

Questions and Answers

Electricity Demand and Supply in NL – Updated August 20, 2014

July 2014

- Q1. The Muskrat Falls analysis was based on the full output of Muskrat Falls and remaining recall from Churchill Falls being available to NL ratepayers, with the completion of the Labrador Island Link. The analysis completed by Nalcor, and submitted to the PUB did not include the 167 MW which must be delivered to Nova Scotia during peak demand in Newfoundland in the winter or the requirement in the Energy Access Agreement to supply additional energy in the amount of a minimum yearly average of 1.2 TWh of “market” energy. Nor did it include any sales of additional energy or capacity to Labrador Mining. Will Nalcor be undertaking a revised Strategist run for the 50 year Muskrat Falls analysis period, with these additional obligations included? Any increase in peak load due to increasing penetration of space heating will only serve to exacerbate any shortfalls in winter, due to these additional obligations.**
- A1. Yes, Nalcor will complete the next generation expansion study with Strategist, Newfoundland and Labrador Hydro will update the model with the relevant additions since Decision Gate 3, in the areas of forecasted loads, electricity supply and electricity contracts. This study is scheduled to be carried out later in 2014.
- Q2. What Capacity (in terms of MW) will be available to Newfoundland and Labrador Hydro (NLH) at Soldiers Pond in the months of January – May respectfully, and how does this compare to the Strategist calculations performed by Nalcor in support of the Muskrat Falls decision as the lowest cost option for ratepayers?**
- A2. In the months of January to May, up to 673 MW of capacity will be available to Newfoundland and Labrador Hydro at Soldier’s Pond. The Strategist analysis performed in support of the Decision Gate 3 (DG3) Muskrat Falls decision assumed up to 830 MW available at Soldiers Pond.
- Q3. Does Nalcor’s obligations to Emera (the peak delivery of 167 MW, or sales of any surplus energy) potentially compromise the delivery to NLH?**
- A3. Nalcor’s agreements with Emera do not impact the delivery of firm energy contracted from Muskrat Falls to meet the electricity needs of Newfoundlanders and Labradorians.

The development of Muskrat Falls is for the benefit of ratepayers in our province and for the benefit of all Newfoundlanders and Labradorians. Muskrat Falls and the transmission link between Labrador and the island is the lowest-cost option to meet the electricity demands in our province. Once in service, Muskrat Falls will also provide long-term stable electricity rates for generations of Newfoundlanders and Labradorians.

The Nova Scotia Block (including the supplemental energy) is associated with the Muskrat Falls

generating station and the transmission projects and comes from the 20-for-20 principle. Through this arrangement Nalcor has secured transmission access to and through the Maritime Provinces.

The commitments under the Energy Access Agreement (EAA) are not associated with any one project, but rather are tied to the surplus generation production that comes from Nalcor's entire hydroelectric generation fleet in the province. While today we manage hydrology fluctuations by varying production at Holyrood, once the island is interconnected and Holyrood is shut down, we will manage these hydrology fluctuations through export activity. In any event, the needs of electricity consumers in Newfoundland and Labrador take priority over any export sales under this agreement.

Q4. Can 900 MW be guaranteed over the Labrador Island Link, which served as the basis of Nalcor's analysis in support of the Muskrat Falls sanctioning?

A4. The Labrador-Island Transmission Link (HVdc system) will be capable of transmitting 900 MW from Muskrat Falls at any time during normal bipole operation. In the unlikely event of a forced outage, the link will be capable of transmitting 900 MW on one pole for a short period of time, and transmission capacity will be ramped back to 675 MW. Transmission losses are fully accounted for in all of Nalcor's calculations. Forced outage rates for the link are also incorporated into the reliability model which were discussed at length during the Public Utility Board's Decision Gate 2 review.

Q5. Is the firm winter capacity of Muskrat as a run of the river plant 824 MW?

A5. Yes. The rated capacity of the Muskrat Falls plant is 824 MW, with average annual production of 4.9 terawatt hours per year. The plant will be operated in a manner similar to how Hydro operates its facilities on the island and water will be managed to match the demands placed upon it by its customers.

January 2014

Q1. How many developed generation hydro sites are located on the Island of NL and what is the generation capacity. How many possible generating sites are located on the Island of NL that have not been developed to date and what is their generating capacity?

A1. Information on Newfoundland and Labrador Hydro's (Hydro) generation sites are located on our website at: www.nlh.nl.ca. The following hydroelectric generation sites are located on the island and are owned or operated by Nalcor Energy and our subsidiary Hydro. There are other hydroelectric generation sites that are owned and operated by Newfoundland Power and other non-utility generators. We have only listed the assets under our direct ownership/operation. Bay d'Espoir, 604 MW; Cat Arm, 127 MW; Upper Salmon, 84 MW; Hinds Lake, 75 MW; Granite Canal, 41 MW; Paradise River, 8 MW; Snooks Arm and Venams Bight, 1 MW; Roddickton, 0.4 MW; Star Lake 18 MW; Bishop's Falls 20 MW; Grand Falls 74 MW; Buchans 2 MW.

