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March 2, 2023

Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL, A1A 5B2

Attention: Cheryl Blundon
Director of Corporate Services & Board Secretary

Re: *Reliability and Resource Adequacy Study Review* – Labrador-Island Link Monthly Update – February 2023

On November 21, 2019, the Board of Commissioners of Public Utilities ("Board") requested that Newfoundland and Labrador Hydro ("Hydro") provide further information as a result of the findings in The Liberty Consulting Group's ("Liberty") Eighth Quarterly Monitoring Report on the Integration of Power Supply Facilities to the Island Interconnected System.[1] In its response, Hydro committed to providing Liberty and the Board with a monthly status update regarding the schedule for the Labrador-Island Link ("LIL") software development and testing, updated information in response to the specific requests detailed in the Board's November 21, 2019 correspondence, and other pertinent information with respect to the Muskrat Falls Project.[2] On January 19, 2021, the Board requested Hydro continue monthly reporting and outlined specific information, at a minimum, to be included.[3,4] Enclosed please find the update as requested.

1.0 LABRADOR-ISLAND LINK

1.1 Commissioning Activities

1.1.1 Bipole Commissioning

Hydro continues to plan for the execution of LIL high power testing up to 700 MW to permit the Final Commissioning of project assets. Testing requires elevated system loads that would be accommodated by typical temperatures expected in March and April. Hydro expects to perform testing in this time frame.

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[1] "Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System - Phase Two - The Liberty Consulting Group Eighth Quarterly Monitoring Report on the Integration of Power Supply Facilities to the Island Interconnected System - Further Information and Continued Quarterly Monitoring Reports in 2020," Board of Commissioners of Public Utilities, November 21, 2019.

[2] "Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System - Phase Two - The Liberty Consulting Group Eighth Quarterly Monitoring Report on the Integration of Power Supply Facilities to the Island Interconnected System - Further Information - Hydro's Comments," Newfoundland and Labrador Hydro, November 29, 2019, p. 1.

[3] "Newfoundland and Labrador Hydro - Reliability and Resource Adequacy Study Review - Information Required for Monthly Reports," Board of Commissioners of Public Utilities, January 19, 2021.

[4] Hydro's report has been adjusted to reflect the Board's request, with the exception of information related to the LIL monthly energy transfers and Maritime Link availability and exports and imports in the month. Both pieces of information are currently included in Hydro's monthly energy supply report and are not available in a time frame that corresponds with the timing of this report.

In preparation for testing, Hydro is working with GE Canada ("GE") to mitigate three outstanding technical items related to hardware and software. The three technical items are discussed below and include:

1) Firing angle measurement (software);

2) Direct Current Current Transformer measurement (hardware); and

3) Submarine Cable connection (software).

Firing Angle Measurement (Software)

GE has developed a new version of software (Version 1.1.37d) to correct the firing angle measurement issue that caused the 700 MW overload test to fail in November of 2022. This software successfully completed Factory Acceptance Testing on February 9, 2023, demonstrating the resolution of the issue.

Direct Current Current Transformer Measurement (Hardware)

As noted in Section 1.2 below, LIL pole trips occurred on January 31, 2023 and February 2, 2023 due to measurement issues in hardware devices know as Direct Current Current Transformers ("DCCT") during cold weather conditions. Hydro is supporting GE in troubleshooting and root cause analysis efforts, but opportunities to take outages for investigations have been impacted by the extreme cold the province has been experiencing throughout the month of February. During this period, the LIL was kept in service to support system reserves. Hydro and GE are currently investigating findings and developing a root cause analysis.

Submarine Cable Connection (Software)

The investigation of a pole trip that occurred on February 3, 2023 revealed a software item that would impact submarine cable switching in the Strait of Belle Isle under certain conditions. This item only affects operation of the LIL above 450 MW and would trigger an automatic ramping of the LIL back to 450 MW after five minutes. This software issue has been isolated by GE and a new version of software (Version 1.1.37e) is under development and will be tested and made available in the coming weeks.

Testing Plans

Hydro understands the impact of outages on customers. All decision making around advancing the testing and commissioning of the LIL is predicated on Hydro's commitment to providing reliable service. This is of particular importance during any system testing activities. Hydro is committed to managing all system risks during LIL testing to ensure reliable operation for customers.

It is expected that the above items will be mitigated to permit LIL high-power testing to occur in late March/early April time frame. Hydro's contingency plan to eliminate scheduling risk associated with the development and testing of Version 1.1.37e software is to perform high-power testing with the currently available Version 1.1.37d. Subsequent low power tests can be scheduled at a later date to validate the submarine cable switching resolution included in Version 1.1.37e. The risk of cable switching failure during the high power tests using Version 1.1.37d would be limited due to the probability of multiple coinciding factors that would need to materialize during the brief (two-hour) periods of bipole operation above 450 MW. This probability would be further reduced by the mitigation of the DCCT measurement issues outlined above.

