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December 15, 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: Newfoundland and Labrador Hydro - the Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System - *Near-Term Generation Adequacy Report* – Follow Up

Further to the Board's correspondence of December 4 2017, Hydro is enclosing the requested update, under the items noted within that correspondence.

By letter dated December 4, 2017, the Board requested follow-up information from Hydro regarding the information produced in the *Near-Term Generation Adequacy Report* dated November 15, 2017. In response, Hydro is providing the following information regarding thermal generation requirements, Holyrood Thermal Generating Station reliability under increased usage, and Gas Turbine reliability metrics.

Thermal Generation Requirements

Holyrood Thermal Generating Station (Holyrood) provides energy to the Island Interconnected System (IIS) to meet customer requirements that cannot be met by hydraulic generation and purchased power. The amount of required generation from Holyrood varies based on hydrology. In periods with higher than average hydrology, Hydro can reduce its thermal generation to the extent possible to minimize spill. Similarly, in periods of lower than average hydrology, Hydro can increase generation at Holyrood to compensate. On November 1, 2017 in response to reservoir levels and lower than average inflows, Hydro increased generation above minimum from the Holyrood. For most of November, generation at Holyrood has been maximized at the units while staying within operating limits. To date in 2017, there has been no use of standby units to support system reservoirs.

The decisions to operate Holyrood above minimum are made based on the comparison of current water levels to the historic record, knowledge of recent inflows, weather forecasts, and the long term weather outlook. As part of its water management process, Hydro plans to be able to maintain supply even during a repeat of any of the driest historic inflow sequences to ensure its ability to meet customer requirements for the IIS. The water management analysis results in early November indicated that a repeat of the driest fall/winter hydraulic sequences would require generation at Holyrood at 150 MW, 150 MW, and 135 MW for Units 1, 2, and 3 respectively, until the spring freshet in 2018. These generation levels are comparable with the normal operating levels for the

Holyrood units presented in Section 5.1.2 of Hydro's *Near-Term Generation Adequacy Report*, filed November 15, 2017. Table 1 presents both this winter's current expected maximum capacity and the normal operating limits for the Holyrood units presented in that report.

Table 1 Holyrood Unit Ratings for Winter 2017/2018 Operating Season

Unit	Maximum Available Capacity	Normal Operating Limits
1	150	150
2	160	150
3	150	135

Hydro will continue to monitor the reservoirs and their watersheds closely and dispatch appropriate Holyrood generation as required. Hydro will continue to report on available system energy as part of its *Energy Supply Report*, submitted monthly to the Board.

It is important to note that Hydro's analysis presented to date is conservative and does not include energy available over the Maritime Link (ML) or other sources of thermal generation. The ML is scheduled to be in service in January 2018 with a capacity of 300 MW[1]. If it is cost effective, Hydro can purchase energy over the ML to offset Holyrood generation and/or support reservoir levels. Further, Hydro has 248 MW of standby thermal generation in the form of gas turbines and diesel units that could be used as required to meet system needs.

Table 2 provides the current monthly estimated energy output from Holyrood until May, 2018 alongside the planned output from Hydro's *2017 General Rate Application* (GRA) filing. The GRA submission planned output is based on average hydraulic inflows. Therefore, in any year, the expected output from Holyrood will be higher or lower than what is forecast in the GRA, based on change in load or inflows compared to average. Table 2 also shows the planned gas turbine output from the 2017 GRA submission, which did not include any generation for energy. Currently, Hydro does not require standby generation to support reservoir levels. If conditions similar to the historic dry sequence were to occur in this coming winter, Hydro could require standby generation to be operated for energy. Should this occur, Hydro will inform the Board in advance of such conditions.

[1] Please refer to Figure 8-1 of the Operational Studies – Stage 1 (revised) and Stage 2 reports. http://www.pub.nl.ca/applications/IslandInterconnectedSystem/phasetwo/files/reports/From%20NLH%20-%20Operational%20Study%20-%20Stage%201%20-%20Addition%20of%20the%20Maritime%20Link%20-%20Revision%201%20-%202017-11-28.PDF

Table 2 Monthly Energy Output Thermal Generation

Year	Holyrood Forecast Production (GWh)			Gas Turbine Forecast Production (GWh)[2][3]		
	Expected[4]	Driest Sequence	Difference	Hardwoods	Stephenville	Holyrood
December 2017	241	254	13	0.9	0.1	3.0
January 2018	281	304	23	3.0	0.1	9.7
February 2018	253	275	22	2.9	0.1	6.4
March 2018	281	304	23	1.8	0.1	5.2
April 2018	146	261	115	1.6	0.0	3.1
May 2018	71	160	89	0.0	0.0	0.1
June 2018	4	81	77	0.0	0.0	0.1
Total	**1,276**	**1,638**	**362**	**10**	**0**	**28**

Holyrood Reliability

Hydro expects to generate up to an additional 362 GWh of energy, in the case of the driest historical sequence, between now and May, 2018. Hydro does not anticipate reliability issues related to the current planned level of Holyrood generation as the plant's maintenance is completed with the expectation it could have to operate to the maximum possible capability.

