Technical Note – Strategic Risk Analysis and Mitigation

Purpose

This document provides a summary of the continued advancement of the strategic risk analysis and mitigation work undertaken by Nalcor Energy (Nalcor) from the summer of 2010 to Decision Gate 2 – Concept Selection (DG2) in late 2010.

Background

Risk analysis is a tool which provides a framework to assist project managers in identifying and prioritizing key project schedule and cost risks/opportunities early enough to effectively mitigate risks and to take advantage of opportunities.

As part of its project work leading to DG2, Nalcor undertook an independent project review by external parties with expertise in mega project management and risk assessment.

This work was completed during the summer of 2010, allowing time in the project development for any recommendations to be considered and acted upon prior to a decision at DG2. One of the reviews was a Risk Assessment undertaken by the Lower Churchill Project team in conjunction with Westney Consultants.

For the purposes of this analysis, Nalcor categorized risks into two categories: tactical and strategic risk.

<u>Tactical Risks:</u>

Definition Risks — These risks are associated with the degree of design development and planning definition for the given project scope reflected in key project controlled documents (e.g. basis of design, basis of estimate, project execution plan), including such items as quantities, location-driven factors, etc.

Performance Risks — These risks are associated with normal/reasonably expected variations in owner and contractor performance, including such items as construction productivity risk, weather delays, material pricing, etc.

<u>Strategic Risks:</u>

Background Risks — These are typically associated with changes in: scope, market conditions, location factors, commercial or partner requirements and behaviours.

Organization Risks — These risks are typically associated with an asymmetry between size, complexity, and difficulty of projects and the organization's ability to deliver.

Assessment

When considering the level of the strategic risk reserve for the Project, progress made on mitigating and/or eliminating the strategic exposures was substantial. (A status report on actions taken to resolve and mitigate these risks between the evaluation in the summer of 2010 and DG2 is included in Appendix A.) For the reasons set out below, the following two were of particular importance:

1. Federal government support for generation and transmission investment (item 7)
2. Application of VSC technology on Island Link (item 34)

Federal government support

Negotiations with the federal government regarding support for the Project, either in the form of a loan guarantee or support through the P3 Canada Fund, were ongoing through 2010. A loan guarantee had the potential to reduce the present value of project financing costs by over $600 million, so considering this from a probabilistic view, the P50 value of the federal support could reasonably be in the order of -$300 million dollars. This risk was not quantified in the initial analysis by the Project team.

Application of VSC technology

While Voltage Source Converter (VSC) technology was identified as a potential technical solution for the Labrador Island Transmission Link, modelling completed at DG2 indicated that conventional Line Commutated Converter (LCC) technology offered equivalent performance. As a result, the technology risk (and up to $200 million exposure) was retired. Eliminating this risk could reasonably be valued at -$100 million on a P50 basis.

With the extent of the mitigation activities undertaken and in progress, and probabilistic cost reductions in the order of -$400 million being available and a P50 strategic exposure of $290 million (in the range of $187 million (P25) to $413 million (P75)), Nalcor executive determined that it was not appropriate to create a positive or negative strategic reserve amount at DG2. These factors were also considered in establishing Project tactical contingency at 15%.

Nalcor recognizes that risks identified for the development of Muskrat Falls also transcend both alternatives so work continues to ensure a thorough and diligent approach to risk management and mitigation in the alternative business case. For example, Nalcor is closely following the oil price forecast which represents a considerable risk in the Isolated Island scenario and is closely monitoring the potential for near term green house gas costs as a result of emissions regulation.

Substantial work continues on both risk assessment and risk mitigation at both the tactical and strategic levels as the project advances. A prudent and thorough approach to risk management is a cornerstone of Nalcor's approach to the development.

Appendix A – Strategic Risk Management and Mitigation Progress at Decision Gate 2

Strategic Risk	Summer 2010 View of Mitigated Risk Exposure	Year End 2010 View of Mitigated Risk Exposure
1. Organizational experience and resources for a project of this size	-$50 to $10 million	Led to Engineering Contractor EOI and RFP, with selection of SNC-Lavalin as EPCM Contractor High quality Owner Team personnel selected to fill key positions This risk has been largely mitigated with an experienced EPCM contractor
2. Time required under Crown Corporation rules to gain approval	$4 to $10 million	Gatekeeper has maintained regular engagement with shareholder to maintain alignment Clear decision making process in place with shareholder and clear distinction between policy and execution roles. VP-LCP has regular engagement at DM level with key government departments to communicate issues and to streamline decision making
3. Changes in financial markets	Not applicable	Interest rates used in financial modelling based on advice from LCP financial advisors and close engagement with financial markets Risk is significantly mitigated with federal loan guarantee
4. Foreign currency exchange risk	$10 million	Project team has used appropriate $US/$CAN exchange rate ($1CAN=$0.95US) Currency purchases will be hedged to the degree possible
5. Risk Premium for obtaining lump sum contracts	Not applicable	Province has fiscal capacity to invest significant equity into the project

