Q. What is the schedule for completion of the Navigant Consulting review?

A. Navigant completed its review and submitted its report to Nalcor on September 14, 2011.

Q. Further to PUB-Nalcor-80 has Navigant Consulting provided any interim or final reports or presentations or findings as part of this review? If so, provide copies.

A. The Navigant report has been received and is filed attached as Exhibit 101.

Q. The HVdc Labrador-Island Link is a large energy and capacity link to a relatively small system. Exhibit 29 Rev 1, pgs. 33 & 34 addresses some of the concerns with providing standby generating and the cost of energy loss for an extended outage to the bipole. Has Nalcor made similar allowances in its current studies?

A. Exhibit 106, Technical Note: Labrador – Island HVdc Link and Island Interconnected System Reliability, compares the level of exposure and unserved energy due to a transmission outage for both the Interconnected Island and Isolated Island options. The analysis indicates that for the Interconnected Island option the level of exposure is similar to the Isolated Island option today. In terms of level of exposure the availability values for the Isolated Island and Interconnected Island are very similar in the long term with both options providing energy availability values in excess of 99% and unsupplied energy values less than 1% of the annual energy forecast in any year. Further the analysis demonstrates the improvements afforded by imports via the Maritime Link for an outage to the Labrador – Island Link.

Q. Losses related to the HVdc Labrador-Island Link are mentioned in Exhibit 43, pg. 33 of 37 (5%), Nalcor Submission July 6, 2011 Synopsis of 2010 Generation Expansion Decision, Appendix C, pg. 3 of 9 (10%) and Exhibit 18, pg. 32 (7% & 8%). Please provide the design capacity and energy losses for the proposed HVdc Labrador-Island Link.

A. As noted in response to MHI-Nalcor-119 a maximum loss value of 10% worst case was chosen the determine the minimum acceptable operating voltage to the Labrador – Island HVdc Link. An estimated average loss value rate of 5% has been used for analysis purposes. Transmission losses will be evaluated further in conjunction with conductor, converter and transmission optimization during detailed engineering prior to Project Sanction.

At Decision Gate 2 the Labrador – Island HVdc Link has the following ratings:

- Operating voltage ±320 kV
- Rated capacity at Muskrat Falls
    - 450 MW per pole in bipole mode, 1406 A
    - 900 MW per pole 10 minute monopolar mode – 2812 A
    - 675 MW per pole continuous monopolar mode – 2109 A
- Capacity losses
    - Bipole mode
        - 84.85 MW winter (Ambient Labrador -13 ˚C, Island -1 ˚C)
        - 92.1 MW summer (Ambient Labrador 21 ˚C, Island 23 ˚C)
    - 10 Minute monopolar mode
        - 250.4 MW winter (Ambient Labrador -13 ˚C, Island -1 ˚C)

- 272.7 MW summer (Ambient Labrador 21 ˚C, Island 23 ˚C)
  - Continuous monopolar mode – earth return
    - 132 MW winter (Ambient Labrador -13 ˚C, Island -1 ˚C)
    - 144.4 MW summer (Ambient Labrador 21 ˚C, Island 23 ˚C)
- Energy losses are usage dependent. Assuming a design capacity factor of 95%, the system would have an energy loss rate of approximately 9.3%. The forecasted capacity factor for the line is 62% (4.9 TWh / (900 MW*8760 hr / 1,000,000 MW/TW), and losses would be correspondingly lower.

Q. Provide Tables 2-2, 2-3 and A-1 and Figure 5-1 from Hydro's Generation Planning Issues 2009 Mid Year Report dated July 2009 submitted to the Board as part of Hydro's 2010 Capital Budget.

A. Please see the attached pages showing the requested tables and figure.

Table 2-2

Electricity Load Growth Summary – 2009 PLF				
		2008-2013	2008-2018	2008-2028
Utility[1]	HVdc link	1.9%	1.1%	1.1%
	Isolated Island	1.8%	1.3%	1.1%
Industrial[2]	HVdc link	0.0%	0.1%	0.1%
	Isolated Island	0.0%	0.1%	0.1%
Total	HVdc link	1.4%	0.8%	0.8%
	Isolated Island	1.3%	1.0%	0.9%

1. Utility load is the summation of Newfoundland Power and Hydro Rural.
2. Industrial load is the summation of Corner Brook Pulp and Paper, AbitibiBowater[3], North Atlantic Refining, Teck Resources and Vale Inco NL.

