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May 4, 2022

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Via Electronic Mail

Newfoundland and Labrador Board of Commissioners of Public Utilities
120 Torbay Road
P.O. Box 21040
St. John's, NL A1A 5B2

**Attention: Ms. G. Cheryl Blundon, Director of Corporate Services
and Board Secretary**

Dear Ms. Blundon:

**Re: Island Industrial Customers Group-
Electrification, Conservation and Demand Management Plan Review, including
Use of a Modified Total Resource Cost Test**

Further to the above, enclosed please find the Pre-Filed Testimony of Patrick Bowman on behalf of Island Industrial Customers Group dated May 4, 2022.

We trust this is in order.

Yours truly,

Stewart McKelvey

Paul L. Coxworthy

PLC/tas

Enclosures

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Newfoundland and Labrador
The Board of Commissioners of Public Utilities

Electrification, Conservation and Demand
Management Plan Review, including Use of a
Modified Total Resource Cost Test

Pre-filed Testimony
of Patrick Bowman



InterGroup

C O N S U L T A N T S

Submitted to:

The Board of Commissioners of Public Utilities
on behalf of Island Industrial Customers Group

May 4, 2022

1 INTRODUCTION AND SUMMARY

2 This testimony has been prepared for three Island Interconnected Industrial Customers (known
3 collectively as the “IIC Group”) of Newfoundland and Labrador Hydro (“Hydro” or “NLH”) by
4 Mr. Patrick Bowman, Associate with InterGroup Consultants Ltd. (“InterGroup”). This evidence is
5 submitted in relation to the June 16, 2021, Application by Hydro for “Approvals Required to Execute
6 Programming Identified in the Electrification, Conservation and Demand Management Plan
7 (“ECDM”), 2021-2025” (revised July 8, 2021).

8 The Hydro Application seeks a number of approvals from the Board of Commissioners of Public
9 Utilities (“Board” or “PUB”).

10 The IIC Group includes three large industrial companies currently operating in Newfoundland and
11 Labrador on the Island Interconnected System (“IIS”). These companies are:

- 12 • Corner Brook Pulp and Paper Limited (“CBPP”);
- 13 • Braya Renewable Fuels (Newfoundland) LP (formerly NARL Refining Limited Partnership)
14 (“Braya”); and
- 15 • Vale Newfoundland and Labrador Limited (“Vale”).

16 Mr. Bowman’s qualifications are set out in Appendix A.

17 InterGroup was initially retained in June 2001 to assist in addressing the 2001 Hydro Rate Review,
18 and subsequently assisted the IIC in the 2003, 2006, 2013 and 2017 rate reviews, as well as the
19 2009 review of the Rate Stabilization Plan (“RSP”), the Hydro Cost of Service review and the
20 Muskrat Falls Rate Mitigation reference, submitting evidence for each application. InterGroup also
21 provided limited advice in the 2012 review of depreciation methodology but did not provide
22 evidence.

23 InterGroup has been asked to identify and evaluate issues of interest to industrial customers,
24 taking into account normal regulatory review procedures and principles appropriate for Canadian
25 electric power utilities.

26

27 THE APPLICATION

28 Hydro’s Application sets out 4 items on which Hydro was seeking approvals:

- 29 1. Use of a Modified Total Resource Cost test (“mTRC”) for Electrification programs
- 30 2. Modifications to the Conservation and Demand Management (“CDM”) Cost Deferral
31 Account, to permit deferral of ECDM activities on all systems
- 32 3. Modifications to the CDM Cost Recovery Adjustment, to apply to the ECDM account
- 33 4. Supplemental 2021 Capital Expenditures for EV charging infrastructure.

34 The last of the items above was already approved in the Board’s Order P.U. 30(2021), on
35 September 29, 2021.

1 With respect to the CDM Cost Deferral Account and Recovery Adjustments (items 2 and 3 above),
2 no issues were noted with Hydro's proposal.

3 As a result, this submission addresses only the first matter – the proposal for use of an mTRC test
4 for electrification programs, and whether other measures should be applied.

5 This submission does not address which specific ECDM programs should or should not be
6 implemented. This is in part because the focus is on the submissions of Hydro as noted above,
7 while the ECDM programs operated on the IIS are part of an integrated plan between Hydro and
8 Newfoundland Power. Comments contained in this submission on the measurement of cost-
9 effectiveness should be applied in future as part of assessing coordinated ECDM plans of the two
10 utilities to ensure the priority needs of the province and regulated customers are met in a balanced
11 way.

12

13 **SUMMARY OF RECOMMENDATIONS**

14 At its core, the Hydro request to use mTRC as part of an assessment of electrification should be
15 approved as a complement to the Total Resource Cost (TRC) test for CDM. However, the mTRC
16 (and TRC) should be used as a secondary test, with the utility-focused tests of Program
17 Administrator Cost (PAC) test, Net Present Value (NPV) test, and assessment of rate impacts¹ as
18 the primary tools for assessment. This is consistent with the policy imperative that rate mitigation
19 is a top priority.

20 Hydro (and NP) should also be directed to ensure that assessments focus primarily on the early
21 years of any program. Specifically, annual Net Revenue impacts should be positive from the outset
22 or should achieve zero-to-positive within no more than about 5 years at the longest. NPV
23 assessments can be conducted over the life of a program, but should be reported in increments,
24 such as what the NPV of net rate benefits (or net costs) totals using increments such as 5 years,
25 10 years, and longer. Caution should be applied to programs which require more than 10 years to
26 achieve positive NPV revenue/rate impacts.

27

28 **OVERVIEW OF THE HYDRO SUBMISSION AND DEFICIENCIES**

29 In respect of ECDM tests, Hydro's submission focuses on the need for the mTRC test as part of
30 expanding the CDM offerings to include electrification.

31 The Hydro submission on this matter is problematic for three reasons:

32 1) **TRC is only one of two approved tests:** Hydro indicates that it proposes to use the
33 mTRC test for electrification programs, as it is an extension of the approved Total Resource
34 Cost (TRC) test and is "consistent with sound utility practice and tests previously approved
35 by the Board for customer CDM Programs."² Hydro's requested approvals do not mention
36 the fact that the Board's previously approved tests for CDM actually appears to require
37 application of two tests – the TRC and the Program Administrator Cost ("PAC") tests.³ In

¹ For example, this can be through a Rate Impact Measure test, or equivalent NPV analysis.

