

1 Q. Please provide a detailed quantitative and qualitative analysis of the reliability of  
2 supply on 1) Hydro's Interconnected System, and 2) the Avalon Peninsula,  
3 comparing the situation in 2013 (pre-Muskrat Falls) to the situation in 2020 (post  
4 Muskrat Falls with Holyrood TGS retired). Specifically, will the reliability of supply be  
5 improved following commissioning of the Muskrat Falls and associated transmission  
6 project, and if so, by how much?

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9 A. Hydro plans generation supply on a system basis as all generation operates in  
10 concert to meet the entire system load. The reliability in regions of the system such  
11 as on the Avalon Peninsula is assessed using transmission planning criteria. Once  
12 generation supply requirements are determined and if the least cost source is a  
13 combustion turbine or other source that is not tied to a specific site such as a  
14 hydroelectric or wind generation site, the location of the source will be established  
15 considering regional reliability requirements. This response assesses generation  
16 supply reliability for the entire Island Interconnected System as Hydro does not  
17 assess generation supply on a regional basis.

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19 From a quantitative point-of-view, the reliability of supply will be improved  
20 following commissioning of the Muskrat Falls and associated transmission projects,  
21 after the retirement of the Holyrood TGS. As shown in Table 1, prior to the  
22 completion of the Muskrat Falls and Labrador Island Link (LIL) projects, in 2015,  
23 2016 and 2017, the LOLH are calculated to be 0.73, 0.99 and 1.02 hours per year,  
24 respectively (LOLH for 2013 was calculated to be 0.92 hours per year (see Hydro's  
25 response to GT-PUB-NLH-003 in the *100 MW Combustion Turbine Generation –*  
26 *Holyrood* proceeding, attached as CA-NLH-081 Attachment 1)). Following the  
27 completion of the Muskrat Falls and LIL projects in 2018, the system LOLH for the

1 period 2018 through 2021 (when the Holyrood TGS is still in-service) ranges  
2 between 0.15 and 0.18 hours per year. Following retirement of the Holyrood TGS in  
3 2021, the system LOLH in 2022 would be 0.19 hours per year. As the LOLH values  
4 are lower following the completion of the Muskrat Falls and LIL projects, the  
5 generation supply reliability is significantly improved both before and after the  
6 retirement of the Holyrood TGS.

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8 Qualitatively, Muskrat Falls and the associated transmission projects have a  
9 combined forced outage rate significantly lower than that of the Holyrood TGS,  
10 making for overall improved reliability.

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12 When considering the Avalon Peninsula, the pre-Muskrat Falls and post-Muskrat  
13 Falls supply picture changes significantly. Hydro's response to NP-NLH-002 in the  
14 *BDE to Western Avalon Line* proceeding (attached as CA-NLH-081 Attachment 2)  
15 details the changes in regional (on Avalon) generation and transmission line infeed  
16 capability to the Avalon Peninsula. Hydro's transmission planning criteria requires  
17 the system to be able to supply peak load with a single transmission element out of  
18 service. In the application of these criteria, regional generation is assumed available  
19 to supplement the remaining transmission capability.

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21 The current Avalon Peninsula peak load is approximately 840 MW and is anticipated  
22 to grow to around 920 MW by 2020<sup>1</sup>. Based on CA-NLH-081 Attachment 2, for the  
23 pre-Muskrat Falls scenario for a single contingency loss on the Bay d'Espoir to  
24 Western Avalon transmission corridor the supply capacity to the Avalon Peninsula

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<sup>1</sup> This includes Newfoundland Power Avalon load plus the Vale and Praxair industrial load.

1 would be approximately 603 MW (from local generation)<sup>2</sup>, 726 MW considering the  
2 new Holyrood combustion turbine plus 370 MW (via the Bay d’Espoir to Western  
3 Avalon corridor), for a total capacity of 973 MW to 1096 MW. In the post-Muskrat  
4 Falls case, the most onerous transmission contingency would be for the rare  
5 occurrence of the complete loss of the 830 MW LIL. During this contingency, the  
6 supply capacity available to the Avalon Peninsula would be 257<sup>3</sup> MW from local  
7 generation and up to 966<sup>4</sup> MW via the Bay d’Espoir corridor for a total of 1223 MW.  
8 In fact, considering the double contingency of the total loss of the LIL and one  
9 circuit in the Bay d’Espoir to Western Avalon Transmission corridor, the remaining  
10 supply capacity would still be 676<sup>5</sup> MW via the Bay d’Espoir to Western Avalon  
11 corridor plus 257 MW from local generation for a total supply capacity of 933 MW.  
12 Thus, the post-Muskrat Falls configuration will provide enhanced reliability for  
13 customers on the Avalon Peninsula.

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15 Table 1 is from Hydro's response to CA-NLH-022 (Revision 1, Dec 18 -14), *2013 NLH*  
16 *General Rate Application*.

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<sup>2</sup> Local generation includes the Holyrood TGS plus Hydro and Newfoundland Power standby generation on the Avalon Peninsula (does not include new Holyrood combustion turbine).

<sup>3</sup> Includes existing Hydro and Newfoundland Power standby generation, including the new Holyrood combustion turbine.

<sup>4</sup> Assumes new Bay d’Espoir to Western Avalon transmission line and additional voltage compensation provided by the Soldier’s Pond synchronous condenser plant.

<sup>5</sup> Assumes additional voltage compensation provided by the Soldier’s Pond synchronous condenser plant.

