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April 13, 2017

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 Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: The Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System – Response of Newfoundland and Labrador Hydro to the Liberty Consulting Group's ESRA Report of February 27, 2017

This correspondence constitutes the response of Newfoundland and Labrador Hydro ("Hydro") with respect to the Liberty Consulting Group ("Liberty") Report of February 27, 2017, entitled "Evaluation of Pre-Muskrat Falls Supply Needs and Hydro's November 30, 2016 Energy Supply Risk Assessment" (the "Liberty ESRA Report").

This response will be divided into two parts: (1) Hydro's response to the specific recommendations of Liberty in the Liberty ESRA Report and (2) other points of note arising from the Liberty ESRA Report.

Liberty ESRA Report Recommendations

Hydro's response to Liberty's recommendations are set out in the table attached to this letter as Appendix "A". As noted, Hydro agrees with the Liberty ESRA Report recommendations and proposes implementation of items in the manner and on the timeline noted in Appendix "A".

In respect of certain timelines, Hydro notes that several of the Liberty recommendations (#8 to #10) involve updates or modifications to the "current ESRA". As required by the Board's letter of October 13, 2016, Hydro must file a generation adequacy report on May 15, 2017. That upcoming filing will be provided in the form of an updated ESRA[1] and will bring current the previous filing of November 30, 2016. Rather than a review of November 30, 2016 ESRA (as amended), which is now several months old, Hydro proposes that the requested

[1] See Hydro's March 30, 2017 report, "Establishing a Robust Operational Philosophy and Enhancing Skills and Capabilities Relating to Systems Reliability and Analysis" ("Operational Philosophy Report"), page 27.

modifications to the "current ESRA" as noted by Liberty be incorporated as part of the May 2017 ESRA update.

Other Comments by Liberty

In addition to Liberty's recommendations, Hydro notes other comments by Liberty to which Hydro provides additional information or response below:

1. **Load Forecast Sensitivities.** Liberty notes in its Executive Summary (page ES-1), that Hydro "has not considered suitable sensitivities in its analysis". In its analysis, Hydro developed load forecast sensitivities it considered credible and possible. Hydro's intent in doing so was not to produce cases with limited variation in results, but rather to fully consider the implications of demand projections that Hydro considers likely in the context of the current economic climate and projected real electricity price increases: stable demand requirements, higher utility coincidence, and higher industrial coincidence. While Hydro will consider the 50 MW variation in 2019-2020 peak demand versus forecast, Hydro considers the potential for an incremental 50 MW over the P90 peak demand forecast, which includes an additional 60 MW of demand over the P50 peak demand forecast, unlikely.

2. **110 MW Recall Power.** Liberty notes that the ability to access 110 MW of recall power contributes to its conclusion that new capacity is not required at this time.[2] Hydro does not anticipate commercial or technical issues in delivering recall power from Churchill Falls to the Island Interconnected System ("IIS"). Hydro is establishing appropriate commercial arrangements with Nalcor to utilize the transmission lines, Labrador-Island Link ("LIL") and the new Labrador Transmission Assets, to deliver this power to customers on the IIS.

3. **Holyrood.** On page 9 of the Liberty ESRA Report, Liberty refers to Hydro's planned operating levels of Units 1 to 3 at 150 MW, 150 MW and 135 MW respectively as a "pseudo-de-rate". Further, Liberty makes the following observation:

> *The impact of this pseudo de-rate for supply calculations is nil, since the higher emergency outputs used in the model are credible. Perhaps the only real significance for our purposes is the apparent concern by Hydro for the units' fragility. Suffice it to say that if Hydro is concerned, the Board and other stakeholders should be too.*

Hydro is not concerned about the overall operation of the units. All Holyrood units, subject to required standard maintenance, are fully capable of running at their maximum continuous rating ("MCR") of 170 MW for Units 1 and 2, and 150 MW for Unit 3. As indicated in Table 7 of Hydro's ESRA, the MCR ratings are used for the calculation of expected unserved energy. However, in limiting the operating time of the units at their MCR to only times when necessary to meet customer load (and not

[2] Liberty ESRA Report, page 25.

for economic dispatch reasons), Hydro is simply being prudent and exercising its operating judgment, choosing to select other resources to allow for less stress and thereby more reliable production from Holyrood over the long term.

4. **Gas Turbines.** On pages 12 to 16 of the Liberty ESRA Report, Liberty makes several comments in respect of the gas turbines. Hydro will be submitting a separate report on these assets, shortly.

