IN THE MATTER OF the *Electrical Power Control Act, 1994,* SNL 1994, Chapter E-5.1 (the "*EPCA*") and the *Public Utilities Act*, RSNL 1990, Chapter P-47 (the "*Act*"), as amended, and regulations thereunder; and;

IN THE MATTER OF Newfoundland and Labrador Hydro's Reliability and Supply Adequacy Study.

Requests for Information

by the Labrador Interconnected Group

LAB-NLH-029 to LAB-NLH-054

January 13, 2023

Requests for Information Regarding the Reliability and Resource Assessment Study

LAB-NLH-29. Re: RRAS, 2022 Update, Vol. I, page 7 (12 pdf)

Citation:

> Hydro expects to launch a customer engagement initiative in 2023, focused on determining the value of additional reliability to customers.

Please provide details about this customer engagement initiative.

LAB-NLH-30. Re: RRAS, 2022 Update, Vol. I, page 2 (26 pdf)

Citation:

> The LIL began delivering electricity to the Island Interconnected System from the Muskrat Falls Hydroelectric Generating Facility in 2021

a) Please provide a table indicating monthly production from the MFHGS since 2021, and monthly energy transfers over the LIL.

b) Please confirm that energy produced by the MFHGS in excess of the amounts transferred to the Island over the LIL have been stored in the Churchill Falls reservoirs under the Water Management Agreement (WMA).

c) Please confirm that spills have occurred at Churchill Falls since 2021, and indicate to what extent (if at all) those spills are debited from Hydro's (or Nalcor's) Banked Energy.

d) Please provide a monthly register of Hydro's (or Nalcor's) Banked Energy since January 2021, taking into account (i) energy transfers from Muskrat Falls, (ii) energy transfers from Churchill Falls, (iii) spills, and (iv) any other factors affecting Banked Energy.

LAB-NLH-31. Re: RRAS, 2022 Update, Vol. I, page 3, note 10 (27 pdf); p. 30 (54 pdf)

Citation 1 (page 3, note 10):

> Pending the outcome of the *Network Additions Policy – Labrador Interconnected System* process, there may be a requirement to assess the Labrador Interconnected System on a sub-regional basis, due to the potential for growth in load requirements.

Citation 2 (page 30):

> As the LIL bipole forced outage rate increases and bipole outages become the primary driver of generation shortfall on the Island Interconnected System, there is far less correlation between Labrador Interconnected System load and Newfoundland and Labrador Interconnected System reliability. Given the material increase of the LIL bipole forced outage rate assumption compared to the 2018 Filing and 2019 Update, it may be necessary to reassess this approach and instead adopt separate planning criteria for the Island Interconnected System and the Labrador Interconnected System.

a) Please confirm that, for Hydro, "planning on a regional basis" refers to planning the NLIS system as a whole, and "planning on a sub-regional basis" refers to separate planning for the IIS and the LIS.

b) Does Hydro currently believe that it is necessary to perform planning on a sub-regional basis for the IIS and for the LIS, for both energy and capacity? If not, please explain why not.

c) Please indicate if the 2023 Update will include a detailed long-term plan to meet energy and capacity needs in both the IIS and the LIS. If not, please explain why not.

LAB-NLH-32. Re: RRAS, 2022 Update, Vol. I, page (pdf)

Citation:

> As proposed in the 2018 Filing, the intent is to update and file the assessment of resource adequacy annually.

At what point if any in this process does Hydro expect a formal approval or other confirmation from the Board?

LAB-NLH-33. Re: RRAS, 2022 Update, Vol. I, page (pdf)

Citation:

> Given the current evolving nature of the Newfoundland and Labrador Interconnected System and the evolution of system reliability as Hydro continues to work towards fully integrating the Muskrat Falls Hydroelectric Generating Facility, the focus of this filing addresses LIL reliability, the need for on-Island resources, and how existing thermal generation and standby sources can support these requirements in the interim. <u>There remains a high level of uncertainty regarding the potential load growth on the Labrador Interconnected System</u>, due to significant customer requests following the

> implementation of the *Network Additions Policy*, and on the Island Interconnected System, due to electrification and electric vehicle ("EV") adoption and the possibility of new mines as well as wind and hydrogen projects. The grid implications of wind integration into the existing system have not been included in this analysis, as the Wind Development Process[22] is ongoing. However, Hydro recognizes wind integration is likely to have a material impact on system operations and future resource additions. (underlining added)

To what extent can any of the conclusions of this 2022 Update be relied upon, given the high level of uncertainty and the fact that the analysis does not take into account an important element which is likely to have material impact on future resource additions?

