Assessment of Newfoundland and Labrador Hydro's Long-Term Load Forecast Report – 2023

Presented to:
Newfoundland and Labrador
Board of Commissioners of Public Utilities

Prepared by
Vincent Musco
Collin Cain
Nick Puga

July 25, 2024

TABLE OF CONTENTS

List of Tables

List of Figures

Abbreviations Used in Report

Bates White – Bates White, LLC
BEV – Battery Electric Vehicle
Board – Board of Commissioners of Public Utilities
CAGR – Compound Annual Growth Rate
Dunsky -- Dunsky Energy and Climate Advisors
EV – Electric Vehicle
EVA – Electric Vehicle Adoption
GDP – Gross Domestic Power
GHG – Greenhouse Gas
Government – Government of Newfoundland and Labrador
GWh – Gigawatt-hour
HDV – Heavy Duty Vehicles
ICE – Internal Combustion Engine
IIS – Island Interconnected System
kWh – Kilowatt-hour
LDV – Light Duty Vehicles
LIS – Labrador Interconnected System
Load Forecast Report – Long-Term Load Forecast Report – 2023
MDV – Medium Duty Vehicles
MHD – Medium and Heavy Duty
MM – Million
MSHP – Mini-split Heat Pumps
MURB – Multi-unit Residential Buildings
MW – Megawatt
NAP – Network Additions Policy
NL – Newfoundland
NLH – Newfoundland and Labrador Hydro
NP – Newfoundland Power
PHEV – Plug-in Hybrid Electric Vehicle
RRA – Reliability and Resource Adequacy Report
TWh – Terawatt-hour
YoY – Year over Year

I. Introduction

Bates White, LLC ("Bates White") appreciates the opportunity to provide comments on Newfoundland and Labrador Hydro's ("NLH's") Long-Term Load Forecast Report – 2023 ("Load Forecast Report"),[1] which was filed with the Board of Commissioners of Public Utilities ("Board") on March 28, 2024. Bates White was retained by the Board to conduct a review of NLH's Load Forecast Report and to provide comments for filing with the Board. The comments presented here fulfill that obligation.

II. Summary of Load Forecast Report

A. Background

NLH's Load Forecast Report contains the results of NLH's annual load forecasting efforts, completed in the third quarter of 2023.[2] The time horizon for the forecast includes 2023 through 2034.[3] NLH developed separate forecasts for both the Island Interconnected System ("IIS") and the Labrador Interconnected System ("LIS"). As NLH explains, the load forecasts are used across NLH's business operations, including general rate applications, financial budgeting, transmission planning, rate analysis, financing planning, and reliability and resource adequacy matters.[4] NLH also notes that the load forecast "is a key input to the resource planning process, which recommends what resources should be made available to meet projected demand within the province, consistent with applied reliability standards."[5]

Typically, NLH provides details of its load forecasts in its Reliability and Resource Adequacy ("RRA") Study Review filings.[6] The current Load Forecast Report, however, was submitted by NLH as a separate filing in response to a directive by the Board to "file the assumptions for each load forecast scenario as soon as possible and by the end of the first quarter 2024 at the latest."[7]

---

[1] NLH, "Long-Term Load Forecast Report – 2023," March 28, 2024, ("Load Forecast Report").

[2] Load Forecast Report, page i lines 5 to 6.

[3] Load Forecast Report, page i line 6.

[4] Load Forecast Report, page 1, lines 3 to 6.

[5] Load Forecast Report, page 2, lines 3 to 5.

[6] Load Forecast Report, page 1, line 7.

[7] Load Forecast Report, page 1, lines 8 to 10.

NLH engaged Daymark Energy Advisors ("Daymark") to assess the 2023 load forecast methodology as well as the accuracy of NLH's historical forecasts.[8] Daymark concluded that, "Hydro's current load forecasting methodology reflects standard industry approaches for assessing potential growth."[9] Daymark noted various sources of NLH load uncertainty, and found that historical forecast errors were "within industry norms."[10]

B. Methodology

To develop its load forecasts, NLH forecasts requirements for both the IIS and LIS. NLH aims "to characterize and understand the range of possible system demand and energy requirements arising from the inherent uncertainty in the load forecast model inputs to ensure that [NLH] is prepared to serve its customers' needs in the near and long term."[11] For the current forecast, NLH developed a "Reference Case," which represents NLH's expectation of demand and energy requirements "based on the baseline expectations for economic growth and existing government policies and programs."[12] NLH also developed alternative cases "to determine the sensitivity of system requirements to changes in key inputs."[13]

The IIS forecast is the summation of interconnected utility load, industrial customer loads, and distribution losses. Transmission losses and station service are not included in the load forecast but are modeled and added later.[14] The IIS forecast combines "forecasts prepared for [1] load served by Newfoundland Power; [2] industrial customers' load served by NLH; and [3] rural load served by NLH."[15] The IIS forecasts depend on inputs such as (1) the economic forecast from the Government of Newfoundland and Labrador ("Government"), (2) Newfoundland Power load requirements,[16] (3) electric vehicle ("EV") adoption and load (developed by a third party, Dunsky Energy and Climate Advisors ("Dunsky")), (4) Government policies and programs, (5) electricity rates, and (6) industrial load requirements.[17]

For the IIS, NLH developed load forecasts based on three scenarios:

---

8 Daymark Energy Advisors, "R&RA 2024: Independent Load Forecasting Process Review," March 22, 2024, Attachment 1 to the Load Forecast Report.

9 *Id.*, page 15.

10 *Id.*, page 17.

11 Load Forecast Report, page 1 line 22 to page 2 line 3.

12 Load Forecast Report, page 2 lines 7 to 9.

13 Load Forecast Report, page 2 lines 9 to 11.

14 Load Forecast Report, page 3 lines 7 to 9, 15 to 17.

15 Load Forecast Report, page 3 lines 10 to 14.

16 Newfoundland Power provides service to the majority of customers on the IIS. For example, in 2022, Newfoundland Power provided 78 percent of IIS energy requirements and 85 percent of peak demand requirements. Load Forecast Report, page 4 lines 3 to 8.

17 Load Forecast Report, page 3 line 18 to page 5 line 17.

- The “Slow Decarbonization Path Scenario,” or “Slow Decarbonization” case, which assumes more moderate decarbonization efforts, slower electrification of the transportation sector, lower population growth and housing starts, and higher electricity rates. The Slow Decarbonization case results in the lowest load forecast for the IIS.
- The “Reference” case scenario assumes steady decarbonization and transportation electrification, lower electricity rates, and steady increases in population growth and housing starts. The Reference case results in higher forecasted load than the Slow Decarbonization case, but lower forecasted load than the Accelerated Decarbonization Path case.
- The “Accelerated Decarbonization Path Scenario,” or “Accelerated Decarbonization” case, assumes accelerated decarbonization and transportation electrification, higher population growth and housing starts, increases in industrial demand, and electricity rates equal to those in the Reference case. The Accelerated Decarbonization case results in the highest load forecast for the IIS.[18]

Figure 1 shows historical annual coincident demand for the IIS, and the three forecast scenarios, as presented in the Load Forecast Report. Figure 2 shows the corresponding information for the LIS.

[18] Load Forecast Report, page iii lines 7 to 18.

Figure 1: Island Interconnected System Annual Customer Coincident Demand Requirements[19]

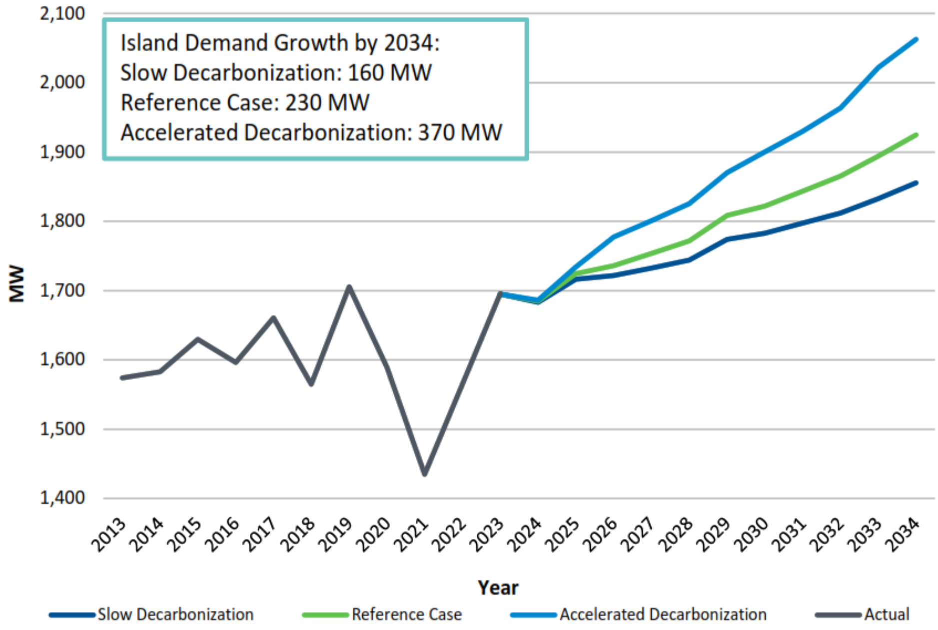
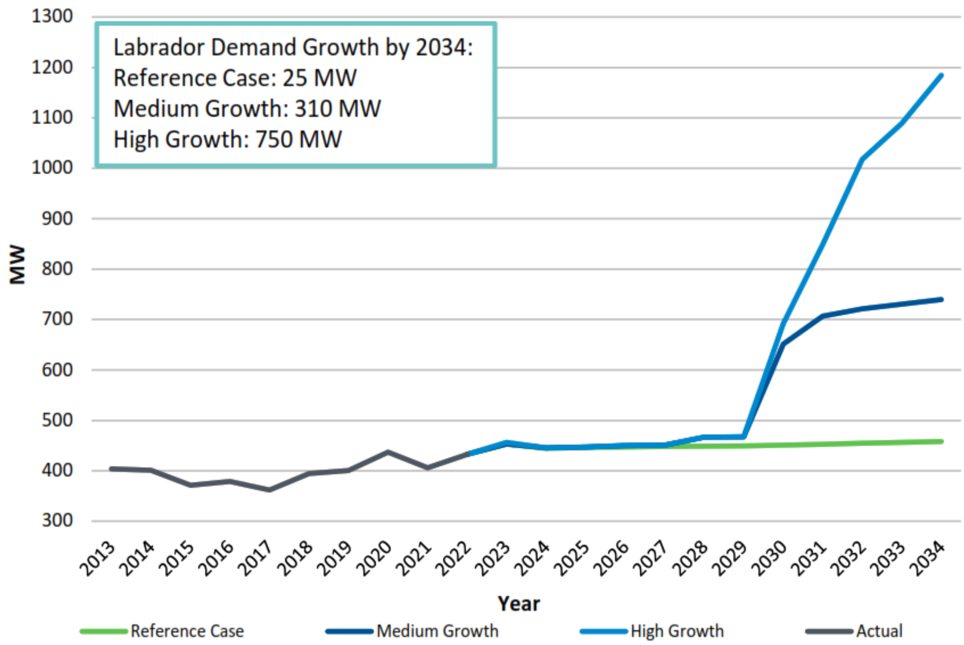


Figure 2: Labrador Interconnected System Annual Customer Coincident Demand Requirements[20]



19 Load Forecast Report, reproduction of Chart 1, page v.

20 Load Forecast Report, reproduction of Chart 2, page vi.

Table 1 below shows the annual energy values for the three load IIS forecast scenarios. The Slow Decarbonization case results in IIS energy demand growing from 7,790 GWh in 2023 to 8,703 GWh in 2034 at a compound annual growth rate ("CAGR") of 1.0 percent.[21] The Reference case sees higher load growth (9,172 GWh in 2034) at a higher CAGR of 1.5 percent, while the Accelerated Decarbonization case results in the highest load growth (9,890 GWh in 2034, CAGR of 2.1 percent.[22]

Table 1: IIS energy forecasts

IIS Energy (GWh)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	7,790	-	7,805	-	7,833	-
2024	8,075	3.66%	8,108	3.88%	8,169	4.29%
2025	8,172	1.20%	8,266	1.95%	8,368	2.44%
2026	8,164	-0.10%	8,305	0.47%	8,497	1.54%
2027	8,191	0.33%	8,355	0.60%	8,573	0.89%
2028	8,254	0.77%	8,440	1.02%	8,725	1.77%
2029	8,380	1.53%	8,597	1.86%	8,949	2.57%
2030	8,419	0.47%	8,692	1.11%	9,085	1.52%
2031	8,461	0.50%	8,780	1.01%	9,232	1.62%
2032	8,540	0.93%	8,907	1.45%	9,461	2.48%
2033	8,622	0.96%	9,039	1.48%	9,706	2.59%
2034	8,703	0.94%	9,172	1.47%	9,890	1.90%
CAGR	**1.01%**		**1.48%**		**2.14%**	

