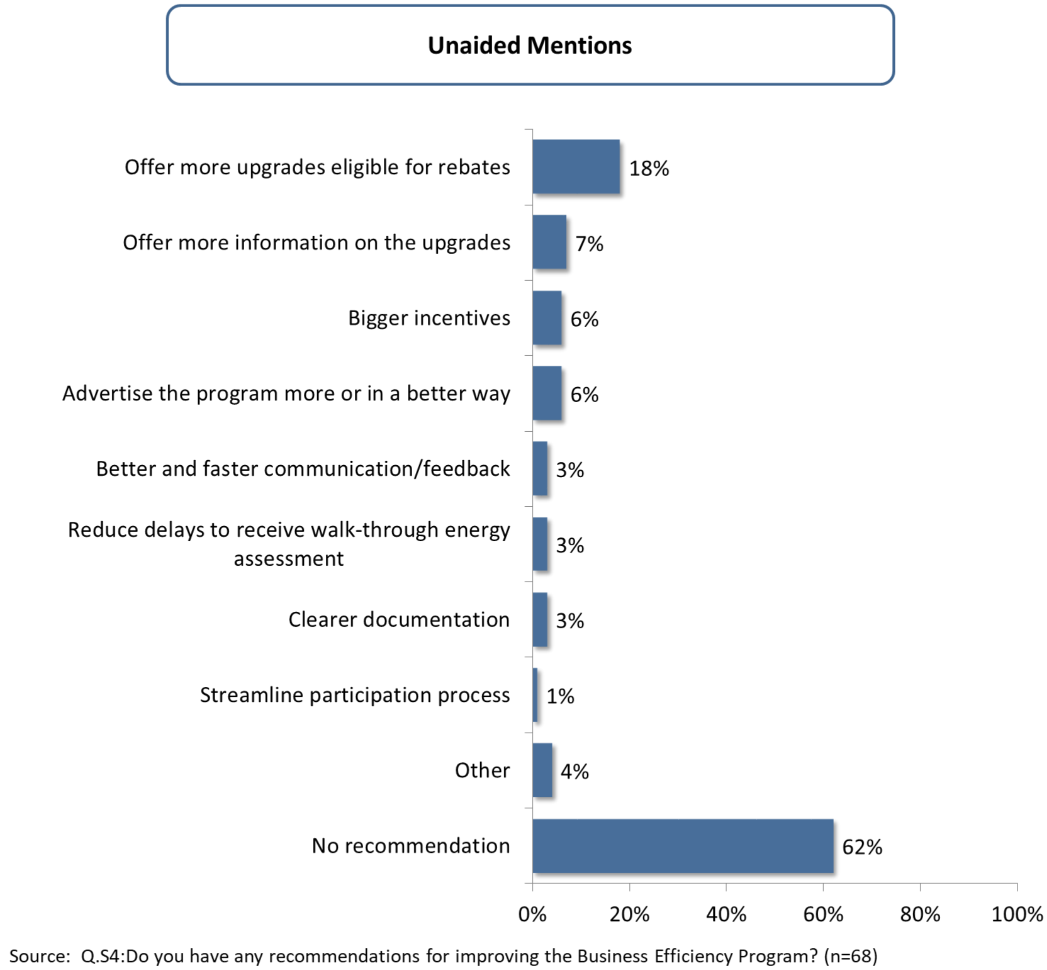


Figure 16: Recommendations for Improving the Program

3.4 Interviews with Partial Participants

This subsection presents the findings from 16 in-depth interviews conducted with partial participants who each had a complimentary BEP walk-through energy assessment conducted for their business.

3.4.1 Awareness and Initial Reasons for Interest in the Program

Partial participants' awareness about the BEP came from a variety of sources, sometimes encompassing multiple sources. Marketing materials including television and radio advertisements, magazine articles, and power bill inserts were mentioned by five partial participants. Another five partial participants became aware of the program after investigating rebates or incentives offered by the utilities or searching online for general program information. Word of mouth through an electrical contractor, program staff, an acquaintance, or a colleague was also mentioned by four partial participants.

The most common reason mentioned by partial participants to initially consider participating in the BEP was the potential for energy savings by upgrading lighting, and to a lesser extent the heating system. Accessing financial incentives to perform the upgrades was also cited by partial participants to explain their interest in the BEP. In addition, one partial participant noted an interest in improving the overall comfort level in the building, while another mentioned a desire to reduce maintenance costs by installing LED lighting.

3.4.2 Satisfaction with the Energy Assessment and Related Information Provided

Partial participants were generally satisfied with the walk-through energy assessment performed in their business, with the average satisfaction rating being 7.5 on a 0-to-10-point scale where 0 means “not at all satisfied” and 10 means “completely satisfied”. Ten of the 16 interviewed participants provided a rating of 8 or higher. Ratings of 7 and 5 were each mentioned by two partial participants, while one provided a rating of zero and another did not provide a rating since they were not present for the walk-through assessment. Those who held a positive opinion were pleased with the timeliness of the process, the knowledge and helpfulness of the staff that conducted the assessment and their quick response to questions after the walk-through. One moderately satisfied partial participant indicated that the assessment was more detailed than they required, while another was displeased that the advisor could not provide insights on insulation and limited their advice to lighting and heating technology. Reasons for lower ratings included a lower incentive estimate than anticipated, fewer recommendations than desired, and a perceived lack of enthusiasm and expertise from the energy advisor.

Overall, nine partial participants read the recommendations received as a result of the walk-through energy assessment. Two customers did not read those recommendations, while five did not recall having received any follow-up documentation. Partial participants were somewhat satisfied with the information provided to them pursuant to the energy assessment, with an average rating of 7.1 on the 0-to-10-point scale. Individual ratings ranged from 5 to 8. Those who gave ratings lower than 8 (n=4) were displeased with the information, stating that either the cost and savings per upgrade were not clearly explained or seemed inaccurate, interactive effects did not seem to have been considered in the savings calculations, not enough short, mid and long-term benefits were provided for the recommendations, and the calculated payback period was too long. One interviewee would have also liked to see recommended products or technology specified in the report, along with from whom or where to buy, thus assisting partial participants in the choice of products.

3.4.3 Implementation of Upgrades

Seven partial participants installed some of the upgrades recommended through the walk-through energy assessment, while nine did not. Overall, only two of the partial participants decided to follow through with the program, one having already received the incentive and the other being in the process of filling out the application forms. Lighting upgrades were most common (5 of the 7 partial participants who installed upgrades), while one interviewee had their windows insulated and another had a heat pump installed. Although the walk-through energy assessment is first and foremost an opportunity to assess existing equipment and technology and the potential for energy efficiency projects, partial participants were asked about the extent to which the walk-through energy assessment and recommendations influenced their decision to proceed with upgrades. The walk-through energy assessment and resulting recommendations had minimal perceived influence on partial participants' decision to implement the upgrades. Notably, while one interviewee rated the importance of these elements a 10, other individual ratings ranged between 2 and 7, resulting in an average of 5.4 on the 0-to-10-point scale where 0 means that the walk-through energy assessment and resulting recommendations had no influence at all and 10 means that they had a great influence.

For the most part, the decision to upgrade lighting was made before the partial participants investigated the program. Two partial participants who implemented at least one recommended upgrade pursuant to the walk-through energy assessment were unaware that they could request an incentive for those upgrades. One believed that they were not eligible to receive the incentive because the utilities did not follow up with them after the recommendations were provided. The other interviewee was under the impression that the electrical contractor they used would receive the incentive. One partial participant found the purchase price of a non-eligible LED lamp to be more financially attractive, which explains why they did not continue with the program.

Very few suggestions were provided as to what would have encouraged partial participants to implement the recommendations. Partial participants mentioned receiving more information on the steps involved in the BEP after the walk-through assessment, being personally contacted after receiving the assessment report to discuss next steps, increasing incentives, as well as to providing assistance with selecting equipment and suppliers.

Among the nine customers who did not follow through with the implementation of the recommendations, one made the decision during the walk-through energy assessment, two decided after receiving the walk-through energy assessment recommendations, and two did after having contacted contractors about making upgrades recommended by the program. The other partial participants did not recall when the decision was made.

3.4.4 Recommendations for Program Improvement

Some partial participants provided suggestions to improve the BEP. Two partial participants recommended that incentives be increased, while one interviewee would have liked to have access to a list of approved contractors to assist with the process of implementing upgrades. One interviewee would have liked to receive a more thorough building energy assessment to understand their overall energy usage besides the measures currently covered by the BEP.

3.4.5 Future Intentions

Most partial participants indicated that their business will definitely (3 interviewees) or probably (8 interviewees) make energy efficiency upgrades or replace existing equipment with more efficient equipment over the next twelve months. Among them, five definitely and six probably intend to participate in the BEP for the implementation energy efficiency upgrades or equipment. The other five partial participants indicated they probably will not be looking at energy efficiency upgrades over the next two years.

3.5 Interviews with Trade Allies

The following presents the findings from 13 in-depth interviews conducted with BEP trade allies. Interviewed trade allies included six distributors and seven service providers.

3.5.1 Awareness about the Program

Four of the 13 interviewed trade allies first learned about the BEP through conversations with NP or NLH staff. Three others could not recall and indicated that their core business is to assess customers' energy usage and inform them of programs available to assist with upgrades. Meanwhile, five trade allies recalled seeing television ads, visiting the program website, or receiving an email about the program. One trade ally could not recall how they first learned of the program.

Perceived familiarity with the current program is moderate, averaging 6.6 on a scale where 0 means "not at all familiar", and 10 means "extremely familiar". Six of the 13 trade allies provided a rating of at least 8, while four others rated their level of familiarity either a 6 or 7. The other three trade allies expressed a lower level of knowledge about the BEP, rating their familiarity with the program a 2 or a 3.

While trade allies believed that their customers are generally aware of the existence of incentives for energy efficiency upgrades, they indicated that, for the most part, they are unfamiliar with the BEP.

3.5.2 Promotion of the Program

Trade allies generally identify customers who may benefit from the BEP based on the scope and type of upgrades considered. The BEP is not used as a means to initially engage with customers, but rather as a way to close sales. Indeed, trade allies approach customers by discussing technology and energy-efficient upgrades, after which they introduce the BEP and its financial benefits to customers who may be eligible.

Trade allies discuss a number of benefits of energy-efficient equipment offered through the BEP, notably the lower cost of lighting maintenance (especially for high bay fixtures) and energy savings which result in lower energy costs over time. To a lesser extent, the comfort offered by more constant heat and better lighting and instant lighting (no delay when lights are turned on) are benefits mentioned to customers. Improved lighting was also described as a means to ensure a safer work environment, whereby better lighting reduces the risk of accidents. Lighting levels are also discussed as a means to impact employee productivity.

Six of the 13 trade allies did not use any materials provided by NP or NLH to conduct outreach to customers mainly because they were not aware of such materials or did not believe they needed them.

3.5.3 Satisfaction of Trade Allies with the Program

Overall satisfaction with the program is high among trade allies, with an average rating of 8 on a 0-to-10-point scale where 0 means “not at all satisfied” and 10 means “completely satisfied”. Individual ratings range from 7 to 9.5. Two trade allies did not rate their satisfaction given their lack of familiarity with the program. The program is positively viewed for being effective at encouraging energy savings by providing good incentives to participants. Trade allies also appreciate the level of support received from program staff. While the application process was described as simple and easy to complete, it was suggested that more space on the form be provided to list energy efficiency measures. Moreover, the application process should limit the need to re-enter information across multiple forms, where possible, such as the business name and address. One trade ally suggested that energy savings calculations be better explained to them, while another would like to see program staff more involved in generating market growth by identifying potential program participants based on business size and energy usage.

For the most part, trade allies are pleased with the program marketing and outreach activities initiated by NP and NLH, with an average satisfaction rating of 8 using the 0-10 scale. More specifically, eight of the 13 interviewees rated at least an 8, while one rated a 7. Most are pleased with the program visibility through advertising. The four other trade allies provided a rating of 5 or did not express an opinion since they believed they lack sufficient knowledge about these activities to provide a rating.

In terms of the information and training provided by program staff, trade allies are generally satisfied with seven of 13 rating this aspect at least an 8 on the scale. Three others rated a 6 or 7, while one rated this aspect a 5 and another offered a rating of 4. One interviewee did not rate this aspect because they had not been in contact with program staff. In general, trade allies appreciated staff responsiveness, availability, knowledge, and diligence. Trade allies also appreciated being promptly informed of program changes. It should be noted that regardless of the ratings provided, six of the 13 trade allies specifically mentioned not being aware of any program training being offered. In fact, this was in most instances the reason explaining lower satisfaction ratings. In addition, one trade ally requested more technical support for lighting technology from program staff.

3.5.4 Provision of Service and Support to Deliver the Program

Trade allies are generally pleased with the provision of support and service needed to assist with delivering the program. Nine of the 13 trade allies gave program service and support a rating of at least 8, while three gave ratings ranging from 5 to 7. The remaining trade ally did not rate this aspect of the program because they had not had contact with program staff.

There is a high degree of satisfaction with the relationship with program staff who are described as helpful, friendly, accessible, cooperative, and responsive.

It was suggested that the utilities look at increasing program awareness among potential participants to further support trade allies' efforts in delivering the program. Similarly, one trade ally suggested that program staff be more involved in helping them identify market leads based on potential energy efficiencies. Other suggestions to support trade allies include keeping them informed of customers who have availed themselves of the program, providing a document listing the benefits of the program that can be left with customers, offering training to trade allies on energy savings calculations and energy efficiency topics in general, offering greater incentives to smaller businesses, and improving marketing materials (point-of-sales; more detailed information on eligibility; and examples of possible rebates). Improving communications and support from NLH was suggested, specifically in terms of being more responsive to requests.

3.5.5 Benefits and Challenges for Trade Allies

The main benefit of the BEP was identified as helping trade allies generate sales. For the most part, the financial incentive encourages customers to perform upgrades sooner than anticipated or to implement more measures than planned.

Moreover, program delivery is not seen as challenging by trade allies. It was, however, mentioned that the long-term growth of the BEP based on current measures is somewhat limited due to the increased popularity of LED technology. One trade ally mentioned that some of the LED screw-in lamps included under the BEP are poor quality, thus requiring more maintenance at an increased cost to customers.

3.5.6 Trade Ally Improvement Recommendations

Few suggestions were provided for improving the BEP to make it more effective, apart from increasing incentives. Of the recommendations volunteered by trade allies, increased program training for distributors and retailers was mentioned, notably by sharing case studies and providing examples of how the program has been successfully implemented. Similarly, it was suggested that more literature be provided that trade allies could use in their interactions with customers. One trade ally would like to see financing offered for the upgrades, while another would like to see program staff more involved in identifying market potential.

Trade allies were asked what additional products or services NP and NLH should provide for BEP projects. While five of the 13 trade allies believed that no changes were required, a variety of suggestions were provided by others. Notably, additional equipment should include energy management software and additional rooftop heat pumps including air-to-water heat pumps, as well as additional LED and fluorescent lamps for high bays, especially technology that can be installed by non-qualified personnel. It was also suggested that products that are not DesignLights Consortium (DLC) listed be accepted.

3.5.7 Impact of the BEP Merger

Five of the 13 trade allies completed projects before August 2016 under the former BEP and within the current program which combines the distributor-based lighting program and the BEP. For the most part, these trade allies indicated that the change in process did not affect them or their customers.

The trade allies' approach to reaching out to customers has not changed since the program was updated in August 2016, with the exception of one interviewee who indicated now placing greater focus on the potential return-on-investment of upgrades than they previously did.

4 IMPACT EVALUATION

This section presents the gross and net energy and peak demand savings achieved by the BEP for the 2016 and 2017 program years.

4.1 Gross Savings – Prescriptive Measures

For the prescriptive products eligible under the BEP, energy savings are established on a unitary basis. Essentially, gross savings are obtained by attributing a unitary savings value to each product and multiplying that value by the number of units rebated through the program. The following subsections present the unitary savings values used by NP and NLH and the revised values determined by the Evaluator based on information from existing literature and the program databases.

The changes applied to interactive effects and peak demand savings are presented separately in Subsections 4.1.13 and 4.1.14. To be able to compare apples with apples, the tracked and revised unitary savings values provided for each prescriptive measure in the following subsections exclude interactive effects factors.

4.1.1 LED Light Bulbs

BEP-eligible LED light bulbs include ENERGY STAR® certified omnidirectional and reflector lamps (screw-in and pin-based) that replace incandescent and halogen lamps as well as compact fluorescent lamps (CFLs).

Tracked Savings Value

NP and NLH use a unitary savings value of 77 kWh per year for all LED light bulbs installed through the BEP. This value corresponds to a weighted average calculated based on various replacement scenarios from the old to the new lamp wattage and on an estimated percentage of participation for each replacement scenario as indicated in Table 3. Due to the current federal energy efficiency regulations[3] banning the import and sale of incandescent bulbs, NP and NLH did not consider the old lamp wattage for these types of light bulbs in the unitary savings calculations, but rather considered the equivalent wattage of halogen lamps.

[3] Natural Resources Canada. General Service Lamps and Modified Spectrum Incandescent Lamps http://www.nrcan.gc.ca/energy/regulations-codes-standards/products/6869, (Last accessed February 28, 2018).

Table 3: Replacement Scenarios Used to Calculate LED Light Bulb Tracked Unitary Savings

Category of LED Bulb	Annual Savings (kWh/year)	Estimated Percentage of Participation
18 W replacing 70 W halogen	156	7.5%
14 W replacing 50 W halogen	108	22.5%
10 W replacing 40 W halogen	90	37.5%
7 W replacing 28 W halogen	63	7.5%
18 W replacing 23 W CFL	15	2.5%
14 W replacing 18 W CFL	12	7.5%
10 W replacing 13 W CFL	9	12.5%
7 W replacing 9 W CFL	6	2.5%
LED Light Bulb Unitary Savings	**77**	**100%**

The following general lighting equation was used by NP and NLH to calculate the annual savings values listed in Table 3.

$$Annual\ Unitary\ Savings\left[\frac{kWh}{yr}\right] = \frac{(Old\ Wattage - New\ Wattage)[W] \times HOU\left[\frac{h}{yr}\right]}{1000\left[\frac{W}{kW}\right]}$$

The annual savings calculation assumes an annual hours of use (HOUs) of 3,000 hours based on the annual operating hours of facilities listed in the Ontario Power Authority's (OPA) Quasi-Prescriptive Measures and Assumptions List[4] for halogen lamps.

Revised Savings Values

To update the unitary savings values used by NP and NLH, the Evaluator analyzed the displaced wattage calculations and reviewed the HOUs.

Displaced Wattage

Displaced wattage is defined as the difference between the real wattage value of the old lamp and that of the new LED lamp. The baseline wattage values associated to each possible LED lamp replacement scenario outlined in Table 4 are based on the information found in the ENERGY STAR light bulb saving calculator.[5] For incandescent bulbs, the Evaluator agreed with the approach used by NP and NLH and also considered halogen lamps as being the equivalent baseline instead.

[4] Ontario Power Authority, *Quasi-Prescriptive Measures and Assumptions*, *Release Version 1,* December 2010, p. 121.
[5] ENERGY STAR light bulb saving calculator. https://www.energystar.gov/products/lighting_fans/light_bulbs, (Last accessed February 28, 2018).

Table 4: Baseline and Equivalent Efficient Wattages for LED Bulbs

<table>
<tr><th>Baseline Lamp Type and Wattage (W)</th><th>Equivalent Efficient LED Bulb Wattage (W)</th><th>Average Equivalent Efficient Wattage (W)</th><th>Average Displaced Wattage (W)</th></tr>
<tr><td>29 W Halogen (40 W Incandescent Equivalent)</td><td>4, 5, 6 and 7</td><td>5.5</td><td>23.5</td></tr>
<tr><td>43 W Halogen (60 W Incandescent Equivalent)</td><td>6, 7, 8.5, 9, 9.5, 10, 10.5 and 11</td><td>8.9</td><td>34.1</td></tr>
<tr><td>53 W Halogen (75 W Incandescent Equivalent)</td><td>10, 11, 12 and 13</td><td>11.5</td><td>41.5</td></tr>
<tr><td>72 W Halogen (100 W Incandescent Equivalent)</td><td>11, 15, 16, 17 and 18</td><td>15.4</td><td>56.6</td></tr>
<tr><td>26 W CFL</td><td rowspan="2">11, 15, 16, 17 and 18</td><td rowspan="2">15.4</td><td>10.6</td></tr>
<tr><td>23 W CFL</td><td>7.6</td></tr>
<tr><td>20 W CFL</td><td rowspan="3">10, 11, 12 and 13</td><td rowspan="3">11.5</td><td>8.5</td></tr>
<tr><td>19 W CFL</td><td>7.5</td></tr>
<tr><td>18 W CFL</td><td>6.5</td></tr>
<tr><td>15 W CFL</td><td>7, 8.5, 9, 9.5, 10, 10.5 and 11</td><td>9.4</td><td>5.6</td></tr>
<tr><td>14 W CFL</td><td rowspan="2">6, 7, 8.5, 9, 9.5, 10, 10.5 and 11</td><td rowspan="2">8.9</td><td>5.1</td></tr>
<tr><td>13 W CFL</td><td>4.1</td></tr>
<tr><td>9 W CFL</td><td>4, 5, 6, 7, 8.5, 9, 9.5, 10, 10.5 and 11</td><td>8.1</td><td>0.9</td></tr>
<tr><td>10 W CFL</td><td rowspan="2">4, 5, 6 and 7</td><td rowspan="2">5.5</td><td>4.5</td></tr>
<tr><td>7 W CFL</td><td>1.5</td></tr>
</table>

To calculate the percentage applicable to each of the replacement scenarios listed in Table 4, the Evaluator used market data from Electro-Federation Canada to identify the market share of incandescent, halogen and CFLs in the commercial and industrial sectors.[6] Upon analyzing the sales of light bulbs other than LEDs between 2010 and 2016 in the Atlantic Region, a market share of 71 percent was observed for incandescent and halogen lamps combined and 29 percent for CFLs.[7] These values are very similar to those used by NP and NLH in the tracked unitary savings calculations (i.e. 25 percent for CFLs and 75 percent for halogen and incandescent lights).

[6] Electro-Federation Canada, Lamp Data - Consumer Channel and C&I Channel 2004–2016, March 2017.
[7] The market shares were calculated considering the light bulb subgroup comprised of incandescent, halogen and CFL lamps only.

In the absence of a more detailed breakdown of the market share per lamp type and wattage, the displaced wattage values provided in Table 4 were averaged per lamp category (halogen/incandescent and CFLs). The resulting average displaced wattages were then used in conjunction with the market shares outlined above to compute an overall displaced wattage value of 29.33 W. This value is higher than the value (25.68 W) considered by NP and NLH in their calculations.

Hours of Use

The Evaluator performed a literature review to validate the HOU values used by NP and NLH in their tracked unitary savings calculations. The most recent versions of four different TRMs were researched to determine if other jurisdictions have completed commercial lighting studies which could yield useful results for NP and NLH. The NP and NLH commercial TRM was also consulted to determine if it contains valuable information that could be used.

The TRMs of Efficiency Maine,[8] Efficiency Vermont,[9] Pennsylvania Utility Commission (PUC),[10] Mid-Atlantic,[11] and NP and NLH each contain a table displaying the lighting operating hours by building type. Efficiency Maine's HOUs are based on the 2010 New York TRM. Efficiency Vermont's HOUs are based on the Commercial & Industrial Lighting Load Shape Project prepared by KEMA for the Northeast Energy Efficiency Partnerships (NEEP) in 2011. The PUC TRM does not list a reference for their information, whereas the HOUs listed in the NP and NLH commercial TRM are based on simulations performed by ICF. Lastly, the Mid-Atlantic TRM contains the data from the most recent light metering study conducted by Navigant[12] from 2010 and 2013 for the state of Maryland, which is quite comprehensive since it lists lighting hours by space type. Unfortunately, BEP databases did not provide information on the end-use location (building type and space type) for the products sold. Therefore, the results of this study and the HOU values contained in the NP and NLH commercial TRM could not be used. Should future databases contain more detailed information about product location, the HOUs could be adapted accordingly.

For the time being, the Evaluator suggests using a value of 3,400 HOUs. This value was obtained through a metering study that the Evaluator conducted in 2012 as part of an evaluation of a Nova Scotia commercial energy efficiency program similar to BEP. During that study, a total of 1,914 lamps located in various commercial buildings were metered for two weeks. The collected data were used to estimate the average annual use of each lamp. In the absence of other available data and because of the geographical proximity of Nova Scotia and the similarity of both program target markets, the Evaluator therefore considered this HOU value appropriate for BEP. It is however recommended that in the future, NP and NLH collect additional information in the application form, such as the building

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[8] Efficiency Maine – Commercial Technical Reference Manual v2018.1, Table 34, page 144.
[9] Efficiency Vermont 2015 Technical Reference Manual, page 114.
[10] Pennsylvania Utility Commission TRM, February 2017, Table 3-5, page 240.
[11] Mid-Atlantic TRM version 7.0, May 2017, Appendix D, page 462.
[12] Navigant Consulting, "*Getting over the Hump: Leveraging Multi-Year Site-Specific Impact Evaluation to Derive C&I Lighting Parameters*", 2015.

type, end-use location (space type) and the daily opening hours of facilities to allow for better estimates of lighting operating hours.

The revised annual unitary savings value for LED light bulbs was established at 100 kWh.

4.1.2 LED High Bay Fixtures

LED high bay fixtures rebated through BEP are used to replace metal halide 250 W or 400 W high intensity discharge (HID) fixtures.

Tracked Savings Value

For LED high bay fixtures, NP and NLH use the same methodology as for LED light bulbs to calculate the unitary savings to be applied to this type of fixture. This time however, only two kinds of replacement scenarios were considered, specifically the upgrades from 400 W and 250 W metal halide lamps (460 W and 295 W when accounting for fixture wattages) to 150 W and 80 W LED lamps. The corresponding annual savings and estimated percentage of participation are presented in Table 5.

Table 5: Replacement Scenarios Used to Calculate LED High Bay Tracked Unitary Savings

Category of LED High Bay Fixture	Annual Savings (kWh/year)	Estimated Percentage of Participation
150 W replacing 460 W metal halide	1,141	75%
80 W replacing 295 W metal halide	791	25%
LED High Bay Fixture Unitary Savings	**1,053**	**100%**

The HOUs used by NP and NLH to calculate the annual savings values are equal to 3,680 hours based on the values presented in the OPA's Quasi-Prescriptive Measures and Assumptions List[13] for HID lighting.

Revised Savings Value

Displaced Wattage

The NP and NLH databases contained information on the new efficient fixture models as well as the corresponding baseline fixtures which were replaced (250 W or 400 W HID fixture). The Evaluator therefore used that data to directly calculate the displaced wattage for each 2016 and 2017 participant. The new fixture efficient wattages were retrieved from the DLC list[14] when possible or from product specification sheets. Table 6 outlines the wattages of the most commonly purchased LED high bay fixtures models (i.e. 80% of the products sold) through the program.

[13] Ontario Power Authority, *Quasi-Prescriptive Measures and Assumptions*, *Release Version 1,* December 2010, p. 121.
[14] DesignLights Consortium, *Solid State Lighting – Search for QPL*, https://www.designlights.org/search/ (Last accessed March 22, 2018).

Table 6: Efficient Wattages of the Most Commonly Purchased LED High Bay Fixtures

Product	Efficient Wattage (W)	Proportion Among High Bay Fixtures in BEP
Lithonia IBG Series	79 to 154	30%
Albeo ABV Series	95 to 190	17%
Lithonia JHBL Series	197 and 251	11%
Metalux SS Series	162 and 224	8%
Sylvania Hibay Series	98 and 193	7%
Lithonia IBH Series	112 to 221	7%

The Evaluator also reviewed the fixture baseline wattages of the 295 W and 460 W used in the tracked unitary savings calculations and found that they were appropriate based on the Duke Energy Fixture Wattage Table.[15]

Based on these baseline and efficient wattages, the Evaluator calculated the displaced wattage for each participant of this category, which resulted in an overall average displaced wattage of 311 W. This value is higher than the one used by NP and NLH (i.e. 286 W). The Evaluator therefore recommends that, in future years, the tracked energy savings for this category of measure be calculated for each participant based on information collected in the application form. This approach will ensure a more accurate calculation of the tracked savings for LED high bay fixtures with only minimal additional effort.

Hours of Use

The revised annual HOUs applied to the high-bay fixtures totalled 4,185 hours per year. This value corresponds to a blended average of annual HOUs for different building types, where these fixtures would typically be installed. The HOUs by building type were extracted from the NP and NLH commercial TRM. In the absence of information about the building type for each participant in the database, the Evaluator calculated the revised HOUs using a simple average. In future years, this value could be refined using a weighted average based on a participation percentage for each building type. However, it should be noted that this HOU value is very close to a value found for a similar Nova Scotian program for high-bay fixtures based on actual building type information (i.e., 4,065 hours).

The revised annual unitary savings value for LED high bay fixtures was established at 1,302 kWh.

[15] Duke Energy, *Fixture Wattage Table*, http://www.ahutton.com/LED/Progress%20wattages.pdf, (Last accessed February 28, 2018).

4.1.3 LED Exit Signs and Retrofit Kits

Tracked Savings Value

For LED exit signs and retrofit kits, NP and NLH use a unitary savings value of 162 kWh based on the assumptions that 25 percent of BEP participation for this type of measure consists in replacing 30 W fixtures (2 x 15 W lamps) by 2.5 W LED exit signs and that the remaining 75 percent consists in replacing 18 W fixtures (2 x 9 W lamps) by 2.5 W exit signs, as summarized in Table 7.

Table 7: Replacement Scenarios Used to Calculate LED Exit Sign Tracked Unitary Savings

Category of LED	Annual Savings (kWh/year)	Estimated Percentage of Participation
2.5 W replacing 30 W fixture (2 x 15 W lamps)	241	25%
2.5 W replacing 18 W fixture (2 x 9 W lamps)	136	75%
LED Exit Signs Unitary Savings	**162**	**100%**

The annual savings for each replacement scenario were calculated assuming an HOU value of 8,760.

Revised Savings Value

Displaced Wattage

In 2016 and 2017, only seven participants applied for a BEP rebate for the purchase of LED exit signs and retrofit kits. The Evaluator therefore used the tracked information on the new lamp models to calculate the average efficient wattage of LED exit signs and retrofit kits as shown in Table 8.

Table 8: Efficient Wattages of BEP Rebated LED Exit Signs and Retrofit Kits in 2016-2017

Product	Efficient Wattage (W)	Number of Rebated Lamps
TCP 20715 Model	1.2	46
T&B EA Series	3	15
T&B PREP2B3-H5A/2LJ Model	6	4
T&B PRExWIN3R Model	3.5	7
T&B EX10 Series	3, 7 and 9	9
Stanpro PRMPN-2 Models	4.1	4
Total (Weighted Average)	**2.6**	**85**

The revised average efficient wattage of 2.6 W is very similar to the one used by NP and NLH (i.e. 2.5 W) and comparable to the value used by ENERGY STAR in its savings calculator,[16] i.e. 2.9 W. The Evaluator hence used this revised average efficient wattage value.

For the baseline wattage, a handful of scenarios are possible. According to the NLH database, approximately 82 percent of the replaced exit signs were 40 W incandescent lamps while the remaining were a mix of 15 W and 60 W lamps. Due to the small number of participants and since NP does not track the baseline wattages of the replaced products for this category of measure, the Evaluator used findings from the literature to establish the equivalent baseline wattage to be used in the unitary savings calculations. The Efficiency Maine TRM[17] considers four possible baseline technologies including both incandescent and CFL lamps as shown in Table 9.

Table 9: Baseline Wattage of Exit Signs

Lamp Type	Baseline Wattage (W)	Reference
Exit Sign – (2) 20 W Incandescent	40	Efficiency Maine 2018 TRM
Exit Sign – (2) 5 W CFL	10	Efficiency Maine 2018 TRM
Exit Sign – (2) 7.5 W Incandescent	15	Efficiency Maine 2018 TRM
Exit Sign – (2) 9 W CFL	18	Efficiency Maine 2018 TRM
Exit Sign – Baseline Wattage Average	**20.8**	

The baseline wattage prescribed by the OPA (now the Independent Electricity System Operator) is equal to 22 W based on the Canadian Standards Association voluntary minimum performance standard[18] requiring that exit signs of 120 V have an input power of 22 W or lower, which is in line with the findings in the Efficiency Maine TRM. This value is also used in the NP and NLH commercial TRM. The Evaluator therefore adopted this revised baseline wattage of 22 W in its calculations.

The revised displaced wattage for this category of measure, calculated based on the revised baseline and efficient wattages, is equal to 19.4 W. This value is slightly higher than the tracked value of 18.5 W.

Hours of Use

Exit signs operate 24 hours per day and their electricity consumption does not depend on the building type. The Evaluator therefore agreed with the tracked annual HOU value of 8,760 and used it in the revised unitary savings calculations.

[16] ENERGY STAR, ENERGY STAR Light Bulb Savings Calculator. https://www.energystar.gov/products/lighting_fans/light_bulbs, (Last accessed February 28, 2018).
[17] Efficiency Maine, Commercial/Industrial and Multifamily Technical Reference Manual Version 2018.3, January 1, 2018. p. 159.
[18] Office of Energy Efficiency, "Proposed Amendment to Canada's Energy Efficiency Regulations for Internally Lighted Exit Signs" April 20, 2009. http://oee.nrcan.gc.ca/regulations/internally_lighted_exit_signs.cfm?attr=0, (Accessed March 6, 2018).

The revised annual unitary savings value for LED exit signs and retrofit kits was established at 170 kWh.

4.1.4 LED Wall Packs

Tracked Savings Value

A unitary savings value of 374 kWh per year was used by NP and NLH for LED wall packs. This value was calculated based on a displaced wattage of 95 W and an HOU value of 3,942 hours per year considering the retrofit of a 100 W HID wall pack (125 W with the ballast) to a 30 W LED wall pack. It should, however, be noted that due to a calculation error found in the savings calculation spreadsheet, an incorrect unitary savings value equal to 493 kWh was used by NP and NLH.

Revised Savings Value

Displaced Wattage

The Evaluator reviewed the specification sheets of the ten most frequently purchased products in this category in 2016 and 2017 (which represent 53% of the rebated LED wall packs) to validate if the correct efficient wattage was used in the tracked unitary savings calculations. The review determined that the average wattage value for those lamps is 38.1 W as shown in Table 10.

Table 10: Efficient Wattages of the 10 Most Popular LED Wall Packs in BEP in 2016-2017

Product	Efficient Wattage (W)	Lumens (lm)	Number of Rebated Products
WPTLED40W/D10	38	4,021	37
ENTRA12/PCRCL	14.4	1,284	36
XTOR1A	10	722	34
WHLF-60LED50K	55	6,934	25
HYPERWALL90-50	90	12,400	20
OLWP11PEBZM4	20	1,096	18
OLCFM-15-BLK-M4	16.6	1,062	14
TWR1LEDP3	40	4,470	14
XTOR3A	26	2,804	12
XTOR8BRL	81	8,635	10
Total (Weighted Average)	**38.1**	**2,900**	**220**

For a LED wall pack of 38 W and a lumen output of 2,900, the equivalent baseline technologies are considered to be 100 W metal halide and 70 W high-pressure sodium (HPS) fixtures based on an analysis of different product specifications sheets[19] as well as on baseline equivalent wattages used by other utilities. Considering a baseline comprising 50 percent metal halide and 50 percent HPS and using the fixture system wattages listed in the Duke Energy Fixture Wattage Table (128 W for 100 W metal halide and 95 W for 70 W HPS), the baseline wattage value used by the Evaluator is equal to 112 W.

The resulting displaced wattage was therefore set at 74 W. This value is lower than the tracked displaced wattage value of 95 W used by NP and NLH.

Hours of Use

Based on the assumption that these lamps operate only at night for an estimated average period of 12 hours of use per day from dawn to dusk, the Evaluator used an annual HOU value of 4,380. This represents an upward adjustment compared to the conservative tracked HOUs of 3,942, but is in line with the value suggested in the NP and NLH commercial TRM.

The revised unitary savings value for this type of measure was established at 324 kWh.

4.1.5 Fluorescent High Bay Fixtures

Tracked Savings Value

The tracked unitary savings value of fluorescent high bay fixtures installed through the BEP is 510 kWh per year. This value was calculated by NP and NLH in a manner similar to that of LED high bay fixtures but by considering the different replacement scenarios listed in Table 11.

Table 11: Replacement Scenarios Used to Calculate Fluorescent High Bay Fixture Tracked Unitary Savings

Category of Fluorescent High Bay Fixture[20]	Annual Savings (kWh/year)	Estimated Percentage of Participation
224 W T5HO (4 lamps) replacing 295 W Metal Halide	368	8%
351 W T5HO (6 lamps) replacing 460 W Metal Halide	423	49%
112 W T8 (4 lamps) replacing 295 W Metal Halide	510	18%
164 W T8 (6 lamps) replacing 460 W Metal Halide	717	26%
Fluorescent High Bay Fixture Unitary Savings	**510**	**100%**

[19] WPTLED40W/D10/PC2 RCL and Sylvania LEDVANCE wall pack specification sheets.
[20] Wattage values are for the entire fixtures including lamps and ballasts.

The annual savings values were calculated based on a methodology prescribed in the OPA's Quasi-Prescriptive Measures and Assumptions List[21] which consists in considering the amount of lumens, within 10 percent variation, of the lighting fixtures being replaced to calculate the equivalent corresponding efficient lamp wattage. Effective factors were thus applied to the efficient wattage of each replacement scenario to produce the same lighting output as the baseline fixture. The displaced wattage was then calculated as the difference between this equivalent efficient wattage and the baseline wattage. An estimated value of 3,000 hours was assumed for the HOUs and no interactive effects were taken into account.

Revised Savings Value

Displaced Wattage

In 2016 and 2017, five unique participants applied for a BEP rebate for the purchase of fluorescent high bay fixtures, for a total of 112 units. Given this small number of participants and the information available in the databases, the Evaluator used the tracked information to revise the percentage of participation through BEP for each replacement scenario. The results of this analysis are outlined in Table 12. Both the efficient and baseline fixture wattages were derived from the Duke Energy Fixture Wattage Table.

Table 12: Replacement Scenarios for Fluorescent High Bay Fixtures

Fluorescent High Bay Fixture	Efficient Wattage (W)	Baseline Fixture Type	Baseline Wattage (W)	Percentage of Participation (%)
4-lamp 32 W T8 Fixture	112	250 W Metal Halide	295	0.7%
		400 W Metal Halide	458	87.1%
6-lamp 32 W T8 Fixture	175	400 W Metal Halide	458	0.2%
4-lamp 54 W T5HO Fixture	240	250 W Metal Halide	295	1.1%
		400 W Metal Halide	458	5.5%
6-lamp 54 W T5HO Fixture	351	250 W Metal Halide	295	0.7%
		400 W Metal Halide	458	4.8%

Most of the replacement scenarios listed above are not one-to-one replacements since the lumens output of the new fluorescent fixture is not equivalent to the replaced metal halide fixture. Indeed, as attested to by the information collected in the databases, the quantity of purchased efficient products was different than the quantity of fixtures replaced for each participant. The Evaluator therefore used the lumens output of both the baseline and efficient fixtures to calculate the displaced wattage as was done by NP and NLH to compute the tracked unitary savings. The luminosity levels of each type of fixture is listed in Table 13, along with the effective factors which represent the amount of efficient fixtures necessary to obtain the equivalent baseline lumens output.

[21] Ontario Power Authority, *Quasi-Prescriptive Measures and Assumptions List*, *Release Version 1,* December 2010, p. 121.

Table 13: High Bay Fixture Lumens per Fixture and Effective Factors

High Bay Fixture	Lumens/Fixture	Effective Factor	
		250 W Metal Halide	400 W Metal Halide
4-lamp 32 W T8 Fixture	10,240	1.3	2.3
6-lamp 32 W T8 Fixture	15,360	0.9	1.5
4-lamp 54 W T5HO Fixture	18,800	0.7	1.3
6-lamp 54 W T5HO Fixture	28,200	0.5	0.8
250 W Metal Halide	13,700	1.0	N/A
400 W Metal Halide	23,500	N/A	1.0

The evaluator used the effective factors to obtain the equivalent efficient wattages and calculate the displaced wattage for each replacement scenario. For instance, the displaced wattage for the replacement of a 400 W metal halide with a 6-lamp T8 fixture was calculated as follows:

$$Displaced\ Wattage\ (400\ W\ MH\ to\ 4 - lamp\ T8) = 458 - 2.3\ \times 112\ W = 200\ W$$

Using this methodology and the percentage of participation listed above, the Evaluator calculated a weighted displaced wattage average of 195 W for this category of measure. This value is higher than the tracked value of 170 W.

Hours of Use

Similarly to the LED high bay fixtures, the Evaluator adopted a revised annual HOU value of 4,185 hours for fluorescent high bay fixtures.

The revised annual unitary savings value for fluorescent high bay fixtures was established at 816 kWh.

4.1.6 High-performance T8 Lamps

Tracked Savings Value

For all high-performance T8 (HPT8) lamps replacing standard fluorescent lamps, NP and NLH used a unitary savings value of 12.58 kWh per year. This value was calculated by using the general lighting equation presented in Subsection 4.1.1 and by using (1) an annual HOU value of 2,860, and (2) two replacement scenarios and corresponding market share as summarized in Table 14. For both the efficient and baseline cases, the ballast factor was assumed to be 1.

Table 14: Replacement Scenarios Used to Calculate High-performance T8 Lamp Tracked Unitary Savings

Category of High-performance T8 lamps	Annual Savings (kWh/year)	Estimated Percentage of Participation
28 W HPT8 replacing 32 W T8 lamp	11.44	90%
32 W HPT8 replacing 40 W T12 lamp	22.88	10%
High Performance Lamps Unitary Savings	**12.58**	**100%**

Revised Savings Value

Displaced Wattage

No savings were associated to this category of measure for 2016 and 2017 and the BEP has offered rebates for 28 W HPT8 lamps only since 2017. The second replacement scenario considered by NP and NLH involving the replacement of 40 W T12 lamps by 32 HPT8 lamps is therefore no longer valid. This is all the more true given the existing ban in the United Stated and the stringent minimum energy performance standard in Canada which led to the phase-out of T12 fixtures.[22] The Evaluator, therefore, only considered the replacement of 32 W T8 lamps by 28 W HPT8 lamps, the 32 W T8 being the new accepted baseline.

As for the displaced wattage calculation, using a ballast factor of 1 overestimates the savings because this does not take into account the whole fixture wattage, but factors in only the bare-lamp wattage. The Evaluator applied a standard ballast factor of 0.88 to both the efficient and baseline wattages. These changes resulted in a revised displaced wattage of 3.5 W compared to the tracked value of 4.4 W.

Given the low participation rate for this category of measure and because of inexpensive and more efficient products now available on the market, it is recommended that NP and NLH replace this type of measure by LED linear lamps, as has already been planned. These lamps have a higher energy savings potential and could possibly yield a higher program participation rate. Offering this new category of product would also be consistent with the observations made by the Evaluator during the site visits for custom projects, where it was noted that the installation of linear LED fixtures and lamps as replacements for fluorescent lamps was a measure commonly implemented.

Hours of Use

As established for the other indoor lighting prescriptive measures, the Evaluator used a revised annual HOU value of 3,400 for this measure category.

[22] Natural Resources Canada, *Fluorescent Lamp Ballasts - January 2017*, http://www.nrcan.gc.ca/energy/regulations-codes-standards/18450, Last accessed March 8, 2018.

The revised annual unitary savings value for high-performance T8 lamps was established at 11.9 kWh.

4.1.7 Programmable Thermostats

Tracked Savings Value

The tracked savings value for programmable thermostats is calculated on a case-by-case basis for each participant based on the square footage of the conditioned area and the facility's daily operating hours. The calculation presented below is based on two main assumptions: (1) a normalized space heating energy consumption value of 9.29715 kWh/year/ft^2; and (2) savings of 10 percent due to the temperature setback.

$$Energy\ Savings = 9.29715\frac{\frac{kWh}{yr}}{ft^2} \times Area\ Covered \times 10\% \times \left(1 - \frac{Business\ hours\ per\ day}{24}\right)$$

Revised Savings Value

The Evaluator consulted TRMs from other jurisdictions to compare savings calculation methodologies. Seven jurisdictions – Connecticut,[23] Maine,[24] Massachusetts,[25] Illinois,[26] Minnesota,[27] New York,[28] Ontario[29] – include programmable thermostats as a measure in the commercial sector. Although the methodologies vary considerably between jurisdictions, similarities were observed.

- Most jurisdictions use energy savings factors (or an equivalent parameter) established for multiple building types and regions based on building energy simulations. These energy savings factors are either a function of the controlled heating system power or of the conditioned floor area, both of which can be used since they are proportional to energy consumption.
- Some jurisdictions also use the setback temperature as a parameter to establish savings, while others assume a fixed value for this parameter and/or a percentage of savings.
- All the jurisdictions include the setback hours in their calculation either by directly including these hours as an input or by adjusting equivalent full load hours (EFLH) to account for the setback temperature.

[23] United Illuminating Company and Connecticut Light & Power Company, *Connecticut Program Savings Document 8th Edition for 2013 Program Year*, October 2012.
[24] Efficiency Maine, *Retail/Residential Technical Reference Manual Version 2018.1,* July 2017.
[25] Massachusetts Electric and Gas Energy Efficiency Program Administrators, *Massachusetts Technical Reference Manual for Estimating Savings from Energy Efficiency Measures, 2016-2018 Program Years – Plan Version*, October 2015.
[26] Illinois Energy Efficiency Stakeholder Advisory Group, *Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0*, February 2017.
[27] Minnesota Department of Commerce Division of Energy Resources, *State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 2.1 Final,* December 2016.
[28] New York State Joint Utilities, *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs – Residential, Multi-Family, and Commercial/Industrial Measures*, April 2016.
[29] Ontario Power Authority, *2011 Quasi-Prescriptive Measures and Assumptions – Release Version 1*, December 2010.

Based on these findings, the equation used by NP and NLH was deemed acceptable by the Evaluator since it includes all the elements mentioned above (area covered, business hours and 10 percent savings based on a setback temperature of 5 °C), except that only one energy savings factor was used instead of varying by region and building types. The Evaluator also consulted the NP and NLH commercial TRM to compare the current methodology with the one prescribed in that document. The NP and NLH commercial TRM states that the electricity savings by building type, but no further details are provided about how these values were computed. The current methodology used by NP and NLH, which is more specific and suitable for each participant, was therefore preferred over the deemed energy savings values presented in the NP and NLH TRM.

The Evaluator deemed the use of a unique energy factor value reasonable since the equation takes into consideration the floor area and business hours, which constitute the main parameters that vary from one building type to another. Furthermore, using multiple values would add complexity without adding significant precision since the number of participants who installed this measure was low. If this measure is expected to significantly gain in popularity, the Evaluator recommends using different energy factors by region and building type based on building energy simulations. In addition, the Evaluator recommends incorporating weekly business hours into the calculation instead of daily business hours since the latter vary throughout the week from one business to another.

The Evaluator reviewed the savings percentage related to temperature setback applied by NP and NLH. To do so, the Evaluator assumed an average business hours value of eight hours per day, which resulted in 6.7 percent savings. Other jurisdictions that apply a savings percentage to total heating energy consumption used values between five percent and 6.8 percent. Since the NP and NLH methodology results in a percentage of savings within the range of those observed in other jurisdictions, the Evaluator deemed the 10 percent savings value a valid assumption.

To complete the analysis, the Evaluator reviewed the normalized space heating energy consumption value of 9.29715 kWh/ft² used by NP and NLH. Using tables from the ICF report (also provided in the NP and NLH commercial TRM) that presents annual electricity consumption by end use and floor area, the Evaluator calculated a normalized space heating energy consumption of 9.32 kWh/ft². Since the values found in that report are based on building simulations made specifically for Newfoundland and Labrador, the Evaluator considers them reliable. In conclusion, the Evaluator decided to keep the value used by NP and NLH since the difference represented less than one percent.

Overall, the Evaluator did not apply any changes to the tracked savings for programmable thermostats but recommends collecting more information about participant building type in the future to improve the accuracy of savings estimates.

4.1.8 Occupancy Sensors

Tracked Savings Value

For occupancy sensors, tracked savings for each participant are calculated by NP and NLH based on five inputs: (1) the type of room where the sensor is installed; (2) the type of lighting in that room; (3) the room area; (4) the daily operating hours; and (5) the operating days per week. The room and lighting types are both used to calculate the lighting wattage controlled by the occupancy sensors. This calculation is based on the illuminance levels and luminous efficacy respectively, which are outlined in Table 15: Illuminance Level per Type of Room

Room Type	Illuminance level (lux)
Conference Room	323
Office	538
Stairway	161
Hallway	161
Bedroom	323
Gym	323
Bathroom	323
Laundry Room	323
Classroom	538
Lecture Hall	538
Kitchen	538
Closet	323
Control Room	592
Body Work and Assembly	592
Warehouse	269

and Table 16 below and represented in the following equation.

$$Lighting\ Wattage\ [W] = \frac{Area\ [m^2] \times Room\ Illuminance\ Level\ [lux]}{Lamp\ Luminous\ Efficacy\ \left[\frac{lumen}{W}\right]}$$

Table 15: Illuminance Level per Type of Room

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Gym	323
Bathroom	323
Laundry Room	323
Classroom	538
Lecture Hall	538
Kitchen	538
Closet	323
Control Room	592
Body Work and Assembly	592
Warehouse	269

Table 16: Luminous Efficacy per Type of Lighting

Type of Lighting	Luminous Efficacy (lumen/watt)
Incandescent Light Bulb	14.7
Halogen Bulb	13.0
LED Lamp	70.0
Ceramic Metal Halide	80.4
Metal Halide Lamp – Probe Start	73.0
Metal Halide – Pulse Start	92.9
High-pressure Sodium Vapour Lamp	104.6
Low-pressure Sodium Vapour Lamp	108.0
Mercury Vapour Lamp	51.1
T5 Electronic Ballast	90.6
T5 High Output with Electronic Ballast	80.6
T8 Electronic Ballast	85.5
T8 Magnetic Ballast	71.7
T12 Electronic Ballast	76.4
T12 Magnetic Ballast	50.5
CFL Plug-in	64.3
CFL Screw-in	56.7

The following equation is then used to calculate the savings, assuming a 40 percent reduction in lighting consumption from the use of the occupancy sensors:

$$Annual\ Unitary\ Savings\left[\frac{kWh}{yr}\right] = \frac{40\%\ \times Lighting\ Wattage\ [W] \times HOU\left[\frac{h}{yr}\right] \times IE}{1000\left[\frac{W}{kW}\right]}$$

Revised Savings Value

The Evaluator agrees with the methodology used by NP and NLH to calculate the savings associated with the use of occupancy sensors for lighting applications. The only revision the Evaluator made relates to the assumed 40 percent energy savings value. This value appears to be too high compared to values commonly found in the literature. According to a study published by the Lawrence Berkeley National Laboratory (LBNL), occupancy sensors installed in a variety of institutional and commercial buildings yield on average 24 percent savings. This study, entitled *A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings*,[30] analyzed the accumulated knowledge from 88 other

[30] Erik Page and Associates, Inc. “A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings,” Energy Analysis Department, Lawrence Berkeley National Laboratory, September 2011.

lighting control studies published over the years and consolidated the savings figures to reflect the real energy savings by lighting control measures actually installed, such as occupancy sensors. This study also lists the average savings for a few building space types as outlined in

Table 17: Occupancy Factor Provided by the IES and the LBNL Study

Building Space Type	Lighting Energy Savings (%)	Reference
Conference Room	43	IES
Office	22	LBNL Meta-Analysis Study
Stairway	24	LBNL Average
Hallway	24	LBNL Average
Bedroom	45	LBNL Meta-Analysis Study
Gym	24	LBNL Average
Bathroom	34	IES
Laundry Room	34	IES
Classroom	42	IES
Public Assembly	36	LBNL Meta-Analysis Study
Kitchen	24	LBNL Average
Closet	24	LBNL Average
Control Room	24	LBNL Average
Body Work and Assembly	24	LBNL Average
Warehouse	31	LBNL Meta-Analysis Study

below. Since the information about building space type is already collected in the application form, the Evaluator decided to use the savings values per space type from the LBNL study, instead of using an overall savings percentage, to be more precise and accurate. Savings potential values of occupancy sensors found in a research study conducted for the Illuminating Engineering Society (IES) in 2000[31] was also used as a reference for space types which were not listed in the LBNL study. Also, an average value of 24 percent was applied to space types for which no savings values could be found in the literature.

[31] VonNeida et al., 2000, *An analysis of the energy and cost savings potential of occupancy sensors for commercial lighting systems, IES Paper #43*.

Table 17: Occupancy Factor Provided by the IES and the LBNL Study

Building Space Type	Lighting Energy Savings (%)	Reference
Conference Room	43	IES
Office	22	LBNL Meta-Analysis Study
Stairway	24	LBNL Average
Hallway	24	LBNL Average
Bedroom	45	LBNL Meta-Analysis Study
Gym	24	LBNL Average
Bathroom	34	IES
Laundry Room	34	IES
Classroom	42	IES
Public Assembly	36	LBNL Meta-Analysis Study
Kitchen	24	LBNL Average
Closet	24	LBNL Average
Control Room	24	LBNL Average
Body Work and Assembly	24	LBNL Average
Warehouse	31	LBNL Meta-Analysis Study

As for the lighting wattage controlled by occupancy sensors, the Evaluator reviewed the illuminance levels per space type as well as the luminous efficacy of lighting products based on typical values found in the literature.

For illuminance levels, the Evaluator compared the values used by NP and NLH to the illuminance levels recommended by the IES[32] and found that the values used were adequate. No adjustments were made to these values.

For luminous efficacy, the Evaluator compared the figures listed in Table 16 to those provided in several sources including the Energy Management Handbook,[33] the US Department of Energy[34] and the Government of Ontario.[35] The efficacy values used by NP and NLH are very similar to the values found in the literature and were deemed acceptable. Since LED lamps and fixtures are becoming more and more widespread, the Evaluator recommends adding more options for these kinds of lights among the lamp choices given to participants in the application form. The three different types of suggested LED lights are listed in Table 18, along with their luminous efficacies.

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[32] IESNA Lighting Handbook, 9th Edition, 2000.
[33] Wayne C. Turner, Steve Doty, *Energy Management Handbook*, 2007, p. 354.
[34] Office of Energy Efficiency & Renewable Energy, LED Basics, https://www.energy.gov/eere/ssl/led-basics. Last accessed March 12, 2018.
[35] Ontario Ministry of Agriculture, Food and Rural Affairs, Energy Efficient Swine Lighting, http://www.omafra.gov.on.ca/english/engineer/facts/06-011.htm. Last accessed March 12, 2018.

Table 18: LED Lamps Efficacies

Type of Lighting	Luminous Efficacy (lumen/watt)
LED Linear	100
LED High/Low-Bay Fixture	113
OLED Luminaire	43

4.1.9 Rooftop Air-source Heat Pumps

Tracked Savings Value

No participant installed this measure in 2016 or 2017, therefore no unitary savings value was tracked. NP and NLH did, however, provide information from the manufacturer detailing the energy savings the measure was expected to generate in the form of a spreadsheet containing data points for the coefficient of performance (COP) attained by the heat pump at various operating temperatures and an estimation of how many hours a year the heat pump would be operating in these conditions. Furthermore, adjustments were made to factor in the heating seasonal performance factor (HSPF), user type and historical usage. Energy savings were established at 15,600 kWh per year.

Revised Savings Value

The Evaluator conducted a literature review to compare the unitary savings value proposed by NP and NLH to those used by similar jurisdictions and found that most base their unitary savings on the equation below. The following originates from the Massachusetts TRM[36] and is for heat pumps with a capacity lower than 65,000 Btu/hr.

$$Annual\ Unitary\ Savings\ \left[\frac{kWh}{yr}\right] = \Delta kWh_{cool} + \Delta kWh_{heat}$$

$$\Delta kWh_{cool}\ \left[\frac{kWh}{yr}\right] = (kBtu/h) \times \left(\frac{1}{SEER_{base}} - \frac{1}{SEER_{eff}}\right) \times EFLH_{cool}$$

$$\Delta kWh_{heat}\ \left[\frac{kWh}{yr}\right] = \left(\frac{kBtu}{h}\right) \times \left(\frac{1}{HSPF_{base}} - \frac{1}{HSPF_{eff}}\right) \times\ EFLH_{heat}$$

Table 19 further below lists the parameters found in the air-source heat pump energy savings equations. Several parameters depend on the specifications of the heat pump installed, namely heat pump capacity, seasonal energy efficiency ratio (SEER) and HSPF.

Since no participant installed this measure in 2016 and 2017, the Evaluator was not able to draw information on the type of heat pump installed to suggest values for these parameters and was

[36] Massachusetts Electric and Gas Energy Efficiency Program Administrators, *Massachusetts Technical Reference Manual for Estimating Savings from Energy Efficiency Measures, 2016-2018 Program Years – Plan Version*, October 2015.

therefore unable to compare any findings with the tracked value of 15,600 kWh. However, these parameters are easily found in heat pump specification sheets. Therefore, if future program participants are required to provide heat pump model information, NP and NLH should be able to find the necessary inputs for the equations.

Baseline SEER and energy efficiency ratio (EER) values are available in Natural Resources Canada's Energy Efficiency Regulations,[37] although, once again, their values depend on heat pump capacity. Equivalent full load hours (EFLH), which correspond to the number of hours during which the heat pump would need to operate at full capacity to provide the necessary amount of cooling or heating during the year, depend on the climate. The Evaluator reviewed the values used in several TRMs. The values presented in Table 19 below were drawn from the Minnesota TRM wherein energy models calculate the necessary EFLH for various commercial and industrial building types using local weather data. To be succinct, the Evaluator chose to present the average of these values, but suggests that NP and NLH use the original values found in the TRM for the building types in which future air-source heat pumps will be installed.

Table 19: Revised Parameter Values for Rooftop Air-source Heat Pumps

Parameter	Symbol	Value
Energy savings during the cooling season	ΔkWh_{cool}	-
Energy savings during the heating season	ΔkWh_{heat}	-
Capacity of the equipment in kBtu per hour	$kBtu/h$	Actual
Seasonal energy efficiency ratio of the baseline equipment	$SEER_{base}$	Depends on heat pump capacity
Seasonal energy efficiency ratio of the energy-efficient equipment	$SEER_{eff}$	Actual
Cooling mode equivalent full load hours	$EFLH_{cool}$	595 hours[38]
Heating seasonal performance factor of the baseline equipment	$HSPF_{base}$	Depends on heat pump capacity
Heating seasonal performance factor of the energy-efficient equipment	$HSPF_{eff}$	Actual
Heating mode equivalent full load hours	$EFLH_{heat}$	1,924 hours[39]

Again, since no information was available about the installed equipment, the Evaluator chose to not recommend a final revised unitary savings value. It is however recommended that, from now on, NP

[37] Natural Resources Canada. "Large Air Conditioners, Heat Pumps and Condensing Units Energy Efficiency Regulations". Online: http://www.nrcan.gc.ca/energy/regulations-codes-standards/products/6881, (Last modified January 20, 2017).
[38] Minnesota Department of Commerce Division of Energy Resources, *State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs Version 2.1 Final,* December 2016.
[39] Ibid.

and NLH use the approach proposed herein which is tailor-made to each participant, rather than use the 15,600 kWh annual unitary savings value in their current methodology.

4.1.10 Low-flow Showerheads

Tracked Savings Value

Low-flow showerheads rebated through the program must have a flow rate of 1.6 gallons per minute (gpm) or less. For this product category, NP and NLH use a unitary savings value of 348 kWh which was calculated based on the following equations:

$$\frac{DHW\ reduction}{year} = (flowrate_{base} - flowrate_{eff})\ gpm\ \times 15\frac{min}{shower} \times \frac{2\ showers}{day} \times \frac{146\ days}{year} \times UC1$$

$$Unitary\ Savings\ (kWh) = \frac{DHW\ reduction\ \times\ Cp\ \times\ \Delta T}{UC2}$$

Table 20 lists the variables used in these two equations.

Table 20: Tracked Unitary Savings Parameter Values for Low-flow Showerhead Calculations

Parameter	Unitary Savings (kWh/year)	Source
Baseline Flow Rate (gpm)	2.2	Enbridge
Low-flow Rate (gpm)	1.6	Enbridge
Average Number of Showers per Day	2	EPA Water Sense Website
Average Shower Time (min)	15	EPA Water Sense Website
Specific Heat of Water (Cp)	4,180 J/kg-°C	Convention
Temperature Rise from Mains to Use	30 °C	Based on difference between main water average yearly temperature for the City of St. John's (10 °C) and average shower temperature of 40 °C (OPA)
Days per Year	146	Estimate
Unit Conversion #1 (UC1)	3.8 litres/gallon	Convention
Unit Conversion #2 (UC2)	3,600,000 J/kWh	Convention

Revised Savings Value

The Evaluator reviewed the unitary savings value by conducting a literature review to validate the parameters used by NP and NLH in their calculation. According to various North American TRMs,[40] baseline showerhead flow rates vary between 2 and 2.5 gpm. In Nova Scotia, the average baseline flow rate of more than 5,000 showerheads replaced in 2016 through an energy efficiency program was

[40] OPA, Efficiency Maine, Efficiency Massachusetts, Efficiency Vermont, Illinois and NEEP TRMs.

2.29. Based on this information, the Evaluator considered that a baseline flow rate of 2.2 gpm is a valid assumption. For the low-flow showerhead flow rate, almost all consulted TRMs use the rated flow of the installed low-flow showerhead. The Evaluator hence considered the low-flow rate value of 1.6 gpm a safe assumption given that the products rebated through the BEP must have a flow rate of 1.6 gpm or less.

For the number of showers taken per day for one showerhead, since the typical target market sector of this prescriptive measure is the residential sector, most TRMs calculate this value based on the number of people per household and on an assumed number of showers per day per person. For commercial applications, this method is therefore not applicable. Depending on the commercial building, whether it is a hotel, a hospital, an office or a sports facility, the average number of showers per day per showerhead can vary greatly. In the absence of data to validate this value, the Evaluator therefore did not make any changes and also assumed an average number of two showers per day per showerhead. The Evaluator, however, recommends collecting this information in the application form together with the type of facility so as to have a basis against which to compare this value in the future. The same conclusion applies to the number of operating days per year value which depends on the facility's opening days as listed in Table 21 below. The values presented in this table are drawn from a study published by the LBNL in 1995,[41] which aimed at characterizing the annual hot water loads for different commercial building types. Since accommodation buildings constitute the primary market targeted by this category of measure, a value of 365 days per year was assumed by the Evaluator as opposed to the 146 days estimated by NP and NLH. This is also consistent with the value used in the Illinois 2018 TRM[42] which is the only found TRM that considers the use of low-flow showerheads for the commercial sector.

[41] Osman Sezgen and Jonathan G. Koomey, *Technology Data Characterizing Water Heating in Commercial Buildings: Application to End-Use Forecasting*, Osman Sezgen and Jonathan G. Koomey, Lawrence Berkeley National Laboratory, December 1995.
[42] Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0, February 8, 2017.

Table 21: Annual Hot Water Days of Use per Building Type

Building Type	Days per Year
Office	250
Fast Food Restaurant	365
Sit-Down Restaurant	365
Retail	365
Grocery	365
School	200
Health	365
Hotel/Motel	365
Other	250

Contrary to the abovementioned parameters which did not require any downward adjustments, changes were made to the average shower time based on different literature findings as presented in Table 22. Although the metering studies therein were performed for the residential sector, their results were assumed to be applicable to the commercial sector.

Table 22: Residential Low-flow Showerhead Metering Studies

Study	Shower Duration (min./person)	Sample Size
Residential End Uses of Water Study, 1999[43]	8.3	889
East Bay MUD Study, 2003[44]	8.6	33
Tampa Study, 2004[45]	7.9	49
Michigan Low-flow Showerhead and Faucet Aerators Study, 2013[46]	7.83	135

Since the study published by Mayer and Oreo in 1999 had the biggest sample size and the highest diversity in household location (including Ontario) and types, its shower duration value was adopted by the Evaluator.

Lastly, it was noted that one parameter, electric water heater efficiency, was missing from the equations used by NP and NLH. The Evaluator therefore used an efficiency value of 98 percent based

[43] Mayer, P. W., W. B. Oreo et al., *Residential End Uses of Water*, published by the AWWA Research Foundation, 1999, pp.99-102.
[44] Mayer, P. W., W, B, Oreo et al., *Residential Indoor Water Conservation Study: Evaluation of High Efficiency Indoor Plumbing Fixture Retrofits in Single-Family Homes in the East Bay Municipal Utility District Service Area,* July 2003, p. 63.
[45] Mayer, P. W., W, B, Oreo et al., *Tampa Water Department Residential Water Conservation Study: The Impacts of High Efficiency Plumbing Fixture Retrofits in Single-Family Homes,* January 8, 2004, p. 56.
[46] Cadmus, *Michigan Showerhead and Faucet Aerators Study,* 2013.

on TRM findings. Table 23 summarizes the variables used to establish the revised unitary savings value.

Table 23: Revised Unitary Savings Parameter Values for Low-flow Showerhead Calculations

Parameter	Unitary Savings (kWh/year)
Baseline Flow Rate (gpm)	2.2
Low-flow Rate (gpm)	1.6
Average Number of Showers per Day	2
Average Shower Time (min)	**8.3**
Specific Heat of Water (Cp)	4,180 J/kg-°C
Temperature Rise from Mains to Use (ΔT)	30 °C
Days per Year	**365**
Electric Water Heater Efficiency	**98%**
Unit Conversion #1 (UC1)	3.8 litres/gallon
Unit Conversion #2 (UC2)	3,600,000 J/kWh
Unitary Savings	**491 kWh/year**

4.1.11 Pre-rinse Spray Valves

Tracked Savings Value

Pre-rinse spray valves are used by restaurants and food service establishments to remove food from dishes prior to loading them in the dishwasher. The efficient pre-rinse spray valves rebated through the BEP must be Consortium for Energy Efficiency (CEE) Tier 1 certified and have a flow rate of 1.2 gpm or less. For this product category, NP and NLH use a unitary savings value of 3,125 kWh/year, which is derived from the following equations:

$$\frac{DHW\ reduction}{year} = (flowrate_{base} - flowrate_{eff})\ gpm\ \times 60\frac{min}{hour} \times 2\frac{hours\ of\ use}{day} \times \frac{365\ days}{year} \times\ UC1$$

$$Unitary\ Savings\ (kWh) = \frac{DHW\ reduction\ \times\ Cp\ \times\ \Delta T}{\eta \times UC2}$$

Table 24 lists the variables used in these two equations.

Table 24: Tracked Unitary Savings Parameter Values for Pre-rinse Spray Valve Calculations

Parameter	Unitary Savings (kWh/year)	Source
Baseline Flow Rate (gpm)	1.42	Pre-program market research
Low-flow Rate (gpm)	1.07	Pre-program market research
Average Hours of Use per Day	2	OPA
Specific Heat of Water (Cp)	4,180 J/kg-°C	Convention
Temperature Rise from Mains to Use	44 °C	OPA
Days per Year	365	Estimate
Electric Boiler Efficiency	95%	OPA
Unit Conversion #1 (UC1)	3.8 litres/gallon	Convention
Unit Conversion #2 (UC2)	3,600,000 J/kWh	Convention

Revised Savings Value

The Evaluator analyzed the program databases and performed a literature review to validate the parameters used by NP and NLH. According to the databases, all 26 participants who received a rebate for this measure purchased the same model of pre-rinse spray valve manufactured by Chicago Faucet (90-LABCP). This model has a rated flow rate of 1.0 gpm. This value was therefore used by the Evaluator as the low-flow rate of the pre-rinse spray valve. As for the baseline flow rate, most North American TRMs consider a value of 1.6 gpm, which corresponds to the maximum allowable flow rate as per U.S. and Canadian standards.[47] However, based on the information collected by NP and NLH during the pre-program market research, it was found that most pre-rinse spray valves sold in the province had a standard flow rate of 1.42 gpm. Therefore, the Evaluator did not change this value.

The average HOUs per day is a parameter which can differ greatly from one building type to another. Upon review of various TRMs, the Evaluator identified HOUs for four types of buildings as listed in Table 25 below. These values were drawn from two sources, namely the 2010 Ohio Technical Reference Manual and a 2007 impact and process evaluation report for the California Urban Water Conservation Council.[48]

[47] Natural Resources Canada, Office of Energy Efficiency, Pre-rinse Spray Valves First Bulletin on Developing the Standards, October 2010, http://oee.nrcan.gc.ca/regulations/bulletin/pre-rinse-spray-valves-oct-2010.cfm. Last accessed, March 15, 2018.
[48] SBW Consulting, *Impact and Process Evaluation Final Report for California Urban Water Conservation Council 2004-5 Pre-Rinse Spray Valve Installation Program (Phase 2)*, 2007, Table 3-6, p. 24.

Table 25: Hours of Pre-rinse Spray Valve Use per Day

Building Type	Hours (hrs/day)
Small quick-service restaurants	0.5
Medium-sized casual dining restaurants	1.5
Large institutional establishments with cafeteria	3.0
Grocery Store	0.1

After analyzing the program databases, the Evaluator assigned each of the 26 participants who received a rebate for this measure to one of the four categories above based on their company name, address and Internet research. Ninety-two percent (92%) of participants were medium-sized casual dining restaurants (restaurants and hotels); the Evaluator therefore used a value of 1.5 HOUs per day in the revised unitary savings calculations. It is, however, recommended that NP and NLH collect information about building types in the application form to assign specific HOUs to each participant. That information would also be useful to assign the right number of operating days per year, as is suggested for low-flow showerheads (see Table 21).

The temperature rise value was also revised by the Evaluator for two reasons. First, the value of 44 °C used by NP and NLH was drawn from the OPA and is therefore not applicable to Newfoundland and Labrador because of the difference in the average temperature of the main water. Second, this temperature rise corresponds to the temperature difference measured at the electric boiler and not the point of use where the hot water is mixed with fresh water. To revise this value, a yearly average main water temperature of 10 °C was hence considered (City of St. John's) and a spray water temperature of 43 °C was assumed. This latter figure corresponds to an average of surveyed results of a study performed by the U.S. Environmental Protection Agency (EPA)[49] in 2011. The revised temperature rise value is thus equal to 33 °C.

As for the electric boiler efficiency, to be consistent with the value used for low-flow showerheads, the Evaluator revised the efficiency from 95 percent to 98 percent. Table 26 summarizes the parameters used to establish the revised unitary savings value.

[49] EPA WaterSense, *Pre-Rinse Spray Valves Field Study Report*, March 31, 2011.

Table 26: Revised Unitary Savings Parameter Values for Pre-rinse Spray Valve Calculations

Parameter	Unitary Savings (kWh/year)
Baseline Flow Rate (gpm)	1.42
Low-flow Rate (gpm)	**1.0**
Average Hours of Use per Day	**1.5**
Specific Heat of Water (Cp)	4,180 J/kg-°C
Temperature Rise from Mains to Use	**33 °C**
Days per Year	365
Electric Boiler Efficiency	**98%**
Unit Conversion #1 (UC1)	3.8 litres/gallon
Unit Conversion #2 (UC2)	3,600,000 J/kWh
Unitary Savings	**2,726 kWh/year**

4.1.12 Electronically-commutated Motors

Tracked Savings Value

ECMs are typically used as an efficient alternative to alternating current (AC) shaded-pole and permanent-split capacitor motors with evaporator fans in refrigerated settings. NP and NLH track a value of 706 kWh per unit for energy savings based on the hypothesis that 80 percent of replaced motors are shaded-pole motors and the remaining 20 percent are permanent-split capacitor motors.

For both baseline scenarios, the tracked energy savings were calculated using the equation below. The energy savings due to the difference in wattage between the baseline and efficient motors as well as the compressor savings are accounted for in the unitary savings calculations. The compressor savings are based on the assumption that reduced wattage corresponds to reduced heat, which reduces the need for cooling. Table 27 below lists the values used in the equation for both baseline scenarios.

$$Unitary\ Savings = Motor\ Energy\ Savings + Compressor\ Energy\ Savings$$

$$= \left(kW_{base} - kW_{eff}\right)[kW] \times 8760 \frac{hours\ of\ use}{year} + \frac{\left(kW_{base} - kW_{eff}\right)[kW] \times 8760 \frac{hours\ of\ use}{year}}{COP}$$

Table 27: Tracked Unitary Savings Parameter Values for ECM Calculations

Parameter	AC Shaded-pole Motors Unitary Savings (kWh/year)	Permanent-split Capacitor Unitary Savings (kWh/year)
Baseline Demand (W)	110	70
ECM Demand (W)	49	49
Demand Savings (W)	61	21
Hours of Use per Year	8,760	8,760
Compressor Coefficient of Performance	1.92	1.92
Unitary Savings	**813 kWh/year**	**280 kWh/year**
Proportion of Each Type of Motor	80%	20%
Weighted Unitary Savings		**706 kWh/year**

Revised Savings Value

To review the unitary savings of this measure, the Evaluator focused on the reduced wattage assumptions and the compressor COP.

The Evaluator examined the wattage savings assumption made by NP and NLH between baseline and efficient motors and found that they were conservative compared to values used by other jurisdictions. Efficiency Maine,[50] which also uses the hypothesis that 80 percent of baseline motors are shaded-pole motors and the remaining 20 percent are permanent-split capacitor motors, sets the overall wattage reduction at 83 W. This value is similar to what is presented in TRMs from Vermont and Wisconsin as well. The Evaluator suggests that NP and NLH adopt this value and notes that future tracking of the baseline and efficient values would increase the accuracy of these calculations.

The Evaluator also reviewed the value used for the compressor COP and found that it is lower (i.e. less efficient) than what is used in several TRMs and in the widely referenced *Energy Savings Potential for Commercial Refrigeration Equipment* report by A.D. Little.[51] Furthermore, the latter source was published over 20 years ago and it is likely that compressor efficiencies have improved since, meaning that current COP values should be even higher. In addition, COP values vary depending on the temperature of the refrigerated setting and medium temperature coolers typically have higher COP values than what is used by NP and NLH. For example, Vermont has developed a set of tables listing possible baseline COPs depending on compressor capacity and evaporator

[50] Efficiency Maine, *Commercial/Industrial Technical Reference Manual Version 2018.1,* July 2017.
[51] Little, A. D. (1996). Energy Savings Potential for Commercial Refrigeration Equipment. Report prepared for *Building Equipment Division Office of Building Technologies U.S. Department of Energy.* Retrieved March 19, 2018. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.593.7507&rep=rep1&type=pdf.

temperatures.[52] The COP values range from 2.60 to 3.80 for medium temperature conditions and range from 1.35 to 1.65 for low temperature conditions.[53]

Considering the aforementioned aspects, the Evaluator recommends that NP and NLH adopt a higher value for the compressor COP. However, since no information was available on whether ECMs were installed in freezers or coolers, which has a large incidence on the COP, the Evaluator opted to retain the value used by NP and NLH in the revised unitary savings and suggests that NP and NLH begin tracking this information to increase the accuracy of the savings calculations.

Overall, as shown in Table 28 below, the Evaluator found that the revised unitary savings value for ECMs is 1,106 kWh. This value is also more in line with the value provided in the NP and NLH TRM (i.e.,1,029 kWh).

Table 28: Revised Unitary Savings Parameter Values for ECM Calculations

Parameter	Unitary Savings (kWh/year)
Demand Savings (W)	83
Hours of Use per Year	8,760
Compressor COP	1.92
Unitary Savings	**1,106 kWh/year**

4.1.13 Interactive Effects

Interactive effects occur when the implementation of energy efficiency measures has an impact on the energy consumption of other elements such as heating and cooling systems. In the case of the BEP, replacing standard lighting products with energy-efficient units causes an increase in the heating load during winter and a decrease in the cooling load during summer.

As indicated in Table 29, NP and NLH currently consider interactive effects in the tracked unitary savings of all indoor lighting products except for fluorescent high bay fixtures. Interactive effects factors were obtained by NP and NLH based on an assumed heat loss of 30 percent for electrically heated areas and a calculated electric heat penetration rate. This electric heat penetration rate was computed by NP and NLH based on floor area values and the share of electric space heating per facility types provided in the ICF International report.[54] While the 30 percent heat loss value was coherently used by NP and NLH, the mix of building types used to compute the electric heat penetration rate was different for each category of measure. This resulted in different interactive effects factors being used for each indoor lighting measure as outlined in the table below.

[52] Efficiency Vermont, *Technical Reference User Manual (TRM) Measure Savings Algorithms and Cost Assumptions*, March 2015.
[53] Energy efficiency ratios (EER) are provided in the Vermont TRM. The Evaluator converted them to COPs to facilitate the comparison.
[54] ICF International, *Newfoundland and Labrador Conservation and Demand Management Potential Study,* August 2015. pp. 16, 19.

Table 29: Tracked Interactive Effects Factors for Indoor Lighting Products

Product	Interactive Effects
LED Light Bulbs	-22.1%
LED High Bay Fixtures	-20.7%
LED Exit Signs and Retrofit Kits	-19.0%
Fluorescent High Bay Fixtures	-
High-performance T8 Lamps	-18.0%

The Evaluator reviewed the methodology used and decided to apply the same interactive effects factor for all lighting products rebated through the BEP that are typically used for indoor lighting. To establish this factor, the interactive effects developed by Efficiency Nova Scotia for a commercial program similar to the BEP were used.[55] These factors, as shown in Table 30 below, were calculated for lighting projects for each individual type of building, using a methodology published in the ASHRAE Journal.[56] Given the geographical proximity of Nova Scotia and its similar climate to Newfoundland, these values were assumed to be applicable to the BEP.

Table 30: Interactive Effects Factor by Building Type

Building Type	Interactive Effects Factors		
	Electrical Heating	Electrical Cooling	Electrical Heating and Cooling
Agriculture	-19%	4%	-15%
Banking/Financial	-20%	4%	-16%
Education	-20%	4%	-16%
Entertainment/Public Assembly	-22%	4%	-18%
Healthcare	-17%	4%	-13%
Hospitality	-19%	4%	-15%
Manufacturing/Industrial	-23%	6%	-17%
Office/Commercial	-22%	4%	-18%
Public Service	-21%	4%	-17%
Residential	-19%	4%	-15%
Restaurant/Bar	-20%	6%	-14%
Retail	-20%	6%	-14%
Technology/Science	-21%	4%	-17%
Warehouse/Storage	-18%	4%	-14%

[55] Econoler, *Efficient Product Rebates Program 2016 DSM Evaluation Program, Efficiency Nova Scotia*, March 2017, Appendix VIII.
[56] Rundquist, Robert A. et al., "Calculating Lighting and HVAC Interactions," *ASHRAE Journal*, November 1993, pp. 28 to 37.

Since information about the building types and associated heating and cooling systems were not collected for prescriptive projects, the Evaluator used the proportions obtained from the 30 on-site visits and phone interviews conducted for the custom component to calculate an average energy savings interactive effects factor. The custom component also covers quite a few lighting product categories promoted through the prescriptive path, including a big proportion of LED light bulbs and LED high-bay fixtures. Therefore, the Evaluator considered this data source appropriate for calculating the interactive effects factor for the lighting products sold through the prescriptive path. This methodology resulted in an average interactive factor of -8.8 percent, which was applied to all indoor lighting unitary savings values. If more data is collected about the participating buildings' types and their heating and cooling sources, this interactive effects factor can be refined using this same methodology in future years.

4.1.14 Peak Demand Savings

Peak demand savings correspond to the demand savings that coincide in time with the peak demand of the electricity system. The winter peak in Newfoundland and Labrador is from 7 a.m. to noon in the morning period and from 4 p.m. to 8 p.m. in the evening period on the four coldest days from December to March, totaling 36 hours per year. The Evaluator used the commercial sector load shape hours-use values developed by NP and NLH in their Conservation and Demand Management Potential Study[57] to calculate peak demand savings. These hours-use values were developed for each combination of peak period, sector, subsector and end use in Newfoundland and Labrador commercial buildings. Each prescriptive measure was therefore assigned an average hours-use value based on the typical subsectors targeted by each measure (office, restaurant, school, healthcare, etc.). These values and the equivalent peak-demand-to-energy ratios are outlined in Table 31 below. The resulting unitary demand savings listed therein were obtained by dividing the annual unitary energy savings by the winter peak hours-use factors.

Table 31: Load Shape Hours-Use Values and Unitary Demand Savings

Product	Winter Peak Hours-Use	Peak Demand-to-Energy Ratios (MW/GWh)	Revised Unitary Demand Savings (kW)
LED Light Bulbs	6,144	0.163	0.015
LED High Bay Fixtures	5,859	0.171	0.203
LED Exit Signs and Retrofit Kits	7,139	0.140	0.022
LED Wall Packs	7,139	0.140	0.045
Fluorescent High Bay Fixtures	5,859	0.171	0.127
High-performance T8 Lamps	6,144	0.163	0.002
Programmable Thermostats	3,032	0.330	0

[57] ICF International. Newfoundland and Labrador Conservation and Demand Management Potential Study: 2015 *Commercial Sector Final Report*, report presented to Newfoundland Power Inc. and Newfoundland and Labrador Hydro, 2015, pp. B-2 to B-9.

Product	Winter Peak Hours-Use	Peak Demand-to-Energy Ratios (MW/GWh)	Revised Unitary Demand Savings (kW)
Occupancy Sensors	6,144	0.163	0
Rooftop Air-source Heat Pumps	3,032	0.330	Calculated on case-by-case basis
Low-flow Showerheads	6,207	0.161	0.079
Pre-rinse Spray Valves	6,141	0.163	0.444
Electrically-commutated Motors	6,393	0.156	0.173

The unitary demand savings of both programmable thermostats and occupancy sensors were considered nil based on the hypothesis that the energy savings generated by these two products occur mostly at night.

4.1.15 Summary of Unitary Savings Review

Table 32 presents the tracked and revised savings values, including interactive effects, for each product rebated under the prescriptive component of the BEP.

Table 32: Tracked and Revised Unitary Savings per Product Type

Product	Tracked Savings (kWh/year)	Revised Savings (kWh/year)
LED Light Bulbs	60	91
LED High Bay Fixtures	836	1,187
LED Exit Signs and Retrofit Kits	130	155
LED Wall Packs	374	324
Fluorescent High Bay Fixtures	510	744
High-performance T8 Lamps	10.32	10.85
Programmable Thermostats	Calculated on case-by-case basis	Calculated on case-by-case basis
Occupancy Sensors	Calculated on case-by-case basis	Calculated on case-by-case basis
Rooftop Air-source Heat Pumps	15,600	Calculated on case-by-case basis
Low-flow Showerheads	348	491
Pre-rinse Spray Valves	3,125	2,726
Electrically-commutated Motors	706	1,106

4.1.16 Evaluated Gross Savings

Gross energy and demand savings were calculated using the revised unitary savings values established through this evaluation. The total savings obtained for each product are presented in Table 33 and Table 34 for NP and NLH separately. For 2016 and 2017 combined, BEP prescriptive gross energy and demand savings amounted to 1.784 GWh and 0.295 MW at the meter respectively.

Table 33: Revised Gross Energy and Demand Savings for NP - Prescriptive

	LED Light Bulbs		LED High Bay Fixtures		LED Exit Signs		LED Wall Packs		Fluorescent High Bay Fixtures		High-performance T8 Lamps	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Number of Units	248	4,541	99	840	1	41	120	267	74	38	0	0
Energy Savings												
Unitary Savings Value (kWh)	91		1,187		155		324		744		10.85	
Gross Energy Savings – at the Meter (GWh)	0.023	0.414	0.118	0.997	0.000	0.006	0.039	0.087	0.055	0.028	0.000	0.000
Peak Demand Savings												
On-peak Demand-to-energy Ratio (MW/GWh)	0.163		0.171		0.140		0.140		0.171		0.163	
Gross Peak Demand Savings – at the Meter (MW)	0.004	0.068	0.020	0.171	0.000	0.001	0.005	0.012	0.009	0.005	0.000	0.000

(Continued)

	Programmable Thermostats		Occupancy Sensors		Rooftop Air-source Heat Pumps		Low-flow Showerheads		Pre-rinse Spray Valves		Electrically-commutated Motors		Total for All Products	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Number of Units	43	30	1	0	0	0	0	0	0	26	0	34	586	5,817
Energy Savings														
Unitary Savings Value (kWh)	-		-		-		491		2,726		1,106		-	
Gross Energy Savings – at the Meter (GWh)	0.009	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.000	0.038	0.245	1.642
Peak Demand Savings														
On-peak Demand-to-energy Ratio (MW/GWh)	0.330		0.163		0.330		0.161		0.163		0.156		-	
Gross Peak Demand Savings – at the Meter (MW)	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.006	0.042	0.274

Table 34: Revised Gross Energy and Demand Savings for NLH - Prescriptive

	LED Light Bulbs		LED High Bay Fixtures		LED Exit Signs		LED Wall Packs		Fluorescent High Bay Fixtures		High-performance T8 Lamps	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Number of Units	258	1,908	9	210	0	10	38	79	0	0	0	0
Energy Savings												
Unitary Savings Value (kWh)	91		1,187		124		324		744		10.85	
Gross Energy Savings – at the Meter (GWh)	0.024	0.174	0.011	0.249	0.000	0.001	0.012	0.026	0.000	0.000	0.000	0.000
Peak Demand Savings												
On-peak Demand-to-energy Ratio (MW/GWh)	0.163		0.171		0.140		0.140		0.171		0.163	
Gross Peak Demand Savings – at the Meter (MW)	0.004	0.028	0.002	0.043	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.000

(Continued)

	Programmable Thermostats		Occupancy Sensors		Rooftop Air-source Heat Pumps		Low-flow Showerheads		Pre-rinse Spray Valves		Electrically-commutated Motors		Total for All Products	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Number of Units	0	6	0	3	0	0	0	0	0	0	0	0	305	2,216
Energy Savings														
Unitary Savings Value (kWh)	-		-		-		491		2,726		1,106		-	
Gross Energy Savings – at the Meter (GWh)	0.006	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.453
Peak Demand Savings														
On-peak Demand-to-energy Ratio (MW/GWh)	0.000		0.163		0.330		0.161		0.163		0.156		-	
Gross Peak Demand Savings – at the Meter (MW)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.075

4.2 Gross Savings – Custom Measures

For custom projects, gross savings correspond to changes in energy consumption that result from actions taken by BEP participants regardless of their reasons for participating.[58] For the 2016-2017 evaluation period, a total of 105 projects (17 for NLH and 88 for NP) received an upgrade incentive through the program custom path. Their tracked savings were revised based on the results of the project review.

4.2.1 Project Review

The Evaluator performed a detailed technical review of 30 of the 105 projects that received an upgrade incentive in 2016 and/or 2017. The review process consisted of a project documentation review of the technical information provided by NP and NLH, followed by a site visit or an in-depth telephone interview with participants.

Sampling Methodology

To determine which 30 projects would be selected for the project review, the Evaluator first considered the gross energy savings of each of the 105 projects listed in the NP and NLH program databases. To account for the impacts of project size, ranging from 2 MWh/year to 1,207 MWh/year for NP and from 5 MWh/year to 766 MWh/year for NLH, the Evaluator used a stratified sampling methodology based on total project energy savings. Projects were then included in various strata of project savings. Since the adjustment factors of larger projects have a greater impact on the overall claimed savings, the sample was weighted to include a higher percentage of large projects.

This methodology consisted of selecting a sufficient number of projects from both the NP and NLH databases to ensure proper representation in the sample. Using this approach, the Evaluator made a list of 30 projects to be reviewed, which included 22 NP projects and eight NLH projects.

Finally, the Evaluator selected the 15 projects to be assessed through site visits (versus the 15 to be assessed through telephone interviews) based on geographical and logistical considerations, as well as project size and type. Table 35 below presents the proportion of the sampled projects compared to the total population of custom projects.

[58] Definition adapted from: National Renewable Energy Laboratory, *The Uniform Methods Project Chapter 23: Estimating Net Savings: Common Practices*, September 2014, p. 3, http://energy.gov/sites/prod/files/2015/02/f19/UMPChapter23-estimating-net-savings_0.pdf, (Last accessed November 25, 2016).

Table 35: Comparison of Program Population and Project Review Sample

Description	Number of Projects	Tracked Gross Energy Savings (GWh/year)
NP		
Population	88	5.722
Sample	22	3.322
Proportion represented by sample	25%	58%
NLH		
Population	17	1.573
Sample	8	1.287
Proportion represented by sample	47%	82%
TOTAL		
Population	105	7.296
Sample	30	4.609
Proportion represented by sample	29%	63%

Desk Review

In preparation for the on-site visits, the Evaluator analyzed the project documentation to become better acquainted with facility operations, learn about project baselines and implemented measures, and understand how the tracked savings were calculated. Key documents that were consulted include the: (1) Project Proposal form; (2) PDA; (3) project invoices; (4) Incentive Claim form and (5) M&V report when applicable.

On-site Visits and In-depth Telephone Interviews

Upon completion of the desk review, the Evaluator carried out on-site validations and telephone interviews with participants for all 30 sampled projects. During the visits, the Evaluator verified facilities' normal operating schedules and requested that participants give a tour of their facilities and review the implemented measures to validate project information.

The visits were helpful in gathering more information on the following features of the facilities:

› The implemented measures and their associated baselines:
  - Specifications: model and wattage;
  - Operating characteristics: operating schedules;
  - Installation rates: quantities of old and new equipment.

› Major parameters used to assess energy savings: heating and air-conditioning energy sources.

The same information was also collected during the phone interviews, although in these cases, the Evaluator mainly relied on project invoices to validate product quantities and the models that were installed as part of projects because it was not possible to conduct visual inspections.

The results of the project reviews were used to calculate project-specific savings adjustments to both the tracked energy and demand savings.

4.2.2 Project Savings Adjustments

Summary of Adjustments

Using the information collected during the on-site visits, phone interviews and individual project desk reviews, the Evaluator made adjustments to the tracked savings values to reflect the final implemented measures. In most cases, the Evaluator used the calculation methodology proposed in the PDA to revise energy savings, unless the Evaluator believed another method was better suited or when calculation details were not made available to the Evaluator.

For 2016-2017, lighting retrofit measures generated the bulk of the energy savings. In fact, 25 of the 30 sampled projects exclusively involved lighting measures while the remaining five included a mix of measures including both lighting and non-lighting measures. In terms of savings, over 85 percent of the revised tracked energy savings were generated by lighting retrofit measures alone. Due to the predominance of lighting measures in 2016-2017 completed projects and the difference in the approach used to measure the savings for non-lighting measures, the adjustments made to the savings of both these types of projects are presented separately below.

Adjustments Made to Lighting Retrofit Measures

Energy savings calculations for lighting measures rely on five parameters: (1) the quantity of installed and replaced lamps; (2) the baseline wattage of replaced lamps; (3) the efficient wattage of new lamps; (4) the HOUs; and (5) the interactive effects factor. During the site visits and phone interviews, the Evaluator reviewed each of these parameters with participants to validate the tracked savings values.

In general, the lighting measure energy savings calculations and invoices were well documented, facilitating the energy savings review. Most lighting measures were fully implemented as planned in the PDAs. As a result, only minor adjustments had to be made to the number of lamps installed for a few projects. Similarly, the efficient wattages of new lighting products were correctly tracked for more than 85 percent of the evaluated projects. Conversely, all three other parameters used in the savings calculations needed to be corrected to some extent for several projects.

The main adjustments made to the baseline wattages involved projects whereby incandescent lamps and T12 fluorescent lamps and fixtures were replaced by more efficient products. As previously mentioned herein, incandescent lamps are now banned in Canada and the U.S. and T12 lamps are being phased out of the market due to stringent minimum energy performance regulations passed in 2014. This phase-out implies that participants who used these types of lamps would have had no other choice to replace them by more efficient lamps upon their end of life. As a result, it is now common practice to use an equivalent baseline to calculate energy savings when these two kinds of lamps are involved. The standard equivalent baseline for incandescent and T12 lights are halogen and T8 lamps respectively. The Evaluator therefore adjusted the baseline wattage used to match those of the equivalent baseline for projects involving these lighting technologies. It is to be noted that this approach was already used by NP and NLH for incandescent lamps in two of the sampled projects, but was not consistently applied to all projects.

The other adjustment made to lighting savings was to account for the efficient lighting interactive effects on HVAC systems. These effects were already considered by NP and NLH in the majority of cases with a default heating loss of 30 percent being consistently applied when facilities were electrically heated. The Evaluator, however, identified two instances where interactive effects were omitted, whereas they should have been accounted for. This had a significant impact on the tracked energy savings in these two cases. Moreover, as opposed to the default 30 percent heating loss value used in the tracked savings calculations, the Evaluator applied the interactive effects factors previously listed in Subsection 4.1.13 to the calculations of facilities which were electrically heated and/or cooled. These applied factors were lower than the default heating loss value of 30 percent used by NP and NLH and therefore resulted in a positive adjustment to more than half of the projects.

Lastly, the Evaluator had to adjust the HOUs for the lighting measures of nearly half the sample based on the information gathered during the on-site visits and interviews. Two common reasons caused a difference between tracked and claimed HOUs. First, the person responsible for completing the application paperwork was not always the on-site contact person interviewed by the Evaluator, the latter being more aware of the upgrades made. Second, the Evaluator noted that a single facility schedule was sometimes applied to all the lighting measures even when these measures involved several sub-schedules such as the schedule of a warehouse with a connected office.

Adjustments Made to Other Retrofit Measures

Five of the 30 evaluated custom projects (two NP and three NLH) comprised a mixture of measures including building insulation, energy management and control systems, recommissioning, and heating equipment upgrades. For these five sampled projects, a billing analysis method based on Option C of the International Performance Measurement and Verification Protocol (IPMVP) was prescribed in the PDA to measure energy savings. Since the estimated savings represented more than 10 percent of the facility's total annual electricity consumption for each of these projects, the billing analysis approach was deemed adequate to measure the savings. The Evaluator therefore used the same approach to validate and revise the tracked savings.

During the on-site visits and phone interviews, the Evaluator confirmed the project implementation date and period with participants and inquired about any major changes made to facilities since project implementation. The electricity bills for each project were then retrieved and analyzed for the periods adjacent to the implementation date to establish both the baseline and reporting periods. Using that information, the Evaluator then used a linear regression model based on heating degree days to build the adjusted baseline and calculate the revised energy savings for each project.

For three of the five reviewed projects, this approach resulted in positive adjustments with one project seeing its revised energy savings increased by a factor of 1.7 compared to the tracked value. In two cases however (one NP and one NLH), the savings were adjusted downward. More specifically for one of these two projects, the billing analysis approach used was found to be flawed since it relied on a regression model built out of the monthly electricity consumption of four months only. Moreover, the annual energy savings for this project were calculated based on the four months pursuant to project implementation and extrapolated to obtain the full-year savings. The Evaluator thus corrected this approach by using full-year consumption data to build the regression model and the 17 months after the project implementation date to calculate the average annual savings. This corrected approach resulted in a 48 percent decrease in energy savings for that project.

4.2.3 Peak Demand Savings

Both NP and NLH currently calculate and track demand savings for each project, which corresponds to the difference between the load required by the old equipment and that of the new efficient equipment. Average demand savings do not, however, take into account the moment during which load savings occur and if they occur during the system peak. The Evaluator therefore had to estimate the peak demand savings for each project based on both the system peak demand period (defined in Subsection 4.1.14) and the operating data collected during the site visits and phone interviews. Demand savings were first calculated and then a peak coincidence factor was estimated and applied to obtain peak demand savings. This revision resulted in an overall downward adjustment ratio of 0.815 in peak demand savings. This adjustment ratio is mainly explained by the fact that the revised peak demand savings were compared to the tracked demand savings as opposed to the tracked peak demand savings for the reasons explained above. Hence, the Evaluator recommends that NP and NLH track the peak demand savings of all custom projects in their databases since this value is of main interest. It is also worth pointing out that the demand savings of a few sampled projects were not indicated in the NP database. This omission partly compensated the significant downward adjustment made to the evaluated peak demand savings.

4.2.4 Overall Adjustment Ratios

Overall, gross energy savings were decreased mostly due to the adjustments made to the equivalent baseline wattages and interactive effects factors of lighting measures. Peak demand savings were also decreased, although this downward adjustment was partly compensated by the fact that these savings were not reported for some projects in the NP database. The adjustment ratios are summarized in Table 36.

Table 36: Overall Adjustment Ratios

Population		Energy Savings (GWh)		Peak Demand Savings (MW)	
Total	**Sample**	**Adjustment Ratio**	**Margin of Error**	**Adjustment Ratio**	**Margin of Error**
NP					
88 projects	22 projects	0.867	6.37%	0.962	13.8%
NLH					
17 projects	8 projects	0.899	6.39%	0.625	19.16%
Total					
105 projects	30 projects	0.876	4.75%	0.819	10.6%

4.2.5 Evaluated Gross Savings

Table 37 presents the revised gross energy and peak demand savings for NP and NLH separately. The adjustments described in the previous subsections were applied to all custom projects reported in 2016 and 2017.

The total gross electrical savings at the meter of custom projects are estimated to be 6.376 GWh and the total gross peak demand savings at the meter are estimated to be 0.889 MW for the 2016-2017 evaluation period.

Table 37: Revised Gross Energy and Demand Savings - Custom

	NP		NLH		Total	
	2016	2017	2016	2017	2016	2017
Number of Projects Implemented	**56**	**32**	**13**	**4**	**69**	**36**
Energy Savings						
Tracked Gross Energy Savings – at the Meter (GWh)	2.533	3.190	1.488	0.085	4.021	3.275
Savings Adjustment Ratio	0.867		0.899		-	
Revised Gross Energy Savings – at the Meter (GWh)	2.196	2.765	1.338	0.076	33.534	2.842
Peak Demand Savings						
Tracked Gross Peak Demand Savings – at the Meter (MW)	0.235	0.433	0.360	0.035	0.595	0.468
Savings Adjustment Ratio	0.962		0.625		-	
Revised Gross Peak Demand Savings – at the Meter (MW)	0.226	0.416	0.225	0.022	0.451	0.438

4.3 Net-to-gross Ratio

The net-to-gross ratio (NTGR) is used to determine net savings, i.e. the energy savings that can be reliably attributed to a program. More precisely, the NTGR represents the positive or negative effects on gross savings. For the BEP, two effects are considered, namely free-ridership and internal spillover.

4.3.1 Free-ridership

Free-ridership occurs when participants would have still implemented energy efficiency measures in the absence of the program. The free-ridership level for the BEP was assessed using a self-report approach which involved asking participants a set of questions during the participant survey and on-site visits. The questionnaire included questions for all relevant variables of the decision-making process, including planning, efficiency, amount, timing and cost. Furthermore, the questions served to assess both the participants' intentions of making the upgrades in the absence of the program and the influence of various program elements on their decision to do so.

The feedback collected from the participant interviews was converted into free-ridership levels using an algorithm which is presented in Appendix VII. Separate free-ridership levels were calculated for the prescriptive and custom components. Sample sizes of 40 prescriptive participants and 58 custom participants were used to calculate the free-ridership levels. Margins of error of 5.5 percent and 2.4 percent at a 90 percent confidence level were observed for the prescriptive and custom components respectively.

Under this approach, the analysis resulted in free-ridership levels of 27 percent and 29 percent for the prescriptive and custom components respectively.

Although participants indicated that the rebate influenced their decision to participate in the BEP, most participants had already made the decision to implement energy efficiency measures before having heard of the BEP or being recommended measures. The fact that the majority of 2016-2017 prescriptive and custom projects are lighting projects also affected the free-ridership levels. The free-ridership level of the custom component would have likely been lower had the projects included more non-lighting measures. The price of LED products continues to decrease and participants are more aware of the technology, thus reducing the impact of the rebate on the sales of these products.

4.3.2 Internal Spillover

Spillover occurs when participants implement additional energy efficiency measures after participating in a program but without receiving further incentives. The participant survey and on-site visits were used to assess internal spillover for the prescriptive and custom components separately. The algorithms used to determine spillover are presented in Appendix VIII.

Under this approach, the analysis resulted in spillover levels of 14 percent and zero percent for the prescriptive and custom components respectively.

This means that the program had some level of influence on prescriptive participants to implement additional energy efficiency measures on their own, while custom participants implemented all of their measures within the program.

4.3.3 NTGR Calculation

The NTGR is calculated using the following equation:

NTGR = (1 – % free-ridership + % internal spillover)

Using the free-ridership and spillover levels established for the BEP, the NTGR values are estimated at 0.87 for the prescriptive component and 0.71 for the custom component.

4.4 Net Savings

Net savings were obtained by applying the NTGRs to the gross savings established by the Evaluator. The following tables present the evaluated net savings for NP and NLH separately and by component (prescriptive and custom). Higher energy and peak demand savings were obtained through custom projects for both NP and NLH.

Table 38: Revised Net Energy and Demand Savings for NP Prescriptive Projects

	LED Light Bulbs		LED High Bay Fixtures		LED Exit Signs		LED Wall Packs		Fluorescent High Bay Fixtures		High Performance T8 Lamps	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Energy Savings												
Revised Gross Energy Savings – at the Meter (GWh)	0.023	0.414	0.118	0.997	0.000	0.006	0.039	0.087	0.055	0.028	0.000	0.000
NTGR	**0.87**											
Net Energy Savings – at the Meter (GWh)	0.020	0.360	0.102	0.868	0.000	0.006	0.034	0.075	0.048	0.025	0.000	0.000
Peak Demand Savings												
Revised Gross Peak Demand Savings – at the Meter (MW)	0.004	0.068	0.020	0.171	0.000	0.001	0.005	0.012	0.009	0.005	0.000	0.000
NTGR	**0.87**											
Peak Demand Savings – at the Meter (MW)	0.003	0.059	0.017	0.148	0.000	0.001	0.005	0.011	0.008	0.004	0.000	0.000

(Continued)

	Programmable Thermostats		Occupancy Sensors		Rooftop Air Source Heat Pumps		Low-flow Showerheads		Pre-rinse Spray Valves		Electrically-commutated Motors		Total for All Products	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Energy Savings														
Revised Gross Energy Savings – at the Meter (GWh)	0.009	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.000	0.038	0.245	1.642
NTGR	**0.87**													
Net Energy Savings – at the Meter (GWh)	0.008	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.000	0.033	0.213	1.429
Peak Demand Savings														
Revised Gross Peak Demand Savings – at the Meter (MW)	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.006	0.042	0.274
NTGR	**0.87**													
Net Peak Demand Savings – at the Meter (MW)	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.005	0.036	0.238

Table 39: Revised Net Energy and Demand Savings for NLH Prescriptive Projects

	LED Light Bulbs		LED High Bay Fixtures		LED Exit Signs		LED Wall Packs		Fluorescent High Bay Fixtures		High Performance T8 Lamps	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Energy Savings												
Revised Gross Energy Savings – at the Meter (GWh)	0.024	0.174	0.011	0.249	0.000	0.001	0.012	0.026	0.000	0.000	0.000	0.000
NTGR	**0.87**											
Net Energy Savings – at the Meter (GWh)	0.020	0.151	0.009	0.217	0.000	0.001	0.011	0.022	0.000	0.000	0.000	0.000
Peak Demand Savings												
Revised Gross Peak Demand Savings – at the Meter (MW)	0.004	0.028	0.002	0.043	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.000
NTGR	**0.87**											
Net Peak Demand Savings – at the Meter (MW)	0.003	0.025	0.002	0.037	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.000

(Continued)

	Programmable Thermostats		Occupancy Sensors		Rooftop Air Source Heat Pumps		Low-flow Showerheads		Pre-rinse Spray Valves		Electrically-commutated Motors		Total for All Products	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Energy Savings														
Revised Gross Energy Savings – at the Meter (GWh)	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.453
NTGR	**0.87**													
Net Energy Savings – at the Meter (GWh)	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.394
Peak Demand Savings														
Revised Gross Peak Demand Savings – at the Meter (MW)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.075
NTGR	**0.87**													
Net Peak Demand Savings – at the Meter (MW)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.047

Table 40: Revised Net Energy and Demand Savings for Custom Projects

	NP		NLH		Total	
	2016	2017	2016	2017	2016	2017
Energy Savings						
Revised Gross Energy Savings – at the Meter (GWh)	2.196	2.5765	1.338	0.076	3.534	2.842
NTGR	**0.71**					
Net Energy Savings – at the Meter (GWh)	1.559	1.963	0.950	0.054	2.509	2.018
Peak Demand Savings						
Revised Gross Peak Demand Savings – at the Meter (MW)	0.226	0.416	0.225	0.022	0.451	0.438
NTGR	**0.71**					
Net Peak Demand Savings – at the Meter (GWh)	0.161	0.295	0.160	0.015	0.320	0.311

4.5 Summary of Results

The following table summarizes and compares tracked results to those obtained by the Evaluator. The tracked and evaluated results presented are for the whole program, combining both prescriptive and custom components.

Table 41: Summary of 2016 and 2017 BEP Results

Parameters	Utility	Tracked Results[59]		Evaluation Results	
		2016	2017	2016	2017
Gross Electricity Energy Savings – at the Meter (GWh)	NP	2.734	4.454	2.441	4.408
	NLH	1.530	0.422	1.391	0.529
	Total	**4.265**	**4.876**	**3.832**	**4.937**
Gross Electricity Peak Demand Savings – at the Meter (MW)	NP	0.241	0.469	0.268	0.690
	NLH	0.367	0.093	0.232	0.097
	Total	**0.608**	**0.561**	**0.501**	**0.787**
NTGR	NP	0.90	0.90	0.72	0.78
	NLH	0.90	0.90	0.72	0.78
Net Electricity Energy Savings – at the Meter (GWh)	NP	2.461	4.008	1.772	3.392
	NLH	1.377	0.380	0.996	0.448
	Total	**3.838**	**4.388**	**2.768**	**3.840**
Net Electricity Peak Demand Savings – at the Meter (MW)	NP	0.217	0.422	0.197	0.534
	NLH	0.330	0.083	0.164	0.081
	Total	**0.547**	**0.505**	**0.361**	**0.614**

4.6 Program Cost-effectiveness

As part of this evaluation, the Evaluator assessed program cost-effectiveness by performing the Levelized Utility Cost (LUC) test. Because the value of the avoided energy cost—a key parameter in conducting a standard cost-effectiveness analysis—was not yet known when this evaluation was conducted, a sensitivity analysis was performed using the Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests. The Evaluator did not calculate TRC and PAC ratios but instead used the TRC and PAC formulas to determine the minimum avoided cost required for the TRC and PAC ratios to be above 1, therefore for the program to be cost effective.

[59] The tracked gross values were calculated by the Evaluator using the program databases, but are not equivalent to the savings reported by NP and NLH. The Evaluator used different criteria than those of NP and NLH to determine which projects were 2016-2017 projects. To obtain the tracked net values, the Evaluator multiplied the gross values by the tracked NTGR (0.90).

Furthermore, effective useful life (EUL) values and incremental costs of the rebated products that had been determined by NP and NLH were reviewed by the Evaluator when conducting this cost-effectiveness analysis.

Some of the evaluation results were also essential to the cost-effectiveness analysis, including program savings which were obtained through the impact evaluation. It should be noted that non-energy benefits were neither quantified nor included in this cost-effectiveness analysis. The Evaluator used the assumptions made by NP and NLH for the discount and inflation rates (7% and 2% respectively).

4.6.1 Effective Useful Life

The EUL of a measure corresponds to the number of years for which it is expected to be in use, and thus still generate energy and peak demand savings. To establish the EUL of measures offered through the BEP, the Evaluator conducted a literature review to compare the values used by NP and NLH to those found in other jurisdictions and consulted the specification sheets of lighting products. For prescriptive measures, the weighted average EUL was established at 19.8 years, compared to the tracked value of 14.6 years. As for custom measures, the weighted average EUL was established at 16.4 years. Altogether, the average EUL of the program was established at 17.2 years based on the weight of each component on the overall savings of the program.

Prescriptive Measures

Lighting Measures

To calculate the EUL of lighting products, the Evaluator divided the rated lifetime of the product by the annual HOUs as presented in the equation below. The rated lifetimes were determined by consulting the specification sheets of several products in each category. For fluorescent high bay fixtures and high-performance T8 lamps, the rated lifetime was obtained from the 2014 *CEATI Lighting Energy Efficiency Guide.*[60] The annual HOUs correspond to the values established in Subsection 4.1. Table 42 below presents both tracked and revised EUL values for lighting products.

$$EUL\ (years) = \frac{Rated\ Lifetime\ (hours)}{Annual\ HOU}$$

[60] CEATI International. *Lighting Energy Efficiency Reference Guide*, 2014.

Table 42: EUL of Lighting Products

Measure	Tracked EUL (years)	Rated Lifetime (hours)	Annual HOUs	Revised EUL (years)
LED Light Bulbs	20	25,000	3,400	7.4
LED High Bay Fixtures	13	100,000	3,400	29.4
LED Exit Signs and Retrofit Kits	10	-	-	10.0[61]
LED Wall Packs	13	100,000	4,380	22.8
Fluorescent High Bay Fixtures	11	24,000	3,400	7.1
High-performance T8 Lamps	7	36,000	3,400	10.6
Occupancy Sensors	8	-	-	10.0[62]

For LED exit signs and retrofit kits as well as occupancy sensors, the EUL values used by NP and NLH were consistent with what the Evaluator found in the literature.

The most notable differences from the tracked values are the EUL for LED light bulbs which were adjusted downward from 20 years to 7.4 years and for LED high bay fixtures which were increased from 13 years to 29.4 years. The Evaluator notes that the revised EUL of LED high bay fixtures is most likely optimistic and suggests tracking their annual HOUs to improve this estimate in the future.

The Evaluator examined the possibility of the baseline of lighting products increasing over their EUL by analyzing current and projected changes in Canadian lighting regulations. An increased baseline would have the effect of reducing the savings generated over the lifetime of the products. For example, Natural Resources Canada has planned to increase the efficiency requirements of general-service lamps through Amendment 16 of Canada's Energy Efficiency Regulations.[63] This would affect the EUL of the LED lamps rebated in the program. The Evaluator expects this update to align Canadian regulations with the U.S. Energy Independence and Security Act (EISA).[64] However, the amendment will enter a pre-consultation phase in 2019 and is expected to be in effect only several years later. The Evaluator concludes that the anticipated regulatory changes will not occur during the lifetime of LED lamps under the program, yet highlights that these changes should be considered in the near future.

[61] ENERGY STAR. "Exit Signs." Online: https://www.energystar.gov/products/lighting_fans/exit_signs.
[62] Database for Energy Efficiency Resources (DEER), *DEER 2008 EUL Table*, 2008.
[63] Natural Resources Canada. "Forward Regulatory Plan 2017-19." Online: http://www.nrcan.gc.ca/energy/regulations-codes-standards/18318, (last modified July 25, 2017).
[64] US EPA. "Summary of the Energy Independence and Security Act. Public Law 110-140 (2007)". Online: www.epa.gov/laws-regulations/summary-energy-independence-and-security-act.

Non-lighting Measures

For prescriptive measures other than lighting, the Evaluator established the EULs listed in Table 43 below. The Evaluator obtained these values by reviewing existing literature and considering the most common values in TRMs and relevant studies.

Table 43: Revised EUL Values for Non-lighting Measures

Measure	Tracked EUL (years)	Revised EUL (years)
Programmable Thermostats	18	8[65]
Rooftop Air-source Heat Pumps	15	15[66]
Low-flow Showerheads	10	10[67]
Pre-rinse Spray Valves	6	5[68]
Electronically-commutated Motors	16	15[69]

In most cases, the revised EUL was very similar to the tracked EUL, with the exception of programmable thermostats which went from 18 years to eight years.

Custom Measures

To establish the average EUL of products installed through the custom component, the Evaluator attributed an EUL to each product of the 30 sampled projects and calculated the weighted average EUL of custom projects.

Some EUL values corresponded to those presented in Table 42 above. For other implemented measures which were not part of the prescriptive component, the Evaluator conducted a literature review by consulting the TRMs of similar jurisdictions. For lighting measures, the Evaluator preserved the hypothesis made for prescriptive measures that the annual HOUs are 3,400 hours. The revised EUL values are presented in Table 44 below.

[65] GDS Associates. *Measure Life Report Residential and Commercial/Industrial Lighting and HVAC Measures*, June 2007.
[66] Ibid.
[67] Database for Energy Efficiency Resources (DEER), *DEER 2011 EUL Table*, 2011.
[68] Database for Energy Efficiency Resources (DEER), *DEER 2008 EUL Table*, 2008.
[69] Energy & Resource Solutions. *Measure Life Study Report prepared for The Massachusetts Joint Utilities,* 2005.

Table 44: Revised EUL Values for Custom Measures

Measure	Rated Life (years)	Annual HOUs	Revised EUL (years)
LED Linear Lamps	50,000	3,400	14.7[70]
Recommissioning	-	-	5[71]
Building Envelope	-	-	20[72]

4.6.2 Incremental Product Cost

The incremental product cost (IPC) is defined as the difference between the cost of the energy-efficient measure offered by the program and the cost of the baseline measure that would have been installed in the absence of the program, regardless of who pays.

For measures whereby the baseline is to not install the efficient product, the IPC corresponds to the full cost of the measure. This is the case for all BEP non-lighting measures as well as occupancy sensors.

As for other lighting measures, the IPC corresponds to the cost difference between the efficient measure and the baseline measure. The Evaluator estimated the incremental cost for each type of lighting product as a percentage, as illustrated in the equation below.

$$IPC\ (\%) = \frac{Cost_{eff} - Cost_{base}}{Cost_{eff}}$$

After conducting a literature review, the Evaluator decided to favour the most recent TRMs (to account for the recent decline in LED product costs) and wherein both baseline and efficient costs were listed to be able to establish the incremental cost as a percentage. Table 45 below lists the incremental cost percentages for lighting measures and their source.

[70] The Evaluator consulted the specifications sheets of various manufacturers.
[71] Energy & Resource Solutions. *Measure Life Study Report prepared for The Massachusetts Joint Utilities,* 2005.
[72] Ibid.

Table 45: Lighting Incremental Cost Percentages

Product	Incremental Cost Percent	Source
LED Light Bulbs	53%	Illinois TRM[73]
LED High Bay Fixtures	26%	Maine TRM[74]
LED Exit Signs and Retrofit Kits	93%	New Brunswick TRM[75]
LED Wall Packs	54%	Maine TRM
Fluorescent High Bay Fixtures	53%	OPA 2011[76]
LED Linear Lamps	26%	Maine TRM

Prescriptive Measures

When available, the full cost of both lighting and non-lighting measures were retrieved from the program databases for prescriptive measures. The Evaluator notes that, in some cases, only the rebated cost was available. For lighting measures, the IPC was determined by applying the percentages above to the full measure cost. For other measures, the IPC corresponded to the full measure cost. The sum of IPCs for prescriptive measures was $21,758 in 2016 and $15,632 in 2017 for NP. As for NLH, the sum was $1,538 in 2016 and $14,367 in 2017.

Custom Measures

For custom measures, the methodology used for prescriptive projects was applied to the 30 sampled projects. In the majority of cases, the cost of each measure was available and the percentages listed in Table 45 above were applied to determine the project IPC in dollars. In addition, the full project cost was used for some lighting projects that installed new fixtures instead of only replacing lamps since the fixture replacement was assumed to be influenced by the program.

The Evaluator then calculated a weighted average IPC percentage per project by dividing total project IPC by total project costs, as outlined in the equation below. This equation yielded a value of 84 percent which was applied to the total costs of all custom projects to obtain the overall IPC of custom projects. While most projects included only LED linear lamps (IPC of 26%), larger non-lighting projects or relamping projects involving fixture replacements (IPC of 100%) yielded an overall average of 84 percent.

$$Weighted\ Average\ IPC\ (\%) = \frac{Sum\ of\ Sampled\ Projects\ IPC\ (\$)}{Sum\ of\ Sampled\ Projects\ Costs\ (\$)}$$

[73] Illinois Energy Efficiency Stakeholder Advisory Group, *Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0*, February 2017.
[74] Efficiency Maine, *Commercial/Industrial Technical Reference Manual Version 2018.1,* July 2017.
[75] Énergie NB Power, *Technical Reference Manual*, August 2015.
[76] Independent Electricity System Operator, *2011 IESO Quasi-Prescriptive Measures and Assumptions List*, December 2010.

The sum of IPCs for custom measures was $1,075,707 in 2016 and $851,673 in 2017 for NP. As for NLH, the sum was $374,250 in 2016 and $49,252 in 2017.

Overall, for both the prescriptive and custom components combined, the IPC was found to be $1,097,465 in 2016 and $867,305 in 2017 for NP. As for NLH, the IPC was $375,788 in 2016 and $63,619 in 2017.

4.6.3 Program Administrator Cost Test

The PAC test is performed using the following equation:

$$PAC = \frac{PV(Marginal\ Benefits)}{PV(Total\ Program\ Administration\ Cost + Incentives)}$$

This test compares the avoided electricity supply-side resource costs (benefits) with the costs incurred by the program administrator to design and deliver the program. Therefore, it represents the program's cost-effectiveness only from the program administrator's perspective.

By applying the revised EUL values, evaluated net savings, as well as the administration and incentive costs provided by NP and NLH, the Evaluator concluded that for the PAC ratio value to be above unity and for the program to be cost-effective, the value of avoided costs (given a first year of EUL in 2017) must be at least $0.056/kWh in 2016 and $0.059/kWh in 2017. It should be noted that no demand benefits were applied and that factoring in these benefits would result in a lower minimum avoided cost value than that required for the program to be cost-effective.

