Q. On p. 2 of Exhibit 101, Navigant's disclaimer states that the report was prepared based on information provided by Nalcor and other sources. What other sources provided information and what information was provided by each source?

A. The other sources of information used by Navigant in its review are listed within the body of the report, as a source for a table or figure, or in a footnote, as appropriate.

A listing of the references in the table, figures and footnotes are below (this list does not include references to studies and examples within the body of the report):

- Government of Newfoundland and Labrador. www.nr.gov.nl.ca/nr/energy/plan/. 2007 Energy Plan.
- Cigre WG B4-04 2003 -IEEE T&D Committee 2006.
- Environment Canada. http://www.windatlas.ca/en/EU_50m_national.pdf.
- National Forestry Registry. http://nfdp.ccfm.org/index_e.php. Accessed August 22, 2011.
- Statistics Canada, Report on Energy Supply and Demand in Canada, 2009.
- Natural Resources Canada. PV Potential and Insolation. www.nrcan-rncan.gc.ca. Downloaded August 5, 2011.
- Wave Power in Canada. http://coppercanada.ca/electrical_wave_power/electrical_wave_powerS7.htm.
- *Technical Feasibility of Off-shore Natural Gas and Gas Liquid Development Based on a Submarine Pipeline Transportation System, Off-shore Newfoundland and Labrador, Final Summary Report* to the Government of

Newfoundland and Labrador, Department of Mines & Energy, Petroleum Resource Development Division, submitted by Pan Maritime Kenny – IHS Energy Alliance, October 2001.

- Canaport homepage at: http://www.canaportlng.com/.
- Updated Capital Costs for Electricity Generation Plants – November 2010. US Energy Information Agency, Department of Energy. Available at http://www.eia.gov/oiaf/beck_plantcosts/pdf/updatedplantcosts.pdf.
- The Brattle Group – "Prospects for a Nuclear Revival in the United States." February 2011. Available at http://www.brattle.com/_documents/UploadLibrary/Upload921.pdf.
- Appendix 2, Table A2.1, *2009 Reference Case Scenario: Canadian energy demand and supply to 2020*, National Energy Board, July 2009.
- Conservation and Demand Management (CDM) Potential Newfoundland and Labrador: Residential, Commercial and Industrial Sectors. Prepared by: Marbek Resource Consultants Ltd. January 31, 2008.
- BC's Energy Plan includes the following energy conservation and efficiency policy: *"Set an ambitious conservation target, to acquire 50 per cent of BC Hydro's incremental resource needs through conservation by 2020."*
- Page 104, *Conservation and Demand Management Potential Newfoundland and Labrador, Residential Sector Final Report*, Marbek Consultants Ltd., January 18, 2008.
- PIRA Energy Group and Nalcor Energy at January 2010.
- EIA Annual Energy Outlook 2011 - Published April 2011, available at http://www.eia.gov/forecasts/aeo/.
- Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations. The consultation version of the proposed regulation

is available at:
http://www.ec.gc.ca/Content/2/E/5/2E5D45F6-E0A4-45C4-A49D-A3514E740296/E_Consultation.pdf.

- http://www.gov.nl.ca/lowerchurchillproject/backgrounder_2.htm.
- Press Release from the Government of Newfoundland and Labrador dated June 17, 2009.

In addition to these sources, the Navigant team drew on their own expertise, experience and knowledge as well as that of their colleagues during the review. Navigant's Energy Practice is comprised of more than 280 full-time consultants with extensive hands-on experience providing existing and prospective owners of energy supply and delivery assets the ability to evaluate, plan, develop and enhance the operating value of their investments within evolving market and regulatory structures. Many of its consultants joined Navigant after long careers with large utilities.

Q. On p. 13 of Exhibit 101, key finding 38 states: "*Relative to the Isolated Island alternative, the Interconnected Island alternative is also expected to provide similar levels of security and reliability, significantly reduced GHG emissions and significantly less risk and uncertainty.*" Please describe in detail how these "*similar levels of security and reliability*" were determined for both options. Was a quantitative assessment of each option completed for comparative purposes? If so, please provide a copy of the assessment.