LAB-NLH-34. Re: RRAS, 2022 Update, Vol. I, page 8 (32 pdf)

Citation:

> The mitigated rate that formed the basis of the rate included in the load forecast is the target mitigated rate that was announced publicly by the Government of Newfoundland and Labrador.[28] The final rate mitigation plan is required for there to be certainty on the actual mitigated rate.

a) Please specify the target mitigated rate in relation to the Muskrat Falls Project that was used in the resource planning process.

b) Please provide references to all rate mitigation measures undertaken to date, or for which commitments have been made.

LAB-NLH-35. Re: RRAS, 2022 Update, Vol. III, page 7 (88 pdf)

Citation:

While the current provincial government's fiscal situation remains relatively challenging, the underlying local market conditions for electric power operations through the medium and long term in the context of provincial energy requirements suggest modest increases in energy requirements throughout the forecast period.[35]

Note 35 : The energy outlook is conditioned by electricity prices in which the customer rate impacts of the Muskrat Falls Project are assumed mitigated.

Please specify the assumptions made with respect to mitigation, including for each year from 2023-2035:

a) the total cost to Hydro for the Lower Churchill Project, before and after mitigation,

b) the average unit cost to Hydro (per kWh) of energy from the Lower Churchill Project, before and after mitigation, and

c) the average customer rate, with and without mitigation.

LAB-NLH-36. Re: RRAS, 2022 Update, Vol. I, page 8 (32 pdf)

Citation:

> However, due to ongoing matters impacting system planning, as mentioned in Section 1.2, the resource plan was not modelled in the long term financial model in an iterative approach to determine the precise impact of required investment on customer rates. Rather, an estimated rate impact placeholder for generation expansion builds was utilized to assess the impact on the Island Interconnected System. This estimated rate impact placeholder was included as an addition to the mitigated rate. (underlining added)

Please specify the estimated rate impact placeholder used to represent the rate impact of generation expansion builds, and types and amounts of additional resources on which it was based.

LAB-NLH-37. Re: RRAS, 2022 Update, Vol. I, page 11 (35 pdf)

Citation:

> In the Newfoundland and Labrador Interconnected System, Hydro considers the first contingency loss to be the loss of a generating unit at the Muskrat Falls Hydroelectric Generating Facility and the second contingency loss to be the loss of a second unit at Muskrat Falls Hydroelectric Generating Facility, once the LIL is considered fully operational.

a) In the context of the subregional planning mentioned earlier in the Update, please confirm that, for the IIS, "Hydro considers the first contingency loss to be the loss of a generating unit at the Muskrat Falls Hydroelectric Generating Facility and the second contingency loss to be the loss of a second unit at Muskrat Falls Hydroelectric Generating Facility, once the LIL is considered fully operational."

b) In the context of the subregional planning mentioned earlier in the Update, please identify the first and second contingencies for the Labrador Interconnected System.

LAB-NLH-38. Re: RRAS, 2022 Update, Vol. I, page 12 (36 pdf)

Citation:

> A review of the system's energy capability and forecasted load requirements has resulted in the extension of the existing energy planning criteria to cover the entire Newfoundland and Labrador Interconnected System, as follows.

> **Energy:** The Newfoundland and Labrador Interconnected System should have sufficient generating capability to supply all of its firm energy requirements with firm system capability.

a) In the context of the subregional planning mentioned earlier in the Update, and of the uncertainties associated with the LIL that connects them, please confirm that the IIS and the LIS each should have sufficient generating capability to supply all of its firm energy requirements with firm system capability. If not, please explain in detail why not.

b) Please provide the results of Hydro's planning exercise with respect to the Energy Criterion for a) the IIS and b) the LIS.

LAB-NLH-39. Re: RRAS, 2022 Update, Vol. I, page 13 (37 pdf)

Please confirm that the Model Topography shown in Figure 3 represents the situation after the decommissioning of Line L1301, and that, prior to that decommissioning, there was also an arrow connecting CFLCo Load Bus to Lab East.