5. **Operational Reliability/Organizational Capabilities.** Liberty indicates on page 19 of the Liberty ESRA Report that "that the fundamental, yet all-important notion of utility culture and capabilities has gotten little attention at Hydro." On March 30, 2017, Hydro filed an extensive Operational Philosophy Report with the Board. This report details the focus and improvements Hydro has undertaken with respect to ensuring that its culture and organization will deliver reliable service for customers.

6. **NP-NLH-156 Clarification.** Liberty indicates on page 22 of the Liberty ESRA Report that it is assuming that NP-NLH-156 regarding the assumptions as to whether Maritime Link ("ML") imports are included in the cases is incorrectly stated. Both Hydro's response to NP-NLH-156 and Hydro's ESRA are correct in their assumptions regarding the Expected Case including availability of the ML for fall of 2019.

   As stated in NP-NLH-156: "Hydro's Energy Supply Risk Assessment only considered the benefit of import power over the ML in the context of its Expected Case parameters."

   From Section 7.3.1 of Hydro's Energy Supply Risk Assessment, Hydro's Expected Case, as defined as follows:

   > *The Expected Case reflects Hydro's anticipated system capability and P90 demand forecast with scheduled in-service of the Labrador Island Link and Maritime Link. The following assumptions were used to develop the Expected case for this analysis:*
   >
   > 1. *The study period is defined as Winter 2016-17 through Winter 2019-20 inclusive.*
   > 2. *Key in-service dates:*
   >   a. *TL267: Available for the 2017/2018 winter peak.*
   >   b. *The Labrador Island Link, the Maritime Link, and the Soldiers Pond Synchronous Condensers are in-service and available for the 2019-2020 winter peak.*
   > 3. *For the duration of the study period, the only power available for import over the LIL would be firm recall power from Labrador at a capacity of 110 MW at Soldiers Pond.*
   > 4. *For conservatism, this analysis considers no import over the ML, though the ML will be in-service and available.*

This means that in developing its Expected Case analysis, while Hydro expected both the LIL and the ML in service, Hydro considered only the availability of firm recall power from Labrador during the study period. The ESRA assumed the ML would be available with no import, that is, in service with 0 MW flowing over the ML on a firm basis.

Finally, given the importance of ensuring adequate near term supply for Hydro's customers, the majority of the analysis conducted in Hydro's ESRA focused on Hydro's supply risk should no interconnection to the North American grid be established through Winter 2019 to 2022. As such, the Fully Stressed Reference Case and all Sensitivity Load Projections provided a conservative analysis, assuming no connection to the North American grid (i.e., availability of supply from the ML or LIL).

7. **Post Muskrat Falls Capacity.** On page 30 of the Liberty ESRA Report, Liberty states the following:

> *Hydro has not responded to Liberty's concerns on post-Muskrat Falls needs and reliability, and perhaps Hydro will identify alternate solutions. Until then, Liberty believes that the need for post-Muskrat Falls capacity is valid and should be considered a major, and perhaps a deciding, influence in the pre-Muskrat Falls supply question.*

Hydro respectfully disagrees with this assessment. Hydro submits it has provided evidence on both the issue of reliability and the issue of need in the post Muskrat Falls period. While certain analyses are still underway, Hydro has provided responses to these questions as and when requested.

In PUB-NLH-589, Hydro directly addressed the issue of post- Muskrat Falls capacity in its determination of Lost of Load Hours ("LOLH") resultant from one bipolar trip without the availability of the ML. Table 2 of this response included Hydro's forecast capacity and evaluation of supply adequacy by calculation of LOLH for a range of bipolar repair times from 2020 to 2035.

Prior to this most recent response, in PUB-NLH-047, Hydro filed its 2012 Generation Planning Issues report, as well as responses to CA-NLH-028, CA-NLH-081 and CA-NLH-082. These RFIs indicated that reliability of supply will be improved following commissioning of the Muskrat Falls and LIL projects and provided detail in that regard.

Conclusion

As detailed in Appendix "A", Hydro accepts the recommendations of the Liberty ESRA Report and proposes both timelines and actions to fulfil these recommendations.

As noted in Hydro's Operational Philosophy Report and in this submission, Hydro continues to take a considered and robust approach to ensuring reliability of the IIS, and particularly in

the immediate period prior to interconnection via the LIL and the ML. Through the ongoing Energy Supply Risk Assessment process, Hydro will continue to monitor conditions to mitigate risk to energy supply to the island.

Hydro appreciates the opportunity to provide this submission and respectfully requests the ability to respond to any submissions from other parties on the Liberty ESRA Report, as and when filed.