Table 46: Analysis of PAC Test

	NP		NLH		Total	
	2016	2017	2016	2017	2016	2017
Incentives ($)	283,589	820,563	80,000	51,000	363,589	871,563
Total Program Admin. Cost ($)	1,019,462	1,223,200	125,000	104,000	1,144,462	1,327,200
Lifetime Energy Savings (kWh)	30,478,400	58,342,400	17,131,200	7,705,600	47,609,600	66,048,000
Minimum Value of Avoided Energy ($/kWh) in First Year	0.076	0.062	0.021	0.036	0.056	0.059

4.6.4 Total Resource Cost Test

The TRC test is performed using the following equation:

$$TRC = \frac{PV(Marginal\ Benefits)}{PV(Incremental\ Product\ Cost + Total\ Program\ Admin\ Cost)}$$

This test establishes the ratio of the avoided electricity supply-side resource cost (benefits) to the cost incurred both by the program administrator (administration costs) and the customer (incremental product cost). Therefore, this test is a more comprehensive analysis of the cost-effectiveness of the program since it also takes into account the customer's perspective.

By applying the revised EUL and IPC values, the evaluated net savings and the administration cost values provided by NP and NLH, the Evaluator concluded that for the TRC ratio value to be above unity and for the program to be cost-effective, the value of the avoided costs (given a first year of EUL in 2017) must be at least $0.090/kWh in 2016 and $0.056/kWh in 2017. It should be noted that no demand benefits were applied and that factoring in these benefits would result in a lower minimum avoided cost value than that required for the program to be cost-effective.

Table 47: Analysis of TRC Test

	NP		NLH		Total	
	2016	2017	2016	2017	2016	2017
Total Incremental Cost ($)	1,097,465	867,305	375,788	63,619	1,473,253	930,924
Total Program Admin. Cost ($)	1,019,462	1,223,200	125,000	104,000	1,144,462	1,327,200
Lifetime Energy Savings (kWh)	30,478,400	58,342,400	17,131,200	7,705,600	47,609,600	66,048,000
Minimum Value of Avoided Energy ($/kWh) in First Year	0.113	0.059	0.048	0.036	0.090	0.056

4.6.5 Levelized Utility Cost Test

The LUC test is performed by dividing the cost incurred by a program administrator to design and deliver a program by the lifetime energy savings generated by the program.

By applying the revised EUL values, the evaluated net savings and the administration and incentive costs provided by NP and NLH, the LUC value was calculated for each year and each utility as outlined in the following table.

Table 48: LUC Test Results

	NP		NLH		Total	
	2016	2017	2016	2017	2016	2017
Incentives ($)	283,589	820,563	80,000	51,000	363,589	871,563
Total Program Admin. Cost ($)	1,019,462	1,223,200	125,000	104,000	1,144,462	1,327,200
Lifetime Energy Savings (kWh)	30,478,400	58,342,400	17,131,200	7,705,600	47,609,600	66,048,000
LUC ($/kWh)	0.043	0.035	0.012	0.02	0.032	0.033

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this evaluation, the Evaluator concludes that the BEP performs well in most aspects, but also faces challenges in getting customers to complete more complex projects that involve non-lighting measures. Participants and trade allies are satisfied with the BEP overall, and they appreciate the easy participation process. Additionally, the participant survey did not reveal any significant issue with the BEP. Indeed, participants are satisfied with most aspects and stages of the BEP, although they found upgrade installations and M&V the most challenging.

That said, the walk-through energy assessment process is perhaps not optimized. While participants mentioned being satisfied with this part of the program, partial participants were more critical. The walk-through energy assessment is the first main step in the BEP participation process and an opportunity to inform and direct customers toward a wide range of measures, not just lighting. Some of the partial participants specifically mentioned that they would have liked a broader assessment of their facility to obtain information about non-lighting measures. Given the somewhat high free-ridership levels of the program and the increasing popularity of LED products, the program will have to diversify to adapt to customer needs and avoid increases in free-ridership.

Trade allies and participants would actually like to see more products rebated. This feedback came from both prescriptive and custom participants, suggesting that custom participants are probably not aware of the possibilities afforded to them by the custom component. Some partial participants also requested more support to help them identify which are quality products and where to buy these. NP and NLH should explore the possibility of developing a partner network to help customers learn which products to buy and where to buy them.

In addition to further encouraging non-lighting measures, there remains potential for greater participation in general. Based on the non-participant survey findings, two businesses out of five are still unaware of the BEP. Trade allies agree that there is potential for the program to reach more customers and create market growth, and they are open to working with NP and NLH on generating more opportunities.

During the impact evaluation, the Evaluator revised most unitary savings values currently used by NP and NLH to calculate savings associated with prescriptive measures, sometimes upward and sometimes downward adjustments depending on the measure. It was also found that some products from the prescriptive list did not generate any savings in 2016 and/or 2017. Most of the savings adjustments made to custom projects involved correcting baseline wattages and interactive effects assumptions. Adjustments were also made to the peak demand savings of custom projects to take into account the moment during which the load savings occurred for each project and whether this occurred during the system peak.

Based on the findings of this evaluation, the Evaluator makes the following recommendations:

1. Use the parameters derived from this impact evaluation for future program tracking.

The Evaluator recommends that NP and NLH use the parameters defined in this evaluation for program tracking going forward. These include the revised unitary savings values, interactive effects factors and NTGRs. The unitary savings values were revised based on program participant characteristics and a literature review of the most recent TRMs. These revised values should be used to track savings in the future. The interactive effects factors were also adjusted to reflect the proportion of electrically heated and cooled buildings in the province. These revised factors should be used to track the savings of all lighting measures under the prescriptive and custom components. Finally, the NTGRs were calculated using a survey with prescriptive participants and interviews with custom participants.

2. Collect additional information in the prescriptive application forms.

To improve the accuracy and precision of the unitary savings calculations, the Evaluator recommends collecting the following in the prescriptive application forms and tracking them in the program databases:

- For all measures: building type;
- For all measures: facility opening hours;
- For all measures: if the building is electrically heated and cooled;
- For lighting measures: efficient wattage;
- For low-flow showerheads: average number of showers taken per day.

3. Replace High-performance T8 lamps by LED linear lamps.

No savings were obtained in 2016-2017 for high-performance T8 lamps. Given the increasing interest of customers for LED technology in general, the Evaluator recommends removing high-performance T8 lamps from the program and replacing them with LED linear lamps which have higher energy savings potential and are likely to yield higher participation.

4. Calculate and track peak demand savings associated with custom projects, not just demand savings.

Both NP and NLH currently calculate and track demand savings for custom projects. However, these demand savings do not take into account the moment during which the load savings occur and if they occur during the system peak. The Evaluator estimated the peak demand savings for each project and adjusted tracked demand savings accordingly, which resulted in an overall downward adjustment for peak demand savings. The Evaluator therefore recommends that NP and NLH calculate and track peak demand savings for all custom projects in the databases.

5. Better document custom projects.

During the project review, the Evaluator found it difficult to understand the evolution of custom projects between the time of the PDA and the M&V report. In most cases, it was clear that changes had been made to the scope of the project, measures implemented and savings, but the Evaluator could clearly follow neither these changes, nor the reasons or justifications for them. The Evaluator recommends better documenting custom projects throughout implementation. This can be accomplished in various ways, whether it be by attaching emails or notes to the project files, including amendments to the PDA, or through a customer relationship management system to keep track of all exchanges and communications with participants.

6. Increase promotion of non-lighting measures.

The free-ridership levels calculated during this evaluation are somewhat high and could increase in the next years if the program offer and completed projects continue to revolve around lighting. Additionally, trade allies expressed concern about the future of the program based on the current offer. The Evaluator recommends promoting non-lighting measures more to encourage their implementation. The walk-through energy assessment should be used as a pivotal tool in promoting such measures because it is an opportunity to direct customers thereto.

7. Improve the content of the database.

The review of the program databases indicated that improvements are possible for better program tracking, monitoring and evaluation. The Evaluator recommends:

- Enter the contact name of prescriptive participants found on the application form;
- Ensuring that all tracked projects have a corresponding phone number;
- For prescriptive projects, including the baseline equipment wattage, type and quantity, as well as project tracked savings, and tracking this information in a clear manner;
- Keeping the Project Milestone field up to date and ensuring it is coherent with other database fields;
- For custom projects, adding a column to indicate the project completion date and using this date to determine under which year the project savings should be tracked;
- For custom projects, revising the savings in the database once M&V results are available.

APPENDIX I
NON-PARTICIPANT SURVEY QUESTIONNAIRE

Key Research Area	Related Questions
Program Awareness	A1-A4
Reasons for Non-participation	P1-P4
Barriers to Making Upgrades	B1, B2
Motivations for Future Participation in the BEP	I1-I3
Firmographics	F1-F4

INTRODUCTION A – BUSINESS *WITH* A CONTACT NAME

Could I speak with **[INSERT NAME]?**

1. Yes
2. No (Say "Perhaps you can help me anyway.")

Hello, I am representing Corporate Research Associates, an Atlantic Canadian survey research company. We are conducting an evaluation of the takeCHARGE Business Efficiency Program provided by [Newfoundland Power and Newfoundland and Labrador Hydro]. We would appreciate your help in answering a few questions about energy efficiency in your business. The information you provide will be used to help Newfoundland Power and Newfoundland and Labrador Hydro improve their programs and services offered to businesses such as yours. The survey should take about 10 minutes. Is this a good time for you?

I1. Are you involved in the energy-related decisions made for your business?
1. Yes (Go to A Series)
2. No

I2. Could you help us identify the person responsible for making energy-related decisions in your business? [Probe if respondent is unsure who best to forward the call to: This individual may be an engineer, equipment contractor, or utility account manager].
1. Yes (Ask for name: ____________ and telephone #: _____________) (And ask to speak to that person – Go back to Intro A)
2. No

I3. Would it be possible to speak to someone who could help us identify this person?
1. Yes (Ask for name: ____________ and telephone #: _____________) (And ask to speak to that person – Go to Intro B)
2. No (Thank and terminate)

INTRODUCTION B – BUSINESS *WITH NO* CONTACT NAME

Hello, I am representing Corporate Research Associates, an Atlantic Canadian survey research company. We are conducting an evaluation of the takeCHARGE Business Efficiency Program by Newfoundland Power and Newfoundland and Labrador Hydro. We are gathering information to help Newfoundland Power and Newfoundland and Labrador Hydro improve their programs and services offered to businesses such as yours.

I4. Could you help us identify the person responsible for making decisions on energy-saving upgrades for your business?

1. Yes, the person is available (Ask for name: ____________ and telephone #: _____________) (And ask to speak to this person – Go back to Intro A)
2. Yes, but the person is unavailable (Ask for name: ____________ and telephone #: _____________) (Thank and terminate; schedule call back to speak to that person)
3. No (Thank and terminate)

Program Awareness (A Series)

A1. Before today, had you ever heard about financial incentives and technical support provided by Newfoundland Power and Newfoundland and Labrador Hydro for businesses such as yours to do energy efficiency projects?

1. Yes
2. No
98. (Don't know)
99. (Refused)

A2. Before today, had you ever heard of the Business Efficiency Program by Newfoundland Power and Newfoundland and Labrador Hydro? This program provides businesses with financial incentives and technical support to upgrade their lighting, heating, hot water and refrigeration equipment for more efficient equipment.

1. Yes
2. No (Go to P series)
98. (Don't know) (Go to P series)
99. (Refused) (Go to P series)

A3. [ASK A3 IF A2 = 1] How did you first learn of the Business Efficiency Program? [DO NOT PROVIDE RESPONSE CATEGORIES. ALLOW MULTIPLE RESPONSES BUT DO NOT PROBE FOR MULTIPLE]

1. (Television)
2. (Newspaper)
3. (Magazine)
4. (Internet - general)
5. (Newfoundland Power/Newfoundland and Labrador Hydro website)
6. (Someone at Newfoundland Power/Newfoundland and Labrador Hydro contacted my business)
7. (Through a third-party contractor or distributor)
8. (My business contacted Newfoundland Power/Newfoundland and Labrador Hydro about the program)
9. (Word of mouth, friends, family)
10. (Facebook or other social media)
11. (Power bill insert)
97. (Other [SPECIFY: _______________])
98. (Cannot recall/Don't know)
99. (Refused)

A4. According to our information, your business did not participate in the Business Efficiency Program in 2016 or 2017. To the best of your knowledge, did your business participate in the Business Efficiency Program before 2016?

1. Yes
2. No
98. (Don't know)
99. (Refused)

Reasons for Non-participation (P Series)

P1. Since the beginning of 2016, have you or someone else made energy efficiency upgrades in your business? [CHOOSE ONLY ONE ANSWER]

1. Yes
2. No (Go to B Series)
98. (Don't know) (Go to B Series)
99. (Refused) (Go to B Series)

P2. [ASK P2 IF P1 = 1] What was the single most important reason your business chose to make these energy efficiency upgrades? [DO NOT READ. CODE ONLY ONE]

1. (Save money/reduce energy bill)
2. (Reduce energy consumption/energy savings)
3. (It was time to update equipment/Concerns with existing equipment age or reliability)
4. (Have better quality equipment)
5. (Increase efficiency of our business in general—not specific to energy)
6. (Be more environmentally friendly)

96. (Other: Please Specify: _____________)
98. (Don't know)
99. (Refused)

P3. What was the main reason for not participating in Newfoundland Power's and Newfoundland and Labrador Hydro's Business Efficiency Program for these upgrades? Any other reasons? [DON'T READ – MULTIPLE NAMINGS POSSIBLE]

1. (I was told upgrades were not eligible for the program)
2. (I didn't think upgrades would be eligible for the program)
3. (Lack of time)
4. (Process too complicated)
5. (I don't like filling out paperwork)
6. (Previous bad experience with a Newfoundland Power/Newfoundland and Labrador Hydro program)
7. (Didn't know about the program)
8. (Project too small)
9. (Rebate too small for the effort required – was not worth the effort)
10. (Lack of resources needed to participate or complete project)

96. (Others, please specify_________)
98. (Don't know)
99. (Refused)

Barriers to Making Upgrades (B Series)

B1. [ASK IF P1 = 2, 98 OR 99] Generally speaking, what do you think keeps your business from making energy efficiency upgrades? Any other reasons? [DO NOT READ. CODE AS MANY AS APPLICABLE]

1. (Cost of upgrades)
2. (Lack of information about energy efficiency upgrades)
3. (Lack of information about possible incentives and programs)
4. (Energy savings would be too small)
5. (Obligation to provide business information)
6. (Incentives would be too small)
7. (They take too long to recover costs)
8. (Lack of staff/internal resources to implement the project)
9. (None/no barriers)
96. (Other: Please Specify: _____________)
98. (Don't know)
99. (Refused)

Future Intentions (I Series)

I1. How likely is your business to make energy efficiency upgrades or replace existing equipment with more efficient equipment over the next twelve months? Would you say Definitely, Probably, Probably Not or Definitely Not? [CHOOSE ONLY ONE ANSWER]

1. Definitely
2. Probably
3. Probably not (Go to F Series)
4. Definitely not (Go to F Series)
98. (Don't know) (Go to F Series)
99. (Refused) (Go to F Series)

I2. [ASK IF 1 or 2 IN I1] Which energy efficiency upgrades or equipment is your business likely to implement over the next twelve months? PROBE: Any others? [DO NOT READ. CODE AS MANY AS APPLICABLE]

1. (Lighting)
2. (Ventilation)
3. (Space heating, including heat pumps)
4. (Water heating, including boilers)
5. (Refrigeration)
6. (Motors)
7. (Water-saving, including low-flow showerheads and faucet aerators)
8. (Controls: e.g., occupancy sensors, programmable thermostats)
9. (Air conditioning)

96. (Other: Please Specify: _____________)
98. (Don’t know)
99. (Refused)

I3. [ASK IF 1 or 2 IN I1] Does your business [READ RESPONSES IN ORDER] intend to participate in Newfoundland Power and Newfoundland and Labrador Hydro’s Business Efficiency Program for the implementation of those energy efficiency upgrades or equipment? [CHOOSE ONLY ONE ANSWER]

1. Definitely
2. Probably
3. Probably not, or
4. Definitely not

98. (Don’t know)
99. (Refused)

Firmographics (F Series)

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

F1. What is the main activity of your business? [DO NOT READ—BUT CONFIRM WITH RESPONDENT THAT THE CATEGORY YOU CHOOSE IS CORRECT]

1. Education
2. Food Sales (grocery)
3. Food Service (restaurant)
4. Health Care - Inpatient
5. Health Care - Outpatient
6. Lodging
7. Mercantile– Retail (Enclosed and Strip Malls)
8. Mercantile – Retail (Other than Mall)
9. Office
10. Public Assembly
11. Public Order and Safety
12. Religious Worship
13. Service
14. Warehouse / storage
15. Manufacturing
16. Building is vacant
17. Agriculture

97 Other (SPECIFY: ___________)
98. (Don't know)
99. (Refused)

F2. Approximately how many full-time equivalent workers does your business employ at all locations within Newfoundland and Labrador? [CODE APPROPRIATE CATEGORY. PROBE TO AVOID ACCEPTING A RANGE]

1. Fewer than 5
2. 5 to 9
3. 10 to 19
4. 20 to 49
5. 50 to 99
6. 100 to 249
7. 250 or more

98. (Don't know)
99. (Refused)

F3. Is your business independent, or part of a larger business?

1. Independent
2. Part of a larger company/ business
96. Other (**SPECIFY:** ____________)
98. (Don't know)
99. (Refused)

F4. How many business locations does your business have in Newfoundland and Labrador? [RECORD A NUMBER 1-99; 998 = Don't know, 999 = Refused. PROBE TO AVOID ACCEPTING A RANGE]

END. Those are all the questions I have for you. I thank you very much for your time and cooperation and have a nice day!

APPENDIX II
FIRMOGRAPHICS – NON-PARTICIPANT SURVEY

The profile of the non-participants who responded to the telephone survey is presented in the following tables.

Those non-participant businesses that took part in the survey were drawn from a variety of industries, as shown in the figure below.

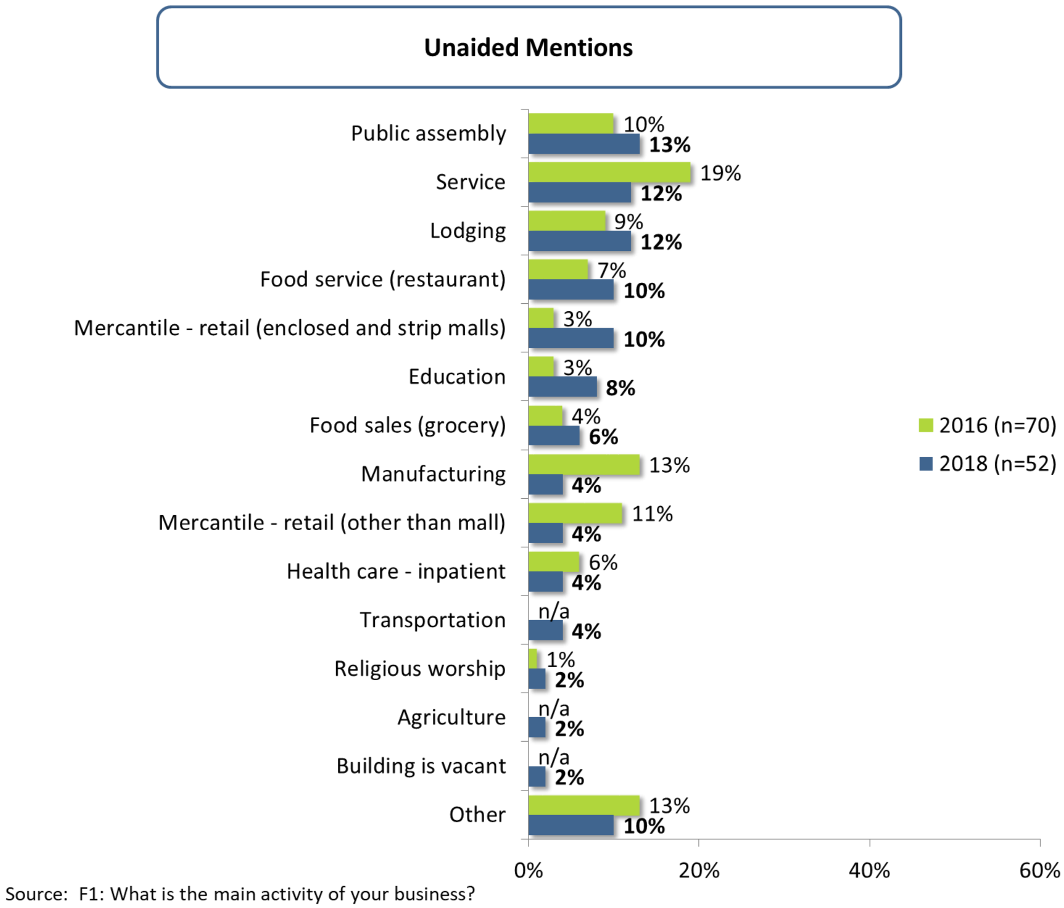
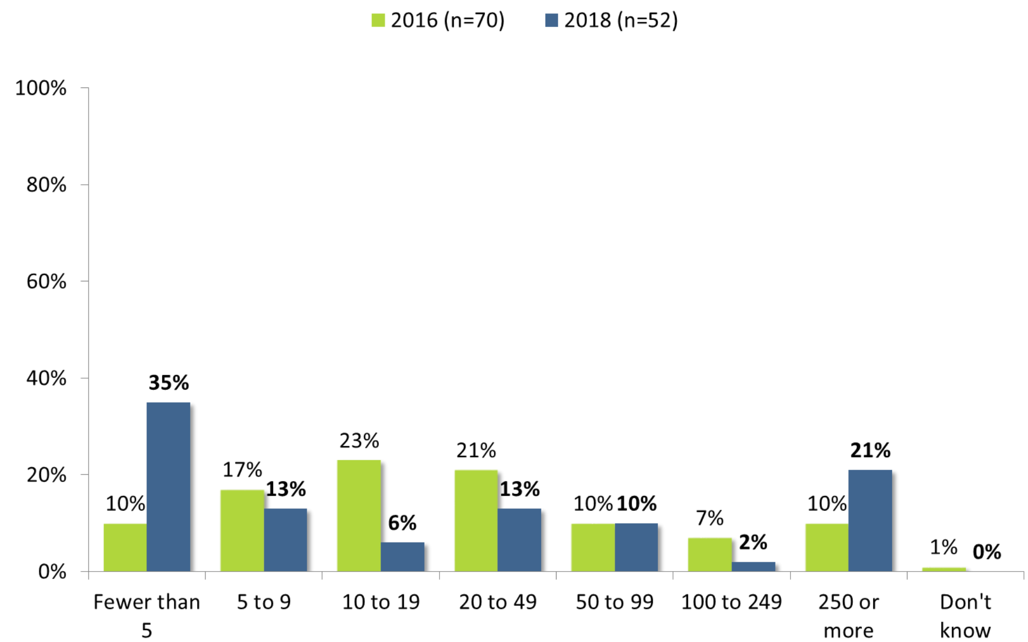


Figure 17: Distribution of the Non-participant Organizations by Industry

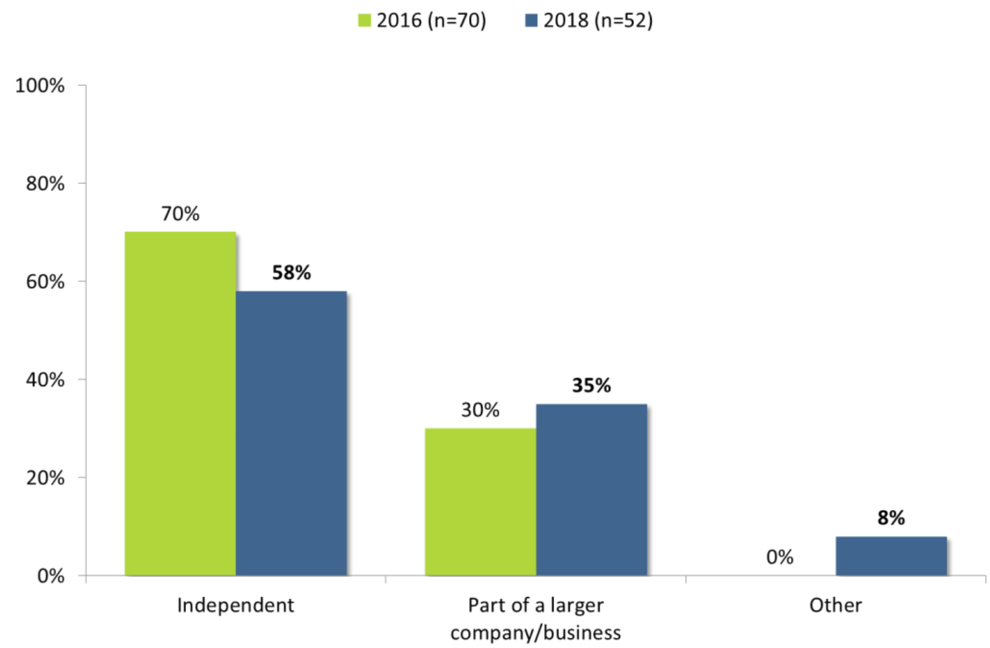
Various organization sizes are represented in the non-participant sample of this evaluation.



Source: Q.F2: Approximately how many full-time equivalent workers does your organization employ at all locations within Newfoundland and Labrador?

Figure 18: Shares of Businesses of Different Sizes (in Terms of Full-time Equivalent Workers Employed) in Newfoundland and Labrador – Non-participants

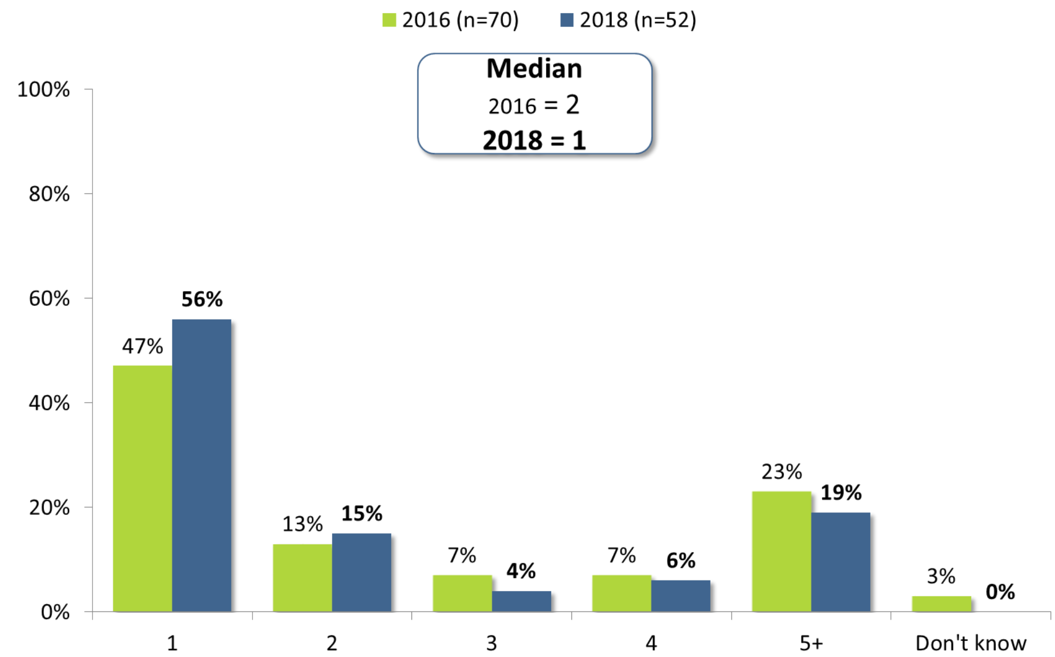
A small majority of non-participants work with independent companies (58%), while one-third (35%) are part of a larger organization.



Source: Q.F3: Is your organization independent, or part of a larger business? (n=70)

Figure 19: Independent Organizations versus Those Organizations that are Part of a Larger Organization – Non-participants

Non-participant businesses represented in these results operate one location, on average, in Newfoundland and Labrador.



Source: Q.F4: How many business locations does your business have in Newfoundland and Labrador? (n=70)

Figure 20: Number of Business Locations Operated by Each Business in Newfoundland and Labrador on Average – Non-participants

APPENDIX III
PARTICIPANT SURVEY QUESTIONNAIRE

Key Research Area	Related Questions
Sources of program awareness and reasons for participation	A1-A3
Participation process	S1-S2
Satisfaction with the program and recommendations	S3-S4
Free-ridership	FR1-FR5
Spillover	SO1-SO6
Firmographics	F1-F4

Hello may I please speak with [INSERT NAME]?

1. Yes [GO TO INTRODUCTION]
2. No [SAY “Perhaps you can help me anyway.” GO TO INTRODUCTION]

INTRODUCTION

Hello, my name is _________ and I am calling from Corporate Research Associates, an Atlantic Canadian survey research company. We are performing an evaluation of energy efficiency programs provided by [Newfoundland Power/Newfoundland and Labrador Hydro]. According to our records, you participated in the takeCHARGE Business Efficiency Program in the last few years. As part of this program, you received a rebate for energy efficiency upgrades that you made in your business. Are you the person in your business who is most familiar with participating in this program?

1. Yes [CONTINUE]
2. No [ASK TO SPEAK TO THE APPROPRIATE PERSON AND RESTART AT INTRODUCTION]
3. Does not recall participating [PROMPT: “Our records indicate that you participated in the program in <MONTH and YEAR>. Your business would have received rebates and possibly technical support for making lighting, space heating or refrigeration upgrades for example.”[IF PERSIST AS NO, THANK, TERMINATE AND RECORD]
4. Don’t know/Refused [PROBE: “Is there someone else in the business who would know about having participated in the Business Efficiency Program?”] [IF YES, ASK TO SPEAK TO THE APPROPRIATE PERSON AND RESTART AT INTRODUCTION. IF PERSISTS AS NO, THANK, TERMINATE AND RECORD.]

We would appreciate your help in answering questions about your participation in this program. The information you provide will help [Newfoundland Power/Newfoundland and Labrador Hydro] improve the program. Is now a good time to conduct this short survey? The survey will take about 10 minutes to complete.

1. Yes [CONTINUE]
2. No/Refused [ASK "Can we schedule a more convenient time for you to conduct this survey?"] [SCHEDULED, IF NECESSARY, FOR: ______________________________]

Program Awareness and Reasons for Participation (A Series)

A1. How did you first learn about the takeCHARGE Business Efficiency Program? [DO NOT READ; ALLOW MULTIPLE RESPONSES BUT DO NOT PROBE FOR MULTIPLE]

1. (Television)
2. (Newspaper)
3. (Magazine)
4. (Internet - general)
5. (Newfoundland Power/Newfoundland and Labrador Hydro website)
6. (Someone at Newfoundland Power/Newfoundland and Labrador Hydro contacted my business)
7. (Through a third-party contractor or distributor)
8. (My business contacted Newfoundland Power/Newfoundland and Labrador Hydro about the program)
9. (Word of mouth, friends, family)
10. (Facebook or other social media)
11. (Power bill insert)
96. (Other [SPECIFY: ______________])
97. (Cannot recall/Don't know)
98. (Refused)

A2. What was the SINGLE most important reason you were interested in participating in the program? [DO NOT READ – CODE ONE ONLY]

1. (Rebate/Credit on electricity bill)
2. (Save money/Reduce energy bill)
3. (Reduce energy consumption/energy savings)
4. (Planning to make upgrades anyway)
5. (Be more environmentally friendly)
6. (Increase efficiency of our business in general—not specific to energy)
96. (Other, SPECIFY_______________])
98. (Don't know) [GO TO SECTION S]
99. (Refused) [GO TO SECTION S]

A3. Were there any other reasons? [SAME LIST AS IN A2] [DO NOT READ. ACCEPT MULTIPLE RESPONSES] 97 None/no other reasons

Participation Process and Satisfaction (S Series)

S1. [ASK ONLY IF IDENTIFIED AS CUSTOM CLIENT IN SAMPLE] Using a scale of 0 to 10, where 0 is ‘extremely difficult’, and 10 is ‘’extremely easy’’, how easy was it for you to complete each of the following program steps? [READ] [DO NOT ROTATE STATEMENTS] [0 TO 10 SCALE, 97=NOT APPLICABLE, 98 = DON’T KNOW/DON’T RECALL THIS STEP]

a. [ASK ONLY IF WALK-THROUGH COMPLETE IN SAMPLE] Contact [Newfoundland Power/Newfoundland and Labrador Hydro] to set up a free walk-through energy assessment of your facility
b. [ASK ONLY IF WALK-THROUGH COMPLETE IN SAMPLE] Review the upgrade recommendations provided in the walk-through energy assessment report
c. Fill out and submit the Project Proposal form
d. Review the Project Development Agreement provided by [Newfoundland Power/Newfoundland and Labrador Hydro]
e. Complete the energy efficiency upgrades
f. Fill out and submit the Incentive Claim form
g. Conduct measurement and verification to confirm the savings generated by your project

S2. Overall, in thinking back across the program steps, how satisfied are you with the process you went through to participate in the Business Efficiency Program, using a scale of 0 to 10, where 0 is ‘’not at all satisfied’’, and 10 is ‘’completely satisfied’’. [0 TO 10 SCALE, 98 = DON’T KNOW]

S3. Now, please tell me how satisfied you are with the following aspects of the Business Efficiency Program, using the same scale where 0 means ‘’not at all satisfied’’ and 10 means ‘’completely satisfied’’. [0 TO 10 SCALE, 97=NON APPLICABLE, 98 = DON’T KNOW]

a. The clarity of program requirements
b. The range of program eligible equipment
c. [ASK ONLY IF IDENTIFIED AS CUSTOM CLIENT IN SAMPLE] The Project Proposal and Incentive Claim forms, and any other documentation you filled out
d. [ASK ONLY IF IDENTIFIED AS PRESCRIPTIVE CLIENT IN SAMPLE] The application form and any other documentation you filled out
e. The usefulness of the information or advice provided by the program
f. [ASK ONLY IF IDENTIFIED AS CUSTOM CLIENT IN SAMPLE] The quality of the technical support or expertise provided by the program, for example the free walk-through energy assessment, or the audit or feasibility study
g. [ASK ONLY IF WALK-THROUGH COMPLETE IN SAMPLE] The relevance of the upgrade recommendations made for your facility
h. The time it took to receive the rebate
i. The rebate amount
j. The program overall

S4. Do you have any recommendations for improving the Business Efficiency Program? PROBE: Anything else? [DO NOT READ. ACCEPT MULTIPLE]

1. (Offer more upgrades eligible for rebates)
2. (Offer more information on the upgrades)
3. (Advertise the program more or in a better way)
4. (Bigger incentives)
5. (Clearer documentation)
6. (No recommendation)
96. (Other [SPECIFY_______________])
98. (Don’t know)
99. (Refused)

Free-Ridership (FR Series)

Moving along to another topic…

FR1. [ASK ONLY IF WALK-THROUGH COMPLETE IN SAMPLE] Before you had your facility evaluated by an energy expert from the Business Efficiency Program, had your business decided to make the specific energy efficiency upgrades that were made as part of the Business Efficiency Program? Did you… [READ. CODE ONLY ONE.]

1. Have plans to make all of the upgrades
2. Have plans to make some of the upgrades
3. Had no plans to make any of the upgrades
98. (Don't know)
99. (Refused)

FR1a. [IF FR1=1 or 2, THEN ASK:] I just want to make sure I understand - **Before** you had your facility evaluated by an energy expert from the Business Efficiency Program, you had already made the decision to make [all/some of] the energy efficiency upgrades that were made as part of the program?

1. Yes
2. No
98. (Don't know)
99. (Refused)

FR2. [DO NOT ASK IF WALK-THROUGH COMPLETE IN SAMPLE] Before you heard about the program, had your business decided to make the specific energy efficiency upgrades that were made as part of the Business Efficiency Program? Did you… [READ. CODE ONLY ONE.]

1. Have plans to make all of the upgrades
2. Have plans to make some of the upgrades
3. Had no plans to make any of the upgrades
98. (Don't know)
99. (Refused)

FR2a. [IF FR2=1 or 2, THEN ASK:] I just want to make sure I understand - **Before** you heard of the Business Efficiency Program, you had already made the decision to make [all/some of] the energy efficiency upgrades that were made as part of the program?

1. Yes
2. No
98. (Don't know)
99. (Refused)

FR3. [Newfoundland Power/Newfoundland and Labrador Hydro] gave a rebate to your business for the upgrades made. If your business had not received the rebate from [Newfoundland Power/ Newfoundland and Labrador Hydro], would you have paid the full cost of the project you implemented? Please answer on a scale of 0 to 10, with a 0 indicating that you "Definitely **Would Not** Have Paid" and a 10 indicating that you "Definitely **Would** Have Paid." [PROBE FOR SPECIFIC RESPONSE – DO NOT ACCEPT A RANGE]

___ Response ___98 Don't Know ___99 Refused

[**READ FIRST TIME THROUGH ONLY**] Now I would like to ask you to consider what actions you would have taken if the rebates and technical support offered by the Business Efficiency Program had NOT been available. Please answer on a scale of 0 to 10, with a 0 indicating that it would have been "Very Unlikely" and a 10 indicating that it would have been "Very Likely".

[DO NOT ACCEPT A RANGE – ASK FR4 SEQUENCE IN ORDER/DO NOT RANDOMIZE]

FR4a. If the program had not been offered, what is the likelihood that you would have installed standard equipment or that you would have simply kept your old equipment instead of installing energy-efficient equipment in your facility?

___ Response ___98 Don't Know ___99 Refused

FR4b. If the program had not been offered, what is the likelihood that you would have installed exactly the same quantity of energy-efficient upgrades that were installed through the Business Efficiency Program?

___ Response ___98 Don't Know ___99 Refused

FR4c. If the program had not been offered, what is the likelihood that you would have postponed making energy-efficient upgrades to your facility by at least one year?

___ Response ___98 Don't Know ___99 Refused

FR5. Using a scale of 0 to 10, where 0 means "No influence" and 10 means "Great influence", please rate the importance of each of the following in your business' decision to make the energy-efficient upgrades. [READ. ROTATE. DO NOT ACCEPT A RANGE]

Factor	Responses
a. [ASK ONLY IF WALK-THROUGH COMPLETE IN SAMPLE] The information provided following the free walk-through energy assessment of your facility	___ Response; 97 N/A; 98 Don't Know; 99 Refused
b. [ASK ONLY IF AUDIT OR FEASIBILITY STUDY COMPLETE IN SAMPLE] The rebate provided for the in-depth audit or feasibility study	___ Response; 97 N/A; 98 Don't Know; 99 Refused
c. [ASK ONLY IF AUDIT OR FEASIBILITY STUDY COMPLETE IN SAMPLE] The information provided in the in-depth audit or feasibility study	___ Response; 97 N/A; 98 Don't Know; 99 Refused
d. The rebates provided for the upgrades made	___ Response; 97 N/A; 98 Don't Know; 99 Refused
e. The promotional materials and information related to energy efficiency distributed by [Newfoundland Power/Newfoundland and Labrador Hydro] or a previous participation in one of their programs	___ Response; 97 N/A; 98 Don't Know; 99 Refused
f. [IF MEASURE CATEGORY = ECM] The installation of the ECM motor, at no charge, offered by the program	___ Response; 97 N/A; 98 Don't Know; 99 Refused

Spillover (SO Series)

[ASK SO SERIES ONLY IF IDENTIFIED AS PRESCRIPTIVE PARTICIPANT IN SAMPLE]

Now, I'm going to ask a few questions about the energy efficiency upgrades that may have been made by your business without a rebate from the Business Efficiency Program.

SO1. Since the time you participated in the Business Efficiency Program, have you made other energy efficiency upgrades that had been identified through the program but for which you did not request any rebates through the Business Efficiency Program?

1. Yes
2. No [GO TO F SERIES]

99. (Don't know/Refused) [GO TO F SERIES]

SO2. Did you receive or do you plan on requesting rebates or incentives from [Newfoundland Power/ Newfoundland and Labrador Hydro] for the upgrades you made after participating in the Business Efficiency Program?

1. Yes [GO TO F SERIES]
2. No
99. (Don't know/Refused)

SO3. What additional energy efficiency upgrades have you made since participating the Business Efficiency Program? Have you installed… [ROTATE. 'M' ALWAYS LAST TO BE POSED.]

a. L-E-D light bulbs
b. L-E-D exit signs
c. L-E-D high bay fixtures
d. L-E-D wall packs
e. Fluorescent high bay fixtures
f. High-performance T8 lamps
g. Programmable thermostats
h. Air source heat pumps
i. Low-flow showerheads
j. Pre-rinse spray valves
k. Occupancy sensors
l. Electronically-commutated motors (ECMs)
m. Any other upgrades? SPECIFY?

1. Yes
2. No
98. Don't know
99. Refused

SO4. [ASK FOR EACH 'YES' IN RESPONSE IN SO3a-l] How many additional [INSERT PRODUCT] have you installed since participating in the Business Efficiency Program? [ENTER NUMBER. PROBE FOR A SPECIFIC ANSWER. DON'T KNOW=98, REFUSED=99]

SO5. Did your experience with the Business Efficiency Program influence your decision to make these additional energy efficiency upgrades? Please, give your answer on a scale of 0 to 10, where 0 indicates that the program "had no influence at all on your decision to make these energy efficiency upgrades" and 10 indicates that the program had a "great influence on your decision to make these energy efficiency upgrades."

___ Response ___98 Don't Know ___99 Refused

SO6. Why did you choose not to make these additional upgrades through the Business Efficiency Program? [DO NOT READ - SELECT ALL THAT APPLY]

1. (I was told upgrades were not eligible for the program)
2. (I didn't think upgrades would be eligible for the program)
3. (Lack of time)
4. (Process too complicated)
5. (Too much paperwork)
6. (Bad experience with the program)
7. (Project too small)
8. (Rebates too small for the effort required – was not worth the effort)
9. (Lack of resources needed to participate or complete project)
96. (Others, please specify)
98. (Don't know)
99. (Refused)

Firmographics (F Series)

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

F1. What is the main activity of your organization? [DO NOT READ—BUT CONFIRM WITH RESPONDENT THAT THE CATEGORY YOU CHOOSE IS CORRECT]

1. Education
2. Food Sales (grocery)
3. Food Service (restaurant)
4. Health Care - Inpatient
5. Health Care - Outpatient
6. Lodging
7. Mercantile– Retail (Enclosed and Strip Malls)
8. Mercantile – Retail (Other than Mall)
9. Office
10. Public Assembly
11. Public Order and Safety
12. Religious Worship
13. Service
14. Warehouse / storage
15. Manufacturing
16. Building is vacant
17. Agriculture

96. Other (SPECIFY: ___________)
98. (Don't know)
99. (Refused)

F2. Approximately how many full-time equivalent workers does your business employ at all locations within Newfoundland and Labrador? [CODE APPROPRIATE CATEGORY. PROBE TO AVOID ACCEPTING A RANGE]

1. Fewer than 5
2. 5 to 9
3. 10 to 19
4. 20 to 49
5. 50 to 99
6. 100 to 249
7. 250 or more

98. (Don't know)
99. (Refused)

F3. Is your business independent, or part of a larger business?

1. Independent
2. Part of a larger company/business
96. Other (____________)
98. (Don't know)
99. (Refused)

F4. How many business locations does your business have in Newfoundland and Labrador? [RECORD A NUMBER 1-99; 98 = Don't know, 99 = Refused. PROBE TO AVOID ACCEPTING A RANGE]

END. Those are all the questions I have for you. I thank you very much for your time and cooperation and have a nice day!

APPENDIX IV
FIRMOGRAPHICS - PARTICIPANT SURVEY

The profile of the participants who responded to the telephone survey is presented in the following tables.

Those participant businesses that took part in the survey were drawn from a variety of industries, as shown in the figure below. The following figure presents only the main industries.

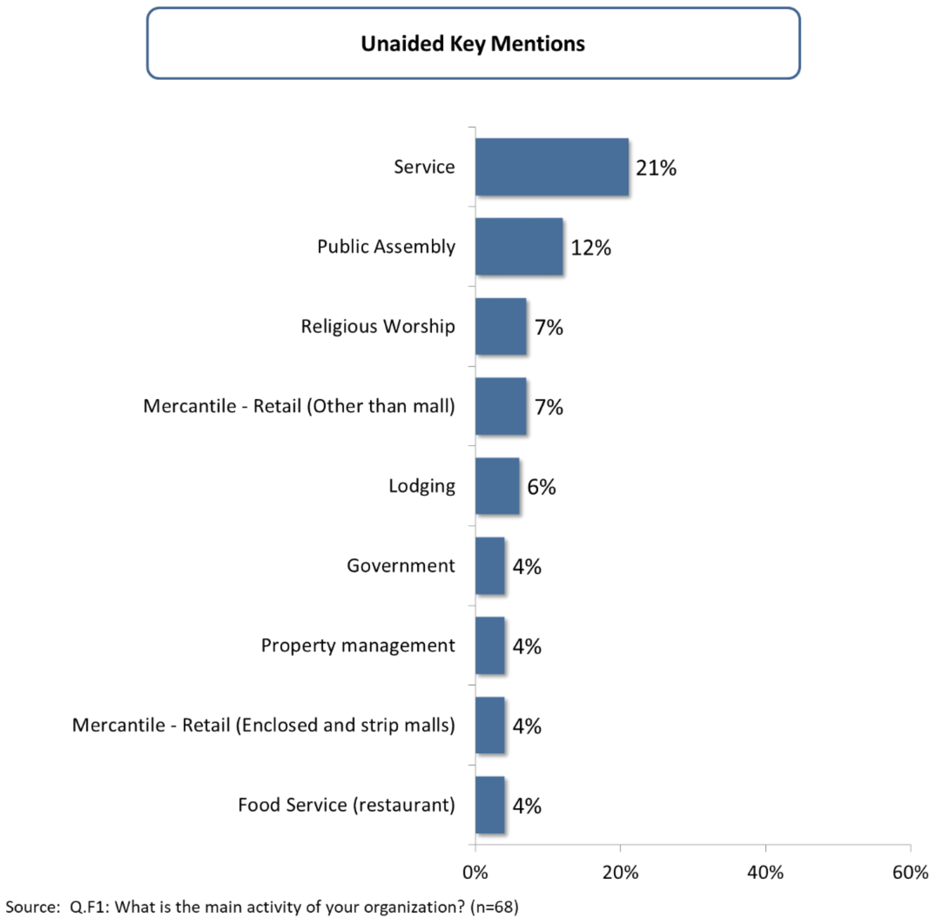
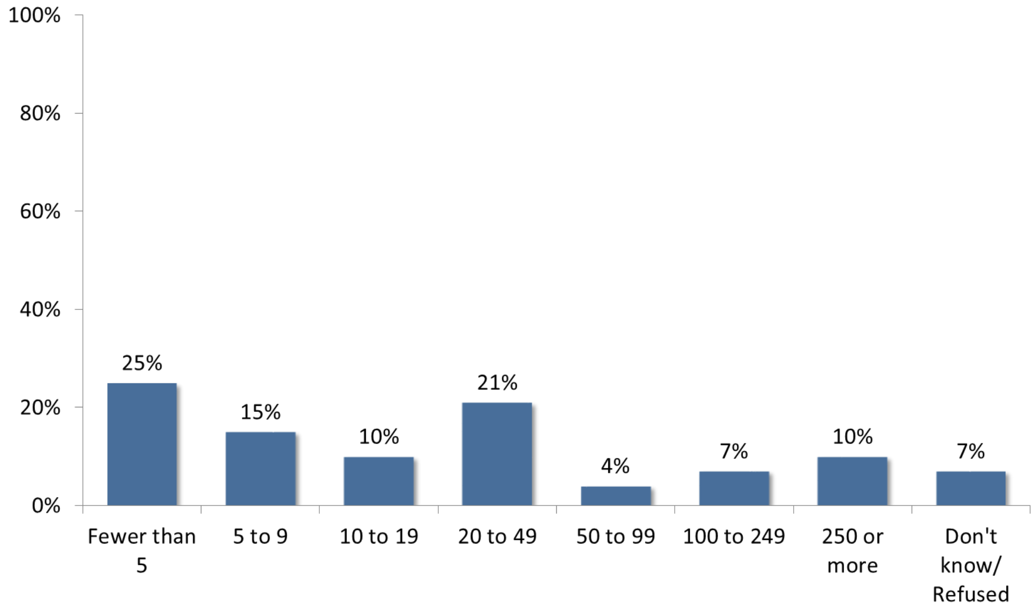


Figure 21: Distribution of the Participant Organizations by Industry

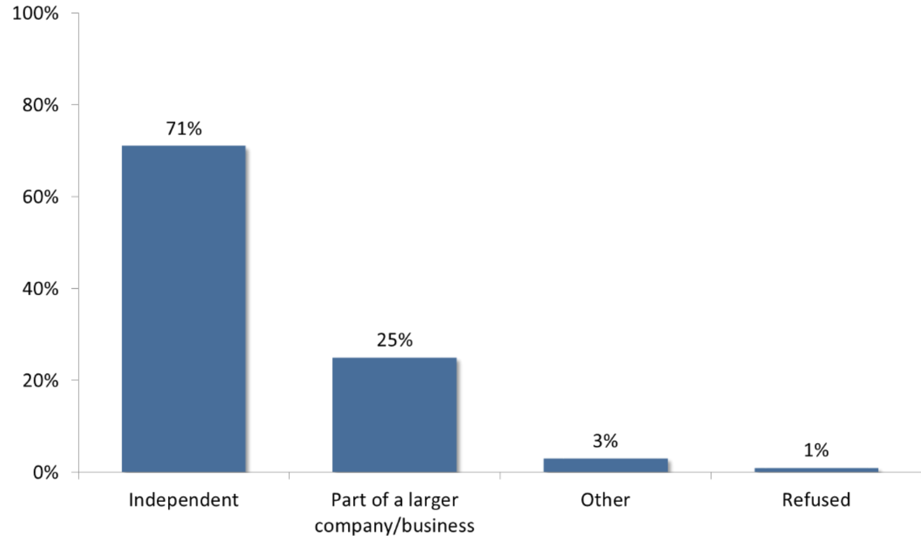
Various organization sizes are represented in the participant sample of this evaluation.



Source: Q.F2: Approximately how many full-time equivalent workers does your organization employ at all locations within Newfoundland and Labrador? (n=68)

Figure 22: Shares of Businesses of Different Sizes (in Terms of Full-time Equivalent Workers Employed) in Newfoundland and Labrador - Participants

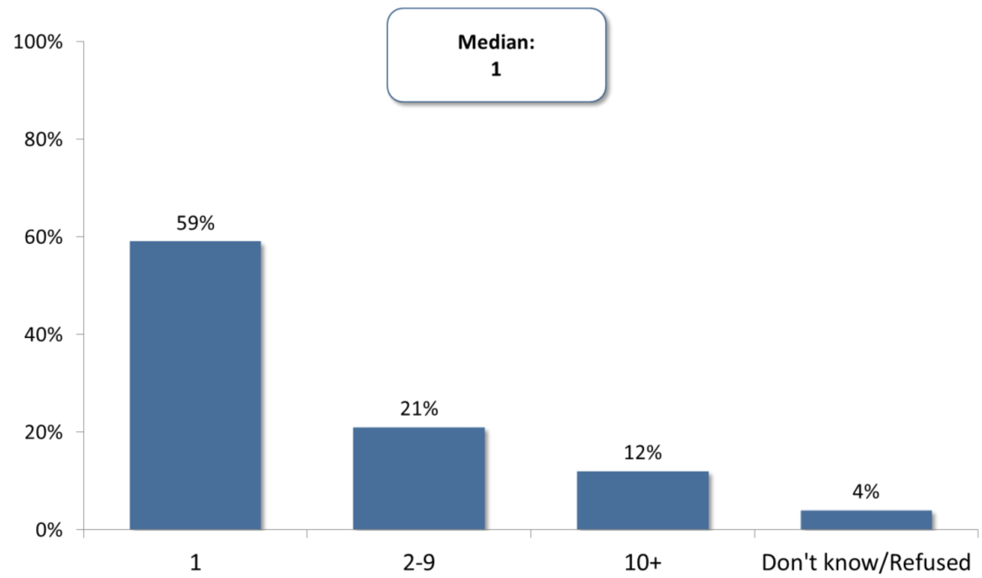
A majority of participants work with independent companies (71%), while one-quarter (25%) are part of a larger organization.



Source: Q.F3: Is your business independent, or part of a larger business? (n=68)

Figure 23: Independent Business versus Those Businesses that are Part of a Larger Business - Participants

A small majority of participant businesses have only one location in the province.



Source: Q.F4: How many business locations does your business have in Newfoundland and Labrador? (n=68)
Note: Mean calculation excludes responses of 'Refused' and 'Don't know'.

Figure 24: Number of Business Locations Operated by Each Business in Newfoundland and Labrador on Average - Participants

APPENDIX V
PARTIAL PARTICIPANT INTERVIEW GUIDE

Date	
Company name	
Name	
Area code and phone number	
Email	
Interview length	

Key Research Area	Related Questions
Sources of awareness about the program	A1
Motivations for participation	A2
Satisfaction with the energy assessment and recommendations	B1-B3
Upgrade implementation and reasons for not doing so	B4-B11
Intentions to make upgrades in the future and participate in the program	C1-C2
Recommendations for program improvement	D1-D2

Introduction

Hello, I am with Corporate Research Associates, an Atlantic Canadian research company. We are conducting an evaluation of energy efficiency services and programs provided by Newfoundland Power and Newfoundland and Labrador Hydro. According to our information, a representative from the Business Efficiency Program would have come to your business to conduct a visit of your facility and discuss possible energy efficiency opportunities. We would appreciate your feedback regarding that visit and any other experience you may have had with this program to help Newfoundland Power and Newfoundland and Labrador Hydro improve the program. Are you the person we should be speaking with regarding your business' experience with the program? **IF NOT, REINTRODUCE WITH NEW CONTACT – SCHEDULE INTERVIEW**

The interview should last 15 minutes. Is now a good time?

Recording of the Interview

Please note that the interview will be recorded for transcription purposes only. The recording will remain strictly confidential.

Do you have any questions before we begin?

Screening

S1. Just to confirm, do you recall having an energy expert from the Business Efficiency Program come to your facility to identify energy efficiency upgrades or projects?

Yes

No (THANK & TERMINATE)

Don't know/Refused (THANK & TERMINATE)

Part A: Awareness and Motivations for Participation

A1. How did your business first learn of the Business Efficiency Program offered by Newfoundland Power and Newfoundland and Labrador Hydro?

A2. I'm going to ask you to think back to when you decided to participate in the Business Efficiency Program and call [Newfoundland Power/Newfoundland and Labrador Hydro] to schedule a walk-through energy assessment. Why was your business interested in participating in the program?

Part B: Satisfaction with Walk-through Assessment and Upgrade Implementation

B1. How satisfied were you with the walk-through energy assessment of your facility that was conducted by an energy expert from the Business Efficiency Program? Please answer using a scale from 0 to 10, where 0 means ''not at all satisfied'' and 10 means ''completely satisfied''?

Rating:
Explanation [IF RATING OF 7 OR LESS]:

B2. Following this energy assessment of your facility, you should have been provided with recommended energy efficiency upgrades or projects for your facility. Did you read these recommendations?

Yes
No
Don't recall these recommendations

B3. [IF YES IN B2] Using a scale from 0 to 10, where 0 means ''not at all satisfied'' and 10 means ''completely satisfied'', how satisfied were you with the recommendations provided to you?

Rating:
Explanation [IF RATING OF 7 OR LESS]:

B4. Since the energy assessment of your facility, has your business implemented any of the recommended upgrades or projects?

Yes
No

B5. [IF YES IN B4] Which of the following upgrades has your business made?

Upgrades	Yes, implemented	No, Not implemented
a) Lighting		
b) Ventilation		
c) Space heating		
d) Refrigeration		
e) Motors		
f) Hot water, including low-flow showerheads and faucet aerators		
g) Controls, e.g. occupancy sensors, programmable thermostats		
h) Air conditioning		
i) Any others?		

B6. [IF IMPLEMENTED AT LEAST ONE UPGRADE IN B5] To what extent, if at all, did the walk-through energy assessment of your facility or the recommended upgrades influence your decision to proceed with the energy efficiency upgrades you made? Please answer using a scale from 0 to 10 where 0 means “no influence at all” and 10 means “a great deal of influence” on your decision.

Rating:

B6a. [IF IMPLEMENTED AT LEAST ONE UPGRADE IN B5] Do you plan on asking for an incentive under the Business Efficiency Program for any of the measures you have implemented so far? If so, which ones?

B7. [IF YES IN B4] Why did your business decide not to participate in the Business Efficiency Program for those energy efficiency upgrades or projects?

B8. [IF YES IN B4] What, if anything, could have been done by [Newfoundland Power/Newfoundland and Labrador Hydro] to encourage you to keep participating in the Business Efficiency Program for those energy efficiency upgrades or projects?

B9. [IF NO IN B4] I would like to know when you decided not to implement the recommended upgrades or projects. Was it…

When the program energy expert came to your business to conduct the walk-through energy assessment

After having received the walk-through energy assessment recommendations

After having contacted contractors about making upgrades recommended by the program

Or at another moment? Specify: ___________________

B10. [IF NO IN B4] Why did your business decide not to implement the recommended energy efficiency upgrades or projects?

B11. [IF NO IN B4] What, if anything, could have been done by [Newfoundland Power/Newfoundland and Labrador Hydro] to encourage you to implement those energy efficiency upgrades or projects?

Part C: Future Intentions

C1. How likely is your business to make energy efficiency upgrades or replace existing equipment with more efficient equipment over the next twelve months? Would you say Definitely, Probably, Probably Not or Definitely Not?

C2. [IF 'Definitely' or 'Probably' IN D1] Does your business intend to participate in the Business Efficiency Program for the implementation of those energy efficiency upgrades or equipment? Would you say Definitely, Probably, Probably Not or Definitely Not? Why not?

Part D: Recommendations

D1. Based on your experience with the Business Efficiency Program, do you have any recommendations to improve the program?

D2. Is there anything else about your experience with the Business Efficiency Program you would like to mention?

Thank you very much for your time and co-operation. Your answers will be treated in strict confidence—no names will ever be mentioned in the evaluation report.

APPENDIX VI
TRADE ALLY INTERVIEW GUIDE

Date	
Company name	
Name	
Area code and phone number	
Email	
Size of business usually served	Large, medium or small
Territory	NP or NLH, or both
Interview length	

Key Research Area	Related Questions
Involvement in the program	A1-A5
Awareness of new program and changes in delivery	B1-B6
Program outreach	C1-C3
Satisfaction with the program and NP/NLH	D1-D3
Challenges, successes and opportunities for improvement	E1-E6

Introduction

Hello, I am with Corporate Research Associates, an Atlantic Canadian research company. We are conducting an evaluation of energy efficiency services and programs provided by Newfoundland Power and Newfoundland and Labrador Hydro. As part of this research, we are looking to speak with organizations who are involved in the Business Efficiency Program. We would appreciate your feedback regarding your involvement in this program to help Newfoundland Power and Newfoundland and Labrador Hydro improve the program. The interview should last about 20 minutes. Are you the person we should be speaking with regarding your involvement in the program? **IF NOT, REINTRODUCE WITH NEW CONTACT – SCHEDULE INTERVIEW**

Recording of the Interview

Please note that the interview will be recorded for transcription purposes only. The recording will remain strictly confidential.

Do you have any questions before we begin?

Part A: Involvement

A1. Let's start with a bit about you. Can you please tell me your title and briefly describe your role with your company?

A2. What is the principal type of work your company does? [PROBE: HVAC, motors, lighting, etc.]

A3. What is your involvement with the Business Efficiency Program? Are you a lighting distributor? Are you mainly involved in custom or prescriptive projects?

A4. How long have you been using the Business Efficiency Program?

A5. How did you first become aware of the Business Efficiency Program?

Part B: Program Processes

As you may know, the Business Efficiency Program changed in August 2016. The distributor-based lighting program was merged with the Business Efficiency Program. As a result, the Business Efficiency Program offerings was updated to include new lighting technologies, such as LED bulbs, and other products, such as rooftop air source heat pumps. Additionally, electronic ballasts were removed from the program, and any instant rebates previously available through distributors are now available through a mail-in claim process.

B1. First, how familiar are you with the current Business Efficiency Program, on a scale from 0 to 10 where 0 means ''not at all familiar'' and 10 means ''extremely familiar''?

B2. Have you completed projects under both program systems, i.e. the distributor-based lighting program and the current Business Efficiency Program?

B3. [If completed projects through both systems] How has this change in process affected you, if at all?

B4. [If completed projects under old system] How do you anticipate this change in process will affect you, if at all?

B5. [If completed projects through both systems] How has this change in process affected your customers, if at all?

B6. How, if at all, has your approach to reaching out to customers changed since the program change?

Part C: Program Outreach

C1. How do you typically identify customers that go through the Business Efficiency Program? [PROBES: Are your customers people who talk to you about a project and you tell them about the program? Are your Business Efficiency Program customers people you cold-call? That is, you approach potential customers you think are likely to do a project?]

C2. What do you tell customers about the benefits of energy-efficient equipment offered through the Business Efficiency Program? Are there any approaches or strategies that seem to be effective at convincing a reluctant customer to purchase an energy-efficient product eligible to the program? [PROBES: Do you discuss savings, non-energy benefits? How do you sell the program to customers?]

C3. Do you use any materials provided by Newfoundland Power to conduct outreach to customers? What do you use and how do you use them?

Part D: Satisfaction with the Program

D1. On a scale from 0 to 10, where 0 is ''not at all satisfied'' and 10 is ''completely satisfied'', please rate your satisfaction in regard to the following aspects of the program.

Aspects of the program	**Score** 0 = not at all satisfied 10 = completely satisfied NA = Not applicable	**Reason(s)** Please share the reason(s) for your score.
The program overall		
The program marketing and outreach activities provided by Newfoundland Power/Newfoundland and Labrador Hydro		
Information and training provided by program staff		

D2. Using the same scale from 0 to 10, overall, how satisfied have you been with Newfoundland Power/Newfoundland and Labrador Hydro in terms of providing you with the service and support you need to deliver the program? Why?

D3. What service or support, if any, would you like to receive from Newfoundland Power/Newfoundland and Labrador Hydro to help you attract more Business Efficiency Program participants?

Part E: Successes, Challenges and Opportunities

E1. How, if at all, has the Business Efficiency Program been helpful or beneficial for your company?

E2. How, if at all, has the Business Efficiency Program been a challenge for your company?

E3. Other than increase incentives, what could Newfoundland Power/Newfoundland and Labrador Hydro do to make the program more effective, if anything?

E4. Are there certain products or services Newfoundland Power/Newfoundland and Labrador Hydro should provide for Business Efficiency Program projects? If so, what products or services should be added and why?

E5. Do you have additional suggestions to improve the Business Efficiency Program?

E6. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Thank you very much for your time and co-operation. Your answers will be treated in strict confidence—no names will ever be mentioned in the evaluation report.

APPENDIX VII
FREE-RIDERSHIP ALGORITHM

FR1. [IF WALK-THROUGH DONE] Before you had your facility evaluated by an energy expert from the Business Efficiency Program, had your business decided to make the specific energy efficiency upgrades that were made as part of the Business Efficiency Program?	IF FR1=1 OR 2: Go to FR1a IF FR1=3 OR 98 OR 99: FR1a = 0%
FR2. [IF NO WALK-THROUGH DONE] Before you heard about the program, had your business decided to make the specific energy efficiency upgrades that were made as part of the Business Efficiency Program?	IF FR2=1 OR 2: Go to FR2a IF FR2=3 OR 98 OR 99: FR2a = 0%
FR1a. [ASK IF FR1=1 OR 2] I just want to make sure I understand - **Before** you had your facility evaluated by an energy expert from the Business Efficiency Program, you had already made the decision to install [all/some of] the energy efficiency measures that were installed as part of the program?	IF FR1a=1 & FR1=1: FR1a = 100% IF FR1a=1 & FR1=2: FR1a = 25% IF FR1a=2 OR 98 OR 99: FR1a = 0%
FR2a. [ASK IF FR2=1 OR 2] I just want to make sure I understand - **Before** you heard about the program, you had already made the decision to install [all/some of] the energy efficiency measures that were installed as part of the program?	IF FR2a=1 & FR2=1: FR2a = 100% IF FR2a=1 & FR2=2: FR2a = 25% IF FR2a=2 OR 98 OR 99: FR2a = 0%
FR3. [Newfoundland Power/Newfoundland and Labrador Hydro] gave a rebate to your business for the upgrades made. If your business had not received the rebate from [Newfoundland Power/ Newfoundland and Labrador Hydro], would you have paid the full cost of the project you implemented? (Scale 0 to 10)	FR3 = Answer x 10% IF 98 OR 99: FR3 = EMPTY
FR4a. If the program had not been offered, what is the likelihood that you would have installed standard equipment or that you would have simply kept your old equipment instead of installing energy-efficient equipment in your facility? (Scale 0 to 10)	FR4a = (10 − Answer) x 10% IF 98 OR 99: FR4a = EMPTY
FR4b. If the program had not been offered, what is the likelihood that you would have installed exactly the same quantity of energy-efficient measures that were installed through the Business Efficiency Program? (Scale 0 to 10)	FR4b = Answer x 10% IF 98 OR 99: FR4b = EMPTY
FR4c. If the program had not been offered, what is the likelihood that you would have postponed making energy-efficient upgrades to your facility by at least one year? (Scale 0 to 10)	FR4c = (10 − Answer) x 10% IF 98 OR 99 : FR4c = EMPTY
Intention Score:	**MEAN VALUE OF: (FR1-1a; FR2-2a; FR3; MIN(FR4a-c))**

CONTINUED

FR5a. Level of influence of the information provided following the free walk-through energy assessment of your facility (Scale 0 to 10)	FR5a = (10 – Answer) x 10% IF 97, 98 OR 99: FR5a = EMPTY
FR5b. [ASK ONLY IF AUDIT OR FEASIBILITY STUDY COMPLETE] Level of influence of the rebate provided for the in-depth audit or feasibility study (Scale 0 to 10)	FR5b = (10 – Answer) x 10% IF 97, 98 OR 99: FR5b = EMPTY
FR5c. [ASK ONLY IF AUDIT OR FEASIBILITY STUDY COMPLETE] Level of influence of the information provided in the in-depth audit or feasibility study (Scale 0 to 10)	FR5c = (10 – Answer) x 10% IF 97, 98 OR 99: FR5c = EMPTY
FR5d. Level of influence of the rebates provided for the upgrades made (Scale 0 to 10)	FR5d = (10 – Answer) x 10% IF 97, 98 OR 99: FR5d = EMPTY
FR5e. Level of influence of the promotional materials and information related to energy efficiency distributed by [Newfoundland Power/ Newfoundland and Labrador Hydro] or a previous participation in one of their programs (Scale 0 to 10)	FR5e = (10 – Answer) x 10% IF 97, 98 OR 99: FR5e = EMPTY
FR5f. Level of influence of the installation of the ECM motor, at no charge, offered by the program (Scale 0 to 10)	FR5f = (10 – Answer) x 10% IF 97, 98 OR 99: FR5f = EMPTY
Influence Score:	**MIN VALUE OF: (FR5a-f)**
Inconsistency Test #1	IF FR3>=70% & FR5d<=30% : FR3 = EMPTY
Inconsistency Test #2	IF FR3>=70% & FR4a<=30% : FR3 = EMPTY
Final Free-ridership	**MEAN VALUE OF : (Intention Score; Influence Score)**

APPENDIX VIII
SPILLOVER ALGORITHMS

Prescriptive Component

SO1. Since the time you participated in the Business Efficiency Program, have you made other energy efficiency upgrades that had been identified through the program but for which you did not request any rebates through the Business Efficiency Program?	IF SO1=1: Go to SO2 IF SO1=2 OR 98 OR 99: END
SO2. [ASK IF SO1=1] Did you receive or plan on requesting rebates from Newfoundland Power or Newfoundland and Labrador Hydro for the upgrades you made after participating in the Business Efficiency Program?	IF SO2=2: Go to SO3 IF SO2=1 OR 98 OR 99: END
SO3. What additional energy efficiency upgrades have you made since participating in the Business Efficiency Program?	SO3-4 = SUM of kWh associated with each measure (number of measures x per-unit savings)
SO4. How many addtional upgrades have you installed since participating in the Business Efficiency Program?	
Additional Upgrade Savings:	**SO3-SO4**
SO5. Did your experience with the Business Efficiency Program influence your decision to make these additional energy efficiency upgrades? (Scale 0 to 10)	SO5 = Answer x 10%
Attribution Level:	**SO5**
Spillover Savings:	**SO3-4 x SO5**

Final Spillover Level = $\dfrac{\textbf{SUM of (SO3-4 x SO5) for All Respondents}}{\textbf{SUM of Program Savings for All Respondents}}$

Custom Component

SO1. Since the time that you participated in the Business Efficiency Program, have you installed additional energy efficiency measures, other than those installed through this program?	IF SO1=1: Go to SO2 IF SO1=2 OR 98 OR 99: END
SO2. [ASK IF SO1=1] Did you receive or plan on requesting rebates from Newfoundland Power or Newfoundland and Labrador Hydro for these addtional energy efficiency measures that you installed on your own after participating in the program?	IF SO2=2: Go to SO3 IF SO2=1 OR 98 OR 99: END
SO3. Can you please describe each of these measures?	SO3 = SUM of kWh associated with each measure
Additional Upgrade Savings:	**SO3**
SO4. Did your experience with the Business Efficiency Program influence your decision to implement these additional energy efficiency measures on your own? (Scale 0 to 10)	SO4 = Answer x 10%
Attribution Level:	**SO4**
Spillover Savings:	**SO3 x SO4**

Final Spillover Level = $\dfrac{\textbf{SUM of (SO3 x SO4) for All Respondents}}{\textbf{SUM of Program Savings for All Respondents}}$

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June 8, 2017

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL A1A 5B2

Attention: Ms. Cheryl Blundon
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro – 2013 General Rate Application – Order Nos. P.U. 14(2017) and P.U. 16(2017) - Compliance Application Revisions

On Friday, May 18, 2017, Newfoundland and Labrador Hydro (Hydro) filed an application in compliance with the direction of the Board of Commissioners of Public Utilities (the Board) in Order No. P.U. 14(2017) and Order No. P.U. 16(2017).

On Tuesday, May 23, 2017, the Board advised Hydro of two incorrect table references in Exhibit 3 to that application. The Board also advised that the hard copies of Exhibit 8 to the application were missing the odd numbered pages.

On Wednesday, May 24, 2017, Hydro refiled its application which included updated (revised) copies of Exhibit 3; however, these copies did not have Revision 1 on the appropriate pages and therefore, Hydro is refiling in proper form.

On Tuesday, June 6, 2017, Grant Thornton filed its report on Hydro's application which identified an error in Exhibit 3, Table 10, related to the calculation of the deficiency of the Labrador Interconnected Customers. Hydro has corrected this error.

Hydro is sending the full electronic copy for the Board's records but ask that the attached pages be used to replace the prior versions of the pages in the Board's paper copies. For ease of reference, Hydro has attached two tables to this letter which identify the changes associated with Revisions 1 and 2 to the Compliance Rates Application.

Hydro apologizes for any inconvenience caused by the above noted issues. If you have any questions, please contact the undersigned at your convenience.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Tracey Pennell

Tracey L. Pennell
Senior Counsel, Regulatory

TPL/bds

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Thomas J. O'Reilly, Q.C. - Cox & Palmer
Genevieve M. Dawson – Benson Buffett
Dennis Browne, Q.C. - Consumer Advocate
Yvonne Jones, MP Labrador
Senwung Luk – Olthuis, Kleer, Townshend LLP

ecc: Larry Bartlett – larry.bartlett@teck .com

Revision 1 – May 24, 2017

Exhibit	**Change**	**Shading Color**
Exhibit 3	p. 8, line 4 p. 12, line 1	Grey Grey

Revision 2 – June 8, 2017

Exhibit	**Change**	**Shading Color**
Exhibit 1	p. 5, Table 2 p. 6, line 12 p. 7, Table 3 p. 11, lines 2 and 3 p. 11, Table 4	Grey Grey Grey Grey Grey
Exhibit 3	p. 10, Table 10 p. 11, line 13 p. 12, Table 11	Grey Grey Grey
Exhibit 4	p. 10, lines 19 and 24 p. 11, lines 1 and 2 p. 11, Table 6 Appendix F, F-1	Grey Grey Grey Yellow
Exhibit 9	Labrador Interconnected	See Note A

Note A: For Exhibit 9 only, items shaded grey represent changes pursuant to Order No. P.U. 49(2016). Items shaded yellow represent changes pursuant to Order No. P.U. 14(2017) and Order No. P.U. 16(2017). Items shaded blue represent changes pursuant to Grant Thornton's June 6, 2017 report.

Compliance Rates Application to Order No. 14(2017)

May 18, 2017

newfoundland labrador hydro
a nalcor energy company

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IN THE MATTER OF the *Electrical Power Control Act, 1994*, Chapter E-5.1(the *EPCA*) and the *Public Utilities Act*, R.S.N. 1990, Chapter P-47 (the Act);

AND IN THE MATTER OF a General Rate Application by Newfoundland and Labrador Hydro to establish customer electricity rates for 2015;

AND IN THE MATTER OF an Amended General Rate Application filed by Newfoundland and Labrador Hydro on November 10, 2014;

AND IN THE MATTER OF a GRA Compliance Application filed by Newfoundland and Labrador Hydro on January 27, 2017, for approval of changes to the rates, tolls and charges for the supply of power and energy to customers, and changes to the rules and regulations applicable to the supply of power and energy to customers, reflecting the determinations set out in Order No. P.U. 49(2016);

AND IN THE MATTER OF an application (the Compliance Rates Application), reflecting the determinations set out in Order No. P.U. 14(2017), and Order No. P.U.16(2017).

TO: The Board of Commissioners of Public Utilities (the Board)

The COMPLIANCE RATES APPLICATION of Newfoundland and Labrador Hydro states that:

A. Background:

1. Newfoundland and Labrador Hydro (Hydro) is a corporation continued and existing under the *Hydro Corporation Act, 2007,* is a public utility within the meaning of the *Act*, and is subject to the provisions of the *Electrical Power Control Act, 1994*.

2. Under the *Act*, the Board has the general supervision of public utilities and requires that a public utility submit for the approval of the Board the rates, tolls and charges for the service provided by the public utility and the rules and regulations which relate to that service.

3. On July 30, 2013, Hydro filed a General Rate Application (GRA) together with evidence in support thereof to establish customer electricity rates to take effect in 2014 based upon a 2013 Test Year.

4. On November 10, 2014, Hydro filed an Amended General Rate Application (the Amended GRA) reflecting updated financial information. The Amended GRA sought approval of, amongst other items, the following:

    (1) Interim rates to become effective January 1, 2015 for Island Industrial Customers and Labrador Industrial Customers, as well as interim rates for Newfoundland Power and Hydro Rural customers;

    (2) Final rates to take effect in 2016 based upon a 2015 Test Year; and

    (3) A cost deferral in the amount of $45.9 million to reduce Hydro's forecast 2014 net income deficiency.

5. On December 24, 2014, in Board Order No. P.U. 58(2014), the Board approved the creation of a deferral account in the amount of $45.9 million. However, recovery by Hydro of this amount, partial or full, was not approved.

6. Interim rates for Newfoundland Power, Hydro Rural customers and Island Industrial Customers became effective July 1, 2015 in accordance with Order Nos. P.U. 17(2015), P.U. 19(2015) and P.U. 21(2015).

7. On November 12, 2015, Hydro filed an Amended 2015 Cost Deferral Application, seeking the deferral of $60.5 million to reduce Hydro's forecast 2015 net income deficiency based on delayed implementation of rates resulting from its Amended GRA.

8. In Order No. P.U. 36(2015), the Board approved the deferral of $30.2 million, as of December 31, 2015, with a final determination on recovery of this amount to be determined by a future order of the Board.

9. In Order No. P.U. 13(2016), the Board set out its determinations of its Prudence Review of certain projects and expenditures and directed Hydro to, among other things, file, in accordance with the subsequent direction of the Board, a revised 2014 Revenue Requirement and Revenue Deficiency calculation, a revised 2015 Revenue Requirement and Revenue Deficiency calculation, and supporting documentation reflecting the findings of the Board in that order.

10. On May 25, 2016, Hydro filed its Prudence Compliance Application, together with a Prudence Review Compliance Report and other supporting evidence,

seeking approval of the Prudence Review Compliance Report as the filing required in Order No. P.U. 13(2016).

11. On December 1, 2016, the Board issued Order No. P.U. 49(2016) setting out its determinations with respect to Hydro's proposals in the Amended GRA (the GRA Order), including the acceptance of Hydro's Prudence Compliance Application and the Settlement Agreement and Supplemental Settlement Agreement which were filed as part of the Amended GRA hearing.

12. On December 9, 2016, Hydro filed an application seeking the creation of a deferral account and the segregation of $38.8 million in 2016 related to supply costs incurred in providing service to customers.

13. In Order No. P.U. 56(2016), the Board approved the creation of a deferral account and the segregation of $38.8 million in 2016 related to supply costs incurred in providing service to customers.

14. On January 27, 2017, Hydro filed its GRA Compliance Application reflecting the findings and determinations of the Board in the GRA Order. The GRA Compliance Application proposed new customer rates to be implemented April 1, 2017.

15. Subsequent to the filing of the GRA Compliance Application, Hydro acknowledged that as part of the normal regulatory process, it is required to make an application for new rates effective July 1, 2017 to reflect the annual update to the Rate Stabilization Plan adjustments, and, as such, it was preferable to have one rate change occur on July 1, 2017 to reflect both the findings of the Board on the GRA Compliance Application as well as the annual July 1 RSP Adjustments.

B. GRA Compliance Order and the 2017 Newfoundland Power Rate Mitigation Order

16. On May 1, 2017, the Board issued Order No. P.U. 14(2017) setting out its determinations with respect to Hydro's proposals in the GRA Compliance Application (the GRA Compliance Order). In the GRA Compliance Order, the Board directed Hydro to make the following revisions to its GRA Compliance filing:

(1) Revise the proposed recovery of the revenue deficiencies for 2014 to 2017 to include Labrador Interconnected customers and the Labrador Industrial Transmission customers;

(2) Reduce its 2014 and 2015 test year revenue requirements for revenue deficiency calculation by $400,000 to reflect the depreciation expenses associated with the capital projects that were carried over into 2015;

(3) Revise its proposals to incorporate its accepted changes related to the issues raised by Grant Thornton, which included:

i. Correcting the $60,000 error detected in the 2014 revenue deficiency allocation between Newfoundland Power and Hydro Rural customers on the Labrador Interconnected system;

ii. Correcting the base rates used in the calculation of the 2017 Revenue Deficiency;

iii. Revising the RSP Fuel Rider for 2017 to reflect the March 2017 forecast fuel price;

iv. Revising the definition of the Isolated Systems Supply Cost Variance Deferral Account; and

v. Revising the Energy Supply Cost Variance Deferral formula.

17. In the GRA Compliance Order, the Board stated that it would not address the RSP rate adjustment for Newfoundland Power but that following receipt of further information from Hydro, the issue would be addressed in a further order of the Board. The Board also stated that the issues related to the Island Industrial Customers' RSP would also be addressed in a subsequent order of the Board.

18. In correspondence dated May 2, 2017, the Board directed Hydro to provide further information on the available options to mitigate the expected rate increase arising from the operation of the Newfoundland Power RSP in 2017, as well as the combined rate impacts for Newfoundland Power and retail customers for identified options and new rates arising from the general rate application.

The Board also requested that Hydro provide an update of estimated outstanding balances and Hydro's plans for disposition for all deferral accounts and any other recoveries for each customer class, as well as any offsetting credit balances that may be available to offset these liabilities. Hydro provided the requested information on May 3, 2017 and May 5, 2017.

19. On May 12, 2017, the Board issued Order No. P.U.16(2017) (the 2017 Newfoundland Power Rate Mitigation Order) directing Hydro to transfer the Newfoundland Power RSP Load Variation balance to the Newfoundland Power RSP Current Plan to mitigate the proposed July 1, 2017 RSP Adjustment Increase.

C. Compliance Rates Application

20. This Compliance Rates Application and the attached Exhibits are supplemental to, and as necessary, modifies Hydro's GRA Compliance Application and evidence to reflect the direction of the Board in the GRA Compliance Order and the 2017 Newfoundland Power Rates Mitigation Order, and the effects that flow from those orders.

21. This application does not address issues related to the recovery of the revenue deficiencies attributable to the Island Industrial Customers or any mechanisms to mitigate the proposed July 1, 2017 rate increases to the Island Industrial Customers, as such matters will be addressed in a separate order of the Board.

22. Exhibit 1, entitled *Overview,* provides an overview of the revisions to the evidence filed with the GRA Compliance Application, in accordance with the requirements of the GRA Compliance Order and the 2017 Newfoundland Power Rates Mitigation Order.

23. Exhibit 2 to the Compliance Rates Application, entitled *Revised Revenue Requirement Schedules*, provides revised revenue requirement schedules reflecting the Board's decisions in the GRA Compliance Order.

24. Exhibit 3 to the Compliance Rates Application, entitled *Recovery of Revenue Deficiencies*, provides a revised version of Hydro's revised: (i) calculation of the revenue deficiencies 2014, 2015, 2016, and 2017; (ii) Hydro's proposal for the allocation of these deficiencies by customer class; and (iii) Hydro's proposal for recovery of the revenue deficiencies and excess revenues for Newfoundland Power, Hydro Rural Labrador Interconnected customers, and Labrador Industrial Transmission customers. The updated version is required to reflect changes in the revenue deficiencies for 2014, 2015, and 2017, and the proposed disposition of excess revenues to customers on the Labrador Interconnected system, in accordance with the GRA Compliance Order.

25. Exhibit 4 to the Compliance Rates Application, entitled *Customer Rates Report*, provides Hydro's calculation of the rates, tolls and charges to be implemented on July 1, 2017. Exhibit 4 also includes the calculation of the proposed RSP

Adjustments, CDM Recovery Adjustment, and the customer rate impacts reflecting this Compliance Rates Application.

26. Exhibit 5 to the Compliance Rates Application, entitled *Revised Deferral Account Report,* provides Hydro's revised deferral account definitions in accordance with the GRA Order and the GRA Compliance Order.

27. Exhibit 6 to the Compliance Rates Application, entitled *RSP Reports*, provides the March 2017 RSP report, reflecting the approval of the 2015 Test Year values which were used to calculate the proposed RSP adjustments used in the derivation of July 1, 2017 customer rates. Exhibit 6 also includes revised RSP Summary sheets from those filed in Exhibits 6, 7, 8, and 9 in the GRA Compliance Application.

28. Exhibit 7 to the Compliance Rates Application, entitled *Revised Cost of Service Schedules for Revenue Deficiency,* provides revised Cost of Service Study summary schedules which provide the allocation of the revenue deficiencies for 2014, 2015, and 2016 among customer classes.

29. Exhibit 8 to the Compliance Rates Application, entitled *Revised 2015 Test Year Cost of Service for Rate Setting,* provides Hydro's revised 2015 Test Year Cost of Service Study for rate setting purposes and replaces Exhibit 13 of the GRA

Compliance Application. The cost of service required refiling as a result of revised rural revenues as a result of delayed rate implementation until July 1, 2017.

30. Exhibit 9 to the GRA Compliance Application, entitled *Schedule of Rates, Rules and Regulations,* provides Hydro's revised Schedule of Rates, Rules and Regulations and replaces Exhibit 14 of the GRA Compliance Application. Exhibit 9 includes a proposed revision to the RSP rules to permit a transfer of the balance in the RSP Hydraulic Variation balance and a transfer from the RSP Load Variation Component at March 31, 2017 to the Current Plan balances of Newfoundland Power.

C. Order Requested

31. Further to the matters described above, Hydro requests that the Board make an Order approving, pursuant to sections 58, 70, 71, 78, and 80, of the Act:

Revenue Requirement

(1) a revised average rate base for 2013 of $1,549,685,000;

(2) (a) a revised test year revenue requirement of $554,646,000 for 2014 for the calculation of 2014 revenue deficiency;

(b) a revised forecast average rate base for 2014 of $1,629,088,000 for the calculation of 2014 revenue deficiency;

(c) a revised rate of return on average rate base for 2014 of 7.18% in a range of 6.98% to 7.38% , for the purpose of calculating the 2014 revenue deficiency;

(3) (a) a revised test year revenue requirement of $566,510,000 for 2015 for rate setting purposes;

(b) a revised forecast average rate base for 2015 of $1,785,353,000 for rate setting purposes

(c) a revised rate of return on average rate base for 2015 of 6.61% in a range of 6.41% to 6.81% , for rate setting purposes;

(4) (a) a revised test year revenue requirement of $539,219,000 for 2015 for the calculation of 2015 revenue deficiency;

(b) a revised test year forecast average rate base for 2015 of $1,729,093,000 for the purpose of determining 2015 revenue deficiency;

(c) a rate of return on average rate base for 2015 of 6.67%, in a range of 6.47% to 6.87% for the purpose of calculating the 2015 revenue deficiency;

(5) (a) a revised revenue requirement of $544,382,000 for 2016 for the calculation of 2016 revenue deficiency;

(b) a revised forecast average rate base for 2016 of $1,802,235,000 for the purpose of determining 2016 revenue deficiency;

(c) a rate of return on average rate base for 2016 2015 of 6.61%, in a range of 6.41% to 6.81% for the purpose of calculating the 2016 revenue deficiency;

(6) Hydro's proposed excess earnings account definition, as provided in Appendix E to Exhibit 2 to the GRA Compliance Application;

Revenue Deficiency

(7) Hydro's proposal to not reflect the use of actual No. 6 fuel costs in the 2014 Test Year Requirement for the purpose of calculating the 2014 revenue deficiency as set out in Exhibit 3 to the GRA Compliance Application;

(8) Hydro's proposal to include the 2014 additional capacity-related supply costs approved for recovery by the Board in calculating its 2014 Revenue Deficiency Rates as set out in Exhibit 3 to the GRA Compliance Application;

(9) To eliminate the cumulative excess earnings for the period 2014 to 2017 from Newfoundland Power, Hydro's proposal to credit $6,577,000 to increase the balance in the Newfoundland Power RSP Current Plan balance effective January 1, 2017, and to debit $804,000 from the Newfoundland Power RSP Current Plan balance effective June 30, 2017, as set out in Exhibit 3 to this Application;

(10) Hydro's proposal to apply a rate reduction to Hydro's Rural customers on the Labrador Interconnected System to provide for the disposition of cumulate excess revenues over the period 2014 to 2017 as set out in Exhibit 3 to this Application;

(11) Hydro's proposal to provide a refund to Labrador Industrial Transmission customers for disposition of cumulative excess revenues over the period 2014-2017 as set out in Exhibit 3 to this Application;

<u>Rates</u>

(12) Hydro's fuel rider for Newfoundland Power and the Island Industrial Customers in accordance with Section D of the RSP rules as set out in Exhibit 4 to this Application;

(13) Hydro's RSP Recovery Adjustment and RSP Mitigation Adjustment as set out in Exhibit 4 to this Application;

(14) Hydro proposal with respect to the finalization of Island Industrial Customer rates as set out in Exhibits 4 to the GRA Compliance Application and this Application;

(15) a revised Labrador Industrial Transmission Rate of $1.19 per kW of Billing Demand, to be applied on a prospective basis, as set out in Exhibits 4 to the GRA Compliance Application and this Application;

(16) Hydro's proposal to implement an RSP recovery adjustment for Island Industrial Customers to provide disposition of the credit balance in the Industrial Customer's current plan as set out in Exhibits 4 to the GRA Compliance Application and this Application;

(17) Hydro's proposal to implement CDM Cost Recovery adjustments for Newfoundland Power and the Island Industrial Customers as set out in Exhibit 4 to this Application.

(18) the rates, tolls and charges, including all RSP adjustments, as set out in Exhibit 9 to this Application;

(19) The amendments to the rules and regulations, including the RSP Rules, governing Hydro's provision of service to its customers effective April 1, 2017, as set out in Exhibit 9 to this Application;

<u>Deferral accounts</u>

(20) the proposed revised account language for the Isolated Systems Supply Cost Variance Deferral Account as set out in Appendix A to Exhibit 5 to this Application;

(21) the proposed revised account language for the Energy Supply Cost Variance Deferral Account as set out in Appendix B to Exhibit 5 to this Application;

(22) the proposed revised account language for the Conservation and Demand Management Cost Deferral Account as set out in Appendix C to Exhibit 5 to this Application; and

(23) the proposed revised account language for the Holyrood Conversion Rate Deferral Account as set out in Appendix D to Exhibit 5 to this Application.

D. Reasons for Approval

32. Approval by the Board of the proposals in this application will permit cost recovery through customer rates as provided for, and intended by, the *Act*, the *Electrical Power Control Act, 1994* and the Orders of the Board set out in the Application.

E. Process Matters

33. The Application is consistent with the GRA Order, the GRA Compliance Order, the 2017 Newfoundland Power Rate Mitigation Order, and with the other Orders of the Board set out in Hydro's GRA Compliance Application. Accordingly, Hydro submits that public notice and hearing into the Application is unnecessary and not in the public interest.

DATED AT St. John's in the Province of Newfoundland and Labrador this 18th day of May 2017.

NEWFOUNDLAND AND LABRADOR HYDRO

Tracey Pennell

Tracey Pennell
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Newfoundland and Labrador Hydro
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IN THE MATTER OF the *Electrical Power Control Act, 1994*, Chapter E-5.1(the *EPCA*) and the *Public Utilities Act*, R.S.N. 1990, Chapter P-47 (the Act);

AND IN THE MATTER OF a General Rate Application by Newfoundland and Labrador Hydro to establish customer electricity rates for 2015;

AND IN THE MATTER OF an Amended General Rate Application filed by Newfoundland and Labrador Hydro on November 10, 2014;

AND IN THE MATTER OF a GRA Compliance Application filed by Newfoundland and Labrador Hydro on January 27, 2017, for approval of changes to the rates, tolls and charges for the supply of power and energy to customers, and changes to the rules and regulations applicable to the supply of power and energy to customers, reflecting the determinations set out in Order No. P.U. 49(2016);

AND IN THE MATTER OF an application (the Compliance Rates Application), reflecting the determinations set out in Order No. P.U. 14(2017), and Order No. P.U.16(2017).

AFFIDAVIT

I, Kevin J. Fagan, of St. John's in the Province of Newfoundland and Labrador, make oath and say as follows:

1. I am Manager, Regulatory Affairs, of Newfoundland and Labrador Hydro, the Applicant named in the attached Application.
2. I have read and understand the foregoing Application.
3. I have personal knowledge of the facts contained therein, except where otherwise indicated, and they are true to the best of my knowledge, information and belief.

SWORN at St. John's in the)
Province of Newfoundland and)
Labrador, this 18th day of)
May 2017, before me:)

Tracey Pennell

Barrister – Newfoundland and Labrador

Kevin J. Fagan

Compliance Rates Application - Exhibit 1

Overview

Revised – June 8, 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
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1.0 Purpose

On December 1, 2016, the Board of Commissioners of Public Utilities (the Board) issued Order No. P.U. 49(2016) (the GRA Order) outlining its decisions and orders related to Newfoundland and Labrador Hydro's (Hydro) Amended General Rate Application (GRA). In the GRA Order, the Board directed Hydro to file a subsequent application reflecting the findings and determinations of the Board.[1]

On January 27, 2017, Hydro submitted its application for approval of various matters arising out of the Amended GRA in accordance with the requirements of the GRA Order (the GRA Compliance Application). The GRA Compliance Application proposed new customer rates to be implemented April 1, 2017.

On May 1, 2017, the Board issued Order No. P.U. 14(2017) (the GRA Compliance Order) setting out its determinations with respect to Hydro's proposals in the GRA Compliance Application. In the GRA Compliance Order, the Board directed Hydro to:

- Revise the proposed recovery of the revenue deficiencies for 2014 to 2017 to include Labrador Interconnected customers and the Labrador Industrial Transmission customers;[2]
- Reduce its 2014 and 2015 test year revenue requirements for revenue deficiency calculation by $400,000 to reflect the depreciation expenses associated with the capital projects that were carried over into 2015;[3]
- Revise its proposals to incorporate its accepted changes related to the issues raised by Grant Thornton;[4] and
- File a revised Compliance Application reflecting the findings of the Board in the GRA Compliance Order to establish customer rates to be implemented effective July 1, 2017.[5]

[1] Order No. P.U. 49(2016), page 130.
[2] Order No. P.U. 14(2017), page 9.
[3] Ibid., page 10.
[4] Ibid., page 15.

In the GRA Compliance Order, the Board expressed concern in relation to the proposed rate increases for customers arising from the operation of the Rate Stabilization Plan (RSP) for Newfoundland Power for July 1, 2017. On May 2, 2017, the Board issued a letter requesting that Hydro provide further information on available options to mitigate the expected increase arising from the operation of the Newfoundland Power RSP in 2017. In addition, the Board requested an update of estimated outstanding balances and Hydro's plans for disposition of all deferral accounts and any other recoveries for each customer class, as well as any offsetting credit balances that may be available to offset those liabilities. Hydro provided the requested information on May 3, 2017 and May 5, 2017.

On May 12, 2017, the Board issued Order No. P.U. 16(2017) (the 2017 Newfoundland Power Rate Mitigation Order), which directed Hydro to:

- Transfer the Newfoundland Power RSP Load Variation balance to the Newfoundland Power RSP Current Plan to mitigate the proposed July 1, 2017 RSP Adjustment rate increase;[6]
- Provide, with its compliance application, detailed calculation in relation to the transfer from the Newfoundland power RSP Load Variation balance and the resulting impacts on rates;[7] and
- Set out the proposed RSP Current Plan rate on the Utility Rate sheet showing the RSP Current Plan rate, calculated in the ordinary course, and the RSP Current Plan mitigation rate.[8]

The purpose of this report is to provide an overview of the revised evidence to support Hydro's application for approval of various matters arising out of the GRA Compliance Application in accordance with the requirements of the GRA Compliance Order and the 2017 Newfoundland Power Rate Mitigation Order.

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[5] Ibid., page 17.
[6] Order No. P.U. 16(2017), page 14.
[7] Ibid.
[8] Ibid.

2.0 Exhibit 2 – Revised Revenue Requirement Schedules

In the GRA Compliance Order, the Board directed Hydro to reduce its 2014 and 2015 Test Year revenue requirement for revenue deficiency calculations by $400,000 to reflect the depreciation expenses associated with the capital projects that were carried over into 2015.[9]

Table 1 highlights the impact of the GRA Compliance Order on the revenue requirements requiring approval of the Board.

Table 1

Impact of P.U. 14(2017) ($000s)

	GRA Compliance Application	P.U. 14(2017) Adjustments	GRA Compliance Rates Application
2014 Test Year Revenue Requirement for Revenue Deficiency	555,046	(400)	554,646
2015 Test Year Revenue Requirement for Revenue Deficiency	539,619	(400)	539,219

The GRA Compliance Order did not require any modifications to the 2015 Test Year revenue requirement for determining 2016 revenue deficiency or the 2015 Test Year revenue requirement for rate setting.

Exhibit 2 provides revised finance schedules reflecting the $400,000 reduction in 2014 and 2015 revenue requirements for revenue deficiency. Although the Board did not order Hydro to modify the revenue requirement for 2016 revenue deficiency or the revenue requirement for rate setting, those finance schedules are also included in Exhibit 2 for information purposes.

[9] Order No. P.U. 14(2017), page 10.

3.0 Exhibit 3 – Recovery of Revenue Deficiencies

Exhibit 3 of the GRA Compliance Rates Application provides the revisions to the calculation of revenue deficiencies and the proposed recovery of revenue deficiencies to reflect the Board's determinations in the GRA Compliance Order.

3.1 Revisions to Revenue Deficiency Balances

The primary drivers of the changes in revenue deficiencies by class from those filed in the GRA Compliance Order are:

- The reduction of $400,000 in 2014 and 2015 Test Year revenue requirements for revenue deficiency;[10]
- The correction of a discrepancy in the return on rate base included in the 2014 cost of service study, resulting in an approximately $60,000 reallocation from Newfoundland Power's revenue requirement to the Labrador Interconnected revenue requirement;[11]
- The inclusion of Hydro Rural Labrador Interconnected customers and Labrador Industrial Transmission customers in 2014 to 2017 revenue deficiencies;[12]
- A correction of the base rates used in determining the 2017 revenue deficiency filed in the Compliance Application;[13] and
- A July 1, 2017 rate implementation date rather than April 1, 2017.[14]

Table 2 provides a summary of the revenue deficiencies for 2014, 2015, 2016, and 2017.

[10] Ibid.
[11] Ibid., pages 15 and 4.
[12] Ibid., page 9.
[13] Ibid., pages 15 and 4.
[14] Ibid.

Table 2

Summary of Revenue Deficiencies for Setting Customer Rates ($000s)

	2014	2015	2016	2017	Total
Newfoundland Power					
GRA Compliance	35,462	(9,611)	(31,604)	5,050	(703)
GRA Compliance Rates	35,015	(9,988)	(31,604)	804	(5,773)
Difference	**(447)**	**(377)**	**0**	**(4,246)**	**(5,070)**
Island Industrial Customers					
GRA Compliance	3,260	413	(2,076)	34	1,631
GRA Compliance Rates	3,233	389	(2,075)	(20)	1,527
Difference	**(27)**	**(24)**	**1**	**(54)**	**(104)**
Labrador Interconnected Hydro Rural					
GRA Compliance	0	0	0	0	0
GRA Compliance Rates	(541)	118	(75)	31	(467)
Difference	**(541)**	**118**	**(75)**	**31**	**(467)**
Labrador Industrial Transmission					
GRA Compliance	0	0	0	0	0
GRA Compliance Rates	0	(333)	(179)	(97)	(609)
Difference	**0**	**(333)**	**(179)**	**(97)**	**(609)**
Total					
GRA Compliance	38,722	(9,198)	(33,680)	5,084	928
GRA Compliance Rates	37,707	(9,814)	(33,933)	718	(5,322)
Total Difference	**(1,015)**	**(616)**	**(253)**	**(4,366)**	**(6,250)**

3.2 Recovery of Revenue Deficiencies

3.2.1 Island Industrial Customers

The Board has established a separate process to determine the approach for recovery of the cumulative revenue deficiency of approximately $1.5 million from Island Industrial Customers.[15]

[15] Ibid., page 17. On May 15, 2017, Corner Brook Pulp Paper, North Atlantic Refinery Limited (NARL) and Vale made a joint proposal with respect to a proposed approach to recovery of the GRA revenue deficiency from Island Industrial Customers. Hydro replied on May 16, 2017 and advised the Board that it does not object to the proposal to utilize the credit balance in the RSP Load Variation Component to provide compensation of $174,000 to NARL and to transfer approximately $1.6 million to eliminate the GRA Revenue Deficiency. This matter is currently before the Board.

3.2.2 Newfoundland Power

Hydro proposes to deal with the cumulative effect of revenue deficiencies and excess revenues between 2014 and 2017 through adjustments to the RSP. The cumulative excess revenues from 2014 to 2016 of approximately $6.6 million would be credited to the RSP Current Plan balance effective January 1, 2017. The 2017 revenue deficiency of $0.8 million would be debited to the RSP Current Plan balance effective June 30, 2017.

3.2.3 Labrador Interconnected System

Hydro proposes to provide the excess revenues from Hydro Rural customers on the Labrador Interconnected System by applying a rate reduction which would effectively refund the excess revenues over the 30 month period of July 1, 2017 to December 31, 2019. For Hydro Rural customers on the Labrador Interconnected System, this will result in a 0.93% reduction to the rates reflecting the 2015 Test Year revenue requirement.

Due to the relatively small number of Labrador Industrial Transmission customers, Hydro proposes to provide these customers with a refund of approximately $0.6 million in the form of a credit to their bills in September 2017.

3.3 Deferral Adjustments

Exhibit 3 also summarizes the necessary deferral adjustments for each year to reflect revenue deficiency/sufficiency, RSP change in test years, and additional supply costs. Table 3 summarizes approved cost deferrals and revenue deficiencies by year.

Table 3

Summary of Cost Deferrals and Revenue Deficiencies ($000s)

	2014	2015	2016	2017	Total
Approved Cost Deferrals	45,900[16]	30,200[17]	38,800[18]	-	114,900
Approved Fuel Cost Deferral	9,650[19]	-	-	-	9,650
Approved Cost Deferrals	**55,550**	**30,200**	**38,800**	**-**	**124,550**
Revenue Deficiency/(Excess Revenues)	37,707	(9,814)	(33,933)	718	(5,322)
RSP Balance Change in Test Years	-	37,473	38,969	-	76,442
Additional Energy Supply Costs	-	17,782	24,427	-	42,210
Net Revenue Deficiency/(Sufficiency)	**37,707**	**45,441**	**29,463**	**718**	**113,330**
Deferral Adjustment Required	**(17,843)**	**15,241**	**(9,337)**	**718**	**(11,220)**

The total of the cost deferrals approved for 2014 to 2016 was $124.6 million, while the cumulative total of the revenue deficiencies was $113.3 million. Subsequent to the approval of the Energy Supply Cost Variance Account definition provided in Exhibit 5, Hydro will file an application for recovery of the $42.2 million balance owing from customers.[20] Following recovery of the revenue deficiencies in 2017 with the updating of the RSP to reflect the 2015 Test Year, and subsequent to a Board decision on an application to be filed by Hydro for recovery of the supply cost deferrals for 2015 and 2016, Hydro will close the revenue deficiency deferral accounts.

[16] Approved by Order No. P.U. 58(2014), page 9.
[17] Approved by Order No. P.U. 36(2015), page 14.
[18] Approved by Order No. P.U. 56(2016), page 6.
[19] Approved by Order No. P.U. 56(2014), page 4.
[20] Reflects actual deferred energy supply costs for 2015 and 2016. $38.8 million approved deferral was based on 2016 forecast.

4.0 Exhibit 4 – Customer Rates Report

Exhibit 4 uses Hydro's revised 2015 Test Year revenue requirement for rate setting purposes[21] and incorporates the Board's findings in the GRA Compliance Order and the 2017 Newfoundland Power Rate Mitigation Order to develop customer rates. Exhibit 4 provides:

- The approach followed by Hydro in computing proposed customer rates;
- The proposed RSP Adjustments to become effective July 1, 2017;
- The proposed Conservation and Demand Management (CDM) Recovery Adjustments to become effective July 1, 2017;
- A comparison of the existing and proposed customer rates including the estimated customer billing impacts from implementation of the proposed customer rates; and
- A reconciliation of revenues from proposed customer base rates to the revised 2015 Test Year revenue requirement for rate-setting.

4.1 Rate Design

The proposed customer rates for Newfoundland Power and Island Industrial Customers reflect a new RSP fuel rider, RSP Recovery Adjustment, and a new CDM Recovery Adjustment to become effective July 1, 2017.

4.1.1 Cost of Service Study

The delayed implementation of GRA rates until July 1, 2017, does not change the 2015 Test Year revenue requirement for rate setting. However, the revised implementation date does impact forecast Test Year revenues from Hydro Rural customers which, in turn, impact the rural deficit and the allocated revenue requirement to Newfoundland Power and Hydro Rural customers on the Labrador Interconnected System. Consequently, Hydro was required to update the 2015 Test Year Cost of Service Study to reflect these changes. The updated 2015 Test Year Cost of Service Study is provided in Exhibit 8.

[21] Exhibit 2, pages 5-8.

4.1.2 RSP Fuel Riders

Hydro submitted its updated proposed 2017 fuel riders to the Board on April 18, 2017. The riders reflect forecast average No. 6 fuel cost for the period of July 2017 to June 2018 of $81.40 per barrel ($Can).[22] As shown in Appendix A to Exhibit 4, the proposed fuel rider for Newfoundland Power is 0.672 cents/kWh and the proposed fuel rider for Island Industrial Customers is 0.625 cents/kWh. Hydro has used these fuel riders in its proposed July 1, 2017 rate schedules.

4.1.3 RSP Recovery Adjustment

The RSP Recovery Adjustment for Newfoundland Power is updated annually on July 1 based on the March 31 Current Plan Balance. Based on the normal operation of the RSP for 2017, there would be a rate increase for retail customers in excess of approximately 18%. In 2017 Newfoundland Power Rate Mitigation Order, the Board has directed Hydro to transfer of 100% of the Newfoundland Power RSP Load Variation balance to the Newfoundland Power RSP Current Plan to mitigate the proposed rate increase.[23] The rate mitigation transfer to the RSP Current Plan balance for Newfoundland Power effective March 31, 2017 reduces the rate increase to the customers of Newfoundland Power to 8.5%.

In order to transfer the $50.7 million balance of the Newfoundland Power RSP Load Variation balance to the Newfoundland Power RSP Current Plan, section B.4 of the RSP Rules are proposed to be revised. Hydro is seeking approval of this change in the GRA Compliance Rates Application. Revised RSP Rules are provided in Exhibit 9.

4.1.4 CDM Adjustment

The CDM Cost Recovery schedule was approved for inclusion in the Schedule of Rates, Rules and Regulations in the GRA Order. The CDM Cost Recovery Adjustment provides the method of

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[22] The proposed fuel riders to become effective on July 1, 2017, use a $U.S. to $Can. exchange rate of 1.3388 from the month of March, 2017.
[23] Order No. P.U. 16(2017), page 14.

allocation and recovery of the CDM Cost Deferral Account balance, with rate adjustments to be implemented for Newfoundland Power and Island Industrial Customers each July 1.

Appendix C to Exhibit 4 provides a calculation of the CDM Cost Recovery adjustments for each of Newfoundland Power and the Island Industrial Customers. The CDM Cost Recovery Adjustment for Newfoundland Power is 0.019 cents/kWh. The proposed CDM Cost Recovery Adjustment for the Island Industrial Customers is 0.009 cents/kWh.

4.2 Proposed Customer Rates and Customer Billing Impacts

Hydro's proposed customer rates, reflecting the determinations of the Board in the GRA Order, the Compliance Order and the 2017 Newfoundland Power Rate Mitigation Order, are explained in detail in Exhibit 4. Rates reflect an implementation date of July 1, 2017.

Rates have been revised from those filed in the GRA Compliance Application as a result of the change in the implementation date from that proposed in the GRA Compliance Application and the required update to the RSP rate adjustments.

In summary, the annualized billing impact of implementing the proposed Utility base rate and the new fuel rider is a 12.6% increase. The end-consumer impact as a result of the Utility Rate increase is estimated to be an approximate 8.5% increase.

The annualized billing impact of implementing the proposed Island Industrial Customer rate is an average 16.8% increase.[24]

The proposed rate change for the Hydro Rural Island Interconnected customers and customers in L'Anse au Loup equal the proposed rate increase of 8.5% to the customers of Newfoundland

[24] Options to potentially mitigate the rate impacts to Island Industrial Customers are being considered separately by the Board. Hydro is currently reviewing the proposal put forth by the Island Industrial Customers on May 17, 2017, and will file a response no later than Wednesday, May 24, 2017.

Power. The proposed rate change for customers on the Labrador Interconnected system is an overall decrease of 0.5% with a 0.8% decrease applied equally to each rate class with the exception of Street and Area Lighting (14.3% increase).

Table 4 provides a summary of the estimated customer rate impacts by class.

Table 4

Impact of Proposed Rates on Customers by Class
December 31, 2016 vs. July 1, 2017

Customer	Customer Rate Impact
Newfoundland Power End-Consumer	8.5%
Island Industrial Customers	16.8%
Praxair	13.0%
Vale	16.6%
Corner Brook Pulp and Paper	30.6%
North Atlantic Refining Limited	12.3%
Teck Resources	38.2%
Labrador Industrial Transmission	(4.3%)
Canadian Forces Base Goose Bay – Secondary	0.0%
Rural Island Interconnected	8.5%
Rural Isolated Systems	15.1%
Domestic Diesel	13.0%
General Service 2.1D	24.3%
General Service 2.2D	24.9%
General Service – Island Interconnected Rates	8.5%
Streetlights	8.5%
Government Diesel	8.6%
L'Anse au Loup	8.5%
Rural Labrador Interconnected	(0.5%)

The supporting calculations for these rates are provided in the appendices to Exhibit 4. The associated rate sheets are provided in Exhibit 9 to this GRA Compliance Rates Application.

5.0 Exhibit 5 – Revised Deferral Account Report

Hydro has updated the Energy Supply Cost Variance Deferral Account and the Isolated Systems Supply Cost Variance Deferral Account definitions to reflect the issues as noted by Grant Thornton in its Financial Consultants Report on Hydro's Compliance Application,[25] as directed by the Board.[26] Updated definitions are included in Appendices A through D to Exhibit 5. This Exhibit 5 wholly replaces the Exhibit 5 filed with Hydro's GRA Compliance Application.

6.0 Other Exhibits

Exhibit 6 provides revised RSP Summary sheets to correct for errors identified by Grant Thornton for each of the following RSP reports: [27]

- 2015 using 2007 Test Year assumptions;
- 2015 using 2015 Test Year assumptions;
- 2016 using 2007 Test Year assumptions; and
- 2016 using 2015 Test Year assumptions.

Exhibit 6 also includes a full RSP Report as of March 31, 2017, using 2015 Test Year assumptions. This report shows the $50.7 million transfer from the RSP Load Variation Component to the Newfoundland Power RSP Current Plan effective March 31, 2017.

Exhibit 7 provides revised Cost of Service Study summary schedules which provide the allocation of revenue deficiencies by customer class for 2014 to 2016. Hydro updated these schedules to reflect the reallocation of approximately $60,000 from Newfoundland Power's revenue requirement to the Labrador Interconnected revenue requirement in the 2014 Cost of

[25] Page 67.
[26] Order No. P.U. 14(2016), page 15.
[27] Grant Thornton's Financial Consultants Report on Hydro's Compliance Application, page 43.

Service study and the $400,000 reduction in revenue requirement related to depreciation expenses associated with the capital projects that were carried over into 2015.

Exhibit 8 provides Hydro's revised 2015 Test Year Cost of Service for rate setting purposes updated to reflect the change in Hydro Rural revenues due to the change in the implementation date. This wholly replaces Exhibit 13 of Hydro's GRA Compliance Application. Exhibit 9 provides Hydro's revised Schedule of Rates, Rules and Regulations, including revised RSP Rules, reflecting the findings and determinations of the Board in the GRA Compliance Order. This wholly replaces Exhibit 14 of Hydro's GRA Compliance Application.

7.0 Conclusion

In the GRA Compliance Order and the 2017 Newfoundland Power Rate Mitigation Order, the Board made a number of determinations on proposals contained in, and matters arising from, Hydro's Amended GRA. The revisions to the Exhibits to this GRA Compliance Application set forth Hydro's revised evidence in support of its application.

