

September 4, 2019

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

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

Dear Ms. Blundon:

Re: Reliability and Resource Adequacy Study – TP-TN-068 Application of Emergency Transmission Planning Criteria for a Labrador-Island Link Bipole Outage – Further Information

On July 31, 2019, Newfoundland and Labrador Hydro (“Hydro”) filed a technical note with the Board of Commissioners of Public Utilities (“Board”) entitled “TP-TN-068 Application of Emergency Transmission Planning Criteria for a Labrador-Island Link Bipole Outage” (“Technical Note”). On August 22, 2019, the Board requested additional information and clarification of certain points detailed in the Technical Note. The Board’s questions and Hydro’s responses to those questions are set out below.

Please confirm that Hydro is recommending temporary adoption of the Emergency Transmission Planning Criteria while the Reliability and Resource Adequacy Study is being reviewed.

Hydro confirms that it is recommending the temporary adoption of the Emergency Transmission Planning Criteria while the Reliability and Resource Adequacy Study is being reviewed.

The analysis performed by Hydro in recent months as summarized in TN-TP-068 and the Avalon Capacity Study (“TransGrid Solutions Study”)¹ have provided an indication of system conditions when the Labrador-Island Link (“LIL”) bipole is out of service in the near-term (five-year) and long-term (ten-year) planning horizons when generation from Holyrood Thermal Generating Station (“Holyrood TGS”) is no longer available.

As discussed in TN-TP-068, it was necessary for Hydro to make a determination regarding the transmission planning criteria to apply when the LIL bipole is not in service. These criteria are necessary for upcoming annual assessments to identify any requirements for transmission system upgrades to be added to Hydro’s capital plan.

The application of Hydro’s existing Transmission Planning Criteria² in conditions when the LIL bipole is not in service would trigger an immediate requirement for transmission system expansion. Hydro’s perspective is that such upgrades would be premature while the review of the Reliability and Resource Adequacy Study is ongoing.

¹ Newfoundland and Labrador Hydro “Avalon Capacity Study - Solutions to Serve Island Demand during a LIL Bipole Outage,” TransGrid Solutions, Technical Note: TN1529.01.02, May 23, 2019.

² NLSO Standard TP-S-007 - Transmission Planning Criteria, March, 2019.

Instead, the temporary application of Emergency Transmission Planning Criteria will provide a basis for interim assessments for the near-term and long-term planning periods and avoid the potential implementation of potentially unnecessary transmission system upgrades. Hydro notes further that due to the availability of generation from the Holyrood TGS, the Emergency Transmission Planning Criteria will have no immediate reliability impact. Holyrood TGS generation serves to offload the transmission corridors and eliminates the violations of the existing Transmission Planning Criteria that would be caused by a LIL bipole outage. It is for these reasons that Hydro recommends the temporary adoption of the Emergency Transmission Planning Criteria.

Please also advise what steps are necessary for Hydro to implement this recommendation and provide a status update on the development of the operational considerations required as outlined on page 11 of TP-TN-068.

Hydro has drafted restoration procedures for black start of the Island Interconnected System; these documents are currently under review. However, Hydro has not yet proceeded with the development of the rapid load shedding procedure or the review of protection settings. These actions would be taken subsequent to the Board's review of Hydro's recommendation to implement the Emergency Transmission Planning Criteria. If the Board agrees with Hydro's recommendation that the adoption of the criteria is an appropriate course of action, Hydro would formally incorporate the changes to the existing Transmission Planning Criteria for the purposes of future system assessments. Hydro would then proceed to develop and implement an action plan. As explained above, such action will not result in any immediate reliability impact due to the availability of generation from the Holyrood TGS.

Using the same base case scenarios as presented in the report, please outline the expected outcomes of the Emergency Transmission Planning Criteria in the event of a Labrador-Island Link bipole outage was not adopted and transmission system upgrades were not implemented. Please include the amount of additional load that would have to be shed and the estimated corresponding number of additional customers affected by outages.

The scenario posed in the Board's request to Hydro for additional information (i.e., a LIL bipole outage in the event Emergency Transmission Planning Criteria were not adopted and transmission system upgrades were not implemented) is not a scenario that could arise. If Hydro does not adopt Emergency Transmission Planning Criteria, the existing Transmission Planning Criteria would be applied and Hydro would pursue transmission system upgrades.

As described in TP-TN-068, the outcomes of the two options are summarized as follows:

- 1) Adoption of Emergency Transmission Planning Criteria:
 - a) In the event that the LIL bipole is out of service, load shedding is permitted in response to a transmission line outage to avoid thermal overloading;
 - b) In the event of a three-phase fault while the LIL bipole is out of service, the suppression of transient recovery voltages is acceptable as long as stable operation is maintained;³ and
 - c) As per normal operation, three-phase faults at Bay d'Espoir terminal station are excluded from consideration. Such faults may result in instability in cases with high power flows eastward from Bay d'Espoir.⁴

³ This criterion would not be required if capacity is limited to existing generation within the Island Interconnected System.