Table 2 shows the results of the three load forecast cases for the IIS peak load. The Slow Decarbonization case results in IIS peak demand growth from 1,696 MW in 2023 to 1,856 MW in 2034, at a CAGR of 0.8 percent.[23] Peak load growth in the Reference case is higher (1,925 MW in 2034, 1.2 percent CAGR), and the Accelerated Decarbonization case is the highest (2,063 MW in 2034, 1.8 percent CAGR).[24]

21 Data compiled from Load Forecast Report, Table A-4.

22 Data compiled from Load Forecast Report, Table A-4.

23 Data compiled from Load Forecast Report, Table A-4.

24 Data compiled from Load Forecast Report, Table A-4.

Table 2: IIS peak demand forecasts

IIS Peak Demand (MW)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	1,696	-	1,696	-	1,696	-
2024	1,683	-0.77%	1,685	-0.65%	1,686	-0.59%
2025	1,716	1.96%	1,725	2.37%	1,734	2.85%
2026	1,722	0.35%	1,736	0.64%	1,777	2.48%
2027	1,733	0.64%	1,753	0.98%	1,801	1.35%
2028	1,744	0.63%	1,772	1.08%	1,825	1.33%
2029	1,774	1.72%	1,809	2.09%	1,870	2.47%
2030	1,783	0.51%	1,822	0.72%	1,900	1.60%
2031	1,797	0.79%	1,843	1.15%	1,930	1.58%
2032	1,812	0.83%	1,865	1.19%	1,964	1.76%
2033	1,833	1.16%	1,894	1.55%	2,022	2.95%
2034	1,856	1.25%	1,925	1.64%	2,063	2.03%
CAGR	**0.82%**		**1.16%**		**1.80%**	

The LIS forecast is the summation of interconnected utility load, industrial customer loads, and distribution losses.[25] The LIS forecast combines forecasts prepared for [1] industrial customers served by NLH; [2] rural load served by NLH; and [3] EV requirements forecast.[26] The LIS forecasts is prepared using inputs such as (1) industrial customer forecast load requirements, including the potential for new industrial customers, (2) rural economic growth, which can drive industrial, commercial, and residential growth, and (3) EV adoption and load.[27]

NLH also developed three scenarios for the LIS forecast. The scenarios used were:

- The "Reference" case, which reflects current decarbonization and consistent industrial loads. The Reference case results in the lowest load forecast for the LIS.
- The "Medium Growth Scenario" case, or "Medium Growth" case, which forecasts higher industrial load growth. The Medium Growth case results in higher forecasted load than the Reference case, but lower forecasted load than the High Growth Scenario case.

[25] As with the IIS forecast, transmission losses and station service are not included in the load forecast but modeled and added later.

[26] Load Forecast Report, page 6 lines 7 to 11.

[27] Load Forecast Report, page 6 line 12 to page 7 line 8.

- The "High Growth Scenario" case, or "High Growth" case, which assumes accelerated decarbonization and electrification and higher industrial load growth. The High Growth case results in the highest load forecast for the LIS.[28]

Table 3 and Table 4 below shows the results of the three load forecast cases for the LIS's energy and demand forecasts. The Reference case results in flat energy demand and modest peak demand growth, from 422 MW in 2023 to 458 MW in 2034, at a CAGR of 0.8 percent.[29] The Medium Growth case forecasts energy demand growth from 2,816 GWh in 2023 to 4,758 GWh in 2034, at a CAGR of 4.9 percent, plus peak demand growth from 422 MW in 2023 to 740 MW in 2034, at a CAGR of 5.2 percent.[30] The High Growth case results in the highest energy demand growth (reaching 8,132 GWh in 2034, CAGR of 10.1 percent) and peak demand growth (reaching 1,184 MW in 2034 at a CAGR of 9.8 percent).[31]

Table 3: LIS energy forecasts

LIS Energy (GWh)						
Year	Reference Case	YoY Growth Rate	Medium Growth	YoY Growth Rate	High Growth	Growth Rate
2023	2,741	-	2,816	-	2,816	-
2024	2,694	-1.71%	2,772	-1.56%	2,772	-1.56%
2025	2,697	0.11%	2,778	0.22%	2,778	0.22%
2026	2,701	0.15%	2,790	0.43%	2,791	0.47%
2027	2,705	0.15%	2,829	1.40%	2,831	1.43%
2028	2,706	0.04%	2,875	1.63%	2,880	1.73%
2029	2,711	0.18%	3,081	7.17%	3,086	7.15%
2030	2,717	0.22%	4,155	34.86%	4,510	46.14%
2031	2,721	0.15%	4,539	9.24%	5,665	25.61%
2032	2,729	0.29%	4,637	2.16%	6,909	21.96%
2033	2,736	0.26%	4,700	1.36%	7,434	7.60%
2034	2,744	0.29%	4,758	1.23%	8,132	9.39%
CAGR	**0.01%**		**4.88%**		**10.12%**	

28 Load Forecast Report, page iv lines 3 to 8.

29 Data compiled from Load Forecast Report, Appendix A.

30 Data compiled from Load Forecast Report, Appendix A.

31 Data compiled from Load Forecast Report, Appendix A.

Table 4: LIS peak demand forecasts

LIS Peak Demand (MW)						
Year	Reference Case	YoY Growth Rate	Medium Growth	YoY Growth Rate	High Growth	Growth Rate
2023	422	-	422	-	422	-
2024	445	5.45%	446	5.69%	446	5.69%
2025	447	0.45%	447	0.22%	448	0.45%
2026	447	0.00%	450	0.67%	450	0.45%
2027	448	0.22%	451	0.22%	451	0.22%
2028	449	0.22%	467	3.55%	467	3.55%
2029	450	0.22%	467	0.00%	468	0.21%
2030	451	0.22%	651	39.40%	692	47.86%
2031	453	0.44%	707	8.60%	849	22.69%
2032	455	0.44%	721	1.98%	1,018	19.91%
2033	456	0.22%	731	1.39%	1,089	6.97%
2034	458	0.44%	740	1.23%	1,184	8.72%
CAGR	**0.75%**		**5.24%**		**9.83%**	

C. Assumptions

Both the IIS and LIS forecasts are impacted by assumptions about key variables. We detail the most significant of these assumptions here.

1. IIS: Economic Forecast

The economic outlook for a utility's footprint is an important variable in any load forecast, as increases in economic activity can drive higher demand for power among all classes of electricity consumers. NLH relies exclusively on the Government's annual long-term economic forecast for the IIS system.[32] For the residential sector, the data includes forecasts of new housing starts (which are used to generate the expected number of residential customers) and household income (which is used to determine average customer use).[33] For the commercial sector (or "general service") at Newfoundland Power, NLH uses adjusted gross domestic product ("GDP") and non-residential building investment data from the Government as primary inputs to the forecast.[34] NLH's rural general service sales are generated using Government forecasts of household disposable income and value of fish landings.[35]

32 Load Forecast Report, page 11 lines 8 to 9.

33 Load Forecast Report, page 11 lines 15 to 18.

34 Load Forecast Report, page 11 lines 18 to 20.

35 Load Forecast Report, page 11 lines 20 to 21.

Both the Slow Decarbonization case and Reference case reflect identical GDP growth assumptions,[36] with a CAGR of 0.44 percent. The Accelerated Decarbonization case results in lower economic growth, with a CAGR of 0.30 percent.[37] This is shown in Table 5 and Table 6, below.

Table 5: GDP Forecast (2012$, MM)

IIS GDP (2012$, MM)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	23,101	-	23,101	-	23,118	-
2024	22,963	-0.60%	22,963	-0.60%	23,287	0.73%
2025	23,495	2.32%	23,495	2.32%	23,819	2.28%
2026	23,654	0.68%	23,654	0.68%	23,978	0.67%
2027	23,607	-0.20%	23,607	-0.20%	23,577	-1.67%
2028	23,946	1.44%	23,946	1.44%	24,107	2.25%
2029	24,036	0.38%	24,036	0.38%	24,112	0.02%
2030	23,401	-2.64%	23,401	-2.64%	23,317	-3.30%
2031	23,003	-1.70%	23,003	-1.70%	22,886	-1.85%
2032	23,551	2.38%	23,551	2.38%	23,408	2.28%
2033	24,024	2.01%	24,024	2.01%	23,873	1.99%
2034	24,250	0.94%	24,250	0.94%	23,881	0.03%
CAGR	**0.44%**		**0.44%**		**0.30%**	

[36] NLH excludes production-related income earned by the non-resident owners of mining, oil, and gas projects. Load Forecast Report, page A-1, n.1.

[37] Load Forecast Report, Tables A-1 through A-3.

Table 6: Household Disposable Income Forecast (2012$, MM)

IIS Household Disposable Income (2012$, MM)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	13,623	-	13,623	-	13,649	-
2024	13,648	0.18%	13,648	0.18%	13,818	1.24%
2025	13,775	0.93%	13,775	0.93%	14,017	1.44%
2026	13,872	0.70%	13,872	0.70%	14,195	1.27%
2027	13,996	0.89%	13,996	0.89%	14,307	0.79%
2028	14,230	1.67%	14,230	1.67%	14,632	2.27%
2029	14,428	1.39%	14,428	1.39%	14,832	1.37%
2030	14,619	1.32%	14,619	1.32%	15,036	1.38%
2031	14,626	0.05%	14,626	0.05%	15,062	0.17%
2032	14,846	1.50%	14,846	1.50%	15,292	1.53%
2033	14,977	0.88%	14,977	0.88%	15,444	0.99%
2034	15,015	0.25%	15,015	0.25%	15,530	0.56%
CAGR	**0.89%**		**0.89%**		**1.18%**	

Like the GDP forecasts, the forecast of household disposable income over the time horizon is equal in the Slow Decarbonization and Reference cases, with a CAGR of 0.89 percent. However, household disposable income is forecasted to be slightly *higher* in the Accelerated Decarbonization case (despite the lower forecasted GDP growth), with a CAGR of 1.18 percent.[38] The Accelerated Decarbonization case also forecasts higher commercial building investment (2034 value: $588 million) than the Slow Decarbonization and Reference cases (2034 value: $576 million).[39]

The forecast for housing starts and population are each highest in the Accelerated Decarbonization Scenario. The Accelerated Decarbonization case reflects 1.76 percent CAGR and a 2034 ending value of 1,690 housing starts, while the Reference case (1.15 percent CAGR, 2034 value of 1,602 housing starts) and Slow Decarbonization case (1.28 percent CAGR, 2034 value of 1,410 housing starts) are lower.[40] This is shown in Table 7 below.

---

38 Load Forecast Report, Tables A-1 through A-3.

39 Load Forecast Report, Tables A-1 through A-3.

40 Load Forecast Report, Tables A-1 through A-3.

Table 7: Average Housing Starts Per Year Forecast

Average Housing Starts per Year						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	1,226	-	1,412	-	1,395	
2024	1,361	11.01%	1,619	14.66%	1,660	19.00%
2025	1,449	6.47%	1,743	7.66%	1,818	9.52%
2026	1,453	0.28%	1,709	-1.95%	1,805	-0.72%
2027	1,402	-3.51%	1,606	-6.03%	1,680	-6.93%
2028	1,405	0.21%	1,614	0.50%	1,713	1.96%
2029	1,383	-1.57%	1,602	-0.74%	1,696	-0.99%
2030	1,360	-1.66%	1,581	-1.31%	1,667	-1.71%
2031	1,339	-1.54%	1,542	-2.47%	1,629	-2.28%
2032	1,376	2.76%	1,593	3.31%	1,673	2.70%
2033	1,402	1.89%	1,611	1.13%	1,689	0.96%
2034	1,410	0.57%	1,602	-0.56%	1,690	0.06%
CAGR	**1.28%**		**1.15%**		**1.76%**	

Population growth assumptions are similar. Population grows at 0.33 percent CAGR in the Accelerated Depreciation with a 2034 population of 553,800,[41] moderately higher than the Reference case (0.20 percent CAGR, 2034 population of 542,500) and Slow Decarbonization case (0.12 percent CAGR, 2034 population of 533,600).[42] This is shown in Table 8 below.