In the interim, Hydro continues to operate the LIL with the current software, based on the successful testing up to 475 MW that occurred in the fall of 2022. In consideration of the technical items listed above, the LIL is currently limited to 430 MW to accommodate for measurement issues.

1.1.2 Soldiers Pond Synchronous Condensers

GE Power has developed measures to allow for the return of Synchronous Condenser ("SC") 1 to service, as it relates to this issue, while developing a long-term solution.

In the January 2023 update,[5] Hydro reported a failure of the high-pressure lift pumps on both SC1 and SC3 that were subsequently replaced. GE Power completed a root cause analysis into the pump failures and concluded that both failures were caused by low oil temperature. Hydro has taken measures to supplement the building heating system. GE Power also identified control system changes to ensure the potential cold oil in the inlet section of the pump is purged to the tank prior to supplying oil to the bearings. Hydro believes oil contamination and the system design may have also contributed to the failures. The control system changes noted above will be implemented by Hydro to reduce the risk of pump failure recurrence during operation of the synchronous condensers. Hydro will continue to work with GE Power to determine if additional long-term corrective actions are required.

SC1 and SC3 are planned to be restarted in the coming days. SC2 has been in continual service throughout the month of February 2023 with no issues.

Monthly meetings between the CEOs of Hydro and GE Power are ongoing to ensure all outstanding issues are resolved to satisfaction.

1.2 Operations

The LIL has been operating at various times and power transfer levels during the month. In total, 243 GWh was delivered over the LIL during the month of February 2023. Hydro continues to operate generation at Holyrood to ensure supply adequacy and reliable operation for customers. Energy and capacity delivered over the LIL are used to minimize thermal generation whenever possible.

As previously reported,[6] there was an issue with the Forteau disconnect switch that required repair. An outage on Pole 1 was required to implement the repairs, which commenced on February 2, 2023 and concluded on February 3, 2023. The repairs resolved the issue.

As previously reported,[7] on January 31, 2023,[8] LIL Pole 1 tripped and Pole 2 successfully compensated resulting in no reduction in power. An additional trip occurred on Pole 2 on February 2, 2023, while the LIL was operating in monopole mode. These trips were caused by the DCCT measurement issue. A root cause investigation into these trips is ongoing.

[5] "Reliability and Resource Adequacy Study Review – Labrador-Island Link Monthly Update – January 2023," Newfoundland and Labrador Hydro, February 2, 2023, p. 2.
[6] "Reliability and Resource Adequacy Study Review – Labrador-Island Link Monthly Update – January 2023, "Newfoundland and Labrador Hydro, February 2, 2023.
[7] "Reliability and Resource Adequacy Study Review – Labrador-Island Link Monthly Update – January 2023, "Newfoundland and Labrador Hydro, February 2, 2023.
[8] This trip was previously reported as occurring on February 1, 2023 in error.

On February 16, 2023, Pole 1 was taken offline to facilitate replacement of DCCT components on Pole 1. When returning Pole 1 to service, Pole 2 protection inadvertently operated resulting in a trip. Mitigations were implemented to prevent such pole trips from occurring and a root cause analysis is ongoing.

On February 20, 2023, the LIL Pole 1 tripped due to an incorrect connection that was put in place following the outage on February 16, 2023. This issue was corrected and the pole was returned to service.

In all cases, there was no impact to Island customers following the pole trips due to successful runbacks of the Maritime Link.

1.3 Outages

There were no LIL-related customer outages to report for February 2023.

2.0 MUSKRAT FALLS GENERATION

2.1 Operations

During the month of February 2023 the Muskrat Falls units were available for service at all times other than the noted exceptions:

- Unit 2 was offline from January 28, 2023 to February 1, 2023 for scheduled maintenance; and
- Unit 3 was offline from February 1, 2023 to February 4, 2023 for scheduled maintenance and from February 4, 2023 to February 11, 2023 due to a forced outage caused by a fault in the excitation system.

3.0 LABRADOR-ISLAND LINK SCHEDULE

As noted in Section 1.1.1, Hydro and GE are continuing to investigate and mitigate the hardware and software items described above. Hydro expects to have these issues mitigated in time to permit the completion of high power testing in late March/early April. Successful completion of remaining testing requirements will allow for Final Commissioning and acceptance activities to be completed early in the second quarter of 2023.

If you have any questions or comments, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

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MSL/kd

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