A. The Technical Note: Labrador – Island HVdc Link and Island Interconnected System Reliability filed as Exhibit 106 provides the analysis of the levels of security and reliability for each option. Navigant was provided with a draft of the report for their review.

The Nalcor analysis to determine the level of exposure and unserved energy as a result of a transmission failure begins with the hourly load data for the year in question. A comparison is made between the hourly load in MW and the available generating capacity to meet the load during the hour. For hours in which the available generating capacity exceeds the load there is no exposure and no unserved energy. For any hour in which the load exceeds the available generating capacity there is an hour of exposure and the difference between the available capacity and the load is taken as the MWh of unserved energy for that hour. The calculation is performed for each hour of the year. Next, a 14 day or 336 hour sliding window is used to determine the two week window having the largest total hours of exposure and unserved energy. This two week window is deemed to be the “worst case” two week window by Nalcor as it captures the maximum unserved energy for the two week repair period. In other words, the “worst case” gives the

maximum unserved energy should the transmission line failure occur at the most inopportune time.

For the Isolated Island option the simultaneous loss of TL202 and TL206 connecting the Bay d'Espoir Generating Station and other hydroelectric resources to the Avalon Peninsula is viewed as the most significant transmission failure for the Isolated Island option. With both TL202 and TL206 in a common corridor and having the same design loading, failure of both lines can be expected for a storm resulting in loads that exceed the design load. Loss of both transmission lines, for all intents and purposes, isolates the Avalon Peninsula from the rest of the grid.

For the Interconnected Island option the failure of the overhead HVdc transmission line is viewed as the most significant transmission line failure as it removes a nominal 900 MW of capacity to the Island with limited on Island resources to supply the load with Holyrood thermal generation unavailable.

Table 5 of Exhibit 106 provides the results of the analysis. In summary it indicates that between 2017 and 2027 the Interconnected Island option has less unserved energy for the worst case two week outage window than the existing system 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.

Q. On p. 19 of Exhibit 101, Section 1.2 states: "*The outcome of the generation planning analysis is a metric called Cumulative Present Worth (CPW), which is the present value of all incremental utility capital and operating costs incurred by the utility to reliably meet a specific load forecast given a prescribed set of reliability criteria.*" Specifically, what was the "*prescribed set of reliability criteria*" assessed by Navigant as part of its review of both Interconnected Island and Isolated Island Options?

A. The phrase *"prescribed set of reliability criteria"* was intended to indicate that each alternative should be subject to a common set of reliability criteria. In this context, Navigant did not assess a "*prescribed set of reliability criteria*" as part of its review. Rather, Navigant accepted the reliability criteria employed by Nalcor in both scenarios, including:

1. The Island Interconnected System should have sufficient generating capacity to satisfy a Loss of Load Expectation of not more than 2.8 hours per year.
2. The Island Interconnected System should have sufficient generating capability to supply all of its firm energy requirements with firm system capability.
3. The bulk transmission system should be capable of sustaining the single contingency loss of any transmission element without loss of system stability.
4. In the event that a transmission element is out of service, power flow in all other elements of the transmission system should be at or below normal rating.

5. The system should be capable of sustaining a successful single pole reclose for a line to ground fault based on the assumption that all system generation is available.
6. For Radial Transmission systems the single contingency loss of certain transmission elements could result in an interruption to some or all of the customers served by that system.
7. For normal operations, voltages should be maintained between 95% and 105%.
8. For contingency or emergency operating situations, voltages may range between 90% and 110%.

Q. On p. 23 of Exhibit 101, one of the key findings is that the level and accuracy of information used in Nalcor's DG2 Island Supply Decision was appropriate for the decision stage. Explain in detail the information relied on to reach this conclusion.

A. The basis for Navigant's finding that the level and accuracy of the information used in Nalcor's DG2 Island Supply Decision was appropriate for the DG2 decision stage included all the documentation reviewed by Navigant related to the DG2 Island Supply Decision, Nalcor's various IR responses relating to the DG2 Island Supply Decision, and Navigant discussions and interviews with Nalcor staff relating to the DG2 Island Supply Decision.