Yours truly,

Newfoundland & Labrador Hydro

Geoffrey P. Young
Corporate Secretary & General Counsel

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Roberta Frampton Benefiel – Grand Riverkeeper Labrador
Dennis Browne, Q.C. – Consumer Advocate
Danny Dumaresque

ecc: Denis Fleming- Vale Newfoundland & Labrador Limited
Larry Bartlett – Teck Resources Ltd.

HYDRO RESPONSE TO LIBERTY ESRA REPORT RECOMMENDATIONS

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Pre-Muskrat Falls Supply Needs			
1	New pre-Muskrat Falls supply should not be pursued further at this time.	Y	N/A. Hydro agrees with this recommendation.
2	The need for pre-Muskrat Falls supply should be reconsidered in one year, or sooner, if major assumptions change, including but not limited to: • The feasibility of the recall power • The load forecast • Muskrat Falls delays	Y	In the pre-Muskrat Falls period, should a material change in any of these assumptions noted result in a negative impact on Hydro's available capacity (without a corresponding risk mitigation opportunity), Hydro will work with the Board in reconsidering the need for pre-Muskrat Falls supply.

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Pre-Muskrat Falls Supply Needs			
3	If a new combustion turbine ("CT") is determined to be a post-Muskrat Falls supply need, the desirability of advancing that CT into the pre-Muskrat Falls window should be evaluated.	Y	Options to meet system capacity requirements continue to be considered by Hydro during its ongoing long-term load forecasting and generation capacity requirements review processes. Any time a generation capacity requirement is identified by Hydro, analysis is performed as to the reliability benefits and economic justification of timing of in-service of that potential source. If additional generation were to be identified as required in the post Muskrat Falls period, a pre-Muskrat Falls implementation would be considered as part of Hydro's evaluation process. As part of its supply planning process, Hydro continues to consider a myriad of potential supply sources including an 8th unit at Bay D'Espoir, combustion turbines, continued capacity assistance, and market opportunities.

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Managing Risk Factors			
4	Hydro should continue its aggressive efforts to improve Holyrood reliability and should add initiatives aimed at lowering the risk of catastrophic events, such as extended outages or multi-unit failures.	Y	Hydro is continuing its efforts to improve Holyrood reliability and in particular is engaged a number of activities, including but not limited to, the following: • Redundant raw water line from QuarryBrook Dam - 2018 project pushing to install in single year (2018); • Marine terminal condition assessment including piling inspection by divers (scheduled for this spring); • Installation of the new DC starter panels for the DC lube oil pumps (Unit 1 and Unit 2) (planned for 2017 unit outages) • Refresh of Level 1 condition assessment (2017); • Continuation of Level 2 work with ASME on high energy piping and boiler components (2017); • Specialized boiler tube survey Unit 3 NOTIS inspection of High temp superheater (Unit 3 outage); • Generator stator condition assessment by IRIS power (completed) • Detailed generator electrical testing of Unit 2 (this year) and Unit 1 (2018) (Unit 3 done in 2016); • Purchase of capital spares: o 2017 - Capstan Gearbox, Stage 1 Rectifying Transformer, o 2018 - Stage 2 Rectifying Transformer, 1500 KVA Auxiliary Board Transformer, Stage 2 DC Lube oil pump motor; • Travelling screen rebuilds: o 2017 - Unit 1, o 2018 - Unit 3;

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Managing Risk Factors			
			• Condition Assessment of CW pump house floor beams (2017); • Critical training plans for Operators (boiler operation, station service, turbine governor, DCS/BMS), Electricians and Instrumentation (station service, turbine governor, DCS/BMS); and • Organization/Staffing - plans in place to ensure a dedicated and competent work force.
5	Hydro should develop a "replacement plan" for the Hardwoods and Stephenville units with a recommendation for when the units will be retired.	Y	Hydro's planning process considers generation supply on a system basis to ensure that, in concert with transmission planning criteria, sufficient resources exist to meet customer requirements. Hydro includes the planned retirement of its assets as part of that process. Hydro considers the retirement dates of its assets in its assessment of its ability to meet system requirements. Should a supply requirement be identified as part of that process, Hydro will identify and evaluate suitable supply options to ensure generation supply reliability. As such, Hydro does not develop replacement plans for individual assets, but rather, takes a holistic view of its supply and demand requirements through its planning process.