⁴ Ibid.

These criteria are less onerous than those applied during normal system operation and there would be no violations. There would, therefore, be no immediate requirement for Hydro to perform transmission system upgrades.

The analysis to assess potential customer impacts that could result from the adoption of the Emergency Transmission Planning Criteria, as described in TP-TN-068, are as follows:

- a) If no incremental capacity or imports are available within the Island Interconnected System, the only possible customer impacts due to transmission system restrictions would only occur as a result of thermal overloads following the loss of TL 217, which would require load shedding; and
- b) If incremental capacity is imported over the Maritime Link (“ML”), there is an increased risk of customer impact due to transmission system limitations. Outages to TL 201 or TL 217 would require load shedding to avoid overload conditions. There would also be an exposure to system instability in the event of a three-phase fault at Bay d’Espoir Terminal Station; however, such events are not considered as part of Transmission Planning Criteria.

The amount of additional load that would be shed during a LIL bipole outage if Emergency Transmission Planning Criteria were adopted is as follows:

- If there is 300 MW of import over the ML, the loss of TL 201 or TL 217 would require load shedding to mitigate thermal overloads:
 - 40 MW of load shed is required east of Soldiers Pond Terminal Station in the event of the loss of TL 201. This equates to approximately 6,600 customers;⁵ and
 - 200 MW of load shed is required east of Soldiers Pond Terminal Station in the event of the loss of TL 217. This equates to approximately 33,000 customers.
- If there is no import over the ML, the loss of TL 217 would require 65 MW load shedding east of Soldiers Pond Terminal Station to mitigate thermal overloads. This equates to approximately 10,700 customers.⁶

2) Perform Transmission System Upgrades

If Emergency Planning Criteria are not adopted, Hydro would apply existing Transmission Planning Criteria in the event of a LIL bipole outage. The load shed and customer interruption requirements described above, and permitted under the Emergency Transmission Planning Criteria, would be deemed to be violations and transmission system upgrades would be required. The following upgrades would to be considered:

- Transmission System Upgrades in the 230 kV Corridor between Western Avalon Terminal Station and Soldiers Pond Terminal Station;
- Reactive Support in the Area of Sunnyside Terminal Station; and

⁵ This is based on an approximation that 1 MW of load on the Avalon Peninsula equates to approximately 165 residential customers. This is derived on the basis of the penetration of electric heat and the diversified average customer consumption at peak.

⁶ In the case with no import over the ML, power flows are such that there would not be an overload of TL 217 in the event of an outage to TL 201 because there would be insufficient off-Avalon generation to overload the transmission line.

- Addition of Incremental Generation on the Avalon Peninsula.

In addition, please quantify or otherwise describe the impact to the overall Island Interconnected System as a result of the implementation of the Emergency Transmission Planning Criteria. In doing so, please outline the types of events that could result in a voltage collapse on the Island Interconnected System that otherwise may not have occurred if the Emergency Transmission Planning Criteria is implemented.

The impacts to the overall Island Interconnected System as a result of the implementation of the Emergency Transmission Planning Criteria are summarized above in the description of how contingencies involving TL 201 or TL 217, when the LIL bipole is out of service, may result in further customer outages.

As described in TP-TN-068, voltage instability can occur in the event of a three-phase fault at Bay d'Espoir Terminal Station if power flows eastward from Bay d'Espoir exceed approximately 615 MW. Such an event may result in a complete outage to the Island Interconnected System. This contingency is not currently covered under the existing Transmission Planning Criteria or proposed under the Emergency Transmission Planning Criteria and is further explained in the Stage 4A Operational Study.⁷

As summarized in the TransGrid Solutions Study, system performance in response to a three-phase fault at Bay d'Espoir would be impacted by the addition of future generation. Any transmission system upgrades to mitigate the risk of system instability would therefore be dependent on the outcomes of Hydro's Reliability and Resource Adequacy Study.

As detailed in TP-TN-068, and discussed above, Hydro recommends that the Emergency Transmission Planning Criteria be adopted while the Reliability and Resource Adequacy Study is ongoing. Such an approach would provide Hydro with a basis to perform interim assessments for the near-term and long-term planning periods and avoid the implementation of potential unnecessary transmission system upgrades. Hydro further notes that due to the current availability of generation on the Avalon Peninsula, the Emergency Transmission Planning Criteria will have no immediate reliability impact. Once the outcomes of the Reliability and Resource Adequacy Study are known, Hydro will have appropriate context to reassess Transmission Planning Criteria and to recommend transmission system additions, as required, to ensure long-term reliability for customers.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO



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⁷ Stage 4A LIL Bipole: Preliminary Assessment of High Power Operation, TransGrid Solutions, November 21, 2018.