41 Load Forecast Report, Table 2.

42 Load Forecast Report, Tables 2, A-1, A-2, and A-3.

Table 8: Population Forecast (000s)

Population (000)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	527	-	531	-	534	
2024	528	0.19%	532	0.19%	536	0.37%
2025	529	0.19%	533	0.19%	538	0.37%
2026	529	0.00%	534	0.19%	539	0.19%
2027	530	0.19%	534	0.00%	541	0.37%
2028	530	0.00%	535	0.19%	542	0.18%
2029	531	0.19%	537	0.37%	544	0.37%
2030	532	0.19%	538	0.19%	547	0.55%
2031	532	0.00%	539	0.19%	548	0.18%
2032	533	0.19%	540	0.19%	550	0.36%
2033	533	0.00%	542	0.37%	552	0.36%
2034	534	0.19%	543	0.18%	554	0.36%
CAGR	**0.12%**		**0.20%**		**0.33%**	

2. IIS: Decarbonization and Electrification

For the IIS forecast, NLH considered the timing and impact of certain public policies, including mandates, regulations, incentives, and carbon pricing.[43] These included the Canada Greener Homes Grant (an energy efficiency incentive),[44] new oil-to-electric heating conversion incentives,[45] and a price on greenhouse gas ("GHG") emissions that begins at $65/tonne in 2023 and increases annually through 2030 at $15/tonne per year,[46] reaching $170/tonne in 2030 and remaining at that level through 2034.[47]

Across the three forecast scenarios, the only difference regarding decarbonization and electrification was in regard to installations of electric heating. In the Accelerated Decarbonization case, NLH assumed 100% of new constructions would be required to be electrically heated, and that existing households and business owners would be required to install an electric heating system when their current oil tank expires. In the Reference and Slow Decarbonization cases, no such assumption was included.[48] The Reference case assumes that 71

43 Load Forecast Report, page 14 lines 7 to 10.

44 Load Forecast Report, page 14, n. 32.

45 Load Forecast Report, page 14, n. 33.

46 Load Forecast Report, page 14, n. 34.

47 NLH Response to PUB-NLH-316.

48 NLH Response to PUB-NLH-316 (b-c).

percent of homes that are currently oil-heated but have an oil tank that will expire during the forecast period and will convert to electric heat, and in the commercial sector, all new customers are assumed to use electric heat, with a modest amount of commercial conversions to electric heat from oil.[49] In the Slow Decarbonization case, NLH assumes 59 percent of homes will convert to electric heat upon oil tank expiration, with the same assumptions regarding commercial customers as in the Reference case.[50] All other incentives and GHG pricing remained the same across all three cases.[51] Table 9 and Table 10 below show the details of the heating sector electrification assumptions and the assumed GHG prices, respectively, across the three scenarios.

Table 9: Heating Electrification Assumptions[52]

Heating Sector Electrification Assumptions			
Case	Residential Conversions	% of 40,000 Available Conversions	Government Building Conversions (2034, GWh)
Slow Decarbonization	12,400	31.00%	6.5
Reference	15,100	37.75%	6.5
Accelerated Decarbonization	24,400	61.00%	82.0

Table 10: GHG Price Assumptions, all scenarios ($/tonne)[53]

Year	GHG Price ($/tonne)
2024	$80.00
2025	$95.00
2026	$110.00
2027	$125.00
2028	$140.00
2029	$155.00
2030	$170.00
2031	$170.00
2032	$170.00
2033	$170.00
2034	$170.00

49 Load Forecast Report, page 14 lines 11 to 17.

50 Load Forecast Report, page 14 lines 18 to 20.

51 NLH Response to PUB-NLH-316 (a-c).

52 Load Forecast Report, Table 3.

53 NLH Response to PUB-NLH-316 (a); Load F.

3. IIS: Electric Vehicles

The forecast of EVs was provided by Dunsky and assumed three possible futures: a Slower EV Adoption Forecast (which was included in the Slow Decarbonization case), a Reference EV Adoption Forecast (used in the Reference case), and the Accelerated EV Adoption forecast (used in the Accelerated Decarbonization case).[54] Dunsky's forecast included both battery electric vehicles ("BEVs") and plug-in hybrid electric vehicles ("PHEVs").[55]

The Slow Decarbonization case assumes 56,819 light duty EVs and 2,662 Medium- and Heavy-Duty ("MHD") EVs (and buses) on the road by 2034, growing at a CAGR of 42.8 percent and 43.8 percent, respectively.[56] The Reference case forecasts 82,383 light duty EVs (CAGR of 46.86 percent) and 3,613 MHD EVs (CAGR of 44.71 percent) by 2034.[57] The Accelerated Decarbonization case assumes 97,435 light duty EVs (CAGR of 47.02 percent) and 4,289 MHD EVs (CAGR of 42.98 percent) in 2034.[58] Table 11 and Table 12 below show the annual increases in EV stock for both light duty and MHD (plus buses) EVs for the forecast time horizon.[59]

Table 11: Light-Duty Electric Vehicle Annual Sales Forecast

IIS EV Stock (Light-Duty Vehicles)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	1,133	-	1,202	-	1,405	
2024	1,833	61.78%	1,989	65.47%	2,553	81.71%
2025	3,010	64.21%	3,343	68.07%	4,516	76.89%
2026	4,857	61.36%	5,555	66.17%	7,568	67.58%
2027	7,364	51.62%	8,880	59.86%	11,893	57.15%
2028	10,755	46.05%	13,857	56.05%	18,062	51.87%
2029	15,202	41.35%	20,868	50.60%	26,468	46.54%
2030	20,948	37.80%	29,982	43.67%	37,179	40.47%
2031	27,654	32.01%	40,897	36.41%	49,829	34.02%
2032	36,106	30.56%	53,317	30.37%	64,102	28.64%
2033	45,742	26.69%	67,181	26.00%	79,988	24.78%
2034	56,819	24.22%	82,383	22.63%	97,435	21.81%
CAGR	**42.75%**		**46.86%**		**47.02%**	

54 Load Forecast Report, page 8 lines 2 to 8.

55 BEVs are EVs that have only an electric powertrain and that plug in to charge. PHEVs are vehicles that plug in to charge and operate in electric mode for short distances but also include a combustion powertrain for longer trips. Load Forecast Report, Attachment 2, page 7.

56 Load Forecast Report, Table A-7.

57 Load Forecast Report, Table A-7.

58 Load Forecast Report, Table A-7.

59 Note that our CAGR calculation assumes an existing stock of 400 light duty EVs and MHD EVs (plus buses) at the end of 2022. Load Forecast Report, Attachment 2, page 10.

Table 12: Medium-, Heavy-Duty Electric Vehicle (including Buses) Annual Sales Forecast

IIS Cumulative EV Sales (Medium and Heavy Duty Vehicles and Buses)						
Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	49		62		84	
2024	86	75.51%	108	74.19%	150	78.57%
2025	132	53.49%	167	54.63%	238	58.67%
2026	205	55.30%	261	56.29%	374	57.14%
2027	289	40.98%	377	44.44%	559	49.47%
2028	402	39.10%	551	46.15%	802	43.47%
2029	553	37.56%	794	44.10%	1,109	38.28%
2030	753	36.17%	1,120	41.06%	1,502	35.44%
2031	1,049	39.31%	1,543	37.77%	1,997	32.96%
2032	1,454	38.61%	2,084	35.06%	2,607	30.55%
2033	1,985	36.52%	2,766	32.73%	3,362	28.96%
2034	2,662	34.11%	3,613	30.62%	4,289	27.57%
CAGR	**43.79%**		**44.71%**		**42.98%**	

4. IIS: Conservation and Energy Efficiency

NLH assumed an equal amount of energy savings through utility conservation programs in all three load forecast scenarios.[60] The conservation estimate was provided by takeCHARGE.[61]

Additionally, NLH included assumptions about the adoption of mini-split heat pumps ("MSHPs"). NLH assumed that any homes that use non-electric heating that install MSHPs would be captured in the oil-to-electric heating conversion program, mentioned above.[62] For customers that use electric heating, NLH assumed that 61 percent of Newfoundland Power's residential customers will have installed MSHPs in their homes by the end of 2034 in both the Accelerated Decarbonization and Reference cases.[63] NLH assumed greater MSHP adoption (and thus lower electric load) in the Slow Decarbonization case (66 percent of electric heating customers).[64]

60 Load Forecast Report, page 16 lines 9 to 11.

61 Load Forecast Report, page 16 lines 9 to 11.

62 Load Forecast Report, page 17 lines 4 to 6.

63 Load Forecast Report, page 17 lines 7 to 9.

64 Load Forecast Report, page 17 lines 10 to 11.

5. IIS: Industrial Customer Growth

The Slow Decarbonization and Reference cases each assume that all six current IIS industrial customers will remain through 2034 and will continue at levels currently forecasted by the industrial customers.[65] In addition, these two cases include an assumed 10 MW of new firm demand in 2028 tied to "hydrogen developments."[66] The Accelerated Decarbonization case includes the same assumptions as the Reference and Slow Decarbonization cases, but the increase in load related to hydrogen developments is 40 MW, with 20 MW added in 2028 and 20 MW more in 2032, and one industrial customer converting to electric heating.[67] The Reference and Slow Decarbonization cases see 220 MW of IIS industrial peak demand in 2034 (an increase of 60 MW relative to 2023), while the Accelerated Decarbonization case forecasts 280 MW of peak demand in 2034 (an increase of 120 MW relative to 2023).[68]

6. IIS: Weather Data

NLH's load forecasts include assumptions regarding heating degree days[69] and wind chill. NLH estimates a normal weather year using a rolling 30-year average for the initial starting value of heating degree days.[70] NLH then applies a linear trend model over the forecast period to reflect gradual warming reflected in recent weather history.[71] In forecasting peak demand, NLH uses a 30-year rolling average wind chill value (P50).[72]

7. IIS: Electricity Rates

An important input to any utility load forecast is the retail rates to be paid by its customers over the time horizon. NLH assumed the same rates for the Reference and Accelerated Decarbonization cases (3.05 percent CAGR, 2034 average rate equal to 19.20 cents/kWh), and slightly higher rates for the Slow Decarbonization case (CAGR 3.8 percent, 2034 average rate equal to 20.87 cents/kWh).[73] We note that the rates assumed in the load forecast do not incorporate the Government's May 16, 2024 announced Muskrat Falls rate mitigation plan, which is referenced in NLH's 2024 Resource Adequacy Plan Overview at page 19 and explained more fully in Appendix C at page 125.

---

[65] Load Forecast Report, page 17 lines 15 to 19.

[66] Load Forecast Report, page 17 lines 19 to 21.

[67] Load Forecast Report, page 18 lines 1 to 7.

[68] Load Forecast Report, Chart 8.

[69] Heating degree days refers to the equivalent number of degrees Celsius a given day's mean temperature is below 18 degrees. Load Forecast Report, page 19, n. 44.

[70] Load Forecast Report, page 19 lines 5 to 7.

[71] Load Forecast Report, page 19 lines 5 to 9.

[72] Load Forecast Report, page 19 lines 9 to 10.

[73] Load Forecast Report, Table A-6.

Table 13: IIS Average Domestic Rate Forecast, excluding HST (cents/kWh)

Year	Slow Decarbonization	YoY Growth Rate	Reference Case	YoY Growth Rate	Accelerated Decarbonization	Growth Rate
2023	13.80	-	13.80	-	13.80	-
2024	14.99	8.62%	14.79	7.17%	14.79	7.17%
2025	15.95	6.40%	15.62	5.61%	15.62	5.61%
2026	16.52	3.57%	16.07	2.88%	16.07	2.88%
2027	17.01	2.97%	16.43	2.24%	16.43	2.24%
2028	17.51	2.94%	16.80	2.25%	16.80	2.25%
2029	18.03	2.97%	17.18	2.26%	17.18	2.26%
2030	18.57	3.00%	17.56	2.21%	17.56	2.21%
2031	19.12	2.96%	17.96	2.28%	17.96	2.28%
2032	19.68	2.93%	18.36	2.23%	18.36	2.23%
2033	20.27	3.00%	18.78	2.29%	18.78	2.29%
2034	20.87	2.96%	19.20	2.24%	19.20	2.24%
CAGR	**3.83%**		**3.05%**		**3.05%**	

8. LIS: Industrial Growth and Electrification

For the LIS Reference case, NLH assumes that the two major industrial customers in Labrador (Iron Ore Company of Canada and Tacora Resources Inc.)[74] will continue at current loads throughout the forecast period, with peak demand remaining at 320 MW through 2034.[75] The Medium Growth Scenario case assumes that both major industrial customers will move forward with expansion projects (leading to 2034 peak demand of 595 MW, an increase of 275 MW), while in the High Growth Scenario, those customers expand even further (resulting in 2034 peak demand of 1,060 MW, an increase of 740 MW).[76] NLH indicated that, as of the date of its load forecast, firm requests for transmission service in Labrador totaled 873.4 MW.[77]

9. LIS: Electric Vehicles

NLH also included assumptions about EV adoption in its LIS load forecast scenarios. The Reference case and Medium Growth Scenario case used the "EV Reference Case" described above regarding the IIS forecast.[78] (Notably, the "Slower EV Adoption Case" was not used.) The High Growth Scenario used the "Accelerated EV Adoption Case."[79] The impact on LIS peak

74 NLH Response to PUB-NLH-315 (b).

75 Load Forecast Report, page 21 lines 8 to 10; Chart 10.

76 Load Forecast Report, page 21 lines 10 to 13; Chart 10.

77 NLH Response to PUB-NLH-315 (a).

78 Load Forecast Report, page 20 lines 6 to 7.

79 Load Forecast Report, page 20 lines 7 to 8.

demand in 2034 is modest (+6.7 MW in the Reference and Medium Growth Scenario cases, and +7.9 MW in the High Growth Scenario case).[80]

D. Key Statistics/Considerations

The Load Forecast Report contains a large amount of information and data. In this section, we draw out some insights from that data.