² Hydro July 8, 2021 Revised Application, pdf page 7 of 510.

³ See P.U. 18(2016), page 50.

1 response to RFIs, Hydro notes that it intends to apply the mTRC, with a “secondary
2 assessment”⁴ of a Net Present Value (“NPV”) test. Presumably the NPV test is meant to
3 replace the approved PAC test when dealing with electrification, but it does not appear that
4 Hydro requests such approval. Further the PAC test was not dismissively framed as a
5 “secondary” test in the Board’s 2016 approvals,⁵ but rather as a primary test equal in
6 importance to the TRC.

7 2) **TRC Test Incorrectly Described:** Hydro misstates the purpose and implications of the
8 TRC/mTRC output. Hydro repeatedly indicates that the tests measure both the impacts on
9 the utility and the impacts on the participating customers. This is not correct. As discussed
10 below, the test only measures the impact on the utility and participating customers
11 collectively. A positive TRC/mTRC can still lead to any of the utility, participating customers,
12 or non-participating customers being materially worse off from the CDM program. This is
13 the reason complementary utility-specific and customer-specific tests are typically
14 required.

15 3) **Insufficient Priority Given to Rate Impacts:** Hydro’s submission and proposed
16 mTRC/TRC test prioritization either ignores measures related to rate impacts (CDM) or
17 gives rate impacts insufficient priority (electrification). Hydro repeatedly references the
18 National Standard Practice Manual (“NPSM”) to indicate the industry-standards for testing
19 CDM resources,⁶ but ignores that this manual also stipulates that rate impacts are an
20 important part of the assessment and “should be examined using separate analyses”⁷ over
21 and above any Cost Benefit tests which are not focused on rates, such as TRC and PAC.

22 a. In regard to electrification, where Hydro proposes an mTRC test with a secondary
23 NPV test, rate impacts generally are considered but only as part of the NPV analysis
24 and only over the long-term.

25 b. In the case of CDM, Hydro apparently plans to continue to focus on the TRC and
26 PAC tests⁸ neither of which focus on rates.

27 The fact that Hydro’s presentation and proposal is deficient in the above areas is significant,
28 because absent a positive utility-focused test (e.g., PAC or equivalent) plus a proper rate impact
29 assessment, Hydro cannot demonstrate that the utility and its other customers benefit from the
30 CDM program – indeed the utility and its other customers can be readily harmed by CDM programs
31 that pass the mTRC/TRC tests but not the utility-focused tests, or that pass both tests but still
32 drive higher rate levels.

33 Finally, Hydro’s proposal is deficient in that it relies too heavily on typical CDM programming and
34 tests used in other jurisdictions, even though the NSPM makes it clear that the manual is not

⁴ PUB-NLH-029.

⁵ See P.U. 18(2016), page 50.

⁶ For example, see PUB-NLH-021, and IIC-NLH-005b

⁷ “National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources,” (“NSPM”) of the National Energy Screening Project (“NESP”), August 2020. Appendix A, page 1.

⁸ For example, see CA-NLH-017b

1 prescriptive in its application of Benefit-Cost Analysis (“BCA”) tests like TRC, but must reflect the
2 local policy objectives:

3 The NSPM is policy-neutral in that it does not recommend any specific cost-
4 effectiveness test of policies, but rather supports BCA practices that align with a
5 jurisdiction’s policy goals and objectives. The manual thus serves as an objective,
6 technology-neutral and economically sound guidance document for regulators,
7 utilities, consumer advocates, DER proponents, state energy offices, and other
8 stakeholders interested in comprehensively assessing the impacts of DER
9 investments.⁹

10 The NSPM goes on to state its Principle #2, that evaluation of CDM should “align with policy goals”
11 and that:

12 Jurisdictions invest in or support energy resources to meet a variety of goals and
13 objectives. The primary cost-effectiveness test should therefore reflect this intent
14 by accounting for the jurisdiction’s applicable policy goals and objectives.¹⁰

15 Indeed, Step 1 in the manual is to “Articulate Applicable Policy Goals.”¹¹ This is a necessary step,
16 as the policy objectives of different jurisdictions can differ materially. In some jurisdictions, for
17 example, increases in energy efficiency that reduce GHG emissions or reduce the need to invest
18 in new resources can be prominent policy objectives. These objectives can abide somewhat higher
19 power rates in order to achieve other priorities.

20 In the case of the IIS, however, a different dramatic and acute policy objective prevails – the need
21 to mitigate rate levels. Specifically, the province has noted that rates are the priority:

22 Government’s position is that the projected rate increases associated with Muskrat
23 Falls Project costs are not acceptable. Without intervention, these projected rate
24 increases would likely cause financial hardship for customers in all rate classes on
25 the island portion of Newfoundland and Labrador (“Ratepayers”).¹²

26 The roles of both CDM and electrification in the province need be tested first and foremost against
27 this rate mitigating policy objective. Muskrat Falls was a long-term investment that can provide
28 more stable and lower rate levels over the course of its long life. However, the Muskrat Falls
29 investment will drive rates upwards materially in the early years, for the benefits of inflation-
30 protected supplies of energy over the long-term. ECDM, as a partial solution to mitigating the rate
31 impacts of the Muskrat Falls, cannot also double-down on this rate trend – adverse impacts in the
32 early years in exchange for lower rates over the long-term. In this situation, ECDM as a solution
33 to the Muskrat Falls rate problem would instead be adding to the rate problem.

34
35

⁹ NPSM, page i

¹⁰ NSPM, page iv.

¹¹ NSPM, page vi.

¹² Reference Questions to the Board of Commissions of Public Utilities Rate Mitigation Options and Impacts, September 8, 2018 letter from the Minister. The policy objective of mitigating rate increases is further described at PUB-NLH-023, particularly footnote 3 to that response.