Compliance Rates Application - Exhibit 2

Revised Revenue Requirement Schedules

May 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
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Exhibit 2 - Revised Revenue Requirement Schedules

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (Revised 2014 Test Year)
Statement of Income and Retained Earnings
($000s)

		Compliance Filing 2014	P.U. 14(2017) Adjustment 2014	Revised TY 2014
1	**Revenue**			
2	Energy sales	514,599	-	514,599
3	Revenue deficiency	38,112	(400)	37,712
4	Other revenue	2,335	-	2,335
5	**Total revenue**	555,046	(400)	554,646
6				
7	**Expenses**			
8	Operating expenses	114,702	-	114,702
9	Other Income and expense	2,068	-	2,068
10	Fuels	200,292	-	200,292
11	Power purchases	66,668	-	66,668
12	Amortization	54,793	(400)	54,393
13	Accretion of asset retirement obligation	726	-	726
14	Interest	87,624	-	87,624
15	**Total expenses**	526,873	(400)	526,473
16				
17	**Net income**	28,173	-	28,173
18				
19	**Retained earnings**			
20	Balance at beginning of year	231,383	-	231,383
21	Opening adjustment - retained earnings	-	-	-
22	Dividends	-	-	-
23	**Balance at end of year**	259,556	-	259,556

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (Revised 2014 Test Year)
Rate of Return on Rate Base
($000s)

		Compliance Filing 2014	P.U. 14(2017) Adjustment 2014	Revised TY 2014
1	**Property, plant, and equipment**	1,606,652	-	1,606,652
2	add: accumulated depreciation	104,535	-	104,535
3	add: contributions in aid of construction	3,061	-	3,061
5	less: work in progress	(128,003)	-	(128,003)
6	**Capital assets in service**	1,586,244	-	1,586,244
7	less: asset retirement obligation	(14,508)	-	(14,508)
8	less: contributions in aid of construction	(3,061)	-	(3,061)
9	less: accumulated depreciation	(104,522)	-	(104,522)
10	**Capital assets - current year**	1,464,153	-	1,464,153
11	**Capital assets - previous year**	1,432,533	-	1,432,533
12	Unadjusted capital assets - average	1,448,343	-	1,448,343
13	less: Average net assets not in use	(8,214)	-	(8,214)
14	**Capital assets - average**	1,440,129	-	1,440,129
15				
16	Cash working capital allowance	9,207	-	9,207
17	Fuel	65,110	-	65,110
18	Materials and supplies	25,823	-	25,823
19	Deferred charges	90,774	-	90,774
20	less: Deferred Charges not in use	(1,955)	-	(1,955)
21				
22	**Average rate base**	1,629,088	-	1,629,088
23				
24	Unadjusted return on regulated equity	28,173	-	28,173
25	add: Cost of service exclusions	1,124	-	1,124
26	Interest	87,624	-	87,624
27	**Return on rate base**	116,920	-	116,920
28				
29	**Rate of return on rate base**	7.18%	0.00%	7.18%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (Revised 2014 Test Year)
Forecast Average Cost of Debt
($000s)

	Series	Interest Rate	Year of Issue	Year of Maturity	Compliance Filing	P.U. 14(2017) Adjustment	Revised TY
					2014	2014	2014
1	Series V	10.50%	1989	2014	-	-	-
2	Series X	10.25%	1992	2017	150,000	-	150,000
3	Series Y	8.40%	1996	2026	300,000	-	300,000
4	Series AB	6.65%	2001	2031	300,000	-	300,000
5	Series AD	5.70%	2003	2033	125,000	-	125,000
6	Series AE	4.30%	2006	2016	225,000	-	225,000
7	Series AF	3.60%	2014	2044	200,000	-	200,000
8	Total debentures				1,300,000	-	1,300,000
9							
10	Promissory notes				145,564	-	145,564
11	Less:						
12	Sinking funds				(235,693)	-	(235,693)
13	Non-regulated debt pool				(8,187)	-	(8,187)
14	Unamortized debt discount and financing				(1,730)	-	(1,730)
15							
16	**Total debt**				1,199,954	-	1,199,954
17							
18	**Average debt**				1,058,966	-	1,058,966
19							
20					Compliance	P.U. 14(2017) Adjustment	Revised TY
21					2014		2014
22	**Embedded cost of debt**						
23	Long-term debt				86,288	-	86,288
24	Accretion of long-term debt				514	-	514
25	Amortization of foreign exchange losses				2,157	-	2,157
26	Debt guarantee fee				1,584	-	1,584
27	Other interest				1,053	-	1,053
28	Interest on sinking fund				(16,026)	-	(16,026)
29					75,570	-	75,570
30							
31	**Embedded cost of debt**				7.14%	0.00%	7.14%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (Revised 2014 Test Year)
Capital Structure
($000s)

		Compliance Filing	P.U. 14(2017) Adjustment	Revised TY
		2014	2014	2014
1	**Regulated capital structure**			
2	Long-term debt	1,252,042	-	1,252,042
3	Promissory notes	145,564	-	145,564
4	Promissory notes - related party	-	-	-
5	less: sinking funds	(220,536)	-	(220,536)
6	add: mark to market of sinking funds	31,071	-	31,071
7		1,208,141	-	1,208,141
8	Cost of service exclusions	-	-	-
9	Non-regulated debt pool	(8,187)	-	(8,187)
10	Net regulated debt	1,199,954	-	1,199,954
11	Asset retirement obligation	20,135	-	20,135
12	less: unfunded asset retirement obligation	(10,339)	-	(10,339)
13	Employee future benefits	66,213	-	66,213
14	Contributed capital	100,000	-	100,000
15	Retained earnings cost of service exclusions	1,765	-	1,765
16	Retained earnings	259,556	-	259,556
17	**Total**	1,637,284	-	1,637,284
18				
19	**Regulated capital structure (%)**			
20	Debt	73.3%	0.0%	73.3%
21	Asset retirement obligation	0.6%	0.0%	0.6%
22	Employee future benefits	4.0%	0.0%	4.0%
23	Equity	22.1%	0.0%	22.1%
24	**Total**	100.0%	0.0%	100.0%
25				
26	**Regulated average capital structure (%)**			
27	Debt	71.4%	0.0%	71.4%
28	Asset retirement obligation	0.6%	0.0%	0.6%
29	Employee future benefits	4.4%	0.0%	4.4%
30	Equity	23.62%	0.0%	23.62%
31	**Total**	100.0%	0.0%	100.0%
32				
33	**Weighted average cost of capital (WACC)**			
34	Embedded cost of debt	7.14%	0.00%	7.14%
35	Asset retirement obligation	0.00%	0.00%	0.00%
36	Employee future benefits	0.00%	0.00%	0.00%
37	Equity	8.80%	0.00%	8.80%
38	**WACC**	7.18%	0.00%	7.18%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Test Year Rate Setting)
Statement of Income and Retained Earnings
($000s)

		Compliance Filing Test Year	P.U. 14(2017) Adjustment Test Year	Rate Setting Test Year
1	**Revenue**			
2	Energy sales	564,002	-	564,002
3	Revenue deficiency	-	-	-
4	Other revenue	2,508	-	2,508
5	**Total revenue**	566,510	-	566,510
6				
7	**Expenses**			
8	Operating expenses	131,350	-	131,350
9	Other Income and expense	4,074	-	4,074
10	Fuels	187,464	-	187,464
11	Power purchases	62,827	-	62,827
12	Amortization	63,230	-	63,230
13	Accretion of asset retirement obligation	748	-	748
14	Interest	89,453	-	89,453
15	**Total expenses**	539,145	-	539,145
16				
17	**Net income**	27,364	-	27,364
18				
19	**Retained earnings**			
20	Balance at beginning of year	259,556	-	259,556
21	Opening adjustment - retained earnings	-	-	-
22	Dividends	-	-	-
23	**Balance at end of year**	286,920	-	286,920

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Test Year Rate Setting)
Rate of Return on Rate Base
($000s)

		Compliance Filing Test Year	P.U. 14(2017) Adjustment Test Year	Rate Setting Test Year
1	**Property, plant, and equipment**	1,882,883	-	1,882,883
2	add: accumulated depreciation	204,001	-	204,001
3	add: contributions in aid of construction	17,936	-	17,936
5	less: work in progress	(240,977)	-	(240,977)
6	**Capital assets in service**	1,863,843	-	1,863,843
7	less: asset retirement obligation	(12,169)	-	(12,169)
8	less: contributions in aid of construction	(17,936)	-	(17,936)
9	less: accumulated depreciation	(203,834)	-	(203,834)
10	**Capital assets - current year**	1,629,904	-	1,629,904
11	**Capital assets - previous year**	1,610,437	-	1,610,437
12	Unadjusted capital assets - average	1,620,170	-	1,620,170
13	less: Average net assets not in use	(7,318)	-	(7,318)
14	**Capital assets - average**	1,612,852	-	1,612,852
15				
16	Cash working capital allowance	7,037	-	7,037
17	Fuel	47,398	-	47,398
18	Materials and supplies	27,402	-	27,402
19	Deferred charges	95,132	-	95,132
20	less: Deferred Charges not in use	(4,467)	-	(4,467)
21				
22	**Average rate base**	1,785,353	-	1,785,353
23				
24	Unadjusted return on regulated equity	27,364	-	27,364
25	add: Cost of service exclusions	1,177	-	1,177
26	Interest	89,453	-	89,453
27	**Return on rate base**	117,994	-	117,994
28				
29	**Rate of return on rate base**	6.61%	0.00%	6.61%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Test Year Rate Setting)
Forecast Average Cost of Debt
($ 000s)

	Series	Interest Rate	Year of Issue	Year of Maturity	Compliance Filing Test Year	P.U. 14(2017) Adjustment Test Year	Rate Setting Test Year
1	Series V	10.50%	1989	2014	-	-	-
2	Series X	10.25%	1992	2017	150,000	-	150,000
3	Series Y	8.40%	1996	2026	300,000	-	300,000
4	Series AB	6.65%	2001	2031	300,000	-	300,000
5	Series AD	5.70%	2003	2033	125,000	-	125,000
6	Series AE	4.30%	2006	2016	225,000	-	225,000
7	Series AF	3.60%	2014	2044	600,000	-	600,000
8	Total debentures				1,700,000	-	1,700,000
9							
10	Promissory notes				-	-	-
11	Less:						
12	Sinking funds				(257,000)	-	(257,000)
13	Non-regulated debt pool				(8,187)	-	(8,187)
14	Unamortized debt discount and financing				(1,235)	-	(1,235)
15							
16	**Total debt**				1,433,578	-	1,433,578
17							
18	**Average debt**				1,316,766	-	1,316,766
19							
20					**Compliance Filing**	**P.U. 14(2017) Adjustment**	**Rate Setting**
21					**Test Year**	**Test Year**	**Test Year**
22	**Embedded cost of debt**						
23	Long-term debt				95,325	-	95,325
24	Accretion of long-term debt				495	-	495
25	Amortization of foreign exchange losses				2,157	-	2,157
26	Debt guarantee fee				1,887	-	1,887
27	Other interest				(1,230)	-	(1,230)
28	Interest on sinking fund				(13,413)	-	(13,413)
29					85,221	-	85,221
30							
31	**Embedded cost of debt**				6.47%	0.00%	6.47%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Test Year Rate Setting)
Capital Structure
($000s)

		Compliance Filing Test Year	P.U. 14(2017) Adjustment Test Year	Rate Setting Test Year
1	**Regulated capital structure**			
2	Long-term debt	1,649,544		1,649,544
3	Promissory notes	-		-
4	Promissory notes - related party	-		-
5	less: sinking funds	(238,850)		(238,850)
6	add: mark to market of sinking funds	31,071		31,071
7		1,441,765	-	1,441,765
8	Cost of service exclusions	-		-
9	Non-regulated debt pool	(8,187)		(8,187)
10	Net regulated debt	1,433,578	-	1,433,578
11	Asset retirement obligation	20,740	-	20,740
12	less: unfunded asset retirement obligation	(8,493)	-	(8,493)
13	Employee future benefits	72,454	-	72,454
14	Contributed capital	100,000	-	100,000
15	Retained earnings cost of service exclusions	2,154	-	2,154
16	Retained earnings	286,920	-	286,920
17	**Total**	1,907,353	-	1,907,353
18				
19	**Regulated capital structure (%)**			
20	Debt	75.2%	0.00%	75.2%
21	Asset retirement obligation	0.6%	0.00%	0.6%
22	Employee future benefits	3.8%	0.00%	3.8%
23	Equity	20.4%	0.00%	20.4%
24	**Total**	100.0%	0.00%	100.0%
25				
26	**Regulated average capital structure (%)**			
27	Debt	74.2%	0.00%	74.2%
28	Asset retirement obligation	0.6%	0.00%	0.6%
29	Employee future benefits	3.9%	0.00%	3.9%
30	Equity	21.23%	0.00%	21.23%
31	**Total**	100.0%	0.00%	100.0%
32				
33	**Weighted average cost of capital (WACC)**			
34	Embedded cost of debt	6.47%	0.00%	6.47%
35	Asset retirement obligation	0.00%	0.00%	0.00%
36	Employee future benefits	0.00%	0.00%	0.00%
37	Equity	8.50%	0.00%	8.50%
38	**WACC**	6.61%	0.00%	6.61%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Revenue Deficiency)
Statement of Income and Retained Earnings
($000s)

		Compliance Filing	P.U. 14(2017) Adjustment	Revenue Deficiency
		2015	**2015**	**2015**
1	**Revenue**			
2	Energy sales	537,111	(400)	536,711
3	Revenue deficiency	-	-	-
4	Other revenue	2,508	-	2,508
5	**Total revenue**	539,619	(400)	539,219
6				
7	**Expenses**			
8	Operating expenses	130,350	-	130,350
9	Other Income and expense	4,074	-	4,074
10	Fuels	164,239	-	164,239
11	Power purchases	62,827	-	62,827
12	Amortization	63,230	(400)	62,830
13	Accretion of asset retirement obligation	748	-	748
14	Interest	92,161	-	92,161
15	**Total expenses**	517,628	(400)	517,228
16				
17	**Net income**	21,990	-	21,990
18				
19	**Retained earnings**			
20	Balance at beginning of year	259,556	-	259,556
21	Opening adjustment - retained earnings	-	-	-
22	Dividends	-	-	-
23	**Balance at end of year**	281,546	-	281,546

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Revenue Deficiency)
Rate of Return on Rate Base
($000s)

		Compliance Filing 2015	P.U. 14(2017) Adjustment 2015	Revenue Deficiency 2015
1	**Property, plant, and equipment**	1,882,883	-	1,882,883
2	add: accumulated depreciation	204,001	-	204,001
3	add: contributions in aid of construction	17,936	-	17,936
5	less: work in progress	(240,977)	-	(240,977)
6	**Capital assets in service**	1,863,843	-	1,863,843
7	less: asset retirement obligation	(12,169)	-	(12,169)
8	less: contributions in aid of construction	(17,936)	-	(17,936)
9	less: accumulated depreciation	(203,834)	-	(203,834)
10	**Capital assets - current year**	1,629,904	-	1,629,904
11	**Capital assets - previous year**	1,464,153	-	1,464,153
12	Unadjusted capital assets - average	1,547,029	-	1,547,029
13	less: Average net assets not in use	(7,318)	-	(7,318)
14	**Capital assets - average**	1,539,711	-	1,539,711
15				
16	Cash working capital allowance	7,037	-	7,037
17	Fuel	42,164	-	42,164
18	Materials and supplies	27,402	-	27,402
19	Deferred charges	117,247	-	117,247
20	less: Deferred Charges not in use	(4,467)	-	(4,467)
21				
22	**Average rate base**	1,729,093	-	1,729,093
23				
24	Unadjusted return on regulated equity	21,991	-	21,991
25	add: Cost of service exclusions	1,177	-	1,177
26	Interest	92,161	-	92,161
27	**Return on rate base**	115,330	-	115,330
28				
29	**Rate of return on rate base**	6.67%	0.00%	6.67%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Revenue Deficiency)
Forecast Average Cost of Debt
($000s)

	Series	Interest Rate	Year of Issue	Year of Maturity	Compliance Filing	P.U. 14(2017) Adjustment	Revenue Deficiency
					2015	2015	2015
1	Series V	10.50%	1989	2014	-	-	-
2	Series X	10.25%	1992	2017	150,000	-	150,000
3	Series Y	8.40%	1996	2026	300,000	-	300,000
4	Series AB	6.65%	2001	2031	300,000	-	300,000
5	Series AD	5.70%	2003	2033	125,000	-	125,000
6	Series AE	4.30%	2006	2016	225,000	-	225,000
7	Series AF	3.60%	2014	2044	600,000	-	600,000
8	Total debentures				1,700,000	-	1,700,000
9							
10	Promissory notes				-	-	-
11	Less:						
12	Sinking funds				(257,000)	-	(257,000)
13	Non-regulated debt pool				(8,187)	-	(8,187)
14	Unamortized debt discount and financing				(1,235)	-	(1,235)
15							
16	**Total debt**				1,433,578	-	1,433,578
17							
18	**Average debt**				1,316,766	-	1,316,766
19							
20					Compliance Filing	P.U. 14(2017) Adjustment	Revenue Deficiency
21					2015	2015	2015
22	**Embedded cost of debt**						
23	Long-term debt				95,325	-	95,325
24	Accretion of long-term debt				495	-	495
25	Amortization of foreign exchange losses				2,157	-	2,157
26	Debt guarantee fee				1,887	-	1,887
27	Other interest				(1,230)	-	(1,230)
28	Interest on sinking fund				(13,413)	-	(13,413)
29					85,221	-	85,221
30							
31	**Embedded cost of debt**				6.47%	0.00%	6.47%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2015 Revenue Deficiency)
Capital Structure
($000s)

		Compliance Filing 2015	P.U. 14(2017) Adjustment 2015	Revenue Deficiency 2015
1	**Regulated capital structure**			
2	Long-term debt	1,649,544	-	1,649,544
3	Promissory notes	-	-	-
4	Promissory notes - related party	-	-	-
5	less: sinking funds	(238,850)	-	(238,850)
6	add: mark to market of sinking funds	31,071	-	31,071
7		1,441,765	-	1,441,765
8	Cost of service exclusions	-	-	-
9	Non-regulated debt pool	(8,187)	-	(8,187)
10	Net regulated debt	1,433,578	-	1,433,578
11	Asset retirement obligation	20,740	-	20,740
12	less: unfunded asset retirement obligation	(8,493)	-	(8,493)
13	Employee future benefits	72,454	-	72,454
14	Contributed capital	100,000	-	100,000
15	Retained earnings cost of service exclusions	2,154	-	2,154
16	Retained earnings	281,547	-	281,547
17	**Total**	1,901,981	-	1,901,981
18				
19	**Regulated capital structure (%)**			
20	Debt	75.4%	0.0%	75.4%
21	Asset retirement obligation	0.6%	0.0%	0.6%
22	Employee future benefits	3.8%	0.0%	3.8%
23	Equity	20.2%	0.0%	20.2%
24	**Total**	100.0%	0.0%	100.0%
25				
26	**Regulated average capital structure (%)**			
27	Debt	74.3%	0.0%	74.3%
28	Asset retirement obligation	0.6%	0.0%	0.6%
29	Employee future benefits	3.9%	0.0%	3.9%
30	Equity	21.12%	0.0%	21.12%
31	**Total**	100.0%	0.0%	100.0%
32				
33	**Weighted average cost of capital (WACC)**			
34	Embedded cost of debt	6.47%	0.00%	6.47%
35	Asset retirement obligation	0.00%	0.00%	0.00%
36	Employee future benefits	0.00%	0.00%	0.00%
37	Equity	8.80%	0.00%	8.80%
38	**WACC**	6.67%	0.00%	6.67%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2016 Revenue Deficiency)
Statement of Income and Retained Earnings
($000s)

		Compliance Filing 2016	P.U. 14(2017) Adjustment 2016	Revenue Deficiency 2016
1	**Revenue**			
2	Energy sales	541,874	-	541,874
3	Revenue deficiency	-	-	-
4	Other revenue	2,508	-	2,508
5	**Total revenue**	544,382	-	544,382
6				
7	**Expenses**			
8	Operating expenses	131,350	-	131,350
9	Other Income and expense	4,074	-	4,074
10	Fuels	164,239	-	164,239
11	Power purchases	62,827	-	62,827
12	Amortization	63,230	-	63,230
13	Accretion of asset retirement obligation	748	-	748
14	Interest	86,695	-	86,695
15	**Total expenses**	513,162	-	513,162
16				
17	**Net income**	31,220	-	31,220
18				
19	**Retained earnings**			
20	Balance at beginning of year	259,556	-	259,556
21	Opening adjustment - retained earnings	-	-	-
22	Dividends	-	-	-
23	**Balance at end of year**	290,776	-	290,776

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2016 Revenue Deficiency)
Rate of Return on Rate Base
($000s)

		Compliance Filing 2016	P.U. 14(2017) Adjustment 2016	Revenue Deficiency 2016
1	**Property, plant, and equipment**	1,882,883	-	1,882,883
2	add: accumulated depreciation	204,001	-	204,001
3	add: contributions in aid of construction	17,936	-	17,936
5	less: work in progress	(240,977)	-	(240,977)
6	**Capital assets in service**	1,863,843	-	1,863,843
7	less: asset retirement obligation	(12,169)	-	(12,169)
8	less: contributions in aid of construction	(17,936)	-	(17,936)
9	less: accumulated depreciation	(203,834)	-	(203,834)
10	**Capital assets - current year**	1,629,904	-	1,629,904
11	**Capital assets - previous year**	1,610,437	-	1,610,437
12	Unadjusted capital assets - average	1,620,170	-	1,620,170
13	less: Average net assets not in use	(7,318)	-	(7,318)
14	**Capital assets - average**	1,612,852	-	1,612,852
15				
16	Cash working capital allowance	7,037	-	7,037
17	Fuel	42,164	-	42,164
18	Materials and supplies	27,402	-	27,402
19	Deferred charges	117,247	-	117,247
20	less: Deferred Charges not in use	(4,467)	-	(4,467)
21				
22	**Average rate base**	1,802,235	-	1,802,235
23				
24	Unadjusted return on regulated equity	31,220	-	31,220
25	add: Cost of service exclusions	1,177	-	1,177
26	Interest	86,695	-	86,695
27	**Return on rate base**	119,092	-	119,092
28				
29	**Rate of return on rate base**	6.61%	0.00%	6.61%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2016 Revenue Deficiency)
Forecast Average Cost of Debt
($000s)

	Series	Interest Rate	Year of Issue	Year of Maturity	Compliance Filing 2016	P.U. 14(2017) Adjustment 2016	Revenue Deficiency 2016
1	Series V	10.50%	1989	2014	-	-	-
2	Series X	10.25%	1992	2017	150,000	-	150,000
3	Series Y	8.40%	1996	2026	300,000	-	300,000
4	Series AB	6.65%	2001	2031	300,000	-	300,000
5	Series AD	5.70%	2003	2033	125,000	-	125,000
6	Series AE	4.30%	2006	2016	225,000	-	225,000
7	Series AF	3.60%	2014	2044	600,000	-	600,000
8	Total debentures				1,700,000	-	1,700,000
9							
10	Promissory notes				-	-	-
11	Less:						
12	Sinking funds				(257,000)	-	(257,000)
13	Non-regulated debt pool				(8,187)	-	(8,187)
14	Unamortized debt discount and financing				(1,235)	-	(1,235)
15							
16	**Total debt**				1,433,578	-	1,433,578
17							
18	**Average debt**				1,316,766	-	1,316,766
19							

		Compliance Filing	P.U. 14(2017) Adjustment	Revenue Deficiency
20				
21		2016	2016	2016
22	**Embedded cost of debt**			
23	Long-term debt	95,325	-	95,325
24	Accretion of long-term debt	495	-	495
25	Amortization of foreign exchange losses	2,157	-	2,157
26	Debt guarantee fee	1,887	-	1,887
27	Other interest	(1,230)	-	(1,230)
28	Interest on sinking fund	(13,413)	-	(13,413)
29		85,221	-	85,221
30				
31	**Embedded cost of debt**	6.47%	0.00%	6.47%

Newfoundland and Labrador Hydro
Financial Results and Forecasts
Finance Schedules (2016 Revenue Deficiency)
Capital Structure
($000s)

		Compliance Filing 2016	P.U. 14(2017) Adjustment 2016	Revenue Deficiency 2016
1	**Regulated capital structure**			
2	Long-term debt	1,649,544	-	1,649,544
3	Promissory notes	-	-	-
4	Promissory notes - related party	-	-	-
5	less: sinking funds	(238,850)	-	(238,850)
6	add: mark to market of sinking funds	31,071	-	31,071
7		1,441,765	-	1,441,765
8	Cost of service exclusions	-	-	-
9	Non-regulated debt pool	(8,187)	-	(8,187)
10	Net regulated debt	1,433,578	-	1,433,578
11	Asset retirement obligation	20,740	-	20,740
12	less: unfunded asset retirement obligation	(8,493)	-	(8,493)
13	Employee future benefits	72,454	-	72,454
14	Contributed capital	100,000	-	100,000
15	Retained earnings cost of service exclusions	2,154	-	2,154
16	Retained earnings	290,776	-	290,776
17	**Total**	1,911,209	-	1,911,209
18				
19	**Regulated capital structure (%)**			
20	Debt	75.0%	0.0%	75.0%
21	Asset retirement obligation	0.6%	0.0%	0.6%
22	Employee future benefits	3.8%	0.0%	3.8%
23	Equity	20.6%	0.0%	20.6%
24	**Total**	100.0%	0.0%	100.0%
25				
26	**Regulated average capital structure (%)**			
27	Debt	74.1%	0.0%	74.1%
28	Asset retirement obligation	0.6%	0.0%	0.6%
29	Employee future benefits	3.9%	0.0%	3.9%
30	Equity	21.31%	0.0%	21.31%
31	**Total**	100.0%	0.0%	100.0%
32				
33	**Weighted average cost of capital (WACC)**			
34	Embedded cost of debt	6.47%	0.0%	6.47%
35	Asset retirement obligation	0.00%	0.0%	0.00%
36	Employee future benefits	0.00%	0.0%	0.00%
37	Equity	8.50%	0.0%	8.50%
38	**WACC**	6.61%	0.0%	6.61%

Compliance Rates Application - Exhibit 3

Recovery of Revenue Deficiencies

Revised – May 24, 2017 and June 8, 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

Table of Contents

1.0 Introduction

In Order No. P.U. 49(2016) (the GRA Order), the Board determined that Hydro is permitted recovery with respect to the 2014 and 2015 revenue deficiencies reflecting the findings of the Board.[1] The Board directed Hydro to file a proposal for the recovery of the 2014 and 2015 revenue deficiencies, including the 2014 additional supply cost deferral, reflecting the Board's findings in the GRA Order.[2] The Board also recognized that delayed implementation of customer rates beyond January 1, 2016 may contribute to further revenue deficiencies.[3]

To determine the revenue deficiency by customer class in its GRA Compliance Application filed on January 27, 2017, Hydro completed Cost of Service studies reflecting the Board's decisions in the GRA Order. This permitted Hydro to use a cost-based approach, consistent with that approved by the Board, in determining revenue deficiency responsibility by customer class.

Exhibit 3 of the GRA Compliance Application provided the following:

- Hydro's explanation of the impact of the RSP on the 2014, 2015 and 2016 revenue deficiencies;
- Revenue deficiency calculations for 2014, 2015, 2016, and 2017;
- Proposed allocation of the revenue deficiencies by customer class for customers currently billed on interim rates; and,
- Hydro's proposal with respect to recovery of the deficiencies from customers.

This report provides the revisions to the calculation of revenue deficiencies and the proposed recovery of revenue deficiencies to reflect Order No. P.U. 14(2017) (the GRA Compliance Order).

[1] Order No. P.U. 49(2016). For the Board's findings on the 2014 revenue deficiency, see pages 75–83. For the Board's findings on the 2015 revenue deficiency, see pages 84–86.
[2] Ibid., page 82.
[3] Ibid., page 129.

2.0 Revenue Deficiency Revisions

2.1 Depreciation

In the GRA Compliance Order, the Board directed Hydro to reduce its 2014 and 2015 Test Year revenue requirements for revenue deficiency by $400,000.[4] Hydro has made this adjustment in its 2014 and 2015 Test Year Cost of Service studies and recalculated revenue deficiency by customer class.

2.2 Labrador Interconnected System

In the GRA Compliance Rates Application, Hydro proposed not to determine revenue deficiencies resulting from delays in rate implementation for customers on the Labrador Interconnected System because the rates for these customers on the Labrador Interconnected system had not been made interim. In the GRA Compliance Order, the Board directed Hydro to revise the proposed recovery of the revenue deficiencies for 2014 to 2017 to include Hydro Rural Labrador Interconnected customers and Labrador Industrial Transmission customers.

The next section provides the revised revenue deficiencies reflecting the GRA Compliance Order by customer class, by year (including customers on the Labrador Interconnected System). Exhibit 7 provides the Test Year Cost of Service summary schedules showing the revenue deficiencies by customer class.

2.3 2014 Revised Revenue Deficiency

2.3.1 Allocation of 2014 Revenue Deficiency

The revised 2014 Test Year Cost of Service for 2014 revenue deficiency was prepared in accordance with the approved Cost of Service Methodology reflecting the Board's decisions in the GRA Order as a basis for determining the 2014 cost responsibility by customer class.

Table 1 provides a summary of the 2014 Test Year revenues resulting from rates in effect for 2014 compared to the revised allocated 2014 Test Year costs by customer group.

[4] Order No. P.U. 14(2017).

Table 1
2014 Revenues vs. Costs ($000s)

	2014 Revenues[5]	2014 TY Costs[6]	Difference	Revenue to Cost Ratio
Newfoundland Power	483,433	460,001	23,432	1.05
Island Industrial Customers	26,833	30,066	(3,233)	0.89
Labrador Interconnected	19,730	17,026	2,704	1.16
Other Hydro Rural[7]	66,455	127,065	(60,610)	0.52
Labrador Industrial Transmission Customers	1,936	1,936	0	1.00
Total	**598,387**	**636,094**	**(37,707)**	**0.94**

To determine the 2014 revenue deficiency for Newfoundland Power first requires that the Rural Deficit be allocated between Labrador Interconnected customers and Newfoundland Power. Island Industrial Customers are not allocated a portion of the Rural Deficit.[8]

Table 2 provides an allocation of the 2014 Rural Deficit based on the 2014 Test Year revenue deficiency revenue requirement from rates for Newfoundland Power and Labrador Interconnected customers.

[5] Exhibit 7, 2014 Test Year Cost of Service, Schedule 1.2, page 1 of 6, Column 2.
[6] Exhibit 7, 2014 Test Year Cost of Service, Schedule 1.2, page 1 of 6, Column 3.
[7] Includes the effects of CFB Goose Bay Secondary for which the 2014 revenue credit of $743,000 is used to reduce the Rural Deficit.
[8] This Is in accordance with Order in Council OC2003-347, which directs that the rural deficit is to be paid by Newfoundland Power customers and Hydro's Labrador Interconnected customers and explicitly excludes Island industrial Customers.

Table 2
2014 Rural Deficit Allocation ($000s)

	2014 TY Costs Excl. Deficit	Rural Deficit Allocation	Total 2014 TY Costs Incl. Deficit	Revenue to Cost Ratio
Newfoundland Power	460,001	58,447	518,448	1.13
Labrador Interconnected	17,026	2,163	19,189	1.13
Total	**477,548**	**60,610**[9]	**537,637**	

Table 3 provides a calculation of the 2014 revenue deficiency to be recovered from Newfoundland Power, the Island Industrial customers, and the customers on the Labrador Interconnected System.[10] Revenue deficiency amounts equal the difference between the 2014 Test Year revenues from rates and the revised 2014 Test Year costs.[11]

Table 3
2014 Revenue Deficiency Allocation ($000s)

	2014 Revenues	2014 TY Costs	Difference
Newfoundland Power	483,433	518,448	(35,015)
Island Industrial Customers	26,833	30,066	(3,233)
Labrador Int. - Hydro Rural	19,730	19,189	541
Labrador Industrial Cost Recovery[12]	1,936	1,936	0

The revised 2014 Test Year Cost of Service Study shows a 2014 revenue deficiency of $35.0 million to be recovered from Newfoundland Power, $3.2 million to be recovered from Island

[9] Exhibit 7, 2014 Test Year Cost of Service, Schedule 1.2, Page 1 of 6, column 5. This amount includes the revenue credit from CFB Secondary Sales.
[10] No portion of the 2014 revenue deficiency is assumed for recovery from Hydro's Rural customer classes that contribute to the Rural Deficit. Additional revenue recovery from these Hydro Rural customer classes effectively reduces the Rural Deficit to be recovered from Newfoundland Power.
[11] For Newfoundland Power, the 2014 Test Year costs include the Rural Deficit.
[12] There are no revenues or costs for the Labrador Industrial Transmission Customers in 2014 as the Labrador Transmission rate was not implemented until 2015.

Industrial customers and $0.5 million in excess revenue from Hydro's Rural customers on the Labrador Interconnected System.

2.3.2 Allocation of 2015 Revenue Deficiency

Hydro's revised 2015 Test Year revenue requirement for use in the calculation of the 2015 revenue deficiency reflects the Board's decisions in the GRA Compliance Order.

Table 4 provides a summary by customer group of the 2015 Test Year revenues under rates in effect for 2015 compared to the revised 2015 Test Year Cost of Service for use in determining revenue deficiency.

Table 4
2015 Revenues vs. Costs ($000s)

	2015 Revenues[13]	2015 TY Costs[14]	Difference	Revenue to Cost Ratio
Newfoundland Power	429,323	363,665	65,658	1.18
Island Industrial Customers	32,182	32,571	(389)	0.99
Labrador Interconnected	20,093	17,528	2,565	1.15
Other Hydro Rural[15]	60,879	119,232	(58,353)	0.51
Labrador Industrial Transmission	5,411	5,078	333	1.07
Total	**547,888**	**538,074**	**9,814**	**1.02**

Table 5 provides an allocation of the Rural Deficit based on the approved Rural Deficit allocation methodology in the GRA Order.

[13] Exhibit 7, 2015 Test Year Cost of Service for 2015 Revenue Deficiency, Schedule 1.2, page 1 of 6, Column 2.
[14] Exhibit 7, 2015 Test Year Cost of Service for 2015 Revenue Deficiency, Schedule 1.2, page 1 of 6, Column 3.
[15] Includes the effects of CFB Goose Bay Secondary, for which the 2015 revenue credit of $912,600 is used to reduce the Rural Deficit.

Table 5
2015 Rural Deficit Allocation ($000s)

	2015 TY Costs Excl. Deficit	Rural Deficit Allocation	Total 2015 TY Costs Incl. Deficit	Revenue to Cost Ratio
Newfoundland Power	363,665	55,670	419,335	1.15
Labrador Interconnected	17,528	2,683	20,211	1.15
Total	**381,193**	**58,353**[16]	**439,546**	

Table 6 provides a calculation of the 2015 revenue deficiency to be recovered from each of Newfoundland Power and the Island Industrial Customers. Revenue deficiency equals the difference between 2015 revenues from rates and the revenue requirement for determining the 2015 revenue deficiency.

Table 6
2015 Revenue Deficiency ($000s)

	2015 Revenues	2015 TY Costs Revenue Deficiency	Difference
Newfoundland Power	429,323	419,335	9,988
Island Industrial Customers	32,182	32,571	(389)
Labrador Int. - Hydro Rural	20,093	20,211	(118)
Labrador Industrial Transmission	5,411	5,078	333

The review of the revenues from interim rates based on the 2015 Test Year load compared to the revised 2015 Test Year Cost of Service Study for determining revenue deficiency show revenues in excess of allocated costs of approximately $10.0 million from Newfoundland Power and $0.3 million from Labrador Industrial Transmission customers.[17] Table 6 also shows a

[16] Exhibit 7 - 2015 Test Year Cost of Service for Revenue Deficiency, Schedule 1.2, page 1 of 6, column 5, line 14.This amount includes the revenue credit from CFB Secondary Sales.
[17] Revenues and costs for the Labrador Industrial Transmission Customers include a portion charged through the demand charge approved by the Board and the generation costs allocated for recovery from the Labrador

revenue deficiency in 2015 of $0.4 million from Island Industrial Customers and $0.1 million for Labrador Interconnected Customers.

2.3.3 Allocation of 2016 Revenue Deficiency

Hydro’s 2015 Test Year revenue requirement for use in the calculation of the 2016 revenue deficiency reflects the Board’s decisions in the GRA Compliance Order. This amount has not changed from that which was filed in the GRA Compliance Application.

Table 7 provides a summary of the 2016 revenues under interim rates in effect for 2016 based on the 2015 Test Year load forecast compared to the 2015 Test Year Cost of Service for rates setting by customer group.

Industrial Transmission Customers. The revenue deficiency only relates to the demand costs recovered through the Labrador Industrial Transmission demand charge.

Table 7
2016 Revenues vs. 2015 TY Costs ($000s)
Based on 2015 TY Load Forecast

	2016 Revenues[18]	2015 TY Costs[19]	Difference	Revenue to Cost Ratio
Newfoundland Power	448,560	367,659	80,901	1.22
Island Industrial Customers	34,892	32,817	2,075	1.06
Labrador Interconnected	20,093	17,651	2,442	1.14
Other Hydro Rural[20]	68,217	119,881	(51,664)	0.57
Labrador Industrial Transmission	5,410	5,231	179	1.03
Total	**577,172**	**543,239**	**33,933**	**1.06**

Table 8 provides a comparison of 2016 revenues from interim rates and 2015 Test Year costs, including allocation of the Rural Deficit.

Table 8
2016 Revenues vs. 2015 TY Cost ($000s)
(Based on 2015 TY Load)

	2016 Revenues	2015 TY Costs	Excess
Newfoundland Power	448,560	416,956	31,604
Island Industrial Customers	34,892	32,817	2,075
Labrador Int. Hydro Rural	20,093	20,018	75
Labrador Industrial Transmission	5,410	5,231	179

Table 8 shows the revenues from interim base rates for Newfoundland Power exceeded allocated costs by $31.6 million in 2016. Table 8 also shows the revenues from interim base rates for Island Industrial Customers exceeded allocated costs by $2.1 million in 2016. Revenues

[18] Exhibit 7, 2015 Test Year Cost of Service for 2016 Revenue Deficiency, Schedule 1.2, page 1 of 6, Column 2.
[19] Exhibit 7, 2015 Test Year Cost of Service for 2016 Revenue Deficiency, Schedule 1.2, page 1 of 6, Column 3.
[20] Includes the effects of CFB Goose Bay Secondary for which the 2015 revenue credit of $912,600 is used to reduce the Rural Deficit.

from rates for Labrador Interconnected Hydro Rural customers exceeded costs by $0.1 million and revenues from Labrador Industrial Transmission customers exceeded costs by $0.2 million.

2.3.5 Allocation of 2017 Revenue Deficiency

Hydro's proposed final customer rates are anticipated to be in effect July 1, 2017. On approval of new rates in 2017, the RSP will be updated to reflect the 2015 Test Year values, including the $64.41 per barrel No. 6 Test Year fuel price for all of 2017. Therefore, the assessment of 2017 revenue deficiency must be computed comparing revenues at interim rates against revenue requirement for rate setting using the 2015 Test Year fuel price of $64.41.

To determine the revenue deficiency for the first 6 months in 2017, Hydro compared the forecast revenues for the first six months by applying both the proposed base rates in the Compliance Rates Application (excluding adjustments for revenue deficiency) and the existing rates which will remain in effect for the first six months of 2017.

Table 9 provides an estimate of the revenue deficiency by class for the first six months of 2017.

Table 9
2017 Revenue Deficiency Summary ($000s)

	Interim Base Rate Revenues at 2015 TY Load	Compliance Base Rate Revenues at 2015 TY Load	2017 Revenue Deficiency (Sufficiency)
Newfoundland Power	259,734	260,538	804
Island Industrial Customers	16,972	16,951	(20)
Labrador Int. Hydro Rural	11,596	11,627	31
Labrador Industrial Transmission	2,025	1,928	(97)

3.0 Summary of Revenue Deficiencies

Table 10 provides a summary of the revenue deficiencies for 2014, 2015, 2016, and 2017.

Table 10
Summary of Revenue Deficiencies for Setting Customer Rates ($000s)

	2014	2015	2016	2017	Total
Newfoundland Power	35,015	(9,988)	(31,604)	804	**(5,773)**
Island Industrial Customers	3,233	389	(2,075)	(20)	**1,527**
Labrador Int. Hydro Rural	(541)	118	(75)	31	**(467)**
Labrador Industrial Transmission	0	(333)	(179)	(97)	**(609)**

The revenue deficiencies for setting customer rates included in Table 10 do not include the net impacts experienced by Hydro in 2015 and 2016 as a result of operation of the RSP using the 2007 Test Year inputs. They also do not include the recovery of the Island Interconnected energy supply costs deferred in accordance with the supply cost deferral accounts approved in the GRA Order.

As shown in Table 10, the billed base rate revenues to Newfoundland Power were in excess of the cumulative revenue deficiencies by $5.8 million. There were also $0.5 million excess revenues for Hydro Rural customers on the Labrador Interconnected System and $0.6 million for Labrador Industrial Transmission customers. There was a cumulative revenue deficiency of $1.5 million from Island Industrial Customers during the period of interim rates from 2014 to the end of June 2017.

4.0 Proposed Recovery of Revenue Deficiencies

4.1 Island Industrial Customers

The Board has established a separate process to determine the approach for recovery of the cumulative revenue deficiency of approximately $1.5 million from Island Industrial Customers.[21]

[21] Order No. P.U. 14(2017), page 17. On May 15, 2017, Corner Brook Pulp Paper, North Atlantic Refinery Limited (NARL) and Vale made a joint proposal with respect to a proposed approach to recovery of the GRA revenue

4.2 Newfoundland Power

Hydro proposes to deal with the cumulative effect of revenue deficiencies and excess revenues of the period 2014 to 2017 through adjustments to the RSP. The cumulative excess revenues for 2014 to 2016 of approximately $6.5 million would be credited to the RSP Current Plan balance effective January 1, 2017. The revenue deficiency for 2017 of approximately $0.8 million would be debited to the RSP Current Plan balance effective June 30, 2017.

4.3 Labrador Interconnected System

Hydro proposes to provide the excess revenues from Hydro Rural customers on the Labrador Interconnected System by applying a rate reduction which would effectively refund the excess revenues over a 30 month period (i.e., July 1, 2017 to December 31, 2019). For the Hydro Rural customers on the Labrador Interconnected System, this results in a 0.93% reduction in to the rates determined from the approved 2015 Test Year Cost of Service Study for rate setting.

Due to the relatively small number of Labrador Industrial Transmission customers, Hydro proposes to provide these customers a refund of approximately $0.6 million in the form of a credit to their bills in September 2017.

5.0 Conclusion

To permit Hydro to deal with forecast revenue deficiencies during the extended GRA process, the Board approved cost deferral accounts for 2014, 2015, and 2016. For 2014, the Board also approved the deferral of $9.7 million of additional capacity related supply costs incurred by Hydro in the first quarter of 2014.[22] Table 11 provides a comparison of the approved cost deferrals with the contributors to revenue deficiencies in each year.

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deficiency from Island Industrial Customers. Hydro replied on May 16, 2017 and advised the Board that it does not object to the proposal to utilize the credit balance in the RSP Load Variation Component to provide compensation of $174,000 to NARL and to transfer approximately $1.6 million to eliminate the GRA Revenue Deficiency. This matter is currently before the Board.

[22] Order No. P.U.56(2014).

Table 11
Summary of Cost Deferrals and Revenue Deficiencies

Particulars ($000s)	**2014**	**2015**	**2016**	**2017**	**Total**
Approved Cost Deferrals	45,900	30,200	38,800	-	114,900
Approved Fuel Cost Deferral	9,650	-	-	-	9,650
Approved Cost Deferrals	**55,550**	**30,200**	**38,800**	**-**	**124,550**
Revenue Deficiency/(Excess Revenues)	37,707	(9,814)	(33,933)	718	(5,322)
RSP Balance Change in Test Years	-	37,473	38,969	-	76,442
Additional Energy Supply Costs	-	17,782	24,427	-	42,210
Net Revenue Deficiency/(Sufficiency)	**37,707**	**45,441**	**29,463**	**718**	**113,330**
Deferral Adjustment Required	**(17,843)**	**15,241**	**(9,337)**	**718**	**(11,220)**

Table 11 shows that for 2014, the Board approved $55.6 million in cost deferrals. Hydro's recoverable costs based on the GRA Order are $37.7 million (a $17.8 million reduction relative to the cost deferral).

For 2015, Hydro has not yet recovered the $37.5 million through the updating of the RSP to reflect the 2015 Test Year or the $17.8 million in additional supply costs. This will occur in 2017 with the updating of the RSP to reflect the 2015 Test Year and through the filing of an additional application by Hydro to recover of the balances in the approved supply cost variance accounts. These cost items are offset by $9.8 million in excess billing revenues in 2015. The combined impact of these items is that Hydro's total revenue deficiency for 2015 was $45.4 million, which is $15.2 million in excess of the approved 2015 revenue deficiency deferral.

For 2016, Hydro has not yet recovered the $39.0 million through the updating of the RSP to reflect the 2015 Test Year or the $24.4 million in additional supply costs. This will occur in 2017 with the updating of the RSP to reflect the 2015 Test Year and through the filing of an additional application by Hydro to recover the balances in the approved supply cost variance accounts. These cost items are offset by $33.9 million in excess billing revenues in 2016. The combined impact of these items is that Hydro's total 2016 revenue deficiency was $29.5 million, or $9.3 million less than the approved deferral.

For 2017, the delay in implementation of customer rates until July 1, 2017 results in a revenue deficiency of $0.7 million.

The total of the cost deferrals approved for 2014 to 2016 was $124.6 million while the cumulative total of the revenue deficiencies was $113.3 million. Subsequent to the approval of the Energy Supply Cost Variance account definition provided in Exhibit 5, Hydro will file an application to for the recovery of the $42.2 million balance owed from customers.[23] Following recovery of the revenue deficiencies in 2017 with the updating of the RSP to reflect the 2015 Test Year and subsequent to a Board decision on an application to be filed by Hydro for recovery of the supply cost deferrals for 2015 and 2016, Hydro will close the revenue deficiency deferral accounts.

[23] Reflects actual deferred energy supply costs for 2015 and 2016. $38.8 million approved deferral was based on 2016 forecast.

Compliance Rates Application - Exhibit 4

Customer Rates Report

Revised – June 8, 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

Table of Content

1.0 Introduction

Hydro's 2015 Test Year revenue requirement for rate-setting reflecting the Board's findings in in Order No. P.U. 49(2016) (GRA Order) was provided in Exhibit 2 to the GRA Compliance Application filed on January 27, 2017. In Order No P.U. 14(2017) (GRA Compliance Order), the Board did not require Hydro to revise the proposed 2015 Test Year revenue requirement for rate setting.

Hydro's GRA Compliance filing proposed new customer rates effective April 1, 2017. In the GRA Compliance Order, the Board directed Hydro to revise its rate proposals to reflect a July 1, 2017 implementation date, to coincide with the annual update to the Utility Rate in compliance with the rules of the Rate Stabilization Plan (RSP).

This report provides:

- The approach followed by Hydro in computing proposed customer rates;
- The proposed RSP Adjustments to become effective July 1, 2017;
- The proposed Conservation and Demand Management (CDM) Recovery Adjustments to become effective July 1, 2017;
- A comparison of the existing and proposed customer rates including the estimated customer billing impacts from implementation of the proposed customer rates; and
- A reconciliation of revenues from proposed customer base rates to the revised 2015 Test Year revenue requirement for rate-setting.

2.0 Rate Design

2.1 General

The proposed rates reflect the approved rate designs from the GRA Order consistent with Hydro's GRA Compliance filing. The proposed customer rates for Newfoundland Power and Island Industrial Customers reflect a new RSP fuel rider, RSP Recovery Adjustment and a new CDM Recovery Adjustment to become effective July 1, 2017.

2.2 Cost of Service Study

The delayed implementation of GRA rates until July 1 does not change the 2015 Test Year Revenue Requirement for rate setting. However, the revised implementation date impacts forecast Test Year revenues from Hydro Rural customers which in turn impacts the rural deficit and the allocated revenue requirement to Newfoundland Power and the Hydro Rural customers on the Labrador Interconnected System. As a result, Hydro was required to update the 2015 Test Year Cost of Service Study to reflect these changes.

Hydro has used the interim Hydro Rural Rates approved July 1, 2015 as base rates for purposes of determining the Rural Deficit in the 2015 Cost of Service Study for rate setting. Any revisions to Hydro Rural revenues that result from rate changes since that time will flow though the RSP via the Rural Rate Alteration (RRA).[1] This approach does not negatively impact Newfoundland Power and its customers.

Exhibit 8 to this Compliance Rates Application provides Hydro's revised 2015 Test Year Cost of Service Study for rate setting purposes.

2.3 RSP Fuel Rider

Section C of the RSP rules includes a provision that requires that Hydro, by the 10th working day of April each year, report its RSP Fuel Price Projection for Newfoundland Power to the Board, Newfoundland Power and the Island Industrial Customers. The RSP Fuel Price Projection is used to determine a fuel rider to be included in the Utility Rate charged to Newfoundland Power effective July 1 each year.

[1] The inclusion of RSP adjustments would result in revenues for the first 6 months of the 2015 Test Year on one set of rates and the revenues for the second 6 months of the 2015 Test Year based on a second set of rates. This would add complexity in determining revenue from Hydro Rural rates and require a reversal of RRA that was in effect for the first 6 months of 2017. In July 2016, Island Interconnected retail rates reduced by 7.1% and the Island Interconnected retail rates are projected to increase by 8.5% in July 2017. Therefore, the July 1, 2015 rates are very similar to the retail rates that will result from the implementation of new customer rates effective July 1, 2017.

Section D of the RSP rules requires that when new Test Year base rates come into effect, if a fuel rider forecast (either March or September) is more current than the Test Year fuel forecast, a fuel rider must be included in the rates charged to both Newfoundland Power and the Island Industrial Customers at the time of implementation of new base rates. The new fuel rider must reflect the current fuel forecast and the new Test Year values.

The Board approved the use of a $64.41 per barrel fuel cost ($Can) for the 2015 Test Year based on a 2016 fuel price forecast which was filed on October 28, 2015. The fuel riders proposed in Hydro's GRA Compliance Application filed in January 2017 were based on the September 2016 fuel price forecast for the 2017 calendar year of $68.50 per barrel.[2] The forecast average No. 6 fuel price for the period July 2017 to June 2018 is $81.40 per barrel ($Can).[3] This forecasted fuel price reflects an increase of $16.99 per barrel ($Can) from the approved 2015 Test Year fuel cost and is reflected in the calculation of the fuel riders provided in Appendix A of this report.

As shown in Appendix A to this report, the proposed fuel rider for Newfoundland Power is 0.672¢/kWh and the proposed fuel rider for the Island Industrial Customers is 0.625¢/kWh. Hydro has used these fuel riders in its proposed July 1, 2017 rate schedules.

2.4 RSP Recovery Adjustment

Section D of the proposed RSP Rules approved in the GRA Compliance Order requires Hydro to calculate a new RSP Recovery Adjustment for Island Industrial Customers on January 1 of each year based on the RSP Current Plan balance as at December 31 of the previous year. This provision was suspended by the Board.

The RSP Recovery Adjustment for Newfoundland Power is updated annually each July 1 based on the March 31 Current Plan balance. Based on the normal operation of the RSP for 2017,

[2] All fuel cost projections are in Canadian dollars.
[3] The fuel price forecast of $81.40 per barrel reflect the $U.S. to $Can. exchange rate approved in the GRA Compliance Order. The proposed fuel riders to become effective July 1, 2017 use a U.S. to Canada exchange rate of 1.3388 from the month of March, 2017.

there would be a very large rate increase for retail customers on July 1, estimated to be more than 18%. In Order No P.U. 16(2017), the Board directed Hydro to transfer the Newfoundland Power RSP Load Variation balance to the Newfoundland Power RSP Current Plan to mitigate the proposed July 1, 2017 RSP Adjustment rate increase.

Order No. P.U. 16(2017) (the 2017 Newfoundland Power Rate Mitigation Order) requires Hydro set out the RSP Current Plan rate on the Utility Rate Sheet showing i) the RSP Current Plan rate, calculated in the ordinary course and ii) the RSP Current Plan mitigation rate. Appendix B to this report provides the calculation of the proposed RSP Recovery Adjustments for Newfoundland Power and the Island Industrial Customers. As shown in Appendix B, page 1 of 3, the RSP Recovery Adjustment for Newfoundland Power based on the normal operation of the RSP is (0.132)¢/kWh. As shown in Appendix C, page 2 of 3, the RSP Mitigation rate is (0.911)¢/kWh. The overall RSP Recovery Adjustment rate is (1.043)¢/kWh.

Hydro is proposing revised wording to Section B.4 of the RSP rules to provide flexibility in adjusting RSP Plan balances when directed by the Board. The proposed wording is provided in Exhibit 9. Further to Order No. P.U.54(2016), Hydro has proposed a revision to the RSP Rules to reflect the purchase premium included in its current No. 6 fuel purchase contract.[4]

Exhibit 6 to this Compliance Rates Application provides the RSP report for March 2017 showing the transfer of $50.3 million from the RSP Load Variation Component to the Newfoundland Power RSP Current Plan for use in rate mitigation.

The proposed RSP Recovery Adjustment for the Island Industrial Customers of is (0.373)¢ per kWh and was calculated based on the Island Industrial Customer RSP Current Plan balance at December 31, 2016. The approach is in accordance with the RSP rules.

[4] The proposed change varies slightly from its application of October 21, 2016. Specifically, for Newfoundland Power's fuel price projection "T" incorrectly stated "…for the following January to December." This has been corrected to state "…for the following July to June."

The proposed July 1, 2017 RSP adjustments also reflect the discontinuance of the RSP Surplus Adjustment rates that are currently in place as the Island Industrial Customer's RSP Balance has been fully refunded.[5]

2.5 Summary of RSP Adjustments Changes

Table 1 provides a comparison of the existing and proposed RSP adjustments for Newfoundland Power.

Table 1

RSP Adjustments – Newfoundland Power (¢ per kWh)

	Existing Rate	Proposed Rate	Change
Recovery Adjustment	(1.213)	(0.132)	1.081
Mitigation Adjustment	0	(0.911)	(0.911)
Fuel Rider	(0.023)	0.672	0.695
Total RSP Adjustment	**(1.236)**	**(0.371)**	**0.865**

The proposed RSP fuel rider reflects an increase of $16.99 per barrel relative to the approved 2015 Test Year fuel cost. The fuel rider for the previous year reflected the difference from the 2007 Test Year fuel cost of $55.45 per barrel and a forecast No. 6 fuel price of $54.60 per barrel. The fuel cost increase from the 2007 Test Year price of $55.45 per barrel to the 2015 Test Year fuel cost of $64.41 per barrel is reflected in the proposed base rates for Newfoundland Power and the Island Industrial customers.

Table 2 provides a comparison of the existing and proposed RSP adjustments for Island Industrial Customers.

[5] There is currently a debit balance owing from Island Industrial Customers related to overpayment of the Island Industrial Customers RSP Surplus balance. Hydro has proposed this balance be reflected in the calculation of the Current Plan RSP recovery adjustment to be implemented effective January 1, 2018.

Table 2: RSP Adjustments – Island Industrial Customers

	Existing	Proposed	Change
RSP Recovery Adjustment (¢ per kWh)	-	(0.373)	(0.373)
RSP Fuel Rider (¢ per kWh)	-	0.625	0.625
RSP Surplus Energy (¢ per kWh)	(0.294)	-	0.294
Total Class RSP Energy Adjustments (¢ per kWh)	**(0.294)**	**0.252**	**0.546**
Class RSP Surplus Demand Adjustment ($/kW)	**(1.52)**	**-**	**1.52**
Teck RSP Adjustment (¢ per kWh)	**(1.141)**	**-**	**1.141**

2.6 CDM Cost Recovery Adjustment

The Conservation and Demand Management (CDM) Cost Recovery schedule was approved for inclusion in the Schedule of Rates, Rules and Regulations in the GRA Order. The CDM Cost Recovery Adjustment provides the method of allocation and recovery of the CDM Cost Deferral Account balance, with rate adjustments to be implemented for Newfoundland Power and Island Industrial Customers each July 1.

Appendix C to this report provides a calculation of the CDM Cost Recovery adjustments for each of Newfoundland Power and the Island Industrial Customers.

3.0 Proposed Customer Rates

3.1 General

Exhibit 9 provides the revised Schedule of Rates, Rules and Regulations (including RSP Rules) reflecting the Board's decisions in the GRA Order, the GRA Compliance Order, and the 2017 Newfoundland Power Rate Mitigation Order. The rates have been revised from those filed in the Compliance filing in January as a result of the change in the implementation date from that proposed in the GRA Compliance filing as directed by the GRA Compliance Order. The CDM Cost Recovery Adjustment has been added to the proposed rate sheets for Newfoundland Power and the Island Industrial Customers.

Hydro has also revised the RSP Rules to permit the RSP transfer as directed by the Board in the 2017 Newfoundland Power Rate Mitigation Order.

The following section provides a summary of Hydro's proposed rates for customers.

3.2 Utility Rate

Table 3 provides a comparison of the existing and proposed Utility Rate including both the change in the base rates and the RSP adjustments.

Table 3: Utility Rate by Rate Component

	Existing Rate	**Proposed Rate**	**Change**
Monthly Demand Charge ($/kW)	4.32	4.75	0.43
Monthly Energy Charges (¢ per kWh)			
1st 250 GWh	3.506	2.226	(1.280)
Excess	9.509	10.422	0.913
Firming Up Charge	0.908	2.882	1.974
RSP Adjustments			
RSP – Recovery Adjustment	(1.213)	(0.132)	1.081
RSP – Mitigation Adjustment	0	(0.911)	(0.911)
RSP – Fuel Rider	(0.023)	0.672	0.695
Total RSP Adjustment	**(1.236)**	**(0.371)**	**0.865**
CDM Cost Recovery Adjustment	**0.000**	**0.019**	**0.019**
Generation Credit (kW)	**117,930**	**119,329**	**1,399**
Minimum Billing Demand (kW)	**1,063,824**	**1,247,569**	**183,475**

The proposed Utility rate is in compliance with the GRA Order, the GRA Compliance Order, and the 2017 Newfoundland Power Rate Mitigation Order. The annualized billing impact of implementing the proposed Utility base rate and the revised RSP adjustments based on the

2015 Test Year load forecast is a 12.6% increase.[6] The end-consumer impact is estimated at an approximate 8.5% increase. The supporting calculations for the Newfoundland Power billing impacts are provided in Appendix D to this report.

3.3 Island Industrial Customers

The proposed rates for Island industrial Customers provided in Exhibit 9 have discontinued the RSP Surplus demand and energy adjustments, introduced a RSP adjustment to reflect the current plan balance at December 31, 2016, and included a new fuel rider to reflect the difference between the 2015 Test Year No.6 fuel price of $64.41 per barrel and the forecast No. 6 fuel price for the period July 2017 to June 2018 of $81.40 per barrel.

Table 4 provides a comparison of the existing and proposed Island Industrial Customers rates including the change in the base rates and the RSP adjustments.[7]

Table 4: Island Industrial Rate by Rate Component

	Existing Rate	Proposed Rate	Change
Monthly Demand Charge ($/kW)	8.38	7.99	(0.39)
RSP Surplus Demand Credit ($/kW)	(1.52)	0.00	1.52
Net Demand Charge ($/kW)	**6.86**	**7.99**	**1.13**
Monthly Energy Charges (¢ per kWh)	4.069	3.971	(0.098)
RSP Adjustments			
RSP - Fuel Rider	0.000	0.625	0.625
RSP – Recovery Adjustment (normal)	0.000	(0.373)	(0.373)
RSP Surplus Energy Credit	(0.294)	0.000	0.294
Total Class RSP Adjustment (¢ per kWh)	**(0.294)**	**0.252**	**0.546**
Teck RSP Adjustment	**(1.141)**	**0.000**	**1.141**
CDM Cost Recovery Adjustment	**0.000**	**0.009**	**0.009**

[6] The proposed base rate change for Newfoundland Power is a decrease of 1.2%. The inclusion of the revised RSP adjustments results in the rate increase.
[7] Options to potentially mitigate the rate impacts to Island Industrial Customers are being considered separately by the Board. Hydro is currently reviewing the proposal put forth by the Island Industrial Customers on May 17, 2017, and will file a response no later than Wednesday, May 24, 2017.

The annualized billing impact of implementing the proposed Industrial Customer rate provided in Table 2 based on the 2015 Test Year load forecast is an average 16.8% increase.[8]

Table 5 provides the projected customer rate impacts for the Island Industrial Customers.

Table 5

Projected Island Industrial Customer Rate Impacts, July 1, 2017

Customer	**Rate Impact**
CBPP	30.6%
NARL	12.3%
Vale	16.6%
Praxair	13.0%
Teck Resources	38.2%
Total Class	**16.8%**

The supporting calculations for the Island Industrial Customer billing impacts reflecting the RSP Adjustments reflecting the current RSP rules are provided in Appendix E to this report.

3.4 Hydro Rural Customers

3.4.1 Island Interconnected and L'Anse Au Loup

The proposed rate change for the Hydro Rural Island Interconnected customers and customers in L'Anse au Loup equal the proposed rate increase of 8.5% to the customers of Newfoundland Power.

3.4.2 Hydro Rural Non-Government Diesel System Customers

The GRA Order approved higher than the average increases for Hydro Rural non-Government Domestic and General Service customers on Isolated Systems than the rate change proposed for the Hydro Rural Interconnected customers. These higher than average increases result from

[8] The addition of the CDM Recovery Adjustment results in a 0.2% average increase for Island Industrial Customers.

the combined impact of i) the 2015 Test Year forecast change of 8.5% in rates for Island Interconnected customers, and ii) the increase in rates to implement the 2007 rate change that was deferred as a result of Government directives.[9]

3.4.3 Hydro Rural Government Diesel System Customers

Hydro has also proposed full cost recovery rates for Government customers on Isolated Diesel systems consistent with past practice and approved in the GRA Order. The proposed Government diesel system rates are consistent with those provided in Exhibit 14 of the GRA Compliance Application.

3.4.4 Labrador Interconnected System - Hydro Rural Customers

The rate change for Hydro Rural customers on the Labrador Interconnected System based on the 2015 Test Year Cost of Service Study for rate setting in an average increase of 0.15% applied equally to each rate class with the exception of Street and Area Lighting (15.3% increase) for an overall 0.4% increase. However, as explained in the Recovery of Revenue Deficiencies Report provided in Exhibit 3, Hydro had cumulative excess revenues from the Hydro Rural customers on the Labrador Interconnected System for the period 2014 to 2017.

To provide disposition of the excess revenues, Hydro is proposing to apply a 0.93% reduction to each of the rates derived to recover the approved 2015 Test Year Revenue Requirement for rate setting. The proposed approach results in disposition of the excess revenues over the 30 month period from July 1, 2017 to December 31, 2019.

The end result of the combined 0.4% increase in Test Year revenue requirement and a 0.93% decrease to provide the disposition of excess revenues is a proposed average overall decrease

[9] The bill impacts differ for Hydro's Rural Domestic Customers in L'Anse au Loup and in Labrador Diesel Systems that are eligible for the Northern Strategic Plan rebate provided by the Provincial Government, as those customers pay the Labrador Interconnected Domestic rate for the lifeline consumption block.

of 0.5% with a 0.8% decrease applied equally to each rate class with the exception of Street and Area Lighting (14.3% increase).[10]

3.4.5 Summary of Hydro Rural Customer Rate Impacts

Table 6 provides a summary of the proposed Hydro Rural customer impacts.

Table 6
Impact of Proposed Rate Change for Hydro Rural Customers – July 1, 2017

	Customer Rate Impact
Rural Island Interconnected & L'Anse au Loup	8.5%
Isolated Systems	
Domestic	13.0%
General Service – 2.1D 0-10 kW	24.3%
General Service – 2.2D 10 kW and Over	24.9%
General Service – Island Interconnected Rates	8.5%
Government Diesel	8.6%
Street and Area Lighting	8.5%
Isolated Systems Total	**15.1%**
Rural Labrador Interconnected	
Domestic and General Service	(0.8%)
Street and Area Lighting	14.3%
Labrador Interconnected Total	**(0.5%)**

Hydro has not filed the proposed rates for its Rural customers whose rates change based on the rates to be implemented for Newfoundland Power customers. Those rates will be filed for approval subsequent to Newfoundland Power filing its application to flow-through Hydro's rate

[10] This approach is consistent with the rate design proposals reflected in the Amended GRA and Exhibit 4 of the GRA Compliance Application.

change to its customers. Hydro has filed its proposed rates for customers on the Labrador Interconnected System and Government customers on Isolated Systems. Appendix F provides a comparison of existing and proposed rates for these customers.

3.5 Labrador Industrial Transmission Rate

Hydro updated it 2015 Test Year Cost of Service Study and derived a revised rate of $1.19 per kW of Billing Demand, to be applied on a prospective basis. The rate sheet provided in Exhibit 9 for the Labrador Industrial Transmission Rate states that the approved rate is available to existing customers only, as required by the GRA Order, and reflects the Billing Demand definition approved in Order No. P.U. 15(2016).

As explained in the Recovery of Revenue Deficiencies Report provided in Exhibit 3, Hydro had excess cumulative excess revenues of $609,000 from the Labrador Transmission Demand Customers for the period 2014 to 2017. To provide disposition of the excess revenues, Hydro is proposing to apply a credit to the customers' bills in September 2017. The credit is proposed to be allocated based on the proportion of the total billings from each customer for the period January 1, 2014 to June 30, 2017. Hydro is proposing the application of a credit for excess revenue disposition for this class as it administratively practical due to the small number of customers in the class.

3.6 Reconciliation of Rates and Cost of Service

Hydro's total revenues under the proposed rates reconcile to the revised 2015 Test Year Cost of Service Study for rate-setting purposes provided in Exhibit 8 with the exception of the proposed rate adjustment to deal with disposition of excess revenues for Hydro Rural Customers on the Labrador Interconnected System. Table 7 provides a comparison of revenues under existing and proposed customer base rates. The base rate revenues provided in Table 7 do not include charges for the proposed RSP adjustments as RSP billings do not provide revenues to Hydro. The figures in Table 7 also do not include the disposition of excess revenues to customers on the Labrador Interconnected System.

Table 7

Reconciliation of Total Base Rate Revenues and Cost of Service for Rate Setting

	Proposed
Newfoundland Power	$443,359,435
Island Industrial	$34,823,379
Labrador Industrial	
Transmission	$3,855,600
Generation Cost Recovery	$1,355,306
Total Labrador Industrial	$5,210,906
CFB Goose Bay Secondary	$932,221
Rural Island Interconnected	$48,698,726
Rural Isolated Systems	$9,425,141
L'Anse au Loup	$2,726,969
Rural Labrador Interconnected	
Domestic	$11,167,803
GS 2.1 0-10 kW	$410,789
GS 2.2 10-100 kW	$2,345,631
GS 2.3 110-1000 kVA	$3,075,654
GS 2.4 Over 1000 kVA	$2,810,272
Street & Area Lighting	$360,347
Total Rural Labrador Interconnected	$20,170,496
All Rural Systems Total	$81,021,332
Grand Total	**$565,347,273**
Per Cost of Service	**$565,347,273**[11]
Difference	**$0**

[11] Reconciliation to the 2015 Test Year Cost of Service, Sch 1.2, Page 1 of 6, Column 2, Line 15 as provided In Exhibit 8 to this Application.

4.0 Conclusion

The proposed Schedule of Rates, Rules and Regulations presented in Exhibit 9 to the Compliance Rates Application reflect the findings and determinations of the Board in the GRA Order, the GRA Compliance Order, and the 2017 Newfoundland Power Rate Mitigation Order.

Hydro proposes that the Rates, Rules and Regulations contained in Exhibit 9 to this Compliance Rates Application, the proposed RSP adjustments provided in Appendix A and B to this report, and the proposed CDM Cost Recovery Adjustments provided in Appendix C to this report become effective July 1, 2017.

Newfoundland and Labrador Hydro
Rate Stabilization Plan Fuel Price Projection Rider
Utility Customer

	Customer Allocation	**Amount**	**Comments**
1	March 2017 Fuel Price Projection	$ 81.40	From Page 3
2	2015 Test Year Fuel Forecast Cost	$ 64.41	
3	Forecast Fuel Price Variance	$ 16.99	Line 1 - Line 2
4	2015 Test Year No. 6 Barrels Consumed	2,577,657	
5	Forecast Fuel Variance	$ 43,794,392	Line 3 x Line 4
6	Utility Customer Allocation Ratio	90.85%	From Line 8
7	Utility Customer Allocation	$ 39,787,205	Line 5 x Line 6

	Calculation of Customer Allocation	**kWh**	**Percent of Total**	**Allocation of Rural**	**Total**
8	2015 Test Year Utility Sales Forecast	5,924,100,000	84.52%	6.33%	90.85%
9	2015 Test Year Industrial Customer Sales Forecast	621,400,000	8.87%	0.00%	8.87%
10	2015 Test Year Bulk Rural Energy Sales Forecast	463,900,000	6.62%	-6.62%	0.00%
11	Total	7,009,400,000			

	Calculation of Utility Customer RSP Rate	**Amount**	**Comments**
	Fuel Rider		
12	Utility Allocation	$ 39,787,205	From Line 7
13	2015 Test Year Utility Sales Forecast	5,924,100,000	From Line 8
14	Fuel Projection Rider (cents per kWh)	**0.672**	Line 12/Line 13 x 1000

Newfoundland and Labrador Hydro
Rate Stabilization Plan Fuel Price Projection Rider
Industrial Customers

	Customer Allocation	**Amount**	**Comments**
1	March 2017 Fuel Price Projection	$ 81.40	From Page 3
2	2015 Test Year Fuel Forecast Cost	$ 64.41	
3	Forecast Fuel Price Variance	$ 16.99	Line 1 - Line 2
4	2015 Test Year No. 6 Barrels Consumed	2,577,657	
5	Forecast Fuel Variance	$ 43,794,392	Line 3 x Line 4
6	Industrial Customer Allocation Ratio	8.87%	From Line 9
7	Industrial Customer Allocation	$ 3,884,563	Line 5 x Line 6

	Calculation of Customer Allocation	**kWh**	**Percent of Total**	**Allocation of Rural**	**Total**
8	2015 Test Year Utility Sales Forecast	5,924,100,000	84.52%	6.33%	90.85%
9	2015 Test Year Industrial Customer Sales Forecast	621,400,000	8.87%	0.00%	8.87%
10	2015 Test Year Bulk Rural Energy Sales Forecast	463,900,000	6.62%	-6.62%	0.00%
11	Total	7,009,400,000			

	Calculation of Industrial Customer RSP Rate	**Amount**	**Comments**
	Rate Rider		
12	Industrial Allocation	$ 3,884,563	From Line 7
13	2015 Test Year Industrial Customer Sales Forecast	621,400,000	From Line 9
14	Fuel Projection Rider (cents per kWh)	**0.625**	Line 12/Line 13 x 1000

NEWFOUNDLAND AND LABRADOR HYDRO
Rate Stabilization Plan Estimated Fuel Price Projection Rider - New Fuel Contract

Hydro Forecast US $/bbl [(1)]		*Forecast* US $/bbl (a)	*Premium / (Discount)* US $/bbl (b)		*Landed Forecast Price* US $/bbl (c) = (a) + (b)
2017	*July*	*51.35*	*3.23*		
	August	*52.22*	*3.23*		
	September	*52.63*	*3.23*		
	October	*55.18*	*5.03*	(3)	
	November	*57.46*	*5.03*		
	December	*57.91*	*5.03*		
2018	*January*	*58.75*	*5.03*		
	February	*60.58*	*5.03*		
	March	*57.24*	*5.03*		
	April	*56.33*	*5.03*		
	May	*56.62*	*5.03*		
	June	*58.22*	*5.03*		
Average Holyrood Forecast Landed Price $US/bbl)		*56.21*	*4.58*		*60.79*
$Cdn/$US Noon Exchange Rate [(4)]					*1.3388*
NLH Fuel Price Projection ($Cdn/bbl) [(2)]					*$81.40*

Notes:

(1) $US pricing: New York Harbour price forecast, March 2017.
(2) Price per barrel is rounded to the nearest $0.05.
(3) Year 3 of Hydro's current No. 6 fuel contract is effective September 23, 2017.
(4) Monthly average of the Bank of Canada $Cdn/$US Noon Exchange Rate for the month of March 2017, rounded to 4 decimal places.

Newfoundland and Labrador Hydro
Rate Stabilization Plan Recovery Adjustment – No Mitigation
Newfoundland Power

Line No	Calculation of Newfoundland RSP Rate	Amount	Comments
	Current Plan		
1	March Balance (Before Mitigation Transfer of $50,737,099)	$ (22,706,380)	March RSP
2	Forecast Financing Costs	$ (549,037)	From Line 23
3	Forecast Recovery to June 30	$ 15,530,597	Lines 8 to 10
4	Total to be recovered	$ (7,724,820)	Lines 1 to 3
5	12 months to date (Apr 2016-Mar 2017) Newfoundland Power Sales	5,868,946,088	From Line 8
6	**Normal RSP Recovery Adjustment rate (¢ per kWh)**	**(0.132)**	Line 4/Line 5 x 1000

Newfoundland Power Forecast Financing Charges
2016-2017

2015 Test Year Weighted Average Cost of Capit:	6.610%
Nominal Financing Rate	6.418%

Line		Sales kWh	Financing Costs	Adjustment	Total To Date Balance
7	Balance Forward				$ (22,706,380)
8	April	520,761,236	$ (121,441)	$ 6,316,834	(16,510,987)
9	May	412,499,270	(88,306)	$ 5,003,616	(11,595,678)
10	June	347,085,498	(62,018)	$ 4,210,147	(7,447,548)
11	July	314,644,032	(39,832)	415,330	(7,072,050)
12	August	302,974,620	(37,824)	399,926	(6,709,947)
13	September	327,366,899	(35,887)	432,124	(6,313,710)
14	October	417,952,992	(33,768)	551,698	(5,795,780)
15	November	463,553,443	(30,998)	611,891	(5,214,887)
16	December	701,229,630	(27,891)	925,623	(4,317,155)
17	January	724,216,282	(23,090)	955,965	(3,384,279)
18	February	661,481,509	(18,100)	873,156	(2,529,224)
19	March	675,180,677	(13,527)	891,238	(1,651,512)
20	April	520,761,236	(8,833)	687,405	(972,940)
21	May	412,499,270	(5,204)	544,499	(433,645)
22	June	347,085,498	(2,319)	458,153	22,189
23	Total		$ (549,037)	$ 23,277,606	

Newfoundland and Labrador Hydro
Rate Stabilization Plan Recovery Adjustment – With Mitigation
Newfoundland Power

Line No	Calculation of Newfoundland RSP Rate		Amount	Comments
	Current Plan			
1	March Balance (After Mitigation Transfer of $50,737,099)	$	(73,443,479)	March RSP
2	Forecast Financing Costs	$	(3,291,395)	From Line 23
3	Forecast Recovery to June 30	$	15,530,597	Lines 8 to 10
4	Total to be recovered	$	(61,204,277)	Lines 1 to 3
5	12 months to date (Apr 2016-Mar 2017) Newfoundland Power Sales		5,868,946,088	From Line 8
6	**Total RSP Recovery Adjustment rate (¢ per kWh)**		**(1.043)**	Line 4/Line 5 x 1000
	RSP Mitigation Adjustment rate (¢ per kWh) = (1.043) - (0.132)		**(0.911)**	

Newfoundland Power Forecast Financing Charges
2016-2017

2015 Test Year Weighted Average Cost of Capital per ar	6.610%
Nominal Financing Rate	6.418%

Line		Sales kWh		Financing Costs		Adjustment		Total To Date Balance
7	Balance Forward						$	(73,443,479)
8	April	520,761,236	$	(392,800)	$	6,316,834		(67,519,445)
9	May	412,499,270		(361,117)	$	5,003,616		(62,876,946)
10	June	347,085,498		(336,287)	$	4,210,147		(59,003,086)
11	July	314,644,032		(315,568)		3,281,737		(56,036,916)
12	August	302,974,620		(299,704)		3,160,025		(53,176,595)
13	September	327,366,899		(284,406)		3,414,437		(50,046,565)
14	October	417,952,992		(267,666)		4,359,250		(45,954,981)
15	November	463,553,443		(245,783)		4,834,862		(41,365,901)
16	December	701,229,630		(221,239)		7,313,825		(34,273,314)
17	January	724,216,282		(183,305)		7,553,576		(26,903,044)
18	February	661,481,509		(143,886)		6,899,252		(20,147,678)
19	March	675,180,677		(107,756)		7,042,134		(13,213,300)
20	April	520,761,236		(70,669)		5,431,540		(7,852,429)
21	May	412,499,270		(41,997)		4,302,367		(3,592,060)
22	June	347,085,498		(19,212)		3,620,102		8,831
23	Total		$	(3,291,395)	$	76,743,705		

Newfoundland and Labrador Hydro

Rate Stabilization Plan Recovery Adjustment
Industrial Customers

	Calculation of Industrial Customer RSP Rate		Amount	Comments
	Current Plan			
1	December Balance		$ (1,817,842)	December RSP 2016 [(1)]
2	Adjustment		$ -	
3	December Balance		$ (1,817,842)	Line 1 minus Line 2
4	Forecast Financing Costs to December 31, 2017		$ (64,993)	Line 21
5	Total		$ (1,882,835)	Line 3 plus Line 4
6	12 months to date (Jan - Dec) Industrial Customer Sales (kWh)	divided by	505,383,547	December RSP 2016
7	**RSP Recovery Adjustment rate (¢ per kWh)**		**(0.373)**	Line 5/Line 6*1000

Industrial Customer Forecast Financing Charges
2016

2015 Test Year Weighted Average Cost of Capital per annum	6.610%
Nominal Financing Rate	6.418%

		Sales kWh	Financing Costs	Adjustment	Total To Date Balance
8	Balance Forward				(1,817,842)
9	January	39,449,999	(9,722)	147,148	(1,680,416)
10	February	39,164,558	(8,987)	146,084	(1,543,320)
11	March	41,340,048	(8,254)	154,198	(1,397,375)
12	April	39,523,430	(7,474)	147,422	(1,257,427)
13	May	44,414,234	(6,725)	165,665	(1,098,487)
14	June	40,713,651	(5,875)	151,862	(952,500)
15	July	41,725,504	(5,094)	155,636	(801,958)
16	August	46,371,467	(4,289)	172,966	(633,282)
17	September	39,352,823	(3,387)	146,786	(489,882)
18	October	46,418,307	(2,620)	173,140	(319,362)
19	November	43,143,243	(1,708)	160,924	(160,146)
20	December	43,766,283	(857)	163,248	2,246
21	Total	505,383,547	(64,993)	1,885,081	

[(1)] Reflects December 2016 RSP balance restated for the 2015 Test Year.

Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Recovery Adjustment
Island Industrial Customers

Line		2016 Energy Sales (kWh)	Percent of Total kWh	Allocation of Recoverable Amount ($000)	
1	**A) Island Interconnected Recoverable Allocation**				
2					
3	Newfoundland Power	5,844,734,737	85.62%	3,874	
4	Island Industrial Firm	505,383,550	7.40%	335	
5	Rural Island Interconnected	476,456,642	6.98%	316	
6	Total	6,826,574,929	100%	4,525	From Page 3, Line 3
7					
8					

Line			
9	**B) Calculation of Island Industrial Customers' 2017 CDM Recovery Adjustment**		
10	Island Industrial Current Year Allocation ($000)	48	(Line 4 / 7 years)
11	2016 Enery Sales - Island Industrial Customers (kWh)	505,383,550	From Line 4
12	CDM Cost Recovery Adjustment (cents per kWh)	**0.009**	(Line 10 x 1000) / Line 11

Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Recovery Adjustment
Newfoundland Power

1	**A) Newfoundland Power's Allocation of CDM Cost Deferral Account Balance**		
2	*Newfoundland Power's Allocation of Rural CDM Balance*		
3	Rural Island Interconnected's Allocation ($000)	316	From Page 1, Line 5
4	Rural Isolated System's Recoverable Amount ($000)	3,846	From Page 3, Line 4
5	Total Rural CDM	4,162	Line 3 + Line 4
6	Newfoundland Power's Allocation (%) of Rural CDM Balance[1]	x 95.6%	
7	Newfoundland Power's Allocation of Rural CDM Balance	3,979	Line 5 x Line 6
8			
9	Newfoundland Power's Direct Allocation of Island Int. CDM Balance ($000)	3,874	From Page 1, Line 4
10			
11	Total Newfoundland Power Allocation of CDM Account Balance ($000)	7,853	Line 7 + Line 9
12			
13	**B) Calculation of Newfoundland Power's 2017 CDM Recovery Adjustment**		
14	Newfoundland Power's Current Year Allocation ($000)	1,122	Line 11 / 7 years
15	2016 Enery Sales - Newfoundland Power (kWh)	5,844,734,737	From Page 1, Line 3
16	CDM Cost Recovery Adjustment (cents per kWh)	**0.019**	(Line 14 x 1000) / Line 15
17			
18	[1] Based on Rural Deficit Allocation between Newfoundland Power and Rural Labrador Interconnected customers in the 2015 Test Year Cost of Service Study.		

Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Recovery Adjustment

Conservation and Demand Management Account Activity ($000s)[1]									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Island Interconnected	167	415	474	433	463	1,717	358	497	**4,525**
Hydro Rural Isolated	-	-	-	951	986	712	543	654	**3,846**
Total	**167**	**415**	**474**	**1,384**	**1,449**	**2,429**	**901**	**1,152**	**8,371**

[1] Balances calculated in accordance with the Conservation and Demand Management Cost Deferral Account.

Newfoundland and Labrador Hydro
Calculation of Customer Billing Impact
Newfoundland Power

	2015 TY Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Increase Utility	Consumer
Demand (kWs)	15,122,052	$/kW/mo	4.32	65,327,265	4.75	71,829,747		
Energy (MWhs)	3,000,000	¢/kWh	3.506	105,180,000	2.226	66,780,000		
Energy (MWhs)	2,924,100	¢/kWh	9.509	278,052,669	10.422	304,749,702		
				448,559,934		443,359,449	-1.2%	
RSP Recovery Adjustment-Normal	5,924,100	¢/kWh	(1.213)	(71,859,333)	(0.132)	(7,819,812)		
RSP Mitigation impact	5,924,100	¢/kWh	0.000	-	(0.911)	(53,968,551)		
RSP Total Recovery Adjustment	5,924,100	¢/kWh	(1.213)	(71,859,333)	(1.043)	(61,788,363)		
RSP Fuel Rider	5,924,100	¢/kWh	(0.023)	(1,362,543)	0.672	39,809,952		
CDM Recovery Adjustment	5,924,100	¢/kWh	0.000	-	0.019	1,125,579		
Total Riders			(1.236)	(73,221,876)	(0.352)	(20,852,832)		
Total				**375,338,058**		**422,506,617**	**12.6%**	**8.5%**

Newfoundland and Labrador Hydro
Island Industrial Customer Rate Impact

Total Island Industrial Customers

	2015 Test Year Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Change vs Existing
Demand (kWs)	1,064,800	$/kW/mo	8.38	8,923,024	7.99	8,507,752	
Energy (MWhs)	621,400	¢/kWh	4.069	25,284,766	3.97	24,675,794	
Spec. Assigned		$	684,312	684,312	1,639,833	1,639,833	
				34,892,102		34,823,379	-0.2%
RSP: Current Plan	621,400	¢/kWh	-	-	(0.373)	(2,317,822)	
RSP: Fuel Rider	621,400	¢/kWh	-	-	0.625	3,883,750	
RSP: Teck Rate	20,400	¢/kWh	(1.141)	(232,764)	-	-	
RSP: IC Surplus Credit (Demand)	1,064,800	$/kW	(1.52)	(1,618,496)	-	-	
RSP: IC Surplus Credit (Energy)	621,400	¢/kWh	(0.294)	(1,826,916)	-	-	
Total RSP				(3,678,176)		1,565,928	
CDM Recovery Adjustment	621,400	¢/kWh	-	-	0.009	55,926	
Firm plus RSP				**31,213,926**		**36,445,233**	**16.8%**

Newfoundland and Labrador Hydro
Island Industrial Customer Rate Impact

Praxair

	2015 Test Year Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Change vs Existing
Demand (kWs)	72,000	$/kW/mo	8.38	603,360	7.99	575,280	
Energy (MWhs)	51,600	¢/kWh	4.069	2,099,604	3.971	2,049,036	
Spec. Assigned		$		-		-	
				2,702,964		2,624,316	-2.9%
RSP: Current Plan	51,600	¢/kWh	-	-	(0.373)	(192,468)	
RSP: Fuel Rider	51,600	¢/kWh	-	-	0.625	322,500	
RSP: IC Surplus Credit (Demand)	72,000	$/kW	(1.52)	(109,440)	-	-	
RSP: IC Surplus Credit (Energy)	51,600	¢/kWh	(0.294)	(151,704)	-	-	
Total RSP				(261,144)		130,032	
CDM Recovery Adjustment	51,600	¢/kWh	-	-	0.009	4,644	
Firm plus RSP				**2,441,820**		**2,758,992**	**13.0%**

Newfoundland and Labrador Hydro
Island Industrial Customer Rate Impact

Vale

	2015 Test Year Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Change vs Existing
Demand (kWs)	488,800	$/kW/mo	8.38	4,096,144	7.99	3,905,512	
Energy (MWhs)	280,800	¢/kWh	4.069	11,425,752	3.971	11,150,568	
Spec. Assigned		$		-	480,243	480,243	
				15,521,896		15,536,323	0.1%
RSP: Current Plan	280,800	¢/kWh	-	-	(0.373)	(1,047,384)	
RSP: Fuel Rider	280,800	¢/kWh	-	-	0.625	1,755,000	
RSP: IC Surplus Credit (Demand)	488,800	$/kW	(1.52)	(742,976)	-	-	
RSP: IC Surplus Credit (Energy)	280,800	¢/kWh	(0.294)	(825,552)	-	-	
Total RSP				(1,568,528)		707,616	
CDM Recovery Adjustment	280,800	¢/kWh	-	-	0.009	25,272	
Firm plus RSP				**13,953,368**		**16,269,211**	**16.6%**

Newfoundland and Labrador Hydro
Island Industrial Customer Rate Impact

CBPP

	2015 Test Year Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Change vs Existing
Demand (kWs)	108,000	$/kW/mo	8.38	905,040	7.99	862,920	
Energy (MWhs)	44,800	¢/kWh	4.069	1,822,912	3.971	1,779,008	
Spec. Assigned		$	347,167	347,167	870,898	870,898	
				3,075,119		3,512,826	14.2%
RSP: Current Plan	44,800	¢/kWh	-	-	(0.373)	(167,104)	
RSP: Fuel Rider	44,800	¢/kWh	-	-	0.625	280,000	
RSP: IC Surplus Credit (Demand)	108,000	$/kW	(1.52)	(164,160)	-	-	
RSP: IC Surplus Credit (Energy)	44,800	¢/kWh	(0.294)	(131,712)	-	-	
Total RSP				(295,872)		112,896	
CDM Recovery Adjustment	44,800	¢/kWh	-	-	0.009	4,032	
Firm plus RSP				**2,779,247**		**3,629,754**	**30.6%**

Newfoundland and Labrador Hydro
Island Industrial Customer Rate Impact

NARL

	2015 Test Year Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Change vs Existing
Demand (kWs)	354,000	$/kW/mo	8.38	2,966,520	7.99	2,828,460	
Energy (MWhs)	223,800	¢/kWh	4.069	9,106,422	3.971	8,887,098	
Spec. Assigned		$	150,976	150,976	89,293	89,293	
				12,223,918		11,804,851	-3.4%
RSP: Current Plan	223,800	¢/kWh	-	-	(0.373)	(834,774)	
RSP: Fuel Rider	223,800	¢/kWh	-	-	0.625	1,398,750	
RSP: IC Surplus Credit (Demand)	354,000	$/kW	(1.52)	(538,080)	-	-	
RSP: IC Surplus Credit (Energy)	223,800	¢/kWh	(0.294)	(657,972)	-	-	
Total RSP				(1,196,052)		563,976	
CDM Recovery Adjustment	223,800	¢/kWh	-	-	0.009	20,142	
Firm plus RSP				**11,027,866**		**12,388,969**	**12.3%**

Newfoundland and Labrador Hydro
Island Industrial Customer Rate Impact

Teck

	2015 Test Year Billing Units	Unit	Existing	$	July 1, 2017 Forecast	$	Percent Change vs Existing
Demand (kWs)	42,000	$/kW/mo	8.38	351,960	7.99	335,580	
Energy (MWhs)	20,400	¢/kWh	4.069	830,076	3.971	810,084	
Spec. Assigned		$	186,169	186,169	199,399	199,399	
				1,368,205		1,345,063	-1.7%
RSP: Current Plan	20,400	¢/kWh	-	-	(0.373)	(76,092)	
RSP: Fuel Rider	20,400	¢/kWh	-	-	0.625	127,500	
RSP: Teck Rate	20,400	¢/kWh	(1.14)	(232,764)	-	-	
RSP: IC Surplus Credit (Demand)	42,000	$/kW	(1.52)	(63,840)	-	-	
RSP: IC Surplus Credit (Energy)	20,400	¢/kWh	(0.294)	(59,976)	-	-	
Total RSP				(356,580)		51,408	
CDM Recovery Adjustment	20,400	¢/kWh	-	-	0.009	1,836	
Firm plus RSP				**1,011,625**		**1,398,307**	**38.2%**

Newfoundland and Labrador Hydro
Labrador Interconnected

	Current Rate	Cost of Service Base Rate	Proposed Rate *w/ Adjustment for Excess Earnings*
Rate 1.2 Domestic			
Basic Customer Charge (per month)	$7.15	$7.16	$7.09
Energy (cents per kWh)	3.280	3.285	3.255
Rate 2.1 General Service (0-10 kW)			
Basic Customer Charge (per month)			
Unmetered (per month)	N/A	$6.47	$6.41
Single Phase (per month)	$10.45	$10.47	$10.37
Three Phase (per month)	N/A	$16.47	$16.32
Energy (cents per kWh)	5.240	5.140	5.092
Rate 2.2 General Service (10-100 kW)			
Basic Customer Charge (per month)			
Unmetered (per month)	N/A	$6.47	$6.41
Single Phase (per month)	N/A	$10.47	$10.37
Three Phase (per month)	N/A	$16.47	$16.32
Demand (dollars per kW)	$2.20	$1.78	$1.76
Energy (cents per kWh)	2.433	2.440	2.417
Rate 2.3 General Service (110-1000 kVA)			
Demand (dollars per kVA)	$2.00	$1.99	$1.97
Energy (cents per kWh)	2.103	2.110	2.090
Rate 2.4 General Service (Over 1000 kVA)			
Demand (dollars per kVA)	$1.75	$1.73	$1.71
Energy (cents per kWh)	1.733	1.740	1.725
Street and Area Lighting 4.1L			
Mercury Vapour			
250 W (9,400 lumens)	$13.50	$15.57	$15.42
High Pressure Sodium			
100W (8,600 lumens)	$10.00	$11.53	$11.43
150W (14,400 lumens)	$13.50	$15.57	$15.42
250W (23,200 lumens)	$17.80	$20.53	$20.34
400W (45,000 lumens)	$23.00	$26.52	$26.28
Wood Pole	$3.40	$3.92	$3.88
Street and Area Lighting 4.11L (CLOSED)			
100W (8,600 lumens) (Closed)	$6.75	$7.78	$7.71
Wood Pole (Closed)	$3.25	$3.75	$3.71
Street and Area Lighting 4.12L			
High Pressure Sodium			
100 W (8,600 lumens)	$4.10	$4.73	$4.68

Newfoundland and Labrador Hydro
Diesel - Government Departments

	Current Rate	Proposed Rate
Rate 1.2G Domestic Diesel		
Basic Customer Charge (per month)	$43.90	$55.69
Energy	$83.567	$89.164
Rate 2.1G General Service Diesel (0-10 kW)		
Basic Customer Charge (per month)	$48.54	$59.76
Energy (cents per kWh)	$75.486	$81.367
Rate 2.2G General Service Diesel (Over 10 kw)		
Basic Customer Charge (per month)	$71.98	$73.76
Demand (dollars per kW)	$58.22	$59.83
Energy (cents per kWh)	$53.741	$60.033
Street and Area Lighting Diesel 4.1G		
Mercury Vapour		
250 W (9,400 lumens)	$72.74	$85.29
High Pressure Sodium		
100 W (8,600 lumens)	$58.92	$57.28
150W (14,400 lumens)	$72.74	$85.29

Compliance Rates Applications - Exhibit 5

Revised Deferral Account Report

May 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

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1.0 Background

Newfoundland and Labrador Hydro's (Hydro) Amended General Rate Application (Amended GRA) contained several proposals for new deferral accounts to defer variances from forecast of certain supply related costs, conservation and demand related costs, and fuel costs. Specifically, Hydro requested approval of the following:

- the Isolated Systems Supply Cost Variance Deferral Account;
- the Energy Supply Cost Variance Deferral Account;
- the Conservation and Demand Management Cost Deferral Account; and
- the Holyrood Conversion Rate Deferral Account.

In Order No. P.U. 49(2016) (the GRA Order), the Board of Commissioners of Public Utilities (the Board) approved each of Hydro's requests, but directed Hydro to file revised language to reflect the Board's findings in the GRA Order.[1]The following report provides a summary of the Board's determinations in the GRA Order and explains Hydro's modifications to its proposals to ensure compliance with the GRA Order. Hydro's proposed definitions for each of the Isolated Systems Supply Cost Variance Deferral Account, the Energy Supply Cost Variance Deferral Account, the Conservation and Demand Management Cost Deferral Account, and the Holyrood Conversion Rate Deferral Account, are provided in Appendices A, B, C, and D, respectively, to this Exhibit 5 to the GRA Compliance Application.

2.0 Isolated Systems Supply Cost Variance Deferral Account

As proposed in the Amended GRA, the Isolated Systems Supply Cost Variance Deferral Account (Isolated Systems Deferral) will provide Hydro the opportunity to recover variances in the price of supply sources on Hydro's Isolated systems. The proposed account would be credited or charged with the difference between the approved test year price and the actual cost of fuel and purchases on Hydro's Isolated systems.

[1] Order No. P.U. 49(2016), page 137.

In the GRA Order, the Board determined that the Isolated Systems Deferral should be approved effective January 1, 2015, but that recovery of the balance in the account should be addressed in the annual application for disposition of the balance in the account. Further, the Board directed Hydro to revise its proposed account language to provide that Hydro is required to file, with its disposition application, a detailed report setting out the efforts made during the year to minimize the costs on the Isolated systems and how any variance would be collected/refunded and from which customers.[2]

The revised account language in compliance with the GRA Order is attached in Exhibit 5, Appendix A. The revised language attached includes a filing date requirement change from March 1, as originally proposed, to March 31. This change has been proposed to align the filing date with that of the Rural Deficit Report, which is also due on March 31 of each year. Alignment of these dates will allow Hydro to file with its application for disposition a detailed report setting out the efforts made during the year to minimize the costs on the Isolated systems, as required by the GRA Order.[3]

As noted in Hydro's 2016 Cost Deferral Application[4], the forecast balance in this account is expected to be $0.0 million and $2.1 million payable to customers for 2015 and 2016, respectively. Hydro will file a separate application for disposition of this balance once the Board issues its final approval of the revised proposed account language.

3.0 Energy Supply Cost Variance Deferral Account

As proposed in Hydro's Amended GRA, the Energy Supply Cost Variance Deferral Account (Energy Supply Deferral) will capture annual energy supply cost variations on the Island Interconnected System. The proposed account would apply to Hydro's own diesel and gas turbine generation, as well as power purchases from wind generation, Corner Brook Pulp and

[2] Ibid., page 116.
[3] Ibid., page 116, lines 1-5.
[4] Filed with the Board on December 9, 2016 and approved in Order No. P.U. 56(2016).

Paper cogeneration, and hydraulic generation, but exclude energy supply costs or savings resulting from the variance in kWh based on the cost of generation at Holyrood Thermal Generating Station.

In the GRA Order, the Board determined that the Energy Supply Deferral should be approved effective January 1, 2015, but required that the language of the account be revised with respect to power purchases variances to reflect variances in volume but not price. In addition, the Board found that the proposed account language was not sufficiently specific as to identify the supply sources which are to be reflected in the variances. As such, the Board directed Hydro to modify the account language to reflect these changes.[5]

The revised account language in compliance with the GRA Order is attached in Exhibit 5, Appendix B. Hydro has also changed the proposed filing date of the Energy Supply Deferral from March 1 to March 31 to allow for a consistent filing date among all approved deferral accounts.

As noted in Hydro's 2016 Cost Deferral Application, the forecast balance in this account is expected to be $14.2 million and $21.2 million recoverable from customers for 2015 and 2016 respectively. Hydro will file a separate application for disposition of this balance once the Board issues its final approval of the revised proposed account language.

4.0 The Conservation and Demand Management Cost Deferral Account

In the Amended GRA, Hydro proposed a Conservation and Demand Management (CDM) Cost Recovery Deferral Account to defer and amortize annual energy conservation program costs relating to customer energy conservation initiatives since 2009, plus the annual CDM costs incurred to be incurred over a seven-year period, commencing in 2015, such that for the initial year the CDM Cost Recovery Adjustment will recover 1/7th of the CDM Cost Deferral Account balance as of December 31 of the previous year. In each subsequent year, the CDM Cost

[5] Ibid., page 119.

Recovery Adjustment will recover the sum of the individual amounts for the previous year representing 1/7th of the transfer to the CDM Cost Deferral Account for the previous year and amortizations carried forward. The amortization for the CDM Cost Deferral Account is not included in the 2015 Test Year revenue requirement but instead will be recovered through rate riders for Newfoundland Power and the Industrial customers.

The Conservation and Demand Management Cost Recovery schedule provided in the Schedule of Rates, Rules and Regulations (Exhibit 14) provides the method of allocation and recovery of the CDM Cost Deferral Account balance, with rate adjustments to be implemented each July 1.

In the GRA Order, the Board determined that, consistent with the Settlement Agreements,[6] Hydro's proposal for the CDM Cost Recovery Deferral Account be approved effective January 1, 2016.[7] A revised account definition is located in Exhibit 5, Appendix C, which reflects the inclusion of 2015 CDM Costs previously approved by the Board for deferral in Order No. P.U. 36(2015), and proposed language regarding annual applications for recovery.

Hydro is proposing a revision to use the calendar year-end balance for disposition in the CDM Cost Deferral Account (from March 31 included in the Amended GRA). The proposed use of December 31 is consistent with the use of year-end balance in the calculation of the CDM Recovery Adjustment provided for in the Schedule of Rates, Rules and Regulations.

5.0 The Holyrood Conversion Rate Deferral Account

As proposed in the Amended GRA, the Holyrood Conversion Rate Deferral Account (Holyrood Conversion Deferral) is intended to stabilize costs related to the conversion of barrels of No. 6 fuel consumed at the Holyrood Thermal Generating Station to kilowatt hours. The proposed language provides for the deferral of costs incurred by Hydro resulting from variations from the test year forecast associated with the Holyrood conversion rate.

[6] Settlement Agreements dated August 14, 2015 and September 28, 2015.
[7] Order No. P.U.49(2016), page 120.

In the GRA Order, the Board determined that, to provide for the deferral and recovery of only significant variances and to reflect the fact that some aspects of the Holyrood conversion rate are within Hydro's control, there should be a cost variance threshold of +/- $500,000 for the Holyrood Conversion Deferral and directed Hydro to file revised account language for the Holyrood Conversion Deferral reflecting this change.[8]

The revised account language in compliance with the GRA Order is located in Exhibit 5, Appendix D. Hydro has also changed the proposed filing date of the Holyrood Conversion Deferral from March 1 to March 31 to allow for a consistent filing date among all approved deferral accounts. As noted in Hydro's 2016 Cost Deferral Application, the forecast balance in this account is expected to be $3.6 million and $1.9 million recoverable from customers for 2015 and 2016, respectively. Hydro will file a separate application for disposition of this balance once the Board issues its final approval of the revised proposed account language.

6.0 Updated Deferral Definitions

As per Order No. P.U.14(2017), Hydro has updated the deferral account definitions for the issues as noted by Grant Thornton in its Report on Hydro's Compliance Application dated March 15, 2017.

7.0 Conclusion

Hydro has revised the language to the definitions for the Isolated Systems Supply Cost Variance Deferral Account, the Energy Supply Cost Variance Deferral Account, the Conservation and Demand Management Cost Deferral Account, and the Holyrood Conversion Rate Deferral Account, as directed by the Board in the GRA Order. Hydro's proposed revised definitions are attached as appendices to this Exhibit 5.

[8] Ibid., page 122.

NEWFOUNDLAND AND LABRADOR HYDRO
Isolated Systems Supply Cost Variance Deferral Account

This account shall be charged or credited with the amount by which Hydro's Isolated Systems Supply Cost Variance exceeds the Supply Cost Variance Threshold in a calendar year.

The ***Isolated Systems Supply Cost Variance*** will be determined by the following formula:

A x (B-C)

Where:

A = Total actual supply produced and purchased (kWh) on Hydro's isolated systems.

B = (Total actual cost of No. 2 fuel used to provide energy plus the total actual cost of purchases) divided by the total of the (actual kWh production and the actual kWh purchases) in $/kWh.

C = (Total Test Year cost of No. 2 fuel used to provide energy plus the total Test Year cost of purchases) divided by the (total of the Test Year kWh production and the Test Year kWh purchases) in $/kWh.

The ***Supply Cost Variance Threshold*** equals ±$500,000 in a calendar year.

Disposition of any Balance in this Account
Hydro shall file an Application for the disposition of any balance in this account with the Board no later than the 31st day of March each year. This Application shall detail the proposed method of collection or refund and from which customer class(s), and the efforts made by Hydro during the [] year to minimize costs on the Isolated systems.

NEWFOUNDLAND AND LABRADOR HYDRO
Energy Supply Cost Variance Deferral Account

This account shall be charged or credited with the Energy Supply cost variance incurred by Hydro on the Island Interconnected System that is in excess of the Cost Variance Threshold in the calendar year.

Variations resulting from both the price and volume of the following thermal generation sources shall be charged or credited to this account:

- Holyrood Combustion Turbine;
- Hardwoods Gas Turbine;
- Stephenville Gas Turbine;
- St. Anthony Diesel Plant; and
- Hawkes Bay Diesel Plant.

Variations resulting from the volume of the following power purchases shall be charged or credited to this account:

- Nalcor Exploits;
- Star Lake;
- Rattle Brook;
- CBPP Cogeneration;
- St. Lawrence wind; and
- Fermeuse wind.

Energy Supply costs will be determined by the following formula:

A + B + C

A = Test Year Thermal Generation Variances resulting from both price and volume;

Where:

A = (Actual Thermal Generation Cost – Test Year Thermal Generation Cost)

B = Test Year Power Purchase Variances resulting from volume;

Where:

B = (Actual kWh Purchases – Test Year kWh Purchases) x (Test Year Purchase Cost in $/kWh)

C = Fuel costs or savings resulting from the variance in generation at the Holyrood Thermal Generating Facility (Holyrood TGS);

Where:

C = D/E x F

D = Holyrood TGS Test Year average annual fuel cost per barrel;

E = Test Year fuel conversion factor (kWh/bbl); and

F = [(Test Year kWh Thermal Generation + Test Year kWh Power Purchases) - (Actual kWh Thermal Generation + Actual kWh Power Purchases)] for all defined sources.

The ***Cost Variance Threshold*** equals ±$500,000 in a calendar year.

Disposition of any Balance in this Account
Hydro shall file an Application for the disposition of any balance in this account with the Board no later than the 31st day of March each year.

NEWFOUNDLAND AND LABRADOR HYDRO
Conservation and Demand Management Cost Deferral Account

Conservation and Demand Management (CDM) Cost Deferral Account

The account shall be charged with the costs incurred in implementing the CDM Program Portfolio but shall exclude CDM Program Costs associated with customers on the Labrador Interconnected System.

The costs include the CDM Program Portfolio costs incurred by Hydro for: detailed program development, promotional materials, advertising, pre and post customer installation checks, processing applications and incentives, training of employees and trade allies, and program evaluation costs.

This account shall also be charged the costs for major CDM studies such as comprehensive customer end use surveys and CDM potential studies that cost greater than $100,000. This account will include Hydro's program expenditures for 2009 to 2015 which received Board approval for deferral.

Disposition of any Balance in this Account

Balances in the account shall be maintained separately for the Island Interconnected and Other Systems. This account will maintain a linkage of all costs recorded in the account to the year the cost was incurred.

The account balances as at December 31 each year shall be recovered over a period of (7) years using a CDM Cost Recovery Adjustment.

Recovery of annual amortizations of costs in this account shall be through an annual application to the Board.

NEWFOUNDLAND AND LABRADOR HYDRO
Holyrood Conversion Rate Deferral Account

This account shall be charged or credited with the Conversion Rate Cost Variance incurred by Hydro on the Island Interconnected system, in excess of the Cost Variance Threshold in the calendar year, which results from variations from the Test Year fuel conversion rate at the Holyrood thermal generating station.

The ***Conversion Rate Cost Variance*** will be determined monthly by the following formula:

$$(A - B) \times C$$

A = Actual quantity of No. 6 fuel consumed (bbl);

B = Calculated quantity of No. 6 fuel consumed using the Cost of Service fuel conversion rate (bbl); and

C = Test Year Cost of Service No. 6 fuel cost ($/bbl).

Where:

$$B = D/E$$

D = Actual net Holyrood production (kWh); and

E = Test Year Cost of Service fuel conversion rate (kWh/bbl).

The ***Cost Variance Threshold*** equals ±$500,000 in a calendar year.

Disposition of any Balance in this Account

Hydro shall file an Application for the disposition of any balance in this account with the Board no later than the 31st day of March each year.

Compliance Rates Application - Exhibit 6

RSP Reports

May 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

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Exhibit 6 – RSP Reports

Rate Stabilization Plan
Plan Highlights
December 31, 2015
(2007 Test Year)

	Actual	Cost of Service	Variance	Year-to-Date Due (To) From customers	Reference
Hydraulic production year-to-date	4,828.2 GWh	4,472.1 GWh	356.1 GWh	$ (31,918,067)	Page 3
No 6 fuel cost - Current month	$ 57.40	$ 58.98	$ (1.58)	$ 28,640,114	Page 4
Year-to-date customer load - Utility	6,072.1 GWh	4,925.8 GWh	1,146.3 GWh	$ (2,966,159)	Page 7
Year-to-date customer load - Industrial	498.0 GWh	894.3 GWh	-396.3 GWh	$ (19,336,644)	Page 9
				$ (25,580,756)	

Rural rates		
Rural Rate Alteration (RRA) [1]	$ (4,120,952)	
Less : RRA to utility customer	$ (3,671,767)	Page 8
RRA to Labrador interconnected	(449,185)	
Fuel variance to Labrador interconnected	$ 211,140	Page 5
Net Labrador interconnected	$ (238,045)	

Current plan summary		
One year recovery		
Due (to) from utility customer	$ (70,887,147)	Page 8
Due (to) from Industrial customers	$ 474,171	Page 10
Sub total	(70,412,976)	
Four year recovery		
Hydraulic balance	$ (56,457,529)	Page 3
Segregated Load Variation		Page 11
Utility Customer	$ (2,472,747)	
Industrial Customer	$ (58,724,691)	
Sub Total	$ (61,197,438)	
Utility RSP Surplus	$ (133,350,561)	Page 12
Industrial RSP Surplus	$ (3,129,977)	Page 13
Total plan balance	$ (324,548,481)	

[1] Beginning January 2011 until June 30, 2015, the RRA includes a monthly credit of $98,295. This amount relates to the phase in of the application of the credit from secondary energy sales to CFB Goose Bay to the Rural deficit as stated in Section B, Clause 1.3(b) of the approved Rate Stabilization Plan Regulations which received final approval in Order No. P.U. 33 (2010) issued December 15, 2010.

Rate Stabilization Plan
Plan Highlights
December 31, 2015
(2015 Test Year)

	Forecast	Cost of Service	Variance	Year-to-Date Due (To) From customers	Reference
Hydraulic production year-to-date	4,828.2 GWh	4,603.6 GWh	224.6 GWh	$ (20,456,974)	Page 3
No 6 fuel cost - Current month	$ 57.40	$ 58.98	$ (1.58)	$ 28,640,114	Page 4
Year-to-date customer load - Utility	6,072.1 GWh	5,924.1 GWh	148.0 GWh	$ 26,221	Page 7
Year-to-date customer load - Industrial	498.0 GWh	621.4 GWh	-123.4 GWh	$ (6,260,007)	Page 9
				$ 1,949,354	

Rural rates		
Rural Rate Alteration (RRA) (1)	$ 2,234,315	
Less : RRA to utility customer	$ 1,565,795	Page 8
RRA to Labrador interconnected	668,520	
Fuel variance to Labrador interconnected	$ 84,262	Page 5
Net Labrador interconnected	$ 752,782	

Current plan summary		
One year recovery		
Due (to) from utility customer	$ (60,639,470)	Page 8
Due (to) from Industrial customers	$ 703,118	Page 10
Sub total	(59,936,352)	
Four year recovery		
Hydraulic balance	$ (47,861,710)	Page 3
Segregated Load Variation		Page 11
Utility Customer	$ (41,416,540)	
Industrial Customer	$ (2,521,405)	
Sub Total	$ (43,937,945)	
Utility RSP Surplus	$ (132,284,835)	Page 12
Industrial RSP Surplus	$ (3,054,362)	Page 13
Total plan balance	$ (287,075,204)	

Rate Stabilization Plan
Plan Highlights
December 31, 2016
(2007 Test Year)

	Actual	Cost of Service	Variance	Year-to-Date Due (To) From customers	Reference
Hydraulic production year-to-date	4,382.0 GWh	4,472.1 GWh	-90.0 GWh	$ 7,099,993	Page 3
No 6 fuel cost - Current month	$ 57.64	$ 58.98	$ (1.34)	$ (23,941,411)	Page 4
Year-to-date customer load - Utility	5,844.7 GWh	4,925.8 GWh	918.9 GWh	$ (6,368,413)	Page 7
Year-to-date customer load - Industrial	505.4 GWh	894.3 GWh	-388.9 GWh	$ (18,166,751)	Page 9
				$ (41,376,582)	

Rural rates		
Rural Rate Alteration (RRA)	$ 8,192,277	
Less : RRA to utility customer	$ 7,299,318	Page 8
RRA to Labrador interconnected	892,959	
Fuel variance to Labrador interconnected	$ (182,136)	Page 5
Net Labrador interconnected	$ 710,823	

Current plan summary		
One year recovery		
Due (to) from utility customer	$ (68,976,964)	Page 8
Due (to) from Industrial customers	$ (2,578,000)	Page 10
Sub total	(71,554,964)	
Four year recovery		
Hydraulic balance	$ (37,018,152)	Page 3
Segregated Load Variation		Page 11
Utility Customer	$ (9,328,286)	
Industrial Customer	$ (81,948,901)	
Sub Total	$ (91,277,187)	
Utility RSP Surplus	$ (143,390,469)	Page 12
Industrial RSP Surplus	$ (388,883)	Page 13
Total plan balance	$ (343,629,655)	

Rate Stabilization Plan
Plan Highlights
December 31, 2016
(2015 Test Year)

	Forecast	Cost of Service	Variance	Year-to-Date Due (To) From customers	Reference
Hydraulic production year-to-date	4,382.0 GWh	4,603.6 GWh	-221.5 GWh	$ 19,318,716	Page 3
No 6 fuel cost - Current month	$ 57.64	$ 58.98	$ (1.34)	$ (23,941,411)	Page 4
Year-to-date customer load - Utility	5,844.7 GWh	5,924.1 GWh	-79.4 GWh	$ 677,007	Page 7
Year-to-date customer load - Industrial	505.4 GWh	621.4 GWh	-116.0 GWh	$ (5,672,102)	Page 9
				$ (9,617,790)	

Rural rates		
Rural Rate Alteration (RRA) [1]	$ 8,192,277	
Less : RRA to utility customer	$ 6,919,518	Page 8
RRA to Labrador interconnected	1,272,759	
Fuel variance to Labrador interconnected	$ (72,687)	Page 5
Net Labrador interconnected	$ 1,200,072	

Current plan summary		
One year recovery		
Due (to) from utility customer	$ (50,664,507)	Page 8
Due (to) from Industrial customers	$ (1,817,842)	Page 10
Sub total	(52,482,349)	
Four year recovery		
Hydraulic balance	$ (21,407,245)	Page 3
Segregated Load Variation		Page 11
Utility Customer	$ (48,868,339)	
Industrial Customer	$ (3,109,520)	
Sub Total	$ (51,977,859)	
Utility RSP Surplus	$ (141,029,124)	Page 12
Industrial RSP Surplus	$ (291,188)	Page 13
Total plan balance	$ (267,187,765)	

Newfoundland and Labrador Hydro

Rate Stabilization Plan Report
March 31, 2017

Summary of Key Facts

The Rate Stabilization Plan of Newfoundland and Labrador Hydro (Hydro), as amended by Board Order No. P.U. 40 (2003) and Order No. P.U. 8 (2007), is established for Hydro’s utility customer, Newfoundland Power, and Island Industrial customers to smooth rate impacts for variationss between actual results and Test Year cost of Service estimates for:

- Hydraulic production;
- No. 6 fuel cost used at Hydro’s Holyrood generating station;
- Customer load (Utility and Island Industrial); and
- Rural rates.

The Test Year Cost of Service Study is based on projections of events and costs that are forecast to happen during a test year. Finance charges are calculated on the balances using the test year Weighted Average Cost of Capital which is currently 6.61% per annum. Holyrood's operating efficiency is set, for RSP purposes, at 618 kWh/barrel regadless of the actual conversion rate experienced.

	2015 Test Year Cost of Service			
	Net Hydraulic Production (kWh)	No. 6 Fuel Cost ($Can/bbl.)	Utility Load (kWh)	Industrial Load (kWh)
January	503,640,000	57.55	729,300,000	49,000,000
February	457,830,000	59.85	662,500,000	45,900,000
March	438,830,000	61.41	657,400,000	51,200,000
April	370,790,000	61.41	514,600,000	50,500,000
May	312,990,000	62.64	423,000,000	53,500,000
June	323,000,000	62.64	348,100,000	51,700,000
July	330,220,000	62.64	314,700,000	51,900,000
August	330,170,000	62.64	314,500,000	53,100,000
September	326,980,000	62.64	337,300,000	38,300,000
October	348,360,000	66.51	416,700,000	58,800,000
November	400,160,000	71.70	526,000,000	57,800,000
December	460,598,000	76.05	680,000,000	59,700,000
Total	4,603,568,000		5,924,100,000	621,400,000

Rate Stabilization Plan
Plan Highlights
March 31, 2017

	Actual	Cost of Service	Variance	Year-to-Date Due (To) From customers	Reference
Hydraulic production year-to-date	1,473.6 GWh	1,400.3 GWh	73.3 GWh	$ (7,204,067)	Page 4
No 6 fuel cost - Current month	$ 69.22	$ 61.41	$ 7.81	$ 7,403,733	Page 5
Year-to-date customer load - Utility	2,060.9 GWh	2,049.2 GWh	11.7 GWh	$ (64,054)	Page 10
Year-to-date customer load - Industrial	126.1 GWh	146.1 GWh	-20.0 GWh	$ (1,098,742)	Page 11
				$ (963,130)	

Rural rates		
Rural Rate Alteration (RRA)	$ 3,104,332	
Less : RRA to utility customer	$ 2,969,256	Page 8
RRA to Labrador interconnected	135,076	
Fuel variance to Labrador interconnected	$ 22,442	Page 6
Net Labrador interconnected	$ 157,518	

Current plan summary		
One year recovery		
Due (to) from utility customer	$ (73,443,479)	Page 8
Due (to) from Industrial customers	$ (1,292,426)	Page 9
Sub total	(74,735,905)	
Four year recovery		
Hydraulic balance	$ (28,970,810)	Page 4
Segregated Load Variation		Page 14
Utility Customer	$ (0)	
Industrial Customer	$ (3,247,433)	
Sub Total	$ (3,247,433)	
Utility RSP Surplus	$ (23,319,579)	Page 15
Industrial RSP Surplus	$ 446,585	Page 16
Total plan balance	$ (129,827,143)	

Rate Stabilization Plan
Net Hydraulic Production Variation
March 31, 2017

	A Cost of Service Net Hydraulic Production (kWh)	B Actual Net Hydraulic Production (kWh)	C Monthly Net Hydraulic Production Variance (kWh) **(A - B)**	D Cost of Service No. 6 Fuel Cost ($Can/bbl.)	E Net Hydraulic Production Variation ($) **(C / O(1) X D)**	F Financing Charges ($)	G Cumulative Variation and Financing Charges ($) **(E + F)** **(to page 17)**
Opening balance							(37,018,152)
RSP Change in Test Years (2)							15,611,000
Adjusted Opening Balance							(21,407,152)
January	503,640,000	513,587,079	(9,947,079)	57.55	(926,231)	(114,493)	(22,447,876)
February	457,830,000	466,205,211	(8,375,211)	59.85	(811,154)	(120,059)	(23,379,089)
March	438,830,000	493,847,401	(55,017,401)	61.41	(5,466,682)	(125,039)	(28,970,810)
April							
May							
June							
July							
August							
September							
October							
November							
December							
	1,400,300,000	1,473,639,691	(73,339,691)		(7,204,067)	(359,591)	(28,970,810)
Hydraulic Allocation (2)							
Hydraulic variation at year end					(7,204,067)	(359,591)	(28,970,810)

(1) O is the Holyrood Operating Efficiency of 618 kWh/barrel.

(2) GRA Compliance Filing to Order No. 49(2016) January 27, 2017.

Rate Stabilization Plan
No. 6 Fuel Variation
March 31, 2017

	A	B	C	D	E	F	G
	Actual Quantity No. 6 Fuel	Actual Quantity No. 6 Fuel for Non-Firm Sales	Net Quantity No. 6 Fuel	Cost of Service No. 6 Fuel Cost	Actual Average No. 6 Fuel Cost	Cost Variance	No.6 Fuel Variation
	(bbl.)	(bbl.)	(bbl.)	($Can/bbl.)	($Can/bbl.)	($Can/bbl.)	($)
			(A - B)			**(E - D)**	**(C X F)** **(to page 6)**
January	375,624	0	375,624	57.55	62.79	5.24	1,969,923
February	364,336	0	364,336	59.85	67.67	7.82	2,847,505
March	330,992	0	330,992	61.41	69.22	7.81	2,586,305
April							
May							
June							
July							
August							
September							
October							
November							
December							
	1,070,952	0	1,070,952				7,403,733

Rate Stabilization Plan
Allocation of Fuel Variance - Year-to-Date
March 31, 2017

	A	B	C	D	E	F	G	H	I	J
	Twelve Months-to-Date				Year-to-Date Fuel Variance				Reallocate Rural Island Customers [(1)]	
	Utility	Industrial Customers	Rural Island Customers	Total	Utility	Industrial Customers	Rural Island Interconnected	Total	Utility	Labrador Interconnected
	(kWh)	(kWh)	(kWh)	(kWh)	($)	($)	($)	($)	($)	($)
				(A+B+C)	**(A/D X H)**	**(B/D X H)**	**(C/D X H)**		**(G X 95.65%)**	**(G X 4.35%)**
					(to page 7)			**(from page 5)**	**(to page 7)**	
January	5,834,707,469	502,513,639	476,656,913	6,813,878,021	1,686,840	145,279	137,804	1,969,923	131,808	5,996
February	5,861,296,315	502,837,253	477,507,277	6,841,640,845	4,127,135	354,065	336,228	4,817,428	321,598	14,630
March	5,868,946,088	511,539,463	477,768,433	6,858,253,984	6,335,739	552,225	515,769	7,403,733	493,327	22,442
April										
May										
June										
July										
August										
September										
October										
November										
December										

(1) The Fuel Variance initially allocated to Rural Island Interconnected is re-allocated between Utility and Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the 2015 Cost of Service Study, which is 95.65% and 4.35% respectively. The Labrador Interconnected amount is then removed from the plan and written off to net income (loss).

Rate Stabilization Plan
Allocation of Fuel Variance - Monthly
March 31, 2017

	A	B	C	D	E	F	G
	Utility					**Industrial**	
	Fuel Variance		Rural Allocation		Total Fuel Variance Activity for the month	Fuel Variance	
	Year-to-Date Activity	Current Month Activity (1)	Year-to-Date Activity	Current Month Activity (1)		Year-to-Date Activity	Current Month Activity (1)
	($)	($)	($)	($)	($)	($)	($)
					(B + D)		
	(from page 6)		**(from page 6)**		**(to page 8)**	**(from page 6)**	**(to page 9)**
January	1,686,840	1,686,840	131,808	131,808	1,818,648	145,279	145,279
February	4,127,135	2,440,295	321,598	189,790	2,630,085	354,065	208,786
March	6,335,739	2,208,604	493,327	171,729	2,380,333	552,225	198,160
April							
May							
June							
July							
August							
September							
October							
November							
December							
		6,335,739		493,327	6,829,066		552,225

(1) The current month activity is calculated by subtracting year-to-date activity for the prior month from year-to-date activity for the current month.

Rate Stabilization Plan
Summary of Utility Customer
March 31, 2017

	A	B	C	D	E	F	G	H
	Load Variation	Allocation Fuel Variance	Allocation Rural Rate Alteration (1)	Subtotal Monthly Variances	Financing Charges	Adjustment (2)	Transfer from Load Variation Balance (3)	Cumulative Net Balance
	($)	($)	($)	($)	($)	($)	($)	($)
				(A + B + C)				
		(from page 7)					**(from page 14)**	**(to page 17)**
Opening Balance								(68,976,964)
RSP Change in Test Years [4]								18,312,000
Revenue Deficiency/(Sufficiency) [5]								(6,577,000)
Adjusted Opening Balance								(57,241,964)
January		1,818,648	916,383	2,735,031	(306,149)	8,951,313		(45,861,769)
February		2,630,085	942,226	3,572,311	(245,284)	8,175,911		(34,358,831)
March		2,380,333	1,110,647	3,490,980	(183,762)	8,345,233	(50,737,099)	(73,443,479)
April								
May								
June								
July								
August								
September								
October								
November								
December								
Year to date		6,829,066	2,969,256	9,798,322	(735,195)	25,472,457	(50,737,099)	(16,201,515)
Hydraulic allocation								0
(from page 4)								
Total		6,829,066	2,969,256	9,798,322	(735,195)	25,472,457	(50,737,099)	(73,443,479)

(1) The Rural Rate Alteration is allocated between Utility and Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Cost of Service Study, which is 95.65% and 4.35% respectively. The Labrador Interconnected amount is then removed from the plan and written off to net income (loss).

(2) The RSP adjustment rate for Utility is 1.236 cents per kWh effective July 1, 2016 to June 30, 2017.

(3) Per Board Order No. P.U. 16(2017), the Newfoundland Power Load Variation balance transferred to the Newfoundland Power Current Plan to mitigate the proposed July 1, 2017 RSP Adjustment rate increase.

(4) GRA Compliance Filing to Order No. 49(2016) January 27, 2017.

(5) Cumulative revenue sufficiency credited to Current Plan per Compliance Rates Application - Exhibit 3 May 2017.($35,015 (2014) - $9,998 (2015) - $31,604 (2016) = ($6,577))

Rate Stabilization Plan
Summary of Industrial Customers
March 31, 2017

	A	B	C	D	E	F
	Load Variation	Allocation Fuel Variance	Subtotal Monthly Variances	Financing Charges	Adjustment	Cumulative Net Balance
	($)	($)	($)	($)	($)	($)
			(A + B)			
		(from page 7)				**(to page 17)**
Opening Balance						(2,578,000)
RSP Change in Test Years [1]						760,000
Adjusted Opening Balance						(1,818,000)
January		145,279	145,279	(9,723)	0	(1,682,444)
February		208,786	208,786	(8,998)	0	(1,482,656)
March		198,160	198,160	(7,930)	0	(1,292,426)
April						
May						
June						
July						
August						
September						
October						
November						
December						
Year to date	0	552,225	552,225	(26,651)	0	525,574
Hydraulic allocation						0
(from page 4)						
Total	0	552,225	552,225	(26,651)	0	(1,292,426)

(1) GRA Compliance Filing to Order No. 49(2016) January 27, 2017.

Rate Stabilization Plan
Load Variation - Utility
March 31, 2017

	A	B	C	D	E	F	G	H	I	J	K
	Firm Energy						Secondary Energy				
	Cost of Service Sales (kWh)	Actual Sales (kWh)	Sales Variance (kWh) **(B - A)**	Cost of Service No. 6 Fuel Cost ($Can/bbl.)	Firm Energy Rate[2] ($/kWh)	Load Variation ($) **C x {(D/O[1]) - E}**	Cost of Service Sales (kWh)	Actual Sales (kWh)	Firming Up Charge[2] ($/kWh)	Load Variation ($) **(G - H) x I**	Total Load Variation ($) **(F + J)** **(to page 12)**
January	729,300,000	723,432,142	(5,867,858)	57.55	0.10422	65,158	0	784,140	0.02882	(22,599)	42,559
February	662,500,000	660,922,054	(1,577,946)	59.85	0.10422	11,627	0	559,455	0.02882	(16,123)	(4,496)
March	657,400,000	674,523,311	17,123,311	61.41	0.10422	(83,172)	0	657,366	0.02882	(18,945)	(102,117)
April											
May											
June											
July											
August											
September											
October											
November											
December											
	2,049,200,000	2,058,877,507	9,677,507			(6,387)	0	2,000,961		(57,667)	(64,054)

(1) O is the Holyrood Operating Efficiency of 618 kWh/barrel.
(2) Proposed 2015 Test Year firm energy rate for Utility is 10.422 cents per kWh effective January 1, 2017 and a firming up charge of 2.882 cents per kWh effective January 1, 2017.