LAB-NLH-40. Re: RRAS, 2022 Update, Vol. I, page 19 (43 pdf); Vol. III, page 11 (92 pdf), Table 4

Citation 1:

> Considered Potential Labrador Load Scenarios:
>
> Case I: Base: Reflects Hydro's Rural Load Forecast Spring 2022, which includes existing data centre requirements and existing industrial loads.
>
> Case II: High Growth: Developed to include requests for service submitted to Hydro as part of the *Network Additions Policy*. Specifically, some of the additional load requirements in Case II: High Growth are for the existing Industrial customers, such as the Department of National Defence at 5 Wing Goose Bay, and other firm requirements from non-data centre customers, totalling 330 MW.
>
> Service requests from the *Network Additions Policy* currently total 1,300 MW, exceeding the amount noted in Case II: High Growth, and are further explained in Section 4.4 of the "Long-Term Resource Plan" included as part of the 2022 Update. As there remains a high level of uncertainty about the total service requests in Labrador, only requests from existing Industrial customers have been included in Case II: High Growth. As the *Network Additions Policy* process advances, Hydro will continue to assess the level of service requests to include in the load forecast or to assess sensitivities to the Case I: Base, as appropriate. Early discussions with various proponents interested in advancing new industries, such as hydrogen production, that would have a major impact on the system planning conclusions are not included in either Case I: Base or

> Case II: High Growth for the Island due to the unconfirmed nature of their needs. Should projects make a formal and final request for service that impacts the system planning forecast, Hydro will update the forecast. Significant loads not current[ly] in Case I: Base or Case II: High Growth either on the Island or in Labrador will have a material effect on the conclusions in the 2022 Update, including the timing and size of new resources required. More information on the development of the load forecast is contained in Section 4.0 of the "Long-Term Resource Plan" included as part of the 2022 Update. (underlining added)

Citation 2 :

Table 4: Labrador Interconnected System Electricity Load Growth Summary – 2022 Load Forecast[49,50,51]

		2021–2027	2021–2032
Case I: Base	MW	12.0%	13.5%
	GWh	9.2%	10.1%
Case II: High Growth	MW	33.5%	79.5%
	GWh	31.3%	83.3%

a) Please provide a copy of Hydro's Rural Load Forecast Spring 2022.

b) Please confirm that the Labrador High Growth Load Scenario includes 330 MW of growth, including DoD and other firm no-data centre customers, but does not include:

   i. Any new data centre or cryptocurrency customers,

   ii. Any non-firm load, or

   iii. Any loads from hydrogen production or other new industries, even though they would have a material effect on the conclusions in the 2022 Update, including the timing and size of new resources required.

c) Please confirm that, given these exclusions, it remains possible and even likely that Labrador loads will be higher than those included in the Case II: High Growth scenario.

d) Please provide figures for a third "very high-growth" scenario that includes plausibly foreseeable quantities for these additional categories of load.

e) Please provide a revised version of Chart 4 (page 12, 93 pdf) including a new line for the new scenario provided in response to the previous question.

f) Please confirm that the 2023 Update will include a third "very high-growth" scenario for Labrador that can be thought of as a reasonable upper bound for expected load growth in the LIS. If not, please explain why not.

LAB-NLH-41. Re: RRAS, 2022 Update, Vol. I, page (pdf)

Citation:

> Vale Newfoundland and Labrador Limited's ("Vale") increased requirements in the fourth quarter of 2024 are associated with the conversion of oil-fired boilers to electric heating. The additional electric load is included in the Island Interconnected System load forecast and is assumed 100% curtailable upon Hydro's request as a planning assumption. However, the duration and extent of the load curtailment need to be negotiated with Vale.
>
> Additional load requirements from the conversion of Memorial University of Newfoundland's oil-fired boilers to electric heating are also included in the Island Interconnected System load forecast and are assumed 100% curtailable upon Hydro's request as a planning assumption.

a) Please confirm that, for the new electric boilers to be 100% curtailable upon Hydro's request, Memorial University and Vale would have to maintain their existing oil-fired boilers in working condition to respond to their heating needs when curtailed.

b) Please indicate whether or not Memorial University and Vale have agreed to these conditions.