1 BACKGROUND ON CDM TESTS, INCLUDING MTRC

2 For utility programs aimed at reducing customer loads - Conservation and Demand Management
3 (CDM), also known as Demand Side Management (DSM), or Energy Efficiency (EE) - a series of
4 assessment tools can be applied to determine cost effectiveness from different perspectives (e.g.,
5 utility, customer, jurisdiction-wide, etc.). As the tools for management of customer loads has
6 expanded, CDM has been more broadly encompassed in a larger category that can include not only
7 reducing customer loads but also increasing customer loads in targeted ways. Hence, CDM
8 becomes Electrification, Conservation and Demand Management (ECDM), and DSM and EE become
9 part of the more general field of Distributed Energy Resources (DER).

10 In this Application, Hydro has expanded its previous program of CDM to ECDM, and requests
11 approval for a new cost effectiveness test, the Modified Total Resource Cost (mTRC). Hydro
12 indicates that this will provide a “test to ensure the programs are economic for both the customer
13 and the Utilities”.¹³

14 To understand the request, it is important to first address what is included in the basic TRC, and
15 then what this revised “Modified” method does to the calculation.

16

17 TOOLS FOR CDM/ECDM SCREENING

18 Measures of cost effectiveness of CDM focus on one of three areas:

19

20 - **Tests of impacts on the utility and its ratepayers:** These tests look at whether, for the
21 utility, and by implication the utility’s other ratepayers, the investments in CDM make
22 economic sense. Most of these tests, such as Program Administrator Cost (PAC) test, look
23 at whether the utility’s financial or economic profile is better off with the CDM program or
24 without it. The transactions measured as “costs” under this type of test are things that cost
25 the utility – principally how much does it cost to run the program, and how much does it
26 cost to incentivize people to participate in the program. The “benefits” are the avoided
27 supply costs or added extraprovincial revenues. If the CDM program is successful then the
28 utility needs less generation, and less fuel, or can sell more export power. In other words,
29 for what the utility pays for the CDM resource, how much benefit does it get from avoided
30 system costs or added export revenues. To normalize the values that arise at different
31 points in time, each value is brought to present dollars using a discount rate (Net Present
32 Value, or NPV, analysis). PAC is measured as a ratio. Other industry standard utility-
33 focused tests include the Levelized Cost (LC) test, measured as a unit cost (e.g.,
34 cents/kW.h).

35 A special category of utility focused tests looks at changes to the utility’s ability to cover
36 its revenue requirement with the loads it serves, and changes in the revenues due to the
37 ECDM program (more revenue in the case of electrification, less in the case of CDM). This

¹³ Hydro July 8, 2021 Revised Application, pdf page 7 of 510.

1 can be measured by the Rate Impact Measure (RIM) test (which is a ratio), or an NPV test
2 (a present value of the impact on rates, in dollars).

3
4 - **Customer focused tests:** A second group of tests looks at the customer perspective. In
5 general, these tests are applied in program design more than in program screening.
6 Specifically, if a program is being considered, analysis is recommended of the impact on
7 customer economics (i.e., how much does it cost for a customer to participate compared
8 to what the customer might save). If an initiative will not save customers money, then
9 uptake is likely to be relatively limited, particularly among vulnerable customers. It is still
10 possible to run such programs if they make sense for the utility (i.e., they cost the utility
11 little and save a lot of energy) but in order to increase uptake, often incentives may be
12 required in these cases. The customer focused tests can help determine how much
13 incentive is justified. The typical measure of customer-focused impacts is the Participant
14 Cost (PC) test.

15
16 - **Consolidated, or societal, tests:** The broadest set of tests combine the above two
17 factors. These tests are much more difficult to conceptualize, as they look at whether the
18 combined utility/customer is better off at the margins, with or without the CDM measure.
19 The most typical of these tests is the Total Resource Cost test (TRC). The TRC test reports
20 a ratio that looks at costs versus benefits. The costs include those that the utility and the
21 customers collectively have to pay to enable the program, comprised of program
22 administration costs (expenses incurred by the utility to administer the program) and
23 participation costs (such as to buy new equipment, typically paid by the customer). The
24 benefits of the measure that are included are the avoided generation/transmission/fuel
25 costs (from lower loads), and the added export revenues. The difficult conceptual
26 understanding comes from the fact that, as a collective test of the utility/customer
27 combined, major costs and impacts of the program are entirely ignored in the test. For
28 example, the test includes no consideration of how much incentives must or will be paid to
29 get the customer to participate, or how much revenue will be lost to the utility from running
30 the program, because these transactions net out in the analysis (they are a benefit to the
31 customer but a cost to the utility, so collectively they are neutral).

32
33 The routinely cited precedent for CDM tests in the province is Order P.U.18(2016), which notes
34 “Newfoundland Power’s proposal to change its evaluation of customer conservation programs by
35 use of the total resource cost test and program administrator cost test is approved.”¹⁴ In other
36 words, the approved method is for both TRC (a consolidated test) and PAC (a utility test) to be
37 applied.

38 On the basis of the above categorization, it is important to note that Hydro makes repeated
39 material misstatements when describing the TRC test (and mTRC test) as measuring individual
40 impacts. Specifically, Hydro notes: “a result of 1.0 or greater indicates that a program is cost-

¹⁴ Order P.U. 18(2016) page 50.

1 effective from both a customer and a utility perspective”¹⁵ (emphasis added). In fact, a TRC of 1.0
2 or greater only indicates that collectively the program may be cost effective for the customer and
3 utility combined – it tells nothing about the specifics of either the customer, or the utility. Take the
4 example of a program where the utility may elect to pay massive incentives to get customers to
5 participate, such that customers make out handsomely while the utility suffers extreme losses.
6 Such programs could still easily lead to a TRC greater than 1.0, since the incentives are ignored in
7 the mathematics.

8

9 **ELECTRIFICATION TESTS AND BENEFICIAL PROGRAMMING**

10 In terms of electrification programs, Hydro proposes to modify the tests used to screen programs
11 from the TRC and PAC test, to the mTRC and NPV tests.