Rate Stabilization Plan
Load Variation - Industrial
March 31, 2017

	A	B	C	D	E	F
	Cost of Service Sales	Actual Sales	Sales Variance	Cost of Service No. 6 Fuel Cost	Firm Energy Rate	Load Variation
	(kWh)	(kWh)	(kWh)	($)	($/kWh)	($)
			(B - A)			**C x {(D/O[1]) - E}**
						(to page 12)
January	49,000,000	36,580,091	(12,419,909)	57.55	0.03971	(663,296)
February	45,900,000	39,488,172	(6,411,828)	59.85	0.03971	(366,383)
March	51,200,000	50,042,258	(1,157,742)	61.41	0.03971	(69,063)
April						
May						
June						
July						
August						
September						
October						
November						
December						
	146,100,000	126,110,521	(19,989,479)			(1,098,742)

(1) O is the Holyrood Operating Efficiency of 618 kWh/barrel.

Rate Stabilization Plan
Allocation of Load Variance - Year-to-Date
March 31, 2017

	A	B	C	D	E	F	G	H	I	J
	Twelve Months-to-Date				Year-to-Date Load Variance				Reallocate Rural Island Customers [1]	
	Utility	Industrial Customers	Rural Island Customers	Total	Utility	Industrial Customers	Rural Island Interconnected	Total [2]	Utility	Labrador Interconnected
	(kWh)	(kWh)	(kWh)	(kWh)	($)	($)	($)	($)	($)	($)
				(A+B+C)	**(A/D X H)**	**(B/D X H)**	**(C/D X H)**	**(from pages 11 & 12)**		
January	5,834,707,469	502,513,639	476,656,913	6,813,878,021	(531,536)	(45,778)	(43,423)	(620,737)	(41,534)	(1,889)
February	5,861,296,315	502,837,253	477,507,277	6,841,640,845	(849,527)	(72,880)	(69,209)	(991,616)	(66,198)	(3,011)
March	5,868,946,088	511,539,463	477,768,433	6,858,253,984	(995,062)	(86,730)	(81,004)	(1,162,796)	(77,479)	(3,525)
April										
May										
June										
July										
August										
September										
October										
November										
December										

(1) The Load Variance initially allocated to Rural Island Interconnected is re-allocated between Utility and Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the 2015 Cost of Service Study, which is 95.65% and 4.35% respectively. The Labrador Interconnected amount is then removed from the plan and written off to net income (loss).

(2) Total load re-allocated based on energy ratios. The total is the sum of the Load Variation - Utility and Load Variation - Industrial.

Rate Stabilization Plan
Allocation of Load Variance - Year-to-Date
March 31, 2017

	A	B	C	D	E	F	G
	Utility					**Industrial**	
	Load Variance		Rural Allocation		Total load	Load Variance	
	Year-to-Date Activity	Current Month Activity (1)	Year-to-Date Activity	Current Month Activity (1)	Activity for the month	Year-to-Date Activity	Current Month Activity (1)
	($)	($)	($)	($)	($)	($)	($)
					(B + D)		
					(to page 14)		**(to page 14)**
January	(531,536)	(531,536)	(41,534)	(41,534)	(573,070)	(45,778)	(45,778)
February	(849,527)	(317,991)	(66,198)	(24,664)	(342,655)	(72,880)	(27,102)
March	(995,062)	(145,535)	(77,479)	(11,282)	(156,817)	(86,730)	(13,850)
April	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0
September	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
		(995,062)		(77,479)	(1,072,541)		(86,730)

(1) The current month activity is calculated by subtracting year-to-date activity for the prior month from year-to-date activity for the current month.

Rate Stabilization Plan
Load Variation
March 31, 2017

	A	B	C	D	E	F	G	H
	Utility Customer				Island Industrial Customers			
	Load Variation	Financing Charges	Transfer to Current (1)	Total To Date	Load Variation	Financing Charges	Total To Date	Total To Date (2)
		($)		($)		($)	($)	($)
				(A + B + C)			(E+ F)	(D + G)
	(from page 13)		**(to page 8)**		**(from page 13)**			**(to page 17)**
Opening Balance				(9,328,286)			(81,948,901)	(91,277,187)
RSP Change in Test Years 3				(39,540,000)			78,839,000	39,299,000
Adjusted Opening Balance				(48,868,286)			(3,109,901)	(51,978,187)
January	(573,070)	(261,364)		(49,702,720)	(45,778)	(16,633)	(3,172,312)	(52,874,702)
February	(342,655)	(265,827)		(50,311,202)	(27,102)	(16,967)	(3,216,381)	(53,527,251)
March	(156,817)	(269,081)	50,737,099	(0)	(13,850)	(17,202)	(3,247,433)	(53,984,198)
April								
May								
June								
July								
August								
September								
October								
November								
December								
Total	(1,072,541)	(796,272)	50,737,099	(0)	(86,730)	(50,802)	(3,247,433)	(3,247,433)

(1) Per Board Order No. P.U. 16(2017), the Newfoundland Power Load Variation balance transferred to the Newfoundland Power Current Plan to mitigate the proposed July 1, 2017 RSP Adjustment rate increase.

(2) Per Board Order No. P.U. 29(2013), the load variation from the Industrial and Utility Customers as of September 1, 2013 be held in a separate account until its disposition.

Rate Stabilization Plan
Utility RSP Surplus
March 31, 2017

	A	B	C	D
	Industrial Customer Adjustment	Utility Payout [1]	Financing Charges	Cumulative Balance
	($)	($)	($)	($)
				(to page 17)
Opening Balance				(143,390,469)
RSP Change in Test Years [2]				2,361,000
Adjusted Opening Balance				(141,029,469)
January		59,087	(754,273)	(141,724,655)
February		118,912,863	(757,991)	(23,569,783)
March		376,263	(126,059)	(23,319,579)
April				
May				
June				
July				
August				
September				
October				
November				
December				
Year to date	-	119,348,213	(1,638,323)	117,709,890
Total		119,348,213	(1,638,323)	(23,319,579)

(1) The RSP Surplus Payout and Admin Costs are comprised of a payout of $118,912,863, Hydro admin costs of $59,087 and NL F costs of $376,263.

(2) GRA Compliance Filing to Order No. 49(2016) January 27, 2017.

Rate Stabilization Plan
Industrial RSP Surplus
March 31, 2017

	A	B	C	D	E
	Industrial Surplus	Teck Allocation [(1)]	Industrial Drawdown[(2)]	Financing Charges	Cumulative Balance
	($)	($)	($)	($)	($)
					(to page 17)
Opening Balance					(388,883)
RSP Change in Test Years [3]					98,000
Adjusted Opening Balance					(290,883)
January		4,835	222,983	(1,556)	(64,621)
February		4,257	233,053	(346)	172,344
March		4,677	268,642	922	446,585
April					
May					
June					
July					
August					
September					
October					
November					
December					
Year to date	0	13,769	724,679	(980)	737,468
Total	0	13,769	724,679	(980)	446,585

(1) Per Board Order No. P.U. 29(2013), the RSP drawdown adjustment rate for Teck Resources is 1.111 cents per kWh effective September 1, 2013. Effective July 1, 2015 the RSP drawdown adjustment rate for Teck Resources is 1.141 cents per kWh.

(2) Drawdown of Industrial Customers RSP Surplus balance effective July 1, 2015 using RSP Adjustment rates for all Industrial Customers are $1.52 per kW per month and 0.294 cents per kWh as approved in Board Order No. P.U. 35(2015).

(3) GRA Compliance Filing to Order No. 49(2016) January 27, 20:

Rate Stabilization Plan
Overall Summary
March 31, 2017

	A	B	C	D	E	F	G
	Hydraulic Balance	Utility Balance	Industrial Balance	Segregated Load Balance	Utility RSP Surplus	Industrial RSP Surplus	Total To Date
	($)	($)	($)	($)	($)	($)	($)
							(A + B + C + D + E + F)
	(from page 4)	**(from page 8)**	**(from page 9)**	**(from page 14)**	**(from page 15)**	**(from page 16)**	
Opening Balance	(37,018,152)	(68,976,964)	(2,578,000)	(91,277,187)	(143,390,469)	(388,883)	(343,629,655)
RSP Change in Test Years [1]	15,611,000	18,312,000	760,000	39,299,000	2,361,000	98,000	76,441,000
Revenue Deficiency/(Sufficiency) [2]		(6,577,000)					(6,577,000)
Adjusted Opening Balance	(21,407,152)	(57,241,964)	(1,818,000)	(51,978,187)	(141,029,469)	(290,883)	(273,765,655)
January	(22,447,876)	(45,861,769)	(1,682,444)	(52,875,032)	(141,724,655)	(64,621)	(264,656,396)
February	(23,379,089)	(34,358,831)	(1,482,656)	(53,527,583)	(23,569,783)	172,344	(136,145,598)
March	(28,970,810)	(73,443,479)	(1,292,426)	(3,247,433)	(23,319,579)	446,585	(129,827,143)
April							
May							
June							
July							
August							
September							
October							
November							
December							

(1) GRA Compliance Filing to Order No. 49(2016) January 27, 2017.

(2) Cumulative revenue sufficiency credited to Current Plan per Compliance Rates Application - Exhibit 3 May 2017.

Compliance Rates Application - Exhibit 7

Revised Cost of Service Schedules for Revenue Deficiency

May 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

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Exhibit 7 - Revised Cost of Service Schedules for Revenue Deficiency

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
Total System
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credits ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Total System							
1	Newfoundland Power	417,080,124	460,000,607	-	58,446,455	-	518,447,062	0.91
2	RSP Activity	66,352,616	-	-	-	-	-	
3	Subtotal Newfoundland Power	**483,432,740**	**460,000,607**	**-**	**58,446,455**	**-**	**518,447,062**	**1.05**
4	Island Industrial	26,833,303	30,065,868	-	-		30,065,868	0.89
5	Unallocated RSP Hydraulic Variation	-	-	-	-		-	-
6	Labrador Industrial	1,936,100	1,936,100	-	-		1,936,100	1.00
7	CFB - Goose Bay Secondary	752,411	9,784	742,626	-		752,411	76.90
8	Rural Labrador Interconnected	19,730,211	17,026,399	-	2,163,329		19,189,728	1.16
	Rural Deficit Areas							
9	Island Interconnected	53,211,799	77,439,333	-	(24,227,534)		53,211,799	0.69
10	Island Isolated	1,616,457	9,171,079	-	(7,554,623)		1,616,457	0.18
11	Labrador Isolated	7,917,225	33,643,060	-	(25,725,835)		7,917,225	0.24
12	L'Anse au Loup	2,956,944	6,801,363	-	(3,844,419)		2,956,944	0.43
13	Revenue Credit Applied to Deficit (100.0%)	-	-	(742,626)	742,626		-	-
14	**Subtotal**	**65,702,424**	**127,054,835**	**(742,626)**	**(60,609,784)**	**-**	**65,702,424**	**0.52**
15	**Total**	**598,387,188**	**636,093,593**	**-**	**-**	**-**	**636,093,593**	**0.94**

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
Island Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Interconnected							
1	Newfoundland Power	417,080,124	460,000,607	-	58,446,455	-	518,447,062	
2	NLP RSP Activity	66,352,616					-	
3	**Subtotal Newfoundland Power**	**483,432,740**	**460,000,607**	**-**	**58,446,455**	**-**	**518,447,062**	**1.05**
4	Industrial - Firm	21,683,000	30,065,868	-			30,065,868	
5	Industrial - Non-Firm	-	-	-			-	
6	Industrial RSP Activity	5,150,302					-	
7	**Subtotal Industrial**	**26,833,303**	**30,065,868**	**-**	**-**		**30,065,868**	**0.89**
8	**Unallocated RSP Hydraulic Variation**	**-**						
	Rural							
9	1.1 Domestic	14,678,388	23,092,259	-	(8,413,871)		14,678,388	0.64
10	1.12 Domestic All Electric	18,498,938	28,804,090	-	(10,305,152)		18,498,938	0.64
11	1.3 Special	21,814	72,396	-	(50,582)		21,814	0.30
12	2.1 General Service 0-10 kW							
13	2.2 General Service 10-100 kW	9,810,837	12,638,234	-	(2,827,396)		9,810,837	0.78
14	2.3 General Service 110-1,000 kVa	6,116,636	7,895,740	-	(1,779,104)		6,116,636	0.77
15	2.4 General Service Over 1,000 kVa	3,073,210	3,666,809	-	(593,598)		3,073,210	0.84
16	4.1 Street and Area Lighting	1,011,976	1,269,807	-	(257,831)		1,011,976	0.80
17	**Subtotal Rural**	**53,211,799**	**77,439,333**	**-**	**(24,227,534)**		**53,211,799**	**0.69**
18	**Total Island Interconnected**	**563,477,841**	**567,505,808**	**-**	**34,218,921**		**601,724,729**	**0.99**

Note1:
Calculation of Island Industrial Non-Firm Revenue Credit

Island Industrial Non-Firm Revenues, Ln 5, Col 2	-
Island Industrial Non-Firm Allocated Cost of Service, Ln 5, Col 3	-
Credit to be allocated to Island Interconnected Firm Customers	-

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
Island Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Isolated							
1	1.2 Domestic Diesel	867,907	6,931,939		(6,064,032)		867,907	0.13
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	0	0		0		0	0.00
4	2.1 General Service 0-10 kW	215,144	889,230		(674,086)		215,144	0.24
5	2.2 GS 10-100 kW	492,122	888,147		(396,026)		492,122	0.55
6	2.3 GS 110-1,000 kVa	0	296,734		(296,734)		0	0.00
7	2.4 General Service Over 1,000 kVa	0	0		0		0	0.00
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	41,285	165,029		(123,744)		41,285	0.25
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	**Total**	**1,616,457**	**9,171,079**		**(7,554,623)**		**1,616,457**	**0.18**

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
Labrador Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Labrador Isolated							
1	1.2 Domestic Diesel	3,506,542	18,194,097		(14,687,555)		3,506,542	0.19
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	0	0		0		0	0.00
4	2.1 General Service 0-10 kW	1,156,058	3,708,874		(2,552,816)		1,156,058	0.31
5	2.2 GS 10-100 kW	2,561,636	8,028,884		(5,467,248)		2,561,636	0.32
6	2.3 GS 110-1,000 kVa	325,935	1,781,488		(1,455,553)		325,935	0.18
7	2.4 General Service Over 1,000 kVa	250,320	1,588,651		(1,338,331)		250,320	0.16
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	116,734	341,066		(224,332)		116,734	0.34
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	**Total**	**7,917,225**	**33,643,060**		**(25,725,835)**		**7,917,225**	**0.24**

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
L'Anse au Loup
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues	Cost of Service Before Deficit and Revenue Credit Allocation	Revenue Credit	Deficit	RSP Activity	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6)	Revenue to Cost Coverage (Col.2/3)
		($)	($)	($)	($)	($)	($)	
	L'Anse au Loup							
1	1.1 Domestic	577,120	1,365,788		(788,668)		577,120	0.42
2	1.12 Domestic All Electric	1,258,276	3,113,745		(1,855,469)		1,258,276	0.40
3	2.1 General Service 0-10 kW	0	0		0		0	0.00
4	2.2 General Service 10-100 kW	819,144	1,731,893		(912,749)		819,144	0.47
5	2.3 General Service 110-1,000 kVa	253,818	523,640		(269,822)		253,818	0.48
6	4.1 Street and Area Lighting	48,586	66,297		(17,711)		48,586	0.73
7	**Total L'Anse Au Loup**	**2,956,944**	**6,801,363**		**(3,844,419)**		**2,956,944**	**0.43**

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
Labrador Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Labrador Interconnected							
1	Industrial IOCC Firm	1,936,100	1,936,100		-		1,936,100	1.00
2	Industrial IOCC Non-Firm	-	-		-		-	0.00
3	**Subtotal Industrial**	**1,936,100**	**1,936,100**	**-**	**-**		**1,936,100**	**1.00**
4	**CFB - Goose Bay Secondary**	752,411	9,784	742,626	-		752,411	76.90
	Rural							
5	1.1 Domestic	114,936	212,179	-	26,958.90		239,138	0.54
6	1.1A Domestic All Electric	11,459,804	10,502,344	-	1,334,400		11,836,744	1.09
7	2.1 General Service 0-10 kW	426,828	330,688	-	42,016		372,704	1.29
8	2.2 General Service 10-100 kW	2,398,589	1,679,802	-	213,431		1,893,233	1.43
9	2.3 General Service 110-1,000 kVa	3,417,642	2,458,474	-	312,367		2,770,842	1.39
10	2.4 General Service Over 1,000 kVa	1,604,223	1,527,344	-	194,060		1,721,404	1.05
11	4.1 Street and Area Lighting	308,189	315,567	-	40,095		355,662	0.98
12	**Subtotal Rural**	**19,730,211**	**17,026,399**	**-**	**2,163,329**		**19,189,728**	**1.16**
13	**Total Labrador Interconnected**	**22,418,722**	**18,972,283**	**742,626**	**2,163,329**		**21,878,239**	**1.18**

Note1:
Calculation of CFB - Goose Bay Secondary Revenue Credit

CFB - Goose Bay Secondary Revenues, Ln 4, Col 2		752,411
CFB - Goose Bay Secondary Allocated Cost of Service, Ln 4, Col 3		(9,784)
CFB - Goose Bay Secondary Allocated Deficit, Ln 4, Col 5		-
Revenue Credit		742,626
Revenue Credit Applied to Deficit	**100.0%**	742,626
Revenue Credit Applied to Firm Regulated Labrador Interconnected Customers		-
		742,626

Newfoundland and Labrador Hydro
2014 Test Year Cost of Service for 2014 Revenue Deficiency
Total System
Rural Deficit Allocation

	1	2	3	4
	Rate Class			
	ALLOCATION OF REVENUE REQUIREMENT BEFORE DEFICIT AND REVENUE CREDIT			
			Schedule 1.2, Page 1 of 6	Percentage of Total
1	Island Interconnected		460,000,607	96.4%
2	Labrador Interconnected		17,026,399	3.6%
	TOTAL RURAL DEFICIT			
3	Total Rural Deficit:			**60,609,784**
	CUSTOMER DEFICIT ALLOCATION:		Revenue Requirement Percentage Applied (%)	Deficit Allocation Amount ($)
	Island Interconnected:			
4	Newfoundland Power		96.4%	58,446,455
	Labrador Interconnected:			
5	Rural Labrador Interconnected		3.6%	2,163,329
6	**Total**		100.0%	**60,609,784**

* Specifically assigned costs are converted to equivalent unweighted customers
by dividing the assigned cost by the allocated customer cost per unweighted customer.

Rural Customer Costs per Rural Customer:	
Island Interconnected:	$472.76
Labrador Interconnected:	$457.22

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Total System
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credits ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Total System							
1	Newfoundland Power	429,322,709	363,665,168	-	55,669,859	-	419,335,026	
2	RSP Activity		-	-	-	-	-	
3	Subtotal Newfoundland Power	**429,322,709**	**363,665,168**	**-**	**55,669,859**	**-**	**419,335,026**	**1.18**
4	Island Industrial	32,181,654	32,570,851	-	-		32,570,851	0.99
5	Unallocated RSP Hydraulic Variation	-	-	-	-		-	-
6	Labrador Industrial	5,410,564	5,077,710	-	-		5,077,710	1.07
7	CFB - Goose Bay Secondary	932,221	19,653	912,568	-		932,221	47.43
8	Rural Labrador Interconnected	20,093,238	17,528,328	-	2,683,236		20,211,565	1.15
	Rural Deficit Areas							
9	Island Interconnected	48,185,077	69,876,069	-	(21,690,992)		48,185,077	0.69
10	Island Isolated	1,404,780	9,432,904	-	(8,028,124)		1,404,780	0.15
11	Labrador Isolated	7,657,423	33,973,860	-	(26,316,437)		7,657,423	0.23
12	L'Anse au Loup	2,699,621	5,929,731	-	(3,230,110)		2,699,621	0.46
13	CFB Revenue Credit Applied to Deficit	-	-	(912,568)	912,568		-	-
14	**Subtotal**	**59,946,902**	**119,212,564**	**(912,568)**	**(58,353,095)**	**-**	**59,946,902**	**0.50**
15	**Total**	**547,887,288**	**538,074,273**	**-**	**-**	**-**	**538,074,273**	**1.02**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Island Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Interconnected							
1	Newfoundland Power	429,322,709	363,665,168	-	55,669,859	-	419,335,026	
2	NLP RSP Activity	-					-	
3	**Subtotal Newfoundland Power**	**429,322,709**	**363,665,168**	**-**	**55,669,859**	**-**	**419,335,026**	**1.18**
4	Industrial - Firm	32,181,654	32,570,851	-			32,570,851	
5	Industrial - Non-Firm	-	-	-			-	
6	Industrial RSP Activity	-					-	
7	**Subtotal Industrial**	**32,181,654**	**32,570,851**	**-**	**-**		**32,570,851**	**0.99**
	Rural							
8	1.1 Domestic	13,420,514	20,671,484	-	(7,250,970)		13,420,514	0.65
9	1.12 Domestic All Electric	15,735,315	23,832,256	-	(8,096,941)		15,735,315	0.66
10	1.3 Special	19,223	59,014	-	(39,790)		19,223	0.33
11	2.1 General Service 0-10 kW							
12	2.2 General Service 10-100 kW	8,700,269	11,709,028	-	(3,008,759)		8,700,269	0.74
13	2.3 General Service 110-1,000 kVa	6,102,165	8,084,625	-	(1,982,460)		6,102,165	0.75
14	2.4 General Service Over 1,000 kVa	3,265,914	4,264,722	-	(998,808)		3,265,914	0.77
15	4.1 Street and Area Lighting	941,677	1,254,940	-	(313,263)		941,677	0.75
16	**Subtotal Rural**	**48,185,077**	**69,876,069**	**-**	**(21,690,992)**		**48,185,077**	**0.69**
17	**Total Island Interconnected**	**509,689,440**	**466,112,087**	**-**	**33,978,867**		**500,090,954**	**1.09**

Note1:
Calculation of Island Industrial Non-Firm Revenue Credit

Island Industrial Non-Firm Revenues, Ln 5, Col 2	-
Island Industrial Non-Firm Allocated Cost of Service, Ln 5, Col 3	-
Credit to be allocated to Island Interconnected Firm Customers	-

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Island Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Isolated							
1	1.2 Domestic Diesel	731,622	7,132,304		(6,400,682)		731,622	0.10
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	58,508	0		58,508		58,508	0.00
4	2.1 General Service 0-10 kW	165,325	912,103		(746,778)		165,325	0.18
5	2.2 GS 10-100 kW	411,055	764,739		(353,684)		411,055	0.54
6	2.3 GS 110-1,000 kVa	0	444,362		(444,362)		0	0.00
7	2.4 General Service Over 1,000 kVa	0	0		0		0	0.00
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	38,270	179,396		(141,126)		38,270	0.21
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	**Total**	**1,404,780**	**9,432,904**		**(8,028,124)**		**1,404,780**	**0.15**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Labrador Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Labrador Isolated							
1	1.2 Domestic Diesel	3,095,464	17,973,174		(14,877,709)		3,095,464	0.17
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	259,129	0		259,129		259,129	0.00
4	2.1 General Service 0-10 kW	1,040,841	3,453,288		(2,412,447)		1,040,841	0.30
5	2.2 GS 10-100 kW	2,563,567	8,847,995		(6,284,428)		2,563,567	0.29
6	2.3 GS 110-1,000 kVa	349,154	1,824,754		(1,475,601)		349,154	0.19
7	2.4 General Service Over 1,000 kVa	237,141	1,530,621		(1,293,481)		237,141	0.15
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	112,128	344,029		(231,900)		112,128	0.33
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	**Total**	**7,657,423**	**33,973,860**		**(26,316,437)**		**7,657,423**	**0.23**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
L'Anse au Loup
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues	Cost of Service Before Deficit and Revenue Credit Allocation	Revenue Credit	Deficit	RSP Activity	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6)	Revenue to Cost Coverage (Col.2/3)
		($)	($)	($)	($)	($)	($)	
	L'Anse au Loup							
1	1.1 Domestic	498,981	1,228,307		(729,326)		498,981	0.41
2	1.12 Domestic All Electric	1,142,836	2,705,586		(1,562,751)		1,142,836	0.42
3	2.1 General Service 0-10 kW	0	0		0		0	0.00
4	2.2 General Service 10-100 kW	790,588	1,566,916		(776,328)		790,588	0.50
5	2.3 General Service 110-1,000 kVa	220,623	365,068		(144,445)		220,623	0.60
6	4.1 Street and Area Lighting	46,593	63,854		(17,261)		46,593	0.73
7	**Total L'Anse Au Loup**	**2,699,621**	**5,929,731**		**(3,230,110)**		**2,699,621**	**0.46**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Labrador Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Labrador Interconnected							
1	Industrial IOCC Firm	5,410,564	5,077,710		-		5,077,710	1.07
2	Industrial IOCC Non-Firm	-	-		-		-	0.00
3	**Subtotal Industrial**	**5,410,564**	**5,077,710**	**-**	**-**		**5,077,710**	**1.07**
4	**CFB - Goose Bay Secondary**	932,221	19,653	912,568	-		932,221	47.43
	Rural							
5	1.1 Domestic	101,289	207,517	-	31,766.78		239,284	0.49
6	1.1A Domestic All Electric	11,049,621	10,547,356	-	1,614,589		12,161,945	1.05
7	2.1 General Service 0-10 kW	410,227	359,123	-	54,975		414,098	1.14
8	2.2 General Service 10-100 kW	2,342,225	1,795,946	-	274,923		2,070,869	1.30
9	2.3 General Service 110-1,000 kVa	3,071,096	2,251,753	-	344,698		2,596,451	1.36
10	2.4 General Service Over 1,000 kVa	2,806,310	2,051,954	-	314,113		2,366,068	1.37
11	4.1 Street and Area Lighting	312,471	314,679	-	48,171		362,850	0.99
12	**Subtotal Rural**	**20,093,238**	**17,528,328**	**-**	**2,683,236**		**20,211,565**	**1.15**
13	**Total Labrador Interconnected**	**26,436,023**	**22,625,691**	**912,568**	**2,683,236**		**26,221,495**	**1.17**

Note1:
Calculation of CFB - Goose Bay Secondary Revenue Credit

CFB - Goose Bay Secondary Revenues, Ln 4, Col 2		932,221
CFB - Goose Bay Secondary Allocated Cost of Service, Ln 4, Col 3		(19,653)
CFB - Goose Bay Secondary Allocated Deficit, Ln 4, Col 5		-
Revenue Credit		912,568
Revenue Credit Applied to Deficit	**100.0%**	912,568
Revenue Credit Applied to Firm Regulated Labrador Interconnected Customers		-
		912,568

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Total System
Rural Deficit Allocation

	1	2	3	4	5	6
		Before Deficit and Revenue Credit Allocation				
	Rate Class	Allocated Revenue Reqt ($)	Demand ($)	Energy ($)	Customer ($)	Source
	CLASSIFICATION TO DEMAND, ENERGY, CUSTOMERS:					
1	Newfoundland Power	363,665,168	143,669,786	215,730,989	4,264,392	Schedule 1.3.1, p. 1
2	Rural Labrador Interconnected	17,528,328	10,687,183	1,333,949	5,507,197	Schedule 1.3.1, p. 3
3	**Total**	**381,193,496**	**154,356,969**	**217,064,938**	**9,771,589**	
4	Deficit Classified	58,353,094.80	23,628,963	33,228,298	1,495,835	Prorated on Line 3

* Specifically assigned costs are converted to equivalent unweighted customers by dividing the assigned cost by the allocated customer cost per unweighted customer.

Rural Customer Costs per Rural Customer:	
Island Interconnected:	$520.86
Labrador Interconnected:	$474.77

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2015 Revenue Deficiency
Total System
Rural Deficit Allocation

	1	2	
	Rate Class	Deficit Allocation Allocated 100% on Revenue Reqt ($)	
	ALLOCATION OF DEFICIT:		
1	Island Interconnected	55,669,858.55	
2	Labrador Interconnected	2,683,236.25	
3	**Allocated Totals**	**58,353,095**	
	CUSTOMER DEFICIT ALLOCATION:		
		Amount	Percent
	Island Interconnected:		
4	Newfoundland Power	55,669,859	95.4%
5	Sub-Total Island Interconnected	55,669,859	
	Labrador Interconnected:		
6	Rural Labrador Interconnected	2,683,236	4.6%
7	Subtotal Labrador Interconnected	2,683,236	
8	**Total**	**58,353,095**	100.0%

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Total System
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credits ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Total System							
1	Newfoundland Power	448,559,921	367,659,465	-	49,296,968	-	416,956,434	
2	RSP Activity	-	-	-	-	-	-	
3	Subtotal Newfoundland Power	**448,559,921**	**367,659,465**	**-**	**49,296,968**	**-**	**416,956,434**	**1.22**
4	Island Industrial	34,892,102	32,816,670	-	-		32,816,670	1.06
5	Unallocated RSP Hydraulic Variation	-	-	-	-		-	-
6	Labrador Industrial	5,409,506	5,230,801	-	-		5,230,801	1.03
7	CFB - Goose Bay Secondary	932,221	19,653	912,568	-		932,221	47.43
8	Rural Labrador Interconnected	20,093,238	17,650,669	-	2,366,659		20,017,328	1.14
	Rural Deficit Areas							
9	Island Interconnected	54,444,559	70,109,551	-	(15,664,992)		54,444,559	0.78
10	Island Isolated	1,534,776	9,464,875	-	(7,930,099)		1,534,776	0.16
11	Labrador Isolated	8,268,446	34,298,167	-	(26,029,721)		8,268,446	0.24
12	L'Anse au Loup	3,037,075	5,988,458	-	(2,951,383)		3,037,075	0.51
13	CFB Revenue Credit Applied to Deficit	-	-	(912,568)	912,568		-	-
14	**Subtotal**	**67,284,856**	**119,861,051**	**(912,568)**	**(51,663,627)**	**-**	**67,284,856**	**0.56**
15	**Total**	**577,171,844**	**543,238,309**	**-**	**-**	**-**	**543,238,309**	**1.06**

Schedule 1.2
Page 2 of 6

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Island Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Interconnected							
1	Newfoundland Power	448,559,921	367,659,465	-	49,296,968	-	416,956,434	
2	NLP RSP Activity	-					-	
3	**Subtotal Newfoundland Power**	**448,559,921**	**367,659,465**	**-**	**49,296,968**	**-**	**416,956,434**	**1.22**
4	Industrial - Firm	34,892,102	32,816,670	-			32,816,670	
5	Industrial - Non-Firm	-	-	-			-	
6	Industrial RSP Activity	-					-	
7	**Subtotal Industrial**	**34,892,102**	**32,816,670**	**-**	**-**		**32,816,670**	**1.06**
	Rural							
8	1.1 Domestic	15,088,497	20,737,455	-	(5,648,958)		15,088,497	0.73
9	1.12 Domestic All Electric	18,037,933	23,914,321	-	(5,876,388)		18,037,933	0.75
10	1.3 Special	19,223	59,254	-	(40,030)		19,223	0.32
11	2.1 General Service 0-10 kW							
12	2.2 General Service 10-100 kW	9,821,196	11,746,179	-	(1,924,983)		9,821,196	0.84
13	2.3 General Service 110-1,000 kVa	6,745,832	8,114,608	-	(1,368,776)		6,745,832	0.83
14	2.4 General Service Over 1,000 kVa	3,698,602	4,280,378	-	(581,776)		3,698,602	0.86
15	4.1 Street and Area Lighting	1,033,276	1,257,356	-	(224,080)		1,033,276	0.82
16	**Subtotal Rural**	**54,444,559**	**70,109,551**	**-**	**(15,664,992)**		**54,444,559**	**0.78**
17	**Total Island Interconnected**	**537,896,581**	**470,585,686**	**-**	**33,631,976**		**504,217,663**	**1.14**

Note1:
Calculation of Island Industrial Non-Firm Revenue Credit

Island Industrial Non-Firm Revenues, Ln 5, Col 2	-
Island Industrial Non-Firm Allocated Cost of Service, Ln 5, Col 3	-
Credit to be allocated to Island Interconnected Firm Customers	-

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Island Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Isolated							
1	1.2 Domestic Diesel	823,741	7,156,689		(6,332,948)		823,741	0.12
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	66,502	0		66,502		66,502	0.00
4	2.1 General Service 0-10 kW	172,256	915,079		(742,823)		172,256	0.19
5	2.2 GS 10-100 kW	430,699	767,213		(336,514)		430,699	0.56
6	2.3 GS 110-1,000 kVa	0	445,918		(445,918)		0	0.00
7	2.4 General Service Over 1,000 kVa	0	0		0		0	0.00
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	41,578	179,977		(138,399)		41,578	0.23
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	**Total**	**1,534,776**	**9,464,875**		**(7,930,099)**		**1,534,776**	**0.16**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Labrador Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Labrador Isolated							
1	1.2 Domestic Diesel	3,439,424	18,146,404		(14,706,980)		3,439,424	0.19
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	293,633	0		293,633		293,633	0.00
4	2.1 General Service 0-10 kW	1,083,630	3,485,093		(2,401,462)		1,083,630	0.31
5	2.2 GS 10-100 kW	2,714,967	8,934,432		(6,219,465)		2,714,967	0.30
6	2.3 GS 110-1,000 kVa	366,240	1,841,219		(1,474,979)		366,240	0.20
7	2.4 General Service Over 1,000 kVa	248,329	1,544,261		(1,295,933)		248,329	0.16
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	122,223	346,758		(224,535)		122,223	0.35
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	**Total**	**8,268,446**	**34,298,167**		**(26,029,721)**		**8,268,446**	**0.24**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
L'Anse au Loup
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	L'Anse au Loup							
1	1.1 Domestic	561,906	1,240,674		(678,768)		561,906	0.45
2	1.12 Domestic All Electric	1,311,464	2,734,811		(1,423,347)		1,311,464	0.48
3	2.1 General Service 0-10 kW	0	0		0		0	0.00
4	2.2 General Service 10-100 kW	881,223	1,581,203		(699,980)		881,223	0.56
5	2.3 General Service 110-1,000 kVa	231,149	367,547		(136,398)		231,149	0.63
6	4.1 Street and Area Lighting	51,333	64,223		(12,890)		51,333	0.80
7	**Total L'Anse Au Loup**	**3,037,075**	**5,988,458**		**(2,951,383)**		**3,037,075**	**0.51**

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Labrador Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Labrador Interconnected							
1	Industrial IOCC Firm	5,409,506	5,230,801		-		5,230,801	1.03
2	Industrial IOCC Non-Firm	-	-		-		-	0.00
3	**Subtotal Industrial**	**5,409,506**	**5,230,801**	**-**	**-**		**5,230,801**	**1.03**
4	**CFB - Goose Bay Secondary**	932,221	19,653	912,568	-		932,221	47.43
	Rural							
5	1.1 Domestic	101,289	208,269	-	27,925.35		236,194	0.49
6	1.1A Domestic All Electric	11,049,621	10,614,816	-	1,423,269		12,038,085	1.04
7	2.1 General Service 0-10 kW	410,227	360,452	-	48,331		408,783	1.14
8	2.2 General Service 10-100 kW	2,342,225	1,808,705	-	242,517		2,051,223	1.29
9	2.3 General Service 110-1,000 kVa	3,071,096	2,271,553	-	304,577		2,576,130	1.35
10	2.4 General Service Over 1,000 kVa	2,806,310	2,071,603	-	277,767		2,349,370	1.35
11	4.1 Street and Area Lighting	312,471	315,271	-	42,273		357,543	0.99
12	**Subtotal Rural**	**20,093,238**	**17,650,669**	**-**	**2,366,659**		**20,017,328**	**1.14**
13	**Total Labrador Interconnected**	**26,434,965**	**22,901,123**	**912,568**	**2,366,659**		**26,180,350**	**1.15**

Note1:
Calculation of CFB - Goose Bay Secondary Revenue Credit

CFB - Goose Bay Secondary Revenues, Ln 4, Col 2		932,221
CFB - Goose Bay Secondary Allocated Cost of Service, Ln 4, Col 3		(19,653)
CFB - Goose Bay Secondary Allocated Deficit, Ln 4, Col 5		-
Revenue Credit		912,568
Revenue Credit Applied to Deficit	**100.0%**	912,568
Revenue Credit Applied to Firm Regulated Labrador Interconnected Customers		-
		912,568

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Total System
Rural Deficit Allocation

	1	2	3	4	5	6
		Before Deficit and Revenue Credit Allocation				
	Rate Class	Allocated Revenue Reqt ($)	Demand ($)	Energy ($)	Customer ($)	Source
	CLASSIFICATION TO DEMAND, ENERGY, CUSTOMERS:					
1	Newfoundland Power	367,659,465	147,505,462	215,905,886	4,248,117	Schedule 1.3.1, p. 1
2	Rural Labrador Interconnected	17,650,669	10,802,123	1,333,648	5,514,899	Schedule 1.3.1, p. 3
3	**Total**	**385,310,134**	**158,307,584**	**217,239,534**	**9,763,016**	
4	Deficit Classified	51,663,627.07	21,226,392	29,128,178	1,309,057	Prorated on Line 3

* Specifically assigned costs are converted to equivalent unweighted customers by dividing the assigned cost by the allocated customer cost per unweighted customer.

Rural Customer Costs per Rural Customer:	
Island Interconnected:	$521.53
Labrador Interconnected:	$475.43

Newfoundland and Labrador Hydro
2015 Test Year Cost of Service for 2016 Revenue Deficiency
Total System
Rural Deficit Allocation

	1	2	
	Rate Class	Deficit Allocation Allocated 100% on Revenue Reqt ($)	
	ALLOCATION OF DEFICIT:		
1	Island Interconnected	49,296,968.37	
2	Labrador Interconnected	2,366,658.70	
3	**Allocated Totals**	**51,663,627**	
	CUSTOMER DEFICIT ALLOCATION:		
		Amount	Percent
	Island Interconnected:		
4	Newfoundland Power	49,296,968	95.4%
5	Sub-Total Island Interconnected	49,296,968	
	Labrador Interconnected:		
6	Rural Labrador Interconnected	2,366,659	4.6%
7	Subtotal Labrador Interconnected	2,366,659	
8	**Total**	**51,663,627**	100.0%

Compliance Rates Application - Exhibit 8

wŜǀŝƐĞĚ 2015 Test Year Cost of Service for Rate Setting

May 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador
hydro
a nalcor energy company

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Total System
Revenue Requirement

	1	2	3	4	5	6	7	8
Line No.	Description	Total Amount ($)	Island Interconnected ($)	Island Isolated ($)	Labrador Isolated ($)	L'Anse au Loup ($)	Labrador Interconnected ($)	Basis of Proration
	Revenue Requirement							
	Expenses							
1	Operating, Maintenance and Admin.	132,737,670	100,888,350	5,615,999	13,293,544	1,553,095	11,386,683	Detailed Analysis
2	Fuels - No. 6 Fuel	166,540,358	166,540,358	-	-	-	-	Detailed Analysis
3	Fuels - Diesel	17,260,946	87,140	2,198,340	14,315,837	585,108	74,521	Detailed Analysis
4	Fuels - Gas Turbine	3,672,993	3,473,690	-	-	-	199,303	
5	Fuel Supply Deferral	-	-					
6	Power Purchases -CF(L)Co	1,856,851	-	-	-	-	1,856,851	Detailed Analysis
7	Power Purchases - Other	60,970,016	58,109,820	202,500	-	2,657,696	-	Detailed Analysis
9	Depreciation	62,792,518	55,708,988	539,188	2,621,605	435,508	3,487,229	Detailed Analysis
	Expense Credits:							
10	Sundry	(664,680)	(505,195)	(28,122)	(66,567)	(7,777)	(57,018)	Total O&M Expenses
11	Building Rental Income	(17,472)	(17,472)	-	-	-	0	Detailed Analysis
12	Tax Refunds	-	-	-	-	-	-	Total O&M Expenses
13	Suppliers' Discounts	(103,548)	(78,703)	(4,381)	(10,370)	(1,212)	(8,883)	Total O&M Expenses
14	Pole Attachments	(1,718,482)	(1,263,389)	(24,203)	(105,320)	(69,837)	(255,733)	Detailed Analysis
15	Secondary Energy Revenues	-	-	-	-	-	-	Island Interconnected
16	Wheeling Revenues	-	0	-	-	-	-	Island Interconnected
17	Application Fees	(26,544)	(11,476)	(168)	(1,472)	(412)	(13,016)	Detailed Analysis
18	Meter Test Revenues	(3,400)	(2,075)	(57)	(215)	(110)	(943)	Weighted Customers
19	**Total Expense Credits**	**(2,534,126)**	**(1,878,310)**	**(56,931)**	**(183,944)**	**(79,348)**	**(335,593)**	
20	**Subtotal Expenses**	**443,297,226**	**382,930,036**	**8,499,096**	**30,047,042**	**5,152,059**	**16,668,993**	
21	Disposal Gain/Loss	4,074,381	3,555,647	133,059	273,138	70,800	41,737	Detailed Analysis
22	**Subtotal Rev Reqt Excl Return**	**447,371,607**	**386,485,683**	**8,632,155**	**30,320,180**	**5,222,859**	**16,710,730**	
23	Return on Debt	85,708,058	77,264,792	597,493	2,855,552	549,258	4,440,963	Rate Base
24	Return on Equity	32,286,008	29,105,451	225,074	1,075,679	206,904	1,672,899	Rate Base
25	**Total Revenue Requirement (1)**	**565,365,673**	**492,855,926**	**9,454,722**	**34,251,411**	**5,979,022**	**22,824,593**	

(1) Reconciliation to the Revenue Requirement per Finance Schedules ($millions):

Total Revenue Requirement per Cost of Service	565.4
Add Expense Credits	2.5
Less IOCC Cost Recovery	1.4
Total Revenue Requirement per Finance Schedules	566.5

Schedule 1.1
Page 2 of 2

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Total System
Return on Rate Base

	1	2	3	4	5	6	7	8
Line No		Total $	Island Interconnected $	Island Isolated $	Labrador Isolated $	L'Anse au Loup $	Labrador Interconnected $	Basis of Proration
	Rate Base:							
1	Average Net Book Value	1,612,852,414	1,453,224,206	11,343,272	52,259,255	10,540,623	85,485,059	Schedule 2.3
2	Cash Working Capital	7,037,000	6,340,530	49,492	228,011	45,990	372,978	Prorated on Average Net Book Value - L. 1
3	Fuel Inventory - No. 6 Fuel	39,681,050	39,681,050	-	-	-	-	Specifically Assigned - Holyrood
4	Fuel Inventory - Diesel	3,518,344	186,223	165,549	3,084,574	44,283	37,715	Detailed Fuel Analysis
5	Fuel Inventory - Gas Turbine	4,198,498	3,992,487	-	-	-	206,011	Detailed Fuel Analysis
6	Inventory/Supplies	27,402,000	24,359,458	250,202	973,460	217,976	1,600,905	Prorated on Total Plant in Service, Schedule 2.2
7	Deferred Charges: Holyrood	-	-					Detailed Analysis
8	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	90,665,000	81,691,649	637,651	2,937,705	592,531	4,805,463	Prorated on Average Net Book Value - L. 1
9	Total Rate Base	**1,785,354,306**	**1,609,475,602**	**12,446,166**	**59,483,005**	**11,441,402**	**92,508,130**	
10	Less: Rural Portion	-	-	-	-	-	-	Schedule 2.6, L. 9
11	Rate Base Available for Equity Return	**1,785,354,306**	**1,609,475,602**	**12,446,166**	**59,483,005**	**11,441,402**	**92,508,130**	
	Corporate Targets:							
12	Capital Structure: Percent of Debt	74.210% (1)						
13	Return	6.469%						
14	Weighted Average Return: Debt	**4.801%**						
15	Capital Structure: Percent of Equity	21.275% (1)						
16	Return	8.500%						
17	Weighted Average Return: Equity	**1.808%**						
18	Weighted Average Cost of Capital	**6.609%**						
	Return on Rate Base by System (%):							
19	Return on Rate Base - Debt Component	-	4.801%	4.801%	4.801%	4.801%	4.801%	
20	Return on Rate Base - Equity Component	-	1.808%	1.808%	1.808%	1.808%	1.808%	
	Return on Rate Base ($):							
21	Return on Debt	85,708,058	77,264,792	597,493	2,855,552	549,258	4,440,963	Schedule 2.6, L.12
22	Return on Equity	32,286,008	29,105,451	225,074	1,075,679	206,904	1,672,899	Schedule 2.6, L.13
23	Return on Rate Base ($)	**117,994,066**	**106,370,243**	**822,567**	**3,931,232**	**756,162**	**6,113,862**	Schedule 2.6, L.14
	Return on Total Rate Base (%):							
24	Return on Rate Base - Debt Component	4.801%	4.801%	4.801%	4.801%	4.801%	4.801%	L. 21 divided by L.9
25	Return on Rate Base - Equity Component	1.808%	1.808%	1.808%	1.808%	1.808%	1.808%	L. 22 divided by L.9
26	Return on Rate Base (%)	**6.609%**	**6.609%**	**6.609%**	**6.609%**	**6.609%**	**6.609%**	L. 23 divided by L.9

(1) Debt and equity weightings reflect a 0.6201% funded ARO and 3.92063% component for Employee Future Benefits at 0% cost.

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
Total System
Comparison of Revenue & Allocated Revenue Requirement

	1		2	3	4	5	6	7	8
Line No.	Rate Class		Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credits ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Total System								
1	Newfoundland Power		443,359,435	386,597,884	-	56,768,670	-	443,366,553	
2	RSP Activity	-		-	-	-	-	-	
3	Subtotal Newfoundland Power		**443,359,435**	**386,597,884**	**-**	**56,768,670**	**-**	**443,366,553**	**1.15**
4	Island Industrial		34,823,379	34,828,640	-	-		34,828,640	1.00
5	Unallocated RSP Hydraulic Variation	-		-	-	-		-	-
6	Labrador Industrial		5,210,906	5,218,122	-	-		5,218,122	1.00
7	CFB - Goose Bay Secondary		932,221	19,653	912,568	-		932,221	47.43
8	Rural Labrador Interconnected		20,170,496	17,586,817	-	2,582,477		20,169,294	1.15
	Rural Deficit Areas								
9	Island Interconnected		48,698,726	71,429,395	-	(22,730,669)		48,698,726	0.68
10	Island Isolated		1,452,557	9,454,722	-	(8,002,164)		1,452,557	0.15
11	Labrador Isolated		7,972,584	34,251,411	-	(26,278,828)		7,972,584	0.23
12	L'Anse au Loup		2,726,969	5,979,022	-	(3,252,053)		2,726,969	0.46
13	CFB Revenue Credit Applied to Deficit		-	-	(912,568)	912,568		-	-
14	**Subtotal**		**60,850,836**	**121,114,550**	**(912,568)**	**(59,351,147)**	**-**	**60,850,836**	**0.50**
15	**Total**		**565,347,273**	**565,365,667**	**-**	**-**	**-**	**565,365,667**	**1.00**

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
Line No.	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit Allocation ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Interconnected							
1	Newfoundland Power	443,359,435	386,597,884	-	56,768,670	-	443,366,553	
2	NLP RSP Activity	-					-	
3	**Subtotal Newfoundland Power**	**443,359,435**	**386,597,884**	**-**	**56,768,670**	**-**	**443,366,553**	**1.15**
4	Industrial - Firm	34,823,379	34,828,640	-			34,828,640	
5	Industrial - Non-Firm	-	-	-			-	
6	Industrial RSP Activity	-					-	
7	**Subtotal Industrial**	**34,823,379**	**34,828,640**	**-**	**-**		**34,828,640**	**1.00**
	Rural							
8	1.1 Domestic	13,564,681	21,069,534	-	(7,504,853)		13,564,681	0.64
9	1.12 Domestic All Electric	16,159,404	24,347,709	-	(8,188,305)		16,159,404	0.66
10	1.3 Special	19,091	60,303	-	(41,213)		19,091	0.32
11	2.1 General Service 0-10 kW							
12	2.2 General Service 10-100 kW	8,821,279	11,983,998	-	(3,162,718)		8,821,279	0.74
13	2.3 General Service 110-1,000 kVa	5,957,332	8,307,651	-	(2,350,319)		5,957,332	0.72
14	2.4 General Service Over 1,000 kVa	3,225,813	4,396,628	-	(1,170,816)		3,225,813	0.73
15	4.1 Street and Area Lighting	951,126	1,263,572	-	(312,446)		951,126	0.75
16	**Subtotal Rural**	**48,698,726**	**71,429,395**	**-**	**(22,730,669)**		**48,698,726**	**0.68**
17	**Total Island Interconnected**	**526,881,540**	**492,855,919**	**-**	**34,038,001**		**526,893,920**	**1.07**

Note1:
Calculation of Island Industrial Non-Firm Revenue Credit

Island Industrial Non-Firm Revenues, Ln 5, Col 2	-
Island Industrial Non-Firm Allocated Cost of Service, Ln 5, Col 3	-
Credit to be allocated to Island Interconnected Firm Customers	-

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
Line No.	Rate Class	Revenues ($)	Cost of Service Before Deficit and Revenue Credit Allocation ($)	Revenue Credit ($)	Deficit ($)	RSP Activity ($)	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	Revenue to Cost Coverage (Col.2/3)
	Island Isolated							
1	1.2 Domestic Diesel	742,246	7,148,939		(6,406,694)		742,246	0.10
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	59,697	0		59,697		59,697	0.00
4	2.1 General Service 0-10 kW	177,863	914,117		(736,254)		177,863	0.19
5	2.2 GS 10-100 kW	433,324	766,457		(333,133)		433,324	0.57
6	2.3 GS 110-1,000 kVa	0	445,443		(445,443)		0	0.00
7	2.4 General Service Over 1,000 kVa	0	0		0		0	0.00
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	39,429	179,766		(140,337)		39,429	0.22
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	Total	**1,452,557**	**9,454,722**		**(8,002,164)**		**1,452,557**	**0.15**

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
Line No.	Rate Class	Revenues	Cost of Service Before Deficit and Revenue Credit Allocation	Revenue Credit	Deficit	RSP Activity	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6)	Revenue to Cost Coverage (Col.2/3)
		($)	($)	($)	($)	($)	($)	
	Labrador Isolated							
1	1.2 Domestic Diesel	3,138,175	18,120,350		(14,982,175)		3,138,175	0.17
2	1.2G Government Domestic Diesel	0	0		0		0	0.00
3	1.23 Churches, Schools & Com Halls	263,438	0		263,438		263,438	0.00
4	2.1 General Service 0-10 kW	1,114,119	3,480,251		(2,366,132)		1,114,119	0.32
5	2.2 GS 10-100 kW	2,795,334	8,922,720		(6,127,385)		2,795,334	0.31
6	2.3 GS 110-1,000 kVa	330,132	1,839,239		(1,509,107)		330,132	0.18
7	2.4 General Service Over 1,000 kVa	216,126	1,542,664		(1,326,538)		216,126	0.14
8	2.5 GS Diesel	0	0		0		0	0.00
9	2.5G Gov't General Service Diesel	0	0		0		0	0.00
10	4.1 Street and Area Lighting	115,258	346,187		(230,929)		115,258	0.33
11	4.1G Gov't Street and Area Lighting	0	0		0		0	0.00
12	Total	**7,972,584**	**34,251,411**		**(26,278,828)**		**7,972,584**	**0.23**

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Comparison of Revenue & Allocated Revenue Requirement

	1	2	3	4	5	6	7	8
Line No.	Rate Class	Revenues	Cost of Service Before Deficit and Revenue Credit Allocation	Revenue Credit	Deficit	RSP Activity	Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6)	Revenue to Cost Coverage (Col.2/3)
		($)	($)	($)	($)	($)	($)	
	L'Anse au Loup							
1	1.1 Domestic	504,923	1,238,431		(733,508)		504,923	0.41
2	1.12 Domestic All Electric	1,172,706	2,730,462		(1,557,756)		1,172,706	0.43
3	2.1 General Service 0-10 kW	0	0		0		0	0.00
4	2.2 General Service 10-100 kW	796,153	1,578,832		(782,679)		796,153	0.50
5	2.3 General Service 110-1,000 kVa	205,802	367,210		(161,408)		205,802	0.56
6	4.1 Street and Area Lighting	47,385	64,087		(16,702)		47,385	0.74
7	**Total L'Anse Au Loup**	**2,726,969**	**5,979,022**		**(3,252,053)**		**2,726,969**	**0.46**

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Comparison of Revenue & Allocated Revenue Requirement

Line No.	1 Rate Class	2 Revenues ($)	3 Cost of Service Before Deficit and Revenue Credit Allocation ($)	4 Revenue Credit ($)	5 Deficit Allocation ($)	6 RSP Activity ($)	7 Revenue Requirement After Deficit and Revenue Credit Allocation (Col.3+4+5+6) ($)	8 Revenue to Cost Coverage (Col.2/3)
	Labrador Interconnected							
1	Industrial IOCC Firm	5,210,906	5,218,122		-		5,218,122	1.00
2	Industrial IOCC Non-Firm	-	-		-		-	0.00
3	**Subtotal Industrial**	**5,210,906**	**5,218,122**	**-**	**-**		**5,218,122**	**1.00**
4	**CFB - Goose Bay Secondary**	932,221	19,653	912,568	-		932,221	47.43
	Rural							
5	1.1 Domestic	101,439	207,512	-	30,471.37		237,983	0.49
6	1.1A Domestic All Electric	11,066,364	10,576,239	-	1,553,032		12,129,271	1.05
7	2.1 General Service 0-10 kW	410,789	359,155	-	52,739		411,894	1.14
8	2.2 General Service 10-100 kW	2,345,631	1,802,080	-	264,620		2,066,700	1.30
9	2.3 General Service 110-1,000 kVa	3,075,654	2,263,299	-	332,347		2,595,645	1.36
10	2.4 General Service Over 1,000 kVa	2,810,272	2,064,325	-	303,129		2,367,454	1.36
11	4.1 Street and Area Lighting	360,347	314,207	-	46,139		360,346	1.15
12	**Subtotal Rural**	**20,170,496**	**17,586,817**	**-**	**2,582,477**		**20,169,294**	**1.15**
13	**Total Labrador Interconnected**	**26,313,624**	**22,824,593**	**912,568**	**2,582,477**		**26,319,638**	**1.15**

Note1:
Calculation of CFB - Goose Bay Secondary Revenue Credit

CFB - Goose Bay Secondary Revenues, Ln 4, Col 2		932,221
CFB - Goose Bay Secondary Allocated Cost of Service, Ln 4, Col 3		(19,653)
CFB - Goose Bay Secondary Allocated Deficit, Ln 4, Col 5		-
Revenue Credit		912,568
Revenue Credit Applied to Deficit	**100.0%**	912,568
Revenue Credit Applied to Firm Regulated Labrador Interconnected Customers		-
		912,568

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
Total System
Rural Deficit Allocation

	1	2	3	4	5	6
		Before Deficit and Revenue Credit Allocation				
Line No.	Rate Class	Allocated Revenue Reqt ($)	Demand ($)	Energy ($)	Customer ($)	Source
	CLASSIFICATION TO DEMAND, ENERGY, CUSTOMERS:					
1	Newfoundland Power	386,597,884	146,892,778	235,479,983	4,225,123	Schedule 1.3.1, p. 1
2	Rural Labrador Interconnected	17,586,817	10,757,783	1,333,792	5,495,241	Schedule 1.3.1, p. 3
3	**Total**	**404,184,701**	**157,650,561**	**236,813,776**	**9,720,364**	
4	Deficit Classified	59,351,146.73	23,149,668	34,774,125	1,427,354	Prorated on Line 3

* Specifically assigned costs are converted to equivalent unweighted customers
by dividing the assigned cost by the allocated customer cost per unweighted customer.

Rural Customer Costs per Rural Customer:	
Island Interconnected:	$519.63
Labrador Interconnected:	$473.74

NEWFOUNDLAND AND LABRADOR HYDRC
2015 Test Year Cost of Service - Rate Setting
Total System
Rural Deficit Allocation

Line No.	1	2	
	Rate Class	Deficit Allocation Allocated 100% on Revenue Reqt ($)	
	ALLOCATION OF DEFICIT:		
1	Island Interconnected	56,768,669.58	
2	Labrador Interconnected	2,582,477.15	
3	**Allocated Totals**	**59,351,147**	
	CUSTOMER DEFICIT ALLOCATION:		
		Amount	Percent
	Island Interconnected:		
4	Newfoundland Power	56,768,670	95.6%
5	Sub-Total Island Interconnected	56,768,670	
	Labrador Interconnected:		
6	Rural Labrador Interconnected	2,582,477	4.4%
7	Subtotal Labrador Interconnected	2,582,477	
8	**Total**	**59,351,147**	100.0%

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Unit Demand, Energy & Customer Amounts

	1	2	3	4	5	6	7	8	9	10	11
	Rate Class	Before Deficit and Revenue Credit Allocation					After Deficit and Revenue Credit Allocation				
Line		Demand		Non-Demand			Demand		Non-Demand		
No.		Demand ($/kW)	Non-Demand ($/kWh)	Energy ($/kWh)	Demand & Energy ($/kWh)	Customer ($/Bill)	Demand ($/kW)	Non-Demand ($/kWh)	Energy ($/kWh)	Demand & Energy ($/kWh)	Customer ($/Bill)
	Island Interconnected										
1	Newfoundland Power	9.71	-	0.03975	-	352,093.56	11.14	-	0.04559	-	403,795.56
2	Industrial - Firm	7.99	-	0.03971	-	27,330.55	7.99	-	0.03971	-	27,330.55
3	Industrial - Non-Firm	-	-	-	-	-	-	-	-	-	-
	Rural							-	-		
4	1.1 Domestic	-	0.09779	0.04413	0.14192	39.69	-	-	-	-	-
5	1.12 Domestic All Electric	-	0.10111	0.04420	0.14531	39.75	-	-	-	-	-
6	1.3 Special	-	0.12970	0.04372	0.17342	39.33	-	-	-	-	-
7	2.1 General Service 0-10 kW	-	-	-	-	-	-	-	-	-	-
8	2.2 General Service 10-100 kW	52.58	-	0.04432	-	58.03	-	-	-	-	-
9	2.3 General Service 110-1,000 kVa	31.12	-	0.04425	-	75.54	-	-	-	-	-
10	2.4 General Service Over 1,000 kVa	25.37	-	0.04360	-	75.55	-	-	-	-	-
11	4.1 Street and Area Lighting	-	0.12485	0.04434	0.16920	69.50	-	-	-	-	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Unit Demand, Energy & Customer Amounts

	1	2	3	4	5	6	7	8	9	10	11
	Rate Class	Before Deficit and Revenue Credit Allocation					After Deficit and Revenue Credit Allocation				
		Demand			Non-Demand		Demand			Non-Demand	
Line No.		Demand ($/kW)	Non-Demand ($/kWh)	Energy ($/kWh)	Demand & Energy ($/kWh)	Customer ($/Bill)	Demand ($/kW)	Non-Demand ($/kWh)	Energy ($/kWh)	Demand & Energy ($/kWh)	Customer ($/Bill)
	Isolated Systems:										
1	1.2 Domestic Diesel	-	0.27142	0.62022	0.89164	55.69					
2	2.1 General Service 0-10 kW	-	0.19879	0.61489	0.81367	59.76					
3	2.2 GS 10-100 kW	59.83	-	0.60033	-	73.76					
4	2.3 GS 110-1,000 kVa	21.70	-	0.60531	-	98.83					
5	2.4 General Service Over 1,000 kVa	14.16	-	0.59078	-	90.00					
6	**Subtotal Metered Demand Classes**	44.84	-	0.59991	-	74.95					
7	4.1 Street and Area Lighting	-	0.32698	0.62930	0.95628	98.39					
	Island Isolated										
8	1.2 Domestic Diesel	-	0.48095	0.73436	1.21531	76.96	-	-	-	-	-
9	2.1 General Service 0-10 kW	-	0.36197	0.73670	1.09867	86.25	-	-	-	-	-
10	2.2 GS 10-100 kW	170.72	-	0.74364	-	117.16	-	-	-	-	-
11	2.3 GS 110-1,000 kVa	141.74	-	0.73208	-	152.71	-	-	-	-	-
12	2.4 General Service Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-
13	4.1 Street and Area Lighting	-	0.53466	0.73683	1.27148	116.50	-	-	-	-	-
	Labrador Isolated										
14	1.2 Domestic Diesel	-	0.21780	0.59101	0.80881	48.52	-	-	-	-	-
15	2.1 General Service 0-10 kW	-	0.17003	0.59342	0.76345	53.65	-	-	-	-	-
16	2.2 GS 10-100 kW	55.46	-	0.59183	-	69.71	-	-	-	-	-
17	2.3 GS 110-1,000 kVa	10.35	-	0.58980	-	89.85	-	-	-	-	-
18	2.4 General Service Over 1,000 kVa	14.16	-	0.59078	-	90.00	-	-	-	-	-
19	4.1 Street and Area Lighting	-	0.25827	0.59372	0.85198	90.10	-	-	-	-	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Unit Demand, Energy & Customer Amounts

	1	2	3	4	5	6	7	8	9	10	11
	Rate Class	Before Deficit and Revenue Credit Allocation					After Deficit and Revenue Credit Allocation				
		Demand			Non-Demand		Demand			Non-Demand	
Line No.		Demand ($/kW)	Non-Demand ($/kWh)	Energy ($/kWh)	Demand & Energy ($/kWh)	Customer ($/Bill)	Demand ($/kW)	Non-Demand ($/kWh)	Energy ($/kWh)	Demand & Energy ($/kWh)	Customer ($/Bill)
	L'Anse au Loup										
1	1.1 Domestic	-	0.10493	0.14164	0.24657	45.01	-	-	-	-	-
2	1.12 Domestic All Electric	-	0.09704	0.14145	0.23849	44.95	-	-	-	-	-
3	2.1 General Service 0-10 kW	-	-	-	-	0.00	-	-	-	-	-
4	2.2 General Service 10-100 kW	28.96	-	0.14160	-	61.70	-	-	-	-	-
5	2.3 General Service 110-1,000 kVa	11.41	-	0.14277	-	78.51	-	-	-	-	-
6	4.1 Street and Area Lighting	-	0.09752	0.14264	0.24015	80.58	-	-	-	-	-
	Labrador Interconnected										
7	Industrial - IOCC Firm	1.61	-	-	-	5.85	1.61	-	-	-	5.85
8	Industrial - IOCC Non-Firm	-	-	-	-	0.00	-	-	-	-	0.00
9	CFB - Goose Bay Secondary	-	-	0.00193	0.00193	0.00	-	-	0.00193	0.00193	0.00
	Rural							-	-		
10	1.1 Domestic	-	0.02051	0.00201	0.02252	36.69	-	0.02352	0.00230	0.02582	42.08
11	1.1A Domestic All Electric	-	0.01817	0.00203	0.02021	37.17	-	0.02084	0.00233	0.02317	42.62
12	**Subtotal Domestic**	-	0.01819	0.00203	0.02022	37.15	-	0.02086	0.00233	0.02319	42.60
								-	-		
13	2.1 General Service 0-10 kW	-	0.01395	0.00204	0.01600	40.87	-	0.01600	0.00234	0.01834	46.87
14	2.2 General Service 10-100 kW	4.83	-	0.00205	-	52.69	5.54	-	0.00235	-	60.42
15	2.3 General Service 110-1,000 kVa	5.52	-	0.00205	-	67.65	6.34	-	0.00235	-	77.58
16	2.4 General Service Over 1,000 kVa	6.01	-	0.00201	-	66.89	6.89	-	0.00231	-	76.71
17	4.1 Street and Area Lighting	-	0.01990	0.00203	0.02193	59.53	0.00	0.02283	0.00233	0.02515	68.27

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Total Demand, Energy & Customer Amounts

									56.04866:
									1.4081633
	1	2	3	4	5	6	7	8	9
Line No.	Rate Class	Before Deficit and Revenue Credit Allocation				After Deficit and Revenue Credit Allocation			
		Total ($)	Demand ($)	Energy ($)	Customer ($)	Total ($)	Demand ($)	Energy ($)	Customer ($)
	Island Interconnected								
1	Newfoundland Power	386,597,884	146,892,778	235,479,983	4,225,123	443,366,553	168,462,755	270,058,251	4,845,547
2	Industrial - Firm	34,828,640	8,512,045	24,676,762	1,639,833	34,828,640	8,512,045	24,676,762	1,639,833
3	Industrial - Non-Firm	-	-	-	-	-	-	-	-
	Rural								
4	1.1 Domestic	21,069,534	10,731,025	4,842,897	5,495,612	-	-	-	-
5	1.12 Domestic All Electric	24,347,709	14,208,184	6,210,679	3,928,845	-	-	-	-
6	1.3 Special	60,303	44,747	15,085	472	-	-	-	-
7	2.1 General Service 0-10 kW								
8	2.2 General Service 10-100 kW	11,983,998	6,604,812	3,354,146	2,025,040	-	-	-	-
9	2.3 General Service 110-1,000 kVa	8,307,651	5,560,036	2,664,269	83,346	-	-	-	-
10	2.4 General Service Over 1,000 kVa	4,396,628	2,814,379	1,574,996	7,253	-	-	-	-
11	4.1 Street and Area Lighting	1,263,572	349,591	124,159	789,821	-	-	-	-
12	**Subtotal Rural**	**71,429,395**	**40,312,774**	**18,786,232**	**12,330,389**				
13	**Total Island Interconnected**	**492,855,919**	**195,717,596**	**278,942,977**	**18,195,345**				

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Total Demand, Energy & Customer Amounts

	1	2	3	4	5	6	7	8	9
Line No.	Rate Class	Before Deficit and Revenue Credit Allocation				After Deficit and Revenue Credit Allocation			
		Total ($)	Demand ($)	Energy ($)	Customer ($)	Total ($)	Demand ($)	Energy ($)	Customer ($)
	Isolated Systems:								
1	1.2 Domestic Diesel	25,269,290	7,128,976	16,290,409	1,849,905				
2	2.1 General Service 0-10 kW	4,394,368	983,913	3,043,444	367,011				
3	2.2 GS 10-100 kW	9,689,177	2,194,019	7,360,222	134,936				
4	2.3 GS 110-1,000 kVa	2,284,682	332,183	1,944,197	8,302				
5	2.4 General Service Over 1,000 kVa	1,542,664	90,245	1,451,338	1,080				
6	**Subtotal Metered Demand Classes**	13,516,522	2,616,447	10,755,758	144,318				
7	4.1 Street and Area Lighting	525,953	130,990	252,097	142,866				
8	**Total Isolated Systems**	**43,706,133**	**10,860,326**	**30,341,708**	**2,504,100**				
	Island Isolated								
9	1.2 Domestic Diesel	7,148,939	2,574,058	3,930,284	644,597	-	-	-	-
10	2.1 General Service 0-10 kW	914,117	268,431	546,328	99,357	-	-	-	-
11	2.2 GS 10-100 kW	766,457	237,371	510,809	18,277	-	-	-	-
12	2.3 GS 110-1,000 kVa	445,443	187,384	256,226	1,833	-	-	-	-
13	2.4 General Service Over 1,000 kVa	-	-	-	-	-	-	-	-
14	4.1 Street and Area Lighting	179,766	53,252	73,388	53,126	-	-	-	-
15	**Total Island Isolated**	**9,454,722**	**3,320,496**	**5,317,036**	**817,190**				
	Labrador Isolated								
16	1.2 Domestic Diesel	18,120,350	4,554,918	12,360,125	1,205,308	-	-	-	-
17	2.1 General Service 0-10 kW	3,480,251	715,482	2,497,116	267,653	-	-	-	-
18	2.2 GS 10-100 kW	8,922,720	1,956,647	6,849,413	116,659	-	-	-	-
19	2.3 GS 110-1,000 kVa	1,839,239	144,799	1,687,971	6,470	-	-	-	-
20	2.4 General Service Over 1,000 kVa	1,542,664	90,245	1,451,338	1,080	-	-	-	-
21	4.1 Street and Area Lighting	346,187	77,738	178,709	89,740	-	-	-	-
22	**Total Labrador Isolated**	**34,251,411**	**7,539,829**	**25,024,672**	**1,686,910**				

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Total Demand, Energy & Customer Amounts

	1	2	3	4	5	6	7	8	9
Line No.	Rate Class	Before Deficit and Revenue Credit Allocation				After Deficit and Revenue Credit Allocation			
		Total ($)	Demand ($)	Energy ($)	Customer ($)	Total ($)	Demand ($)	Energy ($)	Customer ($)
	L'Anse au Loup								
1	1.1 Domestic	1,238,431	433,474	585,126	219,831	-	-	-	-
2	1.12 Domestic All Electric	2,730,462	1,026,333	1,495,931	208,199	-	-	-	-
3	2.1 General Service 0-10 kW	-	-	-	-	-	-	-	-
4	2.2 General Service 10-100 kW	1,578,832	509,645	914,450	154,737	-	-	-	-
5	2.3 General Service 110-1,000 kVa	367,210	89,516	272,983	4,710	-	-	-	-
6	4.1 Street and Area Lighting	64,087	13,262	19,399	31,426	-	-	-	-
7	**Total L'Anse au Loup**	**5,979,022**	**2,072,231**	**3,287,888**	**618,902**				
	Labrador Interconnected								
8	Industrial - IOCC Firm	5,218,122	5,218,052	-	70	5,218,122	5,218,052	-	70
9	Industrial - IOCC Non-Firm	-	-	-	-	-	-	-	-
10	CFB - Goose Bay Secondary	19,653	-	19,653	-	19,653	-	19,653	-
	Rural								
11	1.1 Domestic	207,512	44,651	4,368	158,494	237,983	51,207	5,009	181,767
12	1.1A Domestic All Electric	10,576,239	5,724,952	640,216	4,211,071	12,129,271	6,565,613	734,227	4,829,431
13	**Subtotal Domestic**	**10,783,750**	**5,769,602**	**644,584**	**4,369,564**	**12,367,254**	**6,616,820**	**739,235**	**5,011,199**
14	2.1 General Service 0-10 kW	359,155	92,979	13,603	252,573	411,894	106,632	15,600	289,662
15	2.2 General Service 10-100 kW	1,802,080	1,189,995	152,139	459,946	2,066,700	1,364,736	174,480	527,485
16	2.3 General Service 110-1,000 kVa	2,263,299	1,894,424	235,544	133,330	2,595,645	2,172,605	270,132	152,909
17	2.4 General Service Over 1,000 kVa	2,064,325	1,775,216	284,293	4,816	2,367,454	2,035,892	326,039	5,523
18	4.1 Street and Area Lighting	314,207	35,566	3,630	275,011	360,346	40,789	4,163	315,394
19	**Subtotal Rural**	**17,586,817**	**10,757,783**	**1,333,792**	**5,495,241**	**20,169,294**	**12,337,474**	**1,529,649**	**6,302,171**
20	**Total Labrador Interconnected**	**22,824,593**	**15,975,836**	**1,353,446**	**5,495,311**	**25,407,070**	**17,555,526**	**1,549,302**	**6,302,242**

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Demands, Sales, & Number of Bills

394

Line No.	Rate Class (1)	Billing Demands (kW) (2)	Sales (MWh) (3)	Customers (4)	Bills (Total No) (5)
		Units			
	Island Interconnected				
1	Newfoundland Power	15,122,049	5,924,100	1	12
2	Industrial - Firm	1,064,800	621,400	5	60
3	Industrial - Non-Firm	-	-	-	-
	Rural				
4	1.1 Domestic	-	109,735	11,538	138,450
5	1.12 Domestic All Electric	-	140,519	8,236	98,832
6	1.3 Special	-	345	1	12
7	2.1 General Service 0-10 kW	-	-	-	-
8	2.2 General Service 10-100 kW	125,618	75,684	2,908	34,894
9	2.3 General Service 110-1,000 kVa	178,664	60,203	92	1,103
10	2.4 General Service Over 1,000 kVa	110,944	36,122	8	96
11	4.1 Street and Area Lighting	-	2,800	947	11,364
12	**Subtotal Rural**	**415,225**	**425,409**	**23,729**	**284,751**
13	**Total Island Interconnected**	**16,602,074**	**6,970,909**	**23,735**	**284,823**

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Demands, Sales, & Number of Bills

	1	2	3	4	5
		Units			
Line No.	Rate Class	Billing Demands (kW)	Sales (MWh)	Customers	Bills (Total No)
	Isolated Systems:				
1	1.2 Domestic Diesel	-	26,265	2,768	33,217
2	2.1 General Service 0-10 kW	-	4,950	512	6,141
3	2.2 GS 10-100 kW	36,668	12,260	152	1,829
4	2.3 GS 110-1,000 kVa	15,307	3,212	7	84
5	2.4 General Service Over 1,000 kVa	6,372	2,457	1	12
6	**Subtotal Metered Demand Classes**	58,347	17,929	160	1,925
7	4.1 Street and Area Lighting	-	401	121	1,452
8	**Total Isolated Systems**	**58,347**	**49,545**	**3,561**	**42,735**
	Island Isolated				
9	1.2 Domestic Diesel	-	5,352	698	8,376
10	2.1 General Service 0-10 kW	-	742	96	1,152
11	2.2 GS 10-100 kW	1,390	687	13	156
12	2.3 GS 110-1,000 kVa	1,322	350	1	12
13	2.4 General Service Over 1,000 kVa	-	-	-	-
14	4.1 Street and Area Lighting	-	100	38	456
15	**Total Island Isolated**	**2,712**	**7,230**	**846**	**10,152**
	Labrador Isolated				
16	1.2 Domestic Diesel	-	20,913	2,070	24,841
17	2.1 General Service 0-10 kW	-	4,208	416	4,989
18	2.2 GS 10-100 kW	35,277	11,573	139	1,673
19	2.3 GS 110-1,000 kVa	13,985	2,862	6	72
20	2.4 General Service Over 1,000 kVa	6,372	2,457	1	12
21	4.1 Street and Area Lighting	-	301	83	996
22	**Total Labrador Isolated**	**55,634**	**42,314**	**2,715**	**32,583**

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Demands, Sales, & Number of Bills

	1	2	3	4	5
		Units			
Line No.	Rate Class	Billing Demands (kW)	Sales (MWh)	Customers	Bills (Total No)
	L'Anse au Loup				
1	1.1 Domestic	-	4,131	407	4,884
2	1.12 Domestic All Electric	-	10,576	386	4,632
3	2.1 General Service 0-10 kW	-	-	-	-
4	2.2 General Service 10-100 kW	17,600	6,458	209	2,508
5	2.3 General Service 110-1,000 kVa	7,844	1,912	5	60
6	4.1 Street and Area Lighting	-	136	33	390
7	**Total L'Anse au Loup**	**25,444**	**23,213**	**1,040**	**12,474**
	Labrador Interconnected				
8	Industrial - IOCC Firm	3,240,000	1,790,000	1	12
9	Industrial - IOCC Non-Firm	-	-		
10	CFB - Goose Bay Secondary	-	10,200	-	-
	Rural				
11	1.1 Domestic	-	2,177	360	4,320
12	1.1A Domestic All Electric	-	315,013	9,442	113,304
13	**Subtotal Domestic**	-	**317,190**	**9,802**	**117,624**
14	2.1 General Service 0-10 kW	-	6,663	515	6,180
15	2.2 General Service 10-100 kW	246,126	74,304	728	8,730
16	2.3 General Service 110-1,000 kVa	342,935	114,720	164	1,971
17	2.4 General Service Over 1,000 kVa	295,333	141,252	6	72
18	4.1 Street and Area Lighting	-	1,787	385	4,620
19	**Subtotal Rural**	**884,393**	**655,916**	**11,600**	**139,197**
20	**Total Labrador Interconnected**	**4,124,393**	**2,456,116**	**11,601**	**139,209**

Schedule 1.4
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Cost Calculations for Newfoundland Power

Line No.	1 Description	2 Amount	3 Source
	Newfoundland Power:		
	Demand:		
1	**Cost ($/kW/mo.)**	**4.75**	
2	Billing Units (kW)	15,122,049	Sch 1.3.2, pg 1, Ln 1, Col 2
3	Demand Revenue	$71,829,733	Ln 1 * Ln 2
	Energy (First Block):		
4	Total Revenue Requirement	$443,366,553	Sch 1.2, pg 1, Ln 1, Col 7
5	Less: Demand Revenue	71,829,733	Ln 2 * Ln 3
6	Revenue Requirement to be Recovered Through Energy Rates	$ 371,536,821	Ln 4 - Ln 5
	Non-Fuel Energy Costs:		
7	Energy Revenue Requirement	235,479,983	Sch 1.3.1, pg 1, Ln 1, Col 4
	Less Allocated Holyrood Fuel Costs		
8	Total Holyrood Fuel Costs	166,540,358	Sch 1.1, pg 1, Ln 2, Col 3
9	Newfoundland Power Trans. Energy Allocation Ratio	0.8452	Sch 3.1A, pg 1, Ln 14, Col 4
10	Allocated Holyrood Fuel Costs	140,754,084	Ln 8 * Ln 9
11	**Non-Fuel Energy Costs:**	$ 62,552,343	Ln 7 - Ln 10
12	**Customer Costs**	$ 4,225,123	Sch 1.3.1, pg 1, Ln 1, Col 5
13	First Block Energy Consumed (MWh)	3,000,000	
14	**Cost (Mills/kWh)**	**22.26**	Ln 11 + Ln 12 / Ln 13
	Energy (Second Block):		
15	Total Revenue Requirement	$443,366,553	Sch 1.2, pg 1, Ln 1, Col 7
16	Less: Demand Revenue	71,829,733	Ln 2 * Ln 3
17	Less: First Block Revenue	62,552,343	Ln 13 * Ln 14
18	Second Block Energy Revenue	$304,759,354	
19	Second Block Energy Consumed (MWh)	2,924,100	
20	**Cost (Mills/kWh)**	**104.22**	Ln 18 / Ln 19
21	Average No. 6 Fuel Cost per Barrel	$64.41	
22	Efficiency Factor (kWh per Barrel)	618	
23	**Cost (Mills/kWh)**	**104.22**	

Schedule 1.5
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Value of Newfoundland Power Thermal Generation Credit

	1	2	3
Line No.	Description	Amount	Source
1	Island Interconnected System:		
2	Generation demand costs ($)	135,855,835	Sch 2.1A, C. 3, Ln 24
3	Coincident peak (kW)	1,464,218	Sch 3.1A, C. 3, Ln 13
4	Generation demand costs ($/kW)	92.78	Ln 2 / Ln 3
5	NP thermal generation capacity credit (kW)	33,386	(1)
6	Gross value of credit to NP ($)	3,097,553	Ln 4 x Ln 5
7	Less NP's cost share:		
8	Percentage	88.85%	Sch 3.1A, C. 5, Ln 14
9	Amount ($)	(2,752,304)	Ln 6 x Ln 8
10	Net value of credit to NP ($)	345,249	Ln 6 - Ln 9

(1)	NP gas turbine and diesel generation capacity (kW)	37,826
	÷ System reserve	1.13
	NP thermal generation capacity credit (kW)	33,386

Exhibit 8 - Revised 2015 Test Year Cost of Service for Rate Setting
Page 21 of 109

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Calculation of Firming Up Charge

	1	2	3	4
Line No.	Description	Total	Gas Turbine	Transmission & Terminals
1	Operating & Maintenance	11,846,986	6,324,023	5,522,963
2	O&M Overhead	9,261,771	4,483,085	4,778,685
3	Depreciation	11,401,819	4,984,291	6,417,528
4	Return	22,613,486	10,079,460	12,534,025
5	**Total**	**55,124,061**	**25,870,860**	**29,253,201**
6	Capacity (kW)		223,500	1,742,100
7	Cost ($/kW)	$132.55	$115.75	$16.79
8	Rate ($/kWh)	$0.02882		

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Calculation of Transmission Wheeling Charge

	1	2
Line No.	Description	
1	Island Interconnected Transmission Revenue Requirement	29,621,532
2	Transmission Energy Output (MWh)	7,009,400
3	Rate ($/kWh)	$0.00423

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Revenue Requirement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Production and		Rural Prod &	Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Expenses																	
1	Operating & Maintenance	100,888,350	43,468,688	22,314,087	10,301,648	3,796,736	1,327,509	6,574,588	1,705,360	412,367	729,924	978,425	1,068,569	442,293	443,331	149,086	2,715,624	2,391,488
2	Fuels-No. 6 Fuel	166,540,358	-	166,540,358	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Fuels-Diesel	87,140	87,140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuels-Gas Turbine	3,473,690	3,473,690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Fuel Supply Deferral	-	-															
6	Power Purchases -CF(L)Co	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Power Purchases-Other	58,109,820	21,243,193	36,173,623	-	693,003	-	-	-	-	-	-	-	-	-	-	-	-
8	Depreciation	55,708,988	24,873,886	15,586,227	6,417,528	2,634,480	641,186	1,866,278	509,260	223,065	394,844	287,476	318,175	154,393	272,072	139,154	203,182	1,187,781
	Expense Credits																	
9	Sundry	(505,195)	(217,668)	(111,737)	(51,585)	(19,012)	(6,647)	(32,922)	(8,540)	(2,065)	(3,655)	(4,899)	(5,351)	(2,215)	(2,220)	(747)	(13,598)	(11,975)
10	Building Rental Income	(17,472)	(6,795)	(5,229)	(2,318)	(936)	(196)	(775)	(201)	(49)	(86)	(115)	(126)	(52)	(43)	(18)	-	(534)
11	Tax Refunds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Suppliers' Discounts	(78,703)	(33,910)	(17,407)	(8,036)	(2,962)	(1,036)	(5,129)	(1,330)	(322)	(569)	(763)	(834)	(345)	(346)	(116)	(2,118)	(1,866)
13	Pole Attachments	(1,263,389)	-	-	-	-	-	(730,679)	(249,711)	-	-	(129,331)	(153,669)	-	-	-	-	-
14	Secondary Energy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Wheeling Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Application Fees	(11,476)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(11,476)	-
17	Meter Test Revenues	(2,075)	-	-	-	-	-	-	-	-	-	-	-	-	(2,075)	-	-	-
18	Total Expense Credits	(1,878,310)	(258,373)	(134,374)	(61,939)	(22,909)	(7,879)	(769,504)	(259,782)	(2,435)	(4,311)	(135,109)	(159,979)	(2,612)	(4,683)	(880)	(27,193)	(14,375)
19	Subtotal Expenses	382,930,036	92,888,225	240,479,921	16,657,237	7,101,310	1,960,816	7,671,362	1,954,838	632,998	1,120,458	1,130,793	1,226,765	594,074	710,721	287,360	2,891,614	3,564,894
20	Disposal Gain / Loss	3,555,647	1,418,513	1,167,105	430,270	157,570	35,155	129,337	37,243	10,103	17,883	22,316	24,388	13,393	8,083	3,153	5,435	75,702
21	Subtotal Revenue Requirement Ex. Return	386,485,683	94,306,738	241,647,027	17,087,507	7,258,880	1,995,970	7,800,698	1,992,081	643,100	1,138,341	1,153,109	1,251,152	607,467	718,804	290,512	2,897,048	3,640,596
22	Return on Debt	77,264,792	30,180,268	26,534,616	9,104,415	3,339,394	744,776	2,745,180	788,948	213,604	378,097	472,387	516,228	282,308	171,262	66,823	116,402	1,610,084
23	Return on Equity	29,105,451	11,368,830	9,995,522	3,429,610	1,257,941	280,555	1,034,102	297,195	80,464	142,428	177,947	194,462	106,345	64,514	25,172	43,849	606,515
24	Total Revenue Reqmt	492,855,926	135,855,835	278,177,165	29,621,532	11,856,215	3,021,301	11,579,980	3,078,224	937,169	1,658,867	1,803,443	1,961,842	996,119	954,579	382,507	3,057,299	5,857,195

Schedule 2.1A
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Revenue Requirement (CONT'D.)

	1	19	20	21
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Expenses			
1	Operating & Maintenance	1,357,786	710,839	Carryforward from Sch.2.4 L.30
2	Fuels-No. 6 Fuel	-	-	Production - Demand, Energy ratios Sch.4.1 L.10
3	Fuels-Diesel	-	-	Production - Demand, Energy ratios Sch.4.1 L.12
4	Fuels-Gas Turbine	-	-	Production - Demand, Energy ratios Sch.4.1 L.11
5	Fuel Supply Deferral			
6	Power Purchases -CF(L)Co	-	-	
7	Power Purchases-Other	-	-	Carryforward from Sch.4.4 L.8
8	Depreciation	-	-	Carryforward from Sch.2.5 L.40
	Expense Credits			
9	Sundry	(6,799)	(3,560)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.30
10	Building Rental Income	-	-	Prorated on Production, Transmission & Distribution Plant - Sch.2.2 L.34
11	Tax Refunds	-	-	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.30
12	Suppliers' Discounts	(1,059)	(555)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.30
13	Pole Attachments	-	-	Prorated on Distribution Poles - Sch.4.1 L.37
14	Secondary Energy	-	-	Production - Energy
15	Wheeling Revenues	-	-	Transmission - Demand
16	Application Fees	-	-	Accounting - Customer
17	Meter Test Revenues	-	-	Meters - Customer
18	Total Expense Credits	(7,858)	(4,114)	
19	Subtotal Expenses	1,349,927	706,725	
20	Disposal Gain / Loss	-	-	Prorated on Total Net Book Value - Sch.2.3 L.40
21	Subtotal Revenue Requirement Ex. Return	1,349,927	706,725	
22	Return on Debt	-	-	Prorated on Rate Base - Sch.2.6 L.9
23	Return on Equity	-	-	Prorated on Rate Base - Sch.2.6 L.11
24	Total Revenue Reqmt	1,349,927	706,725	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Plant in Service for the Allocation of O&M Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
							Distribution											
				Production and		Rural Prod &		Primary Lines		Line Transformers		Secondary Lines						Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations							Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Production	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Hydraulic																	
1	Bay D'Espoir	224,163,991	100,704,132	123,459,859	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Upper Salmon	174,849,492	78,549,933	96,299,560	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Hinds Lake	82,714,770	37,159,042	45,555,728	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Cat Arm	272,937,726	122,615,397	150,322,329	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Paradise River	22,264,052	10,001,972	12,262,080	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Granite Canal	112,087,573	50,354,572	61,733,001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Other Hydraulic	5,330,264	2,394,585	2,935,680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Subtotal Hydraulic	894,347,869	401,779,633	492,568,236	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Holyrood	256,920,692	185,599,508	71,321,184	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Gas Turbines	155,106,747	155,106,747	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Roddickton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Diesel	10,395,824	10,395,824	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Subtotal Production	1,316,771,131	752,881,711	563,889,420	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																	
14	Lines	286,645,674	-	-	162,412,792	87,840,416	-	-	-	-	-	-	-	-	-	-	-	36,392,465
15	Lines - Hydraulic	55,792,306	25,064,310	30,727,996	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Terminal Stations	160,127,899	-	-	110,982,351	22,520,123	-	-	-	-	-	-	-	-	-	-	-	26,625,425
17	Term Stns - Hydraulic	35,992,419	16,169,347	19,823,072	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Term Stns - Holyrood	8,772,062	6,336,937	2,435,124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Term Stns - Gas Tur/Dsl	700,311	700,311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Term Stns - Distribution	13,916,403	-	-	-	-	13,916,403	-	-	-	-	-	-	-	-	-	-	-
21	Subtotal Term Stns	219,509,093	23,206,595	22,258,197	110,982,351	22,520,123	13,916,403	-	-	-	-	-	-	-	-	-	-	26,625,425
22	Subtotal Transmission	561,947,073	48,270,905	52,986,192	273,395,144	110,360,539	13,916,403	-	-	-	-	-	-	-	-	-	-	63,017,890
	Distribution																	
23	Substations	9,597,162	414,826	-	-	-	9,182,337	-	-	-	-	-	-	-	-	-	-	-
24	Land & Land Improvements	3,994,373	-	-	-	-	-	3,011,558	383,660	-	-	349,308	249,848	-	-	-	-	-
25	Poles	105,894,476	-	-	-	-	-	61,243,858	20,930,255	-	-	10,840,206	12,880,157	-	-	-	-	-
26	Primary Conductor & Eqpt	21,201,429	-	-	-	-	-	18,805,668	2,395,762	-	-	-	-	-	-	-	-	-
27	Submarine Conductor	8,345,651	-	-	-	-	-	8,345,651	-	-	-	-	-	-	-	-	-	-
28	Transformers	15,881,322	-	-	-	-	-	-	-	5,733,157	10,148,165	-	-	-	-	-	-	-
29	Secondary Conductor&Eqpt	4,139,916	-	-	-	-	-	-	-	-	-	2,413,571	1,726,345	-	-	-	-	-
30	Services	6,149,220	-	-	-	-	-	-	-	-	-	-	-	6,149,220	-	-	-	-
31	Meters	5,035,413	-	-	-	-	-	-	-	-	-	-	-	-	5,035,413	-	-	-
32	Street Lighting	2,072,755	-	-	-	-	-	-	-	-	-	-	-	-	-	2,072,755	-	-
33	Subtotal Distribution	182,311,718	414,826	-	-	-	9,182,337	91,406,735	23,709,676	5,733,157	10,148,165	13,603,085	14,856,350	6,149,220	5,035,413	2,072,755	-	-
34	Subttl Prod, Trans, & Dist	2,061,029,922	801,567,441	616,875,613	273,395,144	110,360,539	23,098,739	91,406,735	23,709,676	5,733,157	10,148,165	13,603,085	14,856,350	6,149,220	5,035,413	2,072,755	-	63,017,890
35	General	185,063,996	84,755,553	42,619,321	16,482,878	5,867,173	2,332,857	11,965,798	3,103,767	750,511	1,328,468	1,780,742	1,944,803	804,977	846,236	271,338	6,373,405	3,836,168
36	Telecontrol - Custmr & Spec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Feasibility Studies	739,425	739,425	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-
38	Feasibility Studies - General	200,794	78,092	60,098	26,635	10,752	2,250	8,905	2,310	559	989	1,325	1,447	599	491	202	-	6,139
39	Software - General	4,159,436	1,617,671	1,244,938	551,748	222,722	46,616	184,471	47,849	11,570	20,480	27,453	29,982	12,410	10,162	4,183	-	127,179
40	Total Plant	2,251,193,572	888,758,182	660,799,970	290,456,405	116,461,186	25,480,463	103,565,909	26,863,602	6,495,798	11,498,102	15,412,605	16,832,583	6,967,206	5,892,302	2,348,478	6,373,405	66,987,376

Schedule 2.2A
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Plant in Service for the Allocation of O&M Expense (CONT'D.)

	1	19
Line No.	Description	Basis of Functional Classification
	Production	
	Hydraulic	
1	Bay D'Espoir	Production - Demand, Energy ratios Sch.4.1 L.1
2	Upper Salmon	Production - Demand, Energy ratios Sch.4.1 L.1
3	Hinds Lake	Production - Demand, Energy ratios Sch.4.1 L.1
4	Cat Arm	Production - Demand, Energy ratios Sch.4.1 L.1
5	Paradise River	Production - Demand, Energy ratios Sch.4.1 L.1
6	Granite Canal	Production - Demand, Energy ratios Sch.4.1 L.1
7	Other Hydraulic	Production - Demand, Energy ratios Sch.4.1 L.1, 2
8	Subtotal Hydraulic	
9	Holyrood	Production - Demand, Energy ratios Sch.4.1 L.3
10	Gas Turbines	Production - Demand, Energy ratios Sch.4.1 L.4
11	Roddickton	Production - Demand, Energy ratios Sch.4.1 L.3
12	Diesel	Production - Demand, Energy ratios Sch.4.1 L.5
13	Subtotal Production	
	Transmission	
14	Lines	Transmission - Demand; Distribution - Primary Demand; Spec Assigned - Custmr
15	Lines - Hydraulic	Production - Demand, Energy ratios Sch.4.1 L.17
16	Terminal Stations	Production - Demand, Energy subtotals, L. 13; Transmission - Demand; Spec Assigned - Custmr
17	Term Stns - Hydraulic	Production - Demand, Energy ratios Sch.4.1 L.20
18	Term Stns - Holyrood	Production - Demand, Energy ratios Sch.4.1 L.21
19	Term Stns - Gas Tur/Dsl	Production - Demand, Energy ratios Sch.4.1 L.22, 23
20	Term Stns - Distribution	Distribution - Substations Demand
21	Subtotal Term Stns	
22	Subtotal Transmission	
	Distribution	
23	Substations	Production - Demand; Dist Substns - Demand
24	Land & Land Improvements	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.32
25	Poles	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.37
26	Primary Conductor & Eqpt	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.38
27	Submarine Conductor	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.39
28	Transformers	Transformers - Demand, Customer - zero intercept ratios Sch.4.1 L.40
29	Secondary Conductor&Eqpt	Secondary - Demand, Customer - zero intercept ratios Sch. 4.1 L.41
30	Services	Services Customer
31	Meters	Meters - Customer
32	Street Lighting	Street Lighting - Customer
33	Subtotal Distribution	
34	Subttl Prod, Trans, & Dist	
35	General	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - Sch.2.4 L.15, 16
36	Telecontrol - Custmr & Spec	Specifically Assigned - Customer
37	Feasibility Studies	Production, Transmission - Demand
38	Feasibility Studies - General	Prorated on subtotal Production, Transmission, & Distribution plant - L.34
39	Software - General	Prorated on subtotal Production, Transmission, & Distribution plant - L.34
40	Total Plant	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Net Book Value

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Production and		Rural Prod &	Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Production	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Hydraulic																	
1	Bay D'Espoir	159,292,385	71,561,009	87,731,376	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Upper Salmon	150,562,745	67,639,278	82,923,467	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Hinds Lake	68,558,878	30,799,605	37,759,274	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Cat Arm	236,005,894	106,024,026	129,981,868	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Paradise River	18,634,236	8,371,302	10,262,933	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Granite Canal	99,568,098	44,730,284	54,837,814	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Other Small Hydraulic	3,369,380	1,513,671	1,855,709	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Subtotal Hydraulic	735,991,616	330,639,175	405,352,441	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Holyrood	65,594,001	47,385,107	18,208,895	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Gas Turbines	134,651,525	134,651,525	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Roddickton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Diesel	3,510,510	3,510,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Subtotal Production	939,747,652	516,186,316	423,561,336	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																	
14	Lines	168,220,778	-	-	103,496,354	47,180,089	-	-	-	-	-	-	-	-	-	-	-	17,544,336
15	Lines - Hydraulic	45,062,465	20,244,002	24,818,462	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Terminal Stations	93,051,056	-	-	66,096,677	14,985,747	-	-	-	-	-	-	-	-	-	-	-	11,968,632
17	Term Stns - Hydraulic	21,686,911	9,742,696	11,944,215	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Term Stns - Holyrood	1,522,380	1,099,767	422,613	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Term Stns - Gas Tur/Dsl	400,885	400,885	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Term Stns - Distribution	9,753,683	-	-	-	-	9,753,683	-	-	-	-	-	-	-	-	-	-	-
21	Subtotal Term Stns	126,414,915	11,243,348	12,366,828	66,096,677	14,985,747	9,753,683	-	-	-	-	-	-	-	-	-	-	11,968,632
22	Subtotal Transmission	339,698,158	31,487,350	37,185,290	169,593,030	62,165,835	9,753,683	-	-	-	-	-	-	-	-	-	-	29,512,968
	Distribution																	
23	Substations	3,895,381	135,275	-	-	-	3,760,106	-	-	-	-	-	-	-	-	-	-	-
24	Land & Land Improvements	2,670,404	-	-	-	-	-	2,013,351	256,492	-	-	233,527	167,034	-	-	-	-	-
25	Poles	66,098,651	-	-	-	-	-	38,228,022	13,064,530	-	-	6,766,387	8,039,711	-	-	-	-	-
26	Primary Conductor & Eqpt	6,865,462	-	-	-	-	-	6,089,665	775,797	-	-	-	-	-	-	-	-	-
27	Submarine Conductor	2,211,614	-	-	-	-	-	2,211,614	-	-	-	-	-	-	-	-	-	-
28	Transformers	10,680,793	-	-	-	-	-	-	-	3,855,766	6,825,027	-	-	-	-	-	-	-
29	Secondary Conductor&Eqpt	2,529,075	-	-	-	-	-	-	-	-	-	1,474,451	1,054,624	-	-	-	-	-
30	Services	5,177,339	-	-	-	-	-	-	-	-	-	-	-	5,177,339	-	-	-	-
31	Meters	2,999,527	-	-	-	-	-	-	-	-	-	-	-	-	2,999,527	-	-	-
32	Street Lighting	1,190,297	-	-	-	-	-	-	-	-	-	-	-	-	-	1,190,297	-	-
33	Subtotal Distribution	104,318,541	135,275	-	-	-	3,760,106	48,542,652	14,096,820	3,855,766	6,825,027	8,474,364	9,261,369	5,177,339	2,999,527	1,190,297	-	-
34	Subttl Prod, Trans, & Dist	1,383,764,351	547,808,941	460,746,626	169,593,030	62,165,835	13,513,789	48,542,652	14,096,820	3,855,766	6,825,027	8,474,364	9,261,369	5,177,339	2,999,527	1,190,297	-	29,512,968
35	General	64,497,334	29,538,469	14,853,416	5,744,509	2,044,790	813,033	4,170,244	1,081,705	261,564	462,989	620,613	677,790	280,546	294,925	94,565	2,221,219	1,336,957
36	Telecontrol - Custmr & Spec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Feasibility Studies	739,425	739,425	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-
38	Feasibility Studies - General	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	Software - General	4,223,096	1,671,852	1,406,148	517,579	189,723	41,243	148,147	43,022	11,767	20,829	25,863	28,265	15,801	9,154	3,633	-	90,070
40	Total Net Book Value	1,453,224,206	579,758,687	477,006,190	175,855,118	64,400,349	14,368,064	52,861,043	15,221,547	4,129,097	7,308,845	9,120,840	9,967,424	5,473,685	3,303,606	1,288,495	2,221,219	30,939,996

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Operating & Maintenance Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Production and		Rural Prod &	Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Production	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
1	Hydraulic	12,112,026	5,441,244	6,670,781	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Holyrood / Thermal	19,459,003	14,057,184	5,401,819	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Roddickton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Gas Turbine	5,995,298	5,995,298	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Diesel	362,481	362,481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Other	2,635,738	1,507,019	1,128,719	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Subtotal Production	40,564,546	27,363,226	13,201,320	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																	
8	Transmission Lines	3,910,236	286,205	350,877	1,854,562	1,003,033	-	-	-	-	-	-	-	-	-	-	-	415,559
9	Terminal Stations	5,102,709	539,461	517,414	2,579,896	523,503	323,501	-	-	-	-	-	-	-	-	-	-	618,935
10	Other	2,237,357	192,188	210,961	1,088,506	439,394	55,407	-	-	-	-	-	-	-	-	-	-	250,902
11	Subtotal Transmission	11,250,301	1,017,853	1,079,253	5,522,963	1,965,930	378,908	-	-	-	-	-	-	-	-	-	-	1,285,395
	Distribution																	
12	Other	7,775,946	18,196	-	-	-	402,769	4,009,413	1,039,988	251,476	445,133	596,678	651,650	269,726	-	90,918	-	-
13	Meters	283,551	-	-	-	-	-	-	-	-	-	-	-	-	283,551	-	-	-
14	Subtotal Distribution	8,059,497	18,196	-	-	-	402,769	4,009,413	1,039,988	251,476	445,133	596,678	651,650	269,726	283,551	90,918	-	-
15	Subttl Prod, Trans, & Dist	59,874,344	28,399,275	14,280,572	5,522,963	1,965,930	781,677	4,009,413	1,039,988	251,476	445,133	596,678	651,650	269,726	283,551	90,918	-	1,285,395
16	Customer Accounting	2,135,554	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,135,554	-
	Administrative & General:																	
	Plant-Related:																	
17	Production	6,089,665	3,481,848	2,607,816	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Prod - Gas Turb & Diesel	1,583,881	1,583,881	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Transmission	5,300,429	455,304	499,779	2,578,733	1,040,949	131,263	-	-	-	-	-	-	-	-	-	-	594,401
20	Distribution	2,446,265	5,566	-	-	-	123,209	1,226,499	318,137	76,928	136,168	182,527	199,343	82,510	67,565	27,812	-	-
21	Prod, Trans, Distn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Prod, Trans, Distn and General Plant	343,528	135,623	100,837	44,323	17,772	3,888	15,804	4,099	991	1,755	2,352	2,569	1,063	899	358	973	10,222
23	Prod, Trans, Distn, Excl Hydraulic & Holyrood	1,425,303	335,564	83,012	428,322	172,899	36,188	143,205	37,145	8,982	15,899	21,312	23,275	9,634	7,889	3,247	-	98,729
24	Property Insurance	1,595,772	794,003	579,666	117,511	26,171	23,446	11,031	2,861	692	1,225	1,642	1,793	742	780	250	5,876	28,083
	Revenue-Related:																	
25	Municipal Tax	1,357,786	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	PUB Assessment	710,839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	All Expense-Related	16,644,581	7,622,880	3,833,165	1,482,463	527,691	209,816	1,076,199	279,152	67,501	119,482	160,159	174,915	72,399	76,110	24,404	573,221	345,023
28	Prod, Trans, and Distn Expense-Related	1,380,404	654,746	329,239	127,332	45,325	18,022	92,437	23,977	5,798	10,263	13,756	15,024	6,219	6,537	2,096	-	29,635
29	Subtotal Admin & General	38,878,452	15,069,414	8,033,515	4,778,685	1,830,806	545,832	2,565,175	665,372	160,891	284,791	381,748	416,918	172,567	159,781	58,168	580,070	1,106,093
30	Total Operating & Maintenance Expenses	100,888,350	43,468,688	22,314,087	10,301,648	3,796,736	1,327,509	6,574,588	1,705,360	412,367	729,924	978,425	1,068,569	442,293	443,331	149,086	2,715,624	2,391,488

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Operating & Maintenance Expense (CONT'D.)

	1	19	20	21
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Production			
1	Hydraulic	-	-	Prorated on Hydraulic Plant in Service - Sch.2.2 L.8
2	Holyrood / Thermal	-	-	Prorated on Holyrood Plant in Service - Sch.2.2 L.9
3	Roddickton	-	-	Prorated on Roddickton Plant in Service - Sch.2.2 L.11
4	Gas Turbine	-	-	Prorated on Gas Turbines Plant in Service - Sch.2.2 L.10
5	Diesel	-	-	Prorated on Diesel Plant in Service - Sch.2.2 L.12
6	Other	-	-	Prorated on Production Plant in Service - Sch.2.2 L.13
7	Subtotal Production	-	-	
	Transmission			
8	Transmission Lines	-	-	Prorated on Transmission Lines Plant in Service - Sch.2.2 L.14, 15
9	Terminal Stations	-	-	Prorated on Transmission Terminal Stations Plant in Service - Sch.2.2 L.21
10	Other	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.22
11	Subtotal Transmission	-	-	
	Distribution			
12	Other	-	-	Prorated on Distribution Plant, excluding Meters - Sch. 2.2 L. 33, less L. 31
13	Meters	-	-	Meters - Customer
14	Subtotal Distribution	-	-	
15	Subttl Prod, Trans, & Dist	-	-	
16	Customer Accounting	-	-	Accounting - Customer
	Administrative & General:			
	Plant-Related:			
17	Production	-	-	Prorated on Production Plant in Service - Sch.2.2 L.13
18	Prod - Gas Turb & Diesel		-	Prorated on Gas Turbine & Diesel Production Plant in Service - Sch.2.2 L.10, 12
19	Transmission	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.22
20	Distribution	-	-	Prorated on Distribution Plant in Service - Sch.2.2 L.33
21	Prod, Trans, Distn	-	-	Prorated on Prod, Trans & Distribution Plant in Service - Sch.2.2 L.34
22	Prod, Trans, Distn and General Plant	-	-	Prorated on Total Plant in Service, Sch. 2.2, L. 40
23	Prod, Trans, Distn, Excl Hydraulic & Holyrood	-	-	Prorated on Total Plant in Service, Sch. 2.2, L. 34 Less L. 8 and L. 9
24	Property Insurance	-	-	Prorated on Prod., Trans. Terminal, Dist. Sub & General Plant in Service - Sch.2.2 L.13, 21, 23, 35 - 36
	Revenue-Related:			
25	Municipal Tax	1,357,786	-	Revenue-related
26	PUB Assessment	-	710,839	Revenue-related
27	All Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - L 15, 16
28	Prod, Trans, and Distn Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution Expenses - L 15
29	Subtotal Admin & General	1,357,786	710,839	
30	Total Operating & Maintenance Expenses	1,357,786	710,839	

Schedule 2.5A
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Depreciation Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Production and		Rural Prod &	Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Production	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Hydraulic																	
1	Bay D'Espoir	4,592,375	2,063,093	2,529,282	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Upper Salmon	3,044,289	1,367,626	1,676,663	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Hinds Lake	1,408,226	632,636	775,590	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Cat Arm	5,429,147	2,439,007	2,990,140	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Paradise River	454,623	204,236	250,387	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Granite Canal	2,418,851	1,086,652	1,332,199	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Other Small Hydraulic	79,620	35,769	43,851	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Subtotal Hydraulic	17,427,132	7,829,019	9,598,112	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Holyrood	11,510,648	8,315,292	3,195,356	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Gas Turbines	4,293,739	4,293,739	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Roddickton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Diesel	124,574	124,574	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Subtotal Production	33,356,092	20,562,624	12,793,468	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																	
14	Lines	5,911,528	-	-	3,586,621	1,708,499	-	-	-	-	-	-	-	-	-	-	-	616,408
15	Lines - Hydraulic	1,399,044	628,511	770,533	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Terminal Stations	3,331,774	-	-	2,204,149	696,864	-	-	-	-	-	-	-	-	-	-	-	430,761
17	Term Stns - Hydraulic	728,807	327,412	401,396	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Term Stns - Holyrood	63,247	45,689	17,557	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Term Stns - Gas Tur/Dsl	14,370	14,370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Term Stns - Distribution	398,412	-	-	-	-	398,412	-	-	-	-	-	-	-	-	-	-	-
21	Subtotal Term Stns	4,536,610	387,471	418,953	2,204,149	696,864	398,412	-	-	-	-	-	-	-	-	-	-	430,761
22	Subtotal Transmission	11,847,183	1,015,982	1,189,486	5,790,770	2,405,363	398,412	-	-	-	-	-	-	-	-	-	-	1,047,169
	Distribution																	
23	Substations	163,174	4,515	-	-	-	158,659	-	-	-	-	-	-	-	-	-	-	-
24	Land & Land Improvements	70,663	-	-	-	-	-	53,277	6,787	-	-	6,179	4,420	-	-	-	-	-
25	Poles	1,850,616	-	-	-	-	-	1,070,300	365,778	-	-	189,444	225,094	-	-	-	-	-
26	Primary Conductor & Eqpt	271,631	-	-	-	-	-	240,936	30,694	-	-	-	-	-	-	-	-	-
27	Submarine Conductor	94,774	-	-	-	-	-	94,774	-	-	-	-	-	-	-	-	-	-
28	Transformers	542,150	-	-	-	-	-	-	-	195,716	346,434	-	-	-	-	-	-	-
29	Secondary Conductor&Eqpt	53,374	-	-	-	-	-	-	-	-	-	31,117	22,257	-	-	-	-	-
30	Services	126,517	-	-	-	-	-	-	-	-	-	-	-	126,517	-	-	-	-
31	Meters	240,881	-	-	-	-	-	-	-	-	-	-	-	-	240,881	-	-	-
32	Street Lighting	128,260	-	-	-	-	-	-	-	-	-	-	-	-	-	128,260	-	-
33	Subtotal Distribution	3,542,041	4,515	-	-	-	158,659	1,459,287	403,259	195,716	346,434	226,741	251,771	126,517	240,881	128,260	-	-
34	Subttl Prod, Trans, & Dist	48,745,315	21,583,121	13,982,954	5,790,770	2,405,363	557,071	1,459,287	403,259	195,716	346,434	226,741	251,771	126,517	240,881	128,260	-	1,047,169
35	General	5,899,788	2,701,983	1,358,692	525,470	187,044	74,371	381,466	98,947	23,926	42,351	56,770	62,000	25,662	26,978	8,650	203,182	122,296
36	Telecontrol - Custmr & Spec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Feasibility Studies	211,264	211,264	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	Feasibility Studies - General	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	Software - General	852,621	377,518	244,581	101,288	42,073	9,744	25,525	7,054	3,423	6,060	3,966	4,404	2,213	4,213	2,243	-	18,316
40	Total Deprecn Expense	55,708,988	24,873,886	15,586,227	6,417,528	2,634,480	641,186	1,866,278	509,260	223,065	394,844	287,476	318,175	154,393	272,072	139,154	203,182	1,187,781

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Rate Base

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production and Transmission Energy ($)	5 Transmission Demand ($)	6 Rural Prod & Transmission Demand ($)	7 Distribution: Substations Demand ($)	8 Distribution: Primary Lines Demand ($)	9 Distribution: Primary Lines Customer ($)	10 Distribution: Line Transformers Demand ($)	11 Distribution: Line Transformers Customer ($)	12 Distribution: Secondary Lines Demand ($)	13 Distribution: Secondary Lines Customer ($)	14 Distribution: Services Customer ($)	15 Distribution: Meters Customer ($)	16 Distribution: Street Lighting Customer ($)	17 Accounting Customer ($)	18 Specifically Assigned Customer ($)
1	Average Net Book Value	1,453,224,206	579,758,687	477,006,190	175,855,118	64,400,349	14,368,064	52,861,043	15,221,547	4,129,097	7,308,845	9,120,840	9,967,424	5,473,685	3,303,606	1,288,495	2,221,219	30,939,996
2	Cash Working Capital	6,340,530	2,529,532	2,081,215	767,270	280,984	62,689	230,637	66,413	18,016	31,889	39,795	43,489	23,882	14,414	5,622	9,691	134,994
3	Fuel Inventory - No. 6 Fuel	39,681,050	-	39,681,050	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuel Inventory - Diesel	186,223	186,223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Fuel Inventory - Gas Turbine	3,992,487	3,992,487	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Inventory/Supplies	24,359,458	9,616,973	7,150,309	3,142,937	1,260,190	275,716	1,120,654	290,683	70,289	124,417	166,775	182,140	75,390	63,759	25,412	68,965	724,849
7	Deferred Charges: Holyrood	-	-	-														
8	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	81,691,649	32,590,596	26,814,460	9,885,532	3,620,206	807,687	2,971,534	855,665	232,113	410,860	512,720	560,309	307,698	185,709	72,432	124,864	1,739,263
9	Total Rate Base	1,609,475,602	628,674,498	552,733,224	189,650,857	69,561,728	15,514,157	57,183,868	16,434,308	4,449,515	7,876,011	9,840,129	10,753,362	5,880,655	3,567,488	1,391,960	2,424,739	33,539,102
10	Less: Rural Asset Portion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Rate Base Available for Equity Return	1,609,475,602	628,674,498	552,733,224	189,650,857	69,561,728	15,514,157	57,183,868	16,434,308	4,449,515	7,876,011	9,840,129	10,753,362	5,880,655	3,567,488	1,391,960	2,424,739	33,539,102
12	Return on Debt	77,264,792	30,180,268	26,534,616	9,104,415	3,339,394	744,776	2,745,180	788,948	213,604	378,097	472,387	516,228	282,308	171,262	66,823	116,402	1,610,084
13	Return on Equity	29,105,451	11,368,830	9,995,522	3,429,610	1,257,941	280,555	1,034,102	297,195	80,464	142,428	177,947	194,462	106,345	64,514	25,172	43,849	606,515
14	Return on Rate Base	106,370,243	41,549,098	36,530,139	12,534,025	4,597,335	1,025,331	3,779,282	1,086,143	294,068	520,526	650,334	710,690	388,653	235,775	91,995	160,251	2,216,599

Schedule 2.6A
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Functional Classification of Rate Base (CONT'D.)

	1	19
Line No.	Description	Basis of Functional Classification
1	Average Net Book Value	Sch. 2.3 , L. 40
2	Cash Working Capital	Prorated on Average Net Book Value, L. 1
3	Fuel Inventory - No. 6 Fuel	Production - Demand, Energy ratios Sch.4.1 L.10
4	Fuel Inventory - Diesel	Production - Demand, Energy ratios Sch.4.1 L.12
5	Fuel Inventory - Gas Turbine	Production - Demand, Energy ratios Sch.4.1 L.11
6	Inventory/Supplies	Prorated on Total Plant in Service, Sch. 2.2, L. 40
7	Deferred Charges: Holyrood	Production - Demand, Energy ratios Sch.4.1 L.3
8	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	Prorated on Average Net Book Value, L. 1
9	Total Rate Base	
10	Less: Rural Asset Portion	N/A
11	Rate Base Available for Equity Return	
12	Return on Debt	L.9 x Sch.1.1,p2,L.14
13	Return on Equity	L.11 x Sch.1.1,p2,L.17
14	Return on Rate Base	

Exhibit 8 - Revised 2015 Test Year Cost of Service for Rate Setting
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Basis of Allocation to Classes of Service

Line No.	1 Description	2 Total Amount	3 Production Demand (1 CP kW)	4 Production and Transmission Energy (MWh @ Gen)	5 Transmission Demand (CP kW)	6 Rural Prod & Transmission Demand (CP kW)	7 Distribution: Substations Demand (CP kW)	8 Distribution: Primary Lines Demand (CP kW)	9 Distribution: Primary Lines Customer (Rural Cust)	10 Distribution: Line Transformers Demand (CP kW)	11 Distribution: Line Transformers Customer (Rural Cust)	12 Distribution: Secondary Lines Demand (CP kW)	13 Distribution: Secondary Lines Customer (Rural Cust)	14 Distribution: Services Customer (Wtd Rural Cust)	15 Distribution: Meters Customer (Wtd Rural Cust)	16 Distribution: Street Lighting Customer	17 Accounting Customer (Rural Cust)	18 Specifically Assigned Customer
	Amounts																	
1	Newfoundland Power	-	1,296,985	6,118,065	1,288,081	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Industrial - Firm	-	75,597	641,746	73,040	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Industrial - Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
4	1.1 Domestic	-	24,404	123,746	23,579	23,579	22,367	22,367	11,538	20,572	11,538	20,572	11,538	11,538	11,538	-	11,538	-
5	1.12 Domestic All Electric	-	32,264	158,460	31,173	31,173	29,571	29,571	8,236	27,197	8,236	27,197	8,236	8,236	8,236	-	8,236	-
6	1.3 Special	-	103	389	99	99	94	94	1	87	1	87	1	1	1	-	1	-
7	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	2.2 GS 10-100 kW	-	14,958	85,347	14,452	14,452	13,709	13,709	2,908	12,609	2,908	12,609	2,908	13,871	13,871	-	2,908	-
9	2.3 GS 110-1,000 kVa	-	12,610	67,875	12,184	12,184	11,558	11,558	92	10,589	92	10,589	92	774	774	-	92	-
10	2.4 GS Over 1,000 kVa	-	6,505	40,115	6,285	6,285	5,962	5,962	8	3,987	8	3,987	8	67	67	-	8	-
11	4.1 Street and Area Lighting	-	791	3,157	765	765	725	725	947	667	947	667	947	-	-	1	947	-
12	Subtotal Rural	-	91,636	479,089	88,537	88,537	83,988	83,988	23,729	75,706	23,729	75,706	23,729	34,487	34,487	1	23,729	-
13	Total	-	1,464,218	7,238,900	1,449,658	88,537	83,988	83,988	23,729	75,706	23,729	75,706	23,729	34,487	34,487	1	23,729	-
	Ratios Excluding Return on Equity																	
14	Newfoundland Power	-	0.8858	0.8452	0.8885	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Industrial - Firm	-	0.0516	0.0887	0.0504	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Industrial - Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
17	1.1 Domestic	-	0.0167	0.0171	0.0163	0.2663	0.2663	0.2663	0.4862	0.2717	0.4862	0.2717	0.4862	0.3346	0.3346	-	0.4862	-
18	1.12 Domestic All Electric	-	0.0220	0.0219	0.0215	0.3521	0.3521	0.3521	0.3471	0.3592	0.3471	0.3592	0.3471	0.2388	0.2388	-	0.3471	-
19	1.3 Special	-	0.0001	0.0001	0.0001	0.0011	0.0011	0.0011	0.0000	0.0011	0.0000	0.0011	0.0000	0.0000	0.0000	-	0.0000	-
20	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.2 GS 10-100 kW	-	0.0102	0.0118	0.0100	0.1632	0.1632	0.1632	0.1225	0.1665	0.1225	0.1665	0.1225	0.4022	0.4022	-	0.1225	-
22	2.3 GS 110-1,000 kVa	-	0.0086	0.0094	0.0084	0.1376	0.1376	0.1376	0.0039	0.1399	0.0039	0.1399	0.0039	0.0224	0.0224	-	0.0039	-
23	2.4 GS Over 1,000 kVa	-	0.0044	0.0055	0.0043	0.0710	0.0710	0.0710	0.0003	0.0527	0.0003	0.0527	0.0003	0.0020	0.0020	-	0.0003	-
24	4.1 Street and Area Lighting	-	0.0005	0.0004	0.0005	0.0086	0.0086	0.0086	0.0399	0.0088	0.0399	0.0088	0.0399	-	-	1.0000	0.0399	-
25	Subtotal Rural	-	0.0626	0.0662	0.0611	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-
26	Total	-	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-

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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Basis of Allocation to Classes of Service (CONT'D.)

