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[Gate 2 Gatekeeper's DSP - Updated March 2010 Final Version \(CLEAN\).docx](#)  
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Ed,

Please find attached a "clean" version of the DG2 Updated 3/1/11 document, as well as a blacklined version showing changes against the original 11/16/10 version.

As discussed on Friday, we have tried to keep material revisions to a minimal and have re-inserted a number of sections that at one point we contemplated removing (eg. references to GHG emissions, export sales).

You will see a number of cosmetic changes which simply relate to past tense, typo's, knowledge that was available at the time but has now been updated, and the greater awareness of the need to clearly identify the three separate projects. The view is these are not altering the substance of the report.

The sections where notable revisions were made include:

- 5.3 - removed references to Tactical and Strategic risks pending contingent equity discussions with the Province.
- 5.4 - updates to project economic metrics resulting from impact of Federal Loan Guarantee (FLG) / 66% debt in Muskrat Falls.
- 5.5 - changes to financing strategy given the implications of the FLG.
- 6.5 - same as 5.3 above.

If you have any questions today please feel free to give me a call on my cell at 727-5283. I can also set up a "page flip" meeting for tomorrow morning if you think it's required.

Regards,

Jim



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You owe it to yourself, and your family, to make it home safely every day. What have you done today so that nobody gets hurt?

Updated March 1, 2011



# Lower Churchill Project

Gatekeeper's Decision Support Package:

Request for Approval to Proceed to Gateway Phase 3

**Revision History**

Revision	Date	Reason for Issue
1	1-Mar-2011	Issued to reflect changes since November 16, 2010
0	16-Nov-2010	Issued for November Decision Gate 2 Approval

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## **1.0 EXECUTIVE SUMMARY**

### **1.1 Current Decision**

This *Gatekeeper's Decision Support Package* for Decision Gate 2 of the Nalcor Energy Gateway Process requests authorization for the Lower Churchill Development (LCP or the Projects) to pass through Decision Gate 2 and into Gateway Phase 3 for the Generation Project Phase 1 i.e Muskrat Falls, associated HVac transmission, the HVdc Labrador-Island Link Project and associated island upgrades. The readiness to move through Gate 2 for the scope identified is supported by achievement of the required prerequisite Key Deliverables for the Gate as well as the findings from an Independent Project Review team.

### **1.2 Gateway Phase 2 Recommendation**

After a thorough and comprehensive assessment of the options and alternatives to develop the hydro potential of the lower Churchill River for domestic use and export, a phased development of the Project has been selected as the basis of the Gateway Phase 2 recommendation. Nalcor Energy (Nalcor) believes this is the best alternative to meet the Island's electricity needs, when considering the circumstances with respect to options for energy export.

Phase I will include the development of the following projects, Muskrat Falls 824 MW generating station, associated HVac transmission along with an HVdc Transmission Link to the Island, associated Island upgrades, and an HVdc Maritime Transmission Link to Nova Scotia. First power from Muskrat Falls is targeted for the end of 2016.

Phase II, which is expected to proceed no earlier than three years after the start of Phase I, will consist of the 2,250 MW Gull Island hydroelectric generation project and associated HVac transmission to Churchill Falls and export markets.

### **1.3 Opportunity**

#### **1.3.1 Background**

The best undeveloped hydroelectric resource in North America, the Lower Churchill represents a tremendous prospect for the production of clean, renewable and affordable energy for generations to come. Combined, the Gull Island and Muskrat Falls generation facilities will have a capacity of over 3,000 megawatts, the potential to produce almost 17 terawatt hours (TWh) of electricity annually and the ability to displace up to 16 megatonnes (Mt) of carbon dioxide emissions every year from thermal power generation.

Historically an obstacle hindering the development of the lower Churchill River's hydro resources has been obtaining market access to allow energy transmission. This is attributable to the Project's geographical isolation and the fact that the island portion of the Province is not connected to the mainland grid. In late 2006, both generation facilities were registered for environmental assessment, following which a program of feasibility and planning studies commenced in order to determine the optimal development scheme for harnessing the lower

Churchill River's hydro potential. Concurrently, significant planning and investigation of options to achieve a viable, long-term market access focussed on (1) an overland route through the Province of Quebec, through application to Hydro Quebec TransEnergie's pursuant to its Open Access Transmission Tariff (OATT); and (2) a subsea route from the Island into the Maritimes, enabled by the transmission link from Labrador to the Island.