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Managing Risk Factors			
6	Hydro should avoid significant investments in Hardwoods or Stephenville under the assumption that meaningful reliability improvements are not practical.	Y	Hydro continues to optimize spending in respect of these two assets and has sought approval for capital spending where necessary and prudent to do so. While Hydro recognizes the age of these assets, the alternators have significant remaining life, particularly as sync condensers. Hydro continues to evaluate carefully its investment in these assets.
7	Hydro should promptly report to the Board in the event that the in-service date of TL-267 is in jeopardy, such report to include the effect on supply risks for the next pending winter.	Y	As of the current report to the Board on this project, dated April 13, 2017, the in-service date for this project remains on schedule (October 31, 2017).

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Current ESRA Modifications			
8	Hydro should provide the Board a brief report on the effects of the following perturbations on EUE, expressed numerically as opposed to "pass-fail": • Holyrood DAFOR = 20% • CT UFOP = 30% and a case for 50% • 50 MW variation in 2019-20 peak demand versus the forecast • Two-year delay in Muskrat Falls	Y	Hydro agrees. Hydro proposes that this be included as a sensitivity in the next Hydro ESRA update to be filed by May 15, 2017. Hydro also notes the following: • CT UFOP: This would be for the Hardwoods and Stephenville CTs only, and not for the Holyrood CT; and • Two-year delay in Muskrat Falls: Hydro will extend its analysis to the 2022 timeframe, and in the vein of the Board's original request, will assume that the fully stressed case continues to have no interconnection to the North American grid.
9	Hydro should clarify, or alternately eliminate, its assumptions for Holyrood outages "in the operating season".	Y	This will be clarified in the ESRA Report update to be filed by Hydro in May 2017.
10(a)	Hydro or Newfoundland Power should provide: a) Any Conference Board outlooks after 2016, including any that form the basis for the current load forecast	N/A	Newfoundland Power subscribes to this service, which it uses as an input to its operating forecast as provided bi-annually to Hydro. Hydro suggests that this recommendation be directed to Newfoundland Power.
10(b)	b) Hydro and NP's basis for extrapolating the Conference Board's conclusions to the end of the study period	N/A	Newfoundland Power subscribes to this service, which it uses as an input to its operating forecast as provided bi-annually to Hydro. Hydro suggests that this recommendation be directed to Newfoundland Power.
10(c)	c) Any Conference Board information available on the economic outlook beyond 2017	N/A	Newfoundland Power subscribes to this service, which it uses as an input to its operating forecast as provided bi-annually to Hydro. Hydro suggests that this recommendation be directed to Newfoundland Power.

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Future ESRA Modifications			
11	Hydro should include a more thorough analysis of risks and uncertainties in future ESRAs, specifically addressing the degree of uncertainty in variables and conclusions as well as the risk those uncertainties produce.	Y	Hydro agrees, and will work to incorporate this recommendation.
12	Hydro should include a balancing of priorities in future ESRAs, such as cost versus reliability, incremental reliability benefits and cost benefit analysis.	Y	Hydro evaluates the reliability of its system in consideration of established generation and transmission planning criteria. Upon identification of a violation, Hydro will perform a cost-benefit analysis on options to mitigate that violation.
13	Hydro's focus on EUE as the primary indicator of supply adequacy is acceptable; however, reports should also provide some indication of impact on LOLP and, if Hydro continues its use, LOLH.	Y	Hydro agrees, and will include LOLH in its next ESRA filing. However, Hydro does not use LOLP.

#	RECOMMENDATION	ACCEPTED (Y/N)	PROPOSED HYDRO IMPLEMENTATION
Current ESRA Modifications			
14	Hydro should investigate the degree to which the potential for catastrophic events at Holyrood (extended outages or multi-unit failures) can be reflected in the model.	Y	Catastrophic events can be looked at in two ways: (a) on a probabilistic basis or (b) on a deterministic basic. Catastrophic events are typically very low probability, very high consequence. In the calculation of EUE and LOLH, Hydro currently includes the potential for catastrophic events. However, that is on a probabilistic basis. Note that the calculation of EUE, a probabilistic measure, considers the likelihood of concurrent outages, as the likelihood of unit availability, in this case measured by DAFOR, is embedded in the calculation itself. A catastrophic event at Holyrood or Bay D'Espoir would engage Hydro's emergency procedures as detailed in PUB-NLH-217.
15	Hydro should investigate the use of a demand-related reliability measure (DAUFOP) rather than DAFOR for Holyrood in that the plant is not base load and the demand period performance is all-important.	Y	Hydro has investigated this and will discuss the results of its review in the May 2017 ESRA.
16	Hydro should drop the use of UFOP for the CTs as inadequate and inaccurate and seek an alternate measure (such as DAUFOP).	Y	Hydro has investigated this and will discuss the results of its review in the May 2017 ESRA.