Table 2-3 provides a summary of the 2009 PLF projections for electric power and energy for the System for the period 2009 to 2018. Similar long-term projections are also prepared for the Labrador Interconnected System and for Hydro's Isolated Diesel Systems to derive a Provincial electricity load forecast. Appendix A contains the longer term PLF that was used to complete the generation expansion analysis.

[3] AbitibiBowater ceased production at its Grand Falls newsprint mill in February 2009.

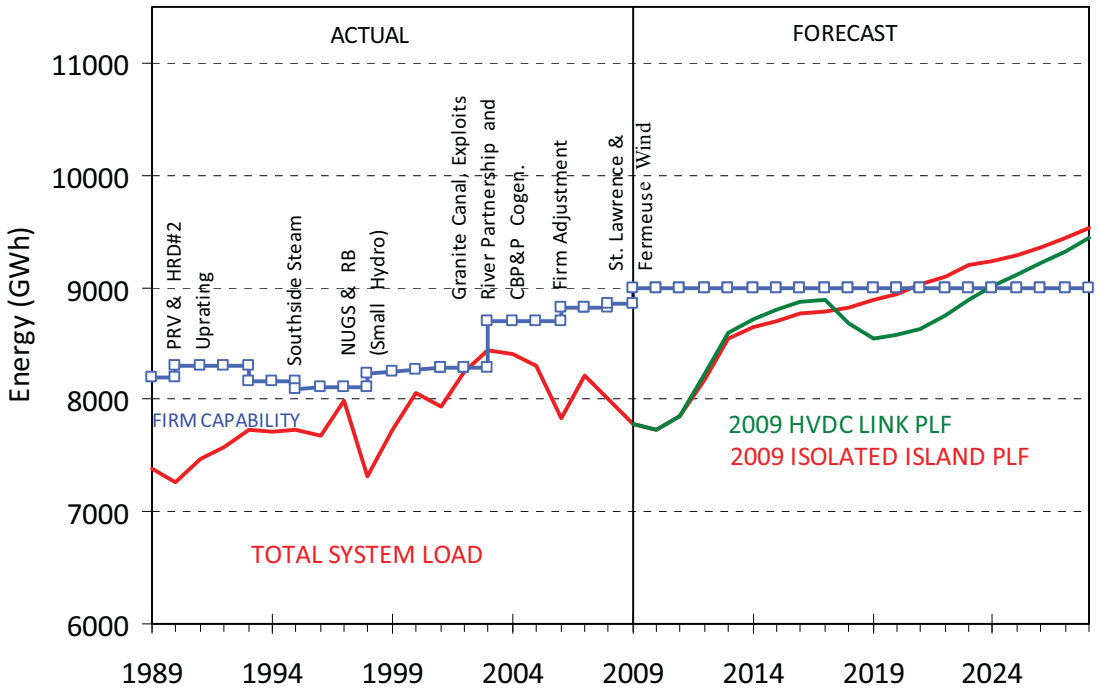
Table 2-3

Electricity Load Summary – 2009 PLF						
HVdc Link	Utility[1]		Industrial[1]		Total System[2]	
	Maximum Demand (MW)	Firm Energy (GWh)	Maximum Demand[3] (MW)	Firm Energy (GWh)	Maximum Demand (MW)	Firm Energy (GWh)
2009	1,326	5,985	286	1,603	1,592	7,781
2010	1,351	6,100	196	1,435	1,534	7,727
2011	1,376	6,210	236	1,456	1,568	7,858
2012	1,400	6,348	274	1,679	1,604	8,223
2013	1,417	6,417	282	1,984	1,673	8,601
2014	1,437	6,501	275	2,009	1,686	8,710
2015	1,450	6,588	275	2,009	1,699	8,798
2016	1,469	6,660	275	2,009	1,718	8,871
2017	1,485	6,669	275	2,009	1,733	8,881
2018	1,488	6,473	275	2,009	1,737	8,682
Isolated Island	Utility[1]		Industrial[1]		Total System[2]	
	Maximum Demand (MW)	Firm Energy (GWh)	Maximum Demand (MW)	Firm Energy (GWh)	Maximum Demand (MW)	Firm Energy (GWh)
2009	1,326	5,985	286	1,603	1,592	7,781
2010	1,351	6,100	196	1,435	1,534	7,727
2011	1,376	6,210	236	1,456	1,568	7,858
2012	1,399	6,300	274	1,679	1,603	8,174
2013	1,416	6,366	282	1,984	1,672	8,550
2014	1,431	6,431	275	2,009	1,680	8,640
2015	1,443	6,481	275	2,009	1,691	8,691
2016	1,453	6,562	275	2,009	1,702	8,772
2017	1,471	6,574	275	2,009	1,719	8,784
2018	1,477	6,613	275	2,009	1,726	8,824