12 The mTRC test is a revision to the TRC test that Hydro proposes to apply to electrification. The
13 normal TRC measures values appropriate for CDM programs, namely:

- 14 - Benefits: Avoided power supply costs (added export revenue, avoided capacity investment
15 – measured at marginal cost)
- 16 - Costs: Program administration (utility cost to administer program), purchase of equipment
17 (customer or utility).
- 18 - Ignored: Incentives paid to the customer by the utility; changes in revenues paid to the
19 utility by the customer.

20

21 The mTRC is understood to similarly be a ratio of costs:benefits, as follows (using the example of
22 an EV)¹⁶:

- 23 - Benefits: Avoided cost of purchasing gasoline, avoided maintenance costs of EV versus
24 gasoline vehicle.
- 25 - Costs: Program administration, purchase of equipment (incremental cost of EV versus
26 gasoline; installation of fast chargers), cost of added power supply (energy supplied from
27 lost export revenue, capacity from new investment – measured at marginal cost).
- 28 - Ignored: Incentives paid to the customer by the utility; changes in revenues paid to the
29 utility by the customer.

30

31 Note that the above formulaic representation of mTRC is inferred from the response to IIC-NLH-
32 001, but the specific formula components do not appear to have been included in the filing.
33 Fundamentally, the difference with the mTRC as compared to TRC is the repositioning of utility
34 supply cost changes to a cost (due to added loads) rather than a benefit (from reduced loads).
35 The new key benefits are avoided gasoline fuel and auto maintenance costs.

¹⁵ July 8, 2021 Revised Application, pdf page 14 of 510

¹⁶ This is derived from IIC-NLH-005.

1 The NPV test proposed by Hydro is illustrated at Appendix A of the Application¹⁷ and comprises the
2 following factors, as focused on the utility:

- 3 - Benefits: The benefits to the utility comprised of incremental revenues per year.
- 4 - Costs: The costs included in the assessment include incremental system costs (supply of
5 energy and demand, at marginal costs), the recovery of capital costs, and the recovery of
6 program administration costs.
- 7 - Ignored: The utility analysis does not consider customer-specific factors, namely the
8 savings from avoiding gasoline purchases, or changes to vehicle maintenance.

9
10 The NPV test as constructed is very useful in that it provides a direct measure of how the CDM
11 initiative will affect Hydro's rates for other customers. In particular, the NPV test measures whether
12 the added revenues that the CDM program will provide will more than pay the utility costs. In this
13 sense the NPV test is much more akin to the RIM test, which similarly looks at added revenues to
14 the utility as compared to added costs, but as a ratio rather than a net present value. For example,
15 the NPV test for the Electrification program proposed by Hydro for EVs indicates a 15 year
16 cumulative NPV of positive \$745,245¹⁸ (very small in relation to the program) while the RIM test
17 indicates a ratio of 1.02 benefit:cost¹⁹ (very slight margin of benefits above costs). It is understood
18 that the RIM test and NPV test in this case are both calculated over the same horizon.

19
20 To use an example, note that in the case of the electrification program proposed by Hydro, the
21 following ECDM metrics were generated:

- 22 - **Utility-Focused:** As noted, the NPV is \$745,245, and the RIM test ratio is 1.02. The
23 programs, under the proposed horizon and assumptions, are basically of minimal net
24 benefit to the utility.
- 25 - **Customer-Focused:** Hydro provides the PC test result, which is the ratio of benefits:costs
26 of the EV program participant, at 1.96²⁰. This is a very favourable ratio for the participant,
27 who basically doubles the value of their investment in the EV, on an NPV basis.
- 28 - **Consolidated:** For the consolidated test, Hydro reports a mTRC of 1.9 for Residential
29 participants, 2.2 for Commercial, and 2.1 for Custom Commercial²¹. These are similarly
30 favourable results, but a favourable result should be expected as the participant is seeing
31 huge benefit under the proposed program and the utility is basically neutral.

32 Under the above cost profile, it appears the program in question is at best marginally merited,
33 with two very significant caveats:

34 First, the benefits are excessively skewed to the participant under the base case analysis. Where
35 the participant is seeking benefits exceeding 2.0, there is likely little need for utility incentives or

¹⁷ July 8, 2021 Revised Application, pdf page 25 of 510

¹⁸ July 8, 2021 Revised Application, pdf page 25 of 510

¹⁹ IIC-NLH-005c

²⁰ IIC-NLH-005c

²¹ July 8, 2021 Revised Application, pdf page 500 of 510

1 subsidies except perhaps in low-cost or focused ways. One such means would be customer
2 education. Through communicating the significant benefits to customers, the customers can be
3 made aware to make the investment without significant subsidies or incentives. Second, it may be
4 appropriate to adopt targeted initiatives to address marginal or low-income customers, if such
5 initiatives can help address affordability barriers. In this case, given EVs are part of the decision
6 process for buying new vehicles, it is unlikely that incentives to help low-income populations would
7 be a successful way of changing customer behaviour.

8 Second, based on the above cost profile, the assumptions about the NPV benefits to the utility and
9 its other customers are extremely marginal over the 15 year horizon. It should be imminently clear
10 that the program exhibiting these metrics would not yield measurable rate mitigation benefits.
11 Further investigation exhibits an NPV cost profile as follows²²:

12

Newfoundland and Labrador Hydro
Pro Forma Revenue Requirement Analysis
2021–2034
(\$000)