1. **Even in the most conservative case, NLH is forecasting 160 MW of peak load growth on the IIS.** In the Slow Decarbonization case, NLH is forecasting 87 MW of peak load growth by 2030 and 160 MW by 2034.[81] The Reference case (growth of 126 MW by 2030 and 229 MW by 2034) and Accelerated Decarbonization case (growth of 204 MW by 2030 and 367 MW by 2034) are considerably higher.[82]
2. **Electric vehicle demand accounts for up to 41 percent of forecasted IIS peak demand growth by 2034.** The impact of forecasted electric vehicle adoption and consumption is an increase of between 65 MW (Slow Decarbonization case) and 113 MW (Accelerated Decarbonization case) of peak load in the IIS.[83] This accounts for between 31 percent and 41 percent of all forecasted IIS peak load growth, depending on the case.[84]
3. **Industrial customer growth is forecasted to have a moderate impact on IIS forecasted peak demand.** NLH expects that in the Slow Decarbonization case, about 38 percent (60 MW out of 160 MW) of peak load growth on the IIS is attributed to industrial customer growth through 2034.[85] In the Accelerated Decarbonization case, NLH forecasts peak demand growth related to industrial customers of 120 MW, which is about 33 percent of total forecasted peak demand growth of 370 MW.[86]
4. **NLH is forecasting IIS energy growth of at least 1.1 TWh, and up to 2.3 TWh by 2034.** IIS energy (in GWh) is forecasted to grow at CAGR of 1.0 percent (in the Slow Decarbonization case) and 2.1 percent (in the Accelerated Decarbonization case), driving between 1.1 and 2.3 TWh of additional energy needs over the next ten years.[87]

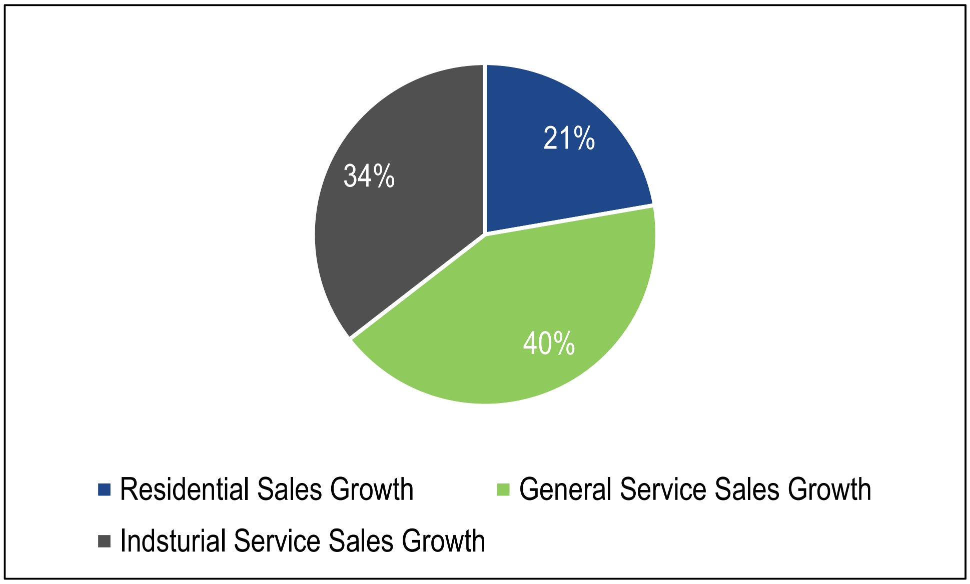
[80] Load Forecast Report, Chart 9.
[81] Load Forecast Report, Table A-4.
[82] Load Forecast Report, Table A-4.
[83] Load Forecast Report, Table 5.
[84] Load Forecast Report, Table 5.
[85] Load Forecast Report, Chart 8.
[86] Load Forecast Report, Chart 1; Chart 8.
[87] Load Forecast Report, Chart 13.

5. **The primary driver of IIS energy growth in the Slow Decarbonization case is General Service Sales growth.** Of the nearly 1.1 TWh of forecasted energy growth in the Slow Decarbonization case, about 40 percent (440 GWh) is forecasted to be from growth in General Services sales.[88] The remainder is made up of growth in industrial services sales (34 percent, 370 GWh)[89] and residential sales (21 percent, 232 GWh).[90]

6. **However, in the other cases (Reference and Accelerated Decarbonization), growth in residential sales is the primary driver of forecasted IIS energy growth**. Residential energy load is forecasted to grow by 605 GWh in the Reference Case and 922 GWh in the Accelerated Decarbonization case.[91] This represents 38 percent and 40 percent, respectively, of the total growth forecasted in those cases.[92]

Figure 3, Figure 4, and Figure 5 below show the share of forecasted energy growth for each major rate class across the three scenarios.

Figure 3: 2022-34 IIS energy growth forecast by service class – Slow Decarbonization



88 Load Forecast Report, Chart 13; Chart 15.

89 Load Forecast Report, Chart 13; Chart 16.

90 Load Forecast Report, Chart 13; Chart 14.

91 Load Forecast Report, Chart 14

92 Load Forecast Report. Chart 13; Chart 14.

Figure 4: 2022-34 IIS energy growth forecast by service class – Reference

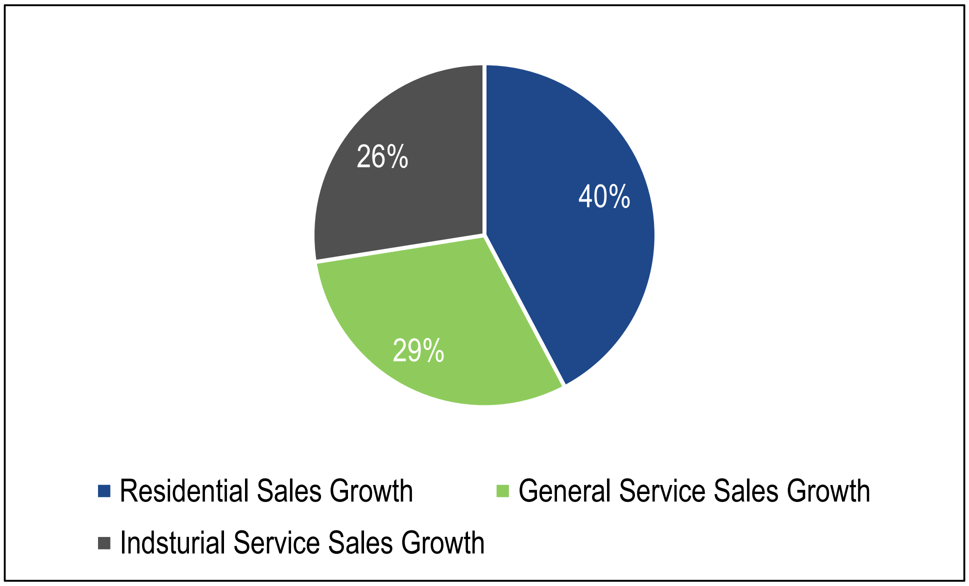
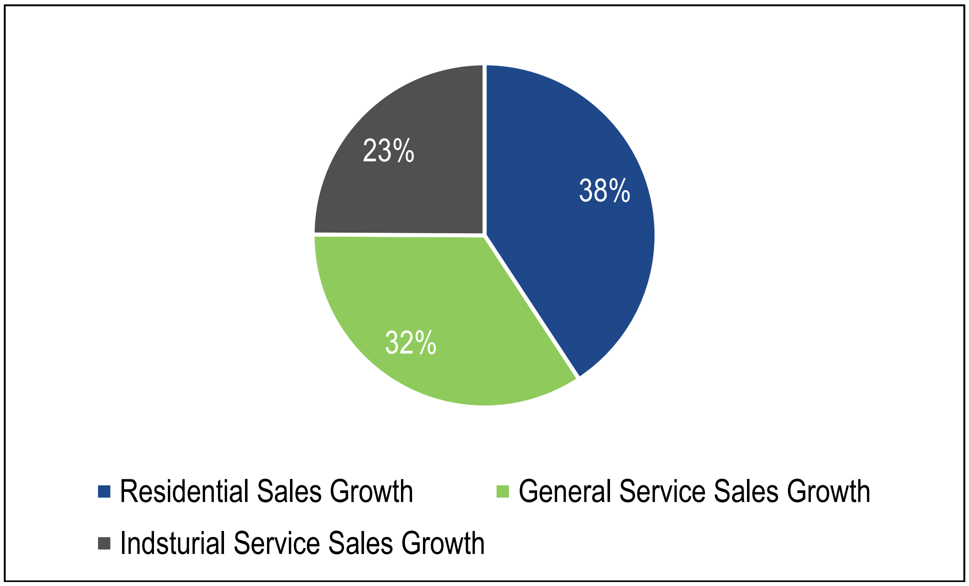


Figure 5: 2022-34 IIS energy growth forecast by service class – Accelerated Decarbonization



7. **Most energy and peak demand growth is forecasted to occur by 2030.** The IIS forecast shows that between 54 and 56 percent of peak load growth and 60 to 69 percent of energy growth is forecasted to occur by 2030, depending on the load

scenario.[93] The same is true for the Reference and Medium Growth cases for the LIS forecast, where 72 to 81 percent of peak load growth is expected to occur by 2030.[94] Only in the LIS High Growth case does most peak load growth (492 MW out of 762 MW, or 64.6 percent) and energy growth (3,622 GWh out of 5,316 GWh, or 68.1 percent) occur after 2030.[95]

8. **The LIS forecast anticipates almost zero or near zero growth in both peak and energy demand through 2029 in all cases.** NLH noted in the Load Forecast Report that "the existing transmission system in Labrador is fully maximized and it has been assumed that this constraint will not be resolved until at least 2029. As such, forecast growth is anticipated to occur after 2029."[96]

9. **Industrial load growth is by far the largest determinant of future peak demand and energy growth in the LIS, and NLH's three scenarios forecast wide ranges of potential future load.** LIS industrial energy growth is forecasted to be as high as 5.3 TWh by 2034 (High Growth case), compared to just 0.125 TWh of combined residential and general service growth in the High Growth case.[97] Additionally, the forecast for industrial energy growth varies widely, with the Reference case assuming zero growth, the Medium Growth case assuming 2.0 TWh of energy growth, and (again) the High Growth case assuming 5.3 TWh of energy growth.[98] The impact of these differences across the cases can be seen in the peak demand forecast as well, with overall peak demand (across all rate classes) forecasted to increase by only 36 MW in the Reference case but by 762 MW in the High Growth case.[99]

10. **Electric Vehicle Load is forecasted to add between 390 GWh and 670 GWh of energy usage by 2034.[100]** Energy growth from electric vehicle demand represents between 31 percent (Accelerated Decarbonization case) and 38 percent (Reference Case) of IIS energy growth through 2034.[101] The electric vehicle energy demand

93 Load Forecast Report, Table A-4.

94 Load Forecast Report, Table A-5.

95 Load Forecast Report, Table A-5.

96 Load Forecast Report, page 37, lines 5 to 7.

97 Load Forecast Report, Charts 19, 20.

98 Load Forecast Report, Chart 20.

99 Load Forecast Report, Table A-5.

100 Table 5 in the Load Forecast Report proports these numbers as the IIS "System Requirements in 2034." Due to the current lack of EV usage and thus energy consumption in NL, we assume these numbers represent growth expected by 2034.