For the analysis to determine the least-cost alternative to meeting the province’s long-term energy needs, three hydroelectric sites were included in the Isolated Island alternative. These included: Island Pond, 36 MW; Portland Creek, 23 MW; and Round Pond 18 MW. Hydro has looked at other generating sites on the island; however, they lack storage and are therefore not generally useful in meeting our winter demand peak.

Q2. How many generators are located on the Island of NL and what is the generating capacity of each i.e. Holyrood, Hardwoods, Stephenville etc.

A2. Information on Hydro’s thermal generation sites are located on our website at: www.nlh.nl.ca. The following thermal generation sites are located on the island and are owned or operated by Hydro. There are other thermal generating sites that are owned and operated by Newfoundland Power. We have only listed the assets under our direct ownership/operation.

The following is a list of these thermal generating assets on the island and their total installed generating capacity: Holyrood Thermal Generating Station, 490 MW; Hardwoods gas turbine, 50 MW; Stephenville gas turbine, 50 MW; St. Anthony diesel 9.7 MW; and Hawke’s Bay diesel 5 MW.

Q3. What is the total power required today in the Island of NL during peak periods (winter) and during lower needs periods such as summer.

A3. In 2013, the winter Hydro System peak demand was 1500 MW. The Total Island Interconnected peak was 1650 MW.

In 2013, the summer Hydro System peak was 680 MW. The Total Island Interconnected peak was 819 MW.

Please see the information filed with the PUB on Hydro’s forecast peak. You can find the full explanation online at the following link:

<http://www.pub.nl.ca/applications/IslandInterconnectedSystem/files/rfi/PUB-NLH-011.pdf>

Q4. What are the average power requirements for the various areas of the province i.e. the Avalon, Central, and the west coast.

A4. The winter average is the monthly average for January. The summer average is the monthly average for July. The summer peak was taken over the two-month period between July and August.

	Winter Average January (MW)	Summer Average, July (MW)	Winter Peak, December (MW)	Summer Peak, August (MW)
Avalon	557	247	750	297
Central	190	83	265	142
West	157	71	208	106
Burin	43	16	59	22
Rural	56	26	78	54

Q5. How many hours did the Holyrood generating station operate during each of the years from 2001 to 2012 and what was the average capacity at which the plant operated during those years.

A5. The Holyrood Generating Station is a critical generation source on the island of Newfoundland. Holyrood is one of many generating stations that supplies electricity for the whole island, not just the Avalon Peninsula. The operation of the Holyrood plant is influenced by many external factors including weather patterns and demand for electricity.

The production schedule for the Holyrood plant is driven by three things: total power requirement on the Island Interconnected System during peak load periods (8 a.m. to 8 p.m.), total power requirements on the Avalon Peninsula during peak load periods, and the water storage levels in Hydro’s reservoirs.

These factors affect the amount of production required from the plant in a given year. Hydro’s System Operations Department monitors the Avalon load requirement on a daily basis to ensure the correct number of Holyrood units are online.

Also, through a commitment to minimize the impact of its operations on the environment, Hydro works to reduce the amount of time the Holyrood plant is operational by maximizing the use of its hydroelectric and wind resources. From an environmental point of view, it is critical to ensure that Holyrood units are not online when they are not required.

As demand for electricity on the island increases, production at the Holyrood plant is expected to increase prior to the operation of the Muskrat Falls Project. A portion of this increased production will be associated with the nickel processing facility in Long Harbour.

The following table outlines unit operating hours and the capacity factor for 2001-2012.

Holyrood Operating Hours and Capacity Factor 2000-2013 Actual and 2014-2017 Forecast			
Year	Unit Operating Hours	Holyrood Net Production (GWh)	Holyrood Capacity Factor (%)
2001	18,684	2,098	51%
2002	17,556	2,385	58%
2003	16,340	1,952	48%
2004	15,011	1,648	40%
2005	13,891	1,329	33%
2006	11,262	740	18%
2007	15,057	1,256	31%
2008	11,562	1,080	26%
2009	12,388	940	23%
2010	11,185	803	20%
2011	11,865	885	22%

2012	10,682	856	21%
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Q6. Are there any plans to decommission any of the existing generating plants (Holyrood, Stephenville or Hardwoods) after Muskrat is commissioned and if so where would a source of power be secured for the island from when the Muskrat Falls plant has to shut down for any extended period of when there is a major power interruption due to extensive repairs being carried out to the transmission line after a major ice storm has destroyed a large portion of the line.

A6. Hydro has been clear with its plans to decommission the Holyrood plant in 2021. Hydro plans to keep the plant available for service in the early years following full commissioning of the Muskrat Falls hydroelectric generating facility and the Labrador-Island Transmission Link. There are no plans to decommission other generating assets on the island following in-service of Muskrat Falls and the Labrador-Island Transmission Link. Some thermal generation will be maintained on the island to provide peak capacity and system reserve. This is outlined on page 13 of the Manitoba Hydro Decision Gate 3 report and is available online at: <https://muskratfalls.nalcorenergy.com/wp-content/uploads/2013/03/MHI-Review-October-2012.pdf>.