Year	Investment		Pro Forma Revenue Requirement Impacts						Cumulative NPV
	Capital Costs	Program Costs	Incremental Revenues	Incremental System Costs	Capital Cost Recovery	Program Cost Recovery	Net Revenues		
	A	B	C	D	E	F	G	H	
2021	724,300	76,686	3,805	2,337	38,388	4,064	(40,985)	(38,922)	
2022	241,400	175,689	13,740	8,440	149,170	23,750	(167,620)	(190,093)	
2023	482,800	247,438	30,079	18,477	201,932	60,052	(250,382)	(404,539)	
2024	362,100	306,908	59,811	36,741	279,127	107,882	(363,939)	(700,556)	
2025	0	314,280	105,669	64,910	317,147	162,275	(438,664)	(1,039,392)	
2026	0	54,035	247,365	151,952	303,438	201,548	(409,574)	(1,339,835)	
2027	0	85,475	461,788	283,668	289,730	204,901	(316,511)	(1,560,326)	
2028	0	117,618	778,714	478,350	276,021	213,802	(189,459)	(1,685,665)	
2029	0	147,608	1,211,499	744,203	164,324	217,619	85,354	(1,632,040)	
2030	0	179,908	1,691,549	1,039,089	123,442	213,501	315,517	(1,443,788)	
2031	0	213,180	2,256,846	1,386,341	51,729	206,022	612,754	(1,096,593)	
2032	0	248,488	2,904,735	1,784,328	0	197,382	923,025	(599,917)	
2033	0	283,690	3,643,191	2,237,949	0	195,097	1,210,146	18,482	
2034	0	317,813	4,492,061	2,759,395	0	235,088	1,497,579	745,245	

13

14

15 The above NPV cost profile appears to include only Hydro’s portion of the electrification program,
16 not NP’s²³, and as such it appears should not be taken as the full basis assessment. Nonetheless,
17 as an example of the potential kinds of issues that can arise from NPV analysis, the above table
18 illustrates a program cost profile that would be problematic from a rate impact perspective,
19 particularly when combined with the very favourable PC and mTRC test results noted above. Note
20 that the “Net Revenues” begin negative (indicating an adverse impact on rates in the year in
21 question) and do not turn positive until 2029, 8 years into the program. Further, due to the
22 accumulated adverse rate impacts totalling over \$2 million over the years 2021 to 2029, the NPV
23 of the program does not turn positive until 2033. Even as of this 2033 date, Program Costs continue

²² July 8, 2021 Revised Application, pdf page 25 of 510.

²³ NP’s portion of the program appears to be shown in the NP Application, Volume 1, pdf 51 of 51.

1 to be expended in excess of the rate at which they are recovered, which means a significant deficit
2 balance would also exist in Hydro's deferred CDM cost account. In addition, the cost profile is just
3 one scenario for how the EV program could unfold. Even minor changes to discount rates (for
4 example, from increases in interest rates) or to program-driven uptake (for example, if EVs are
5 increasingly provided by the market or by regulation, such that Hydro's program is responsible for
6 far less incremental uptake than assumed) would reverse this cost profile and indicate a net
7 negative impact on rates even over the 15 years time frame.

8 Finally, this marginal to adverse cost profile needs to be contrasted with the large PC test result,
9 indicating a very significant positive cost-benefit profile for the participating customer.

10 In short, assuming the above cost profile has been properly developed to capture all incremental
11 benefits of the program (including benefits of avoiding peak load impacts), then the program is a
12 relative wash at best, and on a risk-adjusted basis should likely not be aggressively pursued. With
13 an improved utility cost profile, such as from reduced incentives or utility investment, or from
14 identifying lower cost ways to encourage uptake, the program could be shifted into a more
15 attractive option.

16 As a matter of comparison, consider other program offerings addressed in the Hydro filing, such
17 as industrial-focused curtailment. This program provides exceptional utility rate metrics, reported
18 in Hydro's filing to exceed a PAC test ratio of 25 over all time horizons²⁴. While NPVs and rate
19 impacts are not reported for these measures, the extremely positive PACs (a utility-focused
20 measure) would suggest highly beneficial rate impacts as well, even over near-term durations. In
21 a similar vein, it is expected that electrification programming focused on expansion of industrial
22 Interruptible Energy, provided at a rate that slightly exceeds the foregone export revenue, may
23 similarly exhibit immediate positive and enduring customer and rate benefits in each year.
24 Offerings of this type from other utilities, like Manitoba Hydro's Surplus Energy Program²⁵, which
25 offers non-capacity-backed interruptible energy at prices at a small premium to export prices,
26 would likely provide immediate and sustained rate benefits. For customers who can utilize such
27 energy, such as larger commercial, agricultural and industrial customers who can install dual fuel
28 heating or boiler systems to replace existing oil-fired units, options exist for beneficial
29 electrification programming at a low utility cost, which should be included in Hydro's and NP's CDM
30 offerings. Such programs could be added with limited utility investment at most, and little to no
31 adverse impacts on utility peak loads with appropriate customer response tools (e.g., interruption
32 protocols and short notice periods).

²⁴ For example, see Hydro's Application, pdf pages 381-382 of 510.

²⁵ See, for example, Manitoba PUB Order 46-22 which approves the latest weekly prices for Surplus Energy. Previous Manitoba Hydro reports indicate over 25 customers participate with dual fuel heating systems, such as in Agricultural industries. See pdf page 38 of:
https://www.hydro.mb.ca/regulatory_affairs/pdf/electric/general_rate_application_2017/09.09_appendix_9.9_sep_annual_reports.pdf

APPENDIX A: Resume

AREAS OF EXPERIENCE:

- Utility Regulation and Rates
- Project Development and Planning
- Utility Resource Planning

EDUCATION:

- MNRM (Master of Natural Resources Management), University of Manitoba, 1998
- Bachelor of Arts (Human Development and Outdoor Education), Prescott College (Arizona), 1994

PROFESSIONAL EXPERIENCE:

Bowman Economic Consulting Inc., Winnipeg, Manitoba

2020 – Principal Consultant

Conduct consulting assignments as Principal Consultant of new economic consulting firm, focused on utility regulation.