101 Electric vehicle energy demand growth totals 37 percent of total IIS energy growth in the Slow Decarbonization case. Load Forecast Report, Table 5.

impacts both the residential and general service rate classes.[102] In the residential rate class, almost 100 percent of residential load growth in the Slow Decarbonization case through 2034 is attributed to EVs, while about half of residential load growth in the Reference case is attributed to EVs.[103]

11. **Assumptions regarding carbon/GHG emissions pricing is constant across all load forecast scenarios, and thus has no impact on the results of each case relative to the others.** NLH confirmed that it used the same set of annual carbon emissions prices in all scenarios.[104] Thus, while it is an important assumption to the load forecast process overall and can have a significant impact on both energy and peak demand, assumptions around carbon emissions pricing explains no differences between the load forecast scenario cases.

12. **Daymark provided useful recommendations that NLH should endeavor to address.** For example, Daymark suggested expanded scenario analyses and enhanced consideration of electricity price elasticity through iterative modeling.[105] These are good recommendations that NLH should incorporate into future load forecasting efforts and reporting.

III. Bates White Assessment of Load Forecast Report

A. Residential and General Service Forecasts

1. IIS Residential and General Service

Bates White reviewed the methods, assumptions and results of NLH's forecasts of residential and general service loads for the IIS, drawing on information in the Load Forecast Report; the study attached to that report, "R&RA 2024: Independent Load Forecasting Process Review," completed by Daymark Energy Advisors; and data and responses provided by NLH to Bates White information requests.

NLH relies primarily on econometric regression analysis to produce forecasts of residential and general service energy usage and peak demand on the IIS.[106] Historical data for key variables are used to estimate the extent to which the variables explain energy usage and peak demand

[102] Load Forecast Report, section 4.1.1-4.1.2.
[103] Load Forecast Report, page 31 lines 1 to 5.
[104] NLH Response to PUB-NLH-316 (a).
[105] Load Forecast Report, Attachment 1, Section III.
[106] Load Forecast Report, Appendix B.

over time (a historical period from 1977 through 2022). The estimated regression coefficients are then used to estimate energy and peak demand using forecasted values of the input variable data.

A significant majority of residential and general service energy usage and peak demand on the IIS is associated with serving load on the Newfoundland Power ("NP") system. For example, the 2022 winter peak load (excluding industrial load) for the IIS was approximately 1,571 MW, of which approximately 1,426 MW (91%) was from load on the NP system.[107] Similarly, residential energy usage on the NP system was approximately 3,415 GWh in 2022, representing 93% of the IIS total of approximately 3,655 GWh.[108] General service load would be expected to follow this pattern, but Bates White was unable to validate this, as the detailed data provided by NLH excluded a portion of general service load on the NP system. Specifically, NLH provided data for NP general service energy load for customers with electric heat (coded as "AEGS"), but no data for other NP general service load, which we infer explains the difference in energy data totals compared to reported values in the Load Forecast Report.

Econometric regression analysis is an industry standard methodology applied in utility load forecasting. Bates White did not conduct a detailed comparative assessment to determine whether NLH's *execution* of the methodology would be considered to meet industry standards. However, we have some observations on methods, data, and presentation that could be used to improve NLH's reporting, and possibly its load forecasts.

In addition to the specific observations described below, we note that the load forecast is now relatively old, particularly considering the significant changes in load drivers identified by NLH. Our understanding is that there is an ongoing study by the Posterity Group, a consultant for Hydro and Newfoundland Power, to update the load potential study done by Dunsky in 2019. The Posterity Report is expected to be completed in the third quarter of 2024. The load forecast should be reviewed in light of the Posterity report to determine any implications for the load forecast, particularly as it relates to electrification.

Recommendation #1: *Given a) the importance of NLH load forecasting to the determination of future resource need; b) the changing drivers of energy demand reflected in the Load Forecast Report; c) the fact that the load forecast was conducted before 2023 actual data were available; and d) there is an ongoing study by a consultant for Hydro and Newfoundland Power to update the load potential study done by Dunsky in 2019, we recommend that NLH review its load forecasts and update them for significant changes identified in the review and/or by the consultant study.*

[107] NLH Response to PUB-NLH-311, attachment 'PUB-NLH-311-Attachment 1_Revision1.xlsx'
[108] *Id.*

2. Reporting

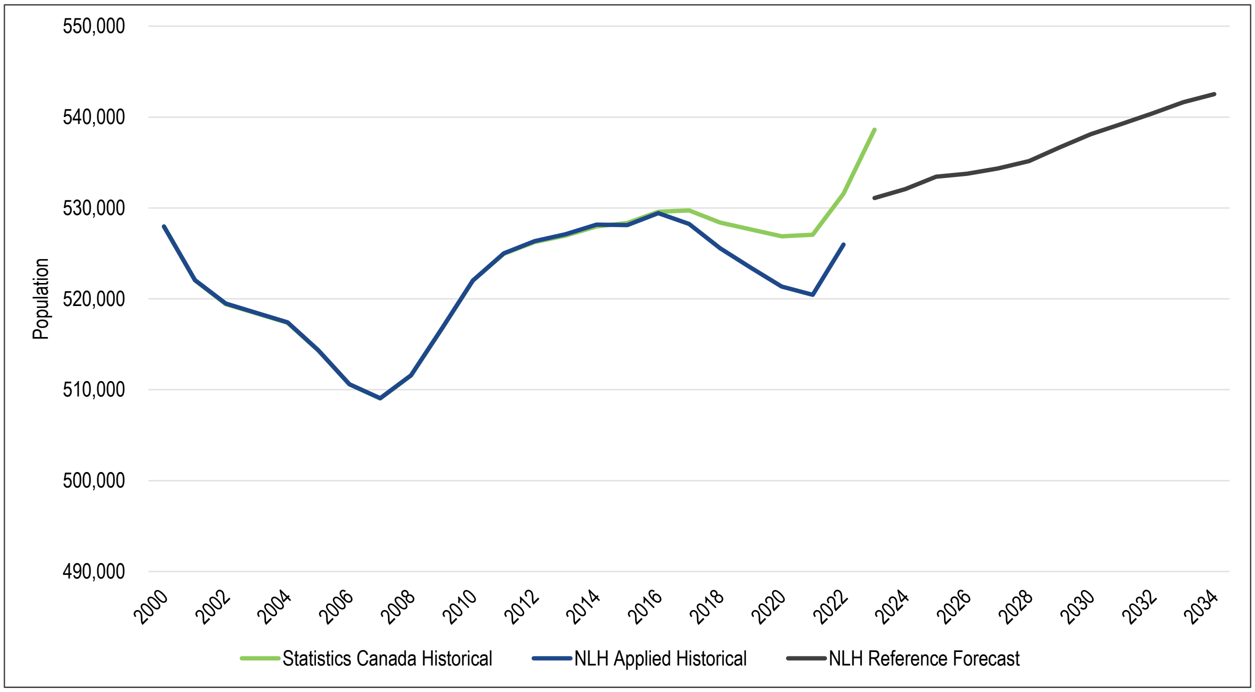
The Load Forecast Report would be improved with greater clarity and discussion of the drivers of the energy and peak demand forecasts. Definitions of component loads – e.g., the definition of general service load – and other terms referenced in the report would be helpful, as would a more detailed description and discussion of key drivers of the forecasts. For example, the relationship and relevance of population growth and customer counts, which we discuss below, would provide greater clarity regarding trends over the historical period compared to those projected for the future. We also recommend at least some characterization of the relevance of the energy and peak demand forecasts to future system needs and the RRA Study Review.

3. Population and Customer Count

As noted above, NLH incorporates population growth data and projections into its load forecasting. NLH uses historical population data to calculate regression estimates, and then applies population forecasts from the provincial government as inputs for the forecast period. We identified a discrepancy in the historical population data applied by NLH in its regression analysis and the historical population data currently available from Statistics Canada. The annual population values from the two series are identical for the period 1977 through 2000, but then diverge starting in 2001. The two population data sets are shown in Figure 6, along with the Reference population forecast applied by NLH.[109] The differences in historical population data are small through 2016 (such that they are not visible in the figure), but grow significant in more recent years, rising to a deviation of about 1%. This is significant, and should be explained and, if appropriate, corrected by NLH.

[109] NLH Response to PUB-NLH-311, attachment 'PUB-NLH-311-Attachment 1_Revision1.xlsx'; Statistics Canada, "Table 17-10-0005-01 Population estimates on July 1, by age and gender," https://doi.org/10.25318/1710000501-eng.

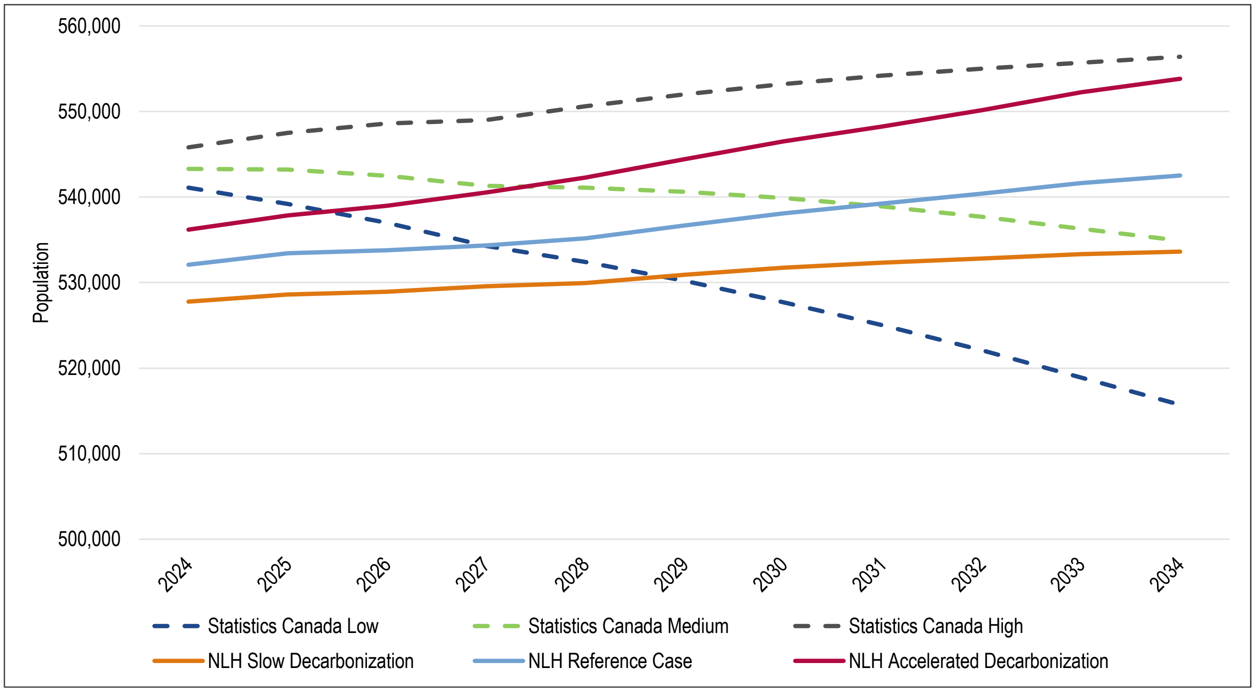
Figure 6: Population data comparison



Another issue of concern relates to the range of population projections applied by NLH in its load forecasts. All three of the NLH cases anticipate positive population growth. In contrast, Statistics Canada has a much wider range of forecast cases for the province. Figure 7 shows a comparison of the three NLH population growth series and the three main forecasts from Statistics Canada.[110]

[110] NLH Response to PUB-NLH-311, attachment 'PUB-NLH-311-Attachment 1_Revision1.xlsx'; Statistics Canada, Table 17-10-0057-01, "Projected population, by projection scenario, age and gender," as of July 1, https://doi.org/10.25318/1710005701-eng.