The reserve requirements on the Island will be reviewed on a regular basis to ensure conformance with our energy availability standards.

Q7. How much power is produced at Churchill Falls?

A7. The Churchill Falls Generating Station has a generating capacity of 5,428 MW. Daily production fluctuates and is dependent on customer demand.

Q8. How much power do we use from Churchill Falls at the present time?

A8. Hydro uses up to 300 MW of recaptured power as required to supply industrial and residential loads in Labrador. In addition, as outlined in answer #11, 225 MW produced at Churchill Falls is used to supply the IOCC and Wabush Mines loads in Labrador West. TwinCo utilizes its full allotment of 225 MW. Hydro utilizes its full 300 MW recall rights with about half being used to serve customers in Labrador and the balance sold into the export markets.

Q9. How much power do we use in Labrador?

A9. Average and peak power used in Labrador in winter and summer 2013 is provided in the table below. The winter average is the monthly average for January. The summer average is the monthly average for July.

Month	Winter Average, January	Summer Average, July	Winter Peak, December	Summer Peak, August
MW	125	34	226	75

- Q10. At what time in the future can we recall further power from Churchill Falls and how much can we recall at that time?**
- A10. There is a provision in the 1969 power contract between Hydro-Quebec and CF(L)Co to recall 300 MW of power, all of which has been recalled since 1998.

December 2013

- Q1. Please prepare tables and charts for the annual energy balance on the NL grid up to 2041 showing:**
- a. firm load on the Island, NS firm load and surplus firm load;
 - b. firm load in Labrador;
 - c. requirements of the Labrador mining industry, including known expansions;
 - d. Firm and average generation, including the available recall power;
 - e. The 1.2 TWH for NS surplus;
 - f. Projected firm surplus remaining, annually up to 2041?
- A2. See table and chart below, Newfoundland and Labrador Interconnected System - Forecast Supply versus Load.
- Q3. Please reproduce the three charts presented by Nalcor at the October 28, 2013 Maritime Link Technical Conference using Nalcor projections and load forecasts for the period 2017 to 2041, in other words using actual values.**
- A3. See table and chart below, Newfoundland and Labrador Interconnected System - Forecast Supply versus Load.

Newfoundland and Labrador Interconnected System - Forecast Supply versus Load

	A	B	C	D (A + B + C)	E	F (E - D)	G	H (G - D)
	Island Firm Load (GWh)	Labrador Firm Load (GWh)	NS Block (GWh)	Total Firm Load (GWh)	NL Firm Generation (GWh)	Surplus Firm (GWh)	NL Average Generation (GWh)	Average NL Surplus (GWh)
2018	8,836	1,063	980	10,879	13,102	2,223	14,372	3,493
2019	8,880	1,066	980	10,927	13,102	2,175	14,372	3,445
2020	8,931	1,069	980	10,980	13,102	2,122	14,372	3,392
2021	9,023	1,072	980	11,075	13,102	2,027	14,372	3,297
2022	9,147	1,074	980	11,202	13,102	1,900	14,372	3,170
2023	9,222	1,077	980	11,279	13,032	1,753	14,292	3,013
2024	9,314	1,079	980	11,374	13,032	1,658	14,292	2,918
2025	9,407	1,082	980	11,469	13,032	1,563	14,292	2,823
2026	9,474	1,084	980	11,537	13,032	1,495	14,292	2,755
2027	9,565	1,086	980	11,631	13,032	1,401	14,292	2,661
2028	9,640	1,088	980	11,708	13,032	1,324	14,292	2,584
2029	9,694	1,090	980	11,764	12,842	1,078	14,102	2,338
2030	9,773	1,092	980	11,845	12,842	997	14,102	2,257
2031	9,858	1,094	980	11,932	12,842	910	14,102	2,170
2032	9,920	1,096	980	11,995	12,842	847	14,102	2,107
2033	9,989	1,098	980	12,067	12,842	775	14,102	2,035
2034	10,058	1,100	980	12,138	12,842	704	14,102	1,964
2035	10,128	1,102	980	12,209	12,842	633	14,102	1,893
2036	10,197	1,103	980	12,281	12,842	561	14,102	1,821
2037	10,267	1,105	980	12,352	12,842	490	14,102	1,750
2038	10,330	1,107	980	12,418	12,842	424	14,102	1,684
2039	10,394	1,109	980	12,483	12,842	359	14,102	1,619
2040	10,458	1,111	980	12,549	12,842	293	14,102	1,553
2041	10,522	1,113	980	12,615	12,842	227	14,102	1,487

Note:

(1) The 1200 GWh NS Surplus Block will come from "Average NL Surplus"