	1	19	20
		Revenue Related	
Line No.	Description	Municipal Tax (Prior Year (Rural Revenues)	PUB Assessment (Prior Year (Revenues + RSP)
	Amounts		
1	Newfoundland Power	-	447,430,477
2	Industrial - Firm	-	16,126,195
3	Industrial - Non-Firm	-	4,881
	Rural		
4	1.1 Domestic	13,662,764	13,662,764
5	1.12 Domestic All Electric	17,059,306	17,059,306
6	1.3 Special	19,235	19,235
7	2.1 GS 0-10 kW	-	-
8	2.2 GS 10-100 kW	9,534,018	9,534,018
9	2.3 GS 110-1,000 kVa	6,258,109	6,258,109
10	2.4 GS Over 1,000 kVa	3,348,569	3,348,569
11	4.1 Street and Area Lighting	1,030,113	1,030,113
12	Subtotal Rural	50,912,113	50,912,113
13	Total	50,912,113	514,473,667
	Ratios Excluding Return on Equity		
14	Newfoundland Power	-	0.8697
15	Industrial - Firm	-	0.0313
16	Industrial - Non-Firm	-	0.0000
	Rural		
17	1.1 Domestic	0.2684	0.0266
18	1.12 Domestic All Electric	0.3351	0.0332
19	1.3 Special	0.0004	0.0000
20	2.1 GS 0-10 kW	-	-
21	2.2 GS 10-100 kW	0.1873	0.0185
22	2.3 GS 110-1,000 kVa	0.1229	0.0122
23	2.4 GS Over 1,000 kVa	0.0658	0.0065
24	4.1 Street and Area Lighting	0.0202	0.0020
25	Subtotal Rural	1.0000	0.0990
26	Total	1.0000	1.0000

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Allocation of Functionalized Amounts to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
							Distribution											
				Production and		Rural Prod &												Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Allocated Rev Reqmt Excl Return		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
1	Newfoundland Power	305,973,876	83,535,651	204,231,613	15,182,956	-	-	-	-	-	-	-	-	-	-	-	-	2,409,028
2	Industrial - Firm	28,406,256	4,869,011	21,422,583	860,942	-	-	-	-	-	-	-	-	-	-	-	-	1,231,568
3	Industrial - Non-Firm	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
4	1.1 Domestic	15,374,607	1,571,831	4,130,848	277,932	1,933,172	531,563	2,077,468	968,578	174,749	553,478	313,334	608,328	203,228	240,476	-	1,408,586	-
5	1.12 Domestic All Electric	17,704,329	2,078,063	5,289,674	367,445	2,555,781	702,762	2,746,550	691,416	231,030	395,098	414,248	434,253	145,074	171,663	-	1,005,514	-
6	1.3 Special	42,826	6,616	12,987	1,170	8,136	2,237	8,744	84	735	48	1,319	53	18	21	-	122	-
7	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	2.2 GS 10-100 kW	8,757,173	963,400	2,849,035	170,349	1,184,872	325,804	1,273,313	244,111	107,107	139,493	192,047	153,317	244,324	289,104	-	355,006	-
9	2.3 GS 110-1,000 kVa	6,052,407	812,206	2,265,777	143,615	998,921	274,673	1,073,482	7,719	89,947	4,411	161,280	4,848	13,637	16,136	-	11,226	-
10	2.4 GS Over 1,000 kVa	3,236,006	418,996	1,339,108	74,087	515,318	141,697	553,782	672	33,865	384	60,722	422	1,186	1,404	-	977	-
11	4.1 Street and Area Lighting	938,196	50,964	105,403	9,011	62,680	17,235	67,358	79,501	5,666	45,430	10,159	49,932	-	-	290,512	115,617	-
12	Subtotal Rural	52,105,544	5,902,076	15,992,831	1,043,609	7,258,880	1,995,970	7,800,698	1,992,081	643,100	1,138,341	1,153,109	1,251,152	607,467	718,804	290,512	2,897,048	-
13	Total	386,485,683	94,306,738	241,647,027	17,087,507	7,258,880	1,995,970	7,800,698	1,992,081	643,100	1,138,341	1,153,109	1,251,152	607,467	718,804	290,512	2,897,048	3,640,596
	Allocated Return on Debt																	
14	Newfoundland Power	58,563,345	26,733,279	22,426,129	8,089,649	-	-	-	-	-	-	-	-	-	-	-	-	1,314,288
15	Industrial - Firm	4,665,065	1,558,193	2,352,357	458,720	-	-	-	-	-	-	-	-	-	-	-	-	295,796
16	Industrial - Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
17	1.1 Domestic	4,136,658	503,021	453,597	148,085	889,341	198,347	731,091	383,598	58,043	183,836	128,362	250,997	94,446	57,296	-	56,597	-
18	1.12 Domestic All Electric	4,825,592	665,027	580,845	195,779	1,175,768	262,228	966,551	273,830	76,736	131,231	169,702	179,174	67,420	40,900	-	40,401	-
19	1.3 Special	12,695	2,117	1,426	623	3,743	835	3,077	33	244	16	540	22	8	5	-	5	-
20	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.2 GS 10-100 kW	2,343,888	308,310	312,845	90,764	545,092	121,570	448,098	96,678	35,575	46,332	78,675	63,259	113,545	68,882	-	14,264	-
22	2.3 GS 110-1,000 kVa	1,638,156	259,924	248,799	76,520	459,546	102,491	377,774	3,057	29,876	1,465	66,070	2,000	6,337	3,845	-	451	-
23	2.4 GS Over 1,000 kVa	843,048	134,088	147,044	39,475	237,068	52,873	194,884	266	11,248	127	24,876	174	551	334	-	39	-
24	4.1 Street and Area Lighting	236,345	16,310	11,574	4,801	28,835	6,431	23,704	31,486	1,882	15,089	4,162	20,602	-	-	66,823	4,645	-
25	Subtotal Rural	14,036,382	1,888,796	1,756,130	556,047	3,339,394	744,776	2,745,180	788,948	213,604	378,097	472,387	516,228	282,308	171,262	66,823	116,402	-
26	Total	77,264,792	30,180,268	26,534,616	9,104,415	3,339,394	744,776	2,745,180	788,948	213,604	378,097	472,387	516,228	282,308	171,262	66,823	116,402	1,610,084
	Allocated Return on Equity																	
27	Newfoundland Power	22,060,663	10,070,358	8,447,866	3,047,350	-	-	-	-	-	-	-	-	-	-	-	-	495,089
28	Industrial - Firm	1,757,318	586,967	886,127	172,799	-	-	-	-	-	-	-	-	-	-	-	-	111,426
29	Industrial - Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
30	1.1 Domestic	1,558,269	189,487	170,869	55,783	335,013	74,717	275,400	144,500	21,865	69,251	48,353	94,550	35,578	21,583	-	21,320	-
31	1.12 Domestic All Electric	1,817,788	250,514	218,803	73,749	442,909	98,781	364,097	103,151	28,906	49,434	63,926	67,494	25,397	15,407	-	15,219	-
32	1.3 Special	4,782	798	537	235	1,410	314	1,159	13	92	6	204	8	3	2	-	2	-
33	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	2.2 GS 10-100 kW	882,937	116,139	117,848	34,191	205,335	45,795	168,797	36,418	13,401	17,453	29,637	23,829	42,772	25,948	-	5,373	-
35	2.3 GS 110-1,000 kVa	617,089	97,913	93,722	28,825	173,110	38,608	142,307	1,152	11,254	552	24,889	754	2,387	1,448	-	170	-
36	2.4 GS Over 1,000 kVa	317,574	50,511	55,391	14,870	89,303	19,917	73,412	100	4,237	48	9,371	66	208	126	-	15	-
37	4.1 Street and Area Lighting	89,030	6,144	4,360	1,809	10,862	2,423	8,929	11,861	709	5,684	1,568	7,761	-	-	25,172	1,750	-
38	Subtotal Rural	5,287,469	711,505	661,530	209,461	1,257,941	280,555	1,034,102	297,195	80,464	142,428	177,947	194,462	106,345	64,514	25,172	43,849	-
39	Total	29,105,451	11,368,830	9,995,522	3,429,610	1,257,941	280,555	1,034,102	297,195	80,464	142,428	177,947	194,462	106,345	64,514	25,172	43,849	606,515

Schedule 3.2A
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	19	20
		Revenue Related	
Line No.	Description	Municipal Tax	PUB Assessment
	Allocated Rev Reqmt Excl Return		($)
1	Newfoundland Power	-	614,629
2	Industrial - Firm	-	22,152
3	Industrial - Non-Firm	-	7
	Rural		
4	1.1 Domestic	362,266	18,768
5	1.12 Domestic All Electric	452,325	23,434
6	1.3 Special	510	26
7	2.1 GS 0-10 kW	-	-
8	2.2 GS 10-100 kW	252,793	13,097
9	2.3 GS 110-1,000 kVa	165,933	8,597
10	2.4 GS Over 1,000 kVa	88,787	4,600
11	4.1 Street and Area Lighting	27,313	1,415
12	Subtotal Rural	1,349,927	69,937
13	Total	1,349,927	706,725
	Allocated Return on Debt		
14	Newfoundland Power	-	-
15	Industrial - Firm	-	-
16	Industrial - Non-Firm	-	-
	Rural		
17	1.1 Domestic	-	-
18	1.12 Domestic All Electric	-	-
19	1.3 Special	-	-
20	2.1 GS 0-10 kW	-	-
21	2.2 GS 10-100 kW	-	-
22	2.3 GS 110-1,000 kVa	-	-
23	2.4 GS Over 1,000 kVa	-	-
24	4.1 Street and Area Lighting	-	-
25	Subtotal Rural	-	-
26	Total	-	-
	Allocated Return on Equity		
27	Newfoundland Power	-	-
28	Industrial - Firm	-	-
29	Industrial - Non-Firm	-	-
	Rural		
30	1.1 Domestic	-	-
31	1.12 Domestic All Electric	-	-
32	1.3 Special	-	-
33	2.1 GS 0-10 kW	-	-
34	2.2 GS 10-100 kW	-	-
35	2.3 GS 110-1,000 kVa	-	-
36	2.4 GS Over 1,000 kVa	-	-
37	4.1 Street and Area Lighting	-	-
38	Subtotal Rural	-	-
39	Total	-	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
							Distribution											
				Production and		Rural Prod &												Specifically
Line		Total	Production	Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Total Revenue Requiremt	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
40	Newfoundland Power	386,597,884	120,339,288	235,105,608	26,319,954	-	-	-	-	-	-	-	-	-	-	-	-	4,218,405
41	Industrial - Firm	34,828,640	7,014,171	24,661,067	1,492,460	-	-	-	-	-	-	-	-	-	-	-	-	1,638,790
42	Industrial - Non-Firm	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
43	1.1 Domestic	21,069,534	2,264,338	4,755,315	481,801	3,157,526	804,628	3,083,960	1,496,676	254,657	806,565	490,049	953,876	333,252	319,355	-	1,486,503	-
44	1.12 Domestic All Electric	24,347,709	2,993,604	6,089,321	636,973	4,174,458	1,063,771	4,077,198	1,068,397	336,673	575,763	647,877	680,920	237,891	227,970	-	1,061,134	-
45	1.3 Special	60,303	9,530	14,950	2,028	13,290	3,387	12,980	130	1,072	70	2,063	83	29	28	-	129	-
46	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	2.2 GS 10-100 kW	11,983,998	1,387,849	3,279,728	295,304	1,935,298	493,169	1,890,208	377,208	156,083	203,279	300,359	240,406	400,641	383,933	-	374,644	-
48	2.3 GS 110-1,000 kVa	8,307,651	1,170,043	2,608,298	248,959	1,631,577	415,772	1,593,563	11,928	131,077	6,428	252,239	7,602	22,361	21,429	-	11,847	-
49	2.4 GS Over 1,000 kVa	4,396,628	603,595	1,541,543	128,432	841,689	214,486	822,079	1,038	49,351	559	94,968	661	1,946	1,864	-	1,031	-
50	4.1 Street and Area Lighting	1,263,572	73,417	121,336	15,622	102,377	26,089	99,992	122,847	8,257	66,203	15,889	78,294	-	-	382,507	122,012	-
51	Subtotal Rural	71,429,395	8,502,377	18,410,491	1,809,118	11,856,215	3,021,301	11,579,980	3,078,224	937,169	1,658,867	1,803,443	1,961,842	996,119	954,579	382,507	3,057,299	-
52	Total	492,855,926	135,855,835	278,177,165	29,621,532	11,856,215	3,021,301	11,579,980	3,078,224	937,169	1,658,867	1,803,443	1,961,842	996,119	954,579	382,507	3,057,299	5,857,195
	Re-classification of Revenue-Related																	
53	Newfoundland Power	-	191,625	374,375	41,911	-	-	-	-	-	-	-	-	-	-	-	-	6,717
54	Industrial - Firm	-	4,464	15,695	950	-	-	-	-	-	-	-	-	-	-	-	-	1,043
55	Industrial - Non-Firm	(7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
56	1.1 Domestic	-	41,704	87,582	8,874	58,154	14,819	56,799	27,565	4,690	14,855	9,026	17,568	6,138	5,882	-	27,378	-
57	1.12 Domestic All Electric	0	59,661	121,358	12,695	83,195	21,201	81,257	21,293	6,710	11,475	12,912	13,570	4,741	4,543	-	21,148	-
58	1.3 Special	-	86	134	18	119	30	116	1	10	1	19	1	0	0	-	1	-
59	2.1 GS 0-10 kW																	
60	2.2 GS 10-100 kW	0	31,491	74,419	6,701	43,913	11,190	42,890	8,559	3,542	4,612	6,815	5,455	9,091	8,712	-	8,501	-
61	2.3 GS 110-1,000 kVa	0	25,108	55,972	5,342	35,012	8,922	34,196	256	2,813	138	5,413	163	480	460	-	254	-
62	2.4 GS Over 1,000 kVa	0	13,099	33,454	2,787	18,266	4,655	17,840	23	1,071	12	2,061	14	42	40	-	22	-
63	4.1 Street and Area Lighting	0	1,708	2,823	363	2,382	607	2,326	2,858	192	1,540	370	1,821	-	-	8,899	2,839	-
64	Subtotal Rural	0	172,857	375,741	36,780	241,042	61,424	235,426	60,555	19,027	32,633	36,615	38,593	20,492	19,637	8,899	60,143	-
65	Total	(7)	368,946	765,812	79,641	241,042	61,424	235,426	60,555	19,027	32,633	36,615	38,593	20,492	19,637	8,899	60,143	7,760
	Total Allocated Revenue Requirement																	
66	Newfoundland Power	386,597,884	120,530,912	235,479,983	26,361,866	-	-	-	-	-	-	-	-	-	-	-	-	4,225,123
67	Industrial - Firm	34,828,640	7,018,635	24,676,762	1,493,410	-	-	-	-	-	-	-	-	-	-	-	-	1,639,833
68	Industrial - Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																	
69	1.1 Domestic	21,069,534	2,306,042	4,842,897	490,675	3,215,681	819,447	3,140,760	1,524,242	259,347	821,420	499,075	971,444	339,390	325,236	-	1,513,881	-
70	1.12 Domestic All Electric	24,347,709	3,053,266	6,210,679	649,667	4,257,653	1,084,971	4,158,455	1,089,689	343,382	587,238	660,789	694,491	242,632	232,513	-	1,082,282	-
71	1.3 Special	60,303	9,616	15,085	2,046	13,409	3,417	13,096	131	1,081	71	2,081	83	29	28	-	130	-
72	2.1 GS 0-10 kW																	
73	2.2 GS 10-100 kW	11,983,998	1,419,340	3,354,146	302,004	1,979,211	504,359	1,933,098	385,767	159,625	207,891	307,174	245,861	409,732	392,645	-	383,145	-
74	2.3 GS 110-1,000 kVa	8,307,651	1,195,151	2,664,269	254,302	1,666,589	424,694	1,627,759	12,184	133,890	6,566	257,651	7,765	22,841	21,889	-	12,101	-
75	2.4 GS Over 1,000 kVa	4,396,628	616,694	1,574,996	131,219	859,955	219,141	839,919	1,060	50,422	571	97,029	676	1,988	1,905	-	1,053	-
76	4.1 Street and Area Lighting	1,263,572	75,125	124,159	15,985	104,759	26,696	102,318	125,705	8,449	67,743	16,259	80,116	-	-	391,406	124,851	-
77	Subtotal Rural	71,429,395	8,675,234	18,786,232	1,845,898	12,097,257	3,082,725	11,815,406	3,138,779	956,196	1,691,500	1,840,058	2,000,435	1,016,611	974,216	391,406	3,117,442	-
78	Total	492,855,919	136,224,781	278,942,977	29,701,173	12,097,257	3,082,725	11,815,406	3,138,779	956,196	1,691,500	1,840,058	2,000,435	1,016,611	974,216	391,406	3,117,442	5,864,956

Schedule 3.2A
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

Line No.	1 Description	19 Revenue Related Municipal Tax ($)	20 PUB Assessment ($)	Basis of Proration
	Total Revenue Requiremt			
40	Newfoundland Power	-	614,629	
41	Industrial - Firm	-	22,152	
42	Industrial - Non-Firm	-	7	
	Rural			
43	1.1 Domestic	362,266	18,768	
44	1.12 Domestic All Electric	452,325	23,434	
45	1.3 Special	510	26	
46	2.1 GS 0-10 kW	-	-	
47	2.2 GS 10-100 kW	252,793	13,097	
48	2.3 GS 110-1,000 kVa	165,933	8,597	
49	2.4 GS Over 1,000 kVa	88,787	4,600	
50	4.1 Street and Area Lighting	27,313	1,415	
51	Subtotal Rural	1,349,927	69,937	
52	Total	1,349,927	706,725	
	Re-classification of Revenue-Related			
53	Newfoundland Power	-	(614,629)	Re-classification to demand, energy and customer is based on rate class revenue
54	Industrial - Firm	-	(22,152)	requirements excluding revenue-related items.
55	Industrial - Non-Firm	-	(7)	
	Rural			
56	1.1 Domestic	(362,266)	(18,768)	
57	1.12 Domestic All Electric	(452,325)	(23,434)	
58	1.3 Special	(510)	(26)	
59	2.1 GS 0-10 kW	-	-	
60	2.2 GS 10-100 kW	(252,793)	(13,097)	
61	2.3 GS 110-1,000 kVa	(165,933)	(8,597)	
62	2.4 GS Over 1,000 kVa	(88,787)	(4,600)	
63	4.1 Street and Area Lighting	(27,313)	(1,415)	
64	Subtotal Rural	(1,349,927)	(69,937)	
65	Total	(1,349,927)	(706,725)	
	Total Allocated Revenue Requirement			
66	Newfoundland Power	-	-	
67	Industrial - Firm	-	-	
68	Industrial - Non-Firm	-	-	
	Rural			
69	1.1 Domestic	-	-	
70	1.12 Domestic All Electric	-	-	
71	1.3 Special	-	-	
72	2.1 GS 0-10 kW	-	-	
73	2.2 GS 10-100 kW	-	-	
74	2.3 GS 110-1,000 kVa	-	-	
75	2.4 GS Over 1,000 kVa	-	-	
76	4.1 Street and Area Lighting	-	-	
77	Subtotal Rural	-	-	
78	Total	-	-	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Interconnected
Allocation of Specifically Assigned Amounts to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			OM&A				Depreciation				Expense Credits			Subtotal			Subtotal	
Line			Transmission		Administrative &		Transmission		Telecontrol &		Rental			Excluding	Return on	Return on	Excl Rev	Revenue
No.	Description	Total	Lines	Terminals	General	Other	Lines	Terminals	Feasibility Study	General	Income	Other	Gains/Losses	Return	Debt	Equity	Related	Related
		Amount	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
		($)	(Plant)	(Plant)	(C3 & C4)	(C3 & C4)	(Direct)	(Direct)	(Direct)	(Exp C3,4,6)	(Plant)	(C6)	(NBV)		(NBV)	(NBV)		
	Basis of Allocation - Amounts																	
1	Newfoundland Power		25,304,070	13,005,806	38,309,875	38,309,875	-	-	-	743,804	38,309,875	38,309,875	24,090,999	-	24,090,999	24,090,999	-	-
	Industrial																	
2	Vale		6,554,033	4,509,884	11,063,917	11,063,917	-	-	-	223,726	11,063,917	11,063,917	346,327	-	346,327	346,327	-	-
3	Abitibi Consolidated - GF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Corner Brook P& P - CB		-	7,052,376	7,052,376	7,052,376	-	-	-	192,018	7,052,376	7,052,376	4,753,752	-	4,753,752	4,753,752	-	-
5	Corner Brook P& P - DL		-	19,788	19,788	19,788	-	-	-	539	19,788	19,788	11,393	-	11,393	11,393	-	-
6	North Atlantic Refining Limited		-	1,127,618	1,127,618	1,127,618	-	-	-	30,702	1,127,618	1,127,618	310,497	-	310,497	310,497	-	-
7	Teck Resources		4,534,363	909,953	5,444,315	5,444,315	-	-	-	94,606	5,444,315	5,444,315	0	-	0	0	-	-
8	Subtotal Industrial		11,088,396	13,619,619	24,708,015	24,708,015	-	-	-	541,591	24,708,015	24,708,015	5,421,969	-	5,421,969	5,421,969	-	-
9	Total		36,392,465	26,625,425	63,017,890	63,017,890	-	-	-	1,285,395	63,017,890	63,017,890	29,512,968	-	29,512,968	29,512,968	-	-
10	Basis of Allocation - Ratios																	
11	Newfoundland Power		0.6953	0.4885	0.6079	0.6079	-	-	-	0.5787	0.6079	0.6079	0.8163	-	0.8163	0.8163	-	-
	Industrial																	
12	Vale		0.1801	0.1694	0.1756	0.1756	-	-	-	0.1741	0.1756	0.1756	0.0117	-	0.0117	0.0117	-	-
13	Abitibi Consolidated - GF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Corner Brook P& P - CB		-	0.2649	0.1119	0.1119	-	-	-	0.1494	0.1119	0.1119	0.1611	-	0.1611	0.1611	-	-
15	Corner Brook P& P - DL		-	0.0007	0.0003	0.0003	-	-	-	0.0004	0.0003	0.0003	0.0004	-	0.0004	0.0004	-	-
16	North Atlantic Refining Ltd.		-	0.0424	0.0179	0.0179	-	-	-	0.0239	0.0179	0.0179	0.0105	-	0.0105	0.0105	-	-
17	Teck Resources		0.1246	0.0342	0.0864	0.0864	-	-	-	0.0736	0.0864	0.0864	0.0000	-	0.0000	0.0000	-	-
18	Subtotal Industrial		0.3047	0.5115	0.3921	0.3921	-	-	-	0.4213	0.3921	0.3921	0.1837	-	0.1837	0.1837	-	-
19	Total		1.0000	1.0000	1.0000	1.0000	-	-	-	1.0000	1.0000	1.0000	1.0000	-	1.0000	1.0000	-	-
	Amounts Allocated																	
20	Newfoundland Power	4,225,123	288,942	302,333	672,417	152,528	616,408	241,978	-	81,366	(325)	(8,414)	61,794	2,409,028	1,314,288	495,089	4,218,405	6,717
	Industrial																	
21	Vale	480,243	74,839	104,837	194,194	44,050	-	13,167	-	24,474	(94)	(2,430)	888	453,926	18,894	7,117	479,937	305
22	Abitibi Consolidated - GF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Corner Brook P& P - CB	868,128	-	163,940	123,784	28,079	-	163,149	-	21,005	(60)	(1,549)	12,194	510,541	259,342	97,693	867,576	552
24	Corner Brook P& P - DL	2,770	-	460	347	79	-	943	-	59	(0)	(4)	29	1,913	622	234	2,768	2
25	North Atlantic Refining Ltd.	89,293	-	26,213	19,792	4,490	-	11,524	-	3,359	(10)	(248)	796	65,916	16,939	6,381	89,236	57
26	Teck Resources	199,399	51,777	21,153	95,559	21,676	-	-	-	10,349	(46)	(1,196)	0	199,272	0	0	199,272	127
27	Subtotal Industrial	1,639,833	126,616	316,602	433,676	98,373	-	188,783	-	59,246	(209)	(5,427)	13,908	1,231,568	295,796	111,426	1,638,790	1,043
28	Total	5,864,956	415,559	618,935	1,106,093	250,902	616,408	430,761	-	140,612	(534)	(13,841)	75,702	3,640,596	1,610,084	606,515	5,857,195	7,760

Schedule 2.1B
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Revenue Requirement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Expenses																
1	Operating & Maintenance	5,615,999	1,848,491	2,300,727	-	12,406	605,211	181,748	47,837	84,676	109,601	119,258	55,294	26,822	15,412	167,235	-
2	Fuels	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Fuels-Diesel	2,198,340	-	2,198,340	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuels-Gas Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Power Purchases -CF(L)Co	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Power Purchases-Other	202,500	-	202,500	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Depreciation	539,188	181,905	226,853	-	1,597	53,519	17,111	6,959	12,318	9,518	10,828	4,563	6,925	4,003	3,090	-
	Expense Credits																
8	Sundry	(28,122)	(9,256)	(11,521)	-	(62)	(3,031)	(910)	(240)	(424)	(549)	(597)	(277)	(134)	(77)	(837)	-
9	Building Rental Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Tax Refunds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Suppliers' Discounts	(4,381)	(1,442)	(1,795)	-	(10)	(472)	(142)	(37)	(66)	(85)	(93)	(43)	(21)	(12)	(130)	-
12	Pole Attachments	(24,203)	-	-	-	-	(13,998)	(4,784)	-	-	(2,478)	(2,944)	-	-	-	-	-
13	Secondary Energy Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Wheeling Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Application Fees	(168)	-	-	-	-	-	-	-	-	-	-	-	-	-	(168)	-
16	Meter Test Revenues	(57)	-	-	-	-	-	-	-	-	-	-	-	(57)	-	-	-
17	Total Expense Credits	(56,931)	(10,698)	(13,316)	-	(72)	(17,500)	(5,836)	(277)	(490)	(3,112)	(3,634)	(320)	(212)	(89)	(1,136)	-
18	Subtotal Expenses	8,499,096	2,019,697	4,915,104	-	13,932	641,230	193,023	54,519	96,503	116,007	126,452	59,537	33,535	19,325	169,189	-
19	Disposal Gain / Loss	133,059	41,560	51,619	-	406	18,151	5,740	1,549	2,741	3,327	3,718	2,335	999	444	469	-
20	Subtotal Revenue Requirement Ex. Return	8,632,155	2,061,257	4,966,723	-	14,338	659,381	198,763	56,068	99,245	119,335	130,170	61,872	34,533	19,769	169,658	-
21	Return on Debt	597,493	184,400	236,978	-	1,793	80,205	25,340	6,834	12,097	14,699	16,419	10,263	4,410	1,962	2,091	-
22	Return on Equity	225,074	69,463	89,269	-	676	30,213	9,546	2,574	4,557	5,537	6,185	3,866	1,661	739	788	-
23	Total Revenue Requirement	9,454,722	2,315,121	5,292,970	-	16,807	769,799	233,649	65,476	115,899	139,571	152,775	76,001	40,604	22,471	172,537	-

Schedule 2.1B
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Revenue Requirement (CONT'D.)

	1	18	19	20
		Revenue Related		
Line		Municipal	PUB	
No.	Description	Tax	Assessment	Basis of Functional Classification
	Expenses			
1	Operating & Maintenance	39,247	2,033	Carryforward from Sch.2.4 L.24
2	Fuels	-	-	Production - Energy
3	Fuels-Diesel	-	-	Production - Energy
4	Fuels-Gas Turbine	-	-	Production - Energy
5	Power Purchases -CF(L)Co	-	-	
6	Power Purchases-Other	-	-	
7	Depreciation	-	-	Carryforward from Sch.2.5 L.23
	Expense Credits			
8	Sundry	(197)	(10)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
9	Building Rental Income	-	-	Prorated on Production, Transmission & Distribution Plant - Sch.2.2 L.17
10	Tax Refunds	-	-	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
11	Suppliers' Discounts	(31)	(2)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
12	Pole Attachments	-	-	Prorated on Distribution Poles - Sch.4.1 L.37
13	Secondary Energy Revenues	-	-	Production - Energy
14	Wheeling Revenues	-	-	Transmission - Demand, Energy ratios Sch.4.1 L.16
15	Application Fees	-	-	Accounting - Customer
16	Meter Test Revenues	-	-	Meters - Customer
17	Total Expense Credits	(227)	(12)	
18	Subtotal Expenses	39,020	2,022	
19	Disposal Gain / Loss	-	-	Prorated on Total Net Book Value - Sch.2.3 L.23
20	Subtotal Revenue Requirement Ex. Return	39,020	2,022	
21	Return on Debt	-	-	Prorated on Rate Base - Sch.2.6 L.8
22	Return on Equity	-	-	Prorated on Rate Base - Sch.2.6 L.10
23	Total Revenue Requirement	39,020	2,022	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Plant in Service for the Allocation of O&M Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											
				Production and			Primary Lines		Line Transformers		Secondary Lines						Specifically
Line		Total	Production	Transmission	Transmission	Substations							Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Diesel	15,123,439	6,639,068	8,484,371	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	15,123,439	6,639,068	8,484,371	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	253,721	201,749	-	-	51,973	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	76,483	-	-	-	-	57,665	7,346	-	-	6,688	4,784	-	-	-	-	-
8	Poles	3,549,836	-	-	-	-	2,053,041	701,632	-	-	363,390	431,774	-	-	-	-	-
9	Primary Conductor & Equipment	489,822	-	-	-	-	434,472	55,350	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	557,274	-	-	-	-	-	-	201,176	356,098	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	155,817	-	-	-	-	-	-	-	-	90,841	64,976	-	-	-	-	-
13	Services	232,537	-	-	-	-	-	-	-	-	-	-	232,537	-	-	-	-
14	Meters	138,516	-	-	-	-	-	-	-	-	-	-	-	138,516	-	-	-
15	Street Lighting	64,813	-	-	-	-	-	-	-	-	-	-	-	-	64,813	-	-
16	Subtotal Distribution	5,518,820	201,749	-	-	51,973	2,545,177	764,328	201,176	356,098	460,919	501,533	232,537	138,516	64,813	-	-
17	Subttl Prod, Trans, & Dist	20,642,259	6,840,817	8,484,371	-	51,973	2,545,177	764,328	201,176	356,098	460,919	501,533	232,537	138,516	64,813	-	-
18	General	2,438,631	866,586	1,088,920	-	3,735	182,919	54,931	14,458	25,592	33,126	36,045	16,712	6,193	4,658	104,756	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	41,659	13,806	17,123	-	105	5,137	1,543	406	719	930	1,012	469	280	131	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Plant	23,122,548	7,721,208	9,590,414	-	55,813	2,733,232	820,802	216,040	382,409	494,975	538,590	249,718	144,988	69,601	104,756	-

Schedule 2.2B
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Plant in Service for the Allocation of O&M Expense (CONT'D.)

	1	18
Line No.	Description	Basis of Functional Classification
	Production	
1	Diesel	Production - Demand, Energy ratios Sch.4.1 L.6
2	Subtotal Production	
	Transmission	
3	Lines	Production, Transmission - Demand; Distribution - Primary Demand; Spec Assigned - Custmr
4	Terminal Stations	Production, Transmission - Demand; Spec Assigned - Custmr
5	Subtotal Transmission	
	Distribution	
6	Substation Structures & Equipment	Production - Demand; Dist Substns - Demand
7	Land & Land Improvements	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.32
8	Poles	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.37
9	Primary Conductor & Equipment	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.38
10	Submarine Conductor	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.39
11	Transformers	Transformers - Demand, Customer - zero intercept ratios Sch.4.1 L.40
12	Secondary Conductors & Equipment	Secondary - Demand, Customer - zero intercept ratios Sch. 4.1 L.41
13	Services	Services Customer
14	Meters	Meters - Customer
15	Street Lighting	Street Lighting - Customer
16	Subtotal Distribution	
17	Subttl Prod, Trans, & Dist	
18	General	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - Sch.2.4 L.11, 12
19	Telecontrol - Specific	Specifically Assigned - Customer
20	Feasibility Studies	Production, Transmission - Demand
21	Software - General	Prorated on subtotal Production, Transmission, & Distribution plant - L.17
22	Software - Cust Acctng	Customer Accounting
23	Total Plant	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Net Book Value

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Diesel	7,081,070	3,108,533	3,972,537	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	7,081,070	3,108,533	3,972,537	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	126,876	93,751	-	-	33,125	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	50,783	-	-	-	-	38,288	4,878	-	-	4,441	3,176	-	-	-	-	-
8	Poles	2,252,619	-	-	-	-	1,302,798	445,235	-	-	230,596	273,991	-	-	-	-	-
9	Primary Conductor & Equipment	148,786	-	-	-	-	131,973	16,813	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	349,358	-	-	-	-	-	-	126,118	223,240	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	60,286	-	-	-	-	-	-	-	-	35,146	25,139	-	-	-	-	-
13	Services	192,060	-	-	-	-	-	-	-	-	-	-	192,060	-	-	-	-
14	Meters	82,512	-	-	-	-	-	-	-	-	-	-	-	82,512	-	-	-
15	Street Lighting	35,944	-	-	-	-	-	-	-	-	-	-	-	-	35,944	-	-
16	Subtotal Distribution	3,299,223	93,751	-	-	33,125	1,473,059	466,925	126,118	223,240	270,184	302,306	192,060	82,512	35,944	-	-
17	Subttl Prod, Trans, & Dist	10,380,293	3,202,284	3,972,537	-	33,125	1,473,059	466,925	126,118	223,240	270,184	302,306	192,060	82,512	35,944	-	-
18	General	931,299	330,944	415,852	-	1,426	69,856	20,978	5,522	9,774	12,651	13,765	6,382	2,365	1,779	40,006	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	31,680	9,773	12,124	-	101	4,496	1,425	385	681	825	923	586	252	110	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Net Book Value	11,343,272	3,543,001	4,400,514	-	34,653	1,547,410	489,328	132,025	233,694	283,659	316,994	199,028	85,129	37,833	40,006	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Operating & Maintenance Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											
				Production and			Primary Lines		Line Transformers		Secondary Lines						Specifically
Line		Total	Production	Transmission	Transmission	Substations							Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Diesel	2,130,539	935,289	1,195,250	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Other	314,161	137,914	176,247	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	2,444,700	1,073,204	1,371,497	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Transmission Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
8	Other	487,018	18,262	-	-	4,704	230,386	69,186	18,210	32,234	41,722	45,398	21,049	-	5,867	-	-
9	Meters	7,800	-	-	-	-	-	-	-	-	-	-	-	7,800	-	-	-
10	Subtotal Distribution	494,818	18,262	-	-	4,704	230,386	69,186	18,210	32,234	41,722	45,398	21,049	7,800	5,867	-	-
11	Subttl Prod, Trans, & Dist	2,939,518	1,091,466	1,371,497	-	4,704	230,386	69,186	18,210	32,234	41,722	45,398	21,049	7,800	5,867	-	-
12	Customer Accounting	131,940	-	-	-	-	-	-	-	-	-	-	-	-	-	131,940	-
	Administrative & General:																
	Plant-Related:																
13	Production	668,726	293,565	375,160	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Distribution	571,487	20,892	-	-	5,382	263,559	79,148	20,832	36,875	47,729	51,935	24,080	14,344	6,712	-	-
16	Prod, Trans, Distn Plant	356,326	118,086	146,457	-	897	43,935	13,194	3,473	6,147	7,956	8,657	4,014	2,391	1,119	-	-
17	Prod, Trans, Distn and Gen Plt	3,528	1,178	1,463	-	9	417	125	33	58	76	82	38	22	11	16	-
18	Property Insurance	16,396	7,093	8,810	-	51	168	51	13	24	30	33	15	6	4	96	-
	Revenue Related:																
19	Municipal Tax	39,247	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	PUB Assessment	2,033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	All Expense-Related	819,027	291,047	365,719	-	1,254	61,434	18,449	4,856	8,595	11,125	12,106	5,613	2,080	1,564	35,183	-
22	Prod, Trans, and Distn Expense-Related	67,771	25,164	31,620	-	108	5,312	1,595	420	743	962	1,047	485	180	135	-	-
23	Subtotal Admin & General	2,544,540	757,025	929,230	-	7,702	374,825	112,562	29,627	52,442	67,879	73,860	34,245	19,022	9,545	35,295	-
24	Total Operating & Maintenance Expenses	5,615,999	1,848,491	2,300,727	-	12,406	605,211	181,748	47,837	84,676	109,601	119,258	55,294	26,822	15,412	167,235	-

Schedule 2.4B
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Operating & Maintenance Expense (CONT'D.)

	1	18	19	20
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Production			
1	Diesel	-	-	Production - Demand, Energy ratios Sch.4.1 L6
2	Other	-		Production - Demand, Energy ratios Sch.4.1 L6
3	Subtotal Production	-	-	
	Transmission			
4	Transmission Lines	-	-	Prorated on Transmission Lines Plant in Service - Sch.2.2 L.3
5	Terminal Stations	-	-	Prorated on Transmission Terminal Stations Plant in Service - Sch.2.2 L.4
6	Other	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.5
7	Subtotal Transmission	-	-	
	Distribution			
8	Other	-	-	Prorated on Distribution Plant, excluding Meters - Sch. 2.2 L. 16, less L. 14
9	Meters	-	-	Meters - Customer
10	Subtotal Distribution	-	-	
11	Subttl Prod, Trans, & Dist	-	-	
12	Customer Accounting	-	-	Accounting - Customer
	Administrative & General:			
	Plant-Related:			
13	Production	-	-	Prorated on Production Plant in Service - Sch.2.2 L.2
14	Transmission	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.5
15	Distribution	-	-	Prorated on Distribution Plant in Service - Sch.2.2 L.16
16	Prod, Trans, Distn Plant	-	-	Prorated on Production, Transmission & Distribution Plant in Service - Sch.2.2 L.17
17	Prod, Trans, Distn and Gen Plt	-	-	Prorated on Production, Transmission, Distribution & General Plant in Service - Sch.2.2 L.23
18	Property Insurance	-	-	Prorated on Prod., Trans. Terminal, Dist. Sub & General Plant in Service - Sch.2.2 L.2, 4, 6, 18 - 19
	Revenue Related:			
19	Municipal Tax	39,247	-	Revenue-related
20	PUB Assessment	-	2,033	Revenue-related
21	All Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - L.11, 12
22	Prod, Trans, and Distn Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution Expenses - L.11
23	Subtotal Admin & General	39,247	2,033	
24	Total Operating & Maintenance Expenses	39,247	2,033	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Depreciation Expense

Line No.	Description (1)	Total Amount ($) (2)	Production Demand ($) (3)	Production and Transmission Energy ($) (4)	Transmission Demand ($) (5)	Distribution: Substations Demand ($) (6)	Distribution: Primary Lines Demand ($) (7)	Distribution: Primary Lines Customer ($) (8)	Distribution: Line Transformers Demand ($) (9)	Distribution: Line Transformers Customer ($) (10)	Distribution: Secondary Lines Demand ($) (11)	Distribution: Secondary Lines Customer ($) (12)	Distribution: Services Customer ($) (13)	Distribution: Meters Customer ($) (14)	Distribution: Street Lighting Customer ($) (15)	Accounting Customer ($) (16)	Specifically Assigned Customer ($) (17)
	Production																
1	Diesel	341,149	149,762	191,388	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	341,149	149,762	191,388	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substn Struct & Eqpt	5,357	3,895	-	-	1,461	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	1,458	-	-	-	-	1,100	140	-	-	128	91	-	-	-	-	-
8	Poles	74,203	-	-	-	-	42,915	14,666	-	-	7,596	9,025	-	-	-	-	-
9	Primary Conductor & Equipment	3,700	-	-	-	-	3,282	418	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	17,784	-	-	-	-	-	-	6,420	11,364	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	1,151	-	-	-	-	-	-	-	-	671	480	-	-	-	-	-
13	Services	4,000	-	-	-	-	-	-	-	-	-	-	4,000	-	-	-	-
14	Meters	6,626	-	-	-	-	-	-	-	-	-	-	-	6,626	-	-	-
15	Street Lighting	3,799	-	-	-	-	-	-	-	-	-	-	-	-	3,799	-	-
16	Subtotal Distribution	118,079	3,895	-	-	1,461	47,297	15,225	6,420	11,364	8,395	9,597	4,000	6,626	3,799	-	-
17	Subtotal Prod Tran & Dist	459,228	153,657	191,388	-	1,461	47,297	15,225	6,420	11,364	8,395	9,597	4,000	6,626	3,799	-	-
18	General	71,927	25,560	32,118	-	110	5,395	1,620	426	755	977	1,063	493	183	137	3,090	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	8,033	2,688	3,348	-	26	827	266	112	199	147	168	70	116	66	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Depreciation Expense	539,188	181,905	226,853	-	1,597	53,519	17,111	6,959	12,318	9,518	10,828	4,563	6,925	4,003	3,090	-

Schedule 2.6B
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Rate Base

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
1	Average Net Book Value	11,343,272	3,543,001	4,400,514	-	34,653	1,547,410	489,328	132,025	233,694	283,659	316,994	199,028	85,129	37,833	40,006	-
2	Cash Working Capital	49,492	15,458	19,200	-	151	6,751	2,135	576	1,020	1,238	1,383	868	371	165	175	-
3	Fuel Inventory - No. 6 Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuel Inventory - Diesel	165,549	-	165,549	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Fuel Inventory - Gas Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Inventory/Supplies	250,202	83,549	103,775	-	604	29,575	8,882	2,338	4,138	5,356	5,828	2,702	1,569	753	1,134	-
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	637,651	199,167	247,371	-	1,948	86,986	27,507	7,422	13,137	15,946	17,820	11,188	4,785	2,127	2,249	-
8	Total Rate Base	12,446,166	3,841,175	4,936,408	-	37,356	1,670,723	527,852	142,360	251,989	306,198	342,024	213,787	91,855	40,877	43,563	-
9	Less: Rural Portion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Rate Base Available for Equity Return	12,446,166	3,841,175	4,936,408	-	37,356	1,670,723	527,852	142,360	251,989	306,198	342,024	213,787	91,855	40,877	43,563	-
11	Return on Debt	597,493	184,400	236,978	-	1,793	80,205	25,340	6,834	12,097	14,699	16,419	10,263	4,410	1,962	2,091	-
12	Return on Equity	225,074	69,463	89,269	-	676	30,213	9,546	2,574	4,557	5,537	6,185	3,866	1,661	739	788	-
13	Return on Rate Base	822,567	253,863	326,247	-	2,469	110,418	34,886	9,409	16,654	20,237	22,604	14,129	6,071	2,702	2,879	-

Schedule 2.6B
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Functional Classification of Rate Base (CONT'D.)

	1	18
Line No.	Description	Basis of Functional Classification
1	Average Net Book Value	Sch. 2.3 , L. 23
2	Cash Working Capital	Prorated on Average Net Book Value, L. 1
3	Fuel Inventory - No. 6 Fuel	
4	Fuel Inventory - Diesel	Production - Energy
5	Fuel Inventory - Gas Turbine	
6	Inventory/Supplies	Prorated on Total Plant in Service, Sch. 2.2, L. 23
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	Prorated on Average Net Book Value, L. 1
8	Total Rate Base	
9	Less: Rural Portion	
10	Rate Base Available for Equity Return	
11	Return on Debt	L.8 x Sch.1.1,p2,L.14
12	Return on Equity	L.10 x Sch.1.1,p2,L.17
13	Return on Rate Base	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Basis of Allocation to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
			(CP kW)	(MWh @ Gen)	(CP kW)	(CP kW)	(CP kW)	(Rural Cust)	(CP kW)	(Rural Cust)	(CP kW)	(Rural Cust)	(Wtd Rural Cust)		(Rural Cust)	(Rural Cust)	
	Amounts																
1	1.2 Domestic Diesel	-	1,207	5,660	1,207	1,166	1,166	698	1,103	698	1,103	698	698	698	-	698	-
2	1.2G Government Domestic Diesel		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.1 GS 0-10 kW	-	126	784	126	121	121	96	115	96	115	96	180	180	-	96	-
5	2.2 GS 10-100 kW	-	110	726	110	106	106	13	100	13	100	13	62	62	-	13	-
6	2.3 GS 110-1,000 kVa	-	88	370	88	85	85	1	81	1	81	1	8	8	-	1	-
7	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	2.5G Gov't General Service Diesel		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	4.1 Street and Area Lighting	-	25	105	25	24	24	38	23	38	23	38	-	-	38	38	-
11	4.1G Gov't Street and Area Lighting		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Total	-	1,556	7,646	1,556	1,502	1,502	846	1,421	846	1,421	846	949	949	38	846	-
	Ratios																
13	1.2 Domestic Diesel	-	0.7760	0.7402	0.7760	0.7760	0.7760	0.8251	0.7760	0.8251	0.7760	0.8251	0.7358	0.7358	-	0.8251	-
14	1.2G Government Domestic Diesel		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	2.1 GS 0-10 kW	-	0.0807	0.1026	0.0807	0.0807	0.0807	0.1135	0.0807	0.1135	0.0807	0.1135	0.1900	0.1900	-	0.1135	-
17	2.2 GS 10-100 kW	-	0.0707	0.0950	0.0707	0.0707	0.0707	0.0154	0.0707	0.0154	0.0707	0.0154	0.0654	0.0654	-	0.0154	-
18	2.3 GS 110-1,000 kVa	-	0.0567	0.0484	0.0567	0.0567	0.0567	0.0012	0.0567	0.0012	0.0567	0.0012	0.0089	0.0089	-	0.0012	-
19	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.5G Gov't General Service Diesel		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4.1 Street and Area Lighting	-	0.0160	0.0138	0.0160	0.0160	0.0160	0.0449	0.0160	0.0449	0.0160	0.0449	-	-	1.0000	0.0449	-
23	4.1G Gov't Street and Area Lighting		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total	-	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-

Schedule 3.1B
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Basis of Allocation to Classes of Service (CONT'D.)

Line No.	1 Description	18 Revenue Related Municipal Tax (Prior Year (Rural Revenues)	19 PUB Assessment (Prior Year (Revenues + RSP)
	Amounts		
1	1.2 Domestic Diesel	796,792	796,792
2	1.2G Government Domestic Diesel	-	-
3	1.23 Churches, Schools & Com Halls	-	-
4	2.1 GS 0-10 kW	205,730	205,730
5	2.2 GS 10-100 kW	427,531	427,531
6	2.3 GS 110-1,000 kVa	-	-
7	2.4 GS Over 1,000 kVa	-	-
8	2.5 GS Diesel	-	-
9	2.5G Gov't General Service Diesel	-	-
10	4.1 Street and Area Lighting	41,568	41,568
11	4.1G Gov't Street and Area Lighting	-	-
12	Total	1,471,621	1,471,621
	Ratios		
13	1.2 Domestic Diesel	0.5414	0.5414
14	1.2G Government Domestic Diesel	-	-
15	1.23 Churches, Schools & Com Halls	-	-
16	2.1 GS 0-10 kW	0.1398	0.1398
17	2.2 GS 10-100 kW	0.2905	0.2905
18	2.3 GS 110-1,000 kVa	-	-
19	2.4 GS Over 1,000 kVa	-	-
20	2.5 GS Diesel	-	-
21	2.5G Gov't General Service Diesel	-	-
22	4.1 Street and Area Lighting	0.0282	0.0282
23	4.1G Gov't Street and Area Lighting	-	-
24	Total	1.0000	1.0000

Schedule 3.2B
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Allocation of Functionalized Amounts to Classes of Service

Line No.	Description (1)	Total Amount ($) (2)	Production Demand ($) (3)	Production and Transmission Energy ($) (4)	Transmission Demand ($) (5)	Distribution: Substations Demand ($) (6)	Distribution: Primary Lines Demand ($) (7)	Distribution: Primary Lines Customer ($) (8)	Distribution: Line Transformers Demand ($) (9)	Distribution: Line Transformers Customer ($) (10)	Distribution: Secondary Lines Demand ($) (11)	Distribution: Secondary Lines Customer ($) (12)	Distribution: Services Customer ($) (13)	Distribution: Meters Customer ($) (14)	Distribution: Street Lighting Customer ($) (15)	Accounting Customer ($) (16)	Specifically Assigned Customer ($) (17)
	Allocated Revenue Requirement Excluding Return																
1	1.2 Domestic Diesel	6,521,424	1,599,536	3,676,567	-	11,126	511,680	163,991	43,509	81,883	92,604	107,398	45,523	25,409	-	139,978	-
2	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.1 GS 0-10 kW	836,100	166,275	509,436	-	1,157	53,190	22,555	4,523	11,262	9,626	14,771	11,755	6,561	-	19,252	-
5	2.2 GS 10-100 kW	704,946	145,662	471,867	-	1,013	46,596	3,054	3,962	1,525	8,433	2,000	4,044	2,257	-	2,607	-
6	2.3 GS 110-1,000 kVa	406,917	116,805	240,433	-	812	37,365	235	3,177	117	6,762	154	549	306	-	201	-
7	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	4.1 Street and Area Lighting	162,768	32,980	68,420	-	229	10,550	8,928	897	4,458	1,909	5,847	-	-	19,769	7,621	-
11	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Total	8,632,155	2,061,257	4,966,723	-	14,338	659,381	198,763	56,068	99,245	119,335	130,170	61,872	34,533	19,769	169,658	-
	Allocated Return on Debt and Equity																
13	1.2 Domestic Diesel	627,515	196,998	241,501	-	1,916	85,684	28,783	7,301	13,740	15,704	18,650	10,396	4,467	-	2,375	-
14	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	2.1 GS 0-10 kW	78,017	20,478	33,463	-	199	8,907	3,959	759	1,890	1,632	2,565	2,684	1,153	-	327	-
17	2.2 GS 10-100 kW	61,511	17,940	30,995	-	174	7,803	536	665	256	1,430	347	924	397	-	44	-
18	2.3 GS 110-1,000 kVa	38,526	14,386	15,793	-	140	6,257	41	533	20	1,147	27	125	54	-	3	-
19	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4.1 Street and Area Lighting	16,998	4,062	4,494	-	40	1,767	1,567	151	748	324	1,015	-	-	2,702	129	-
23	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total	822,567	253,863	326,247	-	2,469	110,418	34,886	9,409	16,654	20,237	22,604	14,129	6,071	2,702	2,879	-

Schedule 3.2B
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line No.	Description	Municipal Tax ($)	PUB Assessment ($)	Basis of Proration
	Allocated Revenue Requirement Excluding Return			
1	1.2 Domestic Diesel	21,127	1,095	
2	1.2G Government Domestic Diesel	-	-	
3	1.23 Churches, Schools & Com Halls	-	-	
4	2.1 GS 0-10 kW	5,455	283	
5	2.2 GS 10-100 kW	11,336	587	
6	2.3 GS 110-1,000 kVa	-	-	
7	2.4 GS Over 1,000 kVa	-	-	
8	2.5 GS Diesel	-	-	
9	2.5G Gov't General Service Diesel	-	-	
10	4.1 Street and Area Lighting	1,102	57	
11	4.1G Gov't Street and Area Lighting	-	-	
12	Total	39,020	2,022	
	Allocated Return on Debt and Equity			
13	1.2 Domestic Diesel	-	-	
14	1.2G Government Domestic Diesel	-	-	
15	1.23 Churches, Schools & Com Halls	-	-	
16	2.1 GS 0-10 kW	-	-	
17	2.2 GS 10-100 kW	-	-	
18	2.3 GS 110-1,000 kVa	-	-	
19	2.4 GS Over 1,000 kVa	-	-	
20	2.5 GS Diesel	-	-	
21	2.5G Gov't General Service Diesel	-	-	
22	4.1 Street and Area Lighting	-	-	
23	4.1G Gov't Street and Area Lighting	-	-	
24	Total	-	-	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Total Revenue Requirement																
25	1.2 Domestic Diesel	7,148,939	1,796,534	3,918,068	-	13,042	597,364	192,774	50,810	95,623	108,307	126,048	55,919	29,875	-	142,354	-
26	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	2.1 GS 0-10 kW	914,117	186,753	542,899	-	1,356	62,097	26,513	5,282	13,152	11,259	17,336	14,440	7,714	-	19,579	-
29	2.2 GS 10-100 kW	766,457	163,602	502,863	-	1,188	54,399	3,590	4,627	1,781	9,863	2,348	4,968	2,654	-	2,651	-
30	2.3 GS 110-1,000 kVa	445,443	131,190	256,226	-	952	43,622	276	3,710	137	7,909	181	675	360	-	204	-
31	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	4.1 Street and Area Lighting	179,766	37,042	72,915	-	269	12,317	10,495	1,048	5,206	2,233	6,862	-	-	22,471	7,750	-
35	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	Total	9,454,722	2,315,121	5,292,970	-	16,807	769,799	233,649	65,476	115,899	139,571	152,775	76,001	40,604	22,471	172,537	-
	Re-classification of Revenue-Related																
37	1.2 Domestic Diesel	0	5,602	12,217	-	41	1,863	601	158	298	338	393	174	93	-	444	-
38	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	2.1 GS 0-10 kW	(0)	1,180	3,429	-	9	392	167	33	83	71	109	91	49	-	124	-
41	2.2 GS 10-100 kW	0	2,585	7,946	-	19	860	57	73	28	156	37	79	42	-	42	-
42	2.3 GS 110-1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	4.1 Street and Area Lighting	(0)	240	473	-	2	80	68	7	34	14	45	-	-	146	50	-
47	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	Total	0	9,607	24,065	-	70	3,194	893	272	443	579	584	344	184	146	660	-
	Total Allocated Revenue Requirement																
49	1.2 Domestic Diesel	7,148,939	1,802,135	3,930,284	-	13,083	599,227	193,375	50,968	95,921	108,645	126,441	56,094	29,968	-	142,797	-
50	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	2.1 GS 0-10 kW	914,117	187,933	546,328	-	1,364	62,489	26,681	5,315	13,235	11,330	17,446	14,531	7,763	-	19,702	-
53	2.2 GS 10-100 kW	766,457	166,187	510,809	-	1,206	55,259	3,647	4,700	1,809	10,019	2,385	5,046	2,696	-	2,693	-
54	2.3 GS 110-1,000 kVa	445,443	131,190	256,226	-	952	43,622	276	3,710	137	7,909	181	675	360	-	204	-
55	2.4 GS Over 1,000 kVa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58	4.1 Street and Area Lighting	179,766	37,282	73,388	-	271	12,397	10,563	1,054	5,240	2,248	6,907	-	-	22,617	7,800	-
59	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	Total	9,454,722	2,324,727	5,317,036	-	16,877	772,994	234,542	65,748	116,342	140,151	153,359	76,345	40,788	22,617	173,197	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Island Isolated
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line		Municipal	PUB	
No.	Description	Tax	Assessment	Basis of Proration
		($)	($)	
	Total Revenue Requirement			
25	1.2 Domestic Diesel	21,127	1,095	
26	1.2G Government Domestic Diesel	-	-	
27	1.23 Churches, Schools & Com Halls	-	-	
28	2.1 GS 0-10 kW	5,455	283	
29	2.2 GS 10-100 kW	11,336	587	
30	2.3 GS 110-1,000 kVa	-	-	
31	2.4 GS Over 1,000 kVa	-	-	
32	2.5 GS Diesel	-	-	
33	2.5G Gov't General Service Diesel	-	-	
34	4.1 Street and Area Lighting	1,102	57	
35	4.1G Gov't Street and Area Lighting	-	-	
36	Total	39,020	2,022	
	Re-classification of Revenue-Related			
37	1.2 Domestic Diesel	(21,127)	(1,095)	Re-classification to demand, energy and customer is based on rate class revenue
38	1.2G Government Domestic Diesel	-	-	requirements excluding revenue-related items.
39	1.23 Churches, Schools & Com Halls	-	-	
40	2.1 GS 0-10 kW	(5,455)	(283)	
41	2.2 GS 10-100 kW	(11,336)	(587)	
42	2.3 GS 110-1,000 kVa	-	-	
43	2.4 GS Over 1,000 kVa	-	-	
44	2.5 GS Diesel	-	-	
45	2.5G Gov't General Service Diesel	-	-	
46	4.1 Street and Area Lighting	(1,102)	(57)	
47	4.1G Gov't Street and Area Lighting	-	-	
48	Total	(39,020)	(2,022)	
	Total Allocated Revenue Requirement			
49	1.2 Domestic Diesel	-	-	
50	1.2G Government Domestic Diesel	-	-	
51	1.23 Churches, Schools & Com Halls	-	-	
52	2.1 GS 0-10 kW	-	-	
53	2.2 GS 10-100 kW	-	-	
54	2.3 GS 110-1,000 kVa	-	-	
55	2.4 GS Over 1,000 kVa	-	-	
56	2.5 GS Diesel	-	-	
57	2.5G Gov't General Service Diesel	-	-	
58	4.1 Street and Area Lighting	-	-	
59	4.1G Gov't Street and Area Lighting	-	-	
60	Total	-	-	

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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Revenue Requirement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											
				Production and													Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Expenses																
1	Operating & Maintenance	13,293,544	3,799,748	6,963,415	-	85,414	876,679	243,876	37,805	66,917	163,667	168,686	51,803	50,582	22,673	575,122	-
2	Fuels	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Fuels-Diesel	14,315,837	-	14,315,837	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuels-Gas Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Power Purchases -CF(L)Co	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Power Purchases-Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Depreciation	2,621,605	775,155	1,431,187	-	22,032	179,718	54,706	7,022	12,429	31,642	35,055	17,568	26,369	13,911	14,812	-
	Expense Credits																
8	Sundry	(66,567)	(19,027)	(34,869)	-	(428)	(4,390)	(1,221)	(189)	(335)	(820)	(845)	(259)	(253)	(114)	(2,880)	-
9	Building Rental Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Tax Refunds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Suppliers' Discounts	(10,370)	(2,964)	(5,432)	-	(67)	(684)	(190)	(29)	(52)	(128)	(132)	(40)	(39)	(18)	(449)	-
12	Pole Attachments	(105,320)	-	-	-	-	(60,912)	(20,817)	-	-	(10,781)	(12,810)	-	-	-	-	-
13	Secondary Energy Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Wheeling Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Application Fees	(1,472)	-	-	-	-	-	-	-	-	-	-	-	-	-	(1,472)	-
16	Meter Test Revenues	(215)	-	-	-	-	-	-	-	-	-	-	-	(215)	-	-	-
17	Total Expense Credits	(183,944)	(21,991)	(40,301)	-	(494)	(65,985)	(22,228)	(219)	(387)	(11,729)	(13,787)	(300)	(508)	(131)	(4,801)	-
18	Subtotal Expenses	30,047,042	4,552,912	22,670,138	-	106,951	990,412	276,353	44,608	78,959	183,581	189,954	69,071	76,444	36,453	585,133	-
19	Disposal Gain / Loss	273,138	75,592	137,665	-	2,466	24,997	8,118	1,382	2,446	6,077	6,273	4,727	1,697	674	1,024	-
20	Subtotal Revenue Requirement Ex. Return	30,320,180	4,628,504	22,807,802	-	109,418	1,015,409	284,471	45,989	81,405	189,658	196,227	73,799	78,140	37,127	586,158	-
21	Return on Debt	2,855,552	749,390	1,512,185	-	24,525	248,681	80,518	13,684	24,221	60,162	62,103	46,355	16,815	6,704	10,210	-
22	Return on Equity	1,075,679	282,293	569,636	-	9,239	93,678	30,331	5,155	9,124	22,663	23,394	17,462	6,334	2,525	3,846	-
23	Total Revenue Requirement	34,251,411	5,660,187	24,889,623	-	143,181	1,357,769	395,320	64,828	114,750	272,483	281,724	137,616	101,289	46,357	600,214	

Schedule 2.1C
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Revenue Requirement (CONT'D.)

	1	18	19	20
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Expenses			
1	Operating & Maintenance	177,937	9,219	Carryforward from Sch.2.4 L.24
2	Fuels	-	-	Production - Energy
3	Fuels-Diesel	-	-	Production - Energy
4	Fuels-Gas Turbine	-	-	Production - Energy
5	Power Purchases -CF(L)Co	-	-	
6	Power Purchases-Other	-	-	Carryforward from Sch.4.4 L.12
7	Depreciation	-	-	Carryforward from Sch.2.5 L.23
	Expense Credits			
8	Sundry	(891)	(46)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
9	Building Rental Income	-	-	Prorated on Production, Transmission & Distribution Plant - Sch.2.2 L.17
10	Tax Refunds	-	-	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
11	Suppliers' Discounts	(139)	(7)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
12	Pole Attachments	-	-	Prorated on Distribution Poles - Sch.4.1 L.37
13	Secondary Energy Revenues	-	-	Production - Energy
14	Wheeling Revenues	-	-	Transmission - Demand, Energy ratios Sch.4.1 L.16
15	Application Fees	-	-	Accounting - Customer
16	Meter Test Revenues	-	-	Meters - Customer
17	Total Expense Credits	(1,030)	(53)	
18	Subtotal Expenses	176,907	9,165	
19	Disposal Gain / Loss	-	-	Prorated on Total Net Book Value - Sch.2.3 L.23
20	Subtotal Revenue Requirement Ex. Return	176,907	9,165	
21	Return on Debt	-	-	Prorated on Rate Base - Sch.2.6 L.8
22	Return on Equity	-	-	Prorated on Rate Base - Sch.2.6 L.10
23	Total Revenue Requirement	176,907	9,165	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Plant in Service for the Allocation of O&M Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Diesel	60,226,751	20,632,369	39,594,383	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	60,226,751	20,632,369	39,594,383	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	2,739,332	1,827,404	-	-	911,928	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	243,333	-	-	-	-	183,461	23,372	-	-	21,280	15,221	-	-	-	-	-
8	Poles	11,493,527	-	-	-	-	6,647,258	2,271,719	-	-	1,176,569	1,397,981	-	-	-	-	-
9	Primary Conductor & Equipment	2,952,695	-	-	-	-	2,619,040	333,655	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	1,128,800	-	-	-	-	-	-	407,497	721,303	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	971,404	-	-	-	-	-	-	-	-	566,328	405,075	-	-	-	-	-
13	Services	558,391	-	-	-	-	-	-	-	-	-	-	558,391	-	-	-	-
14	Meters	521,956	-	-	-	-	-	-	-	-	-	-	-	521,956	-	-	-
15	Street Lighting	244,392	-	-	-	-	-	-	-	-	-	-	-	-	244,392	-	-
16	Subtotal Distribution	20,853,830	1,827,404	-	-	911,928	9,449,760	2,628,745	407,497	721,303	1,764,177	1,818,277	558,391	521,956	244,392	-	-
17	Subttl Prod, Trans, & Dist	81,080,582	22,459,773	39,594,383	-	911,928	9,449,760	2,628,745	407,497	721,303	1,764,177	1,818,277	558,391	521,956	244,392	-	-
18	General	8,718,632	2,556,398	4,722,682	-	47,627	493,534	137,292	21,282	37,672	92,138	94,963	29,163	28,898	12,764	444,218	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	163,632	45,327	79,907	-	1,840	19,071	5,305	822	1,456	3,560	3,670	1,127	1,053	493	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Plant	89,962,845	25,061,497	44,396,971	-	961,396	9,962,365	2,771,342	429,602	760,430	1,859,876	1,916,910	588,681	551,908	257,649	444,218	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Plant in Service for the Allocation of O&M Expense (CONT'D.)

Line No.	1 Description	18 Basis of Functional Classification
	Production	
1	Diesel	Production - Demand, Energy ratios Sch.4.1 L.7
2	Subtotal Production	
	Transmission	
3	Lines	Production, Transmission - Demand; Distribution - Primary Demand; Spec Assigned - Custmr
4	Terminal Stations	Production, Transmission - Demand; Spec Assigned - Custmr
5	Subtotal Transmission	
	Distribution	
6	Substation Structures & Equipment	Production - Demand; Dist Substns - Demand
7	Land & Land Improvements	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.32
8	Poles	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.37
9	Primary Conductor & Equipment	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.38
10	Submarine Conductor	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.39
11	Transformers	Transformers - Demand, Customer - zero intercept ratios Sch.4.1 L.40
12	Secondary Conductors & Equipment	Secondary - Demand, Customer - zero intercept ratios Sch. 4.1 L.41
13	Services	Services Customer
14	Meters	Meters - Customer
15	Street Lighting	Street Lighting - Customer
16	Subtotal Distribution	
17	Subttl Prod, Trans, & Dist	
18	General	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - Sch 2.4 L.11, 12
19	Telecontrol - Specific	Specifically Assigned - Customer
20	Feasibility Studies	Production, Transmission - Demand
21	Software - General	Prorated on subtotal Production, Transmission, & Distribution plant - L.17
22	Software - Cust Acctng	Customer Accounting
23	Total Plant	

Schedule 2.3C
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Net Book Value

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Diesel	36,782,536	12,600,893	24,181,643	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	36,782,536	12,600,893	24,181,643	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	1,143,035	693,537	-	-	449,498	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	154,588	-	-	-	-	116,551	14,848	-	-	13,519	9,669	-	-	-	-	-
8	Poles	7,326,313	-	-	-	-	4,237,159	1,448,060	-	-	749,980	891,114	-	-	-	-	-
9	Primary Conductor & Equipment	222,450	-	-	-	-	197,313	25,137	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	704,180	-	-	-	-	-	-	254,209	449,971	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	609,075	-	-	-	-	-	-	-	-	355,091	253,984	-	-	-	-	-
13	Services	888,870	-	-	-	-	-	-	-	-	-	-	888,870	-	-	-	-
14	Meters	310,922	-	-	-	-	-	-	-	-	-	-	-	310,922	-	-	-
15	Street Lighting	123,038	-	-	-	-	-	-	-	-	-	-	-	-	123,038	-	-
16	Subtotal Distribution	11,482,471	693,537	-	-	449,498	4,551,023	1,488,045	254,209	449,971	1,118,589	1,154,768	888,870	310,922	123,038	-	-
17	Subttl Prod, Trans, & Dist	48,265,007	13,294,429	24,181,643	-	449,498	4,551,023	1,488,045	254,209	449,971	1,118,589	1,154,768	888,870	310,922	123,038	-	-
18	General	3,846,949	1,127,967	2,083,804	-	21,015	217,764	60,578	9,390	16,622	40,654	41,901	12,868	12,751	5,632	196,004	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	147,299	40,573	73,800	-	1,372	13,889	4,541	776	1,373	3,414	3,524	2,713	949	375	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Net Book Value	52,259,255	14,462,970	26,339,246	-	471,885	4,782,676	1,553,164	264,375	467,966	1,162,658	1,200,193	904,450	324,622	129,046	196,004	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Operating & Maintenance Expense

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production and Transmission Energy ($)	5 Transmission Demand ($)	6 Distribution: Substations Demand ($)	7 Distribution: Primary Lines Demand ($)	8 Distribution: Primary Lines Customer ($)	9 Distribution: Line Transformers Demand ($)	10 Distribution: Line Transformers Customer ($)	11 Distribution: Secondary Lines Demand ($)	12 Distribution: Secondary Lines Customer ($)	13 Distribution: Services Customer ($)	14 Distribution: Meters Customer ($)	15 Distribution: Street Lighting Customer ($)	16 Accounting Customer ($)	17 Specifically Assigned Customer ($)
	Production																
1	Diesel	6,968,482	2,387,250	4,581,233	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Other	337,907	115,760	222,147	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	7,306,389	2,503,009	4,803,380	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Transmission Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
8	Other	1,080,020	97,071	-	-	48,441	501,967	139,638	21,646	38,315	93,712	96,586	29,662	-	12,982	-	-
9	Meters	29,392	-	-	-	-	-	-	-	-	-	-	-	29,392	-	-	-
10	Subtotal Distribution	1,109,412	97,071	-	-	48,441	501,967	139,638	21,646	38,315	93,712	96,586	29,662	29,392	12,982	-	-
11	Subttl Prod, Trans, & Dist	8,415,802	2,600,080	4,803,380	-	48,441	501,967	139,638	21,646	38,315	93,712	96,586	29,662	29,392	12,982	-	-
12	Customer Accounting	451,809	-	-	-	-	-	-	-	-	-	-	-	-	-	451,809	-
	Administrative & General:																
	Plant-Related:																
13	Production	769,010	263,446	505,564	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Distribution	395,021	34,615	-	-	17,274	179,001	49,795	7,719	13,663	33,418	34,442	10,577	9,887	4,629	-	-
16	Prod, Trans, Distn Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Prod, Trans, Distn and General Plt	447,836	124,757	221,009	-	4,786	49,593	13,796	2,139	3,785	9,258	9,542	2,930	2,747	1,283	2,211	-
18	Property Insurance	63,792	22,262	39,437	-	854	439	122	19	34	82	85	26	26	11	395	-
	Revenue Related:																
19	Municipal Tax	177,937	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	PUB Assessment	9,219	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	All Expense-Related	2,369,092	694,644	1,283,283	-	12,942	134,107	37,306	5,783	10,236	25,036	25,804	7,924	7,852	3,468	120,706	-
22	Prod, Trans, and Distn Expense-Related	194,026	59,945	110,742	-	1,117	11,573	3,219	499	883	2,161	2,227	684	678	299	-	-
23	Subtotal Admin & General	4,425,933	1,199,668	2,160,035	-	36,972	374,712	104,238	16,159	28,602	69,955	72,100	22,142	21,190	9,691	123,313	-
24	Total Operating & Maintenance Expenses	13,293,544	3,799,748	6,963,415	-	85,414	876,679	243,876	37,805	66,917	163,667	168,686	51,803	50,582	22,673	575,122	-

Schedule 2.4C
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Operating & Maintenance Expense (CONT'D.)

Line No.	1 Description	18 Revenue Related Municipal Tax	19 Revenue Related PUB Assessment	20 Basis of Functional Classification
	Production			
1	Diesel	-	-	Production - Demand, Energy ratios Sch.4.1 L7
2	Other	-	-	Production - Demand, Energy ratios Sch.4.1 L7
3	Subtotal Production	-	-	
	Transmission			
4	Transmission Lines	-	-	Prorated on Transmission Lines Plant in Service - Sch.2.2 L.3
5	Terminal Stations	-	-	Prorated on Transmission Terminal Stations Plant in Service - Sch.2.2 L.4
6	Other	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.5
7	Subtotal Transmission	-	-	
	Distribution			
8	Other	-	-	Prorated on Distribution Plant, excluding Meters - Sch. 2.2 L. 16, less L. 14
9	Meters	-	-	Meters - Customer
10	Subtotal Distribution	-	-	
11	Subttl Prod, Trans, & Dist	-	-	
12	Customer Accounting	-	-	Accounting - Customer
	Administrative & General:			
	Plant-Related:			
13	Production	-	-	Prorated on Production Plant in Service - Sch.2.2 L.2
14	Transmission	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.5
15	Distribution	-	-	Prorated on Distribution Plant in Service - Sch.2.2 L.16
16	Prod, Trans, Distn Plant	-	-	Prorated on Production, Transmission & Distribution Plant in Service - Sch.2.2 L.17
17	Prod, Trans, Distn and General Plt	-	-	Prorated on Production, Transmission, Distribution & General Plant in Service - Sch.2.2 L.23
18	Property Insurance	-	-	Prorated on Prod., Trans. Terminal, Dist. Sub & General Plant in Service - Sch.2.2 L.2, 4, 6, 18 - 19
	Revenue Related:			
19	Municipal Tax	177,937	-	Revenue-related
20	PUB Assessment	-	9,219	Revenue-related
21	All Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - L.11, 12
22	Prod, Trans, and Distn Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution Expenses - L.11
23	Subtotal Admin & General	177,937	9,219	
24	Total Operating & Maintenance Expenses	177,937	9,219	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Depreciation Expense

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production and Transmission Energy ($)	5 Transmission Demand ($)	6 Distribution: Substations Demand ($)	7 Distribution: Primary Lines Demand ($)	8 Distribution: Primary Lines Customer ($)	9 Distribution: Line Transformers Demand ($)	10 Distribution: Line Transformers Customer ($)	11 Distribution: Secondary Lines Demand ($)	12 Distribution: Secondary Lines Customer ($)	13 Distribution: Services Customer ($)	14 Distribution: Meters Customer ($)	15 Distribution: Street Lighting Customer ($)	16 Accounting Customer ($)	17 Specifically Assigned Customer ($)
	Production																
1	Diesel	1,904,132	652,314	1,251,818	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	1,904,132	652,314	1,251,818	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substn Struct & Eqpt	45,833	25,740	-	-	20,093	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	3,936	-	-	-	-	2,967	378	-	-	344	246	-	-	-	-	-
8	Poles	232,509	-	-	-	-	134,471	45,956	-	-	23,801	28,280	-	-	-	-	-
9	Primary Conductor & Equipment	25,949	-	-	-	-	23,017	2,932	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	17,184	-	-	-	-	-	-	6,204	10,981	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	6,746	-	-	-	-	-	-	-	-	3,933	2,813	-	-	-	-	-
13	Services	16,310	-	-	-	-	-	-	-	-	-	-	16,310	-	-	-	-
14	Meters	24,969	-	-	-	-	-	-	-	-	-	-	-	24,969	-	-	-
15	Street Lighting	13,254	-	-	-	-	-	-	-	-	-	-	-	-	13,254	-	-
16	Subtotal Distribution	386,690	25,740	-	-	20,093	160,455	49,266	6,204	10,981	28,079	31,340	16,310	24,969	13,254	-	-
17	Subtotal Prod Tran & Dist	2,290,822	678,054	1,251,818	-	20,093	160,455	49,266	6,204	10,981	28,079	31,340	16,310	24,969	13,254	-	-
18	General	290,714	85,240	157,473	-	1,588	16,456	4,578	710	1,256	3,072	3,166	972	964	426	14,812	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	40,070	11,860	21,896	-	351	2,807	862	109	192	491	548	285	437	232	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Depreciation Expense	2,621,605	775,155	1,431,187	-	22,032	179,718	54,706	7,022	12,429	31,642	35,055	17,568	26,369	13,911	14,812	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Rate Base

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											
				Production and			Primary Lines		Line Transformers		Secondary Lines						Specifically
Line		Total	Production	Transmission	Transmission	Substations							Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
1	Average Net Book Value	52,259,255	14,462,970	26,339,246	-	471,885	4,782,676	1,553,164	264,375	467,966	1,162,658	1,200,193	904,450	324,622	129,046	196,004	-
2	Cash Working Capital	228,011	63,103	114,920	-	2,059	20,867	6,777	1,153	2,042	5,073	5,237	3,946	1,416	563	855	-
3	Fuel Inventory - No. 6 Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuel Inventory - Diesel	3,084,574	-	3,084,574	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Fuel Inventory - Gas Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Inventory/Supplies	973,460	271,183	480,406	-	10,403	107,800	29,988	4,649	8,228	20,125	20,742	6,370	5,972	2,788	4,807	-
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	2,937,705	813,022	1,480,636	-	26,527	268,854	87,310	14,862	26,306	65,358	67,468	50,843	18,248	7,254	11,018	-
8	Total Rate Base	59,483,005	15,610,278	31,499,782	-	510,873	5,180,196	1,677,239	285,039	504,543	1,253,213	1,293,640	965,609	350,259	139,651	212,684	-
9	Less: Rural Portion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Rate Base Available for Equity Return	59,483,005	15,610,278	31,499,782	-	510,873	5,180,196	1,677,239	285,039	504,543	1,253,213	1,293,640	965,609	350,259	139,651	212,684	-
11	Return on Debt	2,855,552	749,390	1,512,185	-	24,525	248,681	80,518	13,684	24,221	60,162	62,103	46,355	16,815	6,704	10,210	-
12	Return on Equity	1,075,679	282,293	569,636	-	9,239	93,678	30,331	5,155	9,124	22,663	23,394	17,462	6,334	2,525	3,846	-
13	Return on Rate Base	3,931,232	1,031,683	2,081,821	-	33,764	342,359	110,849	18,838	33,345	82,825	85,497	63,817	23,149	9,230	14,056	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Functional Classification of Rate Base (CONT'D.)

	1	18
Line No.	Description	Basis of Functional Classification
1	Average Net Book Value	Sch. 2.3 , L. 23
2	Cash Working Capital	Prorated on Average Net Book Value, L. 1
3	Fuel Inventory - No. 6 Fuel	
4	Fuel Inventory - Diesel	Production - Energy
5	Fuel Inventory - Gas Turbine	
6	Inventory/Supplies	Prorated on Total Plant in Service, Sch. 2.2, L. 23
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	Prorated on Average Net Book Value, L. 1
8	Total Rate Base	
9	Less: Rural Portion	
10	Rate Base Available for Equity Return	
11	Return on Debt	L.8 x Sch.1.1,p2,L.14
12	Return on Equity	L.10 x Sch.1.1,p2,L.17
13	Return on Rate Base	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Basis of Allocation to Classes of Service

Line No.	1 Description	2 Total Amount	3 Production Demand (CP kW)	4 Production and Transmission Energy (MWh @ Gen)	5 Transmission Demand (CP kW)	6 Distribution: Substations Demand (CP kW)	7 Primary Lines Demand (CP kW)	8 Primary Lines Customer (Rural Cust)	9 Line Transformers Demand (CP kW)	10 Line Transformers Customer (Rural Cust)	11 Secondary Lines Demand (CP kW)	12 Secondary Lines Customer (Rural Cust)	13 Services Customer (Wtd Rural Cust)	14 Meters Customer (Wtd Rural Cust)	15 Street Lighting Customer (Rural Cust)	16 Accounting Customer (Rural Cust)	17 Specifically Assigned Customer
	Amounts																
1	1.2 Domestic Diesel	-	4,715	22,197	4,715	4,562	4,562	2,070	4,330	2,070	4,330	2,070	2,070	2,070	-	2,070	-
2	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.1 GS 0-10 kW	-	738	4,466	738	714	714	416	677	416	677	416	781	781	-	416	-
5	2.2 GS 10-100 kW	-	2,023	12,284	2,023	1,957	1,957	139	1,857	139	1,857	139	665	665	-	139	-
6	2.3 GS 110-1,000 kVa	-	150	3,038	150	145	145	6	138	6	138	6	51	51	-	6	-
7	2.4 GS Over 1,000 kVa	-	93	2,607	93	90	90	1	86	1	86	1	8	8	-	1	-
8	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	4.1 Street and Area Lighting	-	80	319	80	77	77	83	74	83	74	83	-	-	83	83	-
11	4.1G Gov't Street and Area Lighting		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Total	-	7,799	44,912	7,799	7,545	7,545	2,715	7,162	2,715	7,162	2,715	3,575	3,575	83	2,715	-
	Ratios																
13	1.2 Domestic Diesel	-	0.6046	0.4942	0.6046	0.6046	0.6046	0.7624	0.6046	0.7624	0.6046	0.7624	0.5791	0.5791	-	0.7624	-
14	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	2.1 GS 0-10 kW	-	0.0946	0.0994	0.0946	0.0946	0.0946	0.1531	0.0946	0.1531	0.0946	0.1531	0.2184	0.2184	-	0.1531	-
17	2.2 GS 10-100 kW	-	0.2593	0.2735	0.2593	0.2593	0.2593	0.0514	0.2593	0.0514	0.2593	0.0514	0.1861	0.1861	-	0.0514	-
18	2.3 GS 110-1,000 kVa	-	0.0193	0.0676	0.0193	0.0193	0.0193	0.0022	0.0193	0.0022	0.0193	0.0022	0.0141	0.0141	-	0.0022	-
19	2.4 GS Over 1,000 kVa	-	0.0120	0.0581	0.0120	0.0120	0.0120	0.0004	0.0120	0.0004	0.0120	0.0004	0.0024	0.0024	-	0.0004	-
20	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4.1 Street and Area Lighting	-	0.0103	0.0071	0.0103	0.0103	0.0103	0.0306	0.0103	0.0306	0.0103	0.0306	-	-	1.0000	0.0306	-
23	4.1G Gov't Street and Area Lighting		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total	-	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Basis of Allocation to Classes of Service (CONT'D.)

Line No.	1 Description	18 Revenue Related Municipal Tax (Prior Year (Rural Revenues)	19 Revenue Related PUB Assessment (Prior Year (Revenues + RSP)
	Amounts		
1	1.2 Domestic Diesel	3,083,957	3,083,957
2	1.2G Government Domestic Diesel	-	-
3	1.23 Churches, Schools & Com Halls	-	-
4	2.1 GS 0-10 kW	1,096,168	1,096,168
5	2.2 GS 10-100 kW	1,957,521	1,957,521
6	2.3 GS 110-1,000 kVa	178,644	178,644
7	2.4 GS Over 1,000 kVa	240,507	240,507
8	2.5 GS Diesel	-	-
9	2.5G Gov't General Service Diesel	-	-
10	4.1 Street and Area Lighting	115,211	115,211
11	4.1G Gov't Street and Area Lighting	-	-
12	Total	6,672,008	6,672,008
	Ratios		
13	1.2 Domestic Diesel	0.4622	0.4622
14	1.2G Government Domestic Diesel	-	-
15	1.23 Churches, Schools & Com Halls	-	-
16	2.1 GS 0-10 kW	0.1643	0.1643
17	2.2 GS 10-100 kW	0.2934	0.2934
18	2.3 GS 110-1,000 kVa	0.0268	0.0268
19	2.4 GS Over 1,000 kVa	0.0360	0.0360
20	2.5 GS Diesel	-	-
21	2.5G Gov't General Service Diesel	-	-
22	4.1 Street and Area Lighting	0.0173	0.0173
23	4.1G Gov't Street and Area Lighting	-	-
24	Total	1.0000	1.0000

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Allocation of Functionalized Amounts to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Allocated Revenue Requirement Excluding Return																
1	1.2 Domestic Diesel	15,942,670	2,798,231	11,272,538	-	66,150	613,881	216,876	27,804	62,062	114,660	149,600	42,735	45,250	-	446,876	-
2	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.1 GS 0-10 kW	3,074,147	437,760	2,268,152	-	10,349	96,037	43,557	4,350	12,464	17,938	30,045	16,114	17,062	-	89,749	-
5	2.2 GS 10-100 kW	7,933,153	1,200,374	6,238,112	-	28,377	263,340	14,610	11,927	4,181	49,187	10,078	13,732	14,540	-	30,104	-
6	2.3 GS 110-1,000 kVa	1,667,599	89,137	1,542,596	-	2,107	19,555	629	886	180	3,652	434	1,043	1,104	-	1,295	-
7	2.4 GS Over 1,000 kVa	1,403,416	55,463	1,324,163	-	1,311	12,168	105	551	30	2,273	72	174	184	-	216	-
8	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	4.1 Street and Area Lighting	299,194	47,540	162,241	-	1,124	10,429	8,696	472	2,488	1,948	5,998	-	-	37,127	17,917	-
11	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Total	30,320,180	4,628,504	22,807,802	-	109,418	1,015,409	284,471	45,989	81,405	189,658	196,227	73,799	78,140	37,127	586,158	-
	Allocated Return on Debt and Equity																
13	1.2 Domestic Diesel	2,177,680	623,720	1,028,920	-	20,412	206,978	84,509	11,389	25,422	50,073	65,181	36,955	13,405	-	10,716	-
14	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	2.1 GS 0-10 kW	406,104	97,576	207,029	-	3,193	32,380	16,973	1,782	5,106	7,834	13,091	13,935	5,055	-	2,152	-
17	2.2 GS 10-100 kW	989,566	267,561	569,394	-	8,756	88,789	5,693	4,886	1,713	21,480	4,391	11,875	4,307	-	722	-
18	2.3 GS 110-1,000 kVa	171,640	19,868	140,803	-	650	6,593	245	363	74	1,595	189	902	327	-	31	-
19	2.4 GS Over 1,000 kVa	139,248	12,363	120,865	-	405	4,102	41	226	12	992	31	150	55	-	5	-
20	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4.1 Street and Area Lighting	46,993	10,596	14,809	-	347	3,516	3,388	193	1,019	851	2,613	-	-	9,230	430	-
23	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total	3,931,232	1,031,683	2,081,821	-	33,764	342,359	110,849	18,838	33,345	82,825	85,497	63,817	23,149	9,230	14,056	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line No.	Description	Municipal Tax ($)	PUB Assessment ($)	Basis of Proration
	Allocated Revenue Requirement Excluding Return			
1	1.2 Domestic Diesel	81,771	4,236	
2	1.2G Government Domestic Diesel	-	-	
3	1.23 Churches, Schools & Com Halls	-	-	
4	2.1 GS 0-10 kW	29,065	1,506	
5	2.2 GS 10-100 kW	51,903	2,689	
6	2.3 GS 110-1,000 kVa	4,737	245	
7	2.4 GS Over 1,000 kVa	6,377	330	
8	2.5 GS Diesel	-	-	
9	2.5G Gov't General Service Diesel	-	-	
10	4.1 Street and Area Lighting	3,055	158	
11	4.1G Gov't Street and Area Lighting	-	-	
12	Total	176,907	9,165	
	Allocated Return on Debt and Equity			
13	1.2 Domestic Diesel	-	-	
14	1.2G Government Domestic Diesel	-	-	
15	1.23 Churches, Schools & Com Halls	-	-	
16	2.1 GS 0-10 kW	-	-	
17	2.2 GS 10-100 kW	-	-	
18	2.3 GS 110-1,000 kVa	-	-	
19	2.4 GS Over 1,000 kVa	-	-	
20	2.5 GS Diesel	-	-	
21	2.5G Gov't General Service Diesel	-	-	
22	4.1 Street and Area Lighting	-	-	
23	4.1G Gov't Street and Area Lighting	-	-	
24	Total	-	-	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production and Transmission Energy ($)	5 Transmission Demand ($)	6 Distribution: Substations Demand ($)	7 Distribution: Primary Lines Demand ($)	8 Distribution: Primary Lines Customer ($)	9 Distribution: Line Transformers Demand ($)	10 Distribution: Line Transformers Customer ($)	11 Distribution: Secondary Lines Demand ($)	12 Distribution: Secondary Lines Customer ($)	13 Distribution: Services Customer ($)	14 Distribution: Meters Customer ($)	15 Distribution: Street Lighting Customer ($)	16 Accounting Customer ($)	17 Specifically Assigned Customer ($)
	Total Revenue Requirement																
1	1.2 Domestic Diesel	18,120,350	3,421,950	12,301,458	-	86,562	820,859	301,385	39,192	87,483	164,733	214,781	79,691	58,655	-	457,592	-
2	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.1 GS 0-10 kW	3,480,251	535,336	2,475,182	-	13,542	128,417	60,529	6,131	17,570	25,771	43,136	30,049	22,117	-	91,902	-
5	2.2 GS 10-100 kW	8,922,720	1,467,934	6,807,506	-	37,133	352,129	20,303	16,813	5,893	70,667	14,469	25,608	18,848	-	30,825	-
6	2.3 GS 110-1,000 kVa	1,839,239	109,005	1,683,399	-	2,757	26,148	874	1,248	254	5,248	623	1,945	1,431	-	1,326	-
7	2.4 GS Over 1,000 kVa	1,542,664	67,825	1,445,028	-	1,716	16,270	146	777	42	3,265	104	324	239	-	221	-
8	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	4.1 Street and Area Lighting	346,187	58,136	177,050	-	1,471	13,946	12,084	666	3,508	2,799	8,612	-	-	46,357	18,347	-
11	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Total	34,251,411	5,660,187	24,889,623	-	143,181	1,357,769	395,320	64,828	114,750	272,483	281,724	137,616	101,289	46,357	600,214	-
	Re-classification of Revenue-Related																
13	1.2 Domestic Diesel	(0)	16,320	58,667	-	413	3,915	1,437	187	417	786	1,024	380	280	-	2,182	-
14	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	2.1 GS 0-10 kW	(0)	4,744	21,935	-	120	1,138	536	54	156	228	382	266	196	-	814	-
17	2.2 GS 10-100 kW	0	9,037	41,907	-	229	2,168	125	103	36	435	89	158	116	-	190	-
18	2.3 GS 110-1,000 kVa	0	296	4,572	-	7	71	2	3	1	14	2	5	4	-	4	-
19	2.4 GS Over 1,000 kVa	-	296	6,310	-	7	71	1	3	0	14	0	1	1	-	1	-
20	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4.1 Street and Area Lighting	-	545	1,659	-	14	131	113	6	33	26	81	-	-	434	172	-
23	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total	(0)	31,237	135,050	-	790	7,493	2,215	358	643	1,504	1,578	811	597	434	3,363	-
	Total Allocated Revenue Requirement																
25	1.2 Domestic Diesel	18,120,350	3,438,270	12,360,125	-	86,975	824,774	302,822	39,379	87,901	165,519	215,806	80,071	58,934	-	459,775	-
26	1.2G Government Domestic Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	1.23 Churches, Schools & Com Halls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	2.1 GS 0-10 kW	3,480,251	540,080	2,497,116	-	13,662	129,555	61,066	6,186	17,726	26,000	43,518	30,315	22,313	-	92,716	-
29	2.2 GS 10-100 kW	8,922,720	1,476,971	6,849,413	-	37,362	354,297	20,428	16,916	5,930	71,102	14,558	25,765	18,964	-	31,015	-
30	2.3 GS 110-1,000 kVa	1,839,239	109,301	1,687,971	-	2,765	26,219	876	1,252	254	5,262	624	1,950	1,435	-	1,330	-
31	2.4 GS Over 1,000 kVa	1,542,664	68,122	1,451,338	-	1,723	16,341	146	780	42	3,279	104	326	240	-	222	-
32	2.5 GS Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	2.5G Gov't General Service Diesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	4.1 Street and Area Lighting	346,187	58,681	178,709	-	1,484	14,076	12,197	672	3,541	2,825	8,692	-	-	46,791	18,519	-
35	4.1G Gov't Street and Area Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	Total	34,251,411	5,691,424	25,024,672	-	143,972	1,365,262	397,535	65,185	115,393	273,986	283,302	138,426	101,886	46,791	603,577	-

Schedule 3.2C
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Isolated
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line No.	Description	Municipal Tax ($)	PUB Assessment ($)	Basis of Proration
	Total Revenue Requirement			
1	1.2 Domestic Diesel	81,771	4,236	
2	1.2G Government Domestic Diesel	-	-	
3	1.23 Churches, Schools & Com Halls	-	-	
4	2.1 GS 0-10 kW	29,065	1,506	
5	2.2 GS 10-100 kW	51,903	2,689	
6	2.3 GS 110-1,000 kVa	4,737	245	
7	2.4 GS Over 1,000 kVa	6,377	330	
8	2.5 GS Diesel	-	-	
9	2.5G Gov't General Service Diesel	-	-	
10	4.1 Street and Area Lighting	3,055	158	
11	4.1G Gov't Street and Area Lighting	-	-	
12	Total	176,907	9,165	
	Re-classification of Revenue-Related			
13	1.2 Domestic Diesel	(81,771)	(4,236)	Re-classification to demand, energy and customer is based on rate class revenue
14	1.2G Government Domestic Diesel	-	-	requirements excluding revenue-related items.
15	1.23 Churches, Schools & Com Halls	-	-	
16	2.1 GS 0-10 kW	(29,065)	(1,506)	
17	2.2 GS 10-100 kW	(51,903)	(2,689)	
18	2.3 GS 110-1,000 kVa	(4,737)	(245)	
19	2.4 GS Over 1,000 kVa	(6,377)	(330)	
20	2.5 GS Diesel	-	-	
21	2.5G Gov't General Service Diesel	-	-	
22	4.1 Street and Area Lighting	(3,055)	(158)	
23	4.1G Gov't Street and Area Lighting	-	-	
24	Total	(176,907)	(9,165)	
	Total Allocated Revenue Requirement			
25	1.2 Domestic Diesel	-	-	
26	1.2G Government Domestic Diesel	-	-	
27	1.23 Churches, Schools & Com Halls	-	-	
28	2.1 GS 0-10 kW	-	-	
29	2.2 GS 10-100 kW	-	-	
30	2.3 GS 110-1,000 kVa	-	-	
31	2.4 GS Over 1,000 kVa	-	-	
32	2.5 GS Diesel	-	-	
33	2.5G Gov't General Service Diesel	-	-	
34	4.1 Street and Area Lighting	-	-	
35	4.1G Gov't Street and Area Lighting	-	-	
36	Total	-	-	

Schedule 2.1D
Page 1 of 2

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Revenue Requirement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											
				Production and			Primary Lines		Line Transformers		Secondary Lines						Specifically
Line		Total	Production	Transmission	Transmission	Substations							Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Expenses																
1	Operating & Maintenance	1,553,095	637,476	-	-	6,320	372,974	109,499	17,130	30,321	68,595	73,269	16,100	22,670	6,616	115,819	-
2	Fuels	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Fuels-Diesel	585,108	-	585,108	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuels-Gas Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Power Purchases -CF(L)Co	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Power Purchases-Other	2,657,696	-	2,657,696	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Depreciation	435,508	228,343	-	-	3,269	90,626	27,424	8,849	15,664	14,532	16,595	6,599	13,827	4,945	4,835	-
	Expense Credits																
8	Sundry	(7,777)	(3,192)	-	-	(32)	(1,868)	(548)	(86)	(152)	(343)	(367)	(81)	(114)	(33)	(580)	-
9	Building Rental Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Tax Refunds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Suppliers' Discounts	(1,212)	(497)	-	-	(5)	(291)	(85)	(13)	(24)	(54)	(57)	(13)	(18)	(5)	(90)	-
12	Pole Attachments	(69,837)	-	-	-	-	(40,390)	(13,803)	-	-	(7,149)	(8,494)	-	-	-	-	-
13	Secondary Energy Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Wheeling Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Application Fees	(412)	-	-	-	-	-	-	-	-	-	-	-	-	-	(412)	-
16	Meter Test Revenues	(110)	-	-	-	-	-	-	-	-	-	-	-	(110)	-	-	-
17	Total Expense Credits	(79,348)	(3,689)	-	-	(37)	(42,549)	(14,437)	(99)	(175)	(7,546)	(8,918)	(93)	(241)	(38)	(1,082)	-
18	Subtotal Expenses	5,152,059	862,129	3,242,804	-	9,553	421,052	122,485	25,880	45,810	75,581	80,945	22,606	36,255	11,523	119,573	-
19	Disposal Gain / Loss	70,800	33,389	-	-	504	18,097	5,551	1,098	1,943	2,939	3,369	2,093	1,135	314	368	-
20	Subtotal Revenue Requirement Ex. Return	5,222,859	895,518	3,242,804	-	10,057	439,149	128,036	26,978	47,753	78,520	84,314	24,700	37,390	11,837	119,941	-
21	Return on Debt	549,258	257,774	2,126	-	3,866	140,130	42,946	8,456	14,969	22,819	26,121	15,994	8,756	2,431	2,871	-
22	Return on Equity	206,904	97,103	801	-	1,456	52,787	16,177	3,186	5,639	8,596	9,840	6,025	3,298	916	1,082	-
23	Total Revenue Requirement	5,979,022	1,250,395	3,245,731	-	15,379	632,066	187,160	38,620	68,360	109,934	120,274	46,719	49,445	15,183	123,893	-

Schedule 2.1D
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Revenue Requirement (CONT'D.)

	1	18	19	20
		Revenue Related		
Line No.	Description	Municipal Tax ($)	PUB Assessment ($)	Basis of Functional Classification
	Expenses			
1	Operating & Maintenance	72,546	3,758	Carryforward from Sch.2.4 L.24
2	Fuels	-	-	Production - Energy
3	Fuels-Diesel	-	-	Production - Energy
4	Fuels-Gas Turbine	-	-	Production - Energy
5	Power Purchases -CF(L)Co	-	-	
6	Power Purchases-Other	-	-	Carryforward from Sch.4.4 L.13
7	Depreciation	-	-	Carryforward from Sch.2.5 L.23
	Expense Credits			
8	Sundry	(363)	(19)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
9	Building Rental Income	-	-	Prorated on Production, Transmission & Distribution Plant - Sch.2.2 L.17
10	Tax Refunds	-	-	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
11	Suppliers' Discounts	(57)	(3)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
12	Pole Attachments	-	-	Prorated on Distribution Poles - Sch.4.1 L.37
13	Secondary Energy Revenues	-	-	Production - Energy
14	Wheeling Revenues	-	-	Transmission - Demand, Energy ratios Sch.4.1 L.16
15	Application Fees	-	-	Accounting - Customer
16	Meter Test Revenues	-	-	Meters - Customer
17	Total Expense Credits	(420)	(22)	
18	Subtotal Expenses	72,126	3,737	
19	Disposal Gain / Loss	-	-	Prorated on Total Net Book Value - Sch.2.3 L.23
20	Subtotal Revenue Requirement Ex. Return	72,126	3,737	
21	Return on Debt	-	-	Prorated on Rate Base - Sch.2.6 L.8
22	Return on Equity	-	-	Prorated on Rate Base - Sch.2.6 L.10
23	Total Revenue Requirement	72,126	3,737	

Schedule 2.2D
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Plant in Service for the Allocation of O&M Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lightin	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Diesel	8,253,654	8,253,654	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	8,253,654	8,253,654	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	153,816	66,299	-	-	87,518	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	66,393	-	-	-	-	50,057	6,377	-	-	5,806	4,153	-	-	-	-	-
8	Poles	7,062,374	-	-	-	-	4,084,510	1,395,892	-	-	722,961	859,011	-	-	-	-	-
9	Primary Conductor & Equipment	1,278,301	-	-	-	-	1,133,853	144,448	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	670,272	-	-	-	-	-	-	241,968	428,304	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	411,959	-	-	-	-	-	-	-	-	240,172	171,787	-	-	-	-	-
13	Services	227,423	-	-	-	-	-	-	-	-	-	-	227,423	-	-	-	-
14	Meters	267,499	-	-	-	-	-	-	-	-	-	-	-	267,499	-	-	-
15	Street Lighting	93,455	-	-	-	-	-	-	-	-	-	-	-	-	93,455	-	-
16	Subtotal Distribution	10,231,494	66,299	-	-	87,518	5,268,420	1,546,717	241,968	428,304	968,939	1,034,950	227,423	267,499	93,455	-	-
17	Subttl Prod, Trans, & Dist	18,485,147	8,319,952	-	-	87,518	5,268,420	1,546,717	241,968	428,304	968,939	1,034,950	227,423	267,499	93,455	-	-
18	General	1,621,900	685,657	-	-	6,712	404,063	118,626	18,558	32,849	74,313	79,376	17,442	25,322	7,168	151,814	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	37,306	16,791	-	-	177	10,632	3,121	488	864	1,955	2,089	459	540	189	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Plant	20,144,353	9,022,400	-	-	94,407	5,683,116	1,668,465	261,014	462,017	1,045,208	1,116,415	245,324	293,361	100,812	151,814	-

Schedule 2.2D
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Plant in Service for the Allocation of O&M Expense (CONT'D.)

	1	18
Line No.	Description	Basis of Functional Classification
	Production	
1	Diesel	Production - Demand, Energy ratios Sch.4.1 L.8
2	Subtotal Production	
	Transmission	
3	Lines	Production, Transmission - Demand; Distribution - Primary Demand; Spec Assigned - Custmr
4	Terminal Stations	Production, Transmission - Demand; Spec Assigned - Custmr
5	Subtotal Transmission	
	Distribution	
6	Substation Structures & Equipment	Production - Demand; Dist Substns - Demand
7	Land & Land Improvements	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.32
8	Poles	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.37
9	Primary Conductor & Equipment	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.38
10	Submarine Conductor	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.39
11	Transformers	Transformers - Demand, Customer - zero intercept ratios Sch.4.1 L.40
12	Secondary Conductors & Equipment	Secondary - Demand, Customer - zero intercept ratios Sch. 4.1 L.41
13	Services	Services Customer
14	Meters	Meters - Customer
15	Street Lighting	Street Lighting - Customer
16	Subtotal Distribution	
17	Subttl Prod, Trans, & Dist	
18	General	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - Sch.2.4 L.11, 12
19	Telecontrol - Specific	Specifically Assigned - Customer
20	Feasibility Studies	Production, Transmission - Demand
21	Software - General	Prorated on subtotal Production, Transmission, & Distribution plant - L.17
22	Software - Cust Acctng	Customer Accounting
23	Total Plant	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Net Book Value

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production and Transmission Energy ($)	5 Transmission Demand ($)	6 Distribution: Substations Demand ($)	7 Distribution: Primary Lines Demand ($)	8 Distribution: Primary Lines Customer ($)	9 Distribution: Line Transformers Demand ($)	10 Distribution: Line Transformers Customer ($)	11 Distribution: Secondary Lines Demand ($)	12 Distribution: Secondary Lines Customer ($)	13 Distribution: Services Customer ($)	14 Distribution: Meters Customer ($)	15 Distribution: Street Lighting Customer ($)	16 Accounting Customer ($)	17 Specifically Assigned Customer ($)
	Production																
1	Diesel	4,695,369	4,695,369	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	4,695,369	4,695,369	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	85,750	13,428	-	-	72,322	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	19,937	-	-	-	-	15,032	1,915	-	-	1,744	1,247	-	-	-	-	-
8	Poles	3,690,889	-	-	-	-	2,134,618	729,512	-	-	377,829	448,930	-	-	-	-	-
9	Primary Conductor & Equipment	440,736	-	-	-	-	390,933	49,803	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	432,823	-	-	-	-	-	-	156,249	276,574	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	51,198	-	-	-	-	-	-	-	-	29,849	21,350	-	-	-	-	-
13	Services	304,411	-	-	-	-	-	-	-	-	-	-	304,411	-	-	-	-
14	Meters	159,346	-	-	-	-	-	-	-	-	-	-	-	159,346	-	-	-
15	Street Lighting	43,987	-	-	-	-	-	-	-	-	-	-	-	-	43,987	-	-
16	Subtotal Distribution	5,229,078	13,428	-	-	72,322	2,540,583	781,230	156,249	276,574	409,421	471,527	304,411	159,346	43,987	-	-
17	Subttl Prod, Trans, & Dist	9,924,446	4,708,797	-	-	72,322	2,540,583	781,230	156,249	276,574	409,421	471,527	304,411	159,346	43,987	-	-
18	General	585,888	247,684	-	-	2,425	145,962	42,852	6,704	11,866	26,845	28,673	6,301	9,147	2,589	54,841	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	30,288	14,371	-	-	221	7,754	2,384	477	844	1,250	1,439	929	486	134	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Net Book Value	10,540,623	4,970,851	-	-	74,967	2,694,298	826,466	163,430	289,284	437,515	501,639	311,641	168,979	46,711	54,841	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Operating & Maintenance Expense

Line No.	Description	Total Amount ($)	Production Demand ($)	Production and Transmission Energy ($)	Transmission Demand ($)	Distribution: Substations Demand ($)	Distribution: Primary Lines Demand ($)	Distribution: Primary Lines Customer ($)	Distribution: Line Transformers Demand ($)	Distribution: Line Transformers Customer ($)	Distribution: Secondary Lines Demand ($)	Distribution: Secondary Lines Customer ($)	Distribution: Services Customer ($)	Distribution: Meters Customer ($)	Distribution: Street Lighting Customer ($)	Accounting Customer ($)	Specifically Assigned Customer ($)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Production																
1	Diesel	360,321	360,321	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Other	44,529	44,529	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	404,850	404,850	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Transmission Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
8	Other	454,593	3,025	-	-	3,993	240,364	70,567	11,039	19,541	44,206	47,218	10,376	-	4,264	-	-
9	Meters	15,063	-	-	-	-	-	-	-	-	-	-	-	15,063	-	-	-
10	Subtotal Distribution	469,656	3,025	-	-	3,993	240,364	70,567	11,039	19,541	44,206	47,218	10,376	15,063	4,264	-	-
11	Subttl Prod, Trans, & Dist	874,506	407,874	-	-	3,993	240,364	70,567	11,039	19,541	44,206	47,218	10,376	15,063	4,264	-	-
12	Customer Accounting	90,309	-	-	-	-	-	-	-	-	-	-	-	-	-	90,309	-
	Administrative & General:																
	Plant-Related:																
13	Production	91,127	91,127	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Distribution	113,348	734	-	-	970	58,365	17,135	2,681	4,745	10,734	11,466	2,519	2,963	1,035	-	-
16	Prod, Trans, Distn Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Prod,Trans, Distn & General Plt	3,074	1,377	-	-	14	867	255	40	71	159	170	37	45	15	23	-
18	Property Insurance	14,284	12,826	-	-	134	575	169	26	47	106	113	25	36	10	216	-
	Revenue Related:																
19	Municipal Tax	72,546	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	PUB Assessment	3,758	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	All Expense-Related	269,981	114,134	-	-	1,117	67,260	19,746	3,089	5,468	12,370	13,213	2,903	4,215	1,193	25,271	-
22	Prod, Trans, and Distn Expense-Related	20,162	9,404	-	-	92	5,542	1,627	255	451	1,019	1,089	239	347	98	-	-
23	Subtotal Admin & General	588,280	229,602	-	-	2,328	132,610	38,932	6,091	10,781	24,389	26,050	5,724	7,607	2,352	25,510	-
24	Total Operating & Maintenance Expenses	1,553,095	637,476	-	-	6,320	372,974	109,499	17,130	30,321	68,595	73,269	16,100	22,670	6,616	115,819	-

Schedule 2.4D
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Operating & Maintenance Expense (CONT'D.)

	1	18	19	20
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Production			
1	Diesel	-	-	Production - Demand, Energy ratios Sch.4.1 L8
2	Other	-	-	Production - Demand, Energy ratios Sch.4.1 L8
3	Subtotal Production	-	-	
	Transmission			
4	Transmission Lines	-	-	Prorated on Transmission Lines Plant in Service - Sch.2.2 L.3
5	Terminal Stations	-	-	Prorated on Transmission Terminal Stations Plant in Service - Sch.2.2 L.4
6	Other	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.5
7	Subtotal Transmission	-	-	
	Distribution			
8	Other	-	-	Prorated on Distribution Plant, excluding Meters - Sch. 2.2 L. 16, less L. 14
9	Meters	-	-	Meters - Customer
10	Subtotal Distribution	-	-	
11	Subttl Prod, Trans, & Dist	-	-	
12	Customer Accounting	-	-	Accounting - Customer
	Administrative & General:			
	Plant-Related:			
13	Production	-	-	Prorated on Production Plant in Service - Sch.2.2 L.2
14	Transmission	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.5
15	Distribution	-	-	Prorated on Distribution Plant in Service - Sch.2.2 L.16
16	Prod, Trans, Distn Plant	-	-	Prorated on Production, Transmission & Distribution Plant in Service - Sch.2.2 L.17
17	Prod,Trans, Distn & General Plt	-	-	Prorated on Production, Transmission, Distribution & General Plant in Service - Sch.2.2 L.23
18	Property Insurance	-	-	Prorated on Prod., Trans. Terminal, Dist. Sub & General Plant in Service - Sch.2.2 L.2, 4, 6, 18 - 19
	Revenue Related:			
19	Municipal Tax	72,546	-	Revenue-related
20	PUB Assessment	-	3,758	Revenue-related
21	All Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - L.11, 12
22	Prod, Trans, and Distn Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution Expenses - L.11
23	Subtotal Admin & General	72,546	3,758	
24	Total Operating & Maintenance Expenses	72,546	3,758	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Depreciation Expense

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production and Transmission Energy ($)	5 Transmission Demand ($)	6 Distribution: Substations Demand ($)	7 Primary Lines Demand ($)	8 Primary Lines Customer ($)	9 Line Transformers Demand ($)	10 Line Transformers Customer ($)	11 Secondary Lines Demand ($)	12 Secondary Lines Customer ($)	13 Services Customer ($)	14 Meters Customer ($)	15 Street Lighting Customer ($)	16 Accounting Customer ($)	17 Specifically Assigned Customer ($)
	Production																
1	Diesel	202,525	202,525	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Subtotal Production	202,525	202,525	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
3	Lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Terminal Stations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Subtotal Transmission	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
6	Substation Structures & Equipment	3,432	429	-	-	3,003	-	-	-	-	-	-	-	-	-	-	-
7	Land & Land Improvements	505	-	-	-	-	381	48	-	-	44	32	-	-	-	-	-
8	Poles	108,921	-	-	-	-	62,994	21,528	-	-	11,150	13,248	-	-	-	-	-
9	Primary Conductor & Equipment	14,707	-	-	-	-	13,045	1,662	-	-	-	-	-	-	-	-	-
10	Submarine Conductor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Transformers	22,483	-	-	-	-	-	-	8,116	14,366	-	-	-	-	-	-	-
12	Secondary Conductors & Equipment	1,306	-	-	-	-	-	-	-	-	762	545	-	-	-	-	-
13	Services	5,940	-	-	-	-	-	-	-	-	-	-	5,940	-	-	-	-
14	Meters	12,796	-	-	-	-	-	-	-	-	-	-	-	12,796	-	-	-
15	Street Lighting	4,636	-	-	-	-	-	-	-	-	-	-	-	-	4,636	-	-
16	Subtotal Distribution	174,725	429	-	-	3,003	76,420	23,239	8,116	14,366	11,956	13,825	5,940	12,796	4,636	-	-
17	Subtotal Prod Tran & Dist	377,250	202,954	-	-	3,003	76,420	23,239	8,116	14,366	11,956	13,825	5,940	12,796	4,636	-	-
18	General	51,660	21,839	-	-	214	12,870	3,778	591	1,046	2,367	2,528	556	807	228	4,835	-
19	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Software - General	6,599	3,550	-	-	53	1,337	406	142	251	209	242	104	224	81	-	-
22	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Total Depreciation Expense	435,508	228,343	-	-	3,269	90,626	27,424	8,849	15,664	14,532	16,595	6,599	13,827	4,945	4,835	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Rate Base

Line No.	Description (1)	Total Amount ($) (2)	Production Demand ($) (3)	Production and Transmission Energy ($) (4)	Transmission Demand ($) (5)	Distribution: Substations Demand ($) (6)	Primary Lines Demand ($) (7)	Primary Lines Customer ($) (8)	Line Transformers Demand ($) (9)	Line Transformers Customer ($) (10)	Secondary Lines Demand ($) (11)	Secondary Lines Customer ($) (12)	Services Customer ($) (13)	Meters Customer ($) (14)	Street Lighting Customer ($) (15)	Accounting Customer ($) (16)	Specifically Assigned Customer ($) (17)
1	Average Net Book Value	10,540,623	4,970,851	-	-	74,967	2,694,298	826,466	163,430	289,284	437,515	501,639	311,641	168,979	46,711	54,841	-
2	Cash Working Capital	45,990	21,688	-	-	327	11,755	3,606	713	1,262	1,909	2,189	1,360	737	204	239	-
3	Fuel Inventory - No. 6 Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuel Inventory - Diesel	44,283	-	44,283	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Fuel Inventory - Gas Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Inventory/Supplies	217,976	97,629	-	-	1,022	61,495	18,054	2,824	4,999	11,310	12,080	2,655	3,174	1,091	1,643	-
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	592,531	279,432	-	-	4,214	151,457	46,459	9,187	16,262	24,595	28,199	17,519	9,499	2,626	3,083	-
8	Total Rate Base	11,441,402	5,369,600	44,283	-	80,530	2,919,006	894,585	176,154	311,808	475,328	544,108	333,174	182,390	50,631	59,805	-
9	Less: Rural Portion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Rate Base Available for Equity Return	11,441,402	5,369,600	44,283	-	80,530	2,919,006	894,585	176,154	311,808	475,328	544,108	333,174	182,390	50,631	59,805	-
11	Return on Debt	549,258	257,774	2,126	-	3,866	140,130	42,946	8,456	14,969	22,819	26,121	15,994	8,756	2,431	2,871	-
12	Return on Equity	206,904	97,103	801	-	1,456	52,787	16,177	3,186	5,639	8,596	9,840	6,025	3,298	916	1,082	-
13	Return on Rate Base	756,162	354,877	2,927	-	5,322	192,917	59,123	11,642	20,607	31,414	35,960	22,019	12,054	3,346	3,953	-

Schedule 2.6D
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Functional Classification of Rate Base (CONT'D.)

	1	18
Line No.	Description	Basis of Functional Classification
1	Average Net Book Value	Sch. 2.3 , L. 23
2	Cash Working Capital	Prorated on Average Net Book Value, L. 1
3	Fuel Inventory - No. 6 Fuel	
4	Fuel Inventory - Diesel	Production - Energy
5	Fuel Inventory - Gas Turbine	
6	Inventory/Supplies	Prorated on Total Plant in Service, Sch. 2.2, L. 23
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	Prorated on Average Net Book Value, L. 1
8	Total Rate Base	
9	Less: Rural Portion	
10	Rate Base Available for Equity Return	
11	Return on Debt	L.8 x Sch.1.1,p2,L.14
12	Return on Equity	L.10 x Sch.1.1,p2,L.17
13	Return on Rate Base	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Basis of Allocation to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
			(CP kW)	(MWh @ Gen)	(CP kW)	(CP kW)	(CP kW)	(Rural Cust)	(CP kW)	(Rural Cust)	(CP kW)	(Rural Cust)	(Wtd Rural Cust)			(Rural Cust)	
	Amounts																
1	1.1 Domestic Diesel	-	1,199	4,441	1,199	1,141	1,141	407	1,053	407	1,053	407	407	407	-	407	-
2	1.12 Domestic All Electric	-	2,844	11,369	2,844	2,704	2,704	386	2,497	386	2,497	386	386	386	-	386	-
3	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.2 GS 10-100 kW	-	1,411	6,942	1,411	1,341	1,341	209	1,239	209	1,239	209	997	997	-	209	-
5	2.3 GS 110-1,000 kVa	-	246	2,055	246	234	234	5	216	5	216	5	42	42	-	5	-
6	4.1 Street and Area Lighting	-	36	146	36	35	35	33	32	33	32	33	-	-	1	33	-
7	Total	-	5,736	24,953	5,736	5,455	5,455	1,040	5,037	1,040	5,037	1,040	1,832	1,832	1	1,040	0
	Ratios																
8	1.1 Domestic Diesel	-	0.2091	0.1780	0.2091	0.2091	0.2091	0.3915	0.2091	0.3915	0.2091	0.3915	0.2222	0.2222	-	0.3915	-
9	1.12 Domestic All Electric	-	0.4958	0.4556	0.4958	0.4958	0.4958	0.3713	0.4958	0.3713	0.4958	0.3713	0.2107	0.2107	-	0.3713	-
10	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	2.2 GS 10-100 kW	-	0.2459	0.2782	0.2459	0.2459	0.2459	0.2011	0.2459	0.2011	0.2459	0.2011	0.5442	0.5442	-	0.2011	-
12	2.3 GS 110-1,000 kVa	-	0.0428	0.0824	0.0428	0.0428	0.0428	0.0048	0.0428	0.0048	0.0428	0.0048	0.0230	0.0230	-	0.0048	-
13	4.1 Street and Area Lighting	-	0.0064	0.0059	0.0064	0.0064	0.0064	0.0313	0.0064	0.0313	0.0064	0.0313	-	-	1.0000	0.0313	-
14	Total	-	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000

Schedule 3.1D
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Basis of Allocation to Classes of Service (CONT'D.)