Q. On p, 23 of Exhibit 101, it is stated that Nalcor asked Navigant to provide an opinion on whether current information impacts the reasonableness of the DG2 decision. What information did Nalcor give Navigant to review to allow such an opinion to be provided?

A. The current information considered by Navigant is listed in the Section 5.2 of Exhibit 101 and was as follows:

1. Updated May 2011 PIRA fuel price forecast;
2. Federal government commitment to provision of a federal loan guarantee for the Muskrat Falls (including associated Labrador transmission) and Labrador-Island Link facilities (as well as for the Maritime Link facility); and
3. The Maritime Link to Nova Scotia.

Q. On p. 25 of Exhibit 101, it is stated: "*As the Island requirements represent a much lower proportion of the Gull Island output and in the absence of confirmed export transmission via Quebec or new, large industrial load in Labrador, the financial returns for the Gull Island project selling only to the Island would be unacceptably low and the project would likely not be supported in capital markets. In order to provide the same rate of return as projected for the Muskrat Falls project in the DG2 decision, the purchase price for power from Gull Island would have to be approximately 60 percent higher than power from Muskrat Falls."* Would the addition of a new, large industrial load on the Island or in Labrador potentially impact the analysis of the preferred supply option?

A. While the addition of load could potentially impact the analysis of the preferred supply option, such a load remains hypothetical. No industrial load has the requisite level of certainty to be included in Nalcor's forecast, and no industrial customer has approached Nalcor with a committed revenue stream that would support financing of the much larger Gull Island project. In addition, no customer has committed to fund the construction of transmission facilities to their potential development.

As a result, these potential industrial loads lack the necessary level of certainty to be included as a firm load in a load forecast, and thus in a generation expansion plan. Should they materialize in the future, Nalcor would include these new committed loads in a planning load forecast, develop a new least-cost generation expansion plan, and obtain new sources of energy and capacity to meet the new requirements.

Q. Further to Exhibit 101, p. 25 referred to in PUB-Nalcor 106, what are the estimated average energy costs in 2010 $/MWh, at the busbar, for each of the Muskrat Falls and the Gull Island developments.

A. Exhibit 101, page 25 states:

"*As the Island requirements represent a much lower proportion of the Gull Island output and in the absence of confirmed export transmission via Quebec or new, large industrial load in Labrador, the financial returns for the Gull Island project selling only to the Island would be unacceptably low and the project would likely not be supported in capital markets. In order to provide the same rate of return as projected for the Muskrat Falls project in the DG2 decision, the purchase price for power from Gull Island would have to be approximately 60 percent higher than power from Muskrat Falls.*"

Based on sales to the Island only, the busbar price for Muskrat Falls that returns an 8.4% internal rate of return is approximately $76 /MWh (2010$) escalating at 2% per year (see MHI-Nalcor 58 (h)).

Using the above methodology, the busbar price for Gull Island that returns an 8.4% internal rate of return selling only to the Island is approximately $122 /MWh (2010$) escalating at 2% per year.

Q. Further to Exhibit 101, p. 25 referred to in PUB-Nalcor 106, what are the estimated average energy costs in 2010 $/MWh, at the busbar, for each of the Muskrat Falls and the Gull Island developments.

A. Exhibit 101, page 25 states:

"*As the Island requirements represent a much lower proportion of the Gull Island output and in the absence of confirmed export transmission via Quebec or new, large industrial load in Labrador, the financial returns for the Gull Island project selling only to the Island would be unacceptably low and the project would likely not be supported in capital markets. In order to provide the same rate of return as projected for the Muskrat Falls project in the DG2 decision, the purchase price for power from Gull Island would have to be approximately 60 percent higher than power from Muskrat Falls.*"

Based on sales to the Island only, the busbar price for Muskrat Falls that returns an 8.4% internal rate of return is approximately $76 /MWh (2010$) escalating at 2% per year (see MHI-Nalcor 58 (h)).

Using the above methodology, the busbar price for Gull Island that returns an 8.4% internal rate of return selling only to the Island is approximately $122 /MWh (2010$) escalating at 2% per year.