InterGroup Consultants Ltd., Winnipeg, Manitoba

1998 – 2020 – Research Analyst/Consultant/Principal/Senior Associate

Utility Regulation

Conducted research and analysis for regulatory and rate reviews of electric, gas and water utilities in eight Canadian provinces and territories and international. Prepared evidence and expert testimony for regulatory hearings. Assisted in utility capital and operations planning to assess impact on rates and long-term rate stability. Major clients included the following:

- **For Manitoba Industrial Power Users Group (1998 – 2020):** Prepare analysis and evidence for regulatory proceedings before Manitoba Public Utilities Board representing large industrial energy users. Appear before PUB as expert in General Rate Application and revenue requirement reviews, the Needs For and Alternatives To (NFAT) resource planning hearing, depreciation, cost of service, and rate design matters. Assist in regulatory analysis of the purchase of local gas distributor (Centra Gas) by Manitoba Hydro. Assist industrial power users with respect to assessing alternative rate structures, surplus energy rates and demand side management initiatives including curtailable rates and load displacement.
- **For Northwest Territories Power Corporation (2000 - 2020):** Provide technical analysis and support regarding General Rate Applications and related Public Utilities Board filings, major capital developments and utility acquisition and valuation topics. Assist in preparation of evidence and providing overall guidance to subject specialists in such topics as depreciation and return. Appear before PUB as expert in revenue requirement, cost of service and rate design matters, and on system planning reviews (Required Firm Capacity).
- **For Industrial Customers of Newfoundland and Labrador Hydro (2001 – 2020):** Prepare analysis and evidence for Newfoundland Hydro GRA hearings before Newfoundland Board of Commissioners of Public Utilities representing large industrial energy users. Provide advice on interventions in respect of major new transmission facilities, depreciation, rate mitigation for major new capital spending. Appear before PUB as expert in cost of service and rate design matters.

- **For Nelson Hydro (2013 - 2020):** Development and updating of a Cost of Service model and filings before the BCUC.
- **For City of Chestermere (2015 – 2020):** Analysis of rate proposals from Chestermere Utilities Inc. and review of strategic options for utility.
- **For the Office of the Utilities Consumer Advocate of Alberta (2016 – 2020):** Provide expert witness and strategic support of multiple depreciation and revenue requirement proceedings. This includes ongoing participation in depreciation working group discussions on behalf of the UCA.
- **For the Association of Major Power Consumers of British Columbia (2015 – 2020):** Provide expert advice in the current 2020-2021 Revenue Requirement Application with a focus on general service large and transmission service customers. Provide consulting support regarding transmission service customer and rate design issues in the 2015 Rate Design Application.
- **Vancouver Airport Fuel Facilities Corporation (2019 – 2020):** Review pipeline tolling application on revenue requirement and depreciation, prepare interrogatories and draft issues for evidence.
- **Jamaica Public Service (2019):** Assist in preparation of regulatory documents, Executive Summary, review of strategic issues for General Rate Application.
- **For Hualapai Tribal Utility Authority (2017 - 2018):** Provided strategic advice to the HTUA Board, and completion of a feasibility study and Cost of Service analysis for the acquisition of assets and development of a tribally-owned distribution utility, including power purchase and transmission, asset purchase (acquisition value) and replacement costs, and ongoing operation and maintenance costs. The assignment included a review of comparable jurisdiction cost and rate structures, building a financial model with input cost variables, reporting and presenting in HTUA Board meetings.
- **For Yukon Energy Corporation (1998 - 2014):** Provided analysis and support of regulatory proceedings and normal regulatory filings before the Yukon Utilities Board. Appeared before YUB as expert on revenue requirement matters, depreciation, cost of service, rate design, and resource planning. Prepared analysis of major capital projects, financing mechanisms to reduce rate impacts on ratepayers. Analysis and support regarding utility asset transfer and system rationalization among various utilities.
- **For City of Swift Current (2013 - 2014):** Utility system valuation for acquisition and disposition alternatives assessment.
- **For Municipal Customers of City of Calgary Water Utility (2012 - 2017):** Analysis of proposed new development charges and reasonableness of water and wastewater rates (City of Chestermere, City of Airdrie, Town of Cochrane, and Town of Strathmore).
- **For Yukon Development Corporation (1998 - 2012):** Prepared analysis and submission on energy matters to Government. Participated in development of options for government rate subsidy programs. Assisted with review of debt purchase, potential First Nations investment in utility projects, and corporate governance.
- **For NorthWest Company Ltd. (2004 - 2006):** Reviewed rate and rider applications by Nunavut Power Corporation (Qulliq Energy). Provided analysis and submission to rate reviews before the Utility Rates Review Council.

Project Development, Socio-Economic Impact Assessment and Mitigation

Provide support in project development, local investment opportunities or socio-economic impact mitigation programs for energy projects, including northern Manitoba, Yukon, and NWT. Support to local communities in resolution of outstanding compensation claims related to hydro projects.

- **For Yukon Energy Corporation (2005 - 2014):** Participated in preparation of resource plans, including Yukon Energy's 20-Year Resource Plan Submission to the Yukon Utilities Board in 2005 (including providing expert testimony before the YUB), advisor on 2010 update. Project Manager for all planning phases of the Mayo B hydroelectric project (\$120 million project) including environmental assessment and licencing, preliminary project design, preparation of materials for Yukon Utilities Board hearing, joint YEC/First Nation working group on all technical matters related to project including fisheries, managing planning phase financing and budgets. Assistance in preparation of assessment documentation for Whitehorse LNG generation project.
- **For Northwest Territories Power Corporation (2010 - 2012):** Participated in planning stages of \$37 million dam replacement project; appear before Mackenzie Valley Land and Water Board (MVLWB) regarding environmental licence conditions; participate in contractor negotiations, economic assessments, and ongoing joint company/contractor project Management Committee. Provided economic and rate analysis of potential major transmission build-out to interconnect to southern jurisdictions.
- **For Northwest Territories Energy Corporation (2003 - 2005):** Provided analysis and support to joint company/local community working groups in development of business case and communication plans related to potential new major hydro and transmission projects.
- **For Kwadacha First Nation and Tsay Keh Dene (2002 - 2004):** Supported and analysed potential compensation claims related to past and ongoing impacts from major northern BC hydroelectric development. Reviewed options related to energy supply, including change in management contract for diesel facilities, potential interconnection to BC grid, or development of local hydro.
- **For Manitoba Hydro Power Major Projects Planning Department (1999 - 2002):** Initial review and analysis of socio-economic impacts of proposed new northern generation stations and associated transmission. Participation in joint working group with client and northern First Nation on project alternatives (such as location of project infrastructure).
- **For Manitoba Hydro Mitigation Department (1999 - 2002):** Provided analysis and process support to implementation of mitigation programs related to past northern generation projects, debris management program.
- **For International Joint Commission (1998):** Analysis of current floodplain management policies in the Red River basin, and assessment of the suitability of alternative floodplain management policies.
- **For Nelson River Sturgeon Co-Management Board (1998 and 2005):** An assessment of the performance of the Management Board over five years of operation and strategic planning for next five years.