	1	18	19
		Revenue Related	
Line No.	Description	Municipal Tax (Prior Year (Rural Revenues)	PUB Assessment (Prior Year (Revenues + RSP)
	Amounts		
1	1.1 Domestic Diesel	570,211	570,211
2	1.12 Domestic All Electric	1,122,691	1,122,691
3	2.1 GS 0-10 kW	-	-
4	2.2 GS 10-100 kW	709,945	709,945
5	2.3 GS 110-1,000 kVa	272,034	272,034
6	4.1 Street and Area Lighting	45,335	45,335
7	Total	2,720,217	2,720,217
	Ratios		
8	1.1 Domestic Diesel	0.2096	0.2096
9	1.12 Domestic All Electric	0.4127	0.4127
10	2.1 GS 0-10 kW	-	-
11	2.2 GS 10-100 kW	0.2610	0.2610
12	2.3 GS 110-1,000 kVa	0.1000	0.1000
13	4.1 Street and Area Lighting	0.0167	0.0167
14	Total	1.0000	1.0000

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Allocation of Functionalized Amounts to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmsn	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Allocated Revenue Requirement Excluding Return																
1	1.1 Domestic Diesel	1,058,834	187,256	577,091	-	2,103	91,828	50,131	5,641	18,697	16,419	33,012	5,487	8,306	-	46,961	-
2	1.12 Domestic All Electric	2,381,951	443,981	1,477,443	-	4,986	217,722	47,544	13,375	17,732	38,929	31,309	5,204	7,878	-	44,538	-
3	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.2 GS 10-100 kW	1,388,808	220,228	902,168	-	2,473	107,997	25,743	6,634	9,601	19,310	16,952	13,441	20,347	-	24,115	-
5	2.3 GS 110-1,000 kVa	340,070	38,364	267,102	-	431	18,813	616	1,156	230	3,364	406	568	859	-	577	-
6	4.1 Street and Area Lighting	53,195	5,689	18,999	-	64	2,790	4,003	171	1,493	499	2,636	-	-	11,837	3,750	-
7	Total	5,222,859	895,518	3,242,804	-	10,057	439,149	128,036	26,978	47,753	78,520	84,314	24,700	37,390	11,837	119,941	-
	Allocated Return on Debt and Equity																
8	1.1 Domestic Diesel	179,597	74,206	521	-	1,113	40,340	23,149	2,434	8,068	6,569	14,080	4,892	2,678	-	1,548	-
9	1.12 Domestic All Electric	348,511	175,941	1,333	-	2,639	95,645	21,954	5,772	7,652	15,575	13,353	4,639	2,540	-	1,468	-
10	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	2.2 GS 10-100 kW	190,024	87,272	814	-	1,309	47,443	11,887	2,863	4,143	7,726	7,230	11,982	6,560	-	795	-
12	2.3 GS 110-1,000 kVa	27,139	15,203	241	-	228	8,264	284	499	99	1,346	173	506	277	-	19	-
13	4.1 Street and Area Lighting	10,891	2,255	17	-	34	1,226	1,848	74	644	200	1,124	-	-	3,346	124	-
14	Total	756,162	354,877	2,927	-	5,322	192,917	59,123	11,642	20,607	31,414	35,960	22,019	12,054	3,346	3,953	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line No.	Description	Municipal Tax ($)	PUB Assessment ($)	Basis of Proration
	Allocated Revenue Requirement Excluding Return			
1	1.1 Domestic Diesel	15,119	783	
2	1.12 Domestic All Electric	29,768	1,542	
3	2.1 GS 0-10 kW	-	-	
4	2.2 GS 10-100 kW	18,824	975	
5	2.3 GS 110-1,000 kVa	7,213	374	
6	4.1 Street and Area Lighting	1,202	62	
7	Total	72,126	3,737	
	Allocated Return on Debt and Equity			
8	1.1 Domestic Diesel	-	-	
9	1.12 Domestic All Electric	-	-	
10	2.1 GS 0-10 kW	-	-	
11	2.2 GS 10-100 kW	-	-	
12	2.3 GS 110-1,000 kVa	-	-	
13	4.1 Street and Area Lighting	-	-	
14	Total	-	-	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Production and		Distribution											Specifically
Line		Total	Production	Transmission	Transmsn	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Total Revenue Requirement																
1	1.1 Domestic Diesel	1,238,431	261,462	577,612	-	3,216	132,167	73,279	8,076	26,765	22,988	47,091	10,379	10,984	-	48,509	-
2	1.12 Domestic All Electric	2,730,462	619,923	1,478,777	-	7,625	313,367	69,498	19,147	25,384	54,503	44,662	9,843	10,418	-	46,006	-
3	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.2 GS 10-100 kW	1,578,832	307,500	902,982	-	3,782	155,439	37,630	9,497	13,744	27,035	24,182	25,423	26,906	-	24,910	-
5	2.3 GS 110-1,000 kVa	367,210	53,566	267,343	-	659	27,077	900	1,654	329	4,710	579	1,074	1,136	-	596	-
6	4.1 Street and Area Lighting	64,087	7,944	19,016	-	98	4,015	5,852	245	2,137	698	3,760	-	-	15,183	3,874	-
7	Total	5,979,022	1,250,395	3,245,731	-	15,379	632,066	187,160	38,620	68,360	109,934	120,274	46,719	49,445	15,183	123,893	-
	Re-classification of Revenue-Related																
8	1.1 Domestic Diesel	0	3,401	7,513	-	42	1,719	953	105	348	299	613	135	143	-	631	-
9	1.12 Domestic All Electric	0	7,191	17,154	-	88	3,635	806	222	294	632	518	114	121	-	534	-
10	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	2.2 GS 10-100 kW	-	3,905	11,468	-	48	1,974	478	121	175	343	307	323	342	-	316	-
12	2.3 GS 110-1,000 kVa	-	1,130	5,640	-	14	571	19	35	7	99	12	23	24	-	13	-
13	4.1 Street and Area Lighting	0	160	383	-	2	81	118	5	43	14	76	-	-	306	78	-
14	Total	0	15,787	42,158	-	194	7,980	2,374	488	867	1,388	1,526	595	629	306	1,572	-
	Total Allocated Revenue Requirement																
15	1.1 Domestic Diesel	1,238,431	264,863	585,126	-	3,258	133,886	74,233	8,181	27,114	23,287	47,704	10,514	11,127	-	49,140	-
16	1.12 Domestic All Electric	2,730,462	627,114	1,495,931	-	7,713	317,002	70,305	19,369	25,679	55,136	45,180	9,958	10,538	-	46,539	-
17	2.1 GS 0-10 kW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	2.2 GS 10-100 kW	1,578,832	311,405	914,450	-	3,830	157,413	38,108	9,618	13,919	27,379	24,489	25,746	27,248	-	25,226	-
19	2.3 GS 110-1,000 kVa	367,210	54,696	272,983	-	673	27,649	919	1,689	336	4,809	591	1,096	1,160	-	608	-
20	4.1 Street and Area Lighting	64,087	8,104	19,399	-	100	4,096	5,969	250	2,180	712	3,836	-	-	15,488	3,951	-
21	Total	5,979,022	1,266,182	3,287,888	-	15,573	640,046	189,534	39,107	69,228	111,322	121,800	47,314	50,074	15,488	125,465	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
L'Anse au Loup
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line No.	Description	Municipal Tax ($)	PUB Assessment ($)	Basis of Proration
	Total Revenue Requirement			
1	1.1 Domestic Diesel	15,119	783	
2	1.12 Domestic All Electric	29,768	1,542	
3	2.1 GS 0-10 kW	-	-	
4	2.2 GS 10-100 kW	18,824	975	
5	2.3 GS 110-1,000 kVa	7,213	374	
6	4.1 Street and Area Lighting	1,202	62	
7	Total	72,126	3,737	
	Re-classification of Revenue-Related			
8	1.1 Domestic Diesel	(15,119)	(783)	Re-classification to demand, energy and customer is based on rate class revenue
9	1.12 Domestic All Electric	(29,768)	(1,542)	requirements excluding revenue-related items.
10	2.1 GS 0-10 kW	-	-	
11	2.2 GS 10-100 kW	(18,824)	(975)	
12	2.3 GS 110-1,000 kVa	(7,213)	(374)	
13	4.1 Street and Area Lighting	(1,202)	(62)	
14	Total	(72,126)	(3,737)	
	Total Allocated Revenue Requirement			
15	1.1 Domestic Diesel	-	-	
16	1.12 Domestic All Electric	-	-	
17	2.1 GS 0-10 kW	-	-	
18	2.2 GS 10-100 kW	-	-	
19	2.3 GS 110-1,000 kVa	-	-	
20	4.1 Street and Area Lighting	-	-	
21	Total	-	-	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Revenue Requirement

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Expenses																
1	Operating & Maintenance	11,386,683	929,391	-	4,358,963	731,647	1,406,185	370,108	303,926	537,973	194,820	215,515	94,319	196,626	42,076	1,500,513	-
2	Fuels	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Fuels-Diesel	74,521	74,521	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuels-Gas Turbine	199,303	199,303	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Power Purchases -CF(L)Co	1,856,851	542,700	1,314,151	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Power Purchases-Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Depreciation	3,487,229	381,913	-	685,269	677,730	510,461	147,314	215,856	382,084	87,306	95,339	50,365	121,115	45,450	87,027	-
	Expense Credits																
8	Sundry	(57,018)	(4,654)	-	(21,827)	(3,664)	(7,041)	(1,853)	(1,522)	(2,694)	(976)	(1,079)	(472)	(985)	(211)	(7,514)	-
9	Building Rental Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Tax Refunds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Suppliers' Discounts	(8,883)	(725)	-	(3,400)	(571)	(1,097)	(289)	(237)	(420)	(152)	(168)	(74)	(153)	(33)	(1,171)	-
12	Pole Attachments	(255,733)	-	-	-	-	(147,903)	(50,546)	-	-	(26,179)	(31,105)	-	-	-	-	-
13	Secondary Energy Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Wheeling Revenues	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Application Fees	(13,016)	-	-	-	-	-	-	-	-	-	-	-	-	-	(13,016)	-
16	Meter Test Revenues	(943)	-	-	-	-	-	-	-	-	-	-	-	(943)	-	-	-
17	Total Expense Credits	(335,593)	(5,379)	-	(25,228)	(4,234)	(156,041)	(52,688)	(1,759)	(3,114)	(27,306)	(32,353)	(546)	(2,081)	(244)	(21,700)	-
18	Subtotal Expenses	16,668,993	2,122,449	1,314,151	5,019,004	1,405,143	1,760,605	464,733	518,023	916,944	254,819	278,502	144,138	315,660	87,282	1,565,840	-
19	Disposal Gain / Loss	41,737	3,617	-	7,297	8,159	8,190	2,377	2,260	4,000	1,491	1,596	1,134	742	213	662	-
20	Subtotal Revenue Requirement Ex. Return	16,710,730	2,126,065	1,314,151	5,026,301	1,413,302	1,768,795	467,111	520,283	920,943	256,311	280,098	145,272	316,401	87,495	1,566,502	-
21	Return on Debt	4,440,963	403,457	-	776,847	860,330	869,198	251,913	238,904	422,881	157,614	168,748	119,292	78,678	22,703	70,398	-
22	Return on Equity	1,672,899	151,981	-	292,636	324,084	327,425	94,895	89,995	159,298	59,373	63,567	44,937	29,638	8,552	26,519	-
23	Total Revenue Requirement	22,824,593	2,681,503	1,314,151	6,095,783	2,597,716	2,965,417	813,918	849,182	1,503,122	473,298	512,413	309,501	424,717	118,750	1,663,419	-

Schedule 2.1E
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NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Revenue Requirement (CONT'D.)

	1	18	19	20
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Expenses			
1	Operating & Maintenance	480,471	24,151	Carryforward from Sch.2.4 L.24
2	Fuels	-	-	
3	Fuels-Diesel	-	-	Production - Demand
4	Fuels-Gas Turbine	-	-	Production - Demand
5	Power Purchases -CF(L)Co	-	-	Carryforward from Sch.4.4 L.9
6	Power Purchases-Other	-	-	Carryforward from Sch.4.4 L.10
7	Depreciation	-	-	Carryforward from Sch.2.5 L.24
	Expense Credits			
8	Sundry	(2,406)	(121)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
9	Building Rental Income	-	-	Prorated on Production, Transmission & Distribution Plant - Sch.2.2 L.18
10	Tax Refunds	-	-	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
11	Suppliers' Discounts	(375)	(19)	Prorated on Total Operating & Maintenance Expenses - Sch 2.4 L.24
12	Pole Attachments	-	-	Prorated on Distribution Poles - Sch.4.1 L.37
13	Secondary Energy Revenues	-	-	Production - Energy
14	Wheeling Revenues	-	-	Transmission - Demand, Energy ratios Sch.4.1 L.16
15	Application Fees	-	-	Accounting - Customer
16	Meter Test Revenues	-	-	Meters - Customer
17	Total Expense Credits	(2,781)	(140)	
18	Subtotal Expenses	477,690	24,011	
19	Disposal Gain / Loss	-	-	Prorated on Total Net Book Value - Sch.2.3 L.24
20	Subtotal Revenue Requirement Ex. Return	477,690	24,011	
21	Return on Debt	-	-	Prorated on Rate Base - Sch.2.6 L.8
22	Return on Equity	-	-	Prorated on Rate Base - Sch.2.6 L.10
23	Total Revenue Requirement	477,690	24,011	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Plant in Service for the Allocation of O&M Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Gas Turbines	23,666,030	23,666,030	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Diesel	3,323,334	3,323,334	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	26,989,364	26,989,364	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Lines	17,100,852	-	-	17,100,852	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	18,092,147	-	-	6,420,032	11,672,115	-	-	-	-	-	-	-	-	-	-	-
6	Subtotal Transmission	35,192,999	-	-	23,520,884	11,672,115	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
7	Substations	5,667,946	-	-	-	5,667,946	-	-	-	-	-	-	-	-	-	-	-
8	Land & Land Improvements	1,083,634	-	-	-	-	817,006	104,083	-	-	94,764	67,781	-	-	-	-	-
9	Poles	30,428,760	-	-	-	-	17,598,412	6,014,305	-	-	3,114,931	3,701,111	-	-	-	-	-
10	Primary Conductor & Eqpt	9,200,174	-	-	-	-	8,160,554	1,039,620	-	-	-	-	-	-	-	-	-
11	Submarine Conductor	620,108	-	-	-	-	620,108	-	-	-	-	-	-	-	-	-	-
12	Transformers	16,282,605	-	-	-	-	-	-	5,878,020	10,404,585	-	-	-	-	-	-	-
13	Secondary Conductor&Eqpt	957,432	-	-	-	-	-	-	-	-	558,183	399,249	-	-	-	-	-
14	Services	1,824,154	-	-	-	-	-	-	-	-	-	-	1,824,154	-	-	-	-
15	Meters	2,288,365	-	-	-	-	-	-	-	-	-	-	-	2,288,365	-	-	-
16	Street Lighting	813,762	-	-	-	-	-	-	-	-	-	-	-	-	813,762	-	-
17	Subtotal Distribution	69,166,939	-	-	-	5,667,946	27,196,080	7,158,008	5,878,020	10,404,585	3,767,878	4,168,141	1,824,154	2,288,365	813,762	-	-
18	Subttl Prod, Trans, & Dist	131,349,302	26,989,364	-	23,520,884	17,340,061	27,196,080	7,158,008	5,878,020	10,404,585	3,767,878	4,168,141	1,824,154	2,288,365	813,762	-	-
19	General	16,334,186	1,039,489	-	7,136,203	899,853	1,912,135	503,274	413,279	731,538	264,917	293,059	128,255	297,178	57,215	2,657,793	-
20	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Software - General	265,081	54,468	-	47,468	34,995	54,885	14,446	11,863	20,998	7,604	8,412	3,681	4,618	1,642	-	-
23	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total Plant	147,948,569	28,083,321	-	30,704,555	18,274,908	29,163,100	7,675,728	6,303,162	11,157,121	4,040,398	4,469,612	1,956,091	2,590,160	872,619	2,657,793	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Plant in Service for the Allocation of O&M Expense (CONT'D.)

Line No.	1 Description	18 Basis of Functional Classification
	Production	
1	Gas Turbines	Production - Demand, Energy ratios Sch.4.1 L.9
2	Diesel	Production - Demand, Energy ratios Sch.4.1 L.9
3	Subtotal Production	
	Transmission	
4	Lines	Production, Transmission - Demand; Distribution - Primary Demand; Spec Assigned - Custmr
5	Terminal Stations	Production, Transmission - Demand; Spec Assigned - Custmr
6	Subtotal Transmission	
	Distribution	
7	Substations	Production - Demand; Dist Substns - Demand
8	Land & Land Improvements	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.32
9	Poles	Primary, Secondary - Demand, Customer - zero intercept ratios Sch.4.1 L.37
10	Primary Conductor & Eqpt	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.38
11	Submarine Conductor	Primary - Demand, Customer - zero intercept ratios Sch.4.1 L.39
12	Transformers	Transformers - Demand, Customer - zero intercept ratios Sch.4.1 L.40
13	Secondary Conductor&Eqpt	Secondary - Demand, Customer - zero intercept ratios Sch. 4.1 L.41
14	Services	Services Customer
15	Meters	Meters - Customer
16	Street Lighting	Street Lighting - Customer
17	Subtotal Distribution	
18	Subttl Prod, Trans, & Dist	
19	General	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - Sch2.4 L.11, 12
20	Telecontrol - Specific	Specifically Assigned - Customer
21	Feasibility Studies	Production, Transmission - Demand
22	Software - General	Prorated on subtotal Production, Transmission, & Distribution plant - L.18
23	Software - Cust Acctng	
24	Total Plant	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Net Book Value

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Gas Turbines	6,276,550	6,276,550	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Diesel	580,257	580,257	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	6,856,807	6,856,807	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Lines	7,907,366	-	-	7,907,366	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	18,265,060	-	-	3,363,187	14,901,873	-	-	-	-	-	-	-	-	-	-	-
6	Subtotal Transmission	26,172,426	-	-	11,270,553	14,901,873	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
7	Substations	1,300,884	-	-	-	1,300,884	-	-	-	-	-	-	-	-	-	-	-
8	Land & Land Improvements	482,081	-	-	-	-	363,465	46,304	-	-	42,158	30,154	-	-	-	-	-
9	Poles	21,235,511	-	-	-	-	12,281,515	4,197,241	-	-	2,173,837	2,582,918	-	-	-	-	-
10	Primary Conductor & Eqpt	3,143,393	-	-	-	-	2,788,189	355,203	-	-	-	-	-	-	-	-	-
11	Submarine Conductor	317,759	-	-	-	-	317,759	-	-	-	-	-	-	-	-	-	-
12	Transformers	12,198,757	-	-	-	-	-	-	4,403,751	7,795,006	-	-	-	-	-	-	-
13	Secondary Conductor&Eqpt	1,191,190	-	-	-	-	-	-	-	-	694,464	496,726	-	-	-	-	-
14	Services	2,250,759	-	-	-	-	-	-	-	-	-	-	2,250,759	-	-	-	-
15	Meters	1,363,148	-	-	-	-	-	-	-	-	-	-	-	1,363,148	-	-	-
16	Street Lighting	406,579	-	-	-	-	-	-	-	-	-	-	-	-	406,579	-	-
17	Subtotal Distribution	43,890,061	-	-	-	1,300,884	15,750,928	4,598,748	4,403,751	7,795,006	2,910,459	3,109,798	2,250,759	1,363,148	406,579	-	-
18	Subttl Prod, Trans, & Dist	76,919,294	6,856,807	-	11,270,553	16,202,757	15,750,928	4,598,748	4,403,751	7,795,006	2,910,459	3,109,798	2,250,759	1,363,148	406,579	-	-
19	General	8,331,016	530,176	-	3,639,717	458,957	975,257	256,688	210,787	373,110	135,117	149,470	65,415	151,571	29,182	1,355,569	-
20	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Software - General	234,749	20,926	-	34,396	49,449	48,070	14,035	13,440	23,789	8,882	9,491	6,869	4,160	1,241	-	-
23	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total Net Book Value	85,485,059	7,407,910	-	14,944,667	16,711,163	16,774,255	4,869,471	4,627,978	8,191,906	3,054,458	3,268,759	2,323,043	1,518,879	437,002	1,355,569	-

Schedule 2.4E
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Operating & Maintenance Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Gas Turbine / Diesel	390,996	390,996	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Other	59,743	59,743	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	450,738	450,738	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Transmission Lines	2,894,754	-	-	2,894,754	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	252,281	-	-	89,522	162,758	-	-	-	-	-	-	-	-	-	-	-
6	Other	164,722	-	-	110,091	54,632	-	-	-	-	-	-	-	-	-	-	-
7	Subtotal Transmission	3,311,757	-	-	3,094,366	217,390	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
8	Other	2,038,937	-	-	-	172,800	829,131	218,227	179,204	317,206	114,872	127,075	55,613	-	24,809	-	-
9	Meters	128,861	-	-	-	-	-	-	-	-	-	-	-	128,861	-	-	-
10	Subtotal Distribution	2,167,798	-	-	-	172,800	829,131	218,227	179,204	317,206	114,872	127,075	55,613	128,861	24,809	-	-
11	Subttl Prod, Trans, & Dist	5,930,293	450,738	-	3,094,366	390,190	829,131	218,227	179,204	317,206	114,872	127,075	55,613	128,861	24,809	-	-
12	Customer Accounting	1,152,459	-	-	-	-	-	-	-	-	-	-	-	-	-	1,152,459	-
	Administrative & General:																
	Plant-Related:																
13	Production	179,997	179,997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Transmission	228,756	-	-	152,886	75,869	-	-	-	-	-	-	-	-	-	-	-
15	Distribution	500,419	-	-	-	41,007	196,762	51,788	42,527	75,277	27,260	30,156	13,198	16,556	5,888	-	-
16	Prod, Trans, Distn Plant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	Prod, Trans, Distn & General Plt	601,388	114,154	-	124,809	74,285	118,543	31,201	25,621	45,352	16,424	18,168	7,951	10,529	3,547	10,804	-
18	Property Insurance	104,909	43,833	-	21,200	28,524	2,990	787	646	1,144	414	458	201	465	89	4,156	-
	Revenue-Related:																
19	Municipal Tax	480,471	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	PUB Assessment	24,151	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	All Expense-Related	2,047,118	130,276	-	894,360	112,776	239,643	63,074	51,795	91,682	33,201	36,728	16,074	37,244	7,171	333,094	-
22																	
	Prod,Trans & Distn Expense-Related	136,723	10,392	-	71,341	8,996	19,116	5,031	4,132	7,313	2,648	2,930	1,282	2,971	572	-	-
23	Subtotal Admin & General	4,303,931	478,652	-	1,264,597	341,457	577,054	151,881	124,721	220,767	79,948	88,441	38,705	67,765	17,267	348,054	-
24	Total Operating & Maintenance Expenses	11,386,683	929,391	-	4,358,963	731,647	1,406,185	370,108	303,926	537,973	194,820	215,515	94,319	196,626	42,076	1,500,513	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Operating & Maintenance Expense (CONT'D.)

	1	18	19	20
		Revenue Related		
Line No.	Description	Municipal Tax	PUB Assessment	Basis of Functional Classification
	Production			
1	Gas Turbine / Diesel	-	-	Production - Demand, Energy ratios Sch.4.1 L.9
2	Other	-	-	Production - Demand, Energy ratios Sch.4.1 L.9
3	Subtotal Production	-	-	
	Transmission			
4	Transmission Lines	-	-	Prorated on Transmission Lines Plant in Service - Sch.2.2 L.4
5	Terminal Stations	-	-	Prorated on Transmission Terminal Stations Plant in Service - Sch.2.2 L.5
6	Other	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L.6
7	Subtotal Transmission	-	-	
	Distribution			
8	Other	-	-	Prorated on Distribution Plant, excluding Meters - Sch. 2.2 L. 17, less L. 15
9	Meters	-	-	Meters - Customer
10	Subtotal Distribution	-	-	
11	Subttl Prod, Trans, & Dist	-	-	
12	Customer Accounting	-	-	Accounting - Customer
	Administrative & General:			
	Plant-Related:			
13	Production	-	-	Prorated on Production Plant in Service - Sch.2.2 L.3
14	Transmission	-	-	Prorated on Transmission Plant in Service - Sch.2.2 L. 6
15	Distribution	-	-	Prorated on Distribution Plant in Service - Sch.2.2 L.17
16	Prod, Trans, Distn Plant	-	-	Prorated on Production, Transmission, Distribution Plant in Service - Sch.2.2 L. 18
17	Prod, Trans, Distn & General Plt	-	-	Prorated on Production, Transmission, Distribution & General Plant in Service - Sch.2.2 L.24
18	Property Insurance	-	-	Prorated on Prod., Trans. Terminal, Dist. Sub & General Plant in Service - Sch.2.2 L.3, 5, 7, 19 - 20
	Revenue-Related:			
19	Municipal Tax	480,471	-	Revenue-related
20	PUB Assessment	-	24,151	Revenue-related
21	All Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution, Accounting Expenses - L 11, 12
22	Prod,Trans & Distn Expense-Related	-	-	Prorated on Subtotal Production, Transmission, Distribution Expenses - L.11
23	Subtotal Admin & General	480,471	24,151	
24	Total Operating & Maintenance Expenses	480,471	24,151	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Depreciation Expense

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
	Production																
1	Gas Turbines	320,518	320,518	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Diesel	21,377	21,377	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Subtotal Production	341,896	341,896	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Transmission																
4	Lines	318,196	-	-	318,196	-	-	-	-	-	-	-	-	-	-	-	-
5	Terminal Stations	693,857	-	-	125,641	568,216	-	-	-	-	-	-	-	-	-	-	-
6	Subtotal Transmission	1,012,053	-	-	443,837	568,216	-	-	-	-	-	-	-	-	-	-	-
	Distribution																
7	Substations	68,905	-	-	-	68,905	-	-	-	-	-	-	-	-	-	-	-
8	Land & Land Improvements	14,988	-	-	-	-	11,300	1,440	-	-	1,311	937	-	-	-	-	-
9	Poles	598,894	-	-	-	-	346,369	118,373	-	-	61,308	72,845	-	-	-	-	-
10	Primary Conductor & Eqpt	77,637	-	-	-	-	68,864	8,773	-	-	-	-	-	-	-	-	-
11	Submarine Conductor	13,618	-	-	-	-	13,618	-	-	-	-	-	-	-	-	-	-
12	Transformers	550,820	-	-	-	-	-	-	198,846	351,974	-	-	-	-	-	-	-
13	Secondary Conductor&Eqpt	25,148	-	-	-	-	-	-	-	-	14,661	10,487	-	-	-	-	-
14	Services	45,372	-	-	-	-	-	-	-	-	-	-	45,372	-	-	-	-
15	Meters	109,470	-	-	-	-	-	-	-	-	-	-	-	109,470	-	-	-
16	Street Lighting	42,827	-	-	-	-	-	-	-	-	-	-	-	-	42,827	-	-
17	Subtotal Distribution	1,547,678	-	-	-	68,905	440,151	128,585	198,846	351,974	77,280	84,269	45,372	109,470	42,827	-	-
18	Subttl Prod, Trans, & Dist	2,901,627	341,896	-	443,837	637,121	440,151	128,585	198,846	351,974	77,280	84,269	45,372	109,470	42,827	-	-
19	General	534,848	34,037	-	233,669	29,465	62,611	16,479	13,532	23,954	8,674	9,596	4,200	9,731	1,873	87,027	-
20	Telecontrol - Specific	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Feasibility Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Software - General	50,753	5,980	-	7,763	11,144	7,699	2,249	3,478	6,156	1,352	1,474	794	1,915	749	-	-
23	Software - Cust Acctng	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Total Depreciation Expense	3,487,229	381,913	-	685,269	677,730	510,461	147,314	215,856	382,084	87,306	95,339	50,365	121,115	45,450	87,027	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Rate Base

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
1	Average Net Book Value	85,485,059	7,407,910	-	14,944,667	16,711,163	16,774,255	4,869,471	4,627,978	8,191,906	3,054,458	3,268,759	2,323,043	1,518,879	437,002	1,355,569	-
2	Cash Working Capital	372,978	32,321	-	65,205	72,912	73,187	21,246	20,192	35,742	13,327	14,262	10,136	6,627	1,907	5,914	-
3	Fuel Inventory - No. 6 Fuel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Fuel Inventory - Diesel	37,715	37,715	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Fuel Inventory - Gas Turbine	206,011	206,011	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Inventory/Supplies	1,600,905	303,881	-	332,244	197,747	315,565	83,057	68,205	120,728	43,720	48,364	21,166	28,027	9,442	28,759	-
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	4,805,463	416,429	-	840,101	939,402	942,949	273,733	260,157	460,500	171,704	183,750	130,588	85,382	24,566	76,202	-
8	Total Rate Base	92,508,130	8,404,266	-	16,182,217	17,921,224	18,105,957	5,247,506	4,976,532	8,808,876	3,283,208	3,515,136	2,484,932	1,638,916	472,916	1,466,445	-
9	Less: Rural Portion	-															
10	Rate Base Available for Equity Return	92,508,130	8,404,266	-	16,182,217	17,921,224	18,105,957	5,247,506	4,976,532	8,808,876	3,283,208	3,515,136	2,484,932	1,638,916	472,916	1,466,445	-
11	Return on Debt	4,440,963	403,457	-	776,847	860,330	869,198	251,913	238,904	422,881	157,614	168,748	119,292	78,678	22,703	70,398	-
12	Return on Equity	1,672,899	151,981	-	292,636	324,084	327,425	94,895	89,995	159,298	59,373	63,567	44,937	29,638	8,552	26,519	-
13	Return on Rate Base	6,113,862	555,438	-	1,069,483	1,184,414	1,196,623	346,808	328,899	582,179	216,987	232,315	164,229	108,316	31,255	96,917	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Functional Classification of Rate Base (CONT'D.)

	1	18
Line No.	Description	Basis of Functional Classification
1	Average Net Book Value	Sch. 2.3 , L. 24
2	Cash Working Capital	Prorated on Average Net Book Value, L. 1
3	Fuel Inventory - No. 6 Fuel	
4	Fuel Inventory - Diesel	Production - Demand
5	Fuel Inventory - Gas Turbine	Production - Demand
6	Inventory/Supplies	Prorated on Total Plant in Service, Sch. 2.2, L. 24
7	Deferred Charges: Foreign Exchange Loss and Regulatory Costs	Prorated on Average Net Book Value, L. 1
8	Total Rate Base	
9	Less: Rural Portion	
10	Rate Base Available for Equity Return	
11	Return on Debt	L.8 x Sch.1.1,p2,L.14
12	Return on Equity	L.10 x Sch.1.1,p2,L.17
13	Return on Rate Base	

Schedule 3.1E
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Basis of Allocation to Classes of Service

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Amounts		(CP kW)	(MWh @ Gen)	(CP kW)	(CP kW)	(CP kW)	(Rural Cust)	(CP kW)	(Rural Cust)	(CP kW)	(Rural Cust)	(Wtd Rural Cust)			(Rural Cust)	
1	CFB - Goose Bay Secondary	-	-	10,973	-	-	-	-	-	-	-	-	-	-	-	-	-
2	IOCC Firm	-	273,606	1,925,673	243,000	-	-	1	-	-	-	-	-	-	-	-	-
3	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																
4	1.1Domestic	-	662	2,462	588	569	569	360	540	360	540	360	360	360	-	360	-
5	1.1A Domestic All Electric	-	83,785	356,271	74,412	72,008	72,008	9,442	68,372	9,442	68,372	9,442	9,442	9,442		9,442	
6	2.1GS 0-10 kW	-	1,355	7,536	1,203	1,164	1,164	515	1,105	515	1,105	515	967	967	-	515	-
7	2.2GS 10-100 kW	-	17,297	84,020	15,362	14,866	14,866	728	14,032	728	14,032	728	3,470	3,470	-	728	-
8	2.3GS 110-1,000 kVa	-	27,494	129,670	24,418	23,629	23,629	164	22,029	164	22,029	164	1,383	1,383	-	164	-
9	2.4GS Over 1,000 kVa	-	27,058	158,274	24,031	23,255	23,255	6	15,536	6	15,536	6	51	51	-	6	-
10	4.1Street and Area Lighting	-	521	2,021	463	448	448	385	425	385	425	385	-	-	1	385	-
11	Subtotal Rural		158,171	740,254	140,477	135,938	135,938	11,600	122,039	11,600	122,039	11,600	15,673	15,673	1	11,600	-
12	Total Labrador Interconnected		431,777	2,676,900	383,477	135,938	135,938	11,601	122,039	11,600	122,039	11,600	15,673	15,673	1	11,600	-
	Ratios																
13	CFB - Goose Bay Boiler	-	-	0.0041	-	-	-	-	-	-	-	-	-	-	-	-	-
14	IOCC Firm	-	0.6337	0.7194	0.6337	-	-	0.0001	-	-	-	-	-	-	-	-	-
15	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																
16	1.1Domestic	-	0.0015	0.0009	0.0015	0.0042	0.0042	0.0310	0.0044	0.0310	0.0044	0.0310	0.0230	0.0230	-	0.0310	-
17	1.1A Domestic All Electric	-	0.1940	0.1331	0.1940	0.5297	0.5297	0.8139	0.5602	0.8140	0.5602	0.8140	0.6025	0.6025	-	0.8140	-
18	2.1GS 0-10 kW	-	0.0031	0.0028	0.0031	0.0086	0.0086	0.0444	0.0091	0.0444	0.0091	0.0444	0.0617	0.0617	-	0.0444	-
19	2.2GS 10-100 kW	-	0.0401	0.0314	0.0401	0.1094	0.1094	0.0627	0.1150	0.0627	0.1150	0.0627	0.2214	0.2214	-	0.0627	-
20	2.3GS 110-1,000 kVa	-	0.0637	0.0484	0.0637	0.1738	0.1738	0.0142	0.1805	0.0142	0.1805	0.0142	0.0882	0.0882	-	0.0142	-
21	2.4GS Over 1,000 kVa	-	0.0627	0.0591	0.0627	0.1711	0.1711	0.0005	0.1273	0.0005	0.1273	0.0005	0.0032	0.0032	-	0.0005	-
22	4.1Street and Area Lighting	-	0.0012	0.0008	0.0012	0.0033	0.0033	0.0332	0.0035	0.0332	0.0035	0.0332	-	-	1.0000	0.0332	-
23	Subtotal Rural		0.3663	0.2765	0.3663	1.0000	1.0000	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-
24	Total Labrador Interconnected		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-
	Ratios Excluding IOCC																
25	CFB - Goose Bay Boiler	-	-	0.0146	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural																
26	1.1Domestic	-	0.0042	0.0033	0.0042	0.0042	0.0042	0.0310	0.0044	0.0310	0.0044	0.0310	0.0230	0.0230	-	0.0310	-
27	1.1A Domestic All Electric	-	0.5297	0.4743	0.5297	0.5297	0.5297	0.8140	0.5602	0.8140	0.5602	0.8140	0.6025	0.6025	-	0.8140	-
28	2.1GS 0-10 kW	-	0.0086	0.0100	0.0086	0.0086	0.0086	0.0444	0.0091	0.0444	0.0091	0.0444	0.0617	0.0617	-	0.0444	-
29	2.2GS 10-100 kW	-	0.1094	0.1118	0.1094	0.1094	0.1094	0.0627	0.1150	0.0627	0.1150	0.0627	0.2214	0.2214	-	0.0627	-
30	2.3GS 110-1,000 kVa	-	0.1738	0.1726	0.1738	0.1738	0.1738	0.0142	0.1805	0.0142	0.1805	0.0142	0.0882	0.0882	-	0.0142	-
31	2.4GS Over 1,000 kVa	-	0.1711	0.2107	0.1711	0.1711	0.1711	0.0005	0.1273	0.0005	0.1273	0.0005	0.0032	0.0032	-	0.0005	-
32	4.1Street and Area Lighting	-	0.0033	0.0027	0.0033	0.0033	0.0033	0.0332	0.0035	0.0332	0.0035	0.0332	-	-	1.0000	0.0332	-
33	Subtotal Rural		1.0000	0.9854	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-
34	Total Labrador Interconnected		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	-

NEWFOUNDLAND & LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Basis of Allocation to Classes of Service (CONT'D.)

Line No.		18	19
		Revenue Related	
		Municipal Tax (Prior Year (Rural Revenues)	PUB Assessment (Prior Year (Revenues + RSP)
	Amounts		
1	CFB - Goose Bay Secondary	-	333,112
2	IOCC Firm	-	-
3	IOCC Non-Firm	-	-
		-	-
	Rural		
4	1.1Domestic	102,994	102,994
5	1.1A Domestic All Electric	10,056,863	10,056,863
6	2.1GS 0-10 kW	398,087	398,087
7	2.2GS 10-100 kW	2,191,392	2,191,392
8	2.3GS 110-1,000 kVa	2,999,815	2,999,815
9	2.4GS Over 1,000 kVa	1,974,167	1,104,411
10	4.1Street and Area Lighting	292,637	292,637
11	Subtotal Rural	18,015,954	17,146,198
12	Total Labrador Interconnected	18,015,954	17,479,310
	Ratios		
13	CFB - Goose Bay Boiler	-	0.0191
14	IOCC Firm	-	-
15	IOCC Non-Firm	-	-
		-	-
	Rural		
16	1.1Domestic	0.0057	0.0059
17	1.1A Domestic All Electric	0.5582	0.5754
18	2.1GS 0-10 kW	0.0221	0.0228
19	2.2GS 10-100 kW	0.1216	0.1254
20	2.3GS 110-1,000 kVa	0.1665	0.1716
21	2.4GS Over 1,000 kVa	0.1096	0.0632
22	4.1Street and Area Lighting	0.0162	0.0167
23	Subtotal Rural	1.0000	0.9809
24	Total Labrador Interconnected	1.0000	1.0000
	Ratios Excluding IOCC		
25	CFB - Goose Bay Boiler	-	0.0191
		-	-
	Rural		
26	1.1Domestic	0.0057	0.0059
27	1.1A Domestic All Electric	0.5582	0.5754
28	2.1GS 0-10 kW	0.0221	0.0228
29	2.2GS 10-100 kW	0.1216	0.1254
30	2.3GS 110-1,000 kVa	0.1665	0.1716
31	2.4GS Over 1,000 kVa	0.1096	0.0632
32	4.1Street and Area Lighting	0.0162	0.0167
33	Subtotal Rural	1.0000	0.9809
34	Total Labrador Interconnected	1.0000	1.0000

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Allocation of Functionalized Amounts to Classes of Service

Line No.	1 Description	2 Total Amount ($)	3 Production Demand ($)	4 Production Energy ($)	5 Transmission Demand ($)	6 Distribution Substations Demand ($)	7 Distribution Primary Lines Demand ($)	8 Distribution Primary Lines Customer ($)	9 Distribution Line Transformers Demand ($)	10 Distribution Line Transformers Customer ($)	11 Distribution Secondary Lines Demand ($)	12 Distribution Secondary Lines Customer ($)	13 Distribution Services Customer ($)	14 Distribution Meters Customer ($)	15 Distribution Street Lighting Customer ($)	16 Accounting Customer ($)	17 Specifically Assigned Customer ($)
	Allocated Rev Reqmt Excl Return																
1	CFB - Goose Bay Boiler	19,653	-	19,196	-	-	-	-	-	-	-	-	-	-	-	-	-
2	IOCC Firm	4,188,421	1,003,339	-	3,185,041	-	-	40	-	-	-	-	-	-	-	-	-
3	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural:																
4	1.1Domestic	147,331	4,699	4,307	7,706	5,915	7,403	14,496	2,303	28,582	1,135	8,693	3,337	7,268	-	48,617	-
5	1.1A Domestic All Electric	7,505,497	594,720	623,238	975,335	748,641	936,950	380,187	291,487	749,632	143,597	227,995	87,520	190,617	-	1,275,106	-
6	2.1GS 0-10 kW	256,046	9,615	13,182	15,769	12,104	15,148	20,737	4,713	40,888	2,322	12,436	8,962	19,520	-	69,549	-
7	2.2GS 10-100 kW	1,274,584	122,776	146,980	201,351	154,552	193,427	29,293	59,823	57,759	29,471	17,567	32,167	70,058	-	98,246	-
8	2.3GS 110-1,000 kVa	1,605,550	195,157	226,837	320,055	245,666	307,459	6,614	93,913	13,040	46,265	3,966	12,818	27,918	-	22,181	-
9	2.4GS Over 1,000 kVa	1,484,157	192,063	276,875	314,981	241,771	302,584	242	66,232	476	32,628	145	468	1,020	-	810	-
10	4.1Street and Area Lighting	229,492	3,697	3,535	6,063	4,654	5,824	15,502	1,812	30,566	893	9,297	-	-	87,495	51,993	-
11	Subtotal Rural	12,502,656	1,122,726	1,294,955	1,841,259	1,413,302	1,768,795	467,070	520,283	920,943	256,311	280,098	145,272	316,401	87,495	1,566,502	-
12	Total	16,710,730	2,126,065	1,314,151	5,026,301	1,413,302	1,768,795	467,111	520,283	920,943	256,311	280,098	145,272	316,401	87,495	1,566,502	-
	Allocated Return on Debt																
13	CFB - Goose Bay Boiler	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	IOCC Firm	747,951	255,661	-	492,268	-	-	22	-	-	-	-	-	-	-	-	-
15	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural:																
16	1.1Domestic	43,714	619	-	1,191	3,601	3,638	7,817	1,057	13,124	698	5,237	2,740	1,807	-	2,185	-
17	1.1A Domestic All Electric	2,230,513	78,289	-	150,744	455,726	460,424	205,035	133,846	344,218	88,303	137,358	71,868	47,400	-	57,303	-
18	2.1GS 0-10 kW	74,896	1,266	-	2,437	7,368	7,444	11,183	2,164	18,775	1,428	7,492	7,360	4,854	-	3,126	-
19	2.2GS 10-100 kW	383,161	16,162	-	31,120	94,081	95,051	15,798	27,470	26,522	18,123	10,583	26,414	17,421	-	4,415	-
20	2.3GS 110-1,000 kVa	477,773	25,691	-	49,467	149,546	151,087	3,567	43,123	5,988	28,450	2,389	10,526	6,942	-	997	-
21	2.4GS Over 1,000 kVa	421,420	25,283	-	48,682	147,175	148,692	130	30,412	219	20,064	87	385	254	-	36	-
22	4.1Street and Area Lighting	61,536	487	-	937	2,833	2,862	8,360	832	14,036	549	5,601	-	-	22,703	2,337	-
23	Subtotal Rural	3,693,012	147,796	-	284,578	860,330	869,198	251,891	238,904	422,881	157,614	168,748	119,292	78,678	22,703	70,398	-
24	Total	4,440,963	403,457	-	776,847	860,330	869,198	251,913	238,904	422,881	157,614	168,748	119,292	78,678	22,703	70,398	-
	Allocated Return on Equity																
25	CFB - Goose Bay Boiler	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	IOCC Firm	281,751	96,307	-	185,436	-	-	8	-	-	-	-	-	-	-	-	-
27	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural:																
28	1.1Domestic	16,467	233	-	449	1,356	1,370	2,945	398	4,944	263	1,973	1,032	681	-	823	-
29	1.1A Domestic All Electric	840,229	29,491	-	56,785	171,671	173,440	77,236	50,419	129,666	33,264	51,742	27,072	17,855	-	21,586	-
30	2.1GS 0-10 kW	28,213	477	-	918	2,776	2,804	4,213	815	7,072	538	2,822	2,772	1,828	-	1,177	-
31	2.2GS 10-100 kW	144,336	6,088	-	11,723	35,440	35,806	5,951	10,348	9,991	6,827	3,987	9,950	6,562	-	1,663	-
32	2.3GS 110-1,000 kVa	179,976	9,678	-	18,634	56,334	56,914	1,344	16,244	2,256	10,717	900	3,965	2,615	-	376	-
33	2.4GS Over 1,000 kVa	158,748	9,524	-	18,338	55,440	56,012	49	11,456	82	7,558	33	145	96	-	14	-
34	4.1Street and Area Lighting	23,180	183	-	353	1,067	1,078	3,149	313	5,287	207	2,110	-	-	8,552	880	-
35	Subtotal Rural	1,391,148	55,674	-	107,200	324,084	327,425	94,887	89,995	159,298	59,373	63,567	44,937	29,638	8,552	26,519	-
36	Total	1,672,899	151,981	-	292,636	324,084	327,425	94,895	89,995	159,298	59,373	63,567	44,937	29,638	8,552	26,519	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line		Municipal	PUB	
No.	Description	Tax	Assessment	Basis of Proration
	Allocated Rev Reqmt Excl Return	($)	($)	
1	CFB - Goose Bay Boiler	-	458	
2	IOCC Firm	-	-	
3	IOCC Non-Firm	-	-	
		-	-	
	Rural:			
4	1.1Domestic	2,731	141	
5	1.1A Domestic All Electric	266,656	13,815	
6	2.1GS 0-10 kW	10,555	547	
7	2.2GS 10-100 kW	58,104	3,010	
8	2.3GS 110-1,000 kVa	79,540	4,121	
9	2.4GS Over 1,000 kVa	52,345	1,517	
10	4.1Street and Area Lighting	7,759	402	
11	Subtotal Rural	477,690	23,553	
12	Total	477,690	24,011	
	Allocated Return on Debt			
13	CFB - Goose Bay Boiler	-	-	
14	IOCC Firm	-	-	
15	IOCC Non-Firm	-	-	
	Rural:			
16	1.1Domestic	-	-	
17	1.1A Domestic All Electric	-	-	
18	2.1GS 0-10 kW	-	-	
19	2.2GS 10-100 kW	-	-	
20	2.3GS 110-1,000 kVa	-	-	
21	2.4GS Over 1,000 kVa	-	-	
22	4.1Street and Area Lighting	-	-	
23	Subtotal Rural	-	-	
24	Total	-	-	
	Allocated Return on Equity			
25	CFB - Goose Bay Boiler	-	-	
26	IOCC Firm	-	-	
27	IOCC Non-Firm	-	-	
	Rural:			
28	1.1Domestic	-	-	
29	1.1A Domestic All Electric	-	-	
30	2.1GS 0-10 kW	-	-	
31	2.2GS 10-100 kW	-	-	
32	2.3GS 110-1,000 kVa	-	-	
33	2.4GS Over 1,000 kVa	-	-	
34	4.1Street and Area Lighting	-	-	
35	Subtotal Rural	-	-	
36	Total	-	-	

Schedule 3.2E
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
						Distribution											Specifically
Line		Total	Production	Production	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
	Total Revenue Requirement	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)	($)
37	CFB - Goose Bay Boiler	19,653	-	19,196	-	-	-	-	-	-	-	-	-	-	-	-	-
38	IOCC Firm	5,218,122	1,355,306	-	3,862,746	-	-	70	-	-	-	-	-	-	-	-	-
39	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural:																
40	1.1Domestic	207,512	5,550	4,307	9,346	10,872	12,411	25,258	3,759	46,650	2,095	15,903	7,109	9,756	-	51,624	-
41	1.1A Domestic All Electric	10,576,239	702,501	623,238	1,182,864	1,376,038	1,570,813	662,459	475,752	1,223,516	265,164	417,096	186,460	255,872	-	1,353,995	-
42	2.1GS 0-10 kW	359,155	11,358	13,182	19,124	22,247	25,396	36,133	7,692	66,735	4,287	22,750	19,094	26,202	-	73,852	-
43	2.2GS 10-100 kW	1,802,080	145,026	146,980	244,194	284,074	324,284	51,042	97,640	94,271	54,420	32,137	68,531	94,042	-	104,324	-
44	2.3GS 110-1,000 kVa	2,263,299	230,525	226,837	388,155	451,545	515,460	11,524	153,281	21,284	85,432	7,256	27,309	37,476	-	23,554	-
45	2.4GS Over 1,000 kVa	2,064,325	226,870	276,875	382,002	444,386	507,289	421	108,101	777	60,251	265	998	1,369	-	860	-
46	4.1Street and Area Lighting	314,207	4,367	3,535	7,353	8,553	9,764	27,012	2,957	49,889	1,648	17,007	-	-	118,750	55,209	-
47	Subtotal Rural	17,586,817	1,326,197	1,294,955	2,233,037	2,597,716	2,965,417	813,848	849,182	1,503,122	473,298	512,413	309,501	424,717	118,750	1,663,419	-
48	Total	22,824,593	2,681,503	1,314,151	6,095,783	2,597,716	2,965,417	813,918	849,182	1,503,122	473,298	512,413	309,501	424,717	118,750	1,663,419	-
	Re-classification of Revenue-Related																
49	CFB - Goose Bay Boiler	-	-	458	-	-	-	-	-	-	-	-	-	-	-	-	-
50	IOCC Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural:																
52	1.1Domestic	-	78	60	131	153	174	355	53	655	29	223	100	137	-	725	-
53	1.1A Domestic All Electric	0	19,137	16,978	32,223	37,485	42,791	18,046	12,960	33,330	7,223	11,362	5,079	6,970	-	36,885	-
54	2.1GS 0-10 kW	0	362	420	610	710	810	1,153	245	2,129	137	726	609	836	-	2,356	-
55	2.2GS 10-100 kW	-	5,091	5,160	8,572	9,972	11,384	1,792	3,428	3,309	1,910	1,128	2,406	3,301	-	3,662	-
56	2.3GS 110-1,000 kVa	0	8,848	8,707	14,898	17,332	19,785	442	5,883	817	3,279	278	1,048	1,438	-	904	-
57	2.4GS Over 1,000 kVa	(0)	6,078	7,418	10,234	11,905	13,591	11	2,896	21	1,614	7	27	37	-	23	-
58	4.1Street and Area Lighting	(0)	116	94	196	228	260	720	79	1,330	44	454	-	-	3,167	1,472	-
59	Subtotal Rural	-	39,711	38,837	66,865	77,785	88,795	22,519	25,544	41,591	14,237	14,178	9,269	12,719	3,167	46,027	-
60	Total	0	39,711	39,295	66,865	77,785	88,795	22,519	25,544	41,591	14,237	14,178	9,269	12,719	3,167	46,027	-
	Total Allocated Revenue Requirement																
61	CFB - Goose Bay Boiler	19,653	-	19,653	-	-	-	-	-	-	-	-	-	-	-	-	-
62	IOCC Firm	5,218,122	1,355,306	-	3,862,746	-	-	70	-	-	-	-	-	-	-	-	-
63	IOCC Non-Firm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rural:		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	1.1Domestic	207,512	5,628	4,368	9,477	11,024	12,585	25,612	3,812	47,304	2,124	16,126	7,209	9,893	-	52,349	-
65	1.1A Domestic All Electric	10,576,239	721,638	640,216	1,215,087	1,413,523	1,613,605	680,505	488,712	1,256,846	272,387	428,458	191,540	262,843	-	1,390,880	-
66	2.1GS 0-10 kW	359,155	11,720	13,603	19,734	22,957	26,207	37,285	7,937	68,864	4,424	23,476	19,703	27,038	-	76,207	-
67	2.2GS 10-100 kW	1,802,080	150,117	152,139	252,766	294,046	335,667	52,834	101,068	97,580	56,331	33,265	70,936	97,343	-	107,987	-
68	2.3GS 110-1,000 kVa	2,263,299	239,373	235,544	403,054	468,877	535,245	11,966	159,164	22,101	88,711	7,534	28,357	38,914	-	24,458	-
69	2.4GS Over 1,000 kVa	2,064,325	232,948	284,293	392,236	456,292	520,879	432	110,997	798	61,865	272	1,024	1,406	-	883	-
70	4.1Street and Area Lighting	314,207	4,483	3,630	7,549	8,782	10,025	27,732	3,036	51,220	1,692	17,461	-	-	121,917	56,682	-
71	Subtotal Rural	17,586,817	1,365,908	1,333,792	2,299,902	2,675,500	3,054,212	836,367	874,726	1,544,713	487,535	526,591	318,770	437,437	121,917	1,709,446	-
72	Total	22,824,593	2,721,214	1,353,446	6,162,648	2,675,500	3,054,212	836,437	874,726	1,544,713	487,535	526,591	318,770	437,437	121,917	1,709,446	-

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Labrador Interconnected
Allocation of Functionalized Amounts to Classes of Service (CONT'D.)

	1	18	19	
		Revenue Related		
Line		Municipal	PUB	
No.	Description	Tax	Assessment	Basis of Proration
	Total Revenue Requirement	($)	($)	
37	CFB - Goose Bay Boiler	-	458	
38	IOCC Firm	-	-	
39	IOCC Non-Firm	-	-	
	Rural:			
40	1.1Domestic	2,731	141	
41	1.1A Domestic All Electric	266,656	13,815	
42	2.1GS 0-10 kW	10,555	547	
43	2.2GS 10-100 kW	58,104	3,010	
44	2.3GS 110-1,000 kVa	79,540	4,121	
45	2.4GS Over 1,000 kVa	52,345	1,517	
46	4.1Street and Area Lighting	7,759	402	
47	Subtotal Rural	477,690	23,553	
48	Total	477,690	24,011	
	Re-classification of Revenue-Related			
49	CFB - Goose Bay Boiler	-	(458)	Re-classification to demand, energy and customer is based on rate class revenue
50	IOCC Firm	-	-	requirements excluding revenue-related items.
51	IOCC Non-Firm	-	-	
	Rural:			
52	1.1Domestic	(2,731)	(141)	
53	1.1A Domestic All Electric	(266,656)	(13,815)	
54	2.1GS 0-10 kW	(10,555)	(547)	
55	2.2GS 10-100 kW	(58,104)	(3,010)	
56	2.3GS 110-1,000 kVa	(79,540)	(4,121)	
57	2.4GS Over 1,000 kVa	(52,345)	(1,517)	
58	4.1Street and Area Lighting	(7,759)	(402)	
59	Subtotal Rural	(477,690)	(23,553)	
60	Total	(477,690)	(24,011)	
	Total Allocated Revenue Requirement			
61	CFB - Goose Bay Boiler	-	-	
62	IOCC Firm	-	-	
63	IOCC Non-Firm	-	-	
	Rural:	-	-	
64	1.1Domestic	-	-	
65	1.1A Domestic All Electric	-	-	
66	2.1GS 0-10 kW	-	-	
67	2.2GS 10-100 kW	-	-	
68	2.3GS 110-1,000 kVa	-	-	
69	2.4GS Over 1,000 kVa	-	-	
70	4.1Street and Area Lighting	-	-	
71	Subtotal Rural	-	-	
72	Total	-	-	

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Functionalization & Classification Ratios

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Production		Rural Prod &	Distribution											Specifically
Line		Total	Production	& Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	Generation																	
1	Hydraulic	100%	44.92%	55.08%														
2	Hydraulic - GNP	100%	44.92%	55.08%		0.0%												
3	Holyrood	100%	72.24%	27.76%														
4	Gas Tur Island Intercnctd	100%	100.00%	0.00%														
5	Diesel Island Intercnctd - GNP	100%	100.00%	0.00%		0.0%												
6	Dsl / Gas Tur Island Isolated	100%	43.90%	56.10%														
7	Dsl / Gas Tur Labrador Isolated	100%	34.26%	65.74%														
8	Dsl / Gas Tur L'Anse au Loup	100%	100.00%	0.00%														
9	Dsl / Gas Tur Labrador Intercnctd	100%	100.00%	0.00%														
	Fuel																	
10	No. 6 Fuel	100%	0.00%	100.00%														
11	Gas Tur Island Intercnctd	100%	100.00%	0.00%														
12	Diesel Island Intercnctd - GNP	100%	100.00%	0.00%		0.0%												
13	Dsl / Gas Tur Island / Lab Isolated	100%	0.00%	100.00%														
14	Dsl / Gas Tur L'Anse au Loup	100%	0.00%	100.00%														
15	Dsl / Gas Tur Labrador Intercnctd	100%	100.00%	0.00%														
	Transmission Lines & Terminals																	
16	Lines	100%		0.00%	100%													
17	Lines - Hydraulic	100%	44.92%	55.08%														
18	Lines - Customer Specific	100%																100%
19	Terminal Stations	100%		0.00%	100%													
20	Term Stns - Hydraulic	100%	44.92%	55.08%														
21	Term Stns - Holyrood	100%	72.24%	27.76%														
22	Term Stns - Gas Tur	100%	100%															
23	Term Stns - Diesel GNP	100%	100.00%	0.00%		0.0%												
24	Terminal Stations - Distribution	100%					100%											
25	Term Stns - Custmr Specific	100%																100%
26	Rural Lines	100%				100.0%												
27	Rural Terminal Stations	100%				100.0%												

Schedule 4.1
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NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Functionalization & Classification Ratios (CONT'D.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Production		Rural Prod &	Distribution											Specifically
Line		Total	Production	& Transmission	Transmission	Transmission	Substations	Primary Lines		Line Transformers		Secondary Lines		Services	Meters	Street Lighting	Accounting	Assigned
No.	Description	Amount	Demand	Energy	Demand	Demand	Demand	Demand	Customer	Demand	Customer	Demand	Customer	Customer	Customer	Customer	Customer	Customer
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	Distribution																	
28	Substation Structures & Equipment						100%											
29	Land & Land Improvements - by Sub-function:																	
30	Primary	85%						88.7%	11.3%									
31	Secondary	15%										58.3%	41.7%					
32	Land & Land Improvements	100%						75.4%	9.6%			8.7%	6.3%					
33	Poles - by Subfunction:																	
34	3 phase - Primary	41.2%						100.0%										
35	Other Primary	36.4%						45.7%	54.3%									
36	Secondary	22.4%										45.7%	54.3%					
37	Poles	100%						57.8%	19.8%			10.2%	12.2%					
38	Primary Condctr & Equip	100%						88.7%	11.3%									
39	Submarine Conductor	100%						100.0%										
40	Transformers	100%								36.1%	63.9%							
41	Secondary Condctr & Equip	100%										58.3%	41.7%					
42	Services	100%												100.0%				
43	Meters	100%													100.0%			
44	Street Lighting	100%														100.0%		
45	Customer Accounting	100%															100.0%	

Schedule 4.2
Page 1 of 1

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting

System Load Factor

Line No.	1	2	3	4	5	6
		Island Interconnected	**Island Isolated**	**Labrador Isolated**	**L'Anse au Loup**	**Labrador Interconnected**
1	Sales+Losses for System Load Factor (MWh)	7,238,900	7,646	44,912	24,953	2,676,900
2	Hours in Year	8,760	8,760	8,760	8,760	8,760
3	Average Demand (kW)	826,358	873	5,127	2,848	305,582
4	Coincident Peak at Generation (kW)	1,500,405	1,556	7,799	5,736	431,777
5	System Load Factor	55.08%	56.10%	65.74%	49.66%	70.77%

Schedule 4.3
Page 1 of 1

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Holyrood Capacity Factor

	1	2	3	4	5
Line No.	Year	Net Production (kWh)	Net Capacity (MW)	Net Production Hours	Net Capacity Factor
1	**2011 Actual**	**885,313,869**	**466**	**8,760**	21.69%
2	**2012 Actual**	**855,826,207**	**466**	**8,784**	20.93%
3	**2013 Actual**	**957,442,307**	**466**	**8,760**	23.48%
4	**2014 Forecast**	**1,373,039,000**	**466**	**8,760**	33.67%
5	**2015 Forecast**	**1,592,992,000**	**466**	**8,760**	39.07%
6	5-Year Average	1,132,922,677	466	8,765	27.76%

NEWFOUNDLAND AND LABRADOR HYDRO
2015 Test Year Cost of Service - Rate Setting
Total System
Power Purchases

	1	2	3	4	5	6	7	
Line No.		Total ($)	Production Demand ($)	Production & Transmission Energy ($)	Transmission Demand ($)	Rural Transmission Demand ($)	Distribution Demand ($)	Basis of Functional Classification
	Island Interconnected:							
1	DLP Secondary	-		-				Production - Energy (Same as RSP Sec Load Var)
2	AP Secondary	-		-				Production - Energy (Secondary)
3	Wheeling	693,003				693,003		Rural Transmission
4	Interruptible Demand	2,122,400	2,122,400	-				Production - Demand
5	Interruptible Energy	-		-				Production - Energy
6	Non-utility Generation excluding wind	42,562,239	19,120,793	23,441,445				Energy: System Load Factor
7	Wind Purchases	12,732,178		12,732,178				Production - Energy
8	**Subtotal**	**58,109,820**	**21,243,193**	**36,173,623**	**-**	**693,003**	**-**	
	Labrador Interconnected:							
9	CF(L)Co	1,856,851	542,700	1,314,151				Energy: System Load Factor
10	Other	-					-	
11	**Subtotal**	**1,856,851**	**542,700**	**1,314,151**	**-**	**-**	**-**	
	Isolated Systems:							
12	Mary's Harbour	-		-				Production - Energy
13	L'Anse au Loup	2,657,696		2,657,696				Production - Energy
14	Ramea Wind	202,500		202,500				Production - Energy
15	**Subtotal**	**2,860,196**	**0**	**2,860,196**	**0**	**0**	**0**	
16	**Total**	**62,826,867**	**21,785,893**	**40,347,970**	**-**	**693,003**	**-**	

Compliance Rates Application - Exhibit 9

Schedule of Rates, Rules and Regulations

Revised June 8, 2017

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY

Availability:

This rate is applicable to service to Newfoundland Power (NP).

Definitions:

"Billing Demand"

The Curtailable Credit shall apply to determine the billing demand as an adjustment to the highest Native Load established during the winter period []. The computation of the adjustment to reflect the Curtailable Credit is provided in the definitions below. [].

In the Months of January through March, billing demand shall be the greater of:

(a) the highest Native Load less the Generation Credit and the Curtailable Credit, beginning in the previous December and ending in the current Month; and
(b) the Minimum Billing Demand.

In the Months of April through December, billing demand shall be the greater of:

(a) the Weather-Adjusted Native Load less the Generation Credit and the Curtailable Credit, plus the Weather Adjustment True-up; and
(b) the Minimum Billing Demand.

If at the time of establishing its Maximum Native Load, NP has been requested by Hydro to reduce its Native Load by shedding curtailable load, the calculation of Billing Demand for each month shall not deduct the Curtailable Credit.

"Generation Credit" refers to NP's net generation capacity less allowance for system reserve, as follows:

	kW
Hydraulic Generation Credit	83,142
Thermal Generation Credit	36,187
Total Generation Credit	119,329

In order to continue to avail of the Generation Credit, NP must demonstrate the capability to operate its generation to the level of the Generation Credit. This will be verified in a test by operating the generation at a minimum of this level for a period of one hour as measured by the generation demand metering used to determine the Native Load. The test will be carried out at

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY

a mutually agreed time between December 1 and March 31 each year. If the level is not sustained, Newfoundland Power will be provided an opportunity to repeat the test at another mutually agreed time during the same December 1 to March 31 period. If the level is not sustained in the second test, the Generation Credit will be reduced in calculating the associated billing demands for January to December to the highest level that could be sustained.

"Curtailable Credit" is determined based upon NP's forecast curtailable load available for the period in accordance with the terms and conditions set forth in NP's Curtailable Service Option. NP will notify Hydro of its available curtailable load with its forecast of annual and monthly electricity requirements.

In order to receive the Curtailable Credit, NP must demonstrate the capability to curtail its customer load requirements to the level of the Curtailable Credit. This will be verified in a test by curtailing load at a minimum of this level for a period of one hour. The test will be carried out at a mutually agreed time in December. If the level is not sustained, the Curtailable Credit will be reduced to the level sustained. If Hydro requests NP to curtail load before a test is completed and NP demonstrates the capability to curtail to the level of the Curtailment Credit, no test will be required.

NP will be required to provide a report to Hydro not later than April 15 to demonstrate the amount of load curtailed for each request of Hydro during the previous winter season. If the load curtailed is less than forecast for either request during the winter season, the annual Curtailable Credit will be adjusted to reflect the average load curtailed for the winter season. If NP is not requested to curtail during the winter season, the Curtailment Credit will established based upon the lesser of the load reduction achieved in the test or the forecast curtailable load (as provided in the previous two paragraphs).

"Maximum Native Load" means the maximum Native Load of NP in the four-Month period beginning in December of the preceding year and ending in March of the current year.

"Minimum Billing Demand" means ninety-nine percent (99%) of:

NP's test year Native Load less the Generation Credit and the Curtailable Credit.

The Curtailable Credit reflected in the Minimum Billing Demand will be set to equal the curtailable load used to determine the Maximum Native Load for NP for the most recently approved Test Year.

"Month" means for billing purposes, the period commencing at 12:01 hours on the last day of the previous month and ending at 12:00 hours on the last day of the month for which the bill applies.

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (continued)

"Native Load" is the sum of:

(a) the amount of electrical power, delivered at any time and measured in kilowatts, supplied by Hydro to NP, averaged over each consecutive period of fifteen minutes duration, commencing on the hour and ending each fifteen minute period thereafter;
(b) the total generation by NP averaged over the same fifteen-minute periods.

"Weather-Adjusted Native Load" means the Maximum Native Load adjusted to normal weather conditions, calculated as:

Maximum Native Load
plus (Weather Adjustment, rounded to 3 decimal places, x 1000)

Weather Adjustment is further described and defined in the Weather Adjustment section.

"Weather Adjustment True-up" means one-ninth of the difference between:

(a) the greater of:
- the Weather Adjusted Native Load less the Generation Credit and the Curtailable Credit (if applicable), times three; and
- the Minimum Billing Demand, times three; and

(b) the sum of the actual billed demands in the Months of January, February and March of the current year.

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (continued)

Monthly Rates:

Billing Demand Charge:
Billing Demand, as set out in the Definitions section, shall be charged at the following rate:

$4.75 per kW of billing demand

Energy Charge:
First 250,000,000 kilowatt-hours* ....@ 2.226 ¢ per kWh
All excess kilowatt-hours* ....@ 10.422 ¢ per kWh

Firming-up Charge:
Secondary energy supplied by
Corner Brook Pulp and Paper Limited* ....@ 2.882 ¢ per kWh

RSP Adjustment:
Current Plan - Normal ....@ (0.132) ¢ per kWh
Current Plan Mitigation Adjustment..@ (0.911) ¢ per kWh

Current Plan - Total ....@ (1.043) ¢ per kWh
Fuel Rider ....@ 0.672 ¢ per kWh

Total RSP Adjustment – All kilowatt-hours .... @ (0.371) ¢ per kWh

CDM Cost Recovery Adjustment... @ 0.019 ¢ per kWh

***Subject to RSP Adjustment:**

RSP Adjustment refers to all applicable adjustments arising from the operation of Hydro's Rate Stabilization Plan, which levelizes variations in hydraulic production, fuel cost, load and rural rates.

Adjustment for Losses:

If the metering point is on the load side of the transformer, either owned by the customer or specifically assigned to the customer, an adjustment for losses as determined in consultation with the customer prior to January 31 of each year, shall be applied to metered demand and energy.

Adjustment for Station Services and Step-Up Transformer Losses:

If the metering point is not on the generator output terminals of NP's generators, an adjustment for Newfoundland Power's power consumption between the generator output terminals and the metering point as determined in consultation with the customer prior to the implementation of the metering, shall be applied to the metered demand.

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (continued)

Weather Adjustment: This section outlines procedures and calculations related to the weather adjustment applied to NP's Maximum Native Load.

(a) Weather adjustment shall be undertaken for use in determining NP's Billing Demand.

(b) Weather adjustment shall be derived from Hydro's NP native peak demand model.

(c) By September 30th of each year, Hydro shall provide NP with updated weather adjustment coefficient incorporating the latest year of actuals.

(d) The underlying temperature and wind speed data utilized to derive weather adjustment shall be sourced to weather station data for the St. John's, Gander, and Stephenville airports reported by Environment Canada. NP's regional energy sales shall be used to weight regional weather data. Hydro shall consult with NP to resolve any circumstances arising from the availability of, or revisions to, weather data from Environment Canada and/or wind chill formulation.

(e) The primary definition for the temperature weather variable is the average temperature for the peak demand hour and the preceding seven hours. The primary definition for the wind weather data is the average wind speed for the peak demand hour and the preceding seven hours. Hydro will consult with NP should data anomalies indicate a departure from the primary definition on underlying weather data.

(f) Subject to the availability of weather data from Environment Canada, Hydro shall prepare a preliminary estimate of the Weather-Adjusted Native Load by March 15th of each year, and a final calculation of Weather-Adjusted Native Load by April 5th of each year.

General:

This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

With respect to all matters where the customer and Hydro consult on resolution but are unable to reach mutual agreement, the billing will be based on Hydro's best estimate.

NEWFOUNDLAND AND LABRADOR HYDRO

INDUSTRIAL – FIRM

Availability:

Any person purchasing power, other than a retailer, supplied from the Interconnected Island bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and who has entered into a contract with Hydro for the purchase of firm power and energy.

Base Rate*:

Demand Charge:

The rate for Firm Power, as defined and set out in the Industrial Service Agreements, shall be $7.99 per kilowatt (kW) per month of billing demand.

Firm Energy Charge:

Base Rate .... @ 3.971 ¢ per kWh

RSP Adjustment:

Current Plan .... @ (0.373) ¢ per kWh
Fuel Rider .... @ 0.625 ¢ per kWh

Total RSP Adjustment – All kilowatt-hours .... @ 0.252 ¢ per kWh**

CDM Cost Recovery Adjustment..@ 0.009 ¢ per kWh

NEWFOUNDLAND AND LABRADOR HYDRO

INDUSTRIAL – FIRM

Specifically Assigned Charges:

The table below contains the additional annual specifically assigned charges for customer plant in service that is specifically assigned to the Customer.

	Annual Amount
Corner Brook Pulp and Paper Limited	$ 870,898
North Atlantic Refining Limited	$ 89,293
Teck Resources Limited	$ 199,399
Vale	$480,243

***Subject to RSP Adjustments**:

RSP Adjustments refers to all applicable adjustments arising from the operation of Hydro's Rate Stabilization Plan, which levelizes variations in hydraulic production, fuel cost, load and rural rates and also provides for disposition of the Industrial Customer RSP Surplus.

Adjustment for Losses:

If the metering point is on the load side of the transformer, either owned by the customer or specifically assigned to the customer, an adjustment for losses as determined in consultation with the customer prior to January 31 of each year shall be applied.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

NEWFOUNDLAND AND LABRADOR HYDRO

INDUSTRIAL – FIRM

Availability:

Any person purchasing power, other than a retailer, supplied from the Interconnected Island bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and who has entered into a contract with Hydro for the purchase of firm power and energy.

Rate:

Non-Firm Energy Charge (¢ per kWh):

Non-Firm Energy is deemed to be supplied from thermal sources. The following formula shall apply to calculate the Non-Firm Energy rate:

$$\{(A \div B) \times (1 + C) \times (1 \div (1 - D))\} \times 100$$

A = the monthly average cost of fuel per barrel for the energy source in the current month or, in the month the source was last used

B = the conversion factor for the source used (kWh/bbl)

C = the administrative and variable operating and maintenance charge (10%)

D = the average system losses on the Island Interconnected grid for the last five years ending in 2013 (3.47%).

The energy sources and associated conversion factors are:

1. Holyrood, using No. 6 fuel with a conversion factor of 618 kWh/bbl
2. Gas turbines using No. 2 fuel with a conversion factor of 475 kWh/bbl
3. Diesels using No. 2 fuel with a conversion factor of 556 kWh/bbl.

Adjustment for Losses:

If the metering point is on the load side of the transformer, either owned by the customer or specifically assigned to the customer, an adjustment for losses as determined in consultation with the customer prior to January 31 of each year shall be applied.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

NEWFOUNDLAND AND LABRADOR HYDRO

INDUSTRIAL - WHEELING

Availability:

Any person purchasing power, other than a retailer, supplied from the Interconnected Island bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and who has entered into a contract with Hydro for the purchase of firm power and energy and whose Industrial Service Agreement so provides.

Rate:

Energy Charge:

All kWh (Net of losses)* .... @ 0.423 ¢ per kWh

* For the purpose of this Rate, losses shall be 3.47%, the average system losses on the Island Interconnected Grid for the last five years ending in 2013.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO
RATE STABILIZATION PLAN

The Rate Stabilization Plan of Newfoundland and Labrador Hydro (Hydro) is established for Hydro's Utility customer, Newfoundland Power, and Island Industrial customers to smooth rate impacts for variations between actual results and Test Year Cost of Service estimates for:

- hydraulic production;
- No. 6 fuel cost used at Hydro's Holyrood generating station;
- customer load (Utility and Island Industrial); and
- rural rates.

The formulae used to calculate the Plan's activity are outlined below. Positive values denote amounts owing from customers to Hydro whereas negative values denote amounts owing from Hydro to customers.

Section A: Hydraulic Production Variation

1. Activity:
Actual monthly production is compared with the Test Year Cost of Service Study in accordance with the following formula:

$$\{(A - B) \div C\} \times D$$

Where:

A = Test Year Cost of Service Net Hydraulic Production (kWh)
B = Actual Net Hydraulic Production (kWh)
C = Test Year Cost of Service Holyrood Net Conversion Factor (kWh /bbl.)
D = Monthly Test Year Cost of Service No. 6 Fuel Cost ($Can /bbl.)

2. Financing:
Each month, financing charges, using Hydro's approved Test Year weighted average cost of capital, will be calculated on the balance.

3. Hydraulic Variation Customer Assignment:
Customer assignment of hydraulic variations will be performed annually as follows:

$$(E \times 25\%) + F$$

Where:

E = Hydraulic Variation Account Balance as of December 31, excluding financing charges
F = Financing charges accumulated to December 31

The total amount of the Hydraulic Customer Assignment shall be removed from the Hydraulic Variation Account.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

4. Customer Allocation:

The annual customer assignment will be allocated among the Island Interconnected customer groups of (1) Newfoundland Power; (2) Island Industrial Firm; and (3) Rural Island Interconnected. The allocation will be based on percentages derived from 12 months-to-date kWh for: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The portion of the hydraulic customer assignment which is initially allocated to Rural Island Interconnected will be re-allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Test Year Cost of Service Study.

The Newfoundland Power and Island Industrial customer allocations shall be included with the Newfoundland Power and Island Industrial RSP balances respectively as of December 31 each year. The Labrador Interconnected Hydraulic customer allocation shall be written off to Hydro's net income (loss).

Section B: Fuel Cost Variation, Load Variation and Rural Rate Alteration

1. Activity

1.1 Fuel Cost Variations

This is based on the consumption of No. 6 Fuel at the Holyrood Generating Station:

$$(G - D) \times H$$

Where:

D = Monthly Test Year Cost of Service No. 6 Fuel Cost ($Can /bbl.)
G = Monthly Actual Average No. 6 Fuel Cost ($Can /bbl.)
H = Monthly Actual Quantity of No. 6 Fuel consumed less No. 6 fuel consumed for non-firm sales (bbl.)

1.2 Load Variations

Firm: Firm load variation is comprised of fuel and revenue components. The load variation is determined by calculating the difference between actual monthly sales and the Test Year Cost of Service Study sales, and the resulting variance in No. 6 fuel costs and sales revenues. It is calculated separately for Newfoundland Power firm sales and Industrial firm sales, in accordance with the following formula:

$$(I - J) \times \{(D \div C) - K\}$$

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

Where:

C = Test Year Cost of Service Holyrood Net Conversion Factor (kWh /bbl.)
D = Monthly Test Year Cost of Service No. 6 Fuel Cost ($Can /bbl.)
I = Actual Sales, by customer class (kWh)
J = Test Year Cost of Service Sales, by customer class (kWh)
K = Firm energy rate, by customer class

Secondary: Secondary load variation is based on the revenue variation for Utility Firmed-Up Secondary energy sales compared with the Test Year Cost of Service Study, in accordance with the following formula:

(J – I) x L

Where:

I = Actual Sales (kWh)
J = Test Year Cost of Service Sales (kWh)
L = Secondary Energy Firming Up Charge

1.3 Rural Rate Alteration

Newfoundland Power Rate Change Impacts:
This component is calculated for Hydro's rural customers whose rates are directly or indirectly impacted by Newfoundland Power's rate changes, with the following formula:

(M – N) x O

Where:

M = Cost of Service rate
N = Existing rate
O = Actual Units (kWh, bills, billing demand)

[ ]

2. Monthly Customer Allocation: Load and Fuel Activity

Each month, the load variation will be held in a separate account in the Plan, until its disposition is ordered by the Board of Commissioners of Public Utilities.

Each month, the year-to-date total for fuel price variation and the year-to-date total for the load variation will be allocated among the Island Interconnected customer groups of (1) Newfoundland Power; (2) Island Industrial Firm; and (3) Rural Island Interconnected. The allocation will be based on percentages derived from 12 months-to-date kWh for: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

The year-to-date portion of the fuel price variation and the year-to-date portion of the load variation which is initially allocated to Rural Island Interconnected will be re-allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Test Year Cost of Service Study.

The current month's activity for Newfoundland Power, Island Industrials and regulated Labrador Interconnected customers will be calculated by subtracting year-to-date activity for the prior month from year-to-date activity for the current month. The current month's activity allocated to regulated Labrador Interconnected customers will be removed from the Plan and written off to Hydro's net income (loss).

3. Monthly Customer Allocation: Rural Rate Alteration Activity

Each month, the rural rate alteration will be allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Test Year Cost of Service Study. The portion allocated to regulated Labrador Interconnected will be removed from the Plan and written off to Hydro's net income (loss).

4. Plan Balances

Separate plan balances for Newfoundland Power, the Island Industrial customer class and the segregated load variation will be maintained. The RSP balances shall be adjusted by other amounts as ordered by the Board. Financing charges on the plan balances will be calculated monthly using Hydro's approved Test Year weighted average cost of capital.

Section C: Fuel Price Projection

A fuel price projection will be calculated to anticipate forecast fuel price changes and to determine fuel riders for the rate adjustments. For industrial customers, this will occur in October each year, for inclusion with the RSP adjustment effective January 1. For Newfoundland Power, this will occur in April each year, for inclusion with the RSP adjustment effective July 1.

1. Industrial Fuel Price Projection:

In October each year, a fuel price projection for the following January to December shall be made to estimate a change from Test Year No. 6 Fuel Cost. Hydro's projection shall be based on the change from the average Test Year No. 6 fuel purchase price, in Canadian dollars per barrel, determined from the forecast oil prices provided by the PIRA Energy Group, and the current US exchange rate. The calculation for the projection is:

$$[\{(S + T) \times U\} - V] \times W$$

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

Where:

S = the September month-end PIRA Energy Group average monthly forecast for No. 6 fuel prices at New York Harbour for the following January to December
T = Hydro's average [ ] fuel contract premium or (discount) ($US[ ]/bbl) for the following January to December
U = the monthly average of the $Cdn / $US Bank of Canada Noon Exchange Rate for the month of September
V = average Test Year Cost of Service purchase price for No. 6 Fuel ($Can /bbl.)
W = the number of barrels of No. 6 fuel forecast to be consumed at the Holyrood Generating Station for the Test Year.

The industrial customer allocation of the forecast fuel price change will be based on 12 months-to-date kWh as of the end of September and is the ratio of Industrial Firm invoiced energy to the total of: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The amount of the forecast fuel price change, in Canadian dollars, and the details of an estimate of the fuel rider based on 12 months-to-date kWh sales to the end of September will be reported to industrial customers, Newfoundland Power, and the Public Utilities Board, by the 10^{th} working day of October.

2. Newfoundland Power Fuel Price Projection:

In April each year, a fuel price projection for the following July to June shall be made to estimate a change from Test Year No. 6 Fuel Cost. Hydro's projection shall be based on the change from the average Test Year No. 6 fuel purchase price, in Canadian dollars per barrel, determined from the forecast oil prices provided by the PIRA Energy Group, and the current US exchange rate. The calculation for the projection is:

$$[\{(X + T) \times Y\} - V] \times W$$

Where:

T = Hydro's average [] fuel contract premium or (discount) ($US []/bbl) for the following July to June
V = average Test Year Cost of Service purchase price for No. 6 Fuel ($Can /bbl.)
W = the number of barrels of No. 6 fuel forecast to be consumed at the Holyrood Generating Station for the Test Year.
X = the average of the March month-end PIRA Energy Group average monthly forecast for No. 6 fuel prices at New York Harbour for July to December of the current year and for the January to June period of the subsequent year.
Y = the monthly average of the $Cdn / $US Bank of Canada Noon Exchange Rate for the month of March.

NEWFOUNDLAND AND LABRADOR HYDRO
RATE STABILIZATION PLAN (Continued)

The Newfoundland Power customer allocation of the forecast fuel price change will be based on 12 months-to-date kWh as of the end of March and is the ratio of Newfoundland Power Firm and Firmed-Up Secondary invoiced energy to the total of: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy. [ ]

The amount of the forecast fuel price change, in Canadian dollars, and the details of the resulting fuel rider applied to the adjustment rate will be reported to Newfoundland Power, industrial customers, and the Public Utilities Board, by the 10th working day of April.

Section D: Adjustment

1. Newfoundland Power

As of March 31 each year, Newfoundland Power's adjustment rate for the 12-month period commencing the following July 1 is determined as the rate per kWh which is projected to collect:

Newfoundland Power March 31 Balance

less projected recovery / repayment of the balance for the following three months (if any), estimated using the energy sales (kWh) for April, May and June from the previous year

plus forecast financing charges to the end of the 12-month recovery period (i.e., June in the following calendar year),

divided by the 12-months-to-date firm plus firmed-up secondary kWh sales to the end of March.

A fuel rider shall be added to the above adjustment rate, based on the Newfoundland Power Fuel Price Projection amount (as per Section C.2 above) divided by 12-months-to-date kWh sales to the end of March.

When new Test Year base rates come into effect, if a fuel rider forecast (either March or September) is more current than the test year fuel forecast, a fuel rider will be implemented at the same time as the change in base rates reflecting the more current fuel forecast and the new test year values.

Otherwise, the fuel rider portion of the RSP Adjustment will be set to zero upon implementation of the new Test Year Cost of Service rates, until the time for the next fuel price projection.

NEWFOUNDLAND AND LABRADOR HYDRO
RATE STABILIZATION PLAN (Continued)

2. Island Industrial Customers

As of December 31 each year, the adjustment rate for industrial customers for the 12-month period commencing January 1 is determined as the rate per kWh which is projected to collect:

Industrial December 31 Balance

plus forecast financing charges to the end of the following calendar year,

divided by 12-months-to-date kWh sales to the end of December.

A fuel rider shall be added to the above adjustment rate, based on the Industrial Fuel Price Projection (as per Section C.1 above) amount divided by 12-months-to-date kWh sales to the end of December.

When new Test Year base rates come into effect, if a fuel rider forecast (either March or September) is more current than the test year fuel forecast, a fuel rider will be implemented at the same time as the change in base rates reflecting the more current fuel forecast and the new test year values. Otherwise, the fuel rider portion of the RSP Adjustment will be set to zero upon implementation of the new Test Year Cost of Service rates, until the time for the next fuel price projection.

[ ]

Section E: RSP Surplus:

1. August 31, 2013 Balance:

The net load variation for Newfoundland Power and the Industrial Customers from January 1, 2007 to August 31, 2013, including financing (the RSP Surplus), will be removed from the respective customer class balance, and allocated based upon direction provided by Government in Orders in Council OC2013-089 and OC2013-207. The balances which remain after this amount is removed will form the adjusted August 31, 2013 current plan balances for each customer class.

The Industrial Customer class allocated amount will be used, firstly, to reduce the Industrial Customer class adjusted August 31, 2013 RSP balance to zero. OC2013-089 states that the remaining IC RSP Surplus is to be used to fund a three-year phase-in of rate increases for Island Industrial customers.

The monthly RSP adjustment resulting from the Teck Resources Limited RSP Adjustment rate of (1.141)¢ per kWh determined in accordance with Order No. P.U. 17(2015), will become effective July 1, 2015 and segregated from the other components of the Industrial Customer RSP until its disposition is ordered by the Board of Commissioners of Public Utilities.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

1.1 Industrial Customer RSP Surplus Disposition

Effective December 31, 2014, a one-time transfer from the Industrial Customer RSP Surplus will be applied to the Industrial Customer RSP current plan balance to reduce the December 31, 2014 current plan balance to zero. This transfer is in accordance with Order No. P.U. 14(2015).

The Industrial Customer RSP Surplus will be used to fund the difference between the approved base rate and net billing rates that result from the application of the Industrial Customer RSP Surplus Adjustment demand and energy rates as approved by the Board.

1.2 Newfoundland Power RSP Surplus Disposition

[] The Newfoundland Power allocated amount of the RSP Surplus will be refunded to Newfoundland Power and Hydro's Rural customers in accordance with Hydro's Customer Refund Plan approved in Order No. P.U. 36(2016).

2. **Plan Balances**
Separate plan balances for Newfoundland Power and the Island Industrial customer class will be maintained. Financing charges on the plan balances will be calculated monthly using Hydro's approved Test Year weighted average cost of capital.

NEWFOUNDLAND AND LABRADOR HYDRO

CONSERVATION AND DEMAND MANAGEMENT COST RECOVERY

The CDM Cost Recovery Adjustment, expressed in cents per kWh, will be calculated to provide for the recovery of costs charged annually to the Conservation and Demand Management Cost Deferral Account (the "CDM Cost Deferral Account") over a seven-year period.

For the initial year of calculating the CDM Cost Recovery Adjustment, the CDM Cost Recovery Adjustment will be calculated to recover 1/7th of the CDM Cost Deferral Account balance at December 31 of the previous year. For each subsequent year, the CDM Cost Recovery Adjustment will be calculated to recover the sum of individual amounts representing 1/7th of the transfer to the CDM Deferral Account for the previous year and the amortizations carried forward from prior years.

There will be different CDM Cost Recovery Adjustments for Island Industrial Customers and Newfoundland Power. The CDM Cost Recovery Adjustment for Island Industrial Customers will be calculated based upon the Island Interconnected Recoverable Amount allocated for recovery from Island Industrial Customers. The CDM Cost Recovery Adjustment for Newfoundland Power will be calculated based upon the allocated Island Interconnected Recoverable Amount to Newfoundland Power (including the allocated Island Interconnected Hydro Rural Amount) plus the allocated Hydro Rural Isolated System amount to Newfoundland Power.

Assignment of Customer Balance for Recovery

The Island Interconnected Recoverable Amount will be allocated among the Island Interconnected customer groups of (1) Newfoundland Power; (2) Island Industrial Firm; and (3) Rural Island Interconnected. The allocation will be based on percentages of previous calendar year sales for: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The portion of the Island Interconnected Recoverable Amount which is initially allocated to Rural Island Interconnected will be added to the Hydro Rural Isolated System Recoverable Amount, and then re-allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Test Year Cost of Service Study.

The Labrador Interconnected Recoverable Amount shall be written off to Hydro's net income (loss).

NEWFOUNDLAND AND LABRADOR HYDRO

CONSERVATION AND DEMAND MANAGEMENT COST RECOVERY

CDM Cost Recovery Adjustment

Newfoundland Power:
The adjustment rate for each year will be determined as follows:

$$B = (C \div D)$$

Where:

B = adjustment rate (¢ per kWh) for the 12-month period commencing the following July 1.
C = Recoverable Amount assigned to Newfoundland Power from previous calendar year.
D = energy sales (kWh) (firm and firmed-up secondary) to Newfoundland Power for the previous calendar year.

Island Industrial Customers:
The adjustment rate for each year will be determined as follows:

$$E = (F \div H)$$

Where:

E = adjustment rate (¢ per kWh) for the 12-month period commencing the following July 1.
F = Recoverable Amount assigned to Industrial Customers from previous calendar year.
H = firm energy sales (kWh) to Industrial Customers for the previous calendar year.

NEWFOUNDLAND AND LABRADOR HYDRO

RULES AND REGULATIONS

APPLICABILITY:

These general Rules and Regulations apply to all Hydro Rural Customers.

1. INTERPRETATION:

(a) In these Rates and Rules the following definitions shall apply:

(i) "***Act***" means The Public Utilities Act, R.S.N. 1990, c.P-47 as amended from time to time.

(ii) "***Applicant***" means any person who applies for Service.

(iii) ***"Board"*** means the Board of Commissioners of Public Utilities of Newfoundland and Labrador.

(iv) "***Hydro***" means Newfoundland and Labrador Hydro.

(v) "***Hydro rural customers***" means regulated customers served by Hydro other than industrial customers and Newfoundland Power.

(vi) "***Customer***" means any person who accepts or agrees to accept Service.

(vii) "***Disconnected***" or "***Disconnect***" in reference to a Service means the physical interruption of the supply of electricity thereto.

(viii) "***Discontinued***" or "***Discontinue***" in reference to a Service means to terminate the Customer's on-going responsibility with respect to the Service.

(ix) "***Domestic Unit***" means a house, apartment or other similar residential unit which is normally occupied by one family, or by a family and no more than four other persons who are not members of that family, or which is normally occupied by no more than six unrelated persons.

(x) ***"Service"*** means any service(s) provided by Hydro pursuant to these Regulations.

(xi) "***Serviced premises***" means the premises at which Service is delivered to the Customer.

(xii) *"**Government Departments**"* means electric service accounts of Provincial or Federal government departments, agencies, boards, commissions, and crown corporations but excludes hospitals, fish plants, churches, schools, community halls, municipal buildings and like facilities.

NEWFOUNDLAND AND LABRADOR HYDRO

RULES AND REGULATIONS (Continued)

(b) Unless the context requires otherwise these Rates and Rules shall be interpreted such that:

(i) words imparting male persons include female persons and corporations.

(ii) words imparting the singular include the plural and vice versa.

2. CLASSES OF SERVICE:

(a) Hydro shall provide the following classes of Service:

ISLAND INTERCONNECTED AREA/LANSE AU LOUP AREA

1.1	Domestic
1.1S	Domestic Seasonal
1.3	Burgeo School and Library
2.1	General Service, 0-100 kW
2.3	General Service, 110 kVA (100 kW) - 1000 kVA
2.4	General Service, 1000 kVA and Over
4.1	Street and Area Lighting Service

ISLAND AND LABRADOR DIESEL AREA

1.2D	Domestic Diesel - Non-Government
1.2DS	Domestic Seasonal Diesel – Non-Government
2.1D	General Service Diesel - Non-Government, 0-10 kW
2.2D	General Service Diesel - Non-Government, 10 kW and Over
4.1D	Street and Area Lighting Service Diesel - Non-Government
1.2G	Domestic Diesel - Government Departments
2.1G	General Service Diesel - Government Departments, 0-10kW
2.2G	General Service Diesel - Government Departments, 10kW and Over
4.1G	Street and Area Lighting Service Diesel - Government Departments

LABRADOR INTERCONNECTED AREA

1.1L	Domestic
2.1L	General Service, 0-10 kW
2.2L	General Service, 10-100 kW (110 kVA)
2.3L	General Service, 110 kVA (100 kW) - 1000 kVA
2.4L	General Service, 1000 kVA and Over
4.1L	Street and Area Lighting Service
4.11L	Street and Area Lighting Service Labrador - Installed as of Sept. 1, 2002
4.12L	Street and Area Lighting Service Labrador– Customer Owned
5.1L	Secondary Energy

(b) The terms and conditions relating to each class of Service shall be those approved by the Board from time to time.

(c) Service, other than Street and Area Lighting Service, shall be metered except where the energy consumption is relatively low and constant and in the opinion of Hydro can be readily determined without metering.

(d) The Customer shall use the Service on the Serviced Premises only. The Customer shall not resell the Service in whole or in part except that the Customer may include the cost of Service in charges for the lease of space or as part of the cost of other services provided by the Customer.

3. APPLICATION FOR SERVICE:

(a) An Applicant, when required by Hydro, shall complete a written Electrical Service Contract.

(b) An application for Service, when accepted by Hydro, constitutes a binding contract between the Applicant and Hydro which cannot be assigned.

(c) The person who signs an application for Service shall be personally liable for Service provided pursuant thereto, unless that person has authority to act for another Person denoted as the Applicant on the application for Service.

(d) Hydro may in its discretion refuse to provide Service to an Applicant where:

(i) the Applicant fails or refuses to complete an application for Service.

(ii) the Applicant provides false or misleading information on the application for Service.

(iii) the Applicant or the Owner or an Occupant of the Serviced Premises has a bill for any Service which is not paid in full 30 days or more after issuance.

NEWFOUNDLAND AND LABRADOR HYDRO

RULES AND REGULATIONS (Continued)

(iv) the Applicant fails to provide the security or guarantee required under Regulation 4.

(v) the Applicant is not the owner or an occupant of the Serviced Premises.

(vi) the Service requested is already supplied to the Serviced Premises for another Customer who does not consent to having his Service Discontinued.

(vii) the Applicant does not pay a charge described in Regulation 9 (b), (c) or (d).

(viii) the Applicant otherwise fails to comply with these Regulations.

(e) A Customer who has not completed an application for Service shall do so within 5 days of a request having been made by Hydro in writing.

4. SECURITY FOR PAYMENT:

(a) An Applicant or a Customer shall give such reasonable security for the payment of charges as may be required by Hydro. When the Customer has established two consecutive years of good credit history, the security deposit will be refunded with simple interest calculated at a Rate equivalent to the Rate paid from time to time by the chartered banks on over-the-counter withdrawal savings accounts.

(b) Hydro may in its discretion require special guarantees from an Applicant or Customer whose location or load characteristics would require abnormal investment in facilities or who requires Service of a special nature.

5. SERVICE STANDARDS - METERED SERVICES:

(a) Service shall normally be provided at one of the following nominal standard secondary voltages depending upon the requirements of the load to be served and the availability of a three phase supply:

Single phase, 3-Wire	-	120/240 volts
Three phase, 4-Wire	-	120/208 volts wye
Three phase, 4-Wire	-	347/600 volts wye

Service at any other supply voltage may be provided in special cases at the discretion of Hydro.

(b) Service to customers who are provided Domestic Service shall be supplied at single phase 120/240 volt or as part of a multiunit building, at single phase 120/208 volts. Hydro may if requested by the customer, provide three phase service if a contribution in aid of construction is paid to Hydro in accordance with regulation 9(c).

NEWFOUNDLAND AND LABRADOR HYDRO

RULES AND REGULATIONS (Continued)

(c) Hydro shall determine the point at which power and energy is delivered from Hydro's facilities to the Customer's electrical system.

(d) Service entrances shall be in a location satisfactory to Hydro and, except as otherwise approved by Hydro, shall be wired for outdoor meters.

(e) Where Hydro has reason to believe that Service to a Customer has or will have load characteristics which may cause undue interference with Service to another Customer, the Customer shall upon written notice by Hydro provide and install, at his expense and within a reasonable period of time, the equipment necessary to eliminate or prevent such interference.

(f) (i) Any Customer having a connected load or a normal operating demand of more than 25 kilowatts, in areas where space limitations or aesthetic reasons make it impractical to use a pole mounted transformer bank, shall, on request of Hydro, install and maintain a padmount transformer and all associated underground wiring, or provide at his expense a suitable vault or enclosure on the Serviced Premises for exclusive use by Hydro for its equipment necessary to supply and maintain service to the Customer.

(ii) Where either the service requirements of a Customer or changes to a Customer’s electrical system necessitate the installation of additional equipment to Hydro’s system which cannot be accommodated in Hydro’s existing vaults or structures, the Customer shall, on request of Hydro, provide at the Customer’s expense such additional space in its vault or enclosure as Hydro shall require to accommodate the additional equipment.

(g) The Customer shall not use a Service for across the line starting of motors rated over 10 horsepower except where specifically approved by Hydro.

(h) For Services having rates based on kilowatt demand, the average power factor shall not be less than 90%. Hydro, in its discretion, may make continuous tests of power factor or may test the Customer's power factor from time to time. If the Customer's power factor is lower than 90%, the Customer shall upon written notice by Hydro provide, at his expense, power factor corrective equipment to ensure that a power factor of not less than 90% is maintained.

(i) Hydro shall provide transformation for Service up to 500 kVA where the required service voltage is one of Hydro's standard service voltages and installation is in accordance with Hydro's standards. In other circumstances, Hydro, on such conditions as it deems acceptable, may provide the transformation.

(j) All Customer wiring and installations shall be in compliance with all statutory and regulatory requirements including the Canadian Electrical Code, Part 1 and, where applicable, in accordance with Hydro's specifications. However, the provision of Service shall not in any way be construed as acceptance by Hydro of the Customer's electrical system.

(k) The Customer shall provide such protective devices as may be necessary to protect his property and equipment from any disturbance beyond the reasonable control of Hydro.

6. SERVICE STANDARDS - STREET AND AREA LIGHTING SERVICE:

(a) For Street and Area Lighting Service Hydro shall use its best efforts to provide illumination during the hours of darkness for a total of approximately 4200 hours per year. Hydro shall, subject to Regulation 9 (i) make all repairs necessary to maintain service.

(b) Hydro shall supply the energy required and shall provide and maintain the illuminating fixtures and lamps together with necessary overhead conductors, control equipment and other devices.

(c) Hydro shall not be required to provide Street and Area Lighting Service where, in the opinion of Hydro, the normal Service is unsuitable for the task or where the nature of the activities carried out in the area would likely result in damage to the poles, wiring or fixtures.

(d) Hydro shall provide a range of fixture sizes utilizing an efficient lighting source in accordance with current standards in the industry and shall consult with the Customer regarding the most appropriate use of such fixtures for any specific installation.

(e) The location of fixtures for Street and Area Lighting Service shall be determined by Hydro in consultation with the Customer. After poles and fixtures have been installed they shall not be relocated except at the expense of the Customer.

(f) Hydro does not guarantee that fixtures used for Street and Area Lighting Service will illuminate any specific area.

(g) Where the installation of fixtures is required in a location where there are no existing distribution poles the Customer shall pay any contribution in aid of construction as may be determined under Hydro's policy for the pole line extension required to supply electric service to the location of the fixtures.

(h) Hydro shall not be required to provide additional Street and Area Lighting Service to a Customer where on at least two occasions in the preceding twelve months, his bill for such Service has been in arrears for more than 30 days.

7. METERING:

(a) Service to each building shall be metered separately except as provided in Regulation 7(b).

(b) Service to buildings and facilities on the same Serviced Premises which are occupied by the same Customer may, subject to Regulation 7(c), be metered together provided the Customer supplies and maintains all distribution facilities beyond the point of supply.

(c) Except as provided in Regulation 7(d) Service to each new Domestic Unit shall be metered separately.

(d) Where an existing Domestic Unit is subdivided into two or more new Domestic Units, Service to the new Domestic Units may, in the discretion of Hydro, be metered together.

(e) Where four or more Domestic Units are metered together, the Basic Customer Charge shall be multiplied by the number of Domestic Units.

(f) Where the Service to a Domestic Unit has a connected load for commercial or nondomestic purposes exceeding 3000 watts, exclusive of space heating, the Service shall not qualify for the Domestic Service Rate.

(g) Hydro shall not be required to provide more than one meter per Service, however, sub-metering by the Customer for any purpose not inconsistent with these Regulations is permitted.

(h) Subject to Regulations 7(c) and 7(g) Service to different units of a building may, at the request of the Customer, be combined on one meter or be metered separately.

(i) Maximum demand for billing purposes shall be determined by demand meter or, at the option of Hydro, may be based on:

(i) 80% of the connected load, where the demand does not exceed 100 kW, or

(ii) the smallest size transformer(s) required to serve the load if it is intermittent in nature such as X-Ray, welding machines or motors that operate for periods of less than thirty minutes, or

(iii) the kilowatt-hour consumption divided by an appropriate number of hours use where the demand is less than 10 kW.

(j) When charges are based on maximum demand the metering shall normally be in kVA if the applicable Rate is in kVA and in kW if the applicable Rate is in kW.

If the demand is recorded on a kVA meter but the applicable Rate is based on a kW demand, the recorded demand may be decreased by ten percent (10%) and the result shall be treated as the kW demand for billing purposes.

If the demand is recorded on a kW meter but the applicable Rate is based on a kVA demand, the recorded demand may be increased by ten percent (10%) and the result shall be treated as the kVA demand for billing purposes.

(k) The Customer shall ensure that meters and related equipment are visible and readily accessible to Hydro's personnel and are suitably protected. Unless otherwise approved by Hydro, meters shall be located outdoors and shall not subsequently be enclosed.

(l) If a meter is located indoors and Hydro employees are unable to obtain access to read the meter at the normal reading time for three consecutive months, the Customer shall upon written notice given by Hydro, provide for the installation of an outdoor meter at his expense.

(m) In the event that a dispute arises regarding the accuracy of a meter, and Hydro is unable to resolve the matter with the Customer then either the Customer or Hydro shall have the right to request an accuracy test in accordance with the requirements of the Electricity Inspection Act of Canada. Should the test indicate that the meter accuracy is not within the allowable limits, the Customer's bill shall be adjusted in accordance with the provisions of the said Act and all costs involved in the removal and testing of the meter shall be borne by Hydro. Should the test confirm the accuracy of the meter, the costs involved shall be borne by the party requesting the test. Hydro may require a Customer to deposit with Hydro in advance of testing, an amount sufficient to cover the costs involved.

(n) Metering shall normally be at secondary distribution voltage level but may at the option of Hydro be at the primary distribution level. When metering is at the primary distribution voltage (4-25KV) the monthly demand and energy consumption shall be reduced by 1.5%.

8. METER READING:

(a) Where reasonably possible Hydro shall read meters monthly provided that Hydro may, at its discretion, read meters at some other interval and estimate the reading for the intervening month(s). Areas which consist primarily of cottages will have their meters read four times per year and Hydro will estimate the readings for all other months.

(b) If Hydro is unable to obtain a meter reading due to circumstances beyond its reasonable control, Hydro may estimate the reading.

(c) If due to any cause a meter has not correctly recorded energy consumption or demand, then the probable consumption or demand shall be estimated in accordance with the best data available and used to determine the relevant charge.

9. CHARGES:

(a) Every Customer shall pay Hydro the charges approved by the Board from time to time for the Service(s) provided to the Customer or provided to the Serviced Premises at the Customer's request.

(b) Where a Customer requires Service for a period of less than three (3) years, the Customer shall pay Hydro in advance a "Temporary Connection Fee". The Temporary Connection Fee is calculated as the estimated labour cost of installing and removing lines and equipment necessary for the Service plus the estimated cost of non-salvageable material.

(c) Where special facilities are required or requested by the Customer or any facility is relocated at the request of the Customer, the Customer shall pay Hydro in advance the estimated additional cost of providing the special facilities and the estimated cost of the relocation less any betterment.

(d) The Customer shall pay Hydro in advance or on such other terms approved by the Board from time to time any contribution in aid of construction as may be determined by the methods prescribed by the Board.

(e) The Customer shall pay Hydro the amount set forth in the Rate for all poles required for Street and Area Lighting Service which are in addition to those installed by Hydro for the distribution of electricity. This charge shall not apply to Hydro poles and communications poles used jointly for Street and Area Lighting Service and communications attachments.

(f) Where a service is Disconnected pursuant to Regulation 12(a), b(ii), (c), or (d) and the Customer subsequently requests that the service be reconnected, the Customer shall pay a reconnection fee. Where a Service is Disconnected pursuant to Regulation 12(g) and an Applicant subsequently requests that the service be reconnected, the Applicant shall pay a reconnection fee. Applicants that pay the reconnection fee will not be required to pay the application fee. The reconnection fee shall be $20.00 where the reconnection is done during Hydro's normal office hours or $40.00 if it is done at other times.

(g) Where a Service, other than a Street and Area Lighting Service, is Discontinued pursuant to Regulation 11(a), or Disconnected pursuant to Regulations 12(a), b(ii), (c) or (d) and the Customer subsequently requests that the Service be restored within 12 months, the Customer shall pay, in advance, the minimum monthly charges that would have been incurred over the period if the Service had not been Discontinued or Disconnected.

(h) (i) Where a Street and Area Lighting Service is Discontinued pursuant to Regulation 11(a), (b), or (c), or 9(i), or when a Customer requests removal of existing fixtures, and/or poles, the Customer shall pay at the time of removal an amount equal to the unrecovered capital cost, plus the cost of removal less any salvage value of only the poles to be Discontinued or removed.

RULES AND REGULATIONS (Continued)

(ii) If a Customer requests the subsequent replacement of the fixture, either immediately or at any time within 12 months by another, whether or not of the same type or size, the Customer shall pay, in advance, an amount equal to the unrecovered capital cost of the fixture removed, plus the cost of removal, less any non-luminaire salvage, as well as the monthly charges that would have been incurred over the period if the Service had not been Discontinued.

(iii) Where a Street and Area Lighting Service is Discontinued, any pole dedicated solely to the Street and Area Lighting Service may, at the Customer's request, remain in place for up to 24 months from the date of removal of the fixture, during which time the Customer shall continue to pay the prescribed monthly charge for the pole.

(i) Where street and area lighting fixtures or lamps are wantonly, wilfilly, or negligently damaged or destroyed (other than through the negligence of Hydro), Hydro, at its option and after notifying the Customer by letter, shall remove the fixtures and the monthly charges for these fixtures will cease thirty days after the date of the letter. However, if the customer contacts Hydro within thirty days of the date of the letter and agrees to pay the repair costs in advance and all future repair costs, Hydro will replace the fixture and rental charges will recommence. If any future repair costs are not paid within three months of the date invoiced, Hydro, after further notifying the Customer by letter, may remove the fixtures. In all such cases the fixtures shall not be replaced unless the Customer pays to Hydro in advance all amounts owing prior to removal plus the cost of removing the old fixtures and installing the new fixtures.

(j) Where a Service other than Street and Area Lighting Service is not provided to the Customer for the full monthly billing period or where Street and Area Lighting Service is not provided for more than seven (7) days during the monthly billing period, the relevant charge to the Customer for the Service for that period may be prorated except where the failure to provide the Service is due to the Customer or to circumstances beyond the reasonable control of Hydro.

(k) Where a Customer's Service is at primary distribution or transmission voltage and the Customer provides his own transformation and all other facilities beyond the designated point of supply the monthly demand charge shall, subject to the minimum monthly charge, be reduced as follows:

For the Island Interconnected, L'Anse au Loup and Isolated service areas:

(i) for supply at 4 KV to 25 KV.. $0.40 per kVA

(ii) for supply at 33 KV to 138 KV.. $0.90 per kVA

For the Labrador Interconnected service area:

(iii) for supply at 4 KV to 25 KV.. $0.25 per kVA

(iv) for supply at 33 KV to 138 KV.. $0.60 per kVA

(l) Where a Customer's monthly demand has been permanently reduced because of the installation of peak load controls, power factor correction, or by rendering sufficient equipment inoperable, by any means satisfactory to Hydro, the monthly demands recorded prior to the effective date of such reduction may be adjusted when determining the Customer's demand for billing purposes thereafter. Should the Customer's demand increase above the adjusted demands in the following 12 months, the Customer will be billed for the charges that would have been incurred over the period if the demand had not been adjusted.

(m) Charges may be based on estimated readings or costs where such estimates are authorized by these Regulations.

(n) An application fee of $8.00 will be charged for all requests for Customer name changes and connection of new Serviced Premises. Landlords will be exempted from the application fee for name changes at Serviced Premises for which a landlord agreement pursuant to Regulation 11(f) is in effect.

10. BILLING:

(a) Hydro shall bill the Customer monthly for charges for Service. However, when a Service is disconnected or a bill is revised, Hydro may issue an additional bill.

(b) The charges for Street and Area Lighting Service may be included as a separate item on a bill for any other Service.

(c) Bills are due and payable when issued. Payment shall be made at such place(s) as Hydro may designate from time to time. Where a bill is not paid in full by the date that a subsequent bill is issued and the amount outstanding is $50.00 or more, Hydro will charge interest at a rate equal to the prime rate charged by chartered banks on the last day of the previous month plus five percent.

(d) Where a Customer's cheque or automated payment is not honoured by their financial institution, a charge of $16.00 may be applied to the Customer's bill.

(e) Where a Customer is billed on the basis of an estimated charge, an adjustment shall be made in a subsequent bill should such estimate prove to be inaccurate.

(f) Where between normal meter reading dates, one Customer assumes from another Customer the responsibility for a metered Service or a Service is Discontinued, Hydro may base the billing on an estimate of the reading as of the date of change.

(g) Where a Customer has been under billed due to an error on the part of Hydro or due to an act or omission by a third party, the Customer may, at the discretion of Hydro, be relieved of the responsibility for all or any part of the amount of the under billing.

11. DISCONTINUANCE OF SERVICE:

(a) A Service may be Discontinued by the Customer at any time upon prior notice to Hydro provided that Hydro may require 10 days prior notice in writing.

(b) A Service may be Discontinued by Hydro upon 10 days prior notice in writing to the Customer if the Customer:

(i) provided false or misleading information on the application for the Service; and

(ii) fails to provide security or guarantee for the Service required under Regulation 4.

(c) A Service may be Discontinued by Hydro without notice if the Service was Disconnected pursuant to Rule 12 and has remained Disconnected for over 30 consecutive days.

(d) When Hydro accepts an application for Service, any prior contract for the same Service shall be Discontinued except where an agreement for that Service is signed by a landlord under Regulation 11(f).

(e) Where a Service has been Discontinued, the Service may, at the option of Hydro and subject to Rule 12(a), remain connected.

(f) A landlord may sign an agreement with Hydro to accept charges for Service provided to a rental premise for all periods when Hydro does not have a contract for Service with a tenant for that premise.

12. DISCONNECTION OF SERVICE:

(a) Hydro shall Disconnect a Service within 10 days of receipt of a written request from the Customer.

(b) Hydro may Disconnect a Service without notice to the Customer:

(i) where the Service has been Discontinued.

(ii) on account of or to prevent fraud or abuse.

(iii) where in the opinion of Hydro the Customer's electrical system is defective and represents a danger to life or property.

(iv) where the Customer's electrical system has been modified without compliance with the Electrical Regulations.

(v) where the Customer has a building or structure under Hydro's wires which is within the minimum clearances recommended by the Canadian Standards Association.

(vi) when ordered to do so by any authority having the legal right to issue such order.

(c) Hydro may, in accordance with its Collection Policies, Disconnect a Service upon prior notice to the Customer if the Customer has a bill for any Service which is not paid in full 30 *days or more after issuance.*

(d) Hydro may Disconnect a Service upon 10 days prior notice to the Customer if the Customer is in violation of any provision of these Regulations.

(e) Hydro may refuse to reconnect a Service if the Customer is in violation of any provisions of these Rules or if the Customer has a bill for any Service which is unpaid.

(f) Hydro may disconnect a service to make repairs or alterations. Where reasonable and practical, Hydro shall give prior notice to the Customer.

(g) Hydro may disconnect the Service to a rental premises where the landlord has an agreement with Hydro authorizing Hydro to disconnect the Service for periods when Hydro does not have a contract for Service with a tenant of that premises.

13. PROPERTY RIGHTS:

(a) The Customer shall provide Hydro with space and cleared rights-of-way on private property for the line(s) and facilities required to serve the Customer.

(b) Hydro shall have the right to install, remove or replace such of its property as it deems necessary.

(c) The Customer shall provide Hydro with access to the Serviced Premises at all reasonable hours for purposes of reading a meter or installing, replacing, removing or testing its equipment, and measuring or checking the connected load.

(d) All equipment and facilities provided by Hydro shall remain the property of Hydro unless otherwise agreed in writing.

(e) The Customer shall not unreasonably interfere with Hydro's access to its property.

(f) The Customer shall not attach wire, cables, clotheslines or any other fixtures to Hydro's poles or other property except by prior written permission of Hydro.

(g) The Customer shall allow Hydro to trim all trees in close proximity to service lines in order to maintain such lines in a safe manner.

(h) The Customer shall not erect any buildings or obstructions on any of Hydro's easement lands or alter the grade of such easements by more than 20 centimetres, without the prior approval of Hydro.

14. HYDRO LIABILITY:

Hydro shall not be liable for any failure to supply Service for any cause beyond its reasonable control, nor shall it be liable for any loss, damage or injury caused by the use of Services or resulting from any cause beyond its reasonable control.

15. GENERAL:

(a) No employee, representative or agent of Hydro has authority to make any promise, agreement or representation, whether verbal or otherwise, which is inconsistent with these Regulations and no such promise, agreement or representation shall be binding on Hydro.

(b) Any notice under these Regulations will be considered to have been given to the Customer on the date it is received by the Customer or three days following the date it was delivered or mailed by Hydro to the Customer's last known address, whichever is sooner.

16. POLICIES FOR AUTOMATIC RATE CHANGES

(a) Island Interconnected System:

(i) As Newfoundland Power changes its rates, Hydro will automatically adjust all rates such that these customers pay the same rates as Newfoundland Power customers.

(b) L'Anse au Loup System:

(i) As Newfoundland Power changes its rates, Hydro will automatically adjust all rates such that these customers pay the same rates as Newfoundland Power customers.

(c) Isolated Systems:

(i) Isolated Rural Domestic customers, excluding Government departments, pay the same rates as Newfoundland Power for the basic customer charge and First Block consumption (outlined in Rate 1.2D). Rates charged for consumption above this block will be automatically adjusted by the average rate of change granted Newfoundland Power from time to time.

(ii) Rates for Isolated Rural General Service customers, excluding Government departments, will increase or decrease by the average rate of change granted Newfoundland Power from time to time.

RULES AND REGULATIONS (Continued)

(iii) As Newfoundland Power changes its rates, Hydro will automatically adjust Rural Isolated street and area lighting rates, excluding those for Government departments, such that these rates are the same as charged Newfoundland Power customers.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 1.2G

DOMESTIC DIESEL

GOVERNMENT DEPARTMENTS

Availability:

For Service to Government Departments throughout the Island and Labrador diesel service areas of Hydro, to a Domestic Unit or to buildings or facilities which are on the same Serviced Premises as a Domestic Unit and used by the same Customer exclusively for domestic or household purposes, whether such buildings or facilities are included on the same meter as the Domestic Unit or metered separately.

Rate:

Basic Customer Charge .... $55.69 per month

Energy Charge:
All kilowatt-hours .... @ 89.164 ¢ per kWh

Minimum Monthly Charge.. $55.69

Discount:

A discount of 1.5% of the amount of the current month's bill, but not less than $1.00 or more than $500.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 2.1G

GENERAL SERVICE DIESEL 0-10 kW

GOVERNMENT DEPARTMENTS (Continued)

Availability:

For Service (excluding Domestic Service) to Government Departments throughout the Island and Labrador diesel service areas of Hydro where the maximum demand occurring in the 12 months ending with the current month is less than 10 kilowatts.

Rate:

Basic Customer Charge .... $59.76 per month

Energy Charge:
All kilowatt-hours .... @ 81.367¢ per kWh

Minimum Monthly Charge $59.76

Discount:

A discount of 1.5% of the amount of the current month's bill, but not less than $1.00 or more than $500.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST), which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE 2.2G

GENERAL SERVICE DIESEL OVER 10 KW

GOVERNMENT DEPARTMENTS (Continued)

Availability:

For Service (excluding Domestic Service) to Government Departments throughout the Island and Labrador diesel service areas of Hydro where the maximum demand occurring in the 12 months ending with the current month is 10 kilowatts or greater.

Rate:

Basic Customer Charge: .... $73.76 per month

Demand Charge:
The maximum demand registered on the meter in the current month................ @ $59.83 per kW

Energy Charge:
All kilowatt-hours.. @ 60.033 ¢ per kWh

Discount:

A discount of 1.5% of the amount of the current month's bill, but not less than $1.00 or more than $500.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding metering [in particular Regulation 7 (n)], transformation [in particular Regulation 9(k)], and other conditions of service are provided in the Rules and Regulations. **This rate does not include the Harmonized Sales tax (HST) which applies to electricity bills.**

NEWFOUNDLAND AND LABRADOR HYDRO

RATE 4.1G

STREET AND AREA LIGHTING SERVICE DIESEL

GOVERNMENT DEPARTMENTS (Continued)

Availability:

For Street and Area Lighting Service to Government Departments throughout the Island and Labrador Diesel service areas of Hydro, where the electricity is supplied by Hydro and all fixtures, wiring and controls are provided, owned and maintained by Hydro.

Monthly Rate:

	SENTINEL / STANDARD
MERCURY VAPOUR	
250W (9,400 lumens)	$85.29
HIGH PRESSURE SODIUM [1]	
100W (8,600 lumens)	57.28
150W (14,400 lumens)	85.29

[1] Only High Pressure Sodium fixtures are available for all new installations and replacements.

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST), which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 1.1L

DOMESTIC

Availability:

For Service throughout the Labrador Interconnected service area of Hydro, to a Domestic Unit or to buildings or facilities which are on the same Serviced Premises as a Domestic Unit and used by the same Customer exclusively for domestic or household purposes, whether such buildings or facilities are included on the same meter as the Domestic Unit or metered separately.

Rate:

Basic Customer Charge: .... $7.09 per month

Energy Charge:
All kilowatt-hours .... @ 3.255¢ per kWh

Minimum Monthly Charge.. $7.09

Discount:

A discount of 1.5% of the amount of the current month's bill, but not less than $1.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 2.1L

GENERAL SERVICE 0 - 10 kW

Availability:

For Service (excluding Domestic Service) throughout the Labrador Interconnected service area of Hydro, where the maximum demand occurring in the 12 months ending with the current month is less than 10 kilowatts.

Rate:

Basic Customer Charge:
Unmetered.. $6.41 per month
Single Phase .... $10.37 per month
Three Phase .... $16.32 per month

Energy Charge:
All kilowatt-hours .... @ 5.092 ¢ per kWh

Minimum Monthly Charge:
Unmetered.. $6.41
Single Phase $10.37

Three Phase $20.00

Discount:

A discount of 1.5% of the amount of the current month's bill, but not less than $1.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 2.2L

GENERAL SERVICE 10 - 100 kW (110 kVA)

Availability:

For Service (excluding Domestic Service) throughout the Labrador Interconnected service area of Hydro, where the maximum demand occurring in the 12 months ending with the current month is 10 kilowatts or greater but less than 100 kilowatts (110 kilovolt-amperes).

Rate:

Basic Customer Charge:
Unmetered...$6.41 per month
Single Phase ....$10.37 per month
Three Phase ....$16.32 per month

Demand Charge:
The maximum demand registered on the meter in the current month ..... @ $1.76 per kW

Energy Charge:
All kilowatt-hours.. @ 2.417 ¢ per kWh

Maximum Monthly Charge:

The Maximum Monthly Charge shall be 6.8 cents per kWh, but not less than the Minimum Monthly Charge.

Minimum Monthly Charge:

An amount equal to $1.05 per kW of maximum demand occurring in the 12 months ending with the current month, but not less than $20.00 for a three phase service.

Discount:

A discount of 1.5% of the amount of the current month's bill, but not less than $1.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding metering [in particular Regulation 7 (n)], transformation [in particular Regulation 9(k)], and other conditions of service are provided in the Rules and Regulations. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 2.3L

GENERAL SERVICE 110 kVA (100 kW) - 1000 kVA

Availability:

For Service (excluding Domestic Service) throughout the Labrador Interconnected service area of Hydro, where the maximum demand occurring in the 12 months ending with the current month is 110 kilovolt-amperes (100 kilowatts) or greater but less than 1000 kilovolt-amperes.

Rate:

Demand Charge:
The maximum demand registered on the meter in the current month .... @ $1.97 per kVA

Energy Charge:
All kilowatt-hours... @ 2.090¢ per kWh

Maximum Monthly Charge:

The Maximum Monthly Charge shall be 6.8 cents per kWh, but not less than the Minimum Monthly Charge.

Minimum Monthly Charge:

An amount equal to $1.05 per kVA of maximum demand occurring in the 12 months ending with the current month.

Discount:

A discount of 1.5% of the amount of the current month's bill, up to a maximum of $500.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding metering [in particular Regulation 7 (n)], transformation [in particular Regulation 9(k)], and other conditions of service are provided in the Rules and Regulations. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 2.4L

GENERAL SERVICE 1000 kVA AND OVER

Availability:

For Service (excluding Domestic Service) throughout the Labrador Interconnected service area of Hydro, where the maximum demand occurring in the 12 month period ending with the current month is 1000 kilovolt-amperes or greater.

Rate:

Billing Demand Charge:
The maximum demand registered on the meter in the current month ..... @ $1.71 per kVA

Energy Charge:
All kilowatt-hours .... @ 1.725¢ per kWh

Maximum Monthly Charge:

The Maximum Monthly Charge shall be 6.8 cents per kWh, but not less than the Minimum Monthly Charge.

Minimum Monthly Charge:

An amount equal to $1.05 per kVA of maximum demand occurring in the 12 months ending with the current month.

Discount:

A discount of 1.5% of the amount of the current month's bill, up to a maximum of $500.00, will be allowed if the bill is paid within 10 days after it is issued.

General:

Details regarding metering [in particular Regulation 7 (n)], transformation [in particular Regulation 9(k)], and other conditions of service are provided in the Rules and Regulations. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 4.1L

STREET AND AREA LIGHTING SERVICE

Availability:

For Street and Area Lighting Service throughout the Labrador Interconnected service area of Hydro, where the electricity is supplied by Hydro and all fixtures, wiring and controls are provided, owned and maintained by Hydro.

Monthly Rate:

	SENTINEL / STANDARD
MERCURY VAPOUR[1]	
250W (9,400 lumens)	$15.42
HIGH PRESSURE SODIUM [2]	
100W (8,600 lumens)	$11.43
150W (14,400 lumens)	$15.42
250W (23,200 lumens)	$20.34
400W (45,000 lumens)	$26.28

[1] Fixtures previously owned by the Town of Wabush as of September 1, 1985, and transferred to Hydro in 1987.

[2] Only High Pressure Sodium fixtures are available for all new installations and replacements installed after September 1, 2002.