As detailed in Section 8.4 of Hydro's Winter Readiness update, filed with the Board December 8, 2017, Holyrood Units 1 and 2 will be available to 150 MW and 160 MW, respectively, as required to meet customer demand requirements during the winter operating season for 2017/2018. Unit 1 and Unit 2 are derated to 150 MW and 160 MW respectively due to high furnace pressure resulting from fouling of the economizer and air heaters. Unit 3 is expected to be available at full capacity. For energy supply requirements, Hydro intends to continue operating the units to the normal operating limits presented in Section 5.1.2 of Hydro's *Near-term Generation Adequacy Report*, filed November 15, 2017.

The planned generation levels for the Holyrood units included in Hydro's response to current reservoir conditions are consistent with the normal operating limits, as presented in Table 1. These generation levels are in the optimal range for efficiency and reliability and align with Hydro's normal operation protocol used through the winter of 2016/2017. Hydro continues to do all required checks and will intervene, as required, with proactive preventive maintenance on these units as system conditions permit. A notable example of such is the continued performance of air heater washes[5], which helps to ensure units are available to their maximum capability. Note that it is Hydro's

[2] Expected case as submitted in 2017 GRA

[3] Gas turbine production currently expected to remain consistent with GRA filing

[4] Please refer to Figure 8-1 of the Operational Studies – Stage 1 (revised) and Stage 2 reports. http://www.pub.nl.ca/applications/IslandInterconnectedSystem/phasetwo/files/reports/From%20NLH%20-%20Operational%20Study%20-%20Stage%201%20-%20Addition%20of%20the%20Maritime%20Link%20-%20Revision%201%20-%202017-11-28.PDF

[5] Air heater washes are planned maintenance interventions to remove accumulated soot in the air heaters during operation, thereby marginally reducing overall furnace pressures and enabling higher unit loads before reaching alarm points and limiting load.

experience that Holyrood units operate more efficiently at higher load levels and, as such, can require less maintenance to maintain acceptable levels of reliability. For example, production at higher levels typically reduces the requirement for air heater washes as less fouling occurs at higher load levels.

Gas Turbine Reliability

In its *Near-Term Generation Adequacy Report*, Hydro presented analysis using Derated Adjusted Utilization Forced Outage Probability (DAUFOP) as a measure of gas turbine reliability. The value selected for DAUFOP was 30% for the Hardwoods and Stephenville gas turbines and 5% for the Holyrood gas turbine. These values were deemed appropriate based on age, condition, recent unit performance, and the availability of loaner engines. In particular, to ensure it is positioned to reduce the potential impact of unit unavailability this coming winter season, Hydro will maintain two loaner engines in the province. In 2016, Hydro maintained one loaner engine. Prior to 2016, Hydro did not maintain any loaner engines.

In the analysis for the *Near-Term Generation Adequacy Report*, Hydro used a 20% Utilization Forced Outage Probability (UFOP) for Hardwoods and Stephenville. Hydro now considers both UFOP and DAUFOP as measures of gas turbine reliability. DAUFOP is the probability that a generating unit will not be available due to forced outages or forced deratings when there is demand on the unit to generate. It is essentially the UFOP calculation adjusted to include the effect of deratings on a unit's availability. It is important to note that this represents a broader perspective on reliability and how it is in the adequacy of the system and not a change in the reliability of the system. The annual calculations of DAUFOP for Hydro's gas turbines can be seen in Table 3.

Hydro considers the DAUFOP from the most recent two years as reflective of how the gas turbines will perform in the near future. In particular, the Stephenville Gas Turbine was out of service for approximately 18 months, from December 2011 until June 2013 because of a generator failure that required the generator stator to be rewound. This resulted in a DAUFOP of 100% in 2012 and 70.27% in 2013. In 2014, one of the units in Stephenville failed, and the entire unit was derated to 25 MW for most of the year, resulting in a DAUFOP of 49.27%. The availability of two loaner units reduces the likelihood of extended outages and reduces the likelihood of higher DAUFOP levels in the coming winter period for similar circumstances.

Table 3 Annual Gas Turbine DAUFOP 2012-2016

	Gas Turbine				
Year	Happy Valley	Hardwoods	Stephenville[6]	Holyrood	CEA Average
2012	20.56	32.16	100	-	27.04
2013	2.56	23.07	70.27	-	20.53
2014	0.01	34.78	49.27	-	19.96
2015	14.56	18.90	31.47	3.06	25.82
2016	5.03	27.26	35.27	1.73	21.43

[6] The SVL GT was out of service for all of 2012. The DAUFOP for this year is technically undefined.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

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Legal Counsel & Assistant Corporate Secretary
MSL/skc

Encl.

cc: Gerard Hayes – Newfoundland Power
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