### 1.3.2 Current Situation

Nalcor has taken the time required to thoroughly complete investigations into the feasibility of these Projects. The Lower Churchill Project team has been vigorously pursuing the project developments on multiple fronts. Like any development project of this magnitude, there are many components being addressed, including the Environmental Assessment (EA) processes; analysis of market access options; analysis of domestic industrial opportunities; development of a financing strategy; finalization of a Water Management Agreement; negotiations for an Impacts and Benefits Agreement (IBA) with Innu Nation of Labrador; review of previous engineering design work and preparation for further studies and field work; understanding cost, schedule and risk; and determination of the optimum Project configuration.

Nalcor's Gateway Process (see Section 4.0, Figure 1) ensures that requisite levels of due diligence are conducted at each stage of the development process before a commitment of significant funds is made. Consistent with this approach, Nalcor has considered all available development options in a prudent manner based on thorough analysis and investment evaluation in order to arrive at the recommended phased development approach.

The recommendation to proceed is based on four years of thorough business assessment as well as a confluence of events and circumstances that have created the winning conditions for the Project to move forward. These conditions are both internal to Nalcor and include the Projects' readiness to proceed in such time to meet the Province's domestic needs as well as external conditions that include market demands for renewable energy, securing transmission access, and the Province's fiscal capacity.

## 1.4 Strategic Fit and Alignment

The phased development of the Lower Churchill Development is consistent with commitments made in the Government of Newfoundland and Labrador's Energy Plan. The first priority is ensuring the current and future power needs of the province are met with environmentally friendly, stable, competitively priced power. In considering this, the Energy Plan states that the development of the Lower Churchill must be considered in the context of Nalcor's broader Integrated Resource Planning initiatives. This assessment has been completed and Nalcor's subsidiary, Newfoundland and Labrador Hydro (NLH) has submitted a Generation Planning Issues Report to the Public Utilities Board. This report signalled that a generation planning decision had to be made by December 2010 if the appropriate planning, approvals and construction are to take place to meet anticipated demand. Nalcor has evaluated all practical supply options for generation sources to meet the Island's long term electricity needs and it has



determined that Muskrat Falls with a transmission link to the Island provides the least cost and most environmentally friendly solution to meet this need. Supplying the needs of the Island with power from Muskrat Falls via a transmission link from Labrador is a financially viable stand-alone proposition and is the most economic long term solution for both rate payers and the Province.

The Energy Plan also states that, if a decision is made to proceed with the Lower Churchill Project then the Holyrood Thermal Generating Facility will be replaced with electricity from the Lower Churchill. Nalcor plans to proceed with this commitment and supply the displaced capacity with power from Phase 1. The replacement of this facility will reduce GHG emissions in the province by 1.3 million tonnes annually, eliminating the province's dependence on the supply of imported fuel and remove future volatility in electricity prices.

The development of Phase I of the Lower Churchill Development means that the forecasted domestic energy requirements for both Labrador and the Island will be met for the foreseeable future and the Holyrood facility will be decommissioned. Phase I will also provide sufficient capacity for future industrial developments throughout the province. However, the capacity of generation at Muskrat Falls is currently greater than that which the domestic market can absorb. This surplus presents an opportunity for Nalcor to monetize the available power. In the absence of selling this power to other markets, water that would have been used to generate the power would be spilled over the dam and an incremental value opportunity would be lost.

As a means to monetize the excess power, Nalcor is committed to forming long term, positive strategic relationships with willing entities to purchase power and enable transmission access to key markets. One such relationship is with Emera Energy, a publicly traded entity based in Nova Scotia which is the parent company of Nova Scotia Power, Bangor Electric and Northern Maine Electric. Nalcor and Emera have reached an agreement on Phase 1 that includes an equity investment by Emera, power sales to Nova Scotia Power, construction of a Maritime transmission link project between provinces, and assignment of transmission rights in the Maritime provinces and Maine to Nalcor. This agreement will generate value for both companies and builds on Nalcor's existing relationship with Emera for the marketing of a portion of Recall power from the Upper Churchill in the United States.