Note: 1. Utility and Industrial demands are non-coincident peak demands.
2. Total System is the total Island Interconnected System and includes losses. Demands are coincident peak demands.
3. Maximum demand in 2009 includes AbitibiBowater paper mill.

Figure 5-1 presents a graphical representation of historical and forecasted load and system capability for the HVdc link and Isolated Island scenarios. It is a visual representation of the energy balance shown in Table 5-1.

Figure 5-1
Island Interconnected System Capability vs. Load Forecast



6.0 Near-Term Resource Options

This section presents a summary of identified near-term generation expansion options. It represents Hydro's current portfolio of alternatives that may be considered to fulfill future generation expansion requirements. Included is a brief project description as well as discussion surrounding project schedules; the basis for capital cost estimates; issues of bringing an alternative into service; and other issues related to generation expansion analysis.

Table A-1
2009 Planning Load Forecasts

Year	2009 PLF HVdc Link Case		2009 PLF Isolated Island Case	
	Maximum Demand [MW]	Firm Energy [GWh]	Maximum Demand [MW]	Firm Energy [GWh]
2009	1,592	7,781	1,592	7,781
2010	1,534	7,727	1,534	7,727
2011	1,568	7,858	1,568	7,858
2012	1,604	8,223	1,603	8,174
2013	1,673	8,601	1,672	8,550
2014	1,686	8,710	1,680	8,640
2015	1,699	8,798	1,691	8,691
2016	1,718	8,871	1,702	8,772
2017	1,733	8,881	1,719	8,784
2018	1,737	8,682	1,726	8,824
2019	1,712	8,534	1,734	8,887
2020	1,693	8,579	1,745	8,936
2021	1,702	8,636	1,756	9,027
2022	1,713	8,757	1,773	9,100
2023	1,732	8,883	1,785	9,199
2024	1,751	9,005	1,801	9,233
2025	1,770	9,113	1,809	9,290
2026	1,787	9,211	1,819	9,362
2027	1,803	9,326	1,831	9,444
2028	1,820	9,445	1,844	9,525

Q. Hydro submitted a report "Generation Planning Issues 2009 Mid Year" dated July 2009-in its 2010 Capital Budget submitted to the Board which had two load forecasts, one for the Isolated Island option and one for the Muskrat Falls-HVdc Link Project. The load growth profiles are sufficiently different that it is possible there will be distinctly different rate forecasts. Please explain the causes of these variations between the two load forecasts, for each stage where the Muskrat Falls-Labrador-Island Link Project forecast line changes direction relative to the Isolated Island option. Since the load forecast is for only 10 years, please describe the expected pattern of each forecast curve in absolute terms and relative to each other for the remainder of the 50 year CPW period.