Table 1

**Island Connected System  
Load Forecast and Capacity and Energy Balances  
With Proposed Additions**

Year	<u>Load Forecast</u>		<u>Existing and Proposed System</u>				
	<b>Peak MW</b>	<b>Energy GWh</b>	<b>Net<sup>1,2,3,4</sup> Capacity MW</b>	<b>Firm<sup>1,5,6</sup> Capability GWh</b>	<b>LOLH hrs/yr</b>	<b>Energy<sup>5</sup> Balance GWh</b>	<b>Interruptible Contracts MW</b>
2015	1,721	8,745	1978	8,940	0.73	195	75.8
2016	1,736	8,902	1978	8,940	0.99	38	75.8
2017	1,755	8,921	1978	8,940	1.02	19	75.8
2018	1,757	8,914	2953	12,791	0.15	3,877	75.8
2019	1,760	8,949	2953	13,024	0.16	4,075	N/A
2020	1,766	9,016	2953	13,024	0.16	4,008	N/A
2021	1,781	9,113	2953	10,028	0.18	915	N/A
2022	1,801	9,243	2487	10,028	0.19	785	N/A
2023	1,824	9,325	2479	10,067	0.20	742	N/A
2024	1,841	9,429	2479	10,202	0.21	773	N/A
2025	1,861	9,522	2479	10,202	0.22	680	N/A
2026	1,879	9,595	2429	10,202	0.23	607	N/A
2027	1,894	9,692	2429	10,202	0.24	510	N/A
2028	1,912	9,783	2429	10,035	0.25	252	N/A
2029	1,929	9,848	2379	10,035	0.27	187	N/A
2030	1,942	9,930	2379	10,035	0.29	105	N/A
2031	1,958	10,012	2379	10,035	0.30	23	N/A

<sup>1</sup> Assumes Muskrat Falls, Labrador-Island Link and Maritime Island Link in-service in 2018.

Assumes that Holyrood shuts down in 2021.

Assumes that CBPP Co-Generation NUG contract is not renewed in 2023.

Assumes that Hardwoods CT shuts down in 2025.

Assumes that Stephenville CT shuts down in 2028.

<sup>2</sup> Assumes capacity is available through market or other contractual means to enable full use of the available transmission capacity.

<sup>3</sup> Assumes capacity at winter peak of 121 MW for NP and 113 MW for Deer Lake Power.

<sup>4</sup> Assumes capacity at winter peak of 18 MW for Star Lake, 8 MW for

Corner Brook Co-gen and 63 MW for Nalcor Grand Falls and Bishop's Falls. Rattle Brook, Nalcor Buchans, St. Lawrence Wind and Fermeuse Wind are assumed to have 0 MW capacity at winter peak.

- <sup>5</sup> Firm Energy Capability does not include energy capability of installed combustion turbines. It does include firm off-island energy sources, including Muskrat Falls and 1,000 GWh from the Churchill Falls recall block surplus to Labrador requirements.
- <sup>6</sup> Firm capability for the hydroelectric resources is the energy capability of those resources under the most adverse sequence of reservoir inflows occurring within the historical record. Firm capability for the thermal resources (HTGS) is based on energy capability adjusted for maintenance and forced outages.

**100 MW Combustion Turbine Generation - Holyrood**

1 Q. Update Table 1 on page 1 of the Report to provide the actual LOLH for 2013 and for  
2 2014 using actual to May 31, 2014 and forecast for the remainder of the year.

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5 A. Please see updated Table 1a, below.

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**Table 1: Island System Loss of Load Hours (LOLH) from Report**

**2013 - 2020**

<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
0.97	2.48	3.85	5.10	4.98	0.15	0.16	0.16

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The LOLH for 2013 and 2014 in Table 1a has been updated using actual monthly peak demands for 2013 and up to May 31, 2014 and forecast for the remainder of 2014. Thermal generation reliability indicators (UFOPs and DAFORs) were not updated. The new 120 MW combustion turbine is assumed to be in-service in December 2014.

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**Table 1a: Island System Loss of Load Hours (LOLH) – Updated 2013 and 2014**

**2013 - 2020**

<b>2013</b>	<b>2014</b>
0.92	3.40

1 Q. Please indicate the forecast generating capacity that will be located on the Avalon  
2 Peninsula following the decommissioning of the Holyrood Thermal Generating  
3 Station.

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6 A. Following the decommissioning of the Holyrood Thermal Generating Station, it is  
7 anticipated that the following generating capacity will be located on the Avalon  
8 Peninsula:

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Generation	Net Capacity (MW)
Holyrood combustion turbine	120
Hardwoods combustion turbine	50
Fermeuse wind farm	27
Newfoundland Power hydro-electric	60
<b>Total</b>	<b>257</b>

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11 In the current configuration, with Holyrood operational, there is approximately 603  
12 MW of generation on the Avalon Peninsula and as referenced in the response in CA-  
13 NLH-001, a total winter peak available transmission infeed capacity via the Bay  
14 d’Espoir to Western Avalon corridor of 739 MW (369.5 MW Firm) for a total supply  
15 capacity of 1342 MW. Following the decommissioning of the Holyrood Thermal  
16 Generating Station, there will be 257 MW of on-Avalon generation and there will be  
17 two available transmission infeeds , approximately 830 MW via the HVdc Labrador-  
18 Island Link and approximately 966.5 MW( 675.8 MW Firm) via the Bay d’Espoir to  
19 Western Avalon corridor for a total supply capacity of approximately 2054 MW..