Phase II will provide considerable energy and capacity that could be used in the domestic market for large industrial projects in mining or heavy industry. These developments could be in existing industries, including expansion of iron ore projects in Labrador West, underground expansion of the Voisey's Bay nickel mine and development of the Aurora Energy uranium mine or by new, yet to be identified power-intensive industries that may be interested in bringing business to the province as a result of the availability of predictably priced electricity. Phase II will also provide significant energy and capacity that could be made available to markets in eastern and central Canada and the northeast United States. Nalcor has been advancing access to Quebec's transmission system for a large portion of the power from Phase 2. Markets have been identified in Ontario, the Maritimes and Northeastern United States and interest is high to

purchase blocks of power from the Project. In the spring of 2010 Quebec's Regie d'Energie (Regie) rendered a decision denying access to markets through Hydro Quebec's system. Nalcor has commenced an appeal of the decision and will pursue all other means to access the Hydro Quebec transmission system. Work will continue on market identification in conjunction with the development of Phase I.

The development approach for Phase I being recommended by Nalcor is viable and is supported by a business case. Strategic support from the Shareholder in the form of an equity investment is critical and is key in achieving the commitments government made in the Energy Plan respecting the development of the lower Churchill River resource and the decommissioning of the Holyrood facility. The strategic agreement achieved with Emera will open the door to the North American market place for power sales to other jurisdictions and demonstrates that projects can be developed with a partner while maintaining control of the Province's resources.

## **1.5 Summary of Work Completed To-Date**

### **1.5.1 Conclusions from Gateway Phase 2**

The extensive body of cross-functional work and investigations from Gateway Phase 2 has enabled Nalcor to recommend the phased development sequence for the lower Churchill River. Extensive feasibility investigations and studies, combined with project planning activities, have provided the critical information required to validate the robustness of the business case.

The Nalcor Energy-Lower Churchill Project Management Team (NE-LCPMT) believes that all pre-requisites or Key Deliverables for Gateway Phase 2 are at a level of readiness sufficient for the Gatekeeper to approve the passage through Decision Gate 2 and commencement of Gateway Phase 3 activities. Confirmation of this assertion was provided by both Independent Project Analysis, Inc. (IPA) and a third party Independent Project Review (IPR) team consisting of four experienced and recognized hydro and megaproject experts. Both groups concluded that the project was in an optimal range for gate passage, with no showstoppers identified.

### **1.5.2 Recommendations from Gateway Phase 2**

The confirmation of the phased development sequence has afforded the ability for Phase I Projects of the development to transition into Gateway Phase 3 and focus on ensuring the level of readiness required to mobilize the Engineering, Procurement and Construction Management (EPCM) consultant(s) that are essential enablers for the development to proceed. Both IPA and the IPR confirmed a number of key focus areas for the Project Team in order to ensure a level of readiness to effectively mobilize the EPCM consultant and undertake the level of activity required to achieve a target of first power by the end of 2016.

### **1.5.3 Gateway Phase 3 Strategy**

Gateway Phase 3 will culminate in a sanction decision.

During the Gateway Phase 3, significant engineering and project execution planning work will be undertaken to both confirm the business case and allow the award of key supply and construct contracts immediately following Decision Gate 3. Until this Gate is achieved, effort will continue towards ensuring a balance of progressing the work required to maintain the ability to achieve the target project schedule and limiting long-term financial commitments and liability.

The estimated capital expenditure for Gateway Phase 3 scope of work and planned duration of 12 months is approximately \$240 million, which will be appropriated progressively by the Project Team with the achievement of key milestones within Gateway Phase 3.