A. The 2009 Load Forecast[1] is presented below:

Figure 5-1
Island Interconnected System Capability vs. Load Forecast

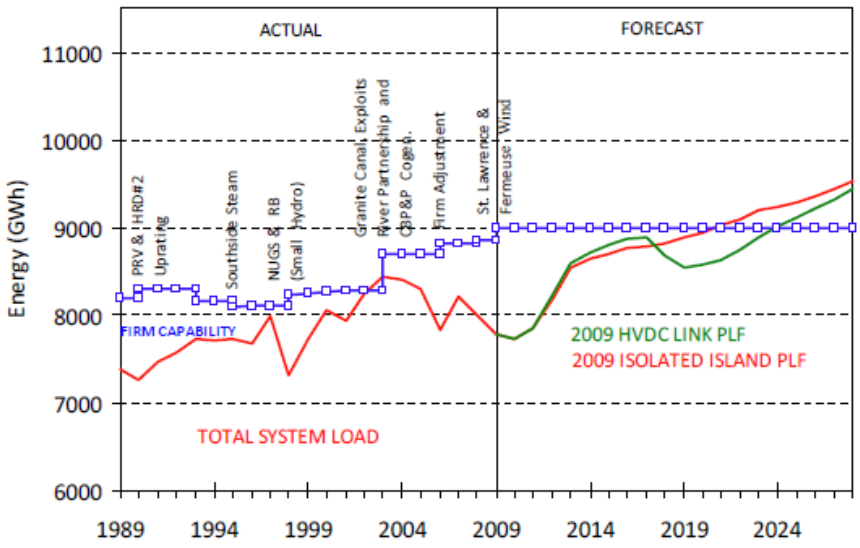


Figure 1 - 2009 Planning Load Forecast

[1] NLH 2010 Capital Budget Application, Volume 2, page 529
http://www.pub.nl.ca/applications/NLH2010Capital/files/application/NLH2010ApplicationComplete-VolumeII.pdf

Two differences in the forecasts presented in Figure 1 are apparent:

1) After 2017, the HVDC Link Case forecasted energy requirement is lower than that of the Isolated Island Case. Table 1 below presents the forecasted energy from the 2009 forecast.[2]

Year	HVDC Link Case	Isolated Island Case
	Firm Energy (GWh)	Firm Energy (GWh)
2015	8798	8691
2016	8871	8772
2017	8881	8784
2018	8682	8824
2019	8534	8887
2020	8579	8936
2021	8636	9027
2022	8757	9100
2023	8883	9199
2024	9005	9233
2025	9113	9290
2026	9211	9362
2027	9326	9444
2028	9445	9525

Table 1 - 2009 PLF Energy Forecast

[2] Table A-1, NLH 2010 Capital Budget Application, Volume 2, page 529
http://www.pub.nl.ca/applications/NLH2010Capital/files/application/NLH2010ApplicationComplete-VolumeII.pdf

The average difference across the period from 2018 to 2028 between the HVdc Link Case and the Isolated Island Case is 241 GWh. This forecasted difference is the result of the differing cost of energy in the two cases. Although the HVDC Link Case had a lower CPW than the Isolated Island Case, in the short term, the rates for the HVDC Link Case were initially higher than those under the Isolated Island Case. This rate differential resulted in a period of lower energy requirement.

2) After 2021, however, the year over year increases in energy requirements in the HVDC Link Case are greater than those in the Isolated Island Case:

Year	HVDC Link Case	Isolated Island Case
	Y/Y Increase (GWh)	Y/Y Increase (GWh)
2022	121	73
2023	126	99
2024	122	34
2025	108	57
2026	98	72
2027	115	82
2028	119	81

Table 2 - Year over Year Increase in Energy Requirements

By the end of 2028, forecasted loads for both cases are within 1 percent of each other. At this point, the short term reduction in energy requirements in the HVDC Link Case will have been almost offset by increased consumption resulting from lower medium term rates.

In the medium to long term, the following differences in interconnected and isolated forecasts would be expected:

a) The interconnected forecast would be expected to initially trend higher than the isolated forecast depending on the rate at which conversions to electric space heating occur relative to the provision already included in the isolated forecast. With rates in an interconnected scenario forecasted to be lower than those under an isolated scenario, conversions to electric heat would be expected to occur earlier than would be projected under an isolated scenario.

The target saturation for electric heat is expected to be 80% - consistent with results seen in the Quebec market[3]. In the longer term, an interconnected load forecast is not expected to be materially different than an isolated load forecast with respect to the impact of conversions since an isolated load forecast would also reflect market saturation for electric heat in the long run.

b) In the longer term, lower electricity rates in an interconnected scenario would encourage an increase in consumption that would not occur in the higher rate regime in an isolated scenario.

The long term effects described in a) and b) are uncertain in the sense that they could be offset by factors such as conservation, which would reduce demand. This issue will be revisited as part of the DG3 analysis.

[3] As per the market share for electric heat in the Province of Quebec where electricity has been the primary choice for space heating for many decades and where natural gas plays an insignificant role in residential heating markets with a 3.6% market share in 2009. Source: Statistics Canada - Survey of Household Spending 2009.

Q. The CPW analysis, submitted for this current Review arising from the Reference to the Board by the Lieutenant-Governor in Council, used only the Isolated Island load forecast for both options. Please explain the objectives met and reasons for the Muskrat Falls-Labrador-Island Link Project load forecast not being used for the Muskrat Falls-Labrador-Island Link Option, and describe the strategies Nalcor expects to use in ensuring there will be no future implications for ratepayers resulting from this decision.