Special poles used exclusively for lighting service

Wood ....$ 3.88

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 4.11L

STREET AND AREA LIGHTING SERVICE

Availability:

For Street and Area Lighting Service throughout the Labrador Interconnected service area of Hydro, where the electricity is supplied by Hydro and all fixtures, wiring and controls are provided, owned and maintained by Hydro existing as of September 1, 2002.

Monthly Rate:

	SENTINEL / STANDARD
HIGH PRESSURE SODIUM [1]	
100W (8,600 lumens)	$7.71

[1] Any new fixtures added will be at the rates set out in Rate 4.1W.

Special poles used exclusively for lighting service

Wood $3.71

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 4.12L

STREET AND AREA LIGHTING SERVICE

Availability:

For Street and Area Lighting Service throughout the Labrador Interconnected service area of Hydro, where the electricity is supplied by Hydro and all fixtures, wiring and controls are provided, owned and maintained by the customer.

Monthly Rate:

	SENTINEL / STANDARD
HIGH PRESSURE SODIUM	
100W (8,600 lumens)	$ 4.68

Special poles used exclusively for lighting service

Wood ....$ 3.88

General:

Details regarding conditions of service are provided in the Rules and Regulations.
This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 5.1L

SECONDARY ENERGY

Availability:

For Service to Customers on the Labrador Interconnected grid engaged in fuel switching who purchase a minimum of 1 MW load and a maximum of 24 MW, who provide their own transformer and, who are delivered power at primary voltages. Hydro shall supply Secondary Energy to the Customer at such times and to the extent that Hydro has Churchill Falls electricity available in excess of the amount it requires for its own use, and to meet its commitments and sales opportunities, present and future, for firm energy. Moreover, Hydro may interrupt or reduce the supply of Secondary Energy at its sole discretion for any cause whatsoever. The energy delivered shall be used solely for the operation of the equipment engaged in fuel switching.

Energy Charge:

The energy charge shall be calculated monthly based on:

EITHER:

A. The Customer's cost of fuel (cents per litre) most recently delivered to the Customer including fuel additives, if any, in accordance with the following formula:

Secondary Energy Rate = Constant Factor x Fuel Cost/Litre x 90%

$$\text{Constant Factor} = \frac{3413\ \text{BTU/kWh} \times A \times B}{C \times D}$$

Where:

A = Customer's Electric Boiler Efficiency

B = Transformer and Losses Adjustment Factor

C = BTU/Litre of the Customer's fuel

D = Customer's Oil-fired Boiler Efficiency

OR:

B. One (1) cent less than the New York Mercantile Exchange (NYMEX) settlement price for New York Independent System Operator (NYISO) Zone A Swap Peak electricity after the end of trading on the 19th day of the previous month, converted to Canadian dollars using the exchange rate at the closing of the same day.

WHICHEVER IS GREATER

NEWFOUNDLAND AND LABRADOR HYDRO

RATE No. 5.1L

SECONDARY ENERGY

Prior to the commencement of service, the Customer will provide to Hydro the rate component values for insertion in the pricing formula for Secondary Energy. If subsequent changes to any of these rate components are required, the Customer will provide them to Hydro as soon as practicable. Hydro may require that these rate component values be verified.

Communications

The Customer and Hydro shall each designate a position within their respective staffs to be responsible for communications as to changes in the cost of the fuel delivered to the Customer. Hydro will contact the Customer's designate on or before the second working day of each month at which time the Customer's designate will inform Hydro of the fuel cost. If this information is unavailable to Hydro for any reason, Hydro will use the previous month's fuel cost and other inputs and make the adjustment to the correct values in the following month's billing.

Hydro will inform the Customer of the value of part B of the energy charge calculation on the first business day following the 21st day of the month preceding the month for which the rate is being set.

Power Factor

If the Customer's power factor is lower than 90%, the Customer shall upon written notice by Hydro provide, at the Customer's expense, power factor corrective equipment to ensure that a power factor of not less than 90% is maintained.

General:

Insofar as they are not inconsistent with the forgoing, the conditions of service provided in the Rules and Regulations shall apply to Customers in this rate class.

This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

NEWFOUNDLAND AND LABRADOR HYDRO

LABRADOR INDUSTRIAL – TRANMISSION

Availability:

CLOSED RATE – AVAILABLE TO EXISTING CUSTOMERS ONLY

Any person purchasing power, other than a retailer, supplied from the Labrador Interconnected bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and has entered into a contract with Hydro for the purchase of power and energy (Labrador Industrial Customer).

Monthly Rate:

Demand Charge:

The rate for Firm Power shall be $1.19 per kilowatt of billing demand. The billing demand shall be equal to the greater of (i) the customer's Power on Order; (ii) the actual monthly demand in the current month; and (iii) their maximum demand in the calendar year less their interruptible demand.

Specifically Assigned Charge:

This rate may include a specifically assigned charge upon approval by the Board.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

newfoundland labrador
hydro
a nalcor energy company

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P.O. Box 12400. St. John's. NL
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April 20, 2018

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL
A1A 5B2 Canada

Attention: **Ms. Cheryl Blundon**
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro – 2018 Utility Customer Interim Rates Application

On April 13, 2018, Newfoundland and Labrador Hydro (Hydro) filed its 2018 Utility Customer Interim Rates Application (the Application). The Application sought approval of revised Rate Stabilization Plan riders, a revised CDM rider, and an interim base rate increase to Hydro's Utility Customer rates all to be made effective July 1, 2018.

It has come to Hydro's attention that the calculation of the 2018 Revenue Deficiency and 2018 recovery percent under the proposed interim rates as presented in the Application evidence is incorrect. The 2018 Revenue Deficiency presented in Schedule 1 to the Application reflected the interim base rate increase on an annual basis as opposed to six months, as proposed in Hydro's Application for implementation effective July 1, 2018.

This resulted in an approximately $8 million overstatement of the additional base rate revenue flowing to Hydro in 2018 under the proposed interim rates, thereby overstating Hydro's 2018 recovery percentage and understating Hydro's 2018 Revenue Deficiency. The change in 2018 Revenue Deficiency requires a corresponding adjustment to the forecast 2019 rate impacts. The table below compares these changes to Hydro's original Application evidence.

Table 1 - 2018 Utility Customer Interim Rates Evidence - Summary of Changes

Scenario	**2018 End Consumer**	**2018 Revenue Deficiency** (millions)	**2018 Recovery**	**2019 End Consumer**
Expected Supply - Original	7.5%	$7.5	69.0%	-1.2%
Expected Supply - Revision 1	7.5%	$15.8	34.5%	-0.5%
Change	0.0%	$8.3	-34.5%	0.7%
Deferral Account - Original	7.5%	$15.5	51.9%	8.6%
Deferral Account - Revision 1	7.5%	$23.8	25.9%	9.4%
Change	0.0%	$8.3	-26.0%	0.8%

The attached 2018 Utility Customer Interim Rates Application (Revision 1) reflects the changes noted in Table 1. For ease of reference, changes from the original filing have been highlighted in grey.

This revision does not alter Hydro's requested rates to be made effective July 1, 2018.

Hydro apologizes for any inconvenience this may have caused. Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Geoffrey P. Young
Corporate Secretary & General Counsel
GPY/skc

Encl.

cc: Gerard Hayes - Newfoundland Power
Paul Coxworthy - Stewart McKelvey
Denis J. Fleming - Cox & Palmer
Dennis Browne, Q.C. – Brown Fitzgerald Morgan & Avis
Dean Porter - Poole Althouse

ecc: Van Alexopoulos - Iron Ore Company
Senwung Luk - Olthuis Kleer Townshend LLP
Benoît Pepin - Rio Tinto

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 and the *Public Utilities Act*, RSN 1990, Chapter P-47 (the *Act*);

AND IN THE MATTER OF a General Rate Application by Newfoundland and Labrador Hydro to establish customer electricity rates for 2018 and 2019;

AND IN THE MATTER OF an application by Newfoundland and Labrador Hydro, pursuant to Sections 70 and 75 of the *Act,* for the approval of customer electricity rates for 2018 on an interim basis ("2018 Utility Customer Interim Rates Application").

TO: The Board of Commissioners of Public Utilities (the Board)

The 2018 Utility Customer Interim Rates Application of Newfoundland and Labrador Hydro states that:

A. Background

A.1 General

1. Newfoundland and Labrador Hydro (Hydro) is a corporation continued and existing under the *Hydro Corporation Act*, *2007,* is a public utility within the meaning of the *Act*, and is subject to the provisions of the *Electrical Power Control Act, 1994*.

2. Under the *Act*, the Board has the general supervision of public utilities and requires that a public utility submit for the approval of the Board the rates, tolls, and charges for the

service provided by the public utility and the rules and regulations which relate to that service.

3. Section 70 of the *Act* provides that a public utility shall not charge, demand, collect, or receive compensation for a service performed by it until the Board has approved a schedule of rates, tolls, and charges for the services provided by the public utility.

4. In Order No. P.U. 49(2016), the Board ordered, amongst other things, that Hydro file its next General Rate Application (GRA) no later than March 31, 2017, with a 2018 Test Year. On February 20, 2017, Hydro filed an application requesting approval to file its next GRA on or before July 31, 2017, reflecting 2018 and 2019 Test Years. In Order No. P.U. 8(2017), the Board ordered Hydro to file its next GRA by July 31, 2017.

5. In Order No. P.U. 7(2018), the Board acknowledged that without an interim rate increase in 2018, Hydro's earnings would be below both the existing return on rate base and the proposed range of return on rate base.

A.2 Interim Rates Request

6. On July 28, 2017, Hydro filed a GRA with the Board. The GRA, among other items, requested approval on an interim basis effective January 1, 2018 of: (i) revised rates for all of Hydro's customers; (ii) a revised rate structure for Labrador Industrial Transmission

Customers; (iii) revised rules and regulations for Hydro Rural customers; and (iv) a revision in the RSP Rules for the purpose of calculation of the Rural Rate Adjustment.

7. On October 4, 2017 Hydro filed correspondence with the Board that proposed delaying the process and subsequent implementation of interim rates beyond January 1, 2018 to permit the Hydro GRA to proceed in an efficient manner.

8. By Order No. P.U. 30(2017), the Board established, amongst other things, a schedule for the 2017 GRA which provides for the commencement of public hearings of the GRA on January 30, 2018.

9. On January 4, 2018, the Consumer Advocate filed an application to delay the 2017 GRA schedule until certain additional information is filed by Hydro. Scheduled settlement discussions and the commencement of the hearing were delayed as a result of the application filed by the Consumer Advocate.

10. By Order No. P.U. 2(2018), the Board ordered Hydro to file additional revenue requirement and cost of service information for its review. On March 22, 2018, Hydro filed additional revenue requirement and cost of service information for the Board's review.

11. The commencement of the hearing is scheduled for April 16, 2018. However, due to other regulatory proceedings in the Board's calendar, the timing of conclusion of the hearing process remains uncertain.

12. The 2017 GRA evidence shows that Hydro has a material 2018 revenue deficiency and if Hydro is not provided rate relief in 2018, Hydro's earnings will below the bottom of both the existing approved range of return on rate base and the 2017 GRA proposed range of return on rate base.

13. Hydro anticipates that final rates resulting from the 2017 GRA process may not be in effect until 2019.

14. Section 75 of the *Act* provides that the Board may make an interim order unilaterally and without public hearing or notice, approving with or without modification, a schedule of rates, tolls and charges submitted by a public utility upon the terms and conditions that it may decide. A public hearing of this application is therefore not necessary.

A.3 Customer Rates

15. In Board Order No. P.U. 22(2017), the Board approved Hydro's proposal to implement a revised Utility Rate to Newfoundland Power related to Hydro's 2013 Amended GRA to reflect Order No. P.U. 49(2016).

16. Order No. P.U. 40(2003) sets out the manner by which the Rate Stabilization Plan (RSP) is calculated and applied to the rates that Hydro charges its Island Industrial Customers and Newfoundland Power. The most recent version of the RSP rules was approved in Order No. P.U. 31(2017). The RSP rules require Hydro to provide a Newfoundland Power fuel price projection to the Board, to Newfoundland Power and to Hydro's Industrial Customers by the tenth working day of April of each year.

17. The RSP rules require that the approved Test Year number of barrels of No. 6 fuel be used in the calculation of the RSP fuel rider. However, Hydro is forecasting that as a result of anticipated off-island power purchases for the period July 1, 2018 to June 30, 2019, that the number of barrels of No. 6 fuel consumed will be approximately 1.3 million barrels lower than the 2015 Test Year forecast.

18. For the period 2008 to 2015, the RSP rules were modified to permit a revised number of barrels of No. 6 fuel to be used in establishing the fuel rider. This change was implemented so that the fuel rider would reasonably reflect the forecast fuel cost variation that will result from the updated fuel price. The revision to the RSP rules to permit this deviation was initially approved in Order No. P.U. 11(2008).

19. The Board approved the use of a $64.41 per barrel fuel cost (CDN) for the 2015 Test Year based on a 2016 fuel price forecast which was filed on October 28, 2015. In Order No. P.U. 22(2017), concurrent with the implementation of the new base rates that

became effective July 1, 2017, the Board approved the implementation of a fuel rider of 0.672¢ per kWh to apply to Newfoundland Power based on the April 2017 fuel price forecast of $81.40 per barrel (CDN) for the period July 1, 2017 to June 30, 2018.

20. In accordance with section D.2 of the RSP rules, Hydro is required to update the RSP Current Plan adjustment rate for disposition of the Newfoundland Power Current Plan balance at March 31st plus forecast financing charges to the end of the 12-month recovery period (i.e., June in the following calendar year). In Order No. P.U. 22(2017), the Board approved the RSP Recovery Adjustment of (0.132)¢ per kWh.

21. In Board Order No. P.U. 22(2017), the Board approved the RSP rate mitigation adjustment rate for Newfoundland Power to reduce the projected July 1, 2017 rate increase. The RSP mitigation adjustment rate of (0.911)¢ per kWh was based on the disposition of an RSP credit balance over the period July 1, 2017 to June 30, 2018 and is, therefore, set to expire on July 1, 2018.

22. In Board Order No. P.U. 49(2017), the Board approved (i) the exclusion of Hydro's conservation and demand management (CDM) program costs as an expense in the determination of revenue requirement through the deferral of these costs to the CDM Deferral Account and (ii) the recovery of these costs through the CDM Cost Recovery Adjustment.

23. In Board Order No. P.U. 22(2017), the Board approved a CDM Cost Recovery Adjustment of 0.019 ¢ per kWh to apply in billing Newfoundland Power effective July 1, 2017.

24. The CDM Cost Recovery Adjustment is required to be updated annually to provide recovery over a seven year period of costs charged annually to the CDM Cost Deferral Account.

B. Application

B.1 General

25. The 2018 Utility Customer Interim Rates Application proposes: (i) to modify the RSP rules to permit a deviation from the use of the Test Year No. 6 barrels in the calculation of the RSP fuel rider; (ii) to update the Utility Customer RSP Adjustments (including the conclusion of the RSP mitigation adjustment rate) effective July 1, 2018; (iii) to update the CDM Cost Recovery Adjustment to become effective July 1, 2018; and (iv) to implement an interim increase in the base rates for Newfoundland Power, all effective July 1, 2018.

26. Schedule 1 to this 2018 Utility Customer Interim Rates Application provides evidence on: (i) the requirement for interim rates in 2018; (ii) the requirement for the proposed modification to the RSP rules; (ii) the customer impacts of implementation of the proposed interim Utility rate: (iii) the proposed RSP adjustments and the CDM Cost Recovery Adjustment; and (iv) Hydro’s recovery of its increased costs in 2018 if the

proposed interim Utility Rate is approved on the implementation date proposed by Hydro.

B.2 Utility Customer RSP Adjustments

27. Schedule 2 to this 2018 Utility Customer Interim Rates Application provides the proposed RSP rules including the proposed revision for use in calculation of the fuel rider.

28. Schedule 3 to this 2018 Utility Customer Interim Rates Application provides the calculation of the No. 6 fuel price forecast of $85.55 per barrel (CDN) for the period July 1, 2018 to June 30, 2019 and the fuel rider of 0.423¢ per kWh. The forecast fuel rider reflects an increase of $21.14 per barrel (CDN) from the 2015 Test Year No. 6 fuel price of $64.41 per barrel (CDN) and will replace the current Newfoundland Power Customer fuel rider of 0.672¢ per kWh.

29. Schedule 4 to this 2018 Utility Customer Interim Rates Application provides the calculation of the proposed RSP Current Plan Adjustment of (0.296)¢ per kWh to apply to Newfoundland Power. The proposed RSP Current Plan adjustment will replace the existing RSP Current Plan Adjustment of (0.132)¢ per kWh.

30. Hydro is proposing to conclude the Newfoundland Power RSP mitigation adjustment rate of (0.911)¢ per kWh which was implemented July 1, 2017.

31. Schedule 5 to this 2018 Utility Customer Interim Rates Application provides the calculation of the proposed CDM Cost Recovery Adjustment.

B.3 Proposed Interim Rates

32. Hydro is proposing to implement the interim base rate change for Newfoundland Power effective July 1, 2018.

33. Hydro is proposing an increase in the first block energy charge with no change in the demand charge or the second block energy charge.

34. Schedule 6 to this 2018 Utility Customer Interim Rates Application provides the proposed rate sheets to be implemented on an interim basis effective July 1, 2018.

B.5 Hydro's Request

35. Hydro requests the Board approve:

a) Revised RSP rules for use in the calculation of the RSP fuel rider;

b) The use of 1,273,184 barrels of No. 6 fuel for use in the calculation of the RSP fuel rider for Newfoundland Power to become effective July 1, 2018;

c) a revised RSP Current Plan Adjustment of (0.296)¢ per kWh;

d) a revised RSP Fuel Rider of 0.423¢ per kWh;

e) a revised CDM Cost Recovery Adjustment of 0.022¢ per kWh;

f) the conclusion of the RSP rate mitigation adjustment rate approved in P.U. 22(2017); and

g) Hydro's proposed Utility Rate to apply to Newfoundland Power as set out in Schedule 6 on an interim basis effective July 1, 2018, specifically:

I. the existing Demand rate of $4.75 per kW per month;

II. a revised energy rate of 2.782¢ per kWh for the first 250,000,000 kilowatt-hours; and

III. the existing energy rate of 10.422¢ per kWh for the excess kilowatt-hours.

C. Reasons for Approval

36. Approval by the Board of the proposals in the 2018 Utility Customer Interim Rates Application will permit partial recovery of the increased cost of servicing Newfoundland Power in 2018 through interim customer rates as provided for, and intended by, the *Act;* the *Electrical Power Control Act, 1994;* and the Orders of the Board set out in the Application.

37. Approval by the Board of the proposed increases interim rates to become effective July 1, 2018 for Newfoundland Power will also reduce the 2018 revenue deficiency to be recovered in customer rates in 2019 and 2020 and contribute to customer rate stability.

38. Approval of the proposed RSP adjustments and the proposed CDM Cost Recovery Adjustment to become effective July 1, 2018 will provide for reasonable recovery of

costs during the period between the approval of Test Year rates and is consistent the deferral account recovery mechanisms approved by the Board.

D. Communications:

39. Communication with respect to the 2018 Interim Rates Application should be forwarded to the attention of Geoff Young and J. Alex Templeton, Counsel to Newfoundland and Labrador Hydro.

DATED AT St. John's in the Province of Newfoundland and Labrador this 13 day of April, 2018.

NEWFOUNDLAND AND LABRADOR HYDRO

Geoff Young and J. Alex Templeton
Counsels for the Applicant
Newfoundland and Labrador Hydro
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2018 Utility Customer Interim Rates Application

Schedule 1 - Evidence

April 13, 2018

Revised: April 20, 2018

newfoundland labrador hydro
a nalcor energy company

Table of Contents

<u>Appendices</u>

1.0 Background

1.1 Rate Stabilization Plan Update

Newfoundland and Labrador Hydro (Hydro) is required by the Newfoundland and Labrador Board of Commissioners of Public Utilities (the Board) to file its proposed Rate Stabilization Plan (RSP) Adjustments by the tenth working day in April to be reflected in a revised rate to Newfoundland Power effective the first of July each year. The RSP Adjustments refers to all applicable adjustments arising from the operation of Hydro's RSP, which provides recovery of fuel cost variations on the Island Interconnected System as a result of variations in hydraulic production, fuel price, and customer load requirements.

This report provides evidence on the following RSP adjustments proposed for implementation on July 1, 2018:

(i) Update to the RSP Fuel Rider which applies to Newfoundland Power;
(ii) Update to Newfoundland Power's RSP Current Plan adjustment; and
(iii) Conclusion of Newfoundland Power's RSP Mitigation Adjustment.

1.2 Conservation and Demand Management Program Costs

In Board Order No. P.U. 49(2017), the Board approved the exclusion of Hydro's Conservation and Demand Management (CDM) program costs as an expense in the determination of revenue requirement through the deferral of these costs in the CDM Cost Deferral Account and the recovery of these costs through the CDM Cost Recovery Adjustment.

The CDM Cost Recovery Adjustment is required to be updated annually to provide recovery, over a seven year period, of costs charged annually to the CDM Cost Deferral Account. This report provides the proposed CDM Cost Recovery Adjustment to apply for the period of July 1, 2018 to June 30, 2019.

1.3 Interim Rates Proposals

On July 28, 2017, Hydro filed its 2017 General Rate Application with the Board (2017 GRA). The 2017 GRA, among other items, requested approval of revised rates for all of Hydro's customers on an interim basis to become effective on January 1, 2018. On October 4, 2017, Hydro filed correspondence with the Board that proposed delaying the interim rates process to permit Hydro's 2017 GRA to proceed in an efficient manner.

The commencement of the 2017 GRA hearing is scheduled for April 16, 2018. However, due to other regulatory proceedings in the Board's calendar, the hearing process may not conclude until late summer 2018. Hydro anticipates that final rates resulting from the 2017 GRA process may not be in effect until 2019.

The 2017 GRA evidence shows that Hydro has a material revenue deficiency in 2018 and, if not provided rate relief in 2018, Hydro's earnings will be below the bottom of both the existing approved range of return on rate base and that which is proposed in the 2017 GRA. In Order No. P.U. 7(2018), the Board approved increased rates on an interim basis for Island Industrial Customers which resulted in an average increase of 1.2% and recovery of 70% of Hydro's increased cost of serving customers in 2018. The Board acknowledged that without an interim rate increase, Hydro's earnings would be below both the existing and proposed range of return on rate base.

This evidence provides support for Hydro's proposal to increase base rates to Newfoundland Power, on an interim basis, effective July 1, 2018.

2.0 RSP Annual Adjustments

2.1 General

This section provides a summary of the revisions to the RSP adjustments to become effective July 1, 2018. These revisions are required in accordance with the approved RSP Rules.

Appendix A to this evidence provides the RSP Monthly Report for March 2018. The balances and the activity to the end of March are used in the calculation of the RSP recovery adjustment factor and the allocation of balances among customer classes.

2.2 RSP - Fuel Rider Update

The RSP Fuel Rider was implemented to enable annual adjustments to customer rates through the RSP to reflect the change in the forecast No. 6 fuel price between Test Years.[1] This approach serves to minimize balances accruing in the RSP as a result of forecast fuel price variances.

In Order No. P.U. 22(2017), concurrent with the implementation of the new base rates that became effective July 1, 2017, the Board approved the implementation of a fuel rider of 0.672¢ per kWh to apply to Newfoundland Power based on the April 2017 fuel price forecast of $81.40 per barrel (CDN) for the period July 1, 2017 to June 30, 2018.[2]

RSP rules require that the approved Test Year number of barrels of No. 6 fuel be used in the calculation of the RSP Fuel Rider. However, as a result of anticipated off-island power purchases for the period July 1, 2018 to June 30, 2019, Hydro is forecasting that the number of barrels of No. 6 fuel consumed will be approximately 1.3 million barrels lower than the approved 2015 Test Year barrels. For the period 2008 to 2015, the Board approved modified RSP rules to permit a revised number of barrels of No. 6 fuel to be used in establishing the fuel rider so the rider would reasonably reflect the forecast fuel cost variation that would have resulted from the updated fuel price.[3]

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[1] Section C of the RSP Rules dictates the process by which fuel riders are calculated for Hydro's Island Interconnected Customers. Section C states that the fuel price projection is meant to *"…anticipate forecast fuel price changes and to determine fuel riders for the rate adjustments."*
[2] The Board approved the use of a $64.41 per barrel fuel cost (CDN) for the 2015 Test Year based on a 2016 fuel price forecast, which was filed on October 28, 2015.
[3] The revision to the RSP Rules to permit this change was initially approved in Order No. P.U. 11(2008).

If Hydro applied the current RSP Rules and used the approved 2015 Test Year No. 6 barrels for establishing the RSP Fuel Rider to become effective July 1, 2018, Hydro expects that a large balance would accrue in the RSP as a result of the RSP Fuel Rider being materially higher than required. Therefore, Hydro is proposing a revision to the RSP Rules to permit a revised number of barrels used in the calculation of the RSP Fuel Rider. The proposed RSP Rules revision is included as Schedule 2 to the 2018 Utility Customer Interim Rates Application (Application).[4] As a result of using the updated number of forecast barrels, the utility customer allocation is approximately $25.0 million less than it would be using the 2015 Test Year barrels. Given this change, the RSP Fuel Rider is proposed to be reduced from 0.672¢ per kWh to 0.423¢ per kWh.

Schedule 3 to this Application provides the calculation of the forecast price of No. 6 fuel of $85.55 per barrel (CDN) for the period July 1, 2018 to June 30, 2019 and the proposed fuel rider of 0.423¢ per kWh. The forecast fuel price is an increase of $21.14 per barrel (CDN) from the 2015 Test Year No. 6 fuel price of $64.41 per barrel (CDN) and a $4.15 per barrel increase compared to the No. 6 fuel price reflected in Newfoundland Power's current fuel rider.

2.3 RSP – Current Plan Update

Hydro is proposing to update Newfoundland Power's RSP Current Plan Adjustment in accordance with existing RSP Rules. The RSP Current Plan Adjustment rate provides for the disposition of the Newfoundland Power Current Plan balance at March 31st plus forecast financing charges to the end of the 12-month recovery period (i.e., June in the following calendar year).

In Order No. P.U. 16(2017), the Board approved a transfer from the Newfoundland Power RSP Load Variation balance to the Newfoundland Power RSP Current Plan to mitigate the

[4] Hydro notes that this proposed change will have no impact on the deferral accounts reflected in its 2017 GRA. The RSP, Off-Island Purchases Deferral Account, Energy Supply Cost Variance Deferral Account, and the Revised Energy Supply Cost Variance Deferral Account are all proposed to operate on the approved test year price of No. 6 fuel, excluding the impact of any RSP Fuel Riders.

proposed July 1, 2017 RSP Adjustment rate increase. In Order No. P.U. 22(2017), the Board approved a RSP Current Plan Mitigation Adjustment of (0.911)¢ per kWh for Newfoundland Power to provide the disposition of the credit balance transfer over the period July 1, 2017 to June 30, 2018. As such, Hydro is proposing to conclude of the RSP mitigation adjustment rate for Newfoundland Power effective July 1, 2018. Hydro's proposal will return to a single RSP Current Plan Adjustment effective July 1, 2018.

Schedule 4 to the Application provides the calculation of the proposed RSP Current Plan Adjustment of (0.296)¢ per kWh to apply to Newfoundland Power. The proposed RSP Current Plan adjustment will replace the existing normal RSP Current Plan Adjustment of (0.132)¢ per kWh and the RSP Mitigation Adjustment of (0.911)¢ per kWh.

3.0 CDM Cost Recovery Adjustment

Hydro is proposing to implement an updated CDM Cost Recovery Adjustment for Newfoundland Power effective July 1, 2018. The CDM Cost Recovery Adjustment is required to be updated annually to provide recovery over a seven year period of costs charged annually to the CDM Cost Deferral Account.[5]

Schedule 5 to the Application provides the calculation of the updated CDM Cost Recovery Adjustment for Newfoundland Power to become effective July 1, 2018. The CDM Cost Recovery Adjustment is proposed to increase from 0.019 ¢ per kWh to 0.022¢ per kWh effective July 1, 2018.

[5] The CDM Cost Recovery Adjustment is calculated to recover the sum of individual amounts representing 1/7th of the transfer to the CDM Deferral Account for the previous year and the amortizations carried forward from prior years.

4.0 Customer Impacts of Annual Adjustments

Table 1 provides a summary of the customer rate impacts resulting from updates to the RSP adjustments to apply to Newfoundland Power, as well as the revised CDM Cost Recovery Adjustment.

Table 1: Summary of Customer Rate Impacts of July 1, 2018 Adjustments[6]

Line No.	Particulars	Existing	Proposed	Wholesale Impact	End-Customer Impact
		cents/kWh	cents/kWh	%	%
1	RSP Fuel Rider	0.672	0.423	-3.5%	-2.4%
2	RSP Current Plan - Normal	(0.132)	(0.296)	-2.3%	-1.6%
3	RSP Current Plan - Mitigation	(0.911)	-	12.9%	8.7%
4	CDM Recovery Adjustment	0.019	0.022	0.0%	0.0%
5	**Total**			**7.1%**	**4.7%**

Table 1 indicates that the overall impact of the RSP and CDM adjustments have an estimated end-consumer impact of 4.7% (7.1% Utility increase) effective July 1, 2018. If Hydro did not propose a revision to the RSP Rules for computing the RSP Fuel Rider, the end-customer rate increase for all RSP adjustments would be approximately 8.9% (13.2% Utility increase).

5.0 Requirement for Interim Rates

Based on the Additional Cost of Service Information filed with the Board on March 22, 2018, the continuation of 2015 Test Year base rates for Newfoundland Power in 2018 is forecast to result in a revenue deficiency of $53.8 million under the Deferral Account Scenario, and $43.4 million under the Expected Supply Scenario.[7] A revenue deficiency of either of these magnitudes would result in a net loss for Hydro in 2018 and a return on rate base below the lower end of the approved range of return on rate base of 6.41% (midpoint of 6.61%).[8]

[6] Customer impacts are calculated using 2018 Test Year annual billing determinates. End-customer impact estimated as 67.5% of the wholesale rate impact.
[7] Source: *Additional Cost of Service Information*, filed March 22, 2018, Table 4 and Table 7.
[8] 2015 rate of return on rate base of 6.61% was approved by the Board in P.U. 22(2017).

If increased base rates for Newfoundland Power are not implemented in 2018, the revenue deficiency for the full calendar year of 2018 will be required to be recovered from customers upon establishment of final customer rates in 2019. Based on the most recent hearing schedule, the hearing process may not be completed until late summer or early fall. Therefore, it is possible final rates resulting from the 2017 GRA may not be implemented until later than January 1, 2019. In this circumstance, future rates would need to include recovery of both a 2018 Revenue Deficiency (for all of 2018) and a 2019 Revenue Deficiency (for part of 2019). The resulting rate impact would be a larger increase in customer rates in 2019 to permit recovery of the revenue deficiencies related to the costs incurred to provide service in prior periods.

Approval of an increase in base rates on an interim basis in 2018 will reduce the amount of the 2018 Revenue Deficiency (and possibly 2019 Revenue Deficiency) to be recovered from customers in future years and also reduce intergenerational equity concerns caused by delayed rate implementation.

6.0 Wholesale Interim Rates Proposal

6.1 General

To develop a proposal for 2018 interim rates requires consideration of both the 2018 Revenue Deficiency and the projected 2019 customer rate impacts upon the implementation of final customer rates resulting from the 2017 GRA. Hydro also has approximately $65.4 million in deferred supply costs for which it will be seeking recovery beginning in 2019. Customer rate impacts associated with the recovery of the deferred supply costs also requires consideration with respect to Hydro's interim rates proposals, as it too could require higher customer rates to enable cost recovery.

The Board will decide in the final 2017 GRA Order whether the Deferral Account Scenario or the Expected Supply Scenario should be used in establishing revenue requirements for 2018 and 2019. As noted earlier, the end-consumer rate impact of updating the RSP and CDM adjustments will result in an end customer rate increase of approximately 4.7%.[9] Any increase in the base rate to Newfoundland Power will result in a higher end-consumer rate increase.

Hydro is proposing interim rates for Newfoundland Power to become effective July 1, 2018 to provide recovery of approximately 35% of the 2018 Revenue Deficiency based on the Expected Supply Scenario and approximately 26% under the Deferral Account Scenario. Detailed calculations of the adjusted 2018 and 2019 Test Year revenue requirements used in this calculation are included as Appendix B to this evidence.[10]

The next section provides a summary of the customer rate impacts in 2018 and 2019 and the projected 2018 cost recovery giving consideration to both the Revised Deferral Account Scenario and the Expected Supply Scenario. Hydro has also estimated the impact of the 2017 GRA Settlement Agreement in its estimate of its 2018 and 2019 revenue deficiencies.[11]

6.2 Rate Stability Considerations

6.2.1 Expected Supply Scenario

Table 2 provides, under the Expected Supply Scenario, the projected end-customer rate impacts in 2018 and 2019 and the projected 2018 Revenue Deficiency showing the RSP and CDM update only impacts separately from the proposed approach which includes the RSP and CDM update in addition to the proposed increase in the base rate for Newfoundland Power.

[9] The actual percentage increase may differ as it depends on the disposition of the balances in the Newfoundland Power Rates Stabilization Account.

[10] 2018 and 2019 Test Year revenue requirements have been adjusted to reflect the operation of the 2015 Test Year RSP in 2018, Hydro's most up-to-date No. 6 fuel price forecast, and estimated impacts of the 2017 GRA Settlement Agreement.

[11] The revenue requirement impact of the 2017 GRA Settlement Agreement in the Utility Customer Interim Rates Application is a preliminary estimate subject to further revision upon Hydro's 2017 GRA Compliance Application.

Table 2: Impact of Annual Rate Adjustments and Interim Rates - Expected Supply Scenario

Line No.	Scenario	2018 End Consumer	2019 End Consumer[12]	2018 Recovery	2018 Revenue Deficiency (millions)
1	RSP+CDM (no Interim Rates)	4.7%	2.8%	0.0%	$24.2
2	Interim Base Rate Increase	2.8%	-3.3%	34.5%	($8.4)
3	Supply Cost Recovery	0.0%	5.1%	0.0%	$0.0
4	**Total**	**7.5%**	**4.6%**	**34.5%**	**$15.8**

Table 2 shows that under the Expected Supply Scenario, Hydro would recover approximately 35% of the estimated 2018 Revenue Deficiency if the Board approved a base rate increase to Newfoundland Power that would result in a 2.8% end-consumer increase (4.1% increase for the Utility Rate) in addition to the approximate 4.7% end-consumer increase required for the RSP and CDM adjustments update. The overall end-consumer rate impact would be an approximate 7.5% increase in 2018.

The proposed interim rates to become effective July 1, 2018 are forecast to result in an end-consumer rate decrease in 2019 as a result of the forecast reduced revenue requirement for the Island Interconnected System relative to 2018. However, if the Board approves the use of the Expected Supply Scenario for establishing customer rates, Hydro is proposing the recovery of $65.4 million in deferred supply costs over a 20 month amortization period beginning January 1, 2019 (i.e., to conclude in the month prior to the planned commissioning of the Muskrat Falls Project). The forecast 2019 end-customer impacts reflecting this recovery period is a net rate increase of 4.6%.

[12] If the Board approves the proposed 2018 RSP and CDM rate changes only, the forecast rate increase in 2019 to recover 2019 costs and 2018 revenue deficiency is 2.8%. If Hydro's proposed interim base rate increase of 2.8% is approved in addition to the RSP and CDM changes, the forecast 2019 rate impact is reduced by 3.3% primarily as a result of having a lower 2018 Revenue Deficiency. The net forecast 2019 impact of -0.5% (2.8% -3.3%) is proposed to be offset by a 5.1% increase to provide the recovery of deferred supply costs over a 20-month amortization period.

6.2.2 Deferral Account Scenario

Table 3 provides, under the Deferral Account Scenario, the projected end-customer rate impacts in 2018 and 2019 and the projected 2018 Revenue Deficiency showing the RSP and CDM update only impacts separately from the proposed approach which includes the RSP and CDM update in addition to the proposed increase in the base rate for Newfoundland Power.

Table 3: Impact of Annual Rate Adjustments and Interim Rates - Deferral Account Scenario

Line No.	Scenario	2018 End Consumer	2019 End Consumer[13]	2018 Recovery	2018 Revenue Deficiency (millions)
1	RSP+CDM (no Interim Rates)	4.7%	13.0%	0.0%	$32.2
2	Interim Base Rate Increase	2.8%	-3.6%	25.9%	($8.4)
3	Supply Cost Recovery	0.0%	0.0%	0.0%	$0.0
4	**Total**	**7.5%**	**9.4%**	**25.9%**	**$23.8**

Table 3 shows that under the Deferral Account Scenario, Hydro would recover approximately 26% of the estimated 2018 Revenue Deficiency if the proposed interim base rate increase in addition to the revised RSP and CDM adjustments effective July 1, 2018.

If Hydro's proposed 2018 interim rate increase is approved effective July 1, 2018, the 2019 end-customer impact is 9.4% under the Deferral Account Scenario. In its letter dated April 13, 2018, Hydro identified options for recovery of deferred supply costs under the Deferral Account Scenario. Hydro has represented one of these potential alternatives in Table 3 where the recovery of the deferred supply costs could be mitigated through use of the Off-Island Purchases Deferral Account; as such, there would be no additional customer impacts forecast in 2019 under this scenario.

[13] If the Board approves the proposed 2018 RSP and CDM rate changes only, the forecast rate increase to recover 2019 costs and 2018 revenue deficiency in 2019 is 13.0%. If Hydro's proposed interim base rate increase of 2.8% is approved in addition to the RSP and CDM changes, the forecast 2019 rate impact is reduced by 3.6% (net 9.4%) primarily as a result of having a lower 2018 Revenue Deficiency.

6.3 Utility Rate Design

Hydro is proposing that the interim rate increase in the Utility Rate apply to the first block energy charge.[14] This approach ensures that the additional base rate revenues resulting from the implementation of interim rates are recorded as revenue and are not transferred to the RSP balance.[15] Hydro's proposal for 2018 interim rates reflects the continuation of the RSP operating relative to the 2015 Test Year.[16] The proposed revision to the fuel rider will provide recovery of the forecast No. 6 fuel cost variances for 2018.[17]

Table 4 provides a comparison of the existing and proposed rates for Newfoundland Power.

Table 4: Comparison of Existing and Proposed Utility Rate Components

	Rate Components	Units	Existing	Proposed	Change
Base Rates	Demand Charge	$/kW	4.75	4.75	-
	Base Energy - First Block	¢/kWh	2.226	2.782	0.556
	Base Energy - Second Block	¢/kWh	10.422	10.422	-
Deferral Account Recovery Adjustments	RSP Current Plan	¢/kWh	(0.132)	(0.296)	(0.164)
	RSP Rate Mitigation	¢/kWh	(0.911)	-	0.911
	RSP Fuel Rider	¢/kWh	0.672	0.423	(0.249)
	CDM Recovery	¢/kWh	0.019	0.022	0.003

[14] The operation of the RSP results in any change in billings resulting from an increase in the second block energy rate (without an offsetting fuel cost increase) being transferred to the RSP load variation component balance. Therefore, the approval of an interim increase on the second block energy rate in July 2015 did not provide any additional interim revenues to Hydro in 2015 and 2016 as the additional revenues were transferred to the balance sheet in the RSP Load Variation balance.

[15] During the 2013 Amended GRA process, the Board approved an interim Utility Rate effective July 1, 2015, with an equal percentage (8.0%) increase applied to each rate component for Newfoundland Power. However, the additional billings from the increase to the second block energy charge flowed through to the RSP Load Variation balance for the period while rates were interim (from July 1, 2015 to June 30, 2017).

[16] In 2018, the RSP will operate relative to the 2015 Test Year, including a No. 6 fuel price of $64.41 CDN/bbl.

[17] The operation of the RSP Load Variation component during the period of interim rates during the 2013 GRA contributed to Hydro's revenue deficiencies in 2015 and 2016 prompting Hydro to request the Board to approve cost deferrals in 2015 and 2016 to avoid forecast financial losses for each year. To avoid this reoccurrence in 2018, Hydro had proposed that interim rate increases apply to rate components that do not impact the operation of the RSP such as the demand charge.

Approval of the rates proposed in the Application will result in an updated RSP Fuel Rider reflecting Hydro's best forecast of the 2018/2019 fuel cost variance, conclusion of the RSP Mitigation Adjustment, an update to the RSP Current Plan and CDM recovery riders, and provide Hydro interim rate relief in 2018 while serving to reduce Hydro's forecast 2018 revenue deficiency. The estimated end-customer 2018 rate increase for Newfoundland Power based on the proposed rates in Table 4 is 7.5%.

7.0 Summary

Hydro's application proposes to update its RSP and CDM adjustments as required by the approved RSP Rules and CDM Cost Deferral Account definition approved by the Board. The estimated end-consumer rate impact of the adjustment update is approximately 4.7%. This estimated rate impact reflects Hydro's proposal to revise the RSP Rules to reflect the reduced operation of Holyrood as a result of the interconnection with the North American grid. The end-consumer impact would be approximately 4.2% higher based on the existing RSP Rules for computation of the fuel rider.[18]

Hydro is also proposing an increase in the base rate for Newfoundland Power on an interim basis effective July 1, 2018 to provide the opportunity for partial recovery of its increased cost to serve Newfoundland Power during 2018. Based on the most recent hearing schedule, final rates resulting from the 2017 GRA may not be implemented until after January 1, 2019. In this circumstance, future rates will need to address recovery of both 2018 Revenue Deficiency and 2019 Revenue Deficiency. Delayed implementation of increased base rates in 2018 will result in higher customer rates in 2019 as a result of revenue deficiencies related the cost of providing service in prior years.

The implementation of Hydro's interim rate proposals will reduce the requirement for a higher rate increase at the conclusion of Hydro's GRA. Hydro considers its interim rates

[18] Total RSP rate impact of 4.7% per Table 1 vs. 8.9% if Hydro did not propose a revision to the RSP Rules for computing the RSP Fuel Rider.

NEWFOUNDLAND AND LABRADOR HYDRO
RATE STABILIZATION PLAN REPORT
March 31, 2018

Rate Stabilization Plan Report
March 31, 2018

Summary of Key Facts

The Rate Stabilization Plan of Newfoundland and Labrador Hydro (Hydro), as amended by Board Order No. P.U. 40 (2003), Order No. P.U. 8 (2007) and Order No. P.U. 49 (2016), is established for Hydro's utility customer, Newfoundland Power, and Island Industrial customers to smooth rate impacts for variations between actual results and Test Year cost of Service estimates for:

- Hydraulic production;
- No. 6 fuel cost used at Hydro's Holyrood generating station;
- Customer load (Utility and Island Industrial); and
- Rural rates.

The Test Year Cost of Service Study is based on projections of events and costs that are forecast to happen during a test year. Finance charges are calculated on the balances using the test year Weighted Average Cost of Capital which is currently 6.61% per annum. Holyrood's operating efficiency is set, for RSP purposes, at 618 kWh/barrel regardless of the actual conversion rate experienced.

	2015 Test Year Cost of Service			
	Net Hydraulic Production	No. 6 Fuel Cost	Utility Load	Industrial Load
	(kWh)	($Can/bbl.)	(kWh)	(kWh)
January	503,640,000	57.55	729,300,000	49,000,000
February	457,830,000	59.85	662,500,000	45,900,000
March	438,830,000	61.41	657,400,000	51,200,000
April	370,790,000	61.41	514,600,000	50,500,000
May	312,990,000	62.64	423,000,000	53,500,000
June	323,000,000	62.64	348,100,000	51,700,000
July	330,220,000	62.64	314,700,000	51,900,000
August	330,170,000	62.64	314,500,000	53,100,000
September	326,980,000	62.64	337,300,000	38,300,000
October	348,360,000	66.51	416,700,000	58,800,000
November	400,160,000	71.70	526,000,000	57,800,000
December	460,598,000	76.05	680,000,000	59,700,000
Total	4,603,568,000		5,924,100,000	621,400,000

Rate Stabilization Plan
Plan Highlights
March 31, 2018

	Actual	Cost of Service	Variance	Year-to-Date Due (To) From Customers	Reference
Hydraulic production year-to-date	1,519.5 GWh	1,400.3 GWh	119.2 GWh	$ (11,732,841)	Page 3
No 6 fuel cost - Current month	$ 79.97	$ 61.41	$ 18.56	$ 16,198,897	Page 4
Year-to-date customer load - Utility	1,943.5 GWh	2,049.2 GWh	-105.7 GWh	$ 706,450	Page 9
Year-to-date customer load - Industrial	157.5 GWh	146.1 GWh	11.4 GWh	$ 634,136	Page 10
				$ 5,806,642	

Rural rates		
Rural Rate Alteration (RRA)	$ (19,145)	
Less : RRA to utility customer	$ (18,311)	Page 7
RRA to Labrador interconnected	(834)	
Fuel variance to Labrador interconnected	$ 48,239	Page 5
Net Labrador interconnected	$ 47,405	

Current plan summary		
One year recovery		
Due (to) from utility customer	$ (30,037,553)	Page 7
Due (to) from Industrial customers	$ 49,059	Page 8
Sub total	(29,988,494)	
Four year recovery		
Hydraulic balance	$ (19,434,656)	Page 3
Utility RSP Surplus	(11,297,442)	Page 13
Total plan balance	$ (60,720,592)	Page 14

Rate Stabilization Plan
Net Hydraulic Production Variation
March 31, 2018

	A	B	C	D	E	F	G
	Cost of Service Net Hydraulilc Production (kWh)	Actual Net Hydraulic Production (kWh)	Monthly Net Hydraulic Production Variance (kWh)	Cost of Service No. 6 Fuel Cost ($Can/bbl.)	Net Hydraulic Production Variation ($)	Financing Charges ($)	Cumulative Variation and Financing Charges ($)
			(A - B)		(C / O[1] x D)		(E + F) (to page 14)
Opening balance							(7,557,375)
January	503,640,000	508,345,612	(4,705,612)	57.55	(438,167)	(40,419)	(8,035,961)
February	457,830,000	492,257,091	(34,427,091)	59.85	(3,334,325)	(42,979)	(11,413,265)
March	438,830,000	518,943,985	(80,113,985)	61.41	(7,960,349)	(61,042)	(19,434,656)
April							
May							
June							
July							
August							
September							
October							
November							
December							
	1,400,300,000	1,519,546,688	(119,246,688)		(11,732,841)	(144,440)	(19,434,656)
Hydraulic Allocation[2]					-	-	-
Hydraulic variation at year end					(11,732,841)	(144,440)	(19,434,656)

[1] O is the Holyrood Operating Efficiency of 618 kWh/barrel (ref. Board Order No. P.U.49(2016) p.32).
[2] At year end 25% of the hydraulic variation balance and 100% of the annual financing charges are allocated to customers.

Rate Stabilization Plan
No. 6 Fuel Variation
March 31, 2018

	A	B	C	D	E	F	G
	Actual Quantity No. 6 Fuel (bbl.)	Actual Quantity No. 6 Fuel for Non-Firm Sales (bbl.)	Net Quantity No. 6 Fuel (bbl.)	Cost of Service No. 6 Fuel Cost ($Can/bbl.)	Actual Average No. 6 Fuel Cost ($Can/bbl.)	Cost Variance ($Can/bbl.)	No. 6 Fuel Variation ($)
			(A - B)			(E - D)	(C x F) (to page 5)
January	386,020	-	386,020	57.55	77.83	20.28	7,830,191
February	226,331	-	226,331	59.85	79.70	19.85	4,491,681
March	208,849	-	208,849	61.41	79.97	18.56	3,877,025
April							
May							
June							
July							
August							
September							
October							
November							
December							
	821,200	-	821,200				16,198,897

Rate Stabilization Plan
Allocation of Fuel Variance - Year-to-Date
March 31, 2018

	A	B	C	D	E	F	G	H	I	J
	Twelve Months-to-Date				Year-to-Date Fuel Variance				Reallocate Rural Island Customers [1]	
	Utility (kWh)	Industrial Customers (kWh)	Rural Island Customers (kWh)	Total (kWh)	Utility ($)	Industrial Customers ($)	Rural Island Customers ($)	Total ($)	Utility ($)	Labrador Interconnected ($)
				(A+B+C)	(A/D X H) (to page 6)	(B/D X H) (to page 6)	(C/D X H)	(from page 4)	(G X 95.65%) (to page 6)	(G X 4.35%)
January	5,873,836,344	603,719,888	475,037,542	6,952,593,774	6,615,266	679,925	535,000	7,830,191	511,721	23,279
February	5,838,623,404	613,634,168	475,115,774	6,927,373,346	10,385,288	1,091,485	845,099	12,321,872	808,327	36,772
March	5,777,715,658	617,169,994	469,815,878	6,864,701,530	13,633,895	1,456,359	1,108,643	16,198,897	1,060,404	48,239
April										
May										
June										
July										
August										
September										
October										
November										
December										

(1) The Fuel Variance initially allocated to Rural Island Interconnected is re-allocated between Utility and Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the 2015 Cost of Service Study, which is 95.65% and 4.35% respectively. The Labrador Interconnected amount is then removed from the plan and written off to net income (loss), (ref. Board Order NO. P.U.49(2016) p.105).

Rate Stabilization Plan
Allocation of Fuel Variance - Monthly
March 31, 2018

	A	B	C	D	E	F	G
	Utility					Industrial	
	Fuel Variance		Rural Allocation		Total Fuel Variance Activity for the Month ($)	Fuel Variance	
	Year-to-Date Activity ($)	Current Month Activity [1] ($)	Year-to-Date Activity ($)	Current Month Activity [1] ($)	(B + D)	Year-to-Date Activity ($)	Current Month Activity [1] ($)
	(from page 5)		(from page 5)		(to page 7)	(from page 5)	(to page 8)
January	6,615,266	6,615,266	511,721	511,721	7,126,987	679,925	679,925
February	10,385,288	3,770,022	808,327	296,606	4,066,628	1,091,485	411,560
March	13,633,895	3,248,607	1,060,404	252,077	3,500,684	1,456,359	364,874
April							
May							
June							
July							
August							
September							
October							
November							
December							
		13,633,895		1,060,404	14,694,299		1,456,359

[1] The current month activity is calculated by subtracting year-to-date activity for the prior month from year-to-date activity for the current month.

Rate Stabilization Plan
Summary of Utility Customer
March 31, 2018

	A	B	C	D	E	F	G	H
	Load Variation ($)	Allocation Fuel Variance ($)	Allocational Rural Rate Alteration [(1)] ($)	Subtotal Monthly Variances ($)	Financing Charges ($)	Adjustment [(2)] ($)	Transfers ($)	Cumulative Net Balance ($)
				(A + B + C)				
	(from page 12)	(from page 6)						(to page 14)
Opening Balance								(52,440,260)
January	515,561	7,126,987	(5,906)	7,636,642	(280,468)	2,607,970		(42,476,116)
February	405,271	4,066,628	(7,027)	4,464,872	(227,176)	2,323,456		(35,914,964)
March	295,237	3,500,684	(5,378)	3,790,543	(192,085)	2,278,953		(30,037,553)
April								
May								
June								
July								
August								
September								
October								
November								
December								
Year to date	1,216,069	14,694,299	(18,311)	15,892,057	(699,729)	7,210,379		22,402,707
Hydraulic allocation **(from page 3)**								
Total	1,216,069	14,694,299	(18,311)	15,892,057	(699,729)	7,210,379		(30,037,553)

[(1)] The Rural Rate Alteration is allocated between Utility and Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved 2015 Cost of Service Study, which is 95.65% and 4.35% respectively. The Labrador Interconnected amount is then removed from the plan and written off to net income (loss).

[(2)]The RSP adjustment rate of 0.371 cents per kWh effective July 1, 2017 was approved in Board Order No. P.U. 22(2017).

Rate Stabilization Plan
Summary of Industrial Customers
March 31, 2018

	A	B	C	D	E	F	G
	Load Variation ($)	**Allocation Fuel Variance ($)**	**Subtotal Monthly Variances ($)**	**Financing Charges ($)**	**Adjustment [1] ($)**	**Transfers**	**Cumulative Net Balance ($)**
			(A + B)				
	(from page 12)	**(from page 6)**					**(to page 14)**
Opening Balance							(1,608,676)
January	49,185	679,925	729,110	(8,604)	33,227		(854,943)
February	40,605	411,560	452,165	(4,573)	30,135		(377,216)
March	30,735	364,874	395,609	(2,017)	32,683		49,059
April							
May							
June							
July							
August							
September							
October							
November							
December							
Year to date	120,525	1,456,359	1,576,884	(15,194)	96,045		1,657,735
Hydraulic allocation **(from page 3)**							-
Total	120,525	1,456,359	1,576,884	(15,194)	96,045		49,059

[1] The RSP adjustment rate for Industrial is 0.061 cents per kWh effective July 1, 2017. Approved in Board Order No. P.U. 26(2017).

Rate Stabilization Plan
Load Variation - Utility
March 31, 2018

	A	B	C	D	E	F	G	H	I	J	K
	Firm Energy						Secondary Energy				
	Cost of Service Sales (kWh)	Acutal Sales (kWh)	Sales Variance (kWh)	Cost of Service No. 6 Fuel Cost ($Can/bbl.)	Firm Energy Rate [2] ($/kWh)	Load Variation ($)	Cost of Service Sales (kWh)	Actual Sales (kWh)	Firming Up Charge [2] ($/kWh)	Load Variation ($)	Total Load Variation ($)
			(B - A)			C x {(D/O[1]) - E}				(G - H) x I	(F + J) (to page 11)
January	729,300,000	701,927,961	(27,372,039)	57.55	0.10422	303,943	-	1,028,951	0.02882	(29,654)	274,289
February	662,500,000	625,341,808	(37,158,192)	59.85	0.10422	273,790	-	926,761	0.02882	(26,709)	247,081
March	657,400,000	613,254,800	(44,145,200)	61.41	0.10422	214,423	-	1,018,131	0.02882	(29,343)	185,080
April											
May											
June											
July											
August											
September											
October											
November											
December											
	2,049,200,000	1,940,524,569	(108,675,431)			792,156	-	2,973,843		(85,706)	706,450

[1] O is the Holyrood Operating Efficiency of 618 kWh/barrel. (ref. Board Order No. P.U.49(2016) p.32)

[2] 2015 Test Year firm energy rate for Utility is 10.422 cents per kWh effective January 1, 2017 and a firming up charge of 2.882 cents per kWh effective January 1, 2017. Approved in Board Order No. P.U.22(2017).

Rate Stabilization Plan
Load Variation - Industrial
March 31, 2018

	A	B	C	D	E	F
	Cost of Service Sales (kWh)	Actual Sales (kWh)	Sales Variance (kWh)	Cost of Service No. 6 Fuel Cost ($)	Firm Energy Rate ($/kWh)	Load Variation ($)
			(B - A)			C x {(D/O[1]) - E} (to page 11)
January	49,000,000	54,470,202	5,470,202	57.55	0.03971	292,141
February	45,900,000	49,402,452	3,502,452	59.85	0.03971	200,136
March	51,200,000	53,578,084	2,378,084	61.41	0.03971	141,859
April						
May						
June						
July						
August						
September						
October						
November						
December						
	146,100,000	157,450,738	11,350,738			634,136

(1) O is the Holyrood Operating Efficiency of 618 kWh/barrel, (ref. Board Order No. P.U.49(2016) p.32).

Rate Stabilization Plan
Allocation of Load Variance - Year-to-Date
March 31, 2018

	A	B	C	D	E	F	G	H	I	J
	Twelve Months-to-Date				Year-to-Date Load Variance				Reallocate Rural Island Customers (1)	
	Utility (kWh)	Industrial Customers (kWh)	Rural Island Customers (kWh)	Total (kWh)	Utility ($)	Industrial Customers ($)	Rural Island Customers ($)	Total (2) ($)	Utility ($)	Labrador Interconnected ($)
				(A+B+C)	(A/D X H)	(B/D X H)	(C/D X H)	(from pages 9 & 10)		
January	5,873,836,344	603,719,888	475,037,542	6,952,593,774	478,543	49,185	38,702	566,430	37,018	1,684
February	5,838,623,404	613,634,168	475,115,774	6,927,373,346	854,336	89,790	69,521	1,013,647	66,496	3,025
March	5,777,715,658	617,169,994	469,815,878	6,864,701,530	1,128,312	120,525	91,749	1,340,586	87,757	3,992
April										
May										
June										
July										
August										
September										
October										
November										
December										

(1) The Load Variance initially allocated to Rural Island Interconnected is re-allocated between Utility and Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the 2015 Cost of Service Study, which is 95.65% and 4.35% respectively. The Labrador Interconnected amount is then removed from the plan and written off to net income (loss). (ref. Board Order NO. P.U.49(2016) p.105)
(2) Total load re-allocated based on energy ratios. The total is the sum of the Load Variation - Utility (page 9) and Load Variation - Industrial (page 10).

Rate Stabilization Plan
Allocation of Load Variance - Year-to-Date
March 31, 2018

	A	B	C	D	E	F	G
	Utility					Industrial	
					Total load		
	Load Variance		Rural Allocation			Load Variance	
	Year-to-Date Activity ($)	Current Month Activity [(1)] ($)	Year-to-Date Activity ($)	Current Month Activity [(1)] ($)	Activity for the month ($)	Year-to-Date Activity ($)	Current Month Activity [(1)] ($)
					(B + D) (page 7)		(page 8)
January	478,543	478,543	37,018	37,018	515,561	49,185	49,185
February	854,336	375,793	66,496	29,478	405,271	89,790	40,605
March	1,128,312	273,976	87,757	21,261	295,237	120,525	30,735
April							
May							
June							
July							
August							
September							
October							
November							
December							
		1,128,312		87,757	1,216,069		120,525

(1) The current month activity is calculated by subtracting year-to-date activity for the prior month from year-to-date activity for the current month.

Rate Stabilization Plan
Utility RSP Surplus
March 31, 2018

	A	B	C	D
	Industrial Customer Adjustment ($)	**Utility Payout (1) ($)**	**Financing Charges ($)**	**Cumulative Balance ($)**
				(to page 14)
Opening Balance				(12,638,065)
January		1,489,103	(67,593)	(11,216,555)
February		-	(59,990)	(11,276,545)
March		39,414	(60,311)	(11,297,442)
April				
May				
June				
July				
August				
September				
October				
November				
December				
Year to date	-	1,528,517	(187,894)	1,340,623
Total	-	1,528,517	(187,894)	(11,297,442)

(1) Consists of a payout to Newfoundland Power for customer refunds of $1.408M, Hydro customer refunds of $0.005M, Hydro admin costs of $0.035M, and NL Power admin costs of $0.081M.

Rate Stabilization Plan
Overall Summary
March 31, 2018

	A	B	C	D	E
	Hydraulic Balance ($)	**Utility Balance ($)**	**Industrial Balance ($)**	**Utility RSP Surplus ($)**	**Total To Date ($)**
	(from page 3)	**(from page 7)**	**(from page 8)**	**(from page 13)**	**(A + B + C + D)**
Opening Balance	(7,557,375)	(52,440,260)	(1,608,676)	(12,638,065)	(74,244,376)
January	(8,035,961)	(42,476,116)	(854,943)	(11,216,555)	(62,583,575)
February	(11,413,265)	(35,914,964)	(377,216)	(11,276,545)	(58,981,990)
March	(19,434,656)	(30,037,553)	49,059	(11,297,442)	(60,720,592)
April					
May					
June					
July					
August					
September					
October					
November					
December					

Appendix B

Adjustments to Revenue Requirement

1.0 Adjustments to Revenue Requirement – Deferral Account Scenario

1.1 2018 Test Year

Hydro's 2018 Test Year Cost of Service studies filed with the Additional Cost of Service Information on March 22, 2018, reflect a forecast 2018 No. 6 fuel price of $68.01 CDN/bbl.[1] Because the RSP will operate relative to the 2015 Test Year for 2018; Hydro will recover through the RSP the No. 6 fuel price variance from the 2015 Test Year approved price of $64.41. Therefore, for the purpose of determining Hydro's recovery of its 2018 Test Year costs in developing its interim rate proposals, Hydro has adjusted the 2018 Test Year revenue requirement to be recovered from Newfoundland Power to reflect the 2015 Test Year fuel price.

Details of the No. 6 fuel cost adjustment for the 2018 Test Year for the purpose of determining cost recovery and revenue deficiency are provided in Table 1.

Table 1: Adjusted 2018 Test Year Fuel Cost to Reflect 2015 Test Year Deferral Account Scenario

Particulars	As Filed	2015TY RSP	Variance
No. 6 Fuel Consumption (bbls)	2,522,118	2,522,118	-
Unit Cost ($/bbl)	68.01	64.41	(3.60)
No. 6 Fuel Cost ($)	**171,529,245**	**162,449,620**	**(9,079,625)**

To determine the portion of the fuel cost difference to be allocated to Newfoundland Power, the $9.1 million fuel adjustment was then allocated by customer class based on the 2018 Test Year forecast energy consumption, as shown in Table 2.

[1] Additional Cost of Service Information, Summary Report, Page 3, lines 2 and 3.

Table 2: 2018 No. 6 Fuel Cost Adjustment Allocation – Deferral Account Scenario

Customer Class	Energy (MWh)	%	Allocated $
Newfoundland Power	5,824,500	83.1%	(7,546,811)
Island Industrial	726,000	10.4%	(940,679)
Rural	457,000	6.5%	(592,135)
Total	**7,007,500**		**(9,079,625)**

The Island Interconnected rural customer No. 6 fuel adjustment of $0.6 million was allocated to Newfoundland Power based on a rural deficit factor of 96.1%. This adjustment results in a reduction of approximately $8.1 million in the No. 6 fuel cost allocated to Newfoundland Power.

For the purpose of determining Hydro's recovery of its 2018 Test Year costs in developing its interim rate proposals, Hydro has also adjusted the 2018 Test Year revenue requirement to be recovered from Newfoundland Power to reflect the estimated impact of the 2017 GRA Settlement Agreement.[2] Table 3 provides the 2018 revenue requirement to be recovered from Newfoundland Power for the Deferral Account Scenario including the adjustments described earlier.

Table 3: Adjusted 2018 Revenue Requirement from Newfoundland Power - Deferral Account Scenario

Particulars	$
2018TY Revenue Requirement	486,982,978
No. 6 Fuel Adjustment	(8,115,853)
Estimated Settlement Impact	(13,517,712)
Adjusted 2018TY	**465,349,413**

[2] For the 2018 Test Year, Hydro estimates $13.5 million of the estimated $16.8 million estimated revenue requirement reduction will be allocated to Newfoundland Power.

1.2 2019 Test Year

Hydro's 2019 Test Year Cost of Service studies filed with the Additional Cost of Service Information on March 22, 2018 reflect a forecast 2019 No. 6 fuel price of $63.63 CDN/bbl.[3] However, Hydro's most recent forecast price of No. 6 fuel is $85.55 CDN/bbl as provided in Schedule 3. Therefore, for the purpose of determining Hydro's recovery of its 2019 Test Year Revenue Requirement in developing its interim rate proposals, Hydro has adjusted the 2019 Test Year revenue requirement to be recovered from Newfoundland Power to reflect the most recent fuel price forecast provided to the Board.

Details of the No. 6 fuel cost adjustment for the 2019 Test Year are shown in Table 4.

Table 4: 2019 Test Year No. 6 Fuel Adjustment – Deferral Account Scenario

Particulars	As Filed	Forecast	Variance
No. 6 Fuel Consumption (bbls)	2,533,629	2,533,629	-
Unit Cost ($/bbl)	63.63	85.55	21.92
No. 6 Fuel Cost ($)	**161,214,813**	**216,751,961**	**55,537,148**

The $55.5 million fuel cost adjustment was then allocated by customer class based on the 2019 Test Year forecast energy consumption, as shown in Table 5.

Table 5: 2019 No. 6 Fuel Cost Adjustment Allocation – Deferral Account Scenario

Customer Class	Energy (MWh)	%	Allocated $
Newfoundland Power	5,833,600	83.0%	46,096,054
Island Industrial	743,300	10.6%	5,873,422
Rural	451,500	6.4%	3,567,671
Total	**7,028,400**		**55,537,148**

[3] Additional Cost of Service Information, Summary Report, Page 3, lines 6 through 8.

The Island Interconnected rural customer No. 6 fuel adjustment of $3.6 million was allocated to Newfoundland Power based on a rural deficit factor of 96.1%. This results in a total adjustment to the 2019 Test Year revenue requirement to be recovered from Newfoundland Power of approximately $49.5 million.

Hydro has also incorporated the estimated impact of the 2017 GRA Settlement Agreement in the calculation of the adjusted 2019 Test Year revenue requirement.[4] Table 6 provides the 2019 revenue requirement to be recovered from Newfoundland Power for the Deferral Account Scenario including the adjustments described earlier.

Table 6: Adjusted 2019 Revenue Requirement from Newfoundland Power Deferral Account Scenario

Particulars	**$**
2019TY Revenue Requirement	488,272,628
No. 6 Fuel Adjustment	49,524,586
Estimated Settlement Impact	(12,795,178)
Adjusted 2019TY	**525,002,036**

2.0 Adjusted Revenue Requirement – Expected Supply Scenario

2.1 2018 Test Year

Similar adjustments were required under the Expected Supply Scenario as provided earlier for the Deferral Account Scenario. Details of the No. 6 fuel cost adjustment for the 2018 Test Year are shown in Table 7.

[4] For the 2019 Test Year, Hydro estimates $12.8 million of the estimated $16.6 million estimated revenue requirement reduction will be allocated to Newfoundland Power.

Table 7: Adjusted 2018 Test Year Fuel Cost to Reflect 2015 Test Year Expected Supply Scenario

Particulars	As Filed	2015TY RSP	Variance
No. 6 Fuel Consumption (bbls)	1,782,981	1,782,981	-
Unit Cost ($/bbl)	68.01	64.41	(3.60)
No. 6 Fuel Cost ($)	**121,260,538**	**114,841,806**	**(6,418,732)**

The $6.4 million fuel adjustment was then allocated by customer class based on the 2018 Test Year forecast energy consumption, as shown in Table 8.

Table 8: 2018 No. 6 Fuel Cost Adjustment Allocation – Expected Supply Scenario

Customer Class	Energy (MWh)	%	Allocated $
Newfoundland Power	5,824,500	83.1%	(5,335,127)
Island Industrial	726,000	10.4%	(665,002)
Rural	457,000	6.5%	(418,603)
Total	**7,007,500**		**(6,418,732)**

The Island Interconnected rural customer No. 6 fuel adjustment of $0.4 million was allocated to Newfoundland Power based on a rural deficit factor of 96.1%. This results in a total adjustment to the 2018 Test Year revenue requirement to be recovered from Newfoundland Power of approximately $5.7 million.

Hydro also incorporated the estimated impact of the 2017 GRA Settlement Agreement in the calculation of the 2018 Test Year revenue requirement to be recovered from Newfoundland Power.[5] Table 9 provides the 2018 revenue requirement to be recovered from Newfoundland Power for the Expected Supply Scenario including the adjustments described earlier.

[5] For the 2018 Test Year, Hydro estimates $13.5 million of the estimated $16.8 million estimated revenue requirement reduction will be allocated to Newfoundland Power.

Table 9: Adjusted 2018 Revenue Requirement from Newfoundland Power Expected Supply Scenario

Particulars	$
2018TY Revenue Requirement	476,593,958
No. 6 Fuel Adjustment	(5,737,404)
Estimated Settlement Impact	(13,517,712)
Adjusted 2018TY	**457,338,842**

2.2 2019 Test Year

Hydro’s 2019 Test Year Cost of Service studies filed with the Additional Cost of Service Information on March 22, 2018 reflect a forecast 2019 No. 6 fuel price of $63.63 CDN/bbl.[6] However, Hydro’s most recent forecast price of No. 6 fuel is $85.55 CDN/bbl as shown in Schedule 3. As such, for the purpose of calculating customer rates which recover Hydro’s forecast 2019 costs, Hydro has adjusted the Newfoundland Power 2019 Test Year revenue requirement to reflect the most recent fuel price forecast.

Details of the No. 6 fuel cost adjustment for the 2019 Test Year are shown in Table 10.

Table 10: 2019 No. 6 Fuel Cost Adjustment – Expected Supply Scenario

Particulars	As Filed	Forecast	Variance
No. 6 Fuel Consumption (bbls)	1,100,740	1,100,740	-
Unit Cost ($/bbl)	63.63	85.55	21.92
No. 6 Fuel Cost ($)	**70,040,086**	**94,168,307**	**24,128,221**

The $24.1 million fuel adjustment was then allocated by customer class based on the 2019 Test Year forecast energy consumption, as shown in Table 11.

[6] Additional Cost of Service Information, Summary Report, Page 3, lines 6 through 8.

Table 11: 2019 No. 6 Fuel Cost Adjustment Allocation Expected Supply Scenario

Customer Class	Energy (MWh)	%	Allocated $
Newfoundland Power	5,833,600	83.0%	20,026,519
Island Industrial	743,300	10.6%	2,551,720
Rural	451,500	6.4%	1,549,982
Total	**7,028,400**		**24,128,221**

The Island Interconnected rural customer No. 6 fuel adjustment of $1.5 million was allocated to Newfoundland Power based on a rural deficit factor of 96.1%. This results in a total adjustment to the 2019 Test Year revenue requirement to be recovered from Newfoundland Power of approximately $21.5 million. Further, Hydro has incorporated the estimated impact of the 2017 GRA Settlement Agreement in the calculation of the adjusted 2019 Test Year revenue requirement.[7] Table 9 provides the 2019 revenue requirement to be recovered from Newfoundland Power for the Expected Supply Scenario including the adjustments described earlier.

Table 12: Adjusted 2019 Revenue Requirement

from Newfoundland Power Expected Supply Scenario

Particulars	$
2019TY Revenue Requirement	453,977,031
No. 6 Fuel Adjustment	21,516,052
Estimated Settlement Impact	(12,795,178)
Adjusted 2019TY	**462,697,905**

3.0 Summary

For the purpose of calculating the 2018 interim rate recovery levels and 2019 customer impacts, Hydro has included adjustments to the 2018 and 2019 Test Year costs allocated to Newfoundland Power from those provided in the Additional Cost of Service Information filing on March 22, 2018. These adjustments were made to recognize the effect of the operation of

[7] For the 2019 Test Year, Hydro estimates $12.8 million of the estimated $16.6 million estimated revenue requirement reduction will be allocated to Newfoundland Power.

the RSP in providing fuel cost recovery during 2018, the revised fuel cost forecast relative to the fuel cost forecast used in the Additional Cost of Service Information, and the estimated revenue requirement reductions resulting from the 2017 GRA Settlement Agreement.

The adjusted estimates of cost allocations to Newfoundland Power are used in determining cost recovery under the proposed interim rates and the customer impacts of the revised RSP and CDM adjustments and the proposed interim rates.

Newfoundland and Labrador Hydro
2018 Required Increase in Customer Billings – Expected Supply Scenario
Newfoundland Power

	2018 Test Year Billing Units	Unit	Existing Rate[1]	Existing Billings ($)	Proposed Rates	2018 Interim Billings	Change ($)	Percent Change Utility	Percent Change Consumer
Demand (kWs)	15,164,832	$/kW/mo	4.75	72,032,952	4.75	72,032,952			
Energy (MWhs)	3,000,000	¢/kWh	2.226	66,780,000	2.782	83,460,000			
Energy (MWhs)	2,824,500	¢/kWh	10.422	294,369,390	10.422	294,369,390			
Total Base Rate				**433,182,342**		**449,862,342**	**16,680,000**		
RSP Recovery Adjustment-Normal	5,824,500	¢/kWh	(0.132)	(7,688,340)	(0.296)	(17,240,520)			
RSP Mitigation impact	5,824,500	¢/kWh	(0.911)	(53,061,195)	0.000	-			
RSP Fuel Rider	5,824,500	¢/kWh	0.672	39,140,640	0.423	24,637,635			
CDM Recovery Adjustment	5,824,500	¢/kWh	0.019	1,106,655	0.022	1,281,390			
Total				**412,680,102**		**458,540,847**	**45,860,745**	**11.1%**	**7.5%**
Adjusted 2018TY Revenue Requirement						**457,338,842**			
2018 Revenue Deficiency[2]						15,816,500			
2018 Interim Recovery %						34.5%			

[1] Based on rates effective July 1, 2017.

[2] Adjusted 2018 revenue requirement (A)	$457.3
2018 forecast billings under existing rates (B)	$433.2
Revenue deficiency with no interim rates (C=A-B)	$24.2
Portion of 2018 revenue deficiency recovered through proposed interim billings (D)	$8.4
2018 revenue deficiency (E=C-D)	$15.8

Newfoundland and Labrador Hydro
2019 Required Increase in Customer Billings – Expected Supply Scenario
Newfoundland Power

	2019 Billing Units at 2018 First Block Size	2019 Test Year Billing Units	Unit	2018 Interim Rate (1)	Existing Billings ($)	2018 Interim Rate	Adjusted 2019TY Revenue Requirement	2018 Revenue Deficiency (12/20)[2]	Recovery of Deferred Supply Costs (12/20)[3]	Change ($) [4]	Percent Change Utility	Percent Change Consumer
Demand (kWs)	15,164,832	15,158,472	$/kW/mo	4.75	72,032,952							
Energy (MWhs)	3,000,000	3,480,000	¢/kWh	2.782	83,460,000							
Energy (MWhs)	2,833,600	2,353,600	¢/kWh	10.422	295,317,792							
Total Base Rate					**450,810,744**		**462,697,905**	**9,489,900**	**34,855,446**	**56,232,506**		
RSP Recovery Adjustment-Normal		5,833,600	¢/kWh	(0.296)	(17,267,456)	(0.296)	(17,267,456)					
RSP Mitigation impact		5,833,600	¢/kWh	0.000	-	0.000	-					
RSP Fuel Rider		5,833,600	¢/kWh	0.423	24,676,128	0.000	-					
CDM Recovery Adjustment		5,833,600	¢/kWh	0.022	1,283,392	0.022	1,283,392					
Total					**459,502,808**		**446,713,841**	**9,489,900**	**34,855,446**	**31,556,378**	**6.9%**	**4.6%**

[1] Based on rates proposed to be effective July 1, 2018.
[2] 2018 revenue deficiency of $15.8 million * 12/20
[3] Newfoundland Power's portion of the $65.4M in deferred supply costs amortized over 20 months.

[4] Adjusted 2019TY revenue requirement (A)	$462.7
2018 revenue deficiency (B)	$9.5
Recovery of deferred supply costs (C)	$34.9
Adjusted 2019 revenue requirement (D=A+B+C)	$507.0
2019 forecast billings under existing rates (E)	$450.8
Change from existing revenue requirement (F=D-E)	$56.2

Newfoundland and Labrador Hydro
2018 Required Increase in Customer Billings – Revised Deferral Account Scenario
Newfoundland Power

	2018 Test Year Billing Units	Unit	Existing Rate[1]	Existing Billings ($)	Proposed Rates	2018 Interim Billings	Change ($)	Percent Change Utility	Percent Change Consumer
Demand (kWs)	15,164,832	$/kW/mo	4.75	72,032,952	4.75	72,032,952			
Energy (MWhs)	3,000,000	¢/kWh	2.226	66,780,000	2.782	83,460,000			
Energy (MWhs)	2,824,500	¢/kWh	10.422	294,369,390	10.422	294,369,390			
Total Base Rate				**433,182,342**		**449,862,342**	**16,680,000**		
RSP Recovery Adjustment-Normal	5,824,500	¢/kWh	(0.132)	(7,688,340)	(0.296)	(17,240,520)			
RSP Mitigation impact	5,824,500	¢/kWh	(0.911)	(53,061,195)	0.000	-			
RSP Fuel Rider	5,824,500	¢/kWh	0.672	39,140,640	0.423	24,637,635			
CDM Recovery Adjustment	5,824,500	¢/kWh	0.019	1,106,655	0.022	1,281,390			
Total				**412,680,102**		**458,540,847**	**45,860,745**	**11.1%**	**7.5%**
Adjusted 2018TY Revenue Requirement						**465,349,413**			
2018 Revenue Deficiency[2]						23,827,071			
2018 Interim Recovery %						25.9%			

[1] Based on rates effective July 1, 2017.

[2] Adjusted 2018 revenue requirement (A)	$465.3
2018 forecast billings under existing rates (B)	$433.2
Revenue deficiency with no interim rates (C=A-B)	$32.2
Portion of 2018 revenue deficiency recovered through proposed interim billings (D)	$8.4
2018 revenue deficiency (E=C-D)	$23.8

Newfoundland and Labrador Hydro
2019 Required Increase Relative to Existing Rates - Revised Deferral Account Scenario
Newfoundland Power

	2019 Billing Units at 2018 First Block Size	2019 Test Year Billing Units	Unit	2018 Interim Rate (1)	Existing Billings ($)	2018 Interim Rate (2)	Adjusted 2019TY Revenue Requirement	2018 Revenue Deficiency (12/20)[3]	Change ($) [4]	Percent Change Utility	Percent Change Consumer
Demand (kWs)	15,164,832	15,158,472	$/kW/mo	4.75	72,032,952						
Energy (MWhs)	3,000,000	3,480,000	¢/kWh	2.782	83,460,000						
Energy (MWhs)	2,833,600	2,353,600	¢/kWh	10.422	295,317,792						
Total Base Rate					**450,810,744**		**525,002,036**	**14,296,243**	**88,487,535**		
RSP Recovery Adjustment-Normal		5,833,600	¢/kWh	(0.296)	(17,267,456)	(0.296)	(17,267,456)				
RSP Mitigation impact		5,833,600	¢/kWh	0.000	-	0.000	-				
RSP Fuel Rider		5,833,600	¢/kWh	0.423	24,676,128	0.000	-				
CDM Recovery Adjustment		5,833,600	¢/kWh	0.022	1,283,392	0.022	1,283,392				
Total					**459,502,808**		**509,017,972**	**14,296,243**	**63,811,407**	**13.9%**	**9.4%**

[1] Based on proposed rates effective July 1, 2018.
[2] Hydro has assumed continuation of the existing RSP and CDM recovery riders proposed to become effective July 1, 2018.
[3] 2018 revenue deficiency of $23.8 million * 12/20

[4] Adjusted 2019TY revenue requirement (A)	$525.0
2018 revenue deficiency (B)	$14.3
Adjusted 2019 revenue requirement (C=A+B)	$539.3
2019 forecast billings under existing rates (D)	$450.8
Change from existing revenue requirement (E=C-D)	$88.5

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN

The Rate Stabilization Plan of Newfoundland and Labrador Hydro (Hydro) is established for Hydro's Utility customer, Newfoundland Power, and Island Industrial customers to smooth rate impacts for variations between actual results and Test Year Cost of Service estimates for:

- hydraulic production;
- No. 6 fuel cost used at Hydro's Holyrood generating station;
- customer load (Utility and Island Industrial); and
- rural rates.

The formulae used to calculate the Plan's activity are outlined below. Positive values denote amounts owing from customers to Hydro whereas negative values denote amounts owing from Hydro to customers.

Section A: Hydraulic Production Variation

1. Activity:
Actual monthly production is compared with the Test Year Cost of Service Study in accordance with the following formula:

$$\{(A - B) \div C\} \times D$$

Where:

A = Test Year Cost of Service Net Hydraulic Production (kWh)
B = Actual Net Hydraulic Production (kWh)
C = Test Year Cost of Service Holyrood Net Conversion Factor (kWh /bbl.)
D = Monthly Test Year Cost of Service No. 6 Fuel Cost ($Can /bbl.)

2. Financing:
Each month, financing charges, using Hydro's approved Test Year weighted average cost of capital, will be calculated on the balance.

3. Hydraulic Variation Customer Assignment:
Customer assignment of hydraulic variations will be performed annually as follows:

$$(E \times 25\%) + F$$

Where:

E = Hydraulic Variation Account Balance as of December 31, excluding financing charges
F = Financing charges accumulated to December 31

The total amount of the Hydraulic Customer Assignment shall be removed from the Hydraulic Variation Account.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

4. Customer Allocation:

The annual customer assignment will be allocated among the Island Interconnected customer groups of (1) Newfoundland Power; (2) Island Industrial Firm; and (3) Rural Island Interconnected. The allocation will be based on percentages derived from 12 months-to-date kWh for: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The portion of the hydraulic customer assignment which is initially allocated to Rural Island Interconnected will be re-allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Test Year Cost of Service Study.

The Newfoundland Power and Island Industrial customer allocations shall be included with the Newfoundland Power and Island Industrial RSP balances respectively as of December 31 each year. The Labrador Interconnected Hydraulic customer allocation shall be written off to Hydro's net income (loss).

Section B: Fuel Cost Variation, Load Variation and Rural Rate Alteration

1. Activity

1.1 Fuel Cost Variations

This is based on the consumption of No. 6 Fuel at the Holyrood Generating Station:

$$(G - D) \times H$$

Where:

D = Monthly Test Year Cost of Service No. 6 Fuel Cost ($Can /bbl.)
G = Monthly Actual Average No. 6 Fuel Cost ($Can /bbl.)
H = Monthly Actual Quantity of No. 6 Fuel consumed less No. 6 fuel consumed for non-firm sales (bbl.)

1.2 Load Variations

Firm: Firm load variation is comprised of fuel and revenue components. The load variation is determined by calculating the difference between actual monthly sales and the Test Year Cost of Service Study sales, and the resulting variance in No. 6 fuel costs and sales revenues. It is calculated separately for Newfoundland Power firm sales and Industrial firm sales, in accordance with the following formula:

$$(I - J) \times \{(D \div C) - K\}$$

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

Where:

C = Test Year Cost of Service Holyrood Net Conversion Factor (kWh /bbl.)
D = Monthly Test Year Cost of Service No. 6 Fuel Cost ($Can /bbl.)
I = Actual Sales, by customer class (kWh)
J = Test Year Cost of Service Sales, by customer class (kWh)
K = Firm energy rate, by customer class

Secondary: Secondary load variation is based on the revenue variation for Utility Firmed-Up Secondary energy sales compared with the Test Year Cost of Service Study, in accordance with the following formula:

$$(J - I) \times L$$

Where:

I = Actual Sales (kWh)
J = Test Year Cost of Service Sales (kWh)
L = Secondary Energy Firming Up Charge

1.3 Rural Rate Alteration

Newfoundland Power Rate Change Impacts:
This component is calculated for Hydro’s rural customers whose rates are directly or indirectly impacted by Newfoundland Power’s rate changes, with the following formula:

$$(M - N) \times O$$

Where:

M = Cost of Service rate
N = Existing rate
O = Actual Units (kWh, bills, billing demand)

2. Monthly Customer Allocation: Load and Fuel Activity

Each month, the year-to-date total for fuel price variation and the year-to-date total for the load variation will be allocated among the Island Interconnected customer groups of (1) Newfoundland Power; (2) Island Industrial Firm; and (3) Rural Island Interconnected. The allocation will be based on percentages derived from 12 months-to-date kWh for: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The year-to-date portion of the fuel price variation and the year-to-date portion of the load variation which is initially allocated to Rural Island Interconnected will be re-allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

which the Rural Deficit was allocated in the approved Test Year Cost of Service Study.

The current month's activity for Newfoundland Power, Island Industrials and regulated Labrador Interconnected customers will be calculated by subtracting year-to-date activity for the prior month from year-to-date activity for the current month. The current month's activity allocated to regulated Labrador Interconnected customers will be removed from the Plan and written off to Hydro's net income (loss).

3. Monthly Customer Allocation: Rural Rate Alteration Activity
Each month, the rural rate alteration will be allocated between Newfoundland Power and regulated Labrador Interconnected customers in the same proportion which the Rural Deficit was allocated in the approved Test Year Cost of Service Study. The portion allocated to regulated Labrador Interconnected will be removed from the Plan and written off to Hydro's net income (loss).

4. Plan Balances
Separate plan balances for Newfoundland Power, the Island Industrial customer class and the segregated load variation will be maintained. The RSP balances shall be adjusted by other amounts as ordered by the Board. Financing charges on the plan balances will be calculated monthly using Hydro's approved Test Year weighted average cost of capital.

Section C: Fuel Price Projection

A fuel price projection will be calculated to anticipate forecast fuel price changes and to determine fuel riders for the rate adjustments. For industrial customers, this will occur in October each year, for inclusion with the RSP adjustment effective January 1. For Newfoundland Power, this will occur in April each year, for inclusion with the RSP adjustment effective July 1.

1. Industrial Fuel Price Projection:
In October each year, a fuel price projection for the following January to December shall be made to estimate a change from Test Year No. 6 Fuel Cost. Hydro's projection shall be based on the change from the average Test Year No. 6 fuel cost, in Canadian dollars per barrel, determined from the forecast oil prices provided by the PIRA Energy Group, and the current US exchange rate. The calculation for the projection is:

$$[\{(S + T) \times U\} - V] \times W$$

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

Where:

S = the September month-end PIRA Energy Group average monthly forecast for No. 6 fuel prices at New York Harbour for the following January to December
T = Hydro's average fuel contract premium or (discount) ($US/bbl) for the following January to December
U = the monthly average of the $Cdn / $US Bank of Canada Exchange Rate for the month of September
V = average Test Year Cost of Service cost of No. 6 Fuel ($Can /bbl.)
W = the number of barrels of No. 6 fuel forecast to be consumed at the Holyrood Generating Station for the Test Year for the Test Year, or an alternate forecast number of barrels as approved by the Board.

The industrial customer allocation of the forecast fuel price change will be based on 12 months-to-date kWh as of the end of September and is the ratio of Industrial Firm invoiced energy to the total of: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The amount of the forecast fuel price change, in Canadian dollars, and the details of an estimate of the fuel rider based on 12 months-to-date kWh sales to the end of September will be reported to industrial customers, Newfoundland Power, and the Public Utilities Board, by the 10th working day of October.

2. Newfoundland Power Fuel Price Projection:

In April each year, a fuel price projection for the following July to June shall be made to estimate a change from Test Year No. 6 Fuel Cost. Hydro's projection shall be based on the change from the average Test Year No. 6 fuel cost, in Canadian dollars per barrel, determined from the forecast oil prices provided by the PIRA Energy Group, and the current US exchange rate. The calculation for the projection is:

$$[\{(X + T) \times Y\} - V] \times W$$

Where:

T = Hydro's average fuel contract premium or (discount) ($US/bbl) for the following July to June
V = average Test Year Cost of Service cost of No. 6 Fuel ($Can /bbl.)
W = the number of barrels of No. 6 fuel forecast to be consumed at the Holyrood Generating Station for the Test Year, or an alternate forecast number of barrels as approved by the Board.
X = the average of the March month-end PIRA Energy Group average monthly forecast for No. 6 fuel prices at New York Harbour for July to December of the current year and for the January to June period of the subsequent year.
Y = the monthly average of the $Cdn / $US Bank of Canada Exchange Rate for the month of March

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

The Newfoundland Power customer allocation of the forecast fuel price change will be based on 12 months-to-date kWh as of the end of March and is the ratio of Newfoundland Power Firm and Firmed-Up Secondary invoiced energy to the total of: Utility Firm and Firmed-Up Secondary invoiced energy, Industrial Firm invoiced energy, and Rural Island Interconnected bulk transmission energy.

The amount of the forecast fuel price change, in Canadian dollars, and the details of the resulting fuel rider applied to the adjustment rate will be reported to Newfoundland Power, industrial customers, and the Public Utilities Board, by the 10th working day of April.

Section D: Adjustment

1. Newfoundland Power

As of March 31 each year, Newfoundland Power's adjustment rate for the 12-month period commencing the following July 1 is determined as the rate per kWh which is projected to collect:

Newfoundland Power March 31 Balance

less projected recovery / repayment of the balance for the following three months (if any), estimated using the energy sales (kWh) for April, May and June from the previous year

plus forecast financing charges to the end of the 12-month recovery period (i.e., June in the following calendar year),

divided by the 12-months-to-date firm plus firmed-up secondary kWh sales to the end of March.

A fuel rider shall be added to the above adjustment rate, based on the Newfoundland Power Fuel Price Projection amount (as per Section C.2 above) divided by 12-months-to-date kWh sales to the end of March.

When new Test Year base rates come into effect, if a fuel rider forecast (either March or September) is more current than the test year fuel forecast, a fuel rider will be implemented at the same time as the change in base rates reflecting the more current fuel forecast and the new test year values.

Otherwise, the fuel rider portion of the RSP Adjustment will be set to zero upon implementation of the new Test Year Cost of Service rates, until the time for the next fuel price projection.

NEWFOUNDLAND AND LABRADOR HYDRO

RATE STABILIZATION PLAN (Continued)

2. Island Industrial Customers

As of December 31 each year, the adjustment rate for industrial customers for the 12-month period commencing January 1 is determined as the rate per kWh which is projected to collect:

Industrial December 31 Balance

plus forecast financing charges to the end of the following calendar year,

divided by 12-months-to-date kWh sales to the end of December.

A fuel rider shall be added to the above adjustment rate, based on the Industrial Fuel Price Projection (as per Section C.1 above) amount divided by 12-months-to-date kWh sales to the end of December.

When new Test Year base rates come into effect, if a fuel rider forecast (either March or September) is more current than the test year fuel forecast, a fuel rider will be implemented at the same time as the change in base rates reflecting the more current fuel forecast and the new test year values. Otherwise, the fuel rider portion of the RSP Adjustment will be set to zero upon implementation of the new Test Year Cost of Service rates, until the time for the next fuel price projection.

Section E: RSP Surplus:

The Newfoundland Power allocated amount of the RSP Surplus will be refunded to Newfoundland Power and Hydro's Rural customers in accordance with Hydro's Customer Refund Plan approved in Order No. P.U. 36(2016).

Financing charges on the Newfoundland Power plan balance will be calculated monthly using Hydro's approved Test Year weighted average cost of capital.

Newfoundland and Labrador Hydro
Rate Stabilization Plan Fuel Price Projection Rider
Utility Customer

Line No	Customer Allocation	Amount	Comments		
1	March 2017 Fuel Price Projection	$85.55	From Page 3		
2	2015 Test Year Fuel Forecast Cost	$ 64.41			
3	Forecast Fuel Price Variance	$ 21.14	Line 1 - Line 2		
4	Forecasted barrels of consumption July 2018 to June 2019	1,273,184			
5	Forecast Fuel Variance	$ 26,915,110	Line 3 x Line 4		
6	Utility Customer Allocation Ratio	90.71%	From Line 8		
7	Utility Customer Allocation	$ 24,414,696	Line 5 x Line 6		
	Calculation of Customer Allocation	**kWh**	**Percent of Total**	**Allocation of Rural**	**Total**
8	12 months-to-date Utility Sales	5,777,715,658	84.17%	6.54%	90.71%
9	12 months-to-date Industrial Customer Sales	617,169,994	8.99%	0.00%	8.99%
10	12 months-to-date Bulk Rural Energy Sales	469,815,878	6.84%	-6.84%	0.00%
11	Total	6,864,701,530			
	Calculation of Utility Customer RSP Rate	**Amount**	**Comments**		
	Fuel Rider				
12	Utility Allocation	$ 24,414,696	From Line 7		
13	12 months-to-date Utility Sales	5,777,715,658	From Line 8		
14	Fuel Projection Rider (cents per kWh)	**0.423**	Line 12/Line 13 x 100		

Newfoundland and Labrador Hydro
Rate Stabilization Plan Estimated Fuel Price Projection Rider

Hydro Forecast US $/bbl [1]	Forecast US $/bbl (a)	Premium / (Discount) [2] US $/bbl (b)	Landed Forecast Price US $/bbl (c) = (a) + (b)
Jul-18	69.88	4.13	
Aug-18	70.85	4.13	
Sep-18	67.22	4.13	
Oct-18	63.60	4.13	
Nov-18	63.01	4.13	
Dec-18	61.97	4.13	
Jan-19	61.38	4.13	
Feb-19	59.33	4.13	
Mar-19	56.08	4.13	
Apr-19	55.67	4.13	
May-19	57.33	4.13	
Jun-19	57.92	4.13	
Average Holyrood Forecast Landed Price ($US/bbl)	62.02	4.13	66.15
$Cdn/$US Exchange Rate [3]			1.2932
NLH Fuel Price Projection ($Cdn/bbl) [4]			$85.55

Notes:

(1) $US pricing: New York Harbour price forecast, March 2018.
(2) Deliveries post October 17, 2017 will be charged US$4.13/bbl as opposed to the US$5.03/bbl per the original contract.
(3) Average of the Bank of Canada $Cdn/$US Exchange Rate for the month of March 2018, rounded to 4 decimal places.
(4) Price per barrel is rounded to the nearest $0.05.

Newfoundland and Labrador Hydro
Rate Stabilization Plan Recovery Adjustment
Utility

Line No	Calculation of Newfoundland Power RSP Rate	Amount	Comments
	Current Plan		
1	March Balance	$ (30,037,553)	March RSP 2018
2	Forecast Financing Costs to June 30, 2019	$ (1,016,302)	Line 25
3	Forecast Recovery to June 30, 2018	$ 13,953,676	Lines 8 to 10
4	Total	$ (17,100,179)	
5	12 months to date (Apr-Mar) Newfoundland Power Sales (kWh)	5,777,715,658	
6	**RSP Recovery Adjustment rate (¢ per kWh)**	**(0.296)**	Line 4/Line 5*1000

Newfoundland Power Forecast Financing Charges
2018

2015 Test Year Weighted Average Cost of Capital per ann	6.610%
Nominal Financing Rate	6.418%

	Month	Sales kWh	Financing Costs	Adjustment	Total To Date Balance
7					(30,037,553)
8	April	542,526,383	(160,646)	5,658,550	(24,539,649)
9	May	462,006,856	(131,242)	4,818,732	(19,852,160)
10	June	333,307,254	(106,173)	3,476,395	(16,481,938)
13	July	294,324,608	(88,148)	871,201	(15,698,886)
14	August	299,504,058	(83,960)	886,532	(14,896,314)
15	September	302,758,870	(79,668)	896,166	(14,079,816)
16	October	406,289,139	(75,301)	1,202,616	(12,952,502)
17	November	521,844,394	(69,272)	1,544,659	(11,477,115)
18	December	671,655,684	(61,382)	1,988,101	(9,550,395)
19	January	702,956,912	(51,077)	2,080,752	(7,520,720)
20	February	626,268,569	(40,222)	1,853,755	(5,707,187)
21	March	614,272,931	(30,523)	1,818,248	(3,919,462)
22	April	542,526,383	(20,962)	1,605,878	(2,334,546)
23	May	462,006,856	(12,486)	1,367,540	(979,492)
24	June	333,307,254	(5,238)	986,589	1,859
25	Total		(1,016,302)	31,055,715	

Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Recovery Adjustment
Island Interconnected Recoverable Allocation

Line No		2017 Energy Sales (kWh)	Percent of Total kWh (%)	Allocation of Recoverable Amount ($000)	
1	Newfoundland Power	5,895,095,713	84.8%	406	
2	Island Industrial Firm	585,829,777	8.4%	40	
3	Rural Island Interconnected	474,366,416	6.8%	33	
4	**Total**	**6,955,291,906**	**100.0%**	**479**	From Page 3, Line 4

Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Recovery Adjustment
Newfoundland Power

Line No	A) Newfoundland Power's Allocation of CDM Cost Deferral Account Balance			
	Newfoundland Power's Allocation of Rural CDM Balance			
1	2017 Rural Island Interconnected's Allocation ($000)		33	From Page 1, Line 3
2	2017 Rural Isolated System's Recoverable Amount ($000)		994	From Page 3, Line 5
3	Total 2017 Rural CDM		1,027	Line 1 + Line 2
4	2017 Newfoundland Power's Allocation (%) of Rural CDM Balance[1]	x	95.6%	
5	2017 Newfoundland Power's Allocation of Rural CDM Balance		982	Line 3 x Line 4
6	Newfoundland Power's Direct Allocation of Island Int. CDM Balance ($000)		406	From Page 1, Line 1
7	Total Newfoundland Power Allocation of CDM Account Balance ($000)		1,388	Line 5 + Line 6
	B) Calculation of Newfoundland Power's 2017 CDM Recovery Adjustment			
8	Newfoundland Power's Current Year Allocation ($000)		198	Line 7 / 7 years
9	2017 Enery Sales - Newfoundland Power (kWh)		5,895,095,713	From Page 1, Line 1
10	2018 - 2024 CDM Cost Recovery Adjustment (cents per kWh)		0.003	(Line 8 x 1000) / Line 9
11	2017 - 2023 CDM Cost Recovery Adjustment (cents per kWh)		0.019	
12	**Total CDM Cost Recovery Adjustment (cents per kWh)**		**0.022**	Line 10 + Line 11

[1] Based on Rural Deficit Allocation between Newfoundland Power and Rural Labrador Interconnected customers in the 2015 Test Year Cost of Service Study.

Newfoundland and Labrador Hydro
Conservation and Demand Management Account Amortization

	Year	System Balance		Amortization ($000s)							
				2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
1	2016	Island Interconnected	4,524	646	646	646	646	646	646	646	-
2		Hydro Rural Isolated	3,846	549	549	549	549	549	549	549	-
3		**2016 Total**	**8,370**	**1,196**	**1,196**	**1,196**	**1,196**	**1,196**	**1,196**	**1,196**	-
4	2017	Island Interconnected	479	-	68	68	68	68	68	68	68
5		Hydro Rural Isolated	994	-	142	142	142	142	142	142	142
6		**2017 Total**	**1,474**	**-**	**211**	**211**	**211**	**211**	**211**	**211**	**211**
7	Total	Island Interconnected	5,004	646	715	715	715	715	715	715	68
8		Hydro Rural Isolated	4,840	549	691	691	691	691	691	691	142
9		**Grand Total**	**9,844**	**1,196**	**1,406**	**1,406**	**1,406**	**1,406**	**1,406**	**1,406**	**211**

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (INTERIM)

Availability:

This rate is applicable to service to Newfoundland Power (NP).

Definitions:

"Billing Demand"

The Curtailable Credit shall apply to determine the billing demand as an adjustment to the highest Native Load established during the winter period. The computation of the adjustment to reflect the Curtailable Credit is provided in the definitions below.

In the Months of January through March, billing demand shall be the greater of:

(a) the highest Native Load less the Generation Credit and the Curtailable Credit, beginning in the previous December and ending in the current Month; and
(b) the Minimum Billing Demand.

In the Months of April through December, billing demand shall be the greater of:

(a) the Weather-Adjusted Native Load less the Generation Credit and the Curtailable Credit, plus the Weather Adjustment True-up; and
(b) the Minimum Billing Demand.

If at the time of establishing its Maximum Native Load, NP has been requested by Hydro to reduce its Native Load by shedding curtailable load, the calculation of Billing Demand for each month shall not deduct the Curtailable Credit.

"Generation Credit" refers to NP's net generation capacity less allowance for system reserve, as follows:

	kW
Hydraulic Generation Credit	83,142
Thermal Generation Credit	36,187
Total Generation Credit	119,329

In order to continue to avail of the Generation Credit, NP must demonstrate the capability to operate its generation to the level of the Generation Credit. This will be verified in a test by operating the generation at a minimum of this level for a period of one hour as measured by the generation demand metering used to determine the Native Load. The test will be carried out at

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (INTERIM)

a mutually agreed time between December 1 and March 31 each year. If the level is not sustained, Newfoundland Power will be provided an opportunity to repeat the test at another mutually agreed time during the same December 1 to March 31 period. If the level is not sustained in the second test, the Generation Credit will be reduced in calculating the associated billing demands for January to December to the highest level that could be sustained.

“Curtailable Credit” is determined based upon NP's forecast curtailable load available for the period in accordance with the terms and conditions set forth in NP’s Curtailable Service Option. NP will notify Hydro of its available curtailable load with its forecast of annual and monthly electricity requirements.

In order to receive the Curtailable Credit, NP must demonstrate the capability to curtail its customer load requirements to the level of the Curtailable Credit. This will be verified in a test by curtailing load at a minimum of this level for a period of one hour. The test will be carried out at a mutually agreed time in December. If the level is not sustained, the Curtailable Credit will be reduced to the level sustained. If Hydro requests NP to curtail load before a test is completed and NP demonstrates the capability to curtail to the level of the Curtailment Credit, no test will be required.

NP will be required to provide a report to Hydro not later than April 15 to demonstrate the amount of load curtailed for each request of Hydro during the previous winter season. If the load curtailed is less than forecast for either request during the winter season, the annual Curtailable Credit will be adjusted to reflect the average load curtailed for the winter season. If NP is not requested to curtail during the winter season, the Curtailment Credit will established based upon the lesser of the load reduction achieved in the test or the forecast curtailable load (as provided in the previous two paragraphs).

“Maximum Native Load” means the maximum Native Load of NP in the four-Month period beginning in December of the preceding year and ending in March of the current year.

“Minimum Billing Demand” means ninety-nine percent (99%) of:

NP’s test year Native Load less the Generation Credit and the Curtailable Credit.

The Curtailable Credit reflected in the Minimum Billing Demand will be set to equal the curtailable load used to determine the Maximum Native Load for NP for the most recently approved Test Year.

“Month” means for billing purposes, the period commencing at 12:01 hours on the last day of the previous month and ending at 12:00 hours on the last day of the month for which the bill applies.

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (continued) (INTERIM)

"Native Load" is the sum of:

(a) the amount of electrical power, delivered at any time and measured in kilowatts, supplied by Hydro to NP, averaged over each consecutive period of fifteen minutes duration, commencing on the hour and ending each fifteen minute period thereafter;
(b) the total generation by NP averaged over the same fifteen-minute periods.

"Weather-Adjusted Native Load" means the Maximum Native Load adjusted to normal weather conditions, calculated as:

Maximum Native Load
plus (Weather Adjustment, rounded to 3 decimal places, x 1000)

Weather Adjustment is further described and defined in the Weather Adjustment section.

"Weather Adjustment True-up" means one-ninth of the difference between:

(a) the greater of:
 - the Weather Adjusted Native Load less the Generation Credit and the Curtailable Credit (if applicable), times three; and
 - the Minimum Billing Demand, times three; and
(b) the sum of the actual billed demands in the Months of January, February and March of the current year.

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (continued) (INTERIM)

Monthly Rates:

Billing Demand Charge:
Billing Demand, as set out in the Definitions section, shall be charged at the following rate:

$4.75 per kW of billing demand

Energy Charge:
First 250,000,000 kilowatt-hours*...@ 2.782 ¢ per kWh
All excess kilowatt-hours* .... @ 10.422 ¢ per kWh

Firming-up Charge:
Secondary energy supplied by
Corner Brook Pulp and Paper Limited* ....@ 2.882 ¢ per kWh

RSP Adjustment:
Current Plan [].................................@ (0.296) ¢ per kWh
[]
Fuel Rider ....@ 0.423 ¢ per kWh

Total RSP Adjustment – All kilowatt-hours.................................... @ 0.127 ¢ per kWh

CDM Cost Recovery Adjustment.. @ 0.022 ¢ per kWh

***Subject to RSP Adjustment:**

RSP Adjustment refers to all applicable adjustments arising from the operation of Hydro's Rate Stabilization Plan, which levelizes variations in hydraulic production, fuel cost, load and rural rates.

Adjustment for Losses:

If the metering point is on the load side of the transformer, either owned by the customer or specifically assigned to the customer, an adjustment for losses as determined in consultation with the customer prior to January 31 of each year, shall be applied to metered demand and energy.

Adjustment for Station Services and Step-Up Transformer Losses:

If the metering point is not on the generator output terminals of NP's generators, an adjustment for Newfoundland Power's power consumption between the generator output terminals and the metering point as determined in consultation with the customer prior to the implementation of the metering, shall be applied to the metered demand.

NEWFOUNDLAND AND LABRADOR HYDRO

UTILITY (continued) (INTERIM)

Weather Adjustment: This section outlines procedures and calculations related to the weather adjustment applied to NP's Maximum Native Load.

(a) Weather adjustment shall be undertaken for use in determining NP's Billing Demand.

(b) Weather adjustment shall be derived from Hydro's NP native peak demand model.

(c) By September 30th of each year, Hydro shall provide NP with updated weather adjustment coefficient incorporating the latest year of actuals.

(d) The underlying temperature and wind speed data utilized to derive weather adjustment shall be sourced to weather station data for the St. John's, Gander, and Stephenville airports reported by Environment Canada. NP's regional energy sales shall be used to weight regional weather data. Hydro shall consult with NP to resolve any circumstances arising from the availability of, or revisions to, weather data from Environment Canada and/or wind chill formulation.

(e) The primary definition for the temperature weather variable is the average temperature for the peak demand hour and the preceding seven hours. The primary definition for the wind weather data is the average wind speed for the peak demand hour and the preceding seven hours. Hydro will consult with NP should data anomalies indicate a departure from the primary definition on underlying weather data.

(f) Subject to the availability of weather data from Environment Canada, Hydro shall prepare a preliminary estimate of the Weather-Adjusted Native Load by March 15th of each year, and a final calculation of Weather-Adjusted Native Load by April 5th of each year.

General:

This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.

With respect to all matters where the customer and Hydro consult on resolution but are unable to reach mutual agreement, the billing will be based on Hydro's best estimate.

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 and the *Public Utilities Act*, RSN 1990, Chapter P-47 (the *Act*);

AND IN THE MATTER OF a General Rate Application by Newfoundland and Labrador Hydro to establish customer electricity rates for 2018 and 2019;

AND IN THE MATTER OF an application by Newfoundland and Labrador Hydro, pursuant to Sections 70 and 75 of the *Act,* for the approval of customer electricity rates for 2018 on an interim basis ("2018 Utility Customer Interim Rates Application").

AFFIDAVIT

I, Grant Outerbridge, of St. John's in the Province of Newfoundland and Labrador, make oath and say as follows:

1. I am Team Lead, Rates and Regulatory of Newfoundland and Labrador Hydro, the Applicant named in the attached Application.
2. I have read and understand the foregoing 2018 Newfoundland Power Interim Rates Application.
3. I have personal knowledge of the facts contained therein, except where otherwise indicated, and they are true to the best of my knowledge, information and belief.

SWORN at St. John's in the)
Province of Newfoundland and)
Labrador)
this 13 day of April, 2018,)
before me:)

Barrister – Newfoundland and Labrador

Grant Outerbridge, CPA, CA

newfoundland labrador
hydro
a nalcor energy company

Hydro Place. 500 Columbus Drive.
P.O. Box 12400. St. John's. NL
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June 4, 2018

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL A1A 5B2

Attention: **Ms. Cheryl Blundon**
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro – 2018 Island Industrial Customer CDM Cost Recovery Application

Enclosed please find one (1) original plus ten (10) copies of Newfoundland and Labrador Hydro's (Hydro) 2018 Island Industrial Customer Conservation and Demand Management (CDM) Recovery Application (Application), to become effective July 1, 2018.

Hydro is proposing an increase of 0.001 cents/kWh to the existing adjustment of 0.009 cents/kWh for a total Island Industrial Customer CDM Cost Recovery Adjustment of 0.010 cents/kWh. The estimated annual billing impact of this increase for Island Industrial Customers is $7,260, or 0.02%.[1]

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Geoffrey P. Young
Corporate Secretary & General Counsel

GPY/bds

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
ecc: Larry Bartlett – Teck Resources Limited

Dennis Browne, Q.C. – Consumer Advocate
Sheryl Nisenbaum – Praxair Canada Inc.
Dennis Fleming – Cox & Palmer

[1] 2018 Test Year billing units (kWh)	726,000,000
Proposed increase (cents/kWh)	x $0.001
Billing impact (converted to $)	$ 7,260

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 and the *Public Utilities Act*, RSN 1990, Chapter P-47 (the *Act*) and regulations thereunder;

AND IN THE MATTER OF an application by Newfoundland and Labrador Hydro, pursuant to subsection 70(1) of the *Act* and Orders No. P.U. 49(2016) and P.U. 22(2017), for the approval of a change in the CDM Cost Recovery Adjustment to be charged to Island Industrial Customers effective July 1, 2018 (2018 Island Industrial Customer CDM Cost Recovery Application).

TO: The Board of Commissioners of Public Utilities (the Board)

The 2018 Island Industrial Customer Conservation and Demand Management (CDM) Cost Recovery Application of Newfoundland and Labrador Hydro states that:

A. Background

1. Newfoundland and Labrador Hydro (Hydro) is a corporation continued and existing under the *Hydro Corporation Act, 2007,* is a public utility within the meaning of the *Act*, and is subject to the provisions of the *Electrical Power Control Act, 1994*.

2. Under the *Act*, the Board has the general supervision of public utilities and requires that a public utility submit for the approval of the Board the rates, tolls, and charges for the service provided by the public utility and the rules and regulations which relate to that service.

3. Subsection 70(1) of the *Act* provides that a public utility shall not charge, demand, collect, or receive compensation for a service performed by it until the Board has approved a schedule of rates, tolls, and charges for the services provided by the public utility.

4. In Order No. P.U. 49(2016), the Board ordered, amongst other things, that Hydro's proposal to defer annual customer energy conservation program costs commencing in 2015 in a CDM Cost Deferral Account, and the proposed recovery of the existing balance of deferred CDM costs as of December 31, 2013 plus the annual costs over a seven-year period through the CDM Cost Recovery Adjustment, was accepted, effective January 1, 2016.

5. In Order No. P.U. 22(2017), the Board approved Hydro's Rules and Regulations for CDM Cost Recovery, which require the CDM Cost Recovery Adjustment to be updated annually reflecting the ongoing amortizations and the deferred CDM program costs for the previous year.

6. In Order No. P.U. 26(2017), the Board approved final rates for Island Industrial Customers resulting from the 2013 Amended General Rate Application, including a CDM Cost Recovery Adjustment of 0.009 cents/kWh to be effective from July 1, 2017 to June 30, 2018.

7. In Order No. P.U. 7(2018), the Board approved interim rates for Island Industrial Customers, reflecting no change to the CDM Cost Recovery Adjustment.

8. In Order No. P.U. 15(2018), the Board approved an interim Utility rate, including the Utility Customer CDM Cost Recovery Adjustment, which is based on the same CDM Cost Deferral Account balances as used in calculating the Island Industrial Customer CDM Cost Recovery Adjustment proposed herein and reflected in Schedule A to this Application.

B. Application

9. The 2018 Island Industrial Customer CDM Cost Recovery Application proposes to increase the Island Industrial Customer CDM Cost Recovery Adjustment by 0.001 cents/kWh, from 0.009 cents/kWh, for a total 2018 Island Industrial Customer CDM Cost Recovery Adjustment of 0.010 cents/kWh, to become effective July 1, 2018.

10. Schedule A to this 2018 Island Industrial Customer CDM Cost Recovery Application provides a calculation of the proposed Island Industrial Customer CDM Cost Recovery Adjustment.

11. Schedule B to this 2018 Island Industrial Customer CDM Cost Recovery Application provides an updated Island Industrial Customer rate sheet, reflecting the proposed change to the CDM Cost Recovery Adjustment.

12. Schedule C this 2018 Island Industrial Customer CDM Cost Recovery Application provides a copy of Hydro's *2017 Conservation and Demand Management Report*, which was filed with the Board on March 29, 2018. This report provides support for the 2017 expenditures transferred to the CDM Cost Deferral Account.

C. Hydro's Request

13. Hydro requests the Board approve its proposed Island Industrial Customers CDM Cost Recovery Adjustment of 0.010 cents/kWh, as set out in Schedule A of this 2018 Island Industrial Customer CDM Cost Recovery Adjustment Application, to be effective July 1, 2018.

14. Approval by the Board of the proposed 2018 Island Industrial Customer CDM Cost Recovery Adjustment will permit for recovery of deferred customer energy conservation program costs, as provided for, and intended by, Orders No. P.U. 49(2016) and P.U. 22(2017).

15. As this Application is made in accordance with Hydro's approved Rules and Regulations for Hydro's CDM Cost Recovery, a public hearing is not necessary.

D. Communications:

16. Communication with respect to the 2018 Island Industrial Customer CDM Cost Recovery Application should be forwarded to the attention of Michael Ladha, Legal Counsel & Assistant Corporate Secretary to Newfoundland and Labrador Hydro.

DATED at St. John's in the Province of Newfoundland and Labrador this 4^{th} day of June 2018.

NEWFOUNDLAND AND LABRADOR HYDRO

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Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Recovery Adjustment
Island Interconnected Recoverable Allocation

Line No		2017 Energy Sales	Percent of Total kWh	Allocation of Recoverable Amount	
1	**A) Island Interconnected Recoverable Allocation**[1]				
2		**(kWh)**	**(%)**	**($000)**	
3	Newfoundland Power	5,895,095,713	84.8%	406	
4	Island Industrial Firm	585,829,777	8.4%	40	
5	Rural Island Interconnected	474,366,416	6.8%	33	
6	**Total**	**6,955,291,906**	**100.0%**	**479**	From Page 2, Line 4
7					
8					

Line No			
9	**B) Calculation of Island Industrial Customers' 2018 CDM Recovery Adjustment**		
10	Island Industrial Current Year Allocation ($000)	6	(Line 4 / 7 years)
11	2017 Enery Sales - Island Industrial Customers (kWh)	585,829,777	From Line 4
12	Change in CDM Cost Recovery Adjustment (cents per kWh)[2]	0.001	(((Line 10 x 1000)/Line 11) x 100)
13	2017 CDM Cost Recovery Adjustment (cents per kWh)[3]	0.009	
14	**Total CDM Cost Recovery Adjustment (cents per kWh)**	**0.010**	(Line 12 + Line 13)

[1] Allocation is consistent with used to calculate Utility Customer CDM Cost Recovery Adjustment, which was approved by the Board in Order No. P.U. 15(2018).

[2] 2017 costs transferred to the CDM Cost Deferral Account amortized over the approved seven year recovery period of 2018 - 2024.

[3] 2016 CDM Cost Deferral Account balance amortized over the approved seven year recovery period of 2017 - 2023.

Newfoundland and Labrador Hydro
Conservation and Demand Management Cost Deferral Account Amortization

	Year		Account Balance	Amortization ($000s)							
				2017	2018	2019	2020	2021	2022	2023	2024
1	2016	Island Interconnected	4,524	646	646	646	646	646	646	646	-
2		Hydro Rural Isolated	3,846	549	549	549	549	549	549	549	-
3		**2016 Balance**	**8,370**	**1,196**	**1,196**	**1,196**	**1,196**	**1,196**	**1,196**	**1,196**	-
4	2017	Island Interconnected	479	-	68	68	68	68	68	68	68
5		Hydro Rural Isolated	994	-	142	142	142	142	142	142	142
6		**2017 Transfer[1]**	**1,474**	**-**	**211**	**211**	**211**	**211**	**211**	**211**	**211**
7	Total	Island Interconnected	5,004	646	715	715	715	715	715	715	68
8		Hydro Rural Isolated	4,840	549	691	691	691	691	691	691	142
9		**Total to be Recovered**	**9,844**	**1,196**	**1,406**	**1,406**	**1,406**	**1,406**	**1,406**	**1,406**	**211**

[1] Refer to page 14, Table 5 of Hydro's *2017 Conservation and Demand Management Report* for CDM Program Costs included in the CDM Deferral Account.

Availability:

Any person purchasing power, other than a retailer, supplied from the Interconnected Island bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and who has entered into a contract with Hydro for the purchase of firm power and energy.

Base Rate*:

Demand Charge:

The rate for Firm Power, as defined and set out in the Industrial Service Agreements, shall be $9.95 per kilowatt (kW) per month of billing demand.

Firm Energy Charge:

Base Rate .... @ 3.971 ¢ per kWh

RSP Adjustment:

RSP Adjustment:

Current Plan .... @ (0.285) ¢ per kWh
Fuel Rider .... @ (0.024) ¢ per kWh

Total RSP Adjustment – All kilowatt-hours .... @ (0.309) ¢ per kWh

CDM Cost Recovery Adjustment...@ 0.010 ¢ per kWh

Specifically Assigned Charges:

The table below contains the additional annual specifically assigned charges for customer plant in service that is specifically assigned to the Customer.

	Annual Amount
Corner Brook Pulp and Paper Limited	$ 870,898
North Atlantic Refining Limited	$ 89,293
Teck Resources Limited	$ 199,399
Vale	$ 480,243

***Subject to RSP Adjustments and CDM Cost Recovery Adjustment:**

RSP Adjustments refers to all applicable adjustments arising from the operation of Hydro's Rate Stabilization Plan, which levelizes variations in hydraulic production, fuel cost, load and rural rates.

The CDM Cost Recovery Adjustment is updated annually to provide recovery over a seven year period of costs charged annually to the Conservation and Demand Management (CDM) Cost Deferral Account.

Adjustment for Losses:

If the metering point is on the load side of the transformer, either owned by the customer or specifically assigned to the customer, an adjustment for losses as determined in consultation with the customer prior to January 31 of each year shall be applied.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

Availability:

Any person purchasing power, other than a retailer, supplied from the Interconnected Island bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and who has entered into a contract with Hydro for the purchase of firm power and energy.

Rate:

Non-Firm Energy Charge (¢ per kWh):

Non-Firm Energy is deemed to be supplied from thermal sources. The following formula shall apply to calculate the Non-Firm Energy rate:

$$\{(A \div B) \times (1 + C) \times (1 \div (1 - D))\} \times 100$$

A = the monthly average cost of fuel per barrel for the energy source in the current month or, in the month the source was last used

B = the conversion factor for the source used (kWh/bbl)

C = the administrative and variable operating and maintenance charge (10%)

D = the average system losses on the Island Interconnected grid for the last five years ending in 2013 (3.47%).

The energy sources and associated conversion factors are:

1. Holyrood, using No. 6 fuel with a conversion factor of 618 kWh/bbl
2. Gas turbines using No. 2 fuel with a conversion factor of 475 kWh/bbl
3. Diesels using No. 2 fuel with a conversion factor of 556 kWh/bbl.

Adjustment for Losses:

If the metering point is on the load side of the transformer, either owned by the customer or specifically assigned to the customer, an adjustment for losses as determined in consultation with the customer prior to January 31 of each year shall be applied.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

Availability:

Any person purchasing power, other than a retailer, supplied from the Interconnected Island bulk transmission grid at voltages of 66 kV or greater on the primary side of any transformation equipment directly supplying the person and who has entered into a contract with Hydro for the purchase of firm power and energy and whose Industrial Service Agreement so provides.