## 2.0 DEFINITIONS

Term	Definition
Base Estimate	Reflects most likely costs for known and defined scope associated with project's specifications and execution plan.
Decision Gate	A Decision Gate is a predefined moment in time where the Gatekeeper has to make appropriate decisions whether to move to the next stage, make a temporary hold or to terminate the project. The option to recycle to the current stage is considered an undesirable option unless caused by changes in business conditions.
Decision Gate Review	A review of the project prior to a Decision Gate to provide the degree of assurance required by the Gatekeeper.
Escalation	Provision for changes in price levels driven by economic conditions. Includes inflation.
Estimate Contingency	Provision made for variations to the basis of an estimate of time or cost that are likely to occur, and that cannot be specifically identified at the time the estimate is prepared, but experience shows will likely occur. Contingency does not cover either of scope changes outside the project's boundaries, events such as strikes or natural disasters, or escalation and currency effects.
Gatekeeper	The person responsible for making the decision at the Decision Gate of the Gateway Process.

Gateway Phase	Refers to the period between Gates during which the applicable Project Team completes various work activities are completed in order to produce Key Deliverables required to move the specific Project forward.
Integrated Resource Plan	Process stewarded by Newfoundland and Labrador Hydro to evaluate future electricity demand on the Island and available options to meet such demand, in order to make a recommendation on the timing for developing new generation sources.
Island	The island portion of Newfoundland and Labrador.
Key Deliverable	High-level listing of key outputs/documents which collectively demonstrate that objectives of the relevant Phase of the Gateway Process have been attained.
NE-LCP Management Team	All managers and their delegates who report directly to the NE-LCP Project Director.
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.
Shareholder	For Nalcor Energy, the Shareholder is the Province of Newfoundland and Labrador.
Steering Committee	For Gateway Phase 2, the Steering Committee is a largely comprised on the VP LCP and the CFO / VP Finance.

### 3.0 ABBREVIATIONS AND ACRONYMS

AFE	Authorization for Expenditure
AFUDC	Allowance for Funds Used During Construction
DCF	Discounted Cash Flow
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPCM	Engineering, Procurement and Construction Management
FEL	Front-end Loading
GHG	Greenhouse Gas Emissions
HTGS	Holyrood Thermal Generating Station
HVac	High Voltage Alternating Current
HVdc	High Voltage Direct Current
IBA	Impacts and Benefits Agreement
IDC	Interest During Construction

Lower Churchill Projects

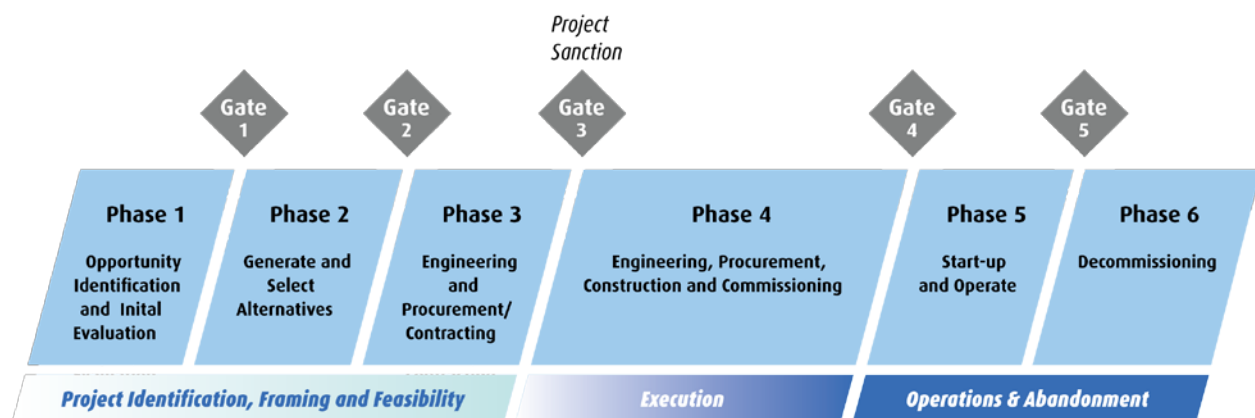
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IPA	Independent Project Analysis, Inc.
IPR	Independent Project Review
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
MW	Megawatt
NE-LCP	Nalcor Energy Lower Churchill Projects
NE-LCPMT	Nalcor Energy Lower Churchill Project Management Teams
NLH	Newfoundland and Labrador Hydro
NPV	Net Present Value
OATT	Open Access Transmission Tariff
PEP	Project Execution Plan
PLF	Planning Load Forecast
PWC	Price Waterhouse Coopers
RACI	Responsible, Accountable, Consult and Inform
SOBI	Strait of Belle Isle
TWh	Terawatt hour
VSC	Voltage Source Converter