Government of Northwest Territories, Yellowknife, Northwest Territories

1996 – 1998 Land Use Policy Analyst

Conducted research into protected area legislation in Canada and potential for application in the NWT. Primary focus was on balancing multiple use issues, particularly mining and mineral exploration, with principles and goals of protection.

Patrick Bowman - Experience in Utility Regulatory Proceedings

Utility	Proceeding	Work Performed	Before	Client	Year	Oral Testimony
Yukon Energy Corporation	Final 1997 and Interim 1998 Rate Application	Analysis and Case Preparation	Yukon Utilities Board (YUB)	Yukon Energy	1998	No
Manitoba Hydro	Curtailable Service Program Application	Analysis, Preparation of Intervenor Evidence and Case Preparation	Manitoba Public Utilities Board (MPUB)	Manitoba Industrial Power Users Group (MIPUG)	1998	No
Yukon Energy	Final 1998 Rates Application	Analysis and Case Preparation	YUB	Yukon Energy	1999	No
Westcoast Energy	Sale of Shares of Centra Gas Manitoba, Inc. to Manitoba Hydro	Analysis and Case Preparation	MPUB	MIPUG	1999	No
Manitoba Hydro	Surplus Energy Program and Limited Use Billing Demand Program	Analysis and Case Preparation	MPUB	MIPUG	2000	No
West Kootenay Power	Certificate of Public Convenience and Necessity - Kootenay 230 kV Transmission System Development	Analysis of Alternative Ownership Options and Impact on Revenue Requirement and Rates	British Columbia Utilities Commission (BCUC)	Columbia Power Corporation/Columbia Basin Trust	2000	No
Northwest Territories Power Corporation (NTPC)	Interim Refundable Rate Application	Analysis and Case Preparation	Northwest Territories Public Utilities Board (NWTPUB)	Northwest Territories Power Corporation (NTPC)	2001	No
NTPC	2001/03 Phase I General Rate Application	Analysis and Case Preparation	NWTPUB	NTPC	2000 - 2002	No - Negotiated Settlement
Newfoundland Hydro	2002 General Rate Application	Analysis, Preparation of Intervenor Evidence and Case Preparation	Board of Commissioners of Public Utilities of Newfoundland and Labrador (NLPUB)	Newfoundland Industrial Customers	2001 - 2002	No
NTPC	2001/02 Phase II General Rate Application	Analysis, Preparation of Company Evidence and Expert Testimony	NWTPUB	NTPC	2002	Yes
Manitoba Hydro/Centra Gas	Integration Hearing	Analysis and Case Preparation	MPUB	MIPUG	2002	No
Manitoba Hydro	2002 Status Update Application/GRA	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2002	Yes
Yukon Energy	Application to Reduce Rider J	Analysis and Case Preparation	YUB	Yukon Energy	2002 - 2003	No
Yukon Energy	Application to Revise Rider F Fuel Adjustment	Analysis and Case Preparation	YUB	Yukon Energy	2002 - 2003	No
Newfoundland Hydro	2004 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	NLPUB	Newfoundland Industrial Customers	2003	Yes
Manitoba Hydro	2004 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2004	Yes
NTPC	Required Firm Capacity/System Planning hearing	Analysis, Preparation of Company Evidence and Expert Testimony	NWTPUB	NTPC	2004	Yes
Nunavut Power (Qulliq Energy)	2004 General Rate Application	Analysis, Preparation of Intervenor Submission	Nunavut Utility Rate Review Commission (URRC)	NorthWest Company (commercial customer intervenor)	2004	No
Qulliq Energy	Capital Stabilization Fund Application	Analysis, Preparation of Intervenor Submission	URRC	NorthWest Company	2005	No
Yukon Energy	2005 Required Revenues and Related Matters Application	Analysis, Preparation of Company Evidence and Expert Testimony	YUB	Yukon Energy	2005	Yes
Manitoba Hydro	Cost of Service Methodology	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2006	Yes
Yukon Energy	2006-2025 Resource Plan Review	Analysis, Preparation of Company Evidence and Expert Testimony	YUB	Yukon Energy	2006	Yes
Newfoundland Hydro	2006 General Rate Application	Analysis, Preparation of Intervenor Evidence	NLPUB	Newfoundland Industrial Customers	2006	No - Negotiated Settlement
NTPC	2006/08 General Rate Application Phase I	Analysis, Preparation of Company Evidence and Expert Testimony	NWTPUB	NTPC	2006 - 2008	Yes
Manitoba Hydro	2008 General Rate Application	Analysis, Preparation of Company Evidence and Expert Testimony	MPUB	MIPUG	2008	Yes
Manitoba Hydro	2008 Energy Intensive Industrial Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2008	Yes
Yukon Energy	2008/2009 General Rate Application	Analysis, Preparation of Company Evidence and Expert Testimony	YUB	Yukon Energy	2008 - 2009	Yes
FortisBC	2009 Rate Design and Cost of Service	Analysis and Case Preparation	BCUC	BC Municipal Electrical Utilities	2009 - 2010	No
Yukon Energy	Mayo B Part III Application	Analysis, Preparation of Company Evidence	YUB	Yukon Energy	2010	No
Yukon Energy	2009 Phase II Rate Application	Analysis, Preparation of Company Evidence and Expert Testimony	YUB	Yukon Energy	2009 - 2010	Yes
Newfoundland Hydro	Rate Stabilization Plan (RSP) Finalization of Rates for Industrial Customers	Analysis, Preparation of Intervenor Evidence	NLPUB	Newfoundland Industrial Customers	2010	No
Manitoba Hydro	2010/11 and 2011/12 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2010 - 2011	Yes
NTPC	Bluefish Dam Replacement Project	Analysis, Preparation of Company Evidence and Expert Testimony	Mackenzie Valley Land and Water Board	NTPC	2011	Yes
NTPC	2012/14 General Rate Application	Analysis, Preparation of Company Evidence and Expert Testimony	NWTPUB	NTPC	2012	Yes