A. As indicated in Nalcor's response to PUB-Nalcor-86, the 2009 Generation Planning Issues report, identified a reduction in energy requirements in the interconnected case compared to the isolated case during the period from 2018-2028. This decline was attributed to higher initial rates associated with the interconnected case.

After reviewing the 2009 results, Nalcor established an internal objective that rates for the Interconnected Island alternative would be no higher than those for the Isolated Island alternative during the early years after commissioning of the Lower Churchill Project. The adoption of this internal objective would prevent the short term rate impacts, and consequently the change in demand, in the 2009 forecast from reoccurring. In the event there were material cost and rate differences forecasted during this period, mitigation strategies would be implemented to ensure that the internal objective would be achieved.

The NLH revenue requirements in the Interconnected Island and Isolated Island alternatives for the DG2 analysis are forecasted to be similar during the early years of start up for the Lower Churchill Project. This can be seen from PUB-Nalcor-5, reproduced below:

Year	Interconnected Island Case	Isolated Island Case
	Revenue Requirements ($M)	Revenue Requirements ($M)
2015	624.4	650.3
2016	648.2	694.0
2017	765.1	716.8
2018	781.4	751.5
2019	804.9	771.7
2020	810.7	804.1
2021	797.5	810.2
2022	803.2	851.7
2023	810.5	906.2
2024	818.7	930.5
2025	830.5	960.2
2026	847.4	988.0
2027	863.7	1022.8
2028	880.8	1067.8

Table 1 – Forecasted Revenue Requirements at DG2[1]

Since the 2010 analysis did not show any significant differences in revenue requirements in the early years after in-service, the potential mitigation strategies referred to above were not developed.

With no significant differences in revenue requirements after in-service of Muskrat Falls and the Labrador-Island Transmission Link, short term rates would be similar. Therefore there was no basis for different short term load forecasts for the two alternatives.

A common forecast corresponding to the Isolated Island alternative forecast was used for both alternatives. It is recognized that the long-term requirement for this forecast would be lower than the long-term requirement for the Interconnected Island alternative for the reason discussed in Nalcor's response to PUB-Nalcor-86.

[1] PUB-Nalcor-5

Based on DG2 information, there are no 'ratepayer implications' predicted from the use of a common forecast. If a divergence in forecasts such that Interconnected Island rates would be higher than Isolated Island rates when the two alternatives are evaluated at DG3, then appropriate mitigation strategies will be implemented to prevent adverse ratepayer implications from occurring.

Q. Without regard to any specific strategy possibly envisaged by Nalcor identified in responding to PUB-Nalcor-87, please estimate the Muskrat Falls Infeed Option CPW if the last available Muskrat Falls-Labrador-Island Link Option load forecast was used instead of the Isolated Island forecast. Please identify the Muskrat Falls-Labrador-Island Link Option load forecast selected and provide it with the response.

A. The last available Muskrat Falls-Labrador-Island Link Option load forecast from mid-2009 is not applicable for the DG2 analysis because it was derived from a set of input assumptions that are inconsistent with the cost and economic inputs used for the DG2 analysis. However, in considering the CPW impact of the short term effects in the 2009 forecasts, Nalcor is of the view that because of the short duration of the demand differences and their relatively small magnitude, these differences would not change the interconnected generation expansion plan.

It is recognized that the long-term Interconnected Island forecast would be higher than the long-term Isolated Island forecast as discussed in the response to PUB-Nalcor-86. However, the long-term impacts on the CPW are unclear and could be offset or mitigated. These potential impacts will be reassessed during the DG3 analysis.

Q. Using the Muskrat Falls-Labrador-Island Link load forecast, please provide the rate differential by year for the Muskrat Falls Infeed Option, from that obtained using the energy sales from the Isolated Island load forecast.

A. As indicated in Nalcor's response in PUB-Nalcor-88, a common short term forecast is applicable to both alternatives and therefore the rates are as projected in PUB-Nalcor-5.

Q. Using Strategist please calculate and show the annual energy projected from the Muskrat Falls-Labrador-Island Link infeed with the load forecast requested in PUB-Nalcor 88. Using these annual energies, calculate the Internal Rate of Return for the Muskrat Falls Project.

A. The design mechanism used to establish the escalating supply price for Muskrat Falls is based on a defined internal rate of return. Consequently, changes in energy volumes would not affect the internal rate of return.