#### 4.0 APPLICATION OF THE GATEWAY PROCESS

The Nalcor Energy Gateway Process, illustrated in Figure 1, is a staged or phased decision gate assurance process that is used to guide the planning and execution of a Project from identifying the opportunity through determining how it should be developed (e.g. transmission access, plant capacity, etc.), obtaining project approvals, completing engineering and commencing construction. It serves as a means of quality assurance for key decisions at crucial points in a project's lifecycle.

**Figure 1: Gateway Process**



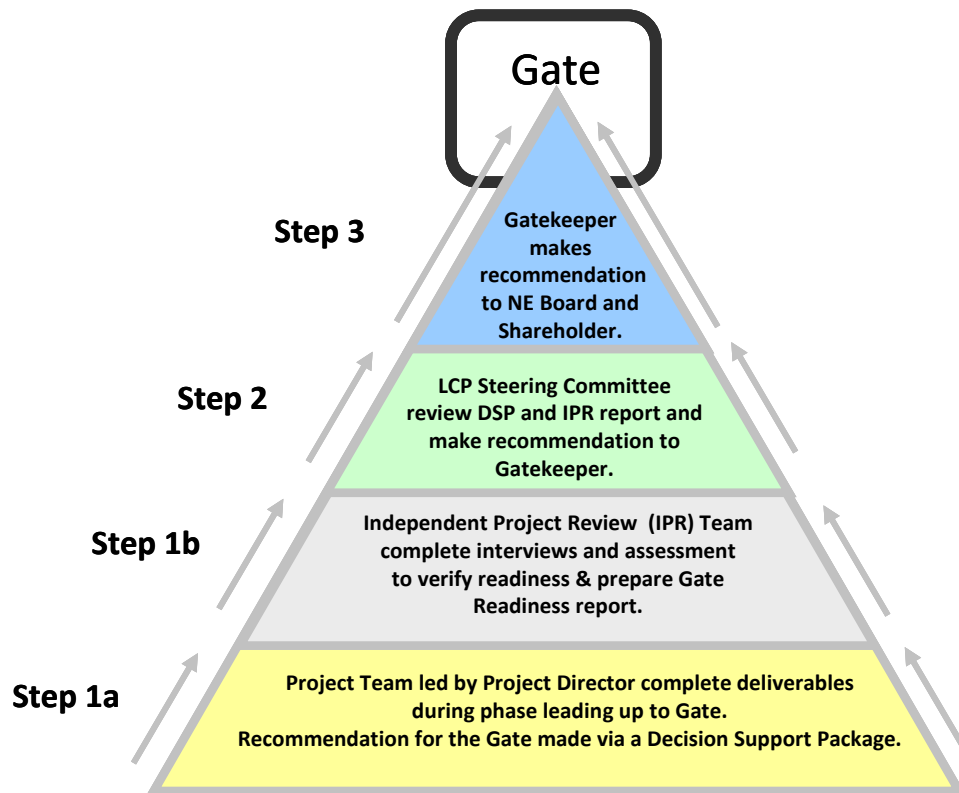
The above phases of a Project are managed by cross-functional teams and are referred to as Gateway Phases, while the gates (known as Decision Gates) are structured decision points at the end of each Gateway phase. The use of formal Decision Gates facilitates decision-making by the Gatekeeper of the readiness of a project to move from one Gateway phase to the next. For each Decision Gate there are a number of pre-determined Key Deliverables that have been agreed with the Gatekeeper. These Key Deliverables must be delivered to an acceptable quality in order to facilitate efficient and effective decision making at the applicable Decision Gate regarding the forward direction of the Project by the Gatekeeper.

