

1 Q. **Reference: 2024 Resource Adequacy Plan**

2 One of the assumptions underlying Hydro’s system planning criteria and methodology for the
3 Minimum Investment Required Expansion Plan is an Equivalent Forced Outage Rate of 1% for
4 the Labrador Island Link. Please explain how this assumption was selected and the implications
5 for reliability and resource adequacy for the Island Interconnected system if the actual outage
6 rate is higher or lower.

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9 A. Daymark Energy Advisors (“Daymark”) conducted an assessment for Newfoundland and
10 Labrador Hydro (“Hydro”), provided in Hydro’s 2022 update to the Reliability and Resource
11 Adequacy Study (“2022 Update”), that provides considerations for HVdc¹ outage and
12 unavailability rates. Daymark gathered information pertaining to metrics, methodologies,
13 experience, and issues relevant to outages of HVdc paths that utilities or other energy industry
14 participants utilize or have witnessed. The assessment focused on Nordic areas of Europe, with
15 coastal conditions of a similar latitudinal place as the Labrador-Island Link (“LIL”) and use of land
16 and undersea cables.² Hydro used this analysis to guide the LIL bipole equivalent forced outage
17 rate (“EqFOR”) ranges of 1%, 5%, and 10% that were introduced in the 2022 Update.

18 Absent any long-term operational experience with the LIL post-commissioning, Hydro does not
19 have a basis to assume a LIL EqFOR of less than 1%.³ Until the LIL has multiple years of
20 operational experience to better inform the selection of a bipole forced outage rate, the LIL
21 bipole forced outage rate is addressed with a range of upper and lower limits (i.e., 1–10%). This
22 range of values is used to assess the planning reserve margin effects that the LIL has on system
23 reliability and overall system planning.

¹ High-Voltage Direct Current (“HVdc”).

² For more information, please refer to the “Reliability and Resource Adequacy Study 2022 Update,” Newfoundland and Labrador Hydro, October 3, 2022, vol. 1, att. 2.

³ Hydro noted in its 2022 Reliability and Resource Adequacy Study Update that absent any long-term experience with the LIL post-commissioning, the previously anticipated bipole forced outage rate of 0.0114% is equivalent to 1 hour of forced outage time per year and is impractical. The LIL is a complex system resulting in the need to calculate its performance as an end-to-end system for reliability planning (EqFOR).

The EqFOR measures the performance of the LIL end-to-end system, including converter stations at Muskrat Falls and Soldiers Pond, overhead lines between Muskrat Falls and Soldiers Pond, transition compounds in Shoal Cove and Forteau Point, and subsea cables in the Strait of Belle Isle. For reference, a LIL bipole EqFOR of 1% equates to LIL unavailability of less than 4 days per year; a LIL bipole EqFOR of 5% represents approximately 18 days of unavailability per year; and a LIL bipole EqFOR of 10% represents approximately 37 days per year of unavailability.

While the Reference Case, or expected case, assumes a LIL bipole EqFOR of 5%, the recommended Minimum Investment Required Expansion Plan assumes a LIL bipole EqFOR of 1%, which Hydro believes to be a reasonable low forced outage rate assumption. For reference, the 12-month annual average EqFOR for the period October 1, 2023 to September 30, 2024, was 3.28%.^{4,5} Hydro will continue to work to achieve a reliable LIL with an outage rate at the lower end of the outage range currently being considered in the Resource Adequacy Plan. However, Hydro does not believe that it is practical to plan a system with an assumption of the LIL having less than four days of forced outages per year given the length of the line, and the complexity of the components involved. Therefore, a LIL bipole EqFOR of 1% is considered a reasonably low assumption for consideration in the recommended Minimum Investment Required Expansion Plan.

Table 1 compares the planning reserve margin requirements based on a range of LIL Bipole EqFORs that were calculated for the 2024 Resource Adequacy Plan probabilistic capacity assessment.

Table 1: Planning Reserve Margin Requirements⁶

Planning Criteria	LIL Bipole EqFOR (%)	2032 Reserve Margin (MW)	Reserve Margin (% of Peak)
2.8 LOLH ⁷	1	360	17.1
2.8 LOLH	3	460	23.3
2.8 LOLH	5	500	25.8
2.8 LOLH	10	550	29.1

⁴ This EqFOR statistic was calculated based on the present rating of the LIL (700 MW).

⁵ "Quarterly Report on Asset Performance in Support of Resource Adequacy for the Twelve Months Ended September 30, 2024," Newfoundland and Labrador Hydro, October 31, 2024.

⁶ Please refer to the "2024 Resource Adequacy Plan – An Update to the Reliability and Resource Adequacy Study," Newfoundland and Labrador Hydro, rev. August 26, 2024 (originally filed July 9, 2024), app. B, sec. 5.1.7.

⁷ Loss of load hours ("LOLH").

1 The planning reserve margin for a LIL bipole EqFOR of 1% equates to 360 MW of reserve
2 requirements in the year 2032. If the actual LIL EqFOR is higher than 1%, this would further
3 support the Minimum Investment Required Expansion Plan as it equates to additional capacity
4 that will be required for the Island Interconnected System, above what is considered in the
5 Minimum Investment Required Expansion Plan. For example, the planning reserve margin for a
6 LIL bipole EqFOR of 5% equates to 500 MW of reserve requirements in the year 2032; an
7 additional 140 MW compared to the calculated planning reserve requirement using LIL bipole
8 EqFOR of 1%.

9 If the actual LIL EqFOR is lower than 1%, this would result in a lower calculated planning reserve
10 margin than what is presented in Table 1; however, it would not reduce the level of investment
11 required to satisfy other planning criteria such as the LIL Shortfall Assessment. The LIL Shortfall
12 Assessment criteria require the Island Interconnected System to have sufficient generating
13 capacity to limit the loss of load to a manageable level in the case of a LIL-shortfall event. In
14 order to meet this requirement, two large capacity options are required in the year 2031, once
15 the Holyrood Thermal Generating Station is retired, to keep rotating outages below 100 MW
16 should the loss of the LIL occur during the winter period. Consequently, the requirement to
17 mitigate the high-consequence impacts of the loss of the LIL during a period in the winter
18 becomes the basis for additional capacity requirements and supersedes a lower calculated
19 planning reserve margin requirement.

20 Therefore, the Minimum Investment Required Expansion Plan represents the first step to meet
21 the Island Interconnected System reliability requirements.