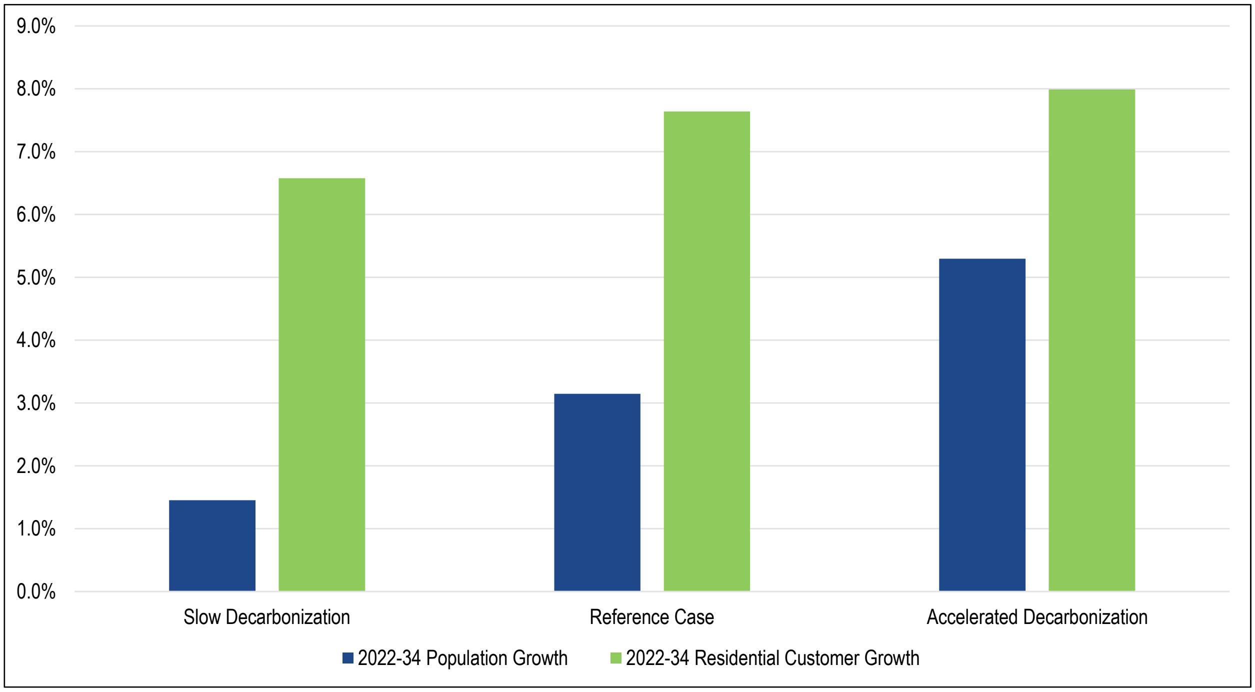
Figure 7: Comparison of population forecast cases, Statistics Canada and Newfoundland and Labrador Finance Department



Based on the historical data discrepancy issue described above, there may be a difference in the implicit starting point of the two forecasts. Regardless, it is clear that the Statistics Canada cases have a much wider range of futures – two of which show falling population between 2024 and 2034. The NLH cases cluster closer together and provide less distinction between potential futures. Bates White concludes that NLH should provide a fuller discussion and justification for the selection of the given population cases applied in its load forecasts. In general, it would be more useful to have a wider range of cases. One option would be to adopt cases from the Statistics Canada forecast set, which, in addition to the three main cases shown in Figure 7, include seven other population cases.

A final observation related to population is that residential customer count grows significantly faster than population in the NLH projections. This is significant as customer count is more relevant to load than population estimates. The percent changes for population and IIS residential customer count from 2022 to 2034 used in the NLH forecast data are shown in Figure 8.

Figure 8: Comparison of Population and Residential Customer Count Growth Rates[111]



This higher growth rate for customer count compared to population reflects a long-term trend in which residential customer count as a share of total population has grown significantly over time. In 1977, IIS residential customer count as a percentage of total population was about 23%, and by 2022 it had grown to 49%.[112] This may reflect demographic changes, including an aging population (with fewer children at home) migration from rural to urban areas, decreased birth rates (more people living singly or as a couple with no children). However, this trend continues through the forecast period, and it is important to note that the historical trend cannot continue without end. At some point, changes in customer count will align more closely with population growth, or contraction.

Recommendation #2: *In its forecast update, NLH should assess the impact of flat population growth and the associated impact on customer count, consistent with low population growth scenarios evaluated by Statistics Canada.*

[111] *Supra* note 107.

[112] NLH Response to PUB-NLH-311, attachment 'PUB-NLH-311-Attachment 1_Revision1.xlsx'; Statistics Canada, "Table 17-10-0005-01 Population estimates on July 1, by age and gender," https://doi.org/10.25318/1710000501-eng.

4. Electricity Rates

Projected electricity rates are inputs to NLH's regression-based load forecasting. As noted above, the assumed future rates reflected in the load forecast are not consistent with the Government's May 16, 2024 Muskrat Falls rate mitigation plan, which is referenced in NLH's 2024 Resource Adequacy Plan at page 19.

With respect to electricity prices, we recommend NLH reconcile and potentially update its load forecast to account for the Government's May 16, 2024 Muskrat Falls rate mitigation plan, which differs from the electricity prices modeled in the load forecast. NLH should address this inconsistency and review the associated impact on its forecasts, updating the forecasts as appropriate.

Recommendation #3: *With respect to electricity prices, we recommend NLH reconcile and potentially update its load forecast to account for the Government's May 16, 2024 Muskrat Falls rate mitigation plan, which differs from the electricity prices modeled in the load forecast.*

5. Electric Vehicles

NLH contracted Dunsky Energy and Climate Advisors to conduct an EV Adoption and Impacts Study. EV adoption in the province was forecast using Dunsky's Electric Vehicle Adoption ("EVA") model, under various scenarios reflecting different federal and provincial policy, incentive programs and technology availability conditions.

Separate estimates of likely EV adoption, impacts on annual energy consumption (GWh), and hourly demand (MW) were developed for the Island and Labrador zones and their respective integrated electrical systems. Three separate scenarios were considered, focused on different policy, market, and technology conditions, resulting in forecasts for Low, Medium, and High EV adoption growth.[113]

The vehicle market was segmented by vehicle and usage characteristics into Light-Duty Vehicles ("LDV"), Medium-Duty Vehicles ("MDV") and Heavy-Duty Vehicles ("HDV"). The LDV market consisting of passenger cars, Sport Utility Vehicles ("SUVs") and light trucks (including pickup trucks) used for personal transportation and commercial use. Both BEVs and PHEVs were included in the LDV segment. The MDV segment is largely comprised of urban or regional delivery vehicles with consistent daily usage with high overall annual driving distances. And the HDV segment for trucks used for either long-haul or other vocational applications (e.g., dump trucks) with special technical characteristics such as range and payload requirements. Passenger buses were considered separately for reporting purposes.[114]

[113] Load Forecast Report, Attachment 2, p.13.

[114] Load Forecast Report, Attachment 2, p.9.

The Dunsky's EVA Model starts by assessing the maximum theoretical potential for deployment of the various types of vehicles considering the size of the market and its composition by vehicle class. It narrows that potential first by finding the unconstrained economic potential EV uptake by considering the incremental purchase cost of an EV over an internal combustion engine ("ICE") vehicle, the relative total cost of ownership (or internal rate of return) of both types of vehicles, and considering O&M and fuel costs operate the vehicles. Next the model accounts for non-economic constraints, such as range anxiety and charging access. The model then finally uses technology diffusion theory to estimate rate of adoption considering market competition between EV types (BEV vs PHEV).[115] More specifically, the EVA model uses Bass diffusion to model the impact of electric vehicle prices on consumer uptake.[116]

The underlying assumptions of a Bass Diffusion Model can be expressed as follows: "*The probability of adopting by those who have not yet adopted is a linear function of those who had previously adopted.*"[117] Its mathematical representation is a simple differential equation that describes the process of how new products get adopted in a population. The model presents a rationale of how current adopters and potential adopters of a new product interact. The basic premise of the model is that adopters can be classified as innovators or as imitators, and the speed and timing of adoption depends on their degree of innovation and the degree of imitation among adopters. In summary, Bass curve models take historic data and an end point and use the past to estimate a midpoint and growth rate in the future. In the early stages of growth, Bass models can be too aggressive and small changes in numbers can have a major impact. As more and more historical data points become available, the forecasting accuracy of Bass models increases.

The EV Adoption and Impacts Study states that the model was calibrated using "historical inputs on vehicle sales, energy prices, vehicle costs, incentive programs and infrastructure deployment to benchmark the model to historical adoption and calibrate key model parameters to local market conditions."[118] A potential source of inaccuracy is that only approximately 400 EVs have been purchased in the province since 2017.[119]

In response to Bates White's inquiry as to whether only NL-specific data was utilized or if data from other provinces further along in transportation electrification was used as well, and

---

[115] Load Forecast Report, Attachment 2, p.12

[116] NHL Response to PUB-NLH-319.

[117] Sungjoon Nam, "Demystifying the Bass Diffusion Model: the hidden role of distribution channel," *Rutgers Business School*, February 2011, https://web-docs.stern.nyu.edu/marketing/SNamPaper.pdf.

[118] Load Forecast Report, Attachment 2, p.13.

[119] At the time of the EV Adoption and Impacts Study, Dunsky attributed lagging EV adoption to lack of charging infrastructure; lower and later financial incentives for the purchase of EVs compared to other provinces; and limited availability of EVs to purchase at local dealerships; Load Forecast Report, Attachment 2, p.10.

how province-specific characteristics (such as typical driving distances, disposable income, and colder climate) were considered, NLH in consultation with Dunsky responded that "The model was specifically built using data from Newfoundland and Labrador and did not include data from other provinces."[120]

A literature survey of EV adoption modeling techniques found diffusion modeling (including Bass) to be used in a small minority of EV adoption studies. Approaches favored over diffusion include agent based or discrete choice.[121] NLH (and Dunsky) did not respond to the request for an explanation of the advantages of diffusion modeling technique over agent based or discrete choice. Instead, NLH's response simply observed that "the Electric Vehicle Adoption model used by Dunsky is not purely a diffusion model and does not use a single approach but adapts multiple technical elements to create a forecast, including expert guidance."[122]

6. Key uncertainty factors in EV adoption forecast

The key drivers of Dunsky's estimate of the unconstrained economic potential uptake of EVs include vehicle initial cost, mainly attributable to battery cost, lifetime operational cost, and associated willingness to pay by the potential buyers. Among the main constraints to adoption identified by Dunsky were range anxiety and charging availability; the later referring to both home and public chargers.

While the prevalence of single-family homes in Labrador bodes well for the feasibility of home charging there, government support in developing public charging infrastructure will be crucial to the speed of EV adoption, given the importance of range anxiety as a barrier to acceptance of EVs, particularly in very cold climates. A 2023 study by US EV charging company FLO found that 60% of EV drivers rely on fast chargers when they're on "extended trips," suggesting that fast charging is "needed for most EV drivers" and that almost one third don't have a charger at home.[123] The latter is particularly relevant in the larger Island EV market given the higher prevalence of Multi-Unit Residential Buildings ("MURBs"). Worthy of note is that all three EV growth scenarios consider limited home charging access in MURBs: 6%, 20% and 40% in the low, medium, and high growth scenarios; respectively.[124]

The importance of the widespread availability of fast EV chargers has been demonstrated in Norway, the country with the highest share of EVs. Over the course of a decade, Norway

[120] NLH Response to PUB-NLH-322 (a).

[121] Lucy Maybury, Padraig Corcoran, and Liana Cipcigan, "Mathematical modelling of electric vehicle adoption: A systematic literature review," *Transportation Research Journal*, May 2022.

[122] NLH response to PUB-NLH-320; Load Forecast Report, Attachment 2, pp. 49–55.

[123] "Survey Says: Most EV Drivers Rely on Fast Chargers for Long Trips, Use Onsite Amenities While Charging," *Flo*, March 14, 2024, https://www.flo.com/news/survey-says-most-ev-drivers-rely-on-fast-chargers-for-long-trips-use-onsite-amenities-while-charging/.

[124] Load Forecast Report, Attachment 2, pp.24-26.

pursued the deployment of public charging ports as one of the cornerstones in its transportation decarbonization efforts as can be seen in Table 14 below.[125]

Table 14: Norway's EV charger deployment efforts 2010 through 2018

Up to 2010	2010-2011	2012-2014	2015-2017	2018
Few hundred public chargers, people used available outdoor domestic plugs.	First public support infrastructure program comes out, supplying normal chargers to requested areas, then fast chargers with remaining program moneys.	National support program of fast chargers, 40% of new chargers would be fast, and municipalities would begin to install free to use public normal chargers.	Networks established on major roads, 2 fast and 2 semi-fast chargers every 50km, teaming up with fuel stations and fast-food restaurants, giving contracts to lowest bidder and cities provide free chargers.	Full fast charger coverage along all major roads complete.

In 2021, NLH completed the first provincial network with 14 fast-chargers on the island to increase electrification of the transportation sector and thereby reduce GHG emissions[126]. Upon announcing the completion of the initial 14 fast-charger network, NLH announced that over the next three years, it would expand the charging network, educate the public, execute programs that promote electric vehicle ownership, and support the provincial government through facilitation of customer rebates. While Hydro has allocated approximately $2 million in its Five-Year (2025-2029) Capital Plan for additions to the fast-charger network, no information is available regarding the specific number and locations of additional EV charging stations.