LAB-NLH-42. Re: RRAS, 2022 Update, Vol. I, page (pdf)

Citation:

> There are two commitments for firm exports—a commitment for firm capacity (Nova Scotia Block) and a commitment for firm energy (Supplemental Energy). Delivery of the Nova Scotia Block commenced in August 2021, with the first physical delivery occurring on August 17, 2021.[66] Delivery of Supplemental Energy[67] commenced in November 2021, with the first physical delivery occurring on November 1, 2021. As per the Energy and Capacity Agreement, in instances where the LIL is fully unavailable, Hydro is not obligated to deliver the Nova Scotia Block or Supplemental Energy. In instances where the LIL is partially available, the Nova Scotia Block and Supplemental Energy are delivered on a *pro rata* basis.

a) Please confirm that deliveries under the Nova Scotia Block and Supplemental Energy have in fact been reduced on a *pro rata* basis, based on LIL availability.

b) Please explain if this *pro rata* calculation is made on a monthly basis, on an hourly basis, or on some other basis.

c) During the periods when the LIL is partially unavailable, has energy had to be obtained from any other source to support deliveries under the Nova Scotia Block and Supplemental Energy? If so, please detail these sources.

d) Please provide a table showing LIL availability and deliveries of Nova Scotia Block and Supplemental Energy, on a monthly basis since January 2021.

LAB-NLH-43. Re: RRAS, 2022 Update, Vol. I, page 25 (49 pdf), Table 2

Please explain why no scenarios were studies including both High FOR and High Loads for either the Island or Labrador.

LAB-NLH-44. Re: RRAS, 2022 Update, Vol. I, page 31 (55 pdf), Chart 1

a) Please indicate the amount of Firm Capacity attributed to the LIL.

b) Please confirm that this energy is sourced from the Muskrat Falls Generating Station, supplemented by deliveries from the Churchill Falls Generating Station as provided for in the Water Management Agreement. If not, please explain the source of the Firm Capacity, during hours in which the MFGS is not producing at its nameplate capacity.

LAB-NLH-45. Re: RRAS, 2022 Update, Vol. I, page 32 (56 pdf)

Citation:

> As noted in the 2018 Filing, the assessment of the firm plant output of the Muskrat Falls Hydroelectric Generating Facility will continue to be analyzed as it continues to operate. [83] If it is determined that the Muskrat Falls Hydroelectric Generating Facility is proven capable of rated output (i.e., 824 MW) through the winter, the operational reserve requirements will increase from 296.5 MW to 309 MW.[84]

a) Please confirm that, as the Muskrat Falls Hydroelectric Generating Facility (MFHGS) has very limited storage, its production at any given time depends largely on actual inflows into the MFHGS.

b) Please confirm that, for the MFHGS to provide its rated output of 824 MW through the winter, the physical output of the plant will have to be supplemented during many hours by energy provided from the Churchill Falls Hydroelectric Generating Facility (CFHGS) as provided for under the Water Management Agreement between Nalcor and CFLCo. If not confirmed, please explain in full.

LAB-NLH-46. Re: RRAS, 2022 Update, Vol. III, page 3 (84 pdf)

Citation:

1 A summary of the firm capacity[8] of Hydro's existing generation assets is listed in Table 1.

Table 1: Summary of Existing Generation Assets (MW)[9,10]

Generation Assets	Firm Capacity
Hydraulic Generation	
Muskrat Falls[11]	
Unit 1	196.2
Unit 2	196.2
Unit 3	196.2
Unit 4	196.2
Subtotal Muskrat Falls[12]	784.6

Note 8: Firm capacity refers to the amount of generation capacity available for production or transmission expected to be available at the annual peak when the unit is fully operational.

Please explain why Hydro considers that each Unit of the Muskrat Falls Generating Facility will necessarily have 196.2 MW of capacity available at the annual system peak.

LAB-NLH-47. Re: RRAS, 2022 Update, Vol. I, page 6 (30 pdf); Vol. III, page 41 (122 pdf)

Citation 1 (Vol. I, page 6):

From an energy perspective, Hydro completed an assessment of its ability to meet firm energy requirements in consideration of firm hydraulic energy sequences.[25]

Note 25: Minimum storage targets are developed annually to provide guidance in the reliable operation of Hydro's major reservoirs: Victoria, Meelpaeg, Long Pond, Cat Arm, and Hinds Lake. The minimum storage target is designed to show the minimum level of aggregate storage required such that if there was a repeat of Hydro's critical dry sequence, or other less severe sequence, Hydro's load can still be met through the use of the available hydraulic storage, maximum generation at the Holyrood TGS, and imports. Hydro's long-term critical dry sequence is defined as January 1959 to March 1962 (39 months). Other dry periods are also examined during the derivation to ensure that no other shorter-term historic dry sequence could result in insufficient storage.