Rate:

Energy Charge:

All kWh (Net of losses)* .... @ 0.423 ¢ per kWh

*For the purpose of this Rate, losses shall be 3.47%, the average system losses on the Island Interconnected Grid for the last five years ending in 2013.

General:

Details regarding the conditions of Service are outlined in the Industrial Service Agreements. **This rate schedule does not include the Harmonized Sales Tax (HST) which applies to electricity bills.**

2017 Conservation and Demand Management Report

March 29, 2018

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

TABLE OF CONTENTS

1.0 Introduction

The Conservation and Demand Management (CDM) activities undertaken by Newfoundland and Labrador Hydro (Hydro) in 2017 included joint utility programs offered by Hydro and Newfoundland Power through the takeCHARGE partnership, as well as programs specifically targeted to Hydro's customers. This report focuses primarily on the costs and initiatives for Hydro's portion of program implementation.

Hydro's programs achieved 2,512 MWh of annual incremental energy savings in 2017, and, since 2009, have accumulated energy savings of 40,971 MWh. This is primarily a reflection of the continued growth and enhancement of takeCHARGE initiatives.

2.0 Coordination and Context

2.1 Utility Planning

Energy conservation was addressed during Hydro's 2006 General Rate Application (GRA). Subsequent to the GRA, a CDM Potential Study was completed in 2008. Following the 2008 CDM Potential study, a five-year strategic plan which outlined proposed energy conservation initiatives to be implemented jointly by Newfoundland Power and Hydro (the Utilities) was developed.[1] The Utilities have since designed and implemented a joint utility portfolio of programs for electricity customers in Newfoundland and Labrador. Currently, programs offered through the joint utility model are available for residential, commercial, and industrial customers and provide rebate options to address energy savings for electricity customers.

In 2012, an updated strategic plan was developed.[2] The new plan continued to focus on joint utility programs, but also outlined additional programs identified and implemented by Hydro to address opportunities in higher avoided cost isolated diesel systems. In 2012, Hydro launched the Isolated Systems Community Program and the Isolated Systems Business Efficiency Program

[1] The *Five Year Energy Conservation Plan: 2008-2012* was filed with the Board on June 27, 2008.

[2] The *Five Year Energy Conservation Plan: 2012-2016* was filed with the Board on September 14, 2012.

for business customers served from Isolated Diesel Systems. In late 2013, the Business Efficiency Program was launched for business customers served from Interconnected Systems through the joint utility partnership. Hydro has been developing programs outside the joint utility process to provide customers with additional opportunities to conserve and to provide feedback for expanded offerings of joint utility programs. For example, Hydro's retailer coupon program offered in 2010-2011 was the impetus for the Small Technology program launched provincially in 2014. This program provides point-of-purchase and mail-in coupons for a range of technologies, including lighting and appliances.

Initially, the joint utility CDM plans were focused on high marginal cost energy savings that translated into fuel savings, and working towards a culture of conservation that will be sustained in the long-term. In 2015, a new CDM Potential Study was completed to guide future initiatives related to energy conservation and demand management. Following the 2015 CDM Potential Study, a new Five-Year Conservation Plan was completed, which will continue to be implemented jointly by the Utilities over the 2016 to 2020 period.[3]

Three new technologies - Rooftop Air Source Heat Pumps, Pre-Rinse Spray Valves, and Electrically Commutated Motors - were launched under the Business Efficiency Program prescriptive path in 2017. These technologies expand the prescriptive list, allowing customers easier access to rebates through mail-in applications.

Conservation and Demand Management activities undertaken in 2017 included a new Energy Efficiency Loan Program with the Government of Newfoundland and Labrador, expansion of existing commercial programs, reshaping or discontinuation of several programs, and continuation of the custom industrial program. An overview of the programs offered during 2017 is included in Appendix A. It includes current programs offered through both the joint

[3] The *Five-Year Conservation Plan: 2016-2020* was filed as Appendix B of Schedule 3, Appendix H – *2015 Conservation Cost Deferral and Program Expansion Report* of the Amended 2015 Cost Deferral Application filed with the Board on November 12, 2015.

utility partnership and those specific to Hydro's customers. The Five Year Conservation Plan 2016-2020 is included in Appendix B.

The Utilities continuously evaluate the customer conservation programs and periodically undertake third party program evaluations to refine program design and support future planning. For example, in 2014, DNV GL-Energy completed a market and process evaluation of the residential joint utility programs.[4] This work supported the Utilities decision to conclude the ENERGY STAR® Windows Program at the end of 2014 due to market transformation.

During 2017, several external evaluations and surveys were completed to measure customer awareness, interest, and uptake in current programs:

- Socket saturation survey - to determine usage of LEDs in lighting sockets in customers' homes, as a means of informing future program planning;
- Annual marketing survey - to assess home energy use and energy saving practices, as well as awareness of, and participation in, the takeCHARGE program;
- Residential end use survey – to provide a detailed overview of home energy usage through the collection of specific information on home construction, home heating sources, appliance and electronic usage and lighting;
- Hydro's home energy use benchmarking program was evaluated to assess program effectiveness, participation uplift, satisfaction and net energy and demand savings versus targeted energy and demand savings. This program allows participating households to compare their net energy usage with similar homes in their neighborhood;
- Insulation and thermostat rebate program was evaluated to assess the adequacy of the program relative to its objectives, identify barriers and trends, and assess the energy and demand savings associated with the program; and

[4] DNV-GL Energy is recognized within the energy efficiency sector, providing program evaluation and assessments.

- Business Efficiency Program – an evaluation of the impact of program processes, existing markets, and savings was started in 2018 and will continue into 2018.

2.2 Government Engagement

In October 2017, Hydro and Newfoundland Power introduced a new Energy Efficiency Loan Program to assist residential customers improve their home energy consumption. The program is supported by the Government of Newfoundland and Labrador and offers on-bill financing for insulation, heat pumps and home energy assessments. Through the Energy Efficiency Loan Program, eligible applicants can receive low-interest financing for up to $10,000 over a maximum of five years.

Late in 2017, Hydro was invited by the Provincial Office of Climate Change to assist in the development of a comprehensive assessment of the opportunities and challenges associated with increasing electric vehicle penetration in Newfoundland and Labrador. In response to increased customer interest in electric vehicles, the province has invited special interest groups to identify requirements to facilitate growth of this market with an anticipated benefit of reduced greenhouse gas emissions.

Hydro continues to have a positive working relationship with the Provincial Office of Climate Change, and remains engaged in dialogue on potential programming, policy, and partnership opportunities.

2.3 Nunatsiavut Government

In 2017, Hydro supported the Nunatsiavut Government with the Nain Wind-Storage-Diesel Micro-Grid Project, which is a part of the Nunatsiavut Government's Energy Security Plan. This project will integrate wind energy, energy storage, and a micro-grid controller interfacing with the existing baseload diesel generator set. It will also include smart meters for the community of Nain, which is the largest diesel-reliant community in Atlantic Canada. The Nain Wind-Storage-Diesel Micro-Grid Project will serve as a prototype for similar clean energy infrastructure installations in the other remote Nunatsiavut communities on the North Coast of Labrador (Makkovik, Rigolet, Hopedale, and Postville) promoting technology diffusion and efficient project development.

3.0 CDM Programs

3.1 Portfolio Level Program Costs and Energy Savings

Table 1 and Table 2 describe Hydro's total CDM expenses and energy savings from 2009 to 2017 across all of Hydro's systems, including the Labrador Interconnected System. This report provides further detail and breakdown of the costs that will be recovered through the CDM Deferral Account[5] and the associated energy reductions in section 6, Regulated Program Energy Savings and Program Costs.

Table 1 Hydro's CDM Portfolio Spending[6] ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Windows	44	48	80	117	169	38	2		
Insulation	40	60	140	126	157	92	70	61	102
Thermostats	13	19	31	47	51	35	20	22	55
Residential Benchmarking								49	45
Coupon Program		140	135						
Commercial Lighting	13	12	59	20	29	15	18		
Industrial	57	221	103	173	89	1,244	(102)	28	41
Block Heater Timer				31	8	8			
Isolated Systems Community				858	871	615	530	451	936
Isolated Systems Business Efficiency Program				93	115	96	7	45	41
Heat Recovery Ventilator					11	7	6	6	7
Small Technologies					1	252	239	247	159
Business Efficiency (Prescriptive)								22	28
Business Efficiency (Custom)					45	101	152	183	127
Appliance Retirement Pilot							56	(12)	
Isolated Load Control Pilot							6	158	17
Total	**167**	**500**	**548**	**1,465**	**1,546**	**2,503**	**1,004**	**1,260**	**1,558**

[5] The CDM Cost Deferral Account is meant to defer the program costs for regulated Hydro (excludes program costs for the Labrador Interconnected System).
[6] Credits are due to an overstated accrual in the preceding year.

Table 2 Hydro's CDM Portfolio Annual Energy Savings (MWh)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Life to Date
Windows	13	37	61	136	99	85	10			441
Insulation	35	126	404	382	795	142	105	72	155	2,216
Thermostats	9	35	30	53	24	38	34	44	59	326
Residential Benchmarking									131	131
Coupon Program		64	256							320
Commercial Lighting	3	10	227	95	99	79	124			637
Industrial			165	3,172		22,258		177		25,772
Block Heater Timer					288					288
Isolated Systems Community				1,676	1,096	1,357	1,426	512	1,141	7,208
Isolated Systems Business Efficiency Program				3	26	111	67	241	24	472
Heat Recovery Ventilator						6	5	5	4	20
Small Technology Program						148	164	191	90	593
Business Efficiency Program(Prescriptive)							22	147	676	845
Business Efficiency Program(Custom)						107	775	588	232	1,702
Total	**60**	**272**	**1,143**	**5,517**	**2,427**	**24,331**	**2,732**	**1,977**	**2,512**	**40,971**

3.2 Residential Programs

Hydro's residential portfolio included five programs; insulation, thermostats, heat recovery ventilators (HRV), small technologies and the Residential Benchmarking Program offered jointly by the Utilities and one offered solely by Hydro during 2017. In addition, the Energy Efficiency Loan Program was launched in November 2017. Throughout 2017, Hydro continued to promote the takeCHARGE programs and technologies. Local advertising and building strong partnerships with retailers remains a priority and is an integral factor in the promotion of customer rebate programs.

The Isolated Systems Community Energy Efficiency Program is a program specifically targeted to residential and commercial customers in Hydro's Isolated Diesel systems. The objective of the program is to provide outreach, education, and energy efficient products free of charge to residential and business customers in the remote diesel system communities within Newfoundland and Labrador. From 2012 to 2017, the program operated in 42 remote communities, installed 94,250 energy efficient products, saved a total of over 7.2 GWh of electricity, and provided employment for over 55 residents of these communities.

The Isolated Systems Community Energy Efficiency Program includes residential and commercial direct installations and focuses on building knowledge and capacity in the communities by hiring and training local representatives. These representatives work within their own communities to promote the program, provide useful information on energy use, and provide direct installation of energy efficient products, including low flow showerheads, faucet aerators, LED lamps, specialty size light bulbs, smart power strips, and hot water tank and pipe insulation.

In 2017, 1,007 residential and business customers received direct installation of 17,275 products consisting of water saving technologies and LED specialty bulbs for lighting needs. While this work was ongoing, information was collected about the type of lighting, heating, and appliances in the homes and businesses, which will be used for future program planning.

The Kids in Charge school program was also delivered in 2017. This is an interactive presentation on saving energy, designed for students from kindergarten to grade 6. Trained representatives visited 7 schools and delivered 16 presentations to a total of 178 students in isolated communities.

3.3 Commercial Programs

Hydro's Business Efficiency Programs, which include prescriptive product rebates for heating and lighting controls and a custom program for individual customer facilities, continued to be delivered to business customers in the company's interconnected and isolated areas in 2017. These programs provide technical support to identify economical energy efficiency opportunities and provide financial support for capital upgrades. The total energy savings achieved as a result of Hydro's prescriptive and custom business programs in 2017 was 932 MWh.

Prior to 2016, the commercial lighting program was offered solely through lighting distributors. As such, there was little to no direct customer contact. In 2016, the Commercial Lighting

Program was incorporated into the Business Efficiency (Prescriptive) Program making rebates available directly to participating customers. This change facilitated more direct contact with business customers for program support and promotion. Hydro continues to engage with lighting distributors to promote the sale of high performance lighting products. Hydro enhanced its Business Efficiency Program in 2017 by expanding the list of energy efficient products eligible for mail-in rebate to include electrically commutated motors, rooftop air source heat pumps, and pre-rinse spray valves.

Commercial facility audits continue to be utilized to engage customers in the Isolated Systems Business Efficiency Program and the Business Efficiency Program. Since 2012, approximately 90 walkthrough audits have been conducted for Hydro's isolated and interconnected business customers. The intent of the audits is to facilitate opportunity identification, technical analysis, and project completion. In 2017, two commercial facility audits were completed in the interconnected system and 23 facility audits were completed in the isolated systems to inform customers of opportunities for incentives. Ten customers completed projects involving upgrades and improvements to LED lighting, building automation controls, insulation, and thermostats.

3.4 Industrial Program

Since 2010, Hydro has delivered the Industrial Energy Efficiency Program, which offers support and financial incentives for Hydro's industrial customers based on projects for lighting retrofits, process improvements, equipment changes, loss prevention (e.g. heat, steam energy), and funding for energy audit consultant reports. Participation in the Industrial Energy Efficiency Program has been variable as there are few industrial customers in the province. Promotion of the Industrial Energy Efficiency Program is now included under Hydro's Key Account Management framework to minimize variability, and to support improved project planning and scheduling. Within the Key Account framework, the five industrial customers are directly engaged with their Key Account Manager to assist with them with the Industrial Energy Efficiency Program. This also permits Hydro to better understand the customers' facilities, processes, plans and schedules for potential efficiency improvement projects. In 2017, three industrial customers initiated lighting retrofit projects which will be supported by approximately $50,000 in program funding. Hydro anticipates this investment will generate approximately 500 MWh of energy savings annually.

4.0 Planning and Evaluation

During 2017, several external evaluations and surveys were completed to measure customer awareness, interest, and uptake in current programs, including a socket saturation survey, a marketing survey, a residential end use survey, a benchmarking program evaluation, and an insulation and thermostat evaluation. Finally, during 2017, the Business Efficiency Program evaluation was started and will continue into 2018. This will evaluate the impact of program processes, existing markets, and savings.

The socket saturation survey was done to determine the level of saturation for LED bulbs in the marketplace. This information will inform decisions regarding the continuation of the instant rebate campaign. This program is also being evaluated by a third party consultant who will complete a process, market and impact evaluation.

MQO Research was contracted in 2017 to complete the residential energy use survey on behalf of the Utilities. The research provides a detailed overview of home energy usage through the collection of specific information on home construction, home heating sources, appliance and electronic usage and lighting to help inform estimates of energy use in the future. The population for the survey included all residents of Newfoundland and Labrador. The survey was completed with one of the primary decision makers in each household to ensure that the survey respondent was able to provide as much detailed information as possible on their home construction and various sources of energy usage.

An impact evaluation of the Benchmarking Program was completed in 2017. The impact evaluation reviewed the energy and demand savings associated with the program, effects such as free-ridership and spillover, and the ability of the program to achieve its targets.

An evaluation of the Business Efficiency Program is ongoing. Its scope includes process, market and impact evaluation. The process evaluation will review the adequacy of the program relative to its objectives, the program's ability to access the appropriate customers, customer satisfaction, the program's funding and how it is used. It will also identify opportunities to improve the effectiveness of the program and its activities and outputs. The market evaluation will review the barriers to adopting or implementing certain technologies, products or regulations, trends in energy efficiency use and consumption, the baseline for current and future evaluations, and the degree of implementation or penetration of products or technologies. The impact evaluation will review the energy and demand savings associated with the program, effects such as free-ridership and spillover, and the ability of the program to achieve its savings targets.

During 2017, the Utilities continued to execute the Five-Year Conservation Plan 2016-2020 (see Appendix B). The second year of this plan included the launch and expansion of existing commercial programs.

The Island Interconnected System is undergoing substantial change, as it will be interconnected with the North American Grid for the first time in 2018 via the Maritime Link and Labrador-Island Link. Furthermore, the 824 MW Muskrat Falls hydroelectric development is forecast to be commissioned in 2020. As a result of these material changes to Hydro's system, there is significant uncertainty as to the future marginal cost of energy and capacity. Recent estimates of the 2019 average hourly marginal cost vary between 4 to 8 ¢/kWh, depending on the time of year. Hydro intends to update its marginal cost projection prior to filing its Cost of Service Methodology Review, which is anticipated to be filed in the third quarter of 2018. Once the marginal cost projections are updated, the cost effectiveness of existing customer energy conservation programs on the Island Interconnected System will be reevaluated.

5.0 Outreach and Support

During 2017, Hydro continued to partner with Newfoundland Power to deliver the takeCHARGE program which offers customer education and conservation awareness activities, primarily through promotion of its takeCHARGE rebate programs and outreach activities. Residential and Business programs are promoted through activities including mass media marketing, targeted promotions, community outreach, school programming, trade ally development, partnerships, and events.

The advertising campaign includes newspaper, radio, online and social media advertisements. Campaigns run throughout the year for insulation, thermostats, HRVs, instant rebates and appliances, and the Business Efficiency Program. The media is chosen based on the time of year that programs are in market and consumer purchasing behaviours.

takeCHARGE is also active in social media through a joint utility Facebook page, YouTube channel, Twitter account, and website. To date, approximately 13,587 Facebook users have "liked" the takeCHARGE Facebook fan page, and YouTube views are continuing to increase through direct links to videos from other takeCHARGE social media channels. takeCHARGE currently has 2,947 Twitter followers and continues to increase. The takeCHARGE website number count of page views continues to increase year over year. In 2016, there were 423,298 page views, compared to 629,447 in 2017, which is a 49% year-over-year increase.

Hydro engages with retailers, suppliers, students, and other groups through presentations, and interactive booth displays to promote programs, answer questions and promote energy conservation. The takeCHARGE Town Challenge initiative has awarded $70,000, to date, to winning towns. Its purpose is to encourage residents and municipalities to reduce their energy use. Each year, municipalities are invited to submit proposals that will support their efforts to develop or improve energy conservation or energy efficiency projects. Projects have to demonstrate a positive effort to conserve energy that benefits the entire community. The takeCHARGE school contests for kindergarten to grade 6 classes and grade 7 to grade 12 classes were run with a goal to enable students to understand and be able to explain why saving energy is important, and demonstrate what they can do to conserve energy.

takeCHARGE held the 9th annual Energy Efficiency Week from September 25 to October 1, 2017 and marked the 25th anniversary of the first insulation rebate. Energy Efficiency Week is dedicated to providing customers with information to enable them to save energy and money. During the week, takeCHARGE teams were visible throughout the province at special events, television advertising was undertaken, and a full social media plan was executed.

Table 3 provides Hydro's costs to provide education, outreach, support, and planning for its CDM programs.

Table 3 Hydro's Support Costs ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Education	262	106	212	200	135	158	154	138	111
Support	53	48	43	53	27	52	68	42	40
Planning	176	180	304	127	152	224	442	250	251
Total	**491**	**334**	**559**	**380**	**314**	**434**	**664**	**430**	**402**

6.0 Regulated Program Energy Savings and Program Costs

Table 4 provides the estimated annual energy savings from Hydro customers in relation to programming associated with the annual regulated deferral request.

Table 4 Energy Savings from Island Interconnected and Isolated Systems CDM Program Activities[7] (MWh)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Life to date
Windows	8	14	38	50	43	40	4			197
Insulation	29	63	229	126	123	100	52	40	111	873
Thermostats	2	16	16	28	14	16	23	33	43	191
Residential Benchmarking									131	131
Coupon Program		47	166							213
Commercial Lighting	3		92	25	19	22	46			207
Industrial			165	3,172		22,258		177		25,772
Block Heater Timer										0
Isolated Systems Community				1,676	1,096	1,357	1,426	512	1,141	7,208
Isolated Systems Business Efficiency Program				3	26	111	67	241	24	472
Heat Recovery Ventilator					1	1		1		3
Small Technology Program						80	71	21	9	181
Business Efficiency Program(Prescriptive)							21	131	503	655
Business Efficiency Program(Custom)						73	773	588	220	1,654
Total	**42**	**140**	**706**	**5,080**	**1,322**	**24,058**	**2,483**	**1,744**	**2,182**	**37,757**

The costs associated with the delivery of the CDM program portfolio provided in Table 4 includes direct costs for advertising, salaries, rebates and other expenses directly associated with a specific program. These costs are recovered from customers through the CDM Cost Recovery Adjustment and vary depending on the uptake of the program and the number of programs offered.

Table 5 provides a breakdown of annual CDM program costs included in the CDM Deferral Account.

[7] Hydro's CDM Cost Deferral Account does not capture spending associated with CDM programs offered to customers on the Labrador Interconnected system, therefore Table 4 does not reflect energy savings associated with these programs.

Table 5 CDM Program Costs Included in the CDM Deferral Account[8] ($000s)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Windows	44	41	69	102	150	31	1		
Insulation	40	53	116	108	112	87	62	57	93
Thermostats	13	18	25	43	47	32	19	21	53
Residential Benchmarking								49	45
Coupon Program		113	123						
Commercial Lighting	13		43	10	17	10	11		
Industrial	57	190	98	170	88	1,243	(115)	27	41
Block Heater Timer									
Isolated Systems Community				858	871	615	530	451	936
Isolated Systems Business Efficiency Program				93	115	96	7	45	41
Heat Recovery Ventilator					8	3	4	4	5
Small Technologies					1	219	186	143	104
Business Efficiency (Prescriptive)								14	12
Business Efficiency (Custom)					40	92	134	193	126
Isolated Load Control Pilot							6	158	17
Appliance Retirement Pilot							56	(12)	-
Total	**167**	**415**	**474**	**1,384**	**1,449**	**2,428**	**901**	**1,150**	**1,473**

7.0 Program Participation and Savings

Table 6 provides statistics on participation for each of Hydro's programs. The transaction units are specific to each program. The Residential Energy Star Window, Insulation, Thermostat and HRV Programs reflect approved rebates. The Coupon Program reflects numbers of coupons redeemed. The Commercial Lighting and Small Technology Programs each reflect the number of products rebated through the programs. The Block Heater Timer Program reflects the number of timers determined to be installed through post-giveaway surveys or coupon redemption. The Isolated Systems Business Efficiency Program, Business Efficiency Program, and Industrial Efficiency Programs reflect the number of completed retrofit projects. The Isolated Systems Program denotes the number of residential and commercial customer premises that received direct installations. Finally, the Residential Benchmarking Program indicates the number of customers included in the treatment group.

[8] Credits are due to an overstated accrual in the preceding year.

Table 6 Life-to-Date Program Participation

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Windows	11	19	41	61	48	24	7			211
Insulation	14	24	104	50	53	22	35	31	39	372
Thermostats	4	28	32	45	23	20	15	63	56	286
Residential Benchmarking								1,000	1,000	2,000
Coupon Program		3,178	5,832							9,010
Commercial Lighting	27	74	470	320	339	377	323			1,930
Industrial			1	1		3		1		6
Block Heater Timers					629					629
Isolated Systems Community				1,355	1,153	1,181	965	345	1,007	6,006
Isolated Systems Business Efficiency Program				1	1	4	1	5	3	15
Heat Recovery Ventilator					1	11	9	8	7	36
Small Technology Program						6,920	4,551	26,601	9,764	47,836
Business Efficiency Program(Prescriptive)							4	173	2,309	2,486
Business Efficiency Program(Custom)						4	3	10	7	24
Total	**56**	**3,323**	**6,480**	**1,833**	**2,247**	**8,566**	**5,913**	**28,237**	**14,192**	**70,847**

8.0 Levelized Utility Costs

The Levelized Utility Cost (LUC) is a method used to compare the costs associated with conservation programs to the value of energy saved. The LUC represents the economic cost to the utility (₵ per kWh) to generate energy savings. It is an industry metric which is calculated by discounting future energy savings resulting from conservation programs to a present value. Table 7 provides the levelized utility cost for Hydro’s programs for 2017. The energy savings represent the annual savings resulting from the individual program participation during 2017.

Table 7 Hydro Program Participation, Savings and Levelized Utility Cost 2017

	Participation	Energy Savings (MWh)	Non-coincident Demand Savings (kW)	2017 Levelized Utility Costs (¢/kWh)	Life to date Levelized Utility Cost (¢/kWh)
Windows	-	-	-	-	15.5
Insulation	39	155	26	6.6	3.6
Thermostats	56	59	-	10.3	10.1
Residential Benchmarking	1,000	131	19	34.6	34.6
Coupon Program	-	-	-	-	-
Industrial	-	-	-	-	-
Block Heater Timer	-	-	-	-	-
Isolated Systems Community	1,007	1,141	352	18.7	11.9
Isolated Systems Business Efficiency Program	3	24	8	22.1	11.9
Heat Recovery Ventilator	7	4	1	20.3	23.5
Business Efficiency (Custom and Prescriptive)	2,316	908	129	2.6	4.2
Small Technology Program	9,764	90	28	19.4	17.4

9.0 Conclusion

Hydro has continued its efforts to promote energy conservation and demand management throughout 2017. Hydro continues to work with Newfoundland Power to develop and execute programs that are accessible to all customers of the Utilities. The takeCHARGE programs have been successful in providing education and fostering the development of a culture of energy conservation. In addition, Hydro continues to work with its customers to understand their needs and drivers of their electrical consumption, ultimately supporting the achievement of sustainable energy savings through the various programs described in this report. Hydro will continue to work towards the completion and implementation of the Five-Year Conservation Plan 2016-2020 and remains committed to adapting its programs as the needs of its customers continue to evolve. Overall, Hydro’s efforts supported annual incremental energy savings of 2,512 MWh in 2017 and accumulated energy savings of 40,971 MWh since 2009.

Appendix A

CDM Program Descriptions

Table of Contents

1.0 Residential takeCHARGE Rebate Programs

Program incentives are processed primarily through customer applications. The programs are promoted in partnership with trade allies in the retail, home building and renovation industries.

1.1 Insulation Rebate Program

The objective of this program is to provide incentives to increase the insulation R-value in residential basements, crawl spaces and attics, thereby increasing the efficiency of the home's building envelope. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects are eligible. Customers can receive an incentive of 75% of basement wall and ceiling insulation materials up to $1,000, and 50% of attic insulation material costs up to $1,000.

1.2 Thermostat Rebate Program

This program encourages installation of programmable and electronic thermostats to allow customers better control of the temperature in their home and to save energy. These high performance thermostats allow customers to set back the temperature during the night or when they are away. Eligibility for the program is limited to electrically heated homes, determined on the basis of annual energy usage. Home retrofit projects and new home developments are eligible. Incentives of $10 for each programmable thermostat and $5 for each electronic high performance thermostat are offered.

1.3 HRV Rebate Program

This program encourages customers to purchase a high efficiency HRV to improve the efficiency of their home. Eligible measures in this program include HRV models that have a Sensible Recovery Efficiency of 70% or more. Customers who purchase a high efficiency HRV can receive a rebate of $175. All customers are eligible for this program regards of age of home or heat source.

1.4 Isolated System Community Energy Efficiency Program – Hydro Program

This program includes both residential and commercial components targeting customers in Isolated Diesel and L'Anse au Loup Systems. The focus is on residential customers through the direct install of a kit of technologies, at-cash coupons on small technologies and mail-in rebates on energy efficient appliances. Commercial customers also receive a direct install of a kit of technologies. The kit includes items for water savings, draft proofing, lighting and other measures.

Homeowners receive education on energy efficiency and information on the existing takeCHARGE rebate programs. Community events, social media promotions and exchanges held to promote the program and energy efficiency awareness.

1.5 Block Heater Timer Program – Hydro Program

This program targeted customers in the Labrador Interconnected System to encourage the purchase of energy saving Block Heater Timers through in-store discounts offered at partnering retailers. The program launched with a giveaway of the technology to create awareness of the product as there was little or no use of the technology before the program. The incentive was offered over two winter seasons (2012-2013 and 2013-2014) and ended in spring 2014.

1.6 Small Technologies Program

1.6.1 Instant Rebates

This program promotes a variety of smaller technologies, such as LED lighting, and smart power bars, through instant rebates available at the cash register of participating retailers. All customers are eligible for this program regardless of age of home or heat source.

1.6.2 Appliances and Electronics

This program encourages customers to purchase high efficiency appliances. Participants receive incentives of $100 for select energy efficient washers, freezers, and $20 for eligible TVs. All customers are eligible for this program regardless of age of home or heat source. This program ended December 31, 2017.

1.7 Residential Benchmarking Program

This program encourages customers to adopt energy efficient behavioural changes. Participants receive Home Energy Reports that provide insight into their home's electricity use. The reports help customers understand changes in their usage over time, as well as how they compare to similar homes. They will also include practical tips on how to save energy moving forward. The program also includes an online component that allows customers to engage even further through weekly challenges and personalized saving plans.

Approximately 1,000 customers were randomly selected as participants in this program. Program participants broadly reflect the composition of Hydro's customer base in heating type and geographical distribution. No financial incentive is offered for this program.

1.8 Energy Efficient Loan Program

This is a program offered by the Government of Newfoundland and Labrador and takeCHARGE, making it easier to save energy and money. On-bill financing with a reduced interest rate by 2.5% from standard utility financing rates, is available on insulation, heat pumps and home energy assessments. Through EELP, eligible applicants can receive low-interest financing for up to $10,000 over a maximum of five years.

2.0 Commercial takeCHARGE Rebate Programs

2.1 Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency and demand reduction projects.

This program is available for existing commercial facilities that can save energy or reduce demand by installing more efficient equipment and systems. The program includes custom project incentives and prescriptive rebates for specific measures on a per unit basis.

2.2 Isolated Systems Business Efficiency Program (ISBEP) – Hydro Program

The ISBEP was launched in 2012 and targets commercial customers in the Isolated Diesel and L'Anse au Loup Systems. The program provides a custom approach to finding energy efficiency solutions and financial assistance for feasibility studies and for retrofit projects. It has the same program design and offerings as the joint utility Business Efficiency Program, but has higher incentive levels for retrofit work because of the higher avoided cost of generation in these systems.

3.0 Industrial Energy Efficiency Program (IEEP)

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings, and other supports to enable industrial facilities to identify and implement efficiency and conservation opportunities. This program is a custom program to respond to the unique needs of the industrial market, rather than a prescriptive technology approach.

Appendix B

Five-Year Conservation Plan: 2016 - 2020

FIVE-YEAR CONSERVATION PLAN: 2016 – 2020

October 2015

CONTENTS

1.0 EXECUTIVE SUMMARY

Newfoundland and Labrador Hydro ("Hydro") and Newfoundland Power have offered customer energy conservation programs on a joint and coordinated basis under the *takeCHARGE* brand since 2009. These programs provide a range of information and financial supports to help customers manage their energy usage.

The joint *Five-Year Conservation Plan: 2016-2020* (the "2016 Plan") builds on this experience, and continues to reflect the principles underlying two previous joint, multi-year conservation plans developed by Hydro and Newfoundland Power (the "Utilities").[1] It reflects refinement of the opportunities identified in a recently updated conservation potential study (the "2015 CPS") through in-depth local market research and program cost benefit analysis.

The 2016 Plan represents both growth and evolution of the Utilities' joint customer energy conservation program portfolio. It includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. The approach outlined in this plan will remain flexible to address the changing provincial landscape, in terms of customer expectations, market conditions for energy efficient products, and electrical system costs. The 2016 Plan also addresses customer support and education, program planning and evaluation processes, as well as the Utilities' costs and cost recovery arrangements.

The total estimated energy savings for 2016 through 2020 are 883 GWh.[2] Total estimated costs through this period are $41.1 million.

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[1] The *Five-Year Energy Conservation Plan: 2008-2013* was filed with the Board on June 27, 2008. The *Five-Year Energy Conservation Plan: 2012-2016* was filed on September 14, 2012.

[2] The energy savings indicated throughout the *Five-Year Energy Conservation Plan: 2016-2020* represent *gross* energy savings achieved by customers. These savings reflect all technologies installed by participating customers since program implementation. *Net* energy savings would reflect adjustments for: (i) the timing of customer installations giving rise to the energy savings; and (ii) program *free ridership* (an estimate of participants who would have chosen the more efficient product without the program).

2.0 BACKGROUND

2.1 Planning Context

Hydro and Newfoundland Power have collaborated on customer energy conservation program planning and delivery for the past 8 years. The programs offered jointly under the takeCHARGE brand have included a variety of information and financial supports which help customers manage their energy usage. The Utilities' provision of energy conservation programming is responsive to customer expectations, supports efforts to be responsible stewards of electrical energy resources and is consistent with provision of least cost, reliable electricity service. Initiatives address conservation opportunities for customers in each sector: residential, commercial and industrial.

The Utilities' practice has been to refresh their joint strategic plans for customer conservation programming every three to four years. This ensures programs achieve long term goals while being responsive to changes in customer expectations, market barriers, technology developments, and economics. Current program offerings are based on the Five Year Energy Conservation Plan: 2012-2016 ("the 2012 Plan").

One of the key inputs into the 2016 Plan was the outcome of the Conservation Potential Study ("CPS"), completed by the Utilities in 2015. The CPS identified cost-effective energy and demand reduction measures, outlined general parameters for program development, and quantified achievable energy savings potential by sector and end-use. The results of the CPS are considered with the Utilities' experience and other factors in the local market to determine potential programs and energy saving targets for the 2016 Plan.

The Utilities' conservation planning is coordinated with overall planning for the electrical system. Significant changes to the Island Interconnected System are anticipated to occur in this planning period. Interconnection of the Muskrat Falls hydroelectric development is forecast for 2018 and will include the Island's first connection to the

North American grid. As a result, there is uncertainty with respect to the marginal cost of energy and capacity on the Island Interconnected System beyond 2017.

Schedule A provides the current forecast marginal cost of energy and capacity for 2015-2035.[3] The forecast indicates a decrease in the marginal cost of energy beginning in 2018. This effectively reduces the value of energy savings arising from customer energy conservation programming, and limits the types of programs that can be cost effectively offered.

Costs of electricity supply additions are expected to be incorporated into customer rates starting in 2018, putting upward pressure on customers' rates. This is expected to increase customers' motivation to conserve energy to manage their electricity costs. Also, the recent economic slowdown is anticipated to continue into this planning period and will influence customer behaviour with regards to conservation.

The 2008 and 2012 Five Year Conservation and Demand Management Plans, delivered jointly by the Utilities, had focused primarily on energy conservation. This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Generating Station) which justified such a focus. The events of recent winters have since brought to light issues with peak load and generation capacity on the Island Interconnected System which are anticipated to continue into this planning period. The 2016 Plan therefore considers demand management opportunities as well as energy conservation.

The Utilities have been offering some form of customer energy conservation programming since 1991, and have achieved significant energy savings over this time. The current forecast, particularly for insulation, anticipates diminishing returns. For example, the remaining potential for energy savings through insulation upgrades has

[3] The marginal costs used to determine cost effectiveness of the customer energy conservation programs are based on the most recent marginal cost forecast as projected by Hydro in February 2015. These estimates are currently under review by Hydro to incorporate the forecast interconnection with the North American grid. Once more current estimates are available, they will be incorporated in the screening process.

been impacted by changes to the National Building Code requiring basement insulation in new homes, as well as barriers to retrofitting many of the eligible existing homes. This is consistent with experience in other North American jurisdictions where utility programming has harvested the "low hanging fruit" and subsequently has moved on to address more challenging and costly opportunities.

Energy conservation programming has also been affected by technology advancements and changes to standards. Lighting product standards changes have effectively eliminated availability of incandescent bulbs for consumers. At the same time, LED technology has advanced and become more affordable and available. The pace of this change has been even faster than anticipated in the 2012 Plan. This is demonstrated by higher than projected uptake in the Utilities' Instant Rebate component of the Small Technologies program.

The Utilities continue to work with the Provincial Government, through the Office of Climate Change and Energy Efficiency, regarding policy development for energy conservation and efficiency, and particularly potential impacts and approaches to building codes, product standards and broader market transformation objectives.

Many of the influences on the provincial energy conservation market can be seen in other North American jurisdictions. In recent years, many jurisdictions have experienced decreasing marginal costs of energy and increasing program costs due to maturing conservation programs. As a result, utilities and program administrators have revised their approach to economic analysis of energy conservation. The Utilities have conducted research on current economic evaluation practices. A summary of this research is provided in Schedule B. It indicates that Canadian jurisdictions use the Total Resource Cost ("TRC") test as their primary benefit cost test for program screening, with the Program Administrator Cost test as a secondary test. Only one of the seven Canadian utilities researched used Ratepayer Impact Measure as a primary benefit cost test for program screening. In the United States, most jurisdictions follow

similar practices with over 70% using TRC as the primary benefit cost test and 2% using Ratepayer Impact Measure for program screening.

2.2 Energy Conservation Programs

Based on the 2012 Plan, the Utilities have jointly offered customer energy conservation programs which provide both information and financial incentives to encourage customer installation of energy efficient technologies.[4] In addition, Hydro has offered programming for its customers, such as incentives for commercial customers in its isolated system service territories, where market conditions and system costs differ.

Table 1 shows, by sector, the portfolio of programs that have been offered under the 2012 Plan.[5]

Table 1
Conservation Programs
By Sector

Residential	**Commercial**	**Industrial**
Insulation Thermostat ENERGY STAR Window[6] HRV Block Heater Timer Small Technologies Isolated Systems Community Program	Lighting Business Efficiency Program Isolated Business Efficiency Program	Industrial Energy Efficiency Program

4 Once installed, these more energy efficient technologies provide energy savings for the customer throughout the life of the product. For example, an HRV has an estimated life of 15 years and will result in energy savings benefits throughout that period.
5 The Utilities also engage in demand management activities, including Newfoundland Power's Curtailable Service Rate Option and Hydro's interruptible load arrangements with its Industrial Customers.
6 The ENERGY STAR Window Program concluded at the end of 2014.

Schedule D summarizes the energy savings and costs for the customer energy conservation programs offered by the Utilities from 2009 through 2015.

Residential Programs

Table 2 provides a summary of residential customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).[7]

Table 2
Residential Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	2.5	7.1	18.6	28.5	38.4	51.5	65.7	**212.3**

The takeCHARGE residential programs are expected to result in aggregate energy savings of approximately 212.3 GWh by the end of 2015.[8]

Insulation Program

As a result of the updates to the National Building Code in 2012, several changes were made to the Insulation Program. New homes are no longer eligible and the minimum R-value requirements for existing homes have been increased. As well, the rebate structure was revised to provide a higher, easy-to-calculate rebate. Customers can receive an incentive of 75% of basement wall or ceiling insulation material costs up to $1,000, and 50% of attic insulation material costs up to $1,000.

[7] Energy savings include savings arising from all technologies installed by all participants since program implementation. This reflects the fact that these technologies provide energy savings benefits for the customer throughout the life of the product.

[8] Since implementation in 2009, there have been approximately 36,650 participants and over 638,000 at-the-cash rebates were provided on energy efficient products in the takeCHARGE residential customer programs.

Thermostat Program

High efficiency programmable and electronic thermostat replacements allow customers to conserve energy at relatively low cost and effort. Eligibility for the programs is limited to electrically heated homes, determined on the basis of annual energy usage.

ENERGY STAR Window Program

This program concluded at the end of 2014. After 5 years, and over 9,200 participating customers, the program had achieved its objective of making more efficient windows the standard in the local market.

Heat Recovery Ventilator Program

This program promotes the installation of high efficiency heat recovery ventilators ("HRVs"). HRVs have been widely used in new home construction in the province since the 1990s, to control humidity and air quality. The HRV program has experienced lower than projected participation since its launch in late 2013.[9] There has been improvement in 2015, and the Utilities will continue to monitor and evaluate this program in order to find opportunities to increase participation.

Block Heater Timer Program

Hydro provided giveaways and at-the-cash coupons for block heater timers to customers in Hydro's Labrador Interconnected System from 2012-2014. While vehicle engine block heaters are used extensively in this area, timers are rarely used. Instead of using electricity throughout the night, block heater timers allow vehicle owners to reduce the amount of time that electricity is used to warm the vehicle engine. Due to lack of participation this program was not continued past 2014 but commercial customers can take advantage of this technology through the Business Efficiency Program ("BEP") or the Isolated Systems Business Efficiency Program ("ISBEP").

[9] The Utilities have received feedback regarding low customer knowledge of home ventilation, with many customers being unaware of the purpose of a HRV in their home and how it can save energy. Also, there are complexities in the supply chain for acquiring a high efficiency HRV which can be problematic for potential participants.

Small Technologies

The small technologies program is supported by retail partners and appeals to a broad customer group as it does not involve a major home renovation. The program uses different marketing approaches for two different groups of energy efficient products.

The Instant Rebate component offers relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home.[10] Participation and energy savings results in the first two years of the program have exceeded the forecast in the 2012 plan. The Appliance and Electronics component offers incentives that are relatively higher value and available by mail-in and online application throughout the year.[11]

Isolated Systems Community Program

Following two pilot programs in 2010 and 2011, Hydro launched a full-scale, energy efficiency direct install program in 2012. The program includes direct installations of energy efficient products at no cost to homes and businesses.[12] The program also focuses on customer education and building capacity in the communities by hiring and training local representatives. These representatives work in their own communities to promote the program, provide information on energy use, and install the products.

[10] Products include LED lighting, motion sensors, timers, dimmer switches, smart power strips and more.

[11] Products include energy efficient clothes washers, full-size refrigerators, full-size freezers and TVs.

[12] Products include low-flow showerheads and aerators, CFLs, smart power strips, and hot water tank and pipe insulation.

Commercial Programs

Table 3 provides a summary of commercial customer energy savings achieved through the Utilities' conservation programs from 2009 through 2015(F).

Table 3
Commercial Portfolio Energy Savings
2009 through 2015F
(GWh)

	2009	2010	2011	2012	2013	2014	2015F	Total
Energy Savings	0.2	0.9	2.4	3.3	3.9	6.5	11.4	**28.6**

The takeCHARGE commercial programs will result in estimated aggregate energy savings of approximately 28.6 GWh by the end of 2015.[13]

Commercial Lighting Program

The Commercial Lighting Program targets reduced energy use through efficient lighting in commercial buildings, including high performance T8 and T5 fluorescent lighting and LED exit signs. This program has primarily been promoted through local lighting distributors by discounting lighting products at time of purchase.

The Business Efficiency Program

The objective of this program is to improve electrical energy efficiency in a variety of commercial facilities and equipment types. The program components include financial incentives based on energy savings from custom projects, and other financial and educational supports to enable commercial facility owners to identify and implement energy efficiency improvement projects. It also includes rebates for specific measures on a per unit basis.

[13] Since implementation in 2009, there have been over 1,050 participants in the takeCHARGE commercial customer programs.

Isolated Systems Business Efficiency Program

This program is targeted toward commercial customers located in Hydro's isolated system communities. This custom program provides incentives based on the energy savings from efficiency improvement projects. This allows customers to implement energy efficient technologies that are suitable for their specific buildings, equipment and operations.

Industrial Programs

Table 4 provides a summary of industrial customer energy savings achieved through Utility customer energy conservation programs from 2009 through 2015(F).

Table 4
Industrial Program Energy Savings
2009 through 2015(F)
(GWh)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Energy Savings	-	-	0.2	3.3	3.3	25.6	25.6	58.0

The takeCHARGE Industrial Energy Efficiency program will result in estimated aggregate energy savings of approximately 58.0 GWh by the end of 2015.[14]

The Industrial Energy Efficiency Program is a custom program that responds to the unique needs of Hydro's transmission level industrial customers. This program provides financial support for engineering feasibility studies of efficiency projects and for project implementation costs. The Industrial program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011 and the last being submitted in 2013. No projects were completed in 2013 as focus was put on feasibility studies for work to be completed in 2014. The program then underwent an assessment by an external third party in 2014 and was re-launched as a full program in 2015.

[14] Since implementation in 2009, there have been 5 projects completed under the takeCHARGE Industrial Energy Efficiency Program.

2.3 Education & Support

The Utilities continue to provide energy efficiency education and support to customers through a variety of channels, which include a joint website, outreach activities, school presentations and partnerships with other organizations.

Table 5 shows the number of customer-initiated contacts with the Utilities for energy conservation information from 2010 through 2015 YTD.

Table 5
Customer Contacts for
Energy Conservation Information

	2010	2011	2012	2013	2014	2015YTD
Contact Centre Inquiries	11,704	12,624	9,793	9,630	10,830	5,328
Website Visits	52,013	72,996	49,202	76,278	186,003	197,973

The majority of customers chose electronic means of communication with the Utilities to obtain information on energy conservation and rebate programs. This is consistent with promotion of the takeCHARGE website as the primary resource for customer inquiries and information. Customer visits to the takeCHARGE website grew by 144% from 2013 to 2014. Activity in the first eight months of 2015 shows continued growth, with approximately 80% of website visits via a mobile device. This increase is related to increased promotion, changes to existing programs, and addition of new programs.

The Utilities have participated in an average of 214 community outreach events each year since 2012. This included presentations to retailers and suppliers, senior citizens, trade allies and other groups. takeCHARGE information booths were displayed at home shows, trade fairs, and retail stores across the province. The Utilities also offer a number of outreach events, such as the annual takeCHARGE of Your Town Challenge and Energy Efficiency Week. Through these outreach activities, members of the takeCHARGE team assisted customers with their energy efficiency questions, while raising awareness of energy conservation and the takeCHARGE rebate programs.

Over the last three years the takeCHARGE *Kids in Charge* K-I-C Start school program, has provided energy efficiency and conservation education support to students throughout Newfoundland and Labrador. This has included delivering in classroom presentations and an annual contest for primary and elementary students. In 2014, takeCHARGE partnered with the Provincial Office of Climate Change and Energy Efficiency to extend this program through the Hotshots pilot program.[15] As a result, in 2014-15 school year, over 11,000 students in 106 schools throughout the province participated in 448 presentations about energy conservation.

Trade allies play an integral role in helping customers make knowledgeable decisions regarding energy conservation and related home improvements. Retail partners display information about takeCHARGE programs and energy efficiency products in their stores and in flyers, as well as during special promotional events.[16] Similarly, the Utilities are continuing to grow a network of business to business service providers and suppliers that support the commercial and industrial sectors.[17]

The Utilities have also developed partnerships with a variety of other organizations that share common goals for the province's conservation market, including the Association of Newfoundland and Labrador Realtors, the Canadian Home Builders Association, Newfoundland and Labrador Housing Corporation, and the Canadian Mortgage and Housing Corporation.

[15] Through the HotShots pilot, the Province provided funding and support for additional in-class presentations, curriculum linked teacher materials, and a contest for high school students.

[16] The Utilities continue to work with over 160 retail store partners, 11 manufacturers/distributors, and approximately 50 HRV installers.

[17] These include lighting equipment manufacturers and distributors, electrical and HVAC contractors, and engineering firms.

Table 6 shows costs for education and support for the period 2009-2015(F).

Table 6
Conservation Education & Support
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Education	666	486	428	426	501	647	693	3,847
Support	236	206	219	222	186	174	158	1,401
Total	**902**	**692**	**647**	**648**	**687**	**821**	**851**	**5,248**

2.4 Planning & Evaluation

Planning

The focus of the Utilities' CDM planning process is to develop a 5-year plan for the implementation of comprehensive customer energy conservation and demand management programs around the technologies that were determined to have conservation potential in the provincial market. The completion of the CPS in 2015 effectively initiated the development of the 2016 Plan.

Programs are developed and revised through consultation with the various market stakeholders, such as government, trade allies and local interest groups, to gather feedback on program delivery strategy.

Table 7 shows costs for conservation planning for the period 2009-2015(F).[18]

Table 7
Conservation Planning
Costs 2009-2015(F)
($000s)

	2009	2010	2011	2012	2013	2014	2015(F)	Total
Planning	401	429	509	404	462	958	1,202	4,365

Variations in annual conservation planning costs primarily reflect the periodic nature of the Utilities' program planning and research activities.

Research

In 2013, the Utilities completed a joint Commercial Facility Equipment Inventory ("CFEI") on 54 commercial facilities.[19] This research provided information on how commercial customers use electricity, through an inventory and analysis of all mechanical and electrical equipment in each facility.[20] This data was used as a direct input into the CPS conducted in 2015.

In 2014, Newfoundland Power and Hydro jointly conducted a survey to gather information regarding electricity end uses in the residential sector. The information gathered was used to assess potential electricity savings opportunities, and was used as a direct input into the current planning cycle. These results are also being taken into account in making adjustments to the *takeCHARGE* programs. For example, because

18 Conservation planning costs include costs related to surveys and research, development of the potential study and the five-year plan, and general administration.

19 The CFEI was completed by CBCL Limited, a consultant that conducted on-site facility audits for participating commercial customers. CBCL Limited is a leading employee owned multidisciplinary engineering and environmental consulting firm in Atlantic Canada.

20 The CFEI found, for example, that the food retail sector are the largest users of electricity on a square footage basis of the customers audited, followed by the manufacturing/fish processing sector.

of survey findings regarding the prevalence of CFLs, these have been removed from the Instant Rebates Program beginning in the fall of 2015.[21]

Newfoundland Power completed research on ductless mini-split heat pumps ("MSHP") from 2013 to 2015. The objectives of this research were to assess the current MSHP market in Newfoundland, the use of the MSHP as a supplementary heat source and the potential impact of MSHPs on the electricity system. The results indicate that MSHP are more efficient and do save energy compared to electric baseboard heat.[22] This analysis also shows that there is not likely to be peak demand reduction on the electricity system from installation of MSHPs.[23] Customer demand for MSHP products has grown significantly in recent years and continues to be strong. However, there are issues with availability of qualified installers and customer understanding of product quality requirements.

In the fall of 2014, Newfoundland Power launched a pilot program to assess the economic, market, and technical feasibility of direct load control to reduce overall peak demand. This pilot was initiated in response to the constraints on system capacity that became evident after the events in January of 2013 and 2014. The pilot involved controlling hot water tanks in approximately 500 customer homes in Paradise and Mount Pearl. Demand reduction achieved by the direct load control events on average was 0.6 kW per participant, and for events that included all participants, approximately

21 Customers were asked what types of lighting they use in areas of their house where they spend the most time: 63% reported that they use incandescent bulbs, 53% CFLs, and 18% LEDs (multiple responses allowed). In another question, 31% of respondents claimed to have changed all their bulbs to more energy efficient types, and 45% indicated that they have begun to change to more energy efficient types.

22 Approximately half of the homes in the study recorded energy savings after installation of the MSHP. In these homes, electricity usage declined by an average of 5,300 kWh or 19% per year, with savings ranging from 7% to 50%. The remaining homes recorded an increase or no change in energy usage. This appears to reflect factors such as heating of additional living space, fuel switching, or operational issues with the MSHP.

23 Savings at time of system peak are dependent on a number of factors such as the efficiency and defrost cycle of the MSHP system, and temperature. A high efficiency MSHP may be capable of providing peak savings in warmer parts of the province but not in colder regions, while a less efficient MSHP may not be capable of providing peak savings in any region. On colder weekdays, the study observed little difference in the load profile of the MSHP homes vs. electric baseboard homes, and occasionally the MSHP homes' peak load was slightly higher.

298 kW of demand reduction was achieved. The Pilot results also indicate that a full scale provincial program does not meet the economic requirements.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project, which is supported by the Utilities and administered by Hydro, began in September 2014 and aims to assess whether real time display of energy use has a positive effect on electricity conservation behavior. The pilot involves approximately 750 customers: 250 with an in-home display device, 250 with an in-home display device as well as electricity conservation information in a monthly mail out, and 250 with only the electricity conservation information. Monitoring of participants will continue until January 2016 and the final report will be submitted to Government by end of March 2016.

Evaluation

The customer energy conservation programs are continuously evaluated by the Utilities on their energy savings, market impacts and delivery process effectiveness. Additional review by external third party evaluators has also been conducted. Program evaluation findings are used to refine program design and implementation details on an ongoing basis, as well as support further planning.

For example, the third party residential program evaluation in 2013 found that two-thirds of windows sold in the province were ENERGY STAR, which supported the Utilities' decision to conclude the ENERGY STAR Windows Program.[24]

Economic and energy savings evaluation of the customer energy conservation programs is performed annually. Program participants are required to provide certain information on program rebate applications. This information ranges from technical data, such as the R-value of installed insulation, or efficiency rating of a HRV to the type of heating in the home and its geographic location. Analysis of this data allows the

[24] The 2013 residential program evaluation was conducted DNV GL- Energy, headquartered in Burlington, Massachusetts, and specializing in evaluating programs that promote energy efficiency, demand response, and distributed generation.

Utilities to accurately estimate the energy savings for each program and perform industry standard economic cost-benefit tests.

2.5 CDM Costs & Cost Recovery

Table 8 provides a summary of the customer energy conservation program and general costs of the Utilities from 2009 through 2015(F).[25]

Table 8
Conservation Costs
2009 through 2015 (F)
($000s)

	2009	2010	2011	2012	2013	2014	2015F	Total
Programs								
Residential	1,386	2,322	3,473	3,436	3,921	4,277	5,188	24,003
Commercial	79	95	216	214	355	926	1,388	3,273
Industrial	57	226	103	173	89	1,244	19	1,910
Total Programs	1,522	2,643	3,791	3,823	4,365	6,447	6,595	29,186
General	1,303	1,121	1,156	1,052	1,149	1,779	2,054	9,614
Total	**2,825**	**3,764**	**4,947**	**4,875**	**5,514**	**8,226**	**8,649**	**38,800**

The Utilities' costs related to conservation programs have increased from approximately $2.8 million in 2009 to $8.6 million in 2015. This primarily reflects the addition of new customer energy conservation programs in 2013, specifically the Small Technologies Program and the Business Efficiency Program. This also reflects the increased levels of customer participation and rebates related to the joint takeCHARGE program portfolio. The expansion of customer programs has also resulted in increasing energy savings.

25 This cost summary does not include (i) costs related to programs offered independently by the Utilities prior to June 2009; (ii) costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management); and (iii) costs related to Hydro's interruptible service arrangements with its Industrial Customers.

Details of the Utilities' customer energy conservation program and general costs are provided in Schedule C.

The Utilities each bear the costs related to the provision of customer energy conservation programming in their own service territory. General conservation and program costs, such as customer rebates and costs related to responding to customer inquiries are incurred directly by each utility. Costs which are incurred jointly, such as provincial mass media advertising, are split on an 85% / 15% basis between Newfoundland Power and Hydro, respectively.[26]

Cost Recovery

Newfoundland Power's current conservation cost recovery practice reflects Board Order No. P.U. 13 (2013). Conservation program costs are deferred and amortized over a seven-year period. Through the annual operation of the Company's Rate Stabilization Adjustment, customer rates are adjusted to reflect any difference between the conservation program costs included in the most recent test year and the costs actually incurred. Newfoundland Power's annually recurring general conservation costs related to providing general customer information, community outreach and planning are expensed in the year in which the costs are incurred.

Hydro's current customer rates, as approved by the Board in Order No. P.U. 8 (2007), include recovery of approximately $0.4 million in costs related to management and planning of conservation programming. In each year from 2009 to 2014, inclusive, Hydro has deferred recovery of direct program costs related to the expansion of customer energy conservation programming under the 2008 Plan and 2012 Plan.[27] As of August 14, 2015, associated with a general rate application filed by Hydro on July 30, 2013, and an amended general rate application filed by Hydro on November 10, 2014,

[26] This approach to division of jointly incurred costs reflects the proportion of customers served by each utility.

[27] The deferred recovery of these costs in 2009, 2010, 2011, 2012, 2013, and 2014 were approved by the Board in Order Nos. P.U. 14(2009), P.U. 13(2010), P.U. 4(2011), P.U. 3(2012), P.U. 35(2013), and P.U. 43(2014), respectively.

the Consumer Advocate, Newfoundland Power, the Industrial Customer Group and Vale, with participation by Board Hearing Counsel, have engaged in negotiations with Hydro. As a result, these parties agreed that "Hydro's proposal to defer and amortize annual customer energy conservation program costs, commencing in 2015, over a discrete seven year period in a Conservation and Demand Management (CDM) Cost Deferral Account should be approved."[28]

3.0 PLAN: 2016-2020

3.1 Conservation Potential & Program Selection

The programs included in the 2016 Plan have been selected based on a number of considerations. Opportunities identified in the 2015 CPS are a key input and these have been further assessed by the Utilities in terms of engineering, market and economic viability. Consideration has also been given to the experience of the Utilities and others in the local marketplace, feedback from customers, as well as experience shared from other Canadian jurisdictions.

Conservation Potential Study

In June 2015, a comprehensive study was completed of electricity conservation and demand management potential for the province.[29] This Conservation Potential Study estimated the potential for electrical energy and demand savings by sector and by electricity system from 2015-2029. It also identified specific technologies available to assist in achieving that potential. The CPS essentially provides a framework, consistent with current North American practices, within which to assess conservation programming. The findings enabled the Utilities to quickly focus on cost effective technologies and begin assessment of market characteristics to guide program concept development.

[28] Newfoundland and Labrador Hydro – Amended General Rate Application – Parties' Settlement Agreement dated August 14, 2015.

[29] ICF International (previously called Marbek) conducted Conservation Potential Studies for the Utilities in 2007 and 2015. ICF International is a leading environmental and energy management consultancy and has extensive experience conducting Conservation Potential Studies in Canada.

Electrical system marginal costs of supply are used in the CPS to screen the economic viability of more efficient technologies.[30] For the current CPS, these costs were based on the most recent marginal cost forecast as projected by Hydro in February 2015.[31] These estimates are currently under review. Once Hydro's marginal cost study is completed, the CPS results will be reassessed. If such a review results in changes to the list of cost effective technologies with conservation potential, these will be considered in future updates to the 2016 Plan.

Figure 1 shows the baseline provincial energy usage forecast which was input to the 2015 CPS (the reference case), and the upper and lower achievable potentials estimated by the Potential Study.[32]

30 Technologies are considered to be economically viable when the cost of saving one kWh or kW of electricity is equal to, or less than, the marginal cost of supplying the electricity.

31 The 2015 CPS included an analysis of the sensitivity of potential technologies to changes in marginal costs. The analysis was based on a range of + 30% to – 10% of the February 2015 forecast marginal costs. It indicated a modest level of variability in technology viability and resulting conservation results. Please see CPS, section 7.5 Energy Efficiency Supply Curve, filed with the Board September 15, 2015.

32 The reference case is based on the provincial energy usage forecast from 2014. After this study was completed the energy usage forecast decreased due to the economic downturn, mainly in the industrial sector. The achievable potential is defined as the portion of the economic conservation potential that is achievable through utility interventions and programs given institutional, economic and market barriers. The upper achievable potential is considered to be the best case scenario with all market barriers removed, such as capital cost and product accessibility. The lower achievable potential is considered a business as usual scenario with the existing market barriers remaining in place.

Figure 1
Conservation Potential Study Results
Provincial Electrical Consumption
2014-2029

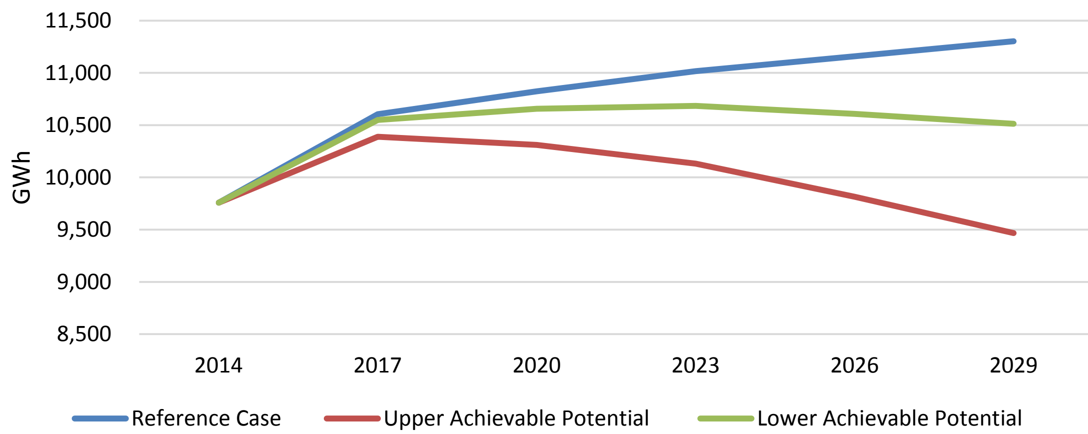


Figure 1 shows that, over time, the cumulative effects of implementing cost effective efficient technologies can significantly reduce forecast growth in electricity usage.[33]

Figures 2 and 3 show the results of the CPS regarding achievable demand reduction potential from energy efficiency measures ("Energy Efficiency") and from demand response specific measures ("Demand Response") by 2020.[34]

[33] At the end of the first estimation interval, in 2017, the CPS shows a range of 55 GWh for the lower achievable potential savings and 215 GWh for the upper achievable potential savings. This compares with annual savings of approximately 116 GWh currently estimated in the Plan for the same timeframe.

[34] The Commercial and Industrial sector includes Hydro's large transmission level Industrial customers as well as Newfoundland Power's general service customers.

Figure 2
Lower Achievable Demand Reduction Potential
Island Interconnected System
2020
(MW)

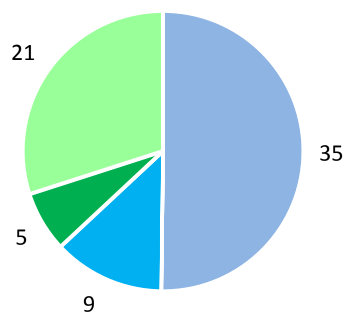
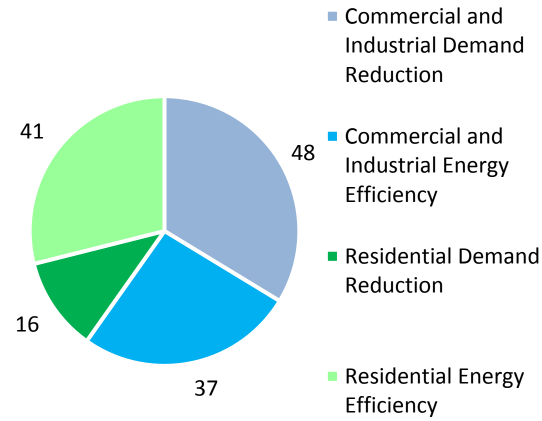


Figure 3
Upper Achievable Demand Reduction Potential
Island Interconnected System
2020
(MW)



Figures 2 and 3 show 70 MW for the lower potential and 142 MW for the upper potential demand reduction on the Island Interconnected System.[35] Installation of energy efficiency measures that reduce consumption during times of peak demand account for approximately 43% and 55% of the lower and upper achievable demand reduction, respectively, by 2020.[36]

The majority of the demand reduction potential was identified in the Commercial and Industrial sectors. Specifically, the Industrial sector represents about 87% and 74% of the total lower and upper achievable demand reduction, respectively. The demand reduction technologies identified through the CPS as having the most potential included curtailable load arrangements with commercial and industrial customers and direct load control of residential hot water tanks.

[35] 21+35+9+5=70 and 41+16+37+48= 142
[36] (21+9)/70=43% and (37+41)/142=55%.

Selection

The technologies that passed the economic screening of the CPS were reviewed in detail to assess their possible inclusion in the 2016 Plan. Local market research was conducted to identify barriers to broader adoption of more efficient technologies, such as capital cost, market availability and awareness. This included consultation with market stakeholders and trade allies, as well as discussions with other utilities.

Once existing market barriers were identified, a program strategy was then developed to attempt to overcome those barriers. Costs associated with the program were considered and the cost effectiveness of the program determined.[37] This more detailed review of program costs and benefits can cause a technology that had passed economic screening in the CPS to fail the economic tests required of CDM programs.

Economic Screening

The Utilities' economic screening of the customer energy conservation programs has previously required a positive result for both the Total Resource Cost ("TRC") and Ratepayer Impact Measure ("RIM") cost-benefit tests.[38] Recent research indicates Canadian and U.S. utility practice has changed to focus on the TRC and Program Administrator Cost ("PAC") tests.[39]

The Utilities recommend adoption of the TRC as the primary means of program economic screening, and the PAC as a secondary means. This is consistent with current North American practice, and is appropriate based on the electrical system marginal costs and program objectives in this jurisdiction. Based on this recommendation the programs included in the 2016 Plan passed economic screening

[37] Program cost estimates include marketing, delivery and administration, incentives, measurement and verification, and evaluation.

[38] In Order No. P.U.7 (1996-97), the Board required customer conservation programs to be evaluated with respect to rate impact, as well as the total resource costs. The Utilities' have interpreted this Order to require a TRC of 1.0 and a RIM of 0.8 as described in *Newfoundland Power Inc. – 2009 Conservation Cost Deferral Application, Section 2: Proposed Customer Program Portfolio* filed with the Board October 29, 2008.

[39] See Section 2.1, page 4, and Schedule B.

based on the TRC and PAC.[40] The Utilities' will continue to monitor changes to economic screening practices to appropriately reflect evolving program characteristics and electrical system costs.

3.2 Conservation & Demand Management Programs

The 2016 Plan builds on the outcomes of the 2012 plan as well as the experience of the Utilities. Programs included in the 2016 Plan address conservation opportunities in all three sectors: residential, commercial, and industrial. The 2016 Plan includes a new behavioural-based program for the residential sector, expansion of existing commercial programs, and the reshaping or discontinuation of several programs. These conservation programs are broadly consistent with programs offered by utilities in other jurisdictions.

Table 9 shows, by sector, the portfolio of programs to be offered under the 2016 Plan.

Table 9
Conservation Programs
By Sector

Residential	**Commercial**	**Industrial**
Insulation	Business Efficiency Program	Industrial Energy Efficiency Program
Thermostat	Isolated Business Efficiency Program	
HRV		
Small Technologies		
Isolated Systems Community Program		
Benchmarking		

[40] Application of the RIM test would result in elimination of a number of programs, including Benchmarking, HRV, and Small Technologies.

Residential Programs

Insulation, Thermostat and HRV Programs

These existing joint incentive programs primarily target space heating energy savings, and will continue to be offered as part of the 2016 Plan. The remaining eligible market for the Insulation and Thermostats programs has been declining in recent years. The HRV program has had limited participation due to barriers related to customer understanding and market complexity. These programs will be continuously evaluated to ensure program cost effectiveness.

Small Technology Program

The jointly offered Small Technologies program will continue to use different marketing approaches for the two different groups of energy efficient products.

The Instant Rebate component will continue to offer relatively small incentives instantly at-the-cash on a variety of low cost, every day energy efficient products for the home. As part of the 2016 Plan, Instant Rebates will include additional technologies.[41] It is anticipated that this component will end during 2018 as LED lighting becomes the norm in the residential lighting market.[42] Most of the energy savings benefits in this program are related to customers' early adoption of LED lighting from less efficient technologies, and energy savings from non-lighting products are not expected to be sufficient to offset the program delivery costs.

Incentives for the Appliance and Electronics component will continue to be available through 2017. At that time, anticipated reductions in marginal costs on the electricity system will effectively reduce the value of energy saving benefits, causing the program to fail economic screening.

[41] As part of the 2016 Plan, Instant Rebates will include additional technologies, such as faucet aerators, door bottom weather stripping, door adhesive weather stripping, window insulation kits, electrical outlet gaskets, and caulking.

[42] The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Isolated Systems Community Program

The existing format for this program will continue to be offered to customers in Hydro's isolated system communities through 2017. Information and feedback collected in 2014 and 2015, particularly for the direct install component, will be used to evaluate and plan for the Isolated Systems Community Program beyond 2017.

An Appliance Retirement component will be added to this program beginning in 2016, targeting at least one community. Older inefficient appliances will be removed from participating homes and routed for appropriate disposal.[43]

Benchmarking

This new joint program will promote customer behaviour changes to encourage more efficient energy use. Benchmarking involves using social norms to encourage neighbourly competition to reduce electricity consumption. This program will include comparison of participant households' energy consumption with their energy history and that of similar households. Participants will also receive personalized home energy reports that provide household specific electricity usage information and savings tips to help them reduce energy use and lower their electricity bills. This program will be available to customers from 2016 to 2019.

Commercial Programs

Lighting Program

Beginning in 2016, existing commercial lighting program products will become prescriptive rebates under the Business Efficiency Program, including the fluorescent high bay, high performance T8 fluorescent lamp and LED exit sign. This change will allow for more specific marketing initiatives and increased awareness of the rebates available for these technologies.

[43] This component will be evaluated to determine whether a broader program would be cost effective.

Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts have become the market standard. Industry partners indicate that approximately 55% of ballasts sold in the province in 2014 meet the program efficiency criteria.[44]

Business Efficiency Program

The Business Efficiency Program, offered jointly by the Utilities, will continue to provide custom and prescriptive incentives to commercial customers for energy efficiency improvements. Continued growth in customer participation and energy savings are anticipated for this program. The Utilities will increase the customer education and awareness component of this program to include sector-based identification of energy efficiency opportunities. New technologies will also be added to the program's list of prescriptive incentives.[45]

Isolated Systems Business Efficiency Program

This program will continue through 2020, and will be offered to Hydro's commercial customers located in isolated system communities. The program will continue to provide incentives based on the energy savings of customer projects, similar to the Business Efficiency Program.

Industrial Programs

Industrial Energy Efficiency Program

Through 2020, this customized program will continue to offer support and financial incentives based on energy savings for retrofit of industrial process equipment for Hydro's transmission level industrial customers.[46]

[44] Note that U.S. Federal Regulations are now equivalent to this ballast efficiency specification.
[45] These include: LED screw-in lamps, high bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems, and low flow pre-rinse spray valves.
[46] The Industrial Energy Efficiency Program's cost effectiveness and potential energy savings will be evaluated on a year to year basis.

Customer Energy Savings

Table 10 shows forecast customer energy reduction estimates for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 10
2016 Plan Energy Reduction Estimates
2016 through 2020
(GWh)

	2016	2017	2018	2019	2020	Total
Residential	80.4	102.7	118.1	123.5	111.7	536.4
Commercial	18.7	27.6	37.5	48.6	61.4	193.8
Industrial	30.6	30.6	30.6	30.6	30.6	153.0
Total	129.7	160.9	186.2	202.7	203.7	883.2

The programs in the 2016 Plan will result in estimated aggregate customer energy savings of approximately 883.2 GWh from 2016 through 2020. Customer energy savings are forecast to increase annually through 2020, due to expansion of the program portfolio and the addition of program technologies for the residential and commercial sectors.

Several program offerings are expected to be concluded during the planning period. These include the Small Technologies program and the Benchmarking program. Design of alternate programming for the residential sector is anticipated through the Utilities' program planning in 2018.

Demand Management

The previous conservation and demand management plans have focused primarily on energy conservation.[47] However, the Utilities' customer energy conservation programs have resulted in quantifiable demand savings.

The technologies identified through the CPS as having the most potential for demand reduction included direct load control of residential hot water tanks and curtailable load arrangements with commercial and industrial customers. Recent research has identified issues with the cost effectiveness of residential load control on the Island Interconnected System. As a result, this measure is not included in the 2016 Plan.[48] The Utilities will continue to pursue curtailment opportunities with their larger customers.[49]

A new component will also be added to the Business Efficiency Program ("BEP") to include a custom incentive for demand reduction measures that are economically viable and that provide measureable demand reduction during peak times.[50]

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[47] This reflected the relatively high marginal energy costs (predominantly due to fuel costs at Hydro's Holyrood Thermal Station) which justified such a focus.

[48] Although residential load control on the Island Interconnected System does not make economic sense, Hydro's isolated communities served by diesel generation have higher marginal costs which may make the program cost effective.

[49] Hydro currently has interruptible load arrangements with its Industrial Customers which have potential for more than 90 MW of capacity assistance. Newfoundland Power currently has 16 customers participating in its Curtailable Rate Option, providing 10.4 MW of potential load reduction.

[50] More information on the custom demand component of the BEP can be found in Schedule C.

Table 11 shows forecast customer demand reduction estimates for the customer energy conservation programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 11
2016 Plan Demand Reduction Estimates
2016 through 2020[51]
(MW)

	2016	2017	2018	2019	2020	Total
Residential	3.3	4.7	5.0	4.3	1.4	18.6
Commercial	2.1	2.0	2.3	2.5	2.8	11.7
Total	5.4	6.7	7.3	6.8	4.2	30.3

The Utilities' takeCHARGE customer energy conservation programs are forecast to achieve approximately 30.3 MW in peak demand reduction through 2020. This demand reduction will occur annually for the life of the installed technologies.[52]

[51] Hydro does not forecast demand reduction for their transmission level industrial customers.
[52] For example, a customer who installs basement insulation in 2014 will achieve approximately 0.9 kW of annual peak demand reduction for the next 20 years.

2016 Plan Program Costs

Table 12 shows forecast costs for the programs in the 2016 Plan, by sector, from 2016 through 2020.

Table 12
2016 Plan Program Costs Estimates
2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Residential	5,987	6,308	4,540	3,048	2,042	21,925
Commercial	1,628	1,906	1,933	2,258	2,301	10,026
Industrial[53]	667	10	10	10	10	707
Total	8,282	8,224	6,483	5,316	4,353	32,658

The Utilities' costs related to programs in the 2016 Plan are forecast to be approximately $32.7 million over the five-year planning period. Forecast changes in program costs primarily reflect the expansion of programs and additional technology offerings anticipated from 2016 to 2018, and the conclusion of certain programs through the planning period.

3.3 Education & Support

The Utilities' customer education and support activities will continue to evolve to support changes in customer energy conservation programs and in the broader conservation market. The Utilities will continue to provide customer support and be responsive to customer expectations. Current activities, including customer outreach events, the takeCHARGE website and partnerships with industry stakeholders will be key elements of customer education.

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[53] Forecasted Industrial program costs after 2016 are associated with program promotion and customer engagement. Given the small number of transmission level customers in the province, there is a high degree of uncertainty for participation in the program year to year. The forecasted amounts after 2016 will increase if customers avail of the program for feasibility assessments or incentives for energy efficiency retrofits. Projects will continue to be screened based on cost effectiveness to ensure the program remains above minimum economic thresholds.

The Utilities' educational initiatives will be expanded to include a program promoting mini-split heat pumps. The program components will include financing, education and marketing initiatives directed towards customers, and direct engagement with certified installers and suppliers. A marketing campaign will be launched to raise customer awareness of the benefits of this technology, how to choose a high quality product, as well as the necessity of having the system installed by qualified contractors. The eligibility criteria for on-bill financing of these systems will encourage the installation of high efficiency units, installed by qualified contractors.[54]

The Utilities will continue to build upon their experience offering the takeCHARGE K-I-C Start School Program. Marketing will continue to build awareness of the program amongst school boards and teachers. Teaching aids will be developed and be made available on the takeCHARGE website to assist in furthering conservation education after presentations are conducted. Updates will also be made to strengthen the message of conservation for younger students, and awareness-building contests will be offered for all age groups.

Table 13 shows forecast costs for conservation education and support for the period 2016 to 2020.

Table 13
Conservation Education & Support
Costs 2016 through 2020
($000s)

	2016	2017	2018	2019	2020	Total
Education	770	791	827	851	873	4,112
Support	171	175	181	184	191	902
Total	941	966	1,008	1,035	1,064	5,014

[54] Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016.

3.4 Planning & Evaluation

Planning

The 2016 Plan incorporates research and analysis required for the next iteration of multi-year conservation portfolio planning by the Utilities.

Table 14 shows forecast planning costs included in the 2016 Plan.

Table 14
Conservation Planning Costs 2016-2020(F)
($000s)

	2016	2017	2018	2019	2020	Total
Planning	527	596	767	863	644	3,397

Variability in annual planning costs reflects the Utilities' multi-year planning cycle for customer conservation programs.

The Utilities anticipate development of the next multi-year plan for customer energy and demand conservation programming in 2018. Further clarity regarding electrical system cost dynamics is expected to be a factor in the next planning cycle.[55] Further assessment and adjustments to the programming contained in the 2016 Plan may also be required within the next three years as marginal cost forecasts are updated.

Research

The next update of the study of conservation potential in the province is being planned for 2020. In advance of this study, the Utilities will undertake a number of research projects regarding electricity end-use trends and the state of the local market for efficient technologies. For the residential sector, customer surveys will gather details on

[55] An updated marginal cost study is expected to be a key input to the next conservation plan in 2018 and the next CPS in 2019-2020.

the type of electrical equipment that customers have in their homes, as well as their energy-related behaviour and motivation. Research for the commercial sector will include on-site facility audits to collect data on mechanical and electrical equipment being used.

The residential lighting market will be evaluated in 2017 to determine whether the Small Technologies program should continue. This research is expected to include a socket saturation study, with onsite inventories, as well as customer surveying. This will provide the Utilities with detailed data regarding the remaining potential for energy efficient lighting replacements.

Hydro is currently investigating the implementation of an Isolated System Direct Load Control Pilot in the community of Postville, Labrador.[56] The community of Postville is served by diesel generation. The objective of this pilot will be to reduce the peak load in the community and defer investment in electrical system upgrades. The Utilities will also continue to coordinate conservation planning with electrical system planning, and will evaluate potential for conservation initiatives targeted in specific areas or communities that may provide a lower-cost alternative to electrical system upgrades.

The Provincial Office of Climate Change Home Energy Monitoring Pilot Project is ongoing and the final report will be submitted to Government by end of March 2016. The results of this pilot project will be used to assess whether this type of technology may be considered as part of future energy conservation programming.

During this planning period, the Utilities will also monitor developments in North American practices for economic evaluation and screening of conservation programs.[57]

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[56] The pilot will involve commercial and residential customers. It will include installing load controllers on hot water tanks, and commercial electric heating circuits, for commercial customers. Load controllers will only be activated during maximum system peak events. The customers that participate will receive incentives such as credits at the local store in Postville.

[57] While reliance on the TRC and PAC tests for primary economic screening is currently the norm in North American jurisdictions, modifications to the TRC methodology are being considered in a number of cases. These modifications primarily involve inclusion of customers' non-energy benefits from efficiency upgrade projects.

Evaluation

The customer program portfolio will continue to be evaluated in terms of its energy savings, market impacts and delivery process effectiveness. Additional review by third party evaluators is expected, reflecting the expanded program portfolio and delivery methods.[58] Program evaluation findings will be used to refine program design and implementation details on an ongoing basis, as well as support further planning.

Specific evaluation objectives in the 2016 Plan are to monitor market saturation of particular technologies as well as cost effectiveness of the programs. For example, the Instant Rebates component of the Small Technologies program will be evaluated and an exit strategy designed based on research into the pace and impact of LED sales growth in the local lighting market.

Similarly, the Utilities will continue to closely monitor the Insulation, Thermostat and HRV programs. These programs have unique challenges and barriers to program participation.[59] Evaluation of these programs will ensure they continue to satisfy cost effectiveness requirements.

In the case of new program introductions, post-implementation evaluations will be conducted within 12 months of program launch to ensure full assessment of program design assumptions, as well as marketing and delivery process effectiveness.

[58] Evaluation costs are primarily reflected in the costs for each specific program.

[59] For the Insulation and Thermostat Programs, these barriers primarily reflect the inherent difficulty in renovating existing living spaces and the remaining market being increasingly hard-to-reach. For the HRV program, this reflects the low level of customer understanding and slow adoption by the supply chain.

3.5 Costs & Cost Recovery

Table 15 provides a summary of the Utilities' customer energy conservation program and general costs from 2016 through 2020.[60]

Table 15
Conservation Costs
2016 through 2020
($000s)

	2016	2017	2018	2019	2020
Program					
Residential	5,987	6,308	4,540	3,048	2,042
Commercial	1,628	1,906	1,933	2,258	2,301
Industrial	667	10	10	10	10
Total Programs	8,282	8,224	6,483	5,316	4,353
Education	770	791	827	851	873
Support	171	175	181	184	191
Planning	527	596	767	863	644
Total General Costs	1,468	1,562	1,775	1,898	1,708
Total	9,750	9,786	8,257	7,214	6,061

Costs related to the customer energy conservation programs outlined in the 2016 Plan are forecast to be $9.8 million in 2016 and 2017.[61] This increase primarily reflects the addition of a new program, and enhanced program technology offerings. Costs begin to decrease in 2018 from $8.3 million to $6.0 million in 2020. This decrease primarily reflects the conclusion of the Small Technologies program in 2018 and the conclusion of the Benchmarking program in 2019.

[60] This cost summary does not include costs related to Newfoundland Power's demand management activities (Curtailable Service Rate Option and facilities management) and costs related to Hydro's interruptible load arrangements.

[61] All customer energy conservation programs outlined in the 2016 Plan are cost effective, and are justified on a cost of service basis.

Schedule E provides a summary of forecast energy savings, cost estimates and cost effectiveness analysis results for the programs in the 2016 Plan.[62]

Cost Recovery

The Utilities propose conservation cost recovery based on amortizing customer energy conservation program costs over seven years.[63] The amortization of program costs over a seven-year period is considered appropriate because of the extended nature of the energy savings benefits provided by program technologies.

The Utilities' annually recurring general conservation costs would continue to be expensed as incurred.[64]

4.0 OUTLOOK

The Utilities anticipate significant changes in the electrical system serving the province within the five years considered in this plan. The Muskrat Falls hydroelectric development and related interconnection to the North American grid will affect system operations and costs, as well as customer prices. The next iteration of multi-year conservation program planning is anticipated in 2018, to coincide with these events.

In the interim, the approach outlined in the 2016 Plan will remain flexible to address ongoing changes. The initiatives in the 2016 Plan are cost effective based on current information, and were assessed for sensitivity to changes in system costs. As the Utilities implement the program changes outlined in this Plan, they will continue to evaluate program offerings to ensure they create economic benefits and are responsive to evolving customer expectations and market conditions.

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[62] Cost forecasts can be expected to be refined as detailed program design progresses in 2016.

[63] Newfoundland Power has used this approach since 2013, based on Order No. P.U. 13 (2013). Hydro has proposed this approach in its ongoing general rate application, and the proposal has been agreed to by the parties to settlement negotiations in that matter.

[64] While general customer energy conservation costs provide benefits to customers in terms of information, knowhow and advice, those benefits are not transparently quantifiable in the same manner as program benefits.

With growing customer awareness of conservation, and of the takeCHARGE brand, the Utilities will continue to seek opportunities to partner with complementary organizations and trade allies for customers' advantage. Information sharing and policy coordination with the Province will also continue, primarily through the Office of Climate Change and Energy Efficiency.

Table A-1 shows most recent marginal cost forecast as projected by Newfoundland and Labrador Hydro in February 2015.

Table A-1
Marginal Cost Projection
for the
Island Interconnected System
2015 - 2035

	Energy ($/MWh)	Capacity ($/KW – Yr)
2015	108	51
2016	133	70
2017	134	74
2018	47	98
2019	50	99
2020	54	108
2021	56	112
2022	59	115
2023	62	119
2024	65	123
2025	68	126
2026	70	126
2027	73	125
2028	76	125
2029	78	124
2030	81	124
2031	85	121
2032	88	118
2033	92	116
2034	96	113
2035	100	110

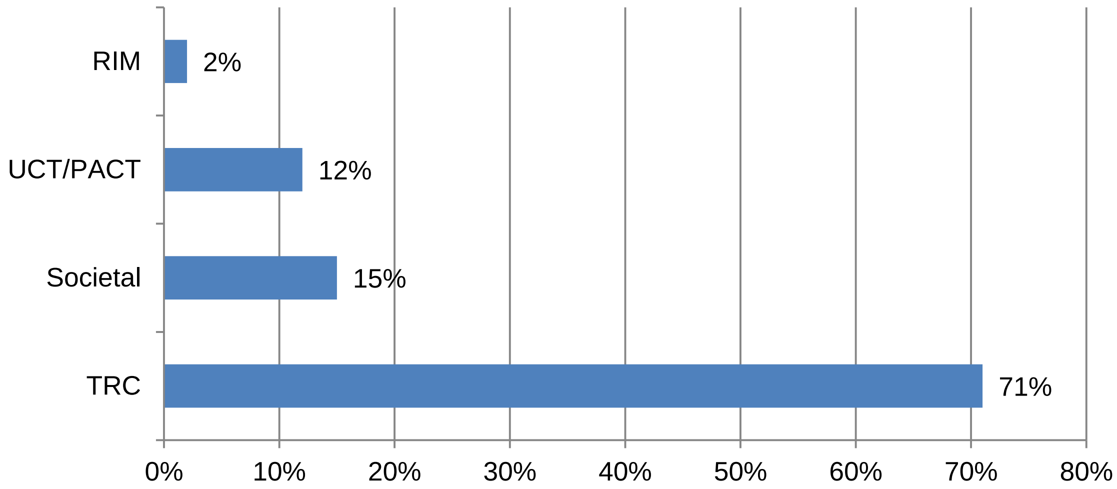
Notes:
1. Modeled as per NERA Economic Consulting marginal cost approach (2006).
2. Fuel costs per NLH corporate assumptions, January 2015.
3. Excludes transmission marginal costs.
4. Projection is at customer bulk delivery point.
5. Island Interconnected costs beyond 2017 reflect opportunity cost as per NERA approach.

Table B-1
Current Canadian
Utility Practice
Economic Evaluation Practices

Province	Economic Test				
	TRC	PAC	RIM	PCT[1]	SCT[2]
British Columbia	X[3]				
Ontario	X	X			
Nova Scotia	X	X			
Manitoba[4]	X		X	X	X
Saskatchewan	X	X			
Quebec	X		X[5]		
Prince Edward Island	X	X[6]		X	X[6]

[1] Participant Cost Test ("PCT").
[2] Societal Cost Test ("SCT").
[3] British Columbia uses a modified TRC that includes non-energy benefits that are not traditionally included in the TRC.
[4] Manitoba also considers the levelized resource cost, net utility benefit, utility net present value, levelized utility cost, and simple customer payback calculation.
[5] Quebec considers the RIM as a secondary test.
[6] Prince Edward Island considers the PAC and SCT as secondary tests.

Chart B-1
Current American Utility Practice
Economic Evaluation Practices
(Percent of States)



[7]

n=43

[7] Research conducted by the American Council for an Energy Efficient Economy (February 2012) "A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs".

Insulation Program

Program Description
The objective of this program is to increase the insulation level in residential basements, crawl spaces and attics. Increasing the insulation R-value in a home will result in space heating energy savings. The program components include rebates and financing, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.
Target Market: Residential
This program targets residential customers completing retrofit projects. Changes to the National Building Code of Canada implemented in December 2012 mandated that all new homes install basement insulation and increased the R-Value requirements in the attic. As a result, this program is only offered to existing homes (i.e. connected to the electricity grid before January 1, 2014) to exclude minimum building code compliance in new homes. Eligibility will continue to be limited to electrically-heated homes.
Eligible Measures
Eligible measures in this program include insulation upgrades to basements, crawl spaces and attics. Technical requirements will be approximately aligned with National Building Code of Canada.
Delivery Strategy
Delivery of this program will continue to be bundled with Thermostat, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio. Marketing initiatives include partnering with retailers and trade allies in the renovation industry, and target both do-it-yourself and professional installers. Tools and tactics will include retail point-of-sale materials, advertising, website, tradeshows, community outreach and trade ally activities. Rebates and financing will be processed through mail and online customer applications.

Insulation Program

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the impact on space heating energy, the practical difficulties of renovating an existing living space and a decreasing number of eligible participants. Experience with the existing program has shown participation to be responsive to awareness-building marketing activities.

Incentive Strategy

Incentives for this program include rebates and financing. In August 2014, the rebate structure was simplified and increased. Customers can now get a rebate of 75% of the cost of materials installed in the basement and 50% of the cost of materials in the attic. Rebates amounts are capped at $1,000.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation and cost effectiveness. A representative sample of installations will be inspected. Formal external evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,187	1,207	1,202	1,197	1,223	6,018
Estimated Cumulative Energy Savings (GWh)	30.0	33.1	36.1	38.9	41.8	180
Total Resource Cost						**2.5**

Thermostat Program

Program Description

The objective of this program is to encourage installation of programmable and high performance electronic thermostats in homes. Programmable and high performance electronic thermostats allow customers to better control the temperature of their homes and to set back the temperature during the night or while away. The program components consist of rebates, financing options, and a variety of education and marketing tools. This program has been offered through takeCHARGE since 2009.

Target Market: Residential

This program targets residential customers, including home retrofit and new home construction. Eligibility will continue to be limited to electrically-heated homes.

Eligible Measures

Eligible measures in this program include both programmable and high performance electronic thermostats. All thermostats must have a setting precision of +/- 0.5 degrees Celsius or less.

Delivery Strategy

The delivery strategy for this program remains unchanged. Delivery of this program will continue to be bundled with the Insulation, Instant Rebates, Appliance & Electronics and HRV programs as part of the takeCHARGE residential portfolio.

Marketing initiatives include partnering with retailers, electrical contractors, homebuilders and real estate professionals, to educate consumers regarding the energy savings and comfort benefits of programmable & high performance electronic thermostats. Tools and tactics include retail and model home point-of-sale materials, website, tradeshows, community outreach and trade ally activities. Rebates will be processed through mail and online customer applications.

Thermostat Program

Market Considerations

Barriers to installation of programmable and high performance electronic thermostats include lack of awareness of the potential for energy savings, difficulty programming, and reluctance to pay for an electrician to install the thermostats, and a decreasing number of eligible participants.

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $5 per high performance electronic thermostat and $10 per programmable thermostat. This continues to reflect incremental cost of the more efficient options. A time limit is no longer required for incentive redemption.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, market saturation, and cost effectiveness, and a representative sample of installations will be inspected. Formal evaluations will be conducted every two years during program operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	517	555	539	557	552	2,720
Estimated Cumulative Energy Savings (GWh)	9.7	11.1	12.5	13.8	15.2	62
Total Resource Cost						**2.8**

Small Technologies Program

Program Description

The objective of this program is to increase home energy efficiency and awareness by offering instant rebates on a variety of energy efficient technologies as well as online and mail in rebates for eligible appliances and electronics. This program also includes promotional events to raise awareness of the technologies and to engage the public.

Target Market: Residential

This program is marketed toward all residential customers province wide. All customers are eligible to participate regardless of age of home or heat source. A variety of marketing techniques such as TV news sponsorships, print, radio, online, website, as well as social media channels are used to engage customers.

Eligible Measures

Eligible measures in this program will vary over time and will be selected based on cost effectiveness, energy saving potential and market conditions. Instant rebates are available for small energy efficient items such as LEDs and smart power bars, and online and mail in customer applications are required for qualifying models of full-size refrigerators, clothes washers, TVs and full-size Energy Star freezers.

Six new measures will be added to the technology list in 2016. They are:

- Faucet aerators
- Door bottom weather stripping
- Door adhesive
- Window insulation kit
- Electrical outlet gaskets
- Caulking

Small Technologies Program

Delivery Strategy

Partnerships have been made with both chain and independent retailers to offer instant rebates to customers on a number of energy efficient products. Efforts to engage both urban and rural retailers have been made in order to ensure rebated products are available in all areas of the province.

Campaigns are held in the spring and fall each year. During each campaign, the Utilities set up in-store events at the participating locations to raise customer's awareness of the rebates and encourage use of energy efficient products.

Market Considerations

The technologies included in the program do not involve a major renovation. This program will allow the Utilities to reach customers that may not have been able to participate in the other incentive programs.

Incentive Strategy

Incentives for this program include instant rebates for small energy efficient items that will vary by year and campaign. Online and mail in customer applications are available for eligible appliances and electronics. The rebate value will be different for each technology offered, and will reflect incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. Exit interviews will be conducted during selected retail events. Formal evaluations will be conducted after the first year of implementation, and biannually during operation.

It is anticipated that this program will end after 2018. The Utilities expect that LEDs will make up the majority of bulbs that are sold in the province. If this occurs, the economics of the program will no longer be cost effective. The uptake of LEDs will be monitored and evaluated to confirm the market saturation rate in 2017.

Small Technologies Program

Estimated Costs & Energy Savings						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	3,113	2,879	1,578	-	-	7,570
Estimated Cumulative Energy Savings (GWh)	23.8	33.3	38.2	37.4	36.5	169
Total Resource Cost						**1.3**

HRV Program

Program Description

The objective of this program is to increase the installation of higher efficiency Heat Recovery Ventilators ("HRV"). The program components include rebates and financing, and a variety of education and marketing tools.

Target Market

This program targets all residential customers regardless of heat source or age of home. Eligibility is available to all homes that install or replace an HRV.

Eligible Measures

Eligible measures in this program include all HRV models that have an SRE of 70% or more and meet the minimum fan efficacy requirements.

Delivery Strategy

Delivery of this program will be bundled with other takeCHARGE residential programs as part of the overall portfolio. Marketing initiatives include partnering with trade allies in the home building and renovation industry, particularly Heating Refrigeration and Air conditioning Institute certified installers. Tools and tactics include website presence, tradeshows, and trade ally activities. Rebates and financing will be processed through customer application.

Market Considerations

The market includes new construction and existing HRV replacement with an emphasis on existing replacements. Early HRV installations of the 1990s are at or near the end of their useful life, so many of these require replacement.

This program has faced a number of barriers such as understanding of what a HRV is and its purpose in the home, initial cost, and awareness of the benefits of selecting more efficient HRVs.

HRV Program

Incentive Strategy

Incentives for this program include rebates and financing. The rebate value is $175 for qualifying HRV units. This reflects the incremental cost of the more efficient options.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. This program has experienced challenging barriers to program participation. Attempting to overcome these barriers can be administratively costly and may outweigh the benefits of program delivery. This program will be monitored to ensure that the participation goals are being met in each year to ensure the program remains cost effective. A representative sample of installations will be inspected. Formal evaluations will be conducted every two years during operation.

Estimated Costs & Energy Savings

	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	223	218	232	231	267	1,171
Estimated Cumulative Energy Savings (GWh)	0.7	1.0	1.3	1.6	2.0	7
Total Resource Cost						**1.3**

Benchmarking Program

Program Description

Energy social benchmarking is the analysis of a household's energy consumption and the comparison of its performance with its energy history and that of other similar households. Historic consumption information, tracking over time and comparisons with other households can encourage customers to reduce energy consumption. A printed paper report is delivered to participating customers via mail. These reports include a normative comparison that compares the customer to similar neighbors. The printed Home Energy Report is supplemented by access to an online web portal allowing for increased customer energy usage information and tips and resources to facilitate energy use reduction.

Target Market: Residential

The Benchmarking program is marketed to residential customers across the province. Customers will be selected into the program and can withdraw (opt-out) at any time.

Eligible Measures

A home's energy use is compared anonymously to the usage patterns of other homes in the vicinity that are of similar size, age, heating type, etc. The Home Energy Report is designed to provide new information to help home owners understand their energy use and find ways to make the home more efficient.

Delivery Strategy

The program is delivered largely by a third party service provider that develops and issues the Home Energy Report and maintains the online web portal. takeCHARGE will oversee all aspects of the program to ensure greater customer insight into their home energy use. The program is available year round and will be supported with takeCHARGE marketing and communication efforts.

Benchmarking Program

Market Considerations

This program will allow the Utilities to reach customers that have not been able to participate in the other incentive programs. It will also allow takeCHARGE actively engage with customers using direct home energy consumption information. This program also allows for the cross promotion of existing takeCHARGE rebate programs as methods to reduce household consumption and to drive participation in these programs.

Incentive Strategy

No monetary incentive will be offered. It has been demonstrated that for this type of program that using social norm comparisons drives the greatest and longest lasting changes to household energy consumption.

Program Monitoring & Evaluation

The program is monitored for participation levels, service quality and cost effectiveness. Formal evaluation will be conducted very two years during operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	530	1,034	989	1,063	-	3,616
Estimated Cumulative Energy Savings (GWh)	0.3	8.0	13.8	15.6	-	38
Total Resource Cost						**1.0**

Mini Split Heat Pump Educational Initiative

Program Description

The objective of the program is to encourage customers to choose high efficiency mini split heat pumps (MSHP), installed by qualified contractors. When installed correctly, a high efficiency MSHP will provide space heating energy savings. The program components include financing, education and marketing initiatives directed towards customers, and direct engagement of certified installers. Financing has been offered by Newfoundland Power since the 1990s and Hydro will have financing available beginning in 2016, however the eligibility criteria for MSHP will be updated to support the uptake of high efficiency units.

Target Market

This program targets residential customers. New home construction and retrofit customers with electric baseboard heat are considered to have the greatest potential for participation, however customer eligibility to participate in financing will not be limited by heating fuel, age or type of dwelling.

Eligible Measures

Financing will now be limited to MSHP with an estimated Heating Seasonal Performance Factor (HSPF) of 9.6 or higher. This is aligned with the minimum HSPF required for certification of units meeting the “ENERGY STAR® Most Efficient 2015” designation. To qualify for financing the installation must be performed by a contractor that has the necessary permits and certification to perform electrical and refrigeration work in the province.

Delivery Strategy

Delivery will be a two pronged approach including marketing to customers and engaging eligible installers.

Marketing initiatives will include information on the takeCHARGE website as well as bill inserts and mass media advertising regarding the benefits of choosing the right heat pump and installer. Installer engagement will include information sessions, contests, and maintaining relationships with qualified installers.

Financing applications will be processed through customer application via the existing customer service channels (online or by phone).

An incentive could not be offered for this program because it does not pass the economic analysis.

Mini Split Heat Pump Educational Initiative

Market Considerations

One of the biggest barriers is a lack of customer awareness and availability of certified installers in rural areas. In order to achieve significant energy savings, the unit must be appropriate for the Newfoundland climate, properly installed and operated.

Other major barriers include identifying what to look for in an installer (i.e. what certification should be required) and difficulty of customers to find qualified installers. The upfront cost of highly efficient units is also a barrier for some customers.

Program Monitoring & Evaluation

This program will be monitored for participation level, and service quality. The criteria for eligible models and installers will also be continually reviewed to ensure the program is promoting units and installers that will provide customers the highest achievable energy savings at a reasonable cost.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	119	100	103	102	104	529

Business Efficiency Program

Program Description
The objective of the Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.
Target Market: Commercial
This program targets business owners and property managers who have an interest in making their businesses more energy efficient. The program includes a custom project approach which appeals primarily to large commercial customers. In 2016, the program will also include rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting, which appeal to small and medium sized customers as well.
Eligible Measures
The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in electrical energy and demand savings. The program excludes alternative energy and fuel switching. Beginning in 2016 the custom stream of the Business Efficiency Program will also include incentives for demand reduction based on the options available at the customer's facilities as well as the amount of demand they are able to reduce during peak times. Also beginning in 2016, the existing fluorescent High Bay program and the current Commercial lighting program (including high performance T8 fluorescent lamps and LED exit signs) will become prescriptive rebates under the Business Efficiency Program.[1] Electronic ballasts will no longer be available for incentive as of 2016 because these ballasts are now considered to be the market standard. The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, electrically commutated motors for evaporator fans, cold climate air source heat pump systems and low flow pre-rinse spray valves will be added to the prescriptive list of incentives.

1 Prescriptive incentive program are customer energy conservation programs that have per unit rebates for installing certain defined technologies. For example, providing a predefined rebate amount for a LED light bulb;

Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. A walk through audit can help customers identify efficiency opportunities.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing and through industry associations such as the Building Owners and Managers Association. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, retail point-of-sale materials, website and advertising in trade publications. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to increased market penetration include initial cost, awareness of the program and available incentives, budget & planning cycles, technical know-how, and customer time constraints.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at 10 cents/kWh for first year savings or project demand savings at $100 per kW per month over the December to March period. Demand saving projects require a minimum of 50 kW savings and be sustainable over 5 years. Incentives of up to $50,000 per site help garner interest and lower customer project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online submissions.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy or demand savings achieved are consistent with incentives paid.

Business Efficiency Program

Estimated Costs & Energy Savings						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	1,519	1,791	1,813	2,133	2,171	9,427
Estimated Cumulative Energy Savings (GWh)	18.2	26.9	36.7	47.6	60.2	190
Total Resource Cost						**2.4**

Industrial Energy Efficiency Program

Program Description

The objective of this program is to improve electrical energy efficiency in a variety of industrial processes. The program components include financial incentives based on energy savings and other supports to enable industrial facilities to identify and implement efficiency and conservation projects. This program is a custom program to respond to the unique needs of the Newfoundland and Labrador industrial market, rather than a prescriptive technology approach.

Target Market: Industrial

This program targets existing, transmission level, industrial customers served by Newfoundland and Labrador Hydro.

Eligible Measures

Eligibility of projects is based on engineering review and confirmation of estimated energy savings impact. Technologies include, but are not limited to, compressed air, pump systems, process equipment and process controls.

Delivery Strategy

The program is managed internally, with external engineering services used as required. The utility takes the role of facilitator and consultant in providing methods for industrial customers to complete project proposals and implement approved projects.

This program was initially launched as a three-year pilot program in 2009, with the first project applications being submitted in 2011, and closed to new projects in 2013. The industrial pilot was reviewed in 2014 by an external party for performance; the review indicated the program matched or exceeded performance of comparable industrial CDM programs relative to the size of the industrial sector in the Newfoundland and Labrador market. The program was officially re-launched as an ongoing program in 2015, with the same structure as the pilot program.

Industrial Energy Efficiency Program

Market Considerations

This market requires a one-on-one approach to project design and delivery. The program builds on the work already completed by the industrial customers, and addresses their unique barriers to improved efficiency, which include, but are not limited to, access to capital and human resources.

The lifecycle for each program transaction will be measured in months rather than weeks because of the need for review, contract development, budgeting and implementation timelines, and post-installation evaluation. This type of program requires that facilities have financial and business stability to continue operations for a time period appropriate to achieve cost effective savings.

Incentive Strategy

Incentives for this program include an initial comprehensive energy audit for the site, funding assistance for feasibility studies, and financial assistance for project implementation based on energy savings.

Program Monitoring & Evaluation

The program will be regularly monitored for participation level, service quality, and cost effectiveness, including engineering review and inspection of all projects and assessment of long-term impact on customer processes.

Industrial Energy Efficiency Program

Estimated Costs & Energy Savings[2]						
	2016	**2017**	**2018**	**2019**	**2020**	**Total**
Estimated Costs ($000s)	667	10	10	10	10	707
Estimated Cumulative Energy Savings (GWh)	30.6	30.6	30.6	30.6	30.6	153
Total Resource Cost						**1.7**

2 While Customer audits have confirmed that there are several potential projects at Hydro's customers' sites, savings for the Industrial Energy Efficiency Program (IEEP) have only been forecasted for 2016 because there are only five transmission level industrial customers in Newfoundland and Labrador and participation depends on each company's capital budgets and focus for the year. As a result of such a small market and budget considerations, participation is extremely variable from year to year and difficult to forecast. The costs from 2017-2020 are the fixed administration costs associated with program promotion and customer engagement in the IEEP. The majority of costs are incurred after a project is submitted and passes economic screening. Projects for the Industrial EE Program will be evaluated on a yearly basis and projects with a TRC of 1.0 or greater will be completed.

Isolated Business Efficiency Program

Program Description
The objective of the Isolated Business Efficiency Program is to help commercial customers increase their electrical energy efficiency by providing incentives on energy efficient options for existing facilities. The program provides supports to encourage customers to implement projects customized to their own facilities.
Target Market: Commercial
This program targets business owners and property managers in Hydro's isolated diesel and L'Anse au Loup systems who have an interest in making their businesses more energy efficient. The program includes a custom project approach and also rebates for specific measures, such as LED lighting, Air Source Heat Pumps and High performance T8 Lighting.
Eligible Measures
The custom stream allows customers to obtain rebates for almost any energy efficiency measures that result in economical electrical energy savings. The program excludes alternative energy and fuel switching. The specific measures eligible for per unit rebates have included programmable thermostats, occupancy sensors, high performance showerheads, and LED wall packs. In 2016, LED screw-in lamps, High Bay LED fixtures, Electrically Commutated Motors for Evaporator fans, Cold climate air source heat pump systems and Low Flow Pre-rinse spray valves will be added to the prescriptive list of incentives.

Isolated Business Efficiency Program

Delivery Strategy

The delivery strategy for this program is mainly through individual customer interactions. The custom track involves a walkthrough audit and feasibility analysis to determine savings and eligible incentive. This allows for a wide range of eligible technologies and projects.

Marketing for this program includes partnering with lighting manufacturers, distributors, electrical contractors and lighting service providers as key market influencers and allies. The program will create business opportunities for trade allies to sell more efficient products.

The program will also target commercial property owners through direct marketing. Tools and tactics will include trade ally and business association activities, such as workshops for distributors, contractors and building operators, and a website. Demonstration projects will be selected from program participants.

Market Considerations

Barriers to efficiency in the commercial market include financial and human resource concerns. Incentives will assist in making energy efficiency upgrades more accessible. Human resource concerns are around awareness and knowledge of the technology options as well as time to develop the business case for retrofit projects.

The isolated systems have additional challenges with access to products and access to specific technical skill sets in the evaluation of projects and technology. Hydro’s program staff will assist in addressing these gaps.

Incentive Strategy

Incentives for this program are designed to reduce the cost barrier, attract customer attention and provide technical and financial support for energy audits and feasibility studies. The custom stream provides incentives based on project energy savings at the lesser of $0.4/kWh for first year savings or 80% of eligible project costs.

Incentives vary for the prescriptive measures. Rebates will be processed through mail-in and online customer applications.

Isolated Business Efficiency Program

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost. Each incented project will have a measurement and verification plan to confirm energy savings achieved are consistent with incentives paid.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	106	112	117	122	128	585
Estimated Cumulative Energy Savings (GWh)	0.5	0.7	0.8	1.0	1.2	4
Total Resource Cost						**1.6**

Isolated Systems Community Program

Program Description

The objective of this program is to provide a portfolio of technologies and opportunities to help residential and commercial customers in isolated diesel communities save electrical energy and to promote energy efficiency awareness.

Target Market

This program targets both residential and commercial customers in Hydro's isolated systems. This includes Isolated Diesel systems on the Island, in Labrador, and the L'Anse au Loup system.

Eligible Measures

Measures will range from efficient lighting products, hot water saving products, pipe insulation, hot water tank insulation, commercial LED exit signs, and others that may be applicable.

An Appliance Retirement program is being planned for at least one community. Old inefficient appliances will be removed from participating homes and routed for appropriate disposal. This will save energy and money for the homeowner. This component will be evaluated to determine if it is economic to develop into a broader program.

The Isolated systems T12 replacement program will take place in 2-3 Isolated communities. This project will offer, free of charge to commercial customers, the supply and install of new High Performance T8 lamps and ballasts.

Delivery Strategy

Hydro has engaged Summerhill Group to deliver this program. They are using a number of delivery strategies, including hiring and training local representatives, to engage residential and commercial customers. Direct installs will be completed, whereby the customer receives the technology in their home or business at no cost. During the direct install visit, customers also receive information on energy usage and efficiency options.

Isolated Systems Community Program

Market Considerations

Availability and awareness of energy efficient technologies continues to be an issue in rural communities and often technologies available are at a higher price than in urban markets. This program will address the barriers of availability. There is a heavy electric hot water heating penetration and opportunities exist in plug load and behavior based areas.

Commercial customers tend to be smaller businesses and as such find it challenging to find the time and resources to address energy consumption issues; this program will provide the one on one interaction needed to assist these customers. The technologies included in the program do not involve a major renovation. This program will allow the utility to reach customers that may not have been able to participate in the other incentive programs.

Following the 2015 direct install component, information collected in 2014 and 2015 will be used to plan for Isolated Systems Community programming beyond 2017. Costs and energy savings will be estimated once the technologies have been determined.

Program Monitoring & Evaluation

The program will be monitored for participation level, service quality, and cost effectiveness. A representative sample of direct installs will be surveyed for confirmation of continued installation and use. Formal evaluations will be conducted after each year of operation.

Estimated Costs & Energy Savings

	2016	2017	2018	2019	2020	Total
Estimated Costs ($000s)	415	415	-	-	-	830
Estimated Cumulative Energy Savings (GWh)	5.2	5.5	5.5	5.5	5.5	27
Total Resource Cost						**2.7**

Table D-1
Conservation Programs
Energy Reductions: 2012 – 2015(F)
by Sector
(GWh)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	15.8	20.6	24.0	27.0	87.4
Thermostat Program	4.5	5.8	7.0	8.4	25.7
ENERGY STAR Window Program	6.1	8.6	10.1	10.1	34.9
Coupon Program	0.3	0.3	0.3	0.3	1.2
HRV	0.0	0.0	0.2	0.4	0.6
Small Technologies	0.0	0.0	5.5	14.4	19.9
Isolated Systems Community Program	1.7	2.8	4.1	4.8	13.4
Block Heater Timer Program	-	0.3	0.3	0.3	0.9
Total Residential Portfolio	**28.4**	**38.4**	**51.5**	**65.7**	**184.0**
Commercial					
Lighting Rebate Program	3.3	3.9	5.8	6.5	19.5
BEP	-	-	0.6	4.5	5.1
Isolated Systems Business Efficiency Program	-	-	0.1	0.4	0.5
Total Commercial Portfolio	**3.3**	**3.9**	**6.5**	**11.4**	**25.1**
Industrial					
Industrial Energy Efficiency Program	3.3	3.3	25.6	25.6	57.8
Total Portfolio	**35.0**	**45.6**	**83.6**	**102.7**	**266.9**

Table D-2
Conservation Programs
Program Costs: 2012 – 2015(F)
by Sector
($000s)

	2012	2013	2014	2015F	Total
Residential					
Insulation Program	882	1,092	796	1,039	3,809
Thermostat Program	492	253	227	454	1,426
ENERGY STAR Window Program	1,173	1,634	698	7	3,512
Coupon Program	-	-	-	-	-
HRV	-	59	56	225	340
Small Technologies	-	4	1,877	2,884	4,765
Isolated Systems Community Program	858	871	615	579	2923
Block Heater Timer Program	31	8	8	-	47
Total Residential Portfolio	**3,436**	**3,921**	**4,277**	**5,188**	**16,822**
Commercial					
Lighting Rebate Program	121	128	373	790	1,412
BEP	-	112	457	532	1,101
Isolated Systems Business Efficiency Program	93	115	96	66	370
Total Commercial Portfolio	**214**	**355**	**926**	**1,388**	**2,883**
Industrial					
Industrial Energy Efficiency Program	173	89	1,244	19	1,525
Total Portfolio	**3,823**	**4,365**	**6,447**	**6,595**	**21,230**

Table E-1
Conservation Programs
Energy Reduction Estimates: 2016 – 2020
by Sector
(GWh)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	30.0	33.1	36.1	38.9	41.8	179.9
Thermostat Program	9.7	11.1	12.5	13.8	15.2	62.3
ENERGY STAR Window Program	10.1	10.1	10.1	10.1	10.1	50.5
Coupon Program	0.3	0.3	0.3	0.3	0.3	1.5
Isolated Systems Community Program	5.2	5.5	5.5	5.5	5.5	27.2
Small Technology Program	23.8	33.3	38.2	37.4	36.5	169.1
HRV Program	0.7	1.0	1.3	1.6	2.0	6.6
Benchmarking	0.3	8.0	13.8	15.6	-	37.7
Block Heater Timer Program	0.3	0.3	0.3	0.3	0.3	1.5
Total Residential Portfolio	**80.4**	**102.7**	**118.1**	**123.5**	**111.7**	**536.4**
Commercial						
Isolated Systems Business Efficiency Program	0.5	0.7	0.8	1.0	1.2	4.3
Business Efficiency Program	18.2	26.9	36.7	47.6	60.2	189.6
Total Commercial Portfolio	**18.7**	**27.6**	**37.5**	**48.6**	**61.4**	**193.8**
Industrial						
Industrial Energy Efficiency Program	30.6	30.6	30.6	30.6	30.6	153.0
Total Portfolio	**129.7**	**160.9**	**186.2**	**202.7**	**203.7**	**883.2**

Table E-2
Conservation Programs
Program Cost Estimates: 2016 – 2020
by Sector
($000s)

	2016	2017	2018	2019	2020	Total
Residential						
Insulation Program	1,189	1,207	1,202	1,197	1,223	6,018
Thermostat Program	517	555	539	557	552	2,720
Isolated Systems Community Program	415	415	-	-	-	830
Small Technology Program	3,113	2,879	1,578	-	-	7,570
HRV Program	223	218	232	231	267	1,171
Benchmarking Program	530	1,034	989	1,063	-	3,616
Total Residential Portfolio	**5,987**	**6,308**	**4,540**	**3,048**	**2,042**	**21,925**
Commercial						
Isolated Systems Business Efficiency Program	106	112	117	122	128	585
Business Efficiency Program	1,522	1,794	1,816	2,136	2,173	9,441
Total Commercial Portfolio	**1,628**	**1,906**	**1,933**	**2,258**	**2,301**	**10,026**
Industrial						
Industrial Energy Efficiency Program	667	10	10	10	10	707
Total Programs Portfolio	**8,282**	**8,224**	**6,483**	**5,316**	**4,353**	**32,658**

Table E-3
Conservation Programs
Total Resource Cost Test Results
by Sector

	TRC Results
Residential	
Insulation Program	2.5
Thermostat Program	2.8
Isolated Systems Community Program	2.7
Small Technology Program	1.3
HRV Program	1.3
Benchmarking	1.0
Commercial	
Isolated Systems Business Efficiency Program	1.6
Business Efficiency Program	2.4
Industrial	
Industrial Energy Efficiency Program	1.7

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 and the *Public Utilities Act*, RSN 1990, Chapter P-47 (the *Act*) and regulations thereunder;

AND IN THE MATTER OF an application by Newfoundland and Labrador Hydro, pursuant to subsection 70(1) of the *Act* and Orders No. P.U. 49(2016) and P.U. 22(2017), for the approval of a change in the CDM Cost Recovery Adjustment to be charged to Island Industrial Customers effective July 1, 2018 (2018 Island Industrial Customer CDM Cost Recovery Application).

AFFIDAVIT

I, Kevin Fagan, of St. John's in the Province of Newfoundland and Labrador, make oath and say as follows:

1. I am Manager, Regulatory Affairs of Newfoundland and Labrador Hydro, the Applicant named in the attached Application.
2. I have read and understand the foregoing 2018 Island Industrial Customer CDM Cost Recovery Application.
3. I have personal knowledge of the facts contained therein, except where otherwise indicated, and they are true to the best of my knowledge, information and belief.

SWORN at St. John's in the)
Province of Newfoundland and)
Labrador)
this 4th day of June, 2018,)
before me:)

Barrister – Newfoundland and Labrador

Kevin Fagan

(DRAFT ORDER)
NEWFOUNDLAND AND LABRADOR
BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

AN ORDER OF THE BOARD

NO. P.U. __ (2018)

IN THE MATTER OF the *Electrical Power Control Act*, RSNL 1994, Chapter E-5.1 (the *EPCA*) and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (the *Act*), and regulations thereunder;

AND IN THE MATTER OF an Application by Newfoundland and Labrador Hydro, pursuant to subsection 70(1) of the *Act* and Orders No. P.U. 49(2016) and P.U. 22(2017), for the approval of a change in the CDM Cost Recovery Adjustment to be charged to Island Industrial Customers effective July 1, 2018 (2018 Island Industrial Customer CDM Cost Recovery Application).

WHEREAS the Applicant is a corporation continued and existing under the *Hydro Corporation Act, 2007,* is a public utility within the meaning of the Act and is subject to the provisions of the *Electrical Power Control Act*, 1994; and

WHEREAS Section 70(1) of the Act requires that a public utility shall not charge, demand, collect or receive compensation for a service performed by it whether for the public or under contract until the public utility has first submitted for the approval of the board a schedule of rates, tolls and charges and has obtained the approval of the board and the schedule of rates, tolls and charges so approved shall be filed with the board and shall be the only lawful rates, tolls and charges of the public utility, until altered, reduced or modified as provided in this Act; and

WHEREAS in Order No. P.U. 49(2016) the Board ordered, amongst other things, that Hydro's proposal to defer annual customer energy conservation program costs commencing in 2015 in a CDM Cost Deferral Account, and the proposed recovery of the existing balance of deferred CDM costs as of December 31, 2013 plus the annual costs over a seven-year period through the CDM Cost Recovery Adjustment, was accepted, effective January 1, 2016; and

WHEREAS in Order No. P.U. 22(2017) the Board approved Hydro's Rules and Regulations for CDM Cost Recovery, which require the CDM Cost Recovery Adjustment to be updated annually reflecting the ongoing amortizations and the deferred CDM program costs for the previous year; and

WHEREAS in Order No. P.U. 26(2017) the Board approved final rates for Island Industrial Customers resulting from the 2013 Amended General Rate Application, including a CDM Cost Recovery Adjustment of 0.009 cents/kWh to be effective from July 1, 2017 to June 30, 2018; and

WHEREAS in Order No. P.U. 7(2018), the Board approved interim rates for Island Industrial Customers, reflecting no change to the CDM Cost Recovery Adjustment; and

WHEREAS in Order No. P.U. 15(2018), the Board approved an interim Utility rate, including the Utility Customer CDM Cost Recovery Adjustment, which is based on the same CDM Cost Deferral Account balances as the proposed Island Industrial Customer CDM Cost Recovery Adjustment; and

WHEREAS the Board is satisfied that the proposed Island Industrial Customer CDM Cost Recovery Adjustment of 0.010 cents/kWh will permit for recovery of deferred customer energy conservation costs, as provided for, and intended by, Orders No. P.U. 49(2016) and P.U. 22(2017).

IT IS THEREFORE ORDERED THAT:

1. The proposed Island Industrial Customer CDM Cost Recovery Adjustment of 0.010 cents per kWh, to be effective from July 1, 2018 to June 30, 2019, is approved.
2. The Interim Island Industrial Customer rates approved by Board Order No. P.U. 7(2018) will be updated to reflect the change in the Island Industrial Customer CDM Cost Recovery Adjustment, as set out in Schedule A to this Order.
3. Hydro shall pay all expenses of the Board arising from this Application.

DATED at St. John's, Newfoundland and Labrador, this day of , 2018.

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