Dunsky's assumptions regarding EV initial costs, particularly battery costs, may be somewhat dated in light of further reductions in the cost of batteries as the market has recently been introduced to new and cheaper battery chemistry formulations by Tesla and other EV manufacturers. A 2023 study by the Rocky Mountain Institute (RMI) "expects battery costs to halve this decade, from $151 per kilowatt hour (kWh) to between $60 and 90 per kWh."[127] According to RMI, by 2030, falling costs will, for the first time, make EVs as cheap or cheaper to both buy and run as petrol cars in every market globally. RMI's study also found that economics is now overtaking policy incentives as the core accelerant of EV sales, with falling

[125] Erik Figenbaum, "Norwegian EV Charging Infrastructure and User Experiences," *Institute of Transport Economics*, May 2, 2019, https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/DCDBC621E1BE55C366D3F8EB2522C002E5D542B77B86?noSaveAs=1.

[126] Lukas Wall, "Completion of 1st fast-charging network 'just the beginning' for electric car owners in N.L.," *CBC*, August 30, 2021, https://www.cbc.ca/news/canada/newfoundland-labrador/ev-fast-charger-network-complete-1.6157101v.

[127] "EVs to surpass two-thirds of global car sales by 2030, putting at risk nearly half of oil demand, new research finds," *Rocky Mountain Institute*, September 14, 2023, https://rmi.org/press-release/evs-to-surpass-two-thirds-of-global-car-sales-by-2030-putting-at-risk-nearly-half-of-oil-demand-new-research-finds/.

battery costs being the lead driver.[128] Another factor considered in Dunsky's forecast is the available vehicle supply. Since the Dunsky study was conducted, several manufacturers have introduced lower cost EV models which, all things being equal, will also help accelerate EV adoption rates.[129]

7. EV Energy and Demand Forecast

Dunsky's EV Study presents a wide range of possible outcomes, but the overall scale of the EV transformation in Newfoundland and Labrador is significant under all scenarios. By 2040 Dunsky expects the province will have between 100,000 and 200,000 LD EVs in circulation plus another 10,000 to 14,000 MHD EVs.[130] Certain segments have the strongest potential for electrification, such as buses and medium-duty delivery trucks. Yet others have greater uncertainty depending on technological advancements in vehicle manufacturing, such as long-haul heavy-duty trucks. While the forecast of EV penetration is significant, the EV growth in Newfoundland and Labrador will continue to lag behind the rest of Canada as summarized below.

Light duty EV adoption is expected to have a significant impact on load growth in Newfoundland and Labrador, increasing load by 480 – 1,000 GWh by 2040.[131] By 2040, light duty EVs will contribute 170 - 340 MW to peak demand in the winter at 10PM if unmanaged.[132] For example, in the Aggressive Growth Scenario, the EV load would peak at 10pm (340 MW) if unmanaged, while, if managed the peak would shift to 1am (385 MW), depending on the load management strategy.[133]

None of the three light duty EV uptake scenarios modeled by Dunsky achieve the 2035 Newfoundland and Labrador EV targets (100% of sales). The High Growth Scenario is the closest to this goal, reaching 65% of new LDV sales by 2035, assuming: aggressive expansion of public charging; increased economic incentives; high EV local availability; and actions to increase home charging in MURBs.[134] Under the Medium Growth Scenario EV sales would only be expected to reach 48% of new vehicle sales by 2035 and, under the Low Growth Scenario the

---

[128] Ibid.

[129] John Vincent and Cherise Threewitt, "How Much Do Electric Cars Cost?", *U.S. News and World Report*, March 2024.

[130] Load Forecast Report, Attachment 2, pp.24-26, 34-36.

[131] Load Forecast Report, Attachment 2, p.28.

[132] Load Forecast Report, Attachment 2, p.56.

[133] Load Forecast Report, Attachment 2, p.58.

[134] Load Forecast Report, Attachment 2, p.26.

EV share of new vehicle sales would be even lower, reaching only 35% of new sales by 2035.[135] Table 15 below shows the impacts of LDV EV stock on demand and peak energy.[136]

Table 15: 2040 Energy and demand LDV EV contribution to NFL load

Case	Energy [MWh]	Demand [MW]	Occurrence
Low Growth Scenario	480	170	10:00 PM
Low Growth Scenario - Managed	480	190	12:00 AM
Medium Growth Scenario		250	10:00 PM
Medium Growth Scenario - Managed		280	1:00 AM
High Growth Scenario	1,000	340	10:00 PM
High Growth Scenario - Managed	1,000	385	1:00 AM

While not nearly as large as the potential impact of light duty EVs, MHD EV adoption could have a significant impact on load growth in Newfoundland and Labrador, increasing load between 450 and 615 GWh and 125 - 175 MW to the winter peak demand by 2040.[137] The peak demand imposed by MHD EVs is expected to occur at 6 pm in all seasons, offering little opportunity for management, due to less flexible charging windows for MHD fleets, with both vehicles and infrastructure designed based on range requirements and the available down time for charging. The impacts of MHD EV stock on demand and peak is shown below in Table 16.[138]

Table 16: 2040 Energy and demand MHD EV Contribution to NFL load

Case	Energy [MWh]	Demand [MW]	Occurrence
Low Growth Scenario	450	125	6:00 PM
Medium Growth Scenario			6:00 PM
High Growth Scenario	615	175	6:00 PM

In all scenarios, EV adoption rates and the associated impact on peak demand and energy sales rise slowly at first, not reaching significant levels until after 2030 as can be observed in Figure 9 and Figure 10 below.

[135] Load Forecast Report, Attachment 2, pp.24-25.

[136] Load Forecast Report, Attachment 2, pp.56-58

[137] Load Forecast Report, Attachment 2, pp.37-38.

[138] Ibid

Figure 9: EV charging demand at IIS peak[139]

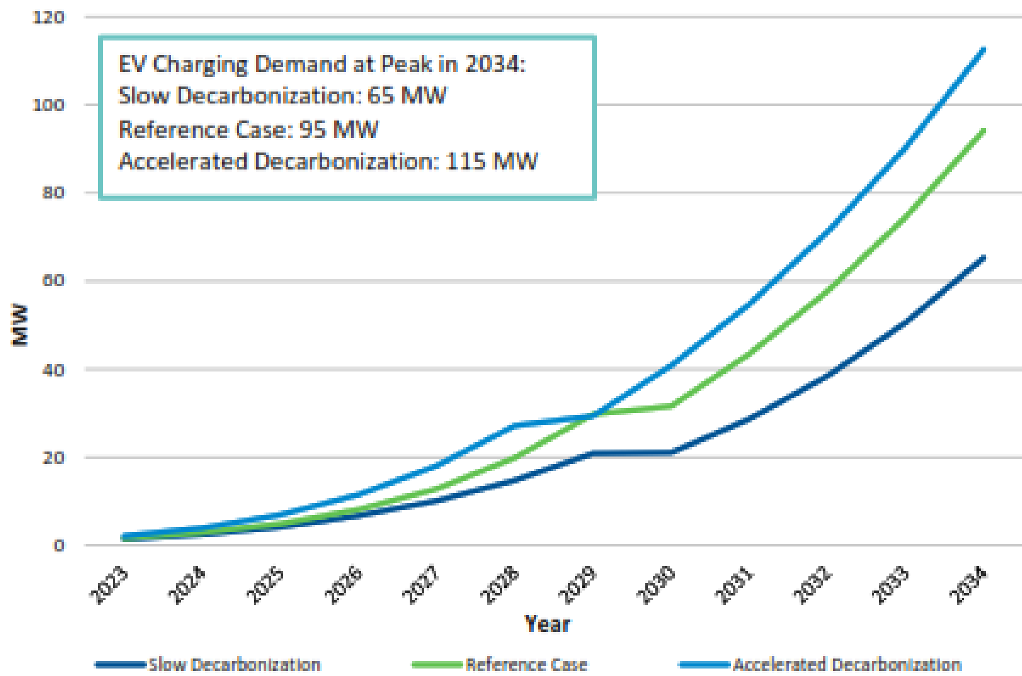
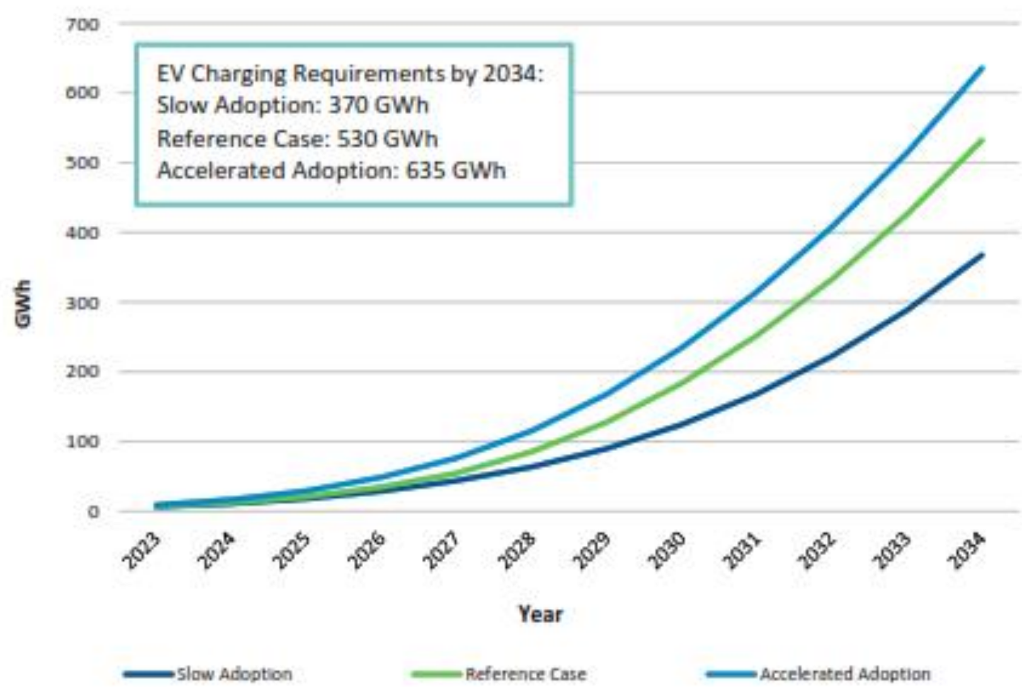


Figure 10: IIS EV charging energy requirements[140]



[139] Load Forecast Report, reproduction of Chart 3, page 9.

[140] Load Forecast Report, reproduction of Chart 4, page 10.

Recommendation #4: *NLH should detail the assumptions underpinning the EV scenarios it adopts, addressing the fact that projected penetration rates reflected in the load forecast fall short of Newfoundland and Labrador provincial targets, and the timing and extent to which growth in charging infrastructure will be achieved.*

8. Electrification of building space heating, Conservation, and Energy Efficiency

Over the last ten years, numerous MSHPs have been installed in homes already heating with electric resistance heat. A recent survey indicates that over 28 percent of homes have installed MSHPs.[141] More recently, provincial and federal government funding programs have targeted homes that do not have electricity as the primary heating source, to supplement or replace their existing heating source with electric heat. As space heating continues to electrify, growth in electricity use on the island, driven by switching from oil or wood to electric heat, will be partially offset by greater penetration of energy-efficient heat pumps in electrically heated homes. A large number of conversions to electric space heating from other fuels may result in increased peak demand in the winter, and the strong uptake of MSHP may also result in increased demand in the summer to meet cooling needs.

One way to reduce or avoid the increase in winter peak demand resulting from heat pump installation could be to allow participants engaged in conversion to electric heat to maintain their fossil fuel heating system as backup or supplemental heat to be used during very low temperature events. In response to a Bates White information request regarding conditions for receiving heat pump participation incentives, NLH responded that "for the oil-to-electric conversions detailed in the [Load Forecast Report], a mix of electric heating systems was assumed and there was no assumption made about consumers being allowed to maintain their non-electric heating system as a backup heating source."[142] However, NLH has assumed that the electric heating source would be their primary heat source and any heating provided by their potential backup heating source would not have a material impact on the load forecast.[143]

a) Energy and Demand Impact Forecast of Oil-to-Electric Conversions

For the 2023 Load Forecast modelling process, NLH considered decarbonization factors in the development of forecast scenarios that include government policy (including mandates and regulations), available incentives and the price of carbon greenhouse gas emissions. Three distinct decarbonization scenarios were developed: a Reference Case, a Slow Decarbonization

[141] Load Forecast Report, page 16 line 12 to page 17 line 1.