Citation 2 (Vol. III, page 41):

The Newfoundland and Labrador Interconnected System energy criterion is that the Newfoundland and Labrador Interconnected System should have

> sufficient generating capability to supply firm energy/ requirements with firm system capability.[126]
>
> The ability to meet energy requirements is continually evaluated in consideration of historical inflow sequences and future customer and contracted requirements.[127,128] In the 2018 Filing and the 2019 Update, there were no violations of the energy criteria.
>
> Note 126 : On the Island, firm capability for the hydroelectric resources is the firm energy capability of those resources under the most adverse three-year sequence of reservoir inflows occurring within the historical record. Firm capability for the thermal resources (Holyrood TGS) is based on energy capability adjusted for maintenance and forced outages.

Please a) confirm that the ability of the Muskrat Falls Generating Facility is not evaluated in consideration of the most adverse three-year sequence of historical inflow, and b) explain why that is the case. If not confirmed, please provide a full explanation.

LAB-NLH-48. Re: RRAS, 2022 Update, Vol. III, page 13 (94 pdf)

Citation:

> This level of load requests far exceed existing generation available on the Labrador Interconnected System and would trigger the need for significant incremental generation. Therefore, prior to progressing with the interconnection process, Hydro opted to communicate further information to the applicants on the projected cost of supply, associated rates, and estimated timeline to supply these large incremental load requests. The intent was to be transparent with such costs and offer the opportunity for applicants to confirm their continued interest.
>
> In March 2022, Hydro met with all applicants and provided the projected cost of supply, possible associated rates, and estimated timeline to supply. Following this, 21 customers, representing approximately 1,300 MW of load, confirmed their continued interest in proceeding with the interconnection process.[55] (underlining added)

Please indicate the projected cost of supply, the possible associated rates and the estimated timeline to supply that was communicated to applicants in March 2022, along with explanations for the values used.

LAB-NLH-49. Re: RRAS, 2022 Update, Vol. III, page 15 (96 pdf)

Citation:

> The extent to which resource builds are required to support the interconnection agreements may delay this timeline. As the load requests are advanced, sensitivity forecasts will continue to be developed for use in various planning studies.

Have any sensitivity forecasts of this type been prepared? If so, please a) describe them in detail, and b) provide copies.

LAB-NLH-50. Re: RRAS, 2022 Update, Vol. III, page 18 (99 pdf)

Citation:

> The Haldar & Associates report, "Assessment of Labrador Island 1 Transmission Link (LIL) Reliability in Consideration of Climatological Loads" ("Original LIL Reliability Report"),[76] considered the LIL design with respect to CSA 22.3 No. 60826-10[77] and the overall likelihood of failure of the LIL with respect to both glaze[78] and rime[79] icing events. Scenarios not directly following the guidance of CSA 22.3 No. 60826-10 (such as effective line lengths and wind speedup) were also considered to provide a fully informed assessment. The Original LIL Reliability Report also included a qualitative review of local conditions based on past operational experience. As part of the Original LIL Reliability Report, LIL return periods were defined to be in the range of 1:72 to 1:160 years.[80,81] A revised reliability analysis ("Phase II LIL Reliability Report") that was based on more extreme loading considerations,[82] indicates an annual probability of full bipole failure of 10% and a return period of 1:10 years due to structural failure. Other outcomes include consideration of regional correlation[83] and line length where the return period could be as low as 1:6 years with an associated annual failure rate of 16%. [84]

How does Hydro explain the dramatic difference between the results of the Original LIL Reliability Report and the Phase II LIL Reliability Report?

LAB-NLH-51. Re: Nalcor, EIS, Labrador-Island Transmission Link, page 2-22

Citation:

> In the context of the analysis completed in the Technical Note on reliability, increasing the return period of the HVdc transmission line design from 1:50 years to, say 1:150 years, would reduce the probability of the occurrence of the event resulting in inability to supply all customer load. For the Interconnected Island alternative with a 1:50 year return period design for the HVdc line the

probability of occurrence is 0.15% to 0.65% (availability 99.35% to 99.85%). If the HVdc line return period were increased to 1:150 years, the probability of occurrence of the event resulting in inability to supply all customer load would be 0.04% to 0.22% (availability 99.78% to 99.95%). However, the level of load curtailment (i.e., quantity of unsupplied energy during the two-week anticipated repair interval after an event), should the event occur, would not change with the change in design return period. In other words, increasing the return period of the line design reduces the probability of a failure for a given storm, but when the line failure happens the same number of customers will be without electricity. In essence, increasing the return period of the line design alone solves only one aspect of the exposure to Island customers for loss of the Labrador–Island Transmission Link.