During the Joint Review Panel Environmental Assessment public hearing, Nalcor provided an economic supply price for Muskrat Falls for information purposes based on the following assumptions:

- All energy produced is sold (equivalent to average annual production),
- Debt equity ratio of 70:30,
- Debt is amortized on a level debt service payment ("mortgage style") basis over 30 years,
- Cost of debt - 7%, Cost of equity - 12%,
- Generation plant only, excluding interconnection transmission, and
- In-Service mid 2017.

The LUEC[1] for Muskrat Falls would be $77 /MWh under these assumptions and analysis. The escalating equivalent supply price[2] for this Muskrat Falls LUEC would be approximately $52 /MWh in $2010 escalating at 2% per year.

A comparable calculation has been also been prepared for Gull Island based on its costs, parameters and outlined above for Muskrat Falls but with an in-service date of mid 2021. The LUEC for Gull Island is $69 /MWh under these assumptions and analysis. The escalating equivalent supply price for this Gull Island LUEC would be approximately $43 /MWh in $2010 escalating at 2% per year.

The economic supply prices set out above are based on a calculation of the revenue required to yield the target Internal Rate of Return equal to the cost of equity assumed above. This methodology recovers all capital and operating costs, including the cost of debt and equity financing, over a 50-year analysis period

[1] Levelized Unit Energy Costs (LUEC) is that constant price, which when multiplied by output and discounted, recovers the present value of all project capital and operating costs.
[2] The escalating supply price analysis calculates the equivalent escalating price which, when multiplied by the volume produced by the plant, yields a revenue series with the same present value as that based on the LUEC.

assuming all production is sold at the supply prices cited. In all cases, the discount rate is the Weighted Average Cost of Capital based on the capital structure and costs of debt and equity assumed above.

Q. On p. 32 of Exhibit 101, Navigant states as a key finding that additional wind power could be considered in the Isolated Island alternative, provided power system constraints identified in the 2004 wind integration study can be addressed cost effectively. Has Nalcor or Navigant studied how the power system constraints could be addressed and at what cost? If yes, please provide copies of the studies completed.

A. No further studies of means to address the power system constraints (water management, frequency control, and transmission limitations) identified in the 2004 wind integration study (Exhibit 61) have been undertaken.

A sensitivity analysis was completed to determine the impact of the addition of 200 MW of wind generation (100 MW in 2025 and 100 MW in 2035) on the CPW analysis. The results, shown on page 64 of Exhibit 101, indicate that the addition of 200 MW of wind reduced the CPW preference for the Island Interconnected scenario over the Island Isolated scenario to $1,717 M, a reduction of $441 M over the reference plan. No allowance for expenditures necessary to address the water management, frequency control, and transmission constraints was included in this sensitivity.

Prior to DG3 NLH will complete an update of the 2004 wind integration study that will confirm integration limitations for both current and anticipated future Island load conditions.

Q. On p. 49 of Exhibit 101, Navigant states as a key finding that the estimated capital costs and escalation methodology for the various supply options were reasonable. What information was provided by Nalcor and/or relied on by Navigant to allow it to reach this conclusion? For example, was a detailed cost estimate report(s) on Muskrat Falls and the Labrador Island Link provided to Navigant?

A. Cost and schedule estimates of the Muskrat Falls and the Labrador Island Link were provided to Navigant on a confidential basis, as has been provided to the Board in Confidential Exhibit CE-51. Navigant also had access to all other public and confidential exhibits and information that were made available to the Board. Navigant reviewed applicable exhibits on capital costs and escalation and discussed these matters with Nalcor as required in developing an opinion that Nalcor's approach and level of analysis for capital costing and escalation was reasonable and appropriate.

Q. Further to PUB-Nalcor-109, did Navigant complete an independent analysis relating to the capital costs for the various supply options? If yes, provide details of the analysis completed.

A. As stated in the response to PUB-Nalcor-104 and PUB-Nalcor-109, Navigant determined that the level and accuracy of the capital cost information and escalation methodology for the various supply options considered was appropriate for the DG2 decision stage. Given this finding, Navigant determined that it was not necessary to complete an independent analysis relating to the capital costs for the various supply options.