[142] The most recent update of the provincial Oil to Electric Incentive Program requires participants to remove oil tanks; however, historically, there was no removal requirement for participants. Such removal is also not required by the current federal Greener Homes Program. NLH Response to PUB-NLH-314 (b).

[143] NLH Response to PUB-NLH-314 (b).

Scenario, and an Accelerated Decarbonization Scenario. Different conversion rates of oil-heated homes with an oil tank expiring during the forecast period to electric heat were assumed in each case: 59% for the Slow Decarbonization Case; 71% for the Reference Case; and, 100% in the Accelerated Decarbonization Scenario.[144] The conversion oil-to-electric heating systems in Government buildings was assumed to be modest in the Slow Decarbonization and Reference Case plus an additional 40% in the Accelerated Decarbonization Scenario.[145]

b) Key uncertainty factors in the forecast of Oil-to-Electric Conversions

The government policy (including mandates and regulations) assumed in each load forecast scenario possibly represent the largest source of uncertainty in the forecast of conversion from oil to electric heating.

The forecast of adoption of heat pumps in electrically heated homes was primarily based on historical uptake with the impact of the Government of Canada's "Canada Greener Homes Initiative" taken into consideration.[146] Newfoundland Power Inc.'s April 2023 Load Forecast for heat pump adoption was also reviewed and considered during the development of the load forecasts.

The available incentives referenced in the Load Forecast Report were limited to two programs: The Government of Canada's Greener Homes Grant and the provincial government's implementation of a new fuel switching and energy efficiency incentive program in collaboration with Natural Resources Canada and Environment and Climate Change Canada.[147]

Within the Slow Decarbonization Scenario and the Reference Case, it was assumed that existing program funding would be available until 2030.[148] However, in the Accelerated Decarbonization Scenario, no such assumption was made as customer incentives would no longer be required because of the assumed policy requirements that households convert to an electric heating system when their oil tank expires.

In the Reference Case and Slow Decarbonization Scenario, it was not assumed that a policy would exist that would require households or building owners to install an electric heating system when their current oil tank expires or require new construction to be electrically heated. In the Accelerated Decarbonization Scenario, it was assumed that a policy would be in place that would require households to convert to an electric heating system when their oil tank expires.[149]

---

[144] Load Forecast Report, page 14 line 11 to page 15 line 1.

[145] Load Forecast Report, page 14 line 13 to page 15 line 7.

[146] Load Forecast Report, page 14 n.32.

[147] Load Forecast Report, page 14 n.32 and n.33.

[148] Load Forecast Report, Chart 7.

[149] Response to IR PUB-NLH-316 (b).

In its Load Forecast Report, NLH provides no information regarding the peak demand and energy impact of conversion of oil-to-electric heating but only reports the expected number of residential oil-to-electric conversions in aggregate for Labrador and Newfoundland systems.

While NLH does not provide estimates of the number of oil-to-electric heating conversions that would retain oil heating back up heat, the overall number of conversions is large enough to warrant such an estimate, as purely resistive heating back up could add significantly to winter peak demand.

Recommendation #5: *NLH should provide detail on key assumptions and their effects in its reporting, including details of oil-to-electric conversion programs made available to customers, the ability of customers to retain oil heating systems as backup, and the potential reliance on electric (i.e. resistive heating) backup to electric heat pumps.*

c) Conservation and Energy Efficiency

The forecast for energy savings used by NLH in its Load Forecast Report is based on estimated energy savings through utility conservation programs forecast by takeCHARGE. The same estimate was incorporated into all three load forecast scenarios.[150] This is problematic because the three scenarios consider varying levels of electrification of space heating, which could benefit from commensurate levels of building thermal efficiency retrofits to balance the increase in electric load caused by the addition of electric heating.

In its Load Forecast Report, NLH does not provide details on how the estimate of number of oil-to-electric conversions is used to estimate the incremental impact on peak demand and energy resulting from the conversions. Nor does NLH provide the assumptions made as to the building thermal efficiency of the converted homes used in its load forecast.

Based on the information provided in both the Load Forecast Report and the responses to questions from Bates White, it is impossible to proffer a definitive opinion on the significance of not having accurate estimates of building heating electrification on the overall load forecast for Newfoundland and Labrador. The significant number of conversions projected by NLH suggest the need for better coordination between oil-to-electric conversion requirements and efficiency programs offered in the province.[151]

[150] Load Forecast Report, page 16 lines 9 to 11.

[151] A 2021 study by Efficiency Canada found that if insulation was improved "fairly significantly" for Canada's entire building stock, the country's buildings would actually use less electricity, even if their heating systems were fully electrified. Brendan Haley and Ralph Torrie, "Canada's Climate Retrofit Mission," *Efficiency Canada*, June 2021, https://www.efficiencycanada.org/wp-content/uploads/2021/06/Retrofit-Mission-FINAL-2021-06-16.pdf.

B. Industrial Forecast

Forecasting industrial load is often challenging as it attempts to forecast the size and timing of future loads which can be lumpy and subject to uncertain timing. Anticipated industrial load growth may not materialize, and often does so in a large, binary manner. That is, a utility may expect 100 MW of new industrial load in 2030, which may be based on a new customer's plans to locate in the utility's service territory; if that customer later determines to locate someplace else (or to not invest at all), the outcome is that zero MW of those expected 100 MW materialize.

NLH has made a reasonable attempt to forecast industrial load for both the IIS and LIS using an approach that relies on soliciting, understanding, and vetting existing and potential new customer business activities and potential plans.[152] NLH builds its industrial forecast from the bottom up, looking at its existing large industrial customers individually and also assessing the potential new industrial customers that have expressed interest in siting loads in the province, particularly in Labrador. NLH has also appropriately focused on firm industrial demand for power, which is the portion of demand that a power supplier is obligated to provide, except during emergency conditions or other reliability events, and firm energy, which is the actual energy guaranteed to be available to meet customer requirements on an annual basis.[153] This may help reduce forecast error based on speculative customer plans or overestimated industrial activity.

For the IIS, NLH forecasts about 50 MW of peak load growth over the time horizon from its six existing industrial customers in the Slow Decarbonization and Reference Case scenarios. The Accelerated Decarbonization case forecasts growth of about 100 MW over the same period.[154] These growth estimates are based on the current industrial customers remaining in business in the province and at the levels of consumption forecasted by those customers.[155] All three cases also include new demand of 10 MW in 2028 due to "hydrogen developments."[156] These may be reasonable assumptions; however, we do note that in its most conservative case (the Slow Decarbonization case), NLH is forecasting about a 37 percent industrial peak load growth on the IIS by 2034, from about 160 MW to 220 MW.[157] There may be cause to explore a more conservative case which considers more tame decisions made by the six existing industrial IIS customers, or a spell of less favorable macroeconomic conditions. This conservative case may vary from the provided forecasts to show a downside of this more uncertain business segment (a scenario NLH has not accounted for in its Load Forecast Report). In the converse to this

152 Load Forecast Report, page 3 lines 3 to 5.
153 Load Forecast Report, page 3 n. 17.
154 Load Forecast Report, Chart 8.
155 Load Forecast Report, page 17 line 18 to page 18 line 4.
156 Load Forecast Report, page 17 lines 19 to 21.
157 Load Forecast Report, Chart 8.

recommended conservative case, we find no issue with the Accelerated Decarbonization case and believe it provides a reasonable look at the potential upper bound of industrial growth on the IIS in its provision of additional electrification and hydrogen developments.[158]

Overall, we think it was reasonable for NLH to explore both a reference case and high/low load cases to provide the Board and stakeholders with a view of potential future demand and energy scenarios. We understand these load forecasts may be used in a number of utility matters going forward. It is our view that in certain cases (such as the upcoming RRA proceeding), NLH supplement the IIS Slow Decarbonization case with a more granular look at future IIS industrial load. Doing so would allow NLH to better understand how, in a case that otherwise adopts the Slow Decarbonization assumptions, lower or flat industrial load growth would impact demand and energy forecasts. This would help ensure that any capital investment associated with future load growth would minimize risk of overbuilding the grid. We also note that NLH committed to "monitor closely and adjust future scenario assumptions as required" related to IIS industrial load growth going forward.[159]

The LIS forecasts, in our view, generally provide a reasonable assessment of future industrial load scenarios, subject to our discussion here. The LIS load forecast is (as we show above) highly dependent on the industrial load forecast, and LIS industrial load is as uncertain, and probably more so, than IIS industrial load. NLH has forecasted zero new customers and zero new industrial load growth through 2029 in all scenarios.[160] In the Reference case, NLH assumes flat industrial load through 2034.[161] This may be reasonable, but as with the IIS industrial forecast, the most conservative case does not consider the possibility that current industrial load could be negatively impacted by macroeconomic conditions or microeconomic forces affecting one or both of the two existing industrial customers. These are not idle concerns: we note that one of NLH's industrial customers on the LIS, Tacora Resources, which operates the Scully iron ore mine in Wabush in Labrador West, has been in creditor protection status since October 2023 and efforts to emerge were challenged in court.[162] It may be worthwhile for NLH to consider more conservative industrial load growth scenarios, particularly in any matters involving future capital investment.

NLH's Medium and High Growth cases, in our view, are reasonable approximations of future industrial load growth scenarios. NLH has appropriately focused on the Network Additions Policy ("NAP") for the LIS as the source for any new industrial load growth. Since

158 Load Forecast report, page 18 lines 1 to 9.

159 Load Forecast Report, page 18 lines 7 to 9.

160 Load Forecast Report, page 37, lines 2 to 7.

161 Load Forecast Report, Chart 20.

162 Elizabeth Whitten, "Global conglomerate raises objections to investment deal for Tacora-owned mine," *CBC*, February 23, 2024, https://www.cbc.ca/news/canada/newfoundland-labrador/tacora-cargill-objection-1.7120787.

these loads may not ultimately materialize, NLH has noted the need for monitoring of the NAP process and updates to its sensitivity forecasts.[163] We note, too, that subsequent to the Load Forecast Report, the other of NLH's LIS industrial customers (Iron Ore Company of Canada) received federal support for installation of an electric boiler at its iron ore processing operations in Labrador West.[164] This new load may be already accounted for in NLH's Medium and/or High Growth cases, but this should be clarified by NLH in future load forecasts or proceedings in which NLH's load forecasts are used.

Recommendation #6: *We recommend that NLH supplement the Slow Decarbonization case with an assessment of how lower or flat industrial load growth would impact demand and energy forecasts.*

C. Bates White's Conclusions and Recommendations

Based on our review of NLH's Load Forecast Report, Bates White concludes that the Company has considered relevant drivers of future peak demand and energy usage, and has generally applied industry standard forecast methods appropriately.

Our assessment of distinct components of the forecast, including econometric regression analyses, industrial load forecasting and projections of EV and electrification demand identified several areas where forecasting and reporting could be improved. Our recommendations presented in the sections above are repeated here:

Recommendation #1: *With respect to electricity prices, we recommend NLH reconcile and potentially update its load forecast to account for the Government's May 16, 2024 Muskrat Falls rate mitigation plan, which differs from the electricity prices modeled in the load forecast.*

Recommendation #2: *Given a) the importance of NLH load forecasting to the determination of future resource need; b) the changing drivers of energy demand reflected in the Load Forecast Report; c) the fact that the load forecast was conducted before 2023 actual data were available; and d) there is an ongoing study by a consultant for Hydro and Newfoundland Power to update the load potential study done by Dunsky in 2019, we recommend that NLH review its load forecasts and update them for significant changes identified in the review and/or by the consultant study.*

---

163 Load Forecast Report, page 21 lines 5 to 7.

164 Paul Moore, "Canadian government supports Rio Tinto's IOC decarbonisation to the tune of over C$18 million," *International Mining*, March 27, 2024, https://im-mining.com/2024/03/27/canadian-government-supports-rio-tintos-ioc-decarbonisation-to-the-tune-of-over-c18-million/.

Recommendation #3: *In its forecast update, NLH should assess the impact of flat population growth and the associated impact on customer count, consistent with low population growth scenarios evaluated by Statistics Canada.*

Recommendation #4: *NLH should detail the assumptions underpinning the EV scenarios it adopts, addressing the fact that projected penetration rates reflected in the load forecast fall short of Newfoundland and Labrador provincial targets, and the timing and extent to which growth in charging infrastructure will be achieved.*

Recommendation #5: *NLH should provide detail on key assumptions and their effects in its reporting, including details of oil-to-electric conversion programs made available to customers, the ability of customers to retain oil heating systems as backup, and the potential reliance on electric (i.e. resistive heating) backup to electric heat pumps.*

Recommendation #6: *We recommend that NLH supplement the Slow Decarbonization case with an assessment of how lower or flat industrial load growth would impact demand and energy forecasts.*