Please explain why in its EIS Nalcor considered the maximum outage period to be two weeks, and now Hydro considers it to be six weeks or more (p. 28, 109 pdf).

LAB-NLH-52. Re: RRAS, 2022 Update, Vol. III, page 26 (107 pdf), Tables 8 and 9

Citation:

Table 8: Holyrood TGS Capital Costs for Extended Base-Load Operation ($000)

	2024	2025	2026	2027	2028	2029	2030	Total
Unit 1	6,433	3,333	3,500	3,800	4,200	12,394	3,667	**37,327**
Unit 2	5,033	3,333	4,300	3,500	3,500	3,667	3,667	**27,000**
Unit 3	4,399	13,097	8,777	6,600	5,200	7,667	3,667	**49,407**
Balance of Plant	10,452	6,109	2,500	3,850	1,111	1,000	1,250	**26,272**
Total Capital	**26,317**	**25,872**	**19,077**	**17,750**	**14,011**	**24,728**	**12,251**	**140,006**

Table 9: Holyrood TGS Operating Costs for Extended Base-Load Operation ($000)

	2024	2025	2026	2027	2028	2029	2030	Total
Operating Cost	25,147	25,147	25,147	25,147	25,147	25,147	25,147	**176,029**
Fuel Cost	101,000	98,000	97,000	98,000	99,000	101,000	103,000	**697,000**

a) Please confirm that total capital and operating costs for extended base-load operation of Holyrood TGS are over $1 billion for the period 2024-2030, with annual total costs of up to $150 million.

b) Please estimate the rate impacts associated with these expenditures, and confirm that they are over and above the rate impacts associated with the Lower Churchill Project.

LAB-NLH-53. Re: RRAS, 2022 Update, Vol. III, page 30 (111 pdf), Chart 7

Citation:

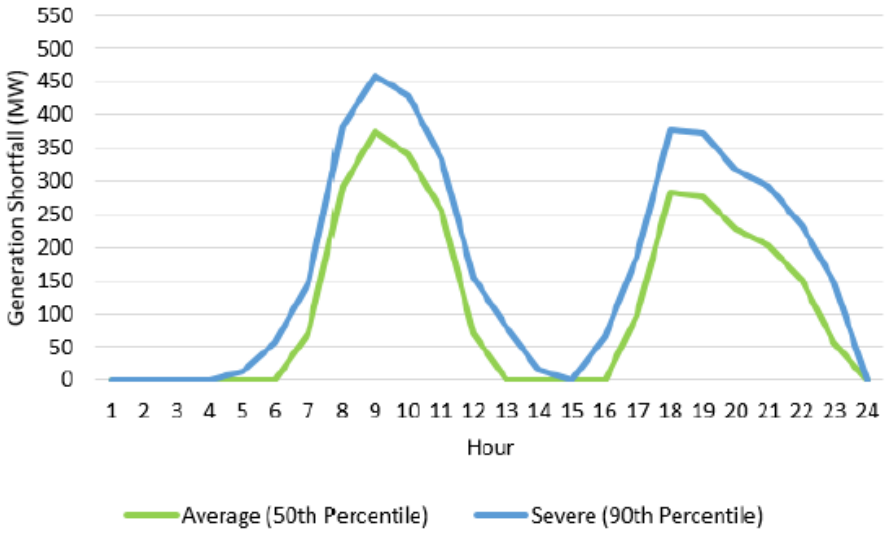

Chart 7: Forecast Shortfall on a Typical Peak Day with the LIL Unavailable (January 2026)

Please provide a similar table showing shortfall as a percentage of load.

LAB-NLH-54. Re: RRAS, 2022 Update, Vol. III, page 53 (134 pdf)

Citation:

> Labrador is experiencing unprecedented requests for incremental load additions. Load additions are still forecasted to be 1,300 MW after cost implications were defined and presented to potential customers. While requests for the load on the Labrador Interconnected System have been reduced, the issue has not been eliminated.
>
> If the Labrador load materializes, it will result in a syphoning of the Muskrat Falls Hydroelectric Generating Facility to serve local load requirements, reducing the ability to serve the Island, which will in turn drive a need for additional incremental additions on the Island, well beyond the 480 MW of new incremental capacity previously mentioned.

Please provide a table for the years 2023-2035 indicating the forecast Island energy and capacity balances, taking into account supplies from Muskrat Falls as well as obligations to Nova Scotia, under the two scenarios of Labrador load growth described in the 2022 Update, as well as the third scenario provided in response to LAB-NLH-29.