6. Extra time required to secure long-term PPA's	$0 to $24 million	This risk has been eliminated based on decision to advance domestic solution that does not require external long-term PPA's
7. Federal government support for generation and transmission projects	Not quantified by summer of 2010 analysis	Federal loan guarantee has potential to reduce borrowing costs significantly, up to $600M -$600 million to $0
8. Changing power market portfolio requires changes in scope	Not applicable	This risk has not materialized, and the basis of design has been confirmed
9. Good HSE record is critical for project success	$10 to $20 million	Following mitigation approaches outlined in risk review. HSE continues to be the highest priority Nalcor has a high and sustained focus corporately and organization wide on HSE
10. Availability of resources to achieve a quality design	-$10 to $10 million	Mitigated with engagement of SNC Lavalin who have considerable project engineering resources
11. Submarine cable crossing	$0 to $50 million	Feasibility of shore approach, crossing methods, protection scheme, as well as iceberg risk assessment has confirmed the feasibility of the sea bed crossing option Residual risk exposure is associated with project execution
12. Faults in submarine cable during commissioning and post installation	$0 to $15 million	Mitigation measures include the selection of mass impregnated cable type which has longer operational track record at the selected operating voltage Basis of design calls for an installed spare cable and installation methods are tried and tested offshore NL

		Although it is not possible to completely mitigate this risk, the measures that are being implemented will significantly reduce risk exposure
13. System reliability during commissioning and startup	$5 to $15 million	factory acceptance testing and owner involvement in these tests along with the project philosophy of using proven technology and high quality suppliers has mitigated this risk exposure Further measures will be taken to ensure system reliability in subsequent project phases
14. Securing generation project release from EA	$0 to $5 million	Necessary resources were deployed during the EA, and the hearing process is completed EA clarity will be obtained prior to sanction- project will not proceed without EA approval by the Ministers
15. Environmental process impact on design	$0 million	No material changes to generation design were made during EA process. Transmission changes to date are not material.
16. Unanticipated design changes from EA process	$0 million	Although there were no changes recommended by regulators during EA hearing, this remains a potential risk.
17. Schedule impact due to delay in ratification of IBA by Innu Nation	$0 to $10 million	IBA is ratified. This risk has been retired.
18. Lack of support from other aboriginal groups	$0 to $10 million	Extensive consultation program in compliance with EA guidelines undertaken, however the possibility of action by other aboriginal groups remains
19. Non-governmental organization /	$0 to $10 million	Extensive communications efforts undertaken by Nalcor and the EA

stakeholder protest		process is comprehensive and process driven Potential of protest or other actions remains
20. Availability of experienced hydro contractors	$0 to $10 million	Following mitigation approaches outlined in risk review.
21. Ability to use Newfoundland and Labrador contractors due to creditworthiness	Not Applicable	Following mitigation approaches outlined in risk review.
22. Availability of qualified construction management and supervision	-$100 to $10 million	Following mitigation approaches outlined in risk review.
23. Site conditions worse than geotechnical baseline	$0 to $75 million	Extensive geotechnical programs undertaken
24. Availability and retention of skilled construction labour	$0 to $20 million	Following mitigation approaches outlined in risk review.
25. Availability of unskilled construction labour	Not Applicable	Following mitigation approaches outlined in risk review.
26. Limited number of creditworthy hydro turbine suppliers	$0 to $50 million	Turbine modelling with 3 suppliers undertaken as phase II activity to reduce this exposure
27. De-escalation and hyperinflation risks	$0	This risk still exists, but Nalcor is following summer 2010 mitigation recommendations
28. Availability of experienced high voltage contractors and skilled labour	$0 to $20 million	This risk still exists, but mitigation activities outlined in risk review will continue.
29. Limited number of HVdc specialties suppliers and installers	$0 to $35 million	Three LCC HVdc converter suppliers are available HVdc cable RFP will be released in 2011 as a phase II activity, at least three bidders are likely
30. Island Link and Maritime Link EA's	$0 million to $25 million	Labrador Island Transmission Link community consultation activities

result in late design changes		undertaken. Community issues (alignment with TLH and relocation of electrode to Strait of Belle Isle) have been addressed in early design.
31. Willingness of shareholder to fund early construction	$0 to $25 million	Value of early start with shareholder funding will be discussed as part of Phase III planning Shareholder and Federal support have mitigated this risk significantly
32. Delay in release of Labrador Island Transmission Link	$0	Comprehensive study / EIS announced. Final EA guidelines released. EIS preparation on schedule.
33. Uncertainty on commercial structure for transmission	$0	Commercial structure is established for Labrador Island Transmission Link and Maritime Link.
34. Failure of application of VSC HVdc technology for Island Link	$0 to $200	This risk is retired Phase II modelling has shown that conventional LCC technology has equivalent performance to VSC

Appendix B – Risk Analysis Results for the Option of Muskrat Falls First plus the Island Link
June – July 2010

Not included in public filing