Patrick Bowman - Experience in Utility Regulatory Proceedings

Utility	Proceeding	Work Performed	Before	Client	Year	Oral Testimony
Manitoba Hydro	2012/13 and 2013/14 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2013	Yes
Manitoba Hydro	Needs For and Alternatives To Investigation	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2014	Yes
Manitoba Hydro	2015/16 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2015	Yes
Newfoundland Hydro	Amended 2013 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	NLPUB	Newfoundland Industrial Customers	2015	No - merged into 2015 General Rate Application
Newfoundland Hydro	2015 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	NLPUB	Newfoundland Industrial Customers	2015	Yes
Manitoba Hydro	2016 Cost of Service review	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2016	Yes
Chestermere Utilities Inc.	2017 Rate Increase Request	Analysis, Preparation of Rate Review	City of Chestermere City Council	City of Chestermere City Council	2016	Presentation to Council
Newfoundland Hydro	2017 General Rate Application	Pre-Filed Evidence and Negotiated Settlement	NLPUB	Newfoundland Industrial Customers	2017 - 2018	No - Negotiated Settlement
Altalink Management Limited	2017-18 General Tariff Application	Analysis, Support of Consumer Advocate during Negotiated Settlement Process on depreciation matters	Alberta Utilities Commission (AUC)	Alberta Utilities Consumer Advocate (UCA)	2016 - 2017	No - Negotiated Settlement
ATCO Pipelines	2017-18 General Rate Application	Analysis, Preparation of Intervenor Evidence on depreciation matters	AUC	UCA	2016 - 2017	No - Written Process only
Manitoba Hydro	2017/18 and 2018/19 General Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2017 - 2018	Yes
ATCO Pipelines	2017-18 GRA Review and Vary	Analysis and Case Preparation	AUC	UCA	2017 - 2018	No
ATCO Pipelines	2019-20 General Rate Application	Analysis, Preparation of Intervenor Evidence	AUC	UCA	2018 - present	No - Written Process only
Altalink Management Limited	2019-21 General Tariff Application	Analysis, Support of Consumer Advocate during Negotiated Settlement Process on depreciation matters, Preparation of Intervenor Evidence and Expert Testimony	AUC	UCA	2018 - present	Yes
ATCO Pipelines	Keephills Transmission Facilities Assessment	Analysis, Preparation of Intervenor Evidence	AUC	UCA	2018 - 2019	No - Written Process only
Manitoba Hydro	2019/20 Electric Rate Application	Analysis, Preparation of Intervenor Evidence and Expert Testimony	MPUB	MIPUG	2019	Yes
Chestermere Water, Wastewater, Stormwater and Solid Waste Utility	2019 Rate Request	Analysis, Preparation of Rate Review	City of Chestermere City Council	City of Chestermere City Council	2019	Presentation to Council
ATCO Electric Distribution	Distribution Depreciation	Analysis and Case Preparation	AUC	UCA	2019	No
AltaGas	Distribution Depreciation	Analysis, Preparation of Intervenor Evidence	AUC	UCA	2019	No - Written Process only
ATCO Gas	Distribution Depreciation	Analysis, Preparation of Intervenor Evidence	AUC	UCA	2019	No - Written Process only
Nalcor Energy, Newfoundland and Labrador Hydro	Muskat Falls Rate Mitigation Hearing	Analysis, Preparation of Intervenor Evidence and Expert Testimony	NLPUB	Newfoundland Industrial Customers	2019	Yes
Kinder Morgan Canada (Jet Fuel) Inc.	2019 Tariff Filing Application	Review pipeline tolling application on revenue requirement and depreciation, prepare interrogatories and draft issues for evidence	BCUC	Vancouver Airport Fuel Facilities Corporation (VAFFC)	2019 - 2021	No
FortisAlberta	Town of Fort Macleod RCN-D Valuation Application	Analysis, Preparation of Intervenor Evidence	AUC	UCA	2019-2020	No - Written Process only
Manitoba Public Insurance	2021 General Rate Application	Review insurer evidence, draft IRs and prepare evidence on regulatory and rate setting principles	MPUB	Taxicab Coalition	2020	Yes
Chestermere Water, Wastewater, Stormwater and Solid Waste Utility	2021 Rate Request	Analysis, Preparation of Rate Review	City of Chestermere City Council	City of Chestermere City Council	2020	Presentation to Council
ATCO Pipelines	Acquisition of Pioneer Pipeline	Review evidence, draft IRs. Evidence TBD	AUC	UCA	2020	No - Written Process only
ATCO Electric Transmission	2020-2022 GTA Depreciation Expert	Analysis, Preparation of Intervenor Evidence	AUC	UCA	2020-2021	No - Written Process only
Direct Energy Regulated Services (DERS)	2020-2022 DRT and RRT Application	Analysis, Support of Consumer Advocate during Negotiated Settlement Process	AUC	UCA	2021	No - Negotiated Settlement
AltaLink Management Ltd.	2022-23 General Tariff Application, and Review and Variance Application	Analysis, Support of Consumer Advocate during Negotiated Settlement Process, Preparation of Intervenor Evidence on Depreciation Matters.	AUC	UCA	2021-2022	No - Written Process only
Manitoba Hydro	2021 Interim Rate Application, Review and Variance Application	Analysis, Support of Intervenor position	MPUB	MIPUG	2021	No
NTPC	2022/23 General Rate Application, Interim Rate Application, and Talson Hydro Major Project Permit Application	Analysis, support preparation of utility filing, responses to information requests.	NWT PUB	NTPC	2022	TBD
Nelson Hydro	Cost of Service and Rate Design Proceeding and 2022 Revenue Requirements proceeding	Support to Nelson Hydro on preparation of Cost of Service model and specified studies	BCUC	Nelson Hydro	2020-2022	No
Epcor Distribution and Transmission Inc (EDTI)	EDTI Phase II Distribution Tariff AUC proceeding 27018	Analysis, Preparation of Intervenor Evidence and Expert Evidence	AUC	UCA	2022	No - Written Process only



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