The Key Deliverables for each Gateway phase are developed specifically for the Project and are developed with consideration of both standard project execution best practice, but more importantly with the consideration of the overall risk spectrum and tolerance for the Lower Churchill Development. These Key Deliverables have been designed to address all focus areas of the Projects and encompass commercial arrangements, financing, regulatory, environment, aboriginal affairs, engineering and technical, project execution and stakeholder management.

Decision Gate 2 is of strategic importance to the NE-LCP as it signifies that the development scenario, including phasing and sequencing of the Projects has been confirmed, and that the Project Teams are ready to move forward with detailed engineering and procurement / contracting and prepare to commence early construction works following release from environmental assessment. During Gateway Phase 3, engineering will progress to a level of completeness required to facilitate the award of key construction and supply contracts required to maintain the overall schedule as well as provide the level of cost and schedule certainty for a Decision Gate 3 passage.

Figure 2 illustrates the Decision Gate Assessment Process, which is made up of four sequential steps, culminating with a Gatekeeper recommendation to the Nalcor Energy Board of Directors and Shareholder. These steps are:

- Step 1a Readiness Recommendation by the Project Team.
- Step 1b confirmation of readiness recommendation following a third party verification by an Independent Project Review team.
- Step 2 confirms an Acceptance of Readiness by the Steering Committee.
- Step 3 approves that the Project is ready to move through the Decision Gate and onto the subsequent Gateway phase.

**Figure 2: Decision Gate Assessment Process**

#### 4.1 Independent Project Review (IPR)

An IPR provides the degree of quality assurance by independent experts required by the Gatekeeper for major decisions. The reviews are regarded as an opportunity to assess readiness, to challenge the project teams, and provide assurance that the projects will deliver the required business results. The findings, observations and recommendations from the Decision Gate 2 IPR, as well as a gap closure plan, are included as part of this *Decision Support Package*.

The general objectives of an IPR are:

- To provide external challenge to the project teams at each Decision Gate, to help assess the validity and robustness of the work done, the key areas requiring focused attention and to assist in maximizing the value of the business opportunity.
- To assess the suitability of the projects' plans and strategies.
- To appraise the readiness and justification of the projects to proceed into the next Gateway phase.

## 5.0 BUSINESS CASE

### 5.1 The Need for the Projects

The need to develop the Lower Churchill Project is driven by three inter-related factors:

- Directives outlined in the Energy Plan
- Domestic energy requirements
- Future growth in export markets

#### 5.1.1 Energy Plan Directives

Two core objectives of the Energy Plan, being environmental sustainability and economic self reliance for the best long-term interests of the people and the Province, define the need, purpose and rationale for development of the Projects. The Energy Plan makes meeting the Province's current and future electricity needs with environmentally friendly, stable and competitively priced energy and power a priority, and endorses the development of the Projects as a cornerstone public policy action to fulfill this obligation.

Nalcor's direction to proceed with planning of the Projects was affirmed with the release of the Energy Plan and includes the following policy directives relevant to the Projects:

- The Government of Newfoundland and Labrador will lead the development of the Lower Churchill Hydroelectric Projects, through the Energy Corporation (Nalcor)<sup>1</sup>
- The Government of Newfoundland and Labrador will maintain the moratorium on small hydro developments, subject to a review concurrent with a decision on proceeding with the Lower Churchill Projects<sup>2</sup>
- Export focus will be on achieving direct access to both long and shorter-term customers in a number of markets, including Ontario, New Brunswick, Quebec, Nova Scotia, P.E.I., New England and New York. Achieving direct access is necessary to ensure we:
  - a) Secure a fair share of the economic upside potential of developments over the long term.
  - b) Position ourselves properly for realizing the long term value of the Upper Churchill development.<sup>3</sup>
- In conjunction with development of the Lower Churchill, Nalcor Energy is in discussions with various parties on potential power sale arrangements. For existing customers, this may require that the Province assess the costs and benefits of continuing these historical arrangements, considering a combination of existing and future generation sources. These arrangements will be designed to balance the realities of market

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<sup>1</sup> Energy Plan, Page 32.

<sup>2</sup> Energy Plan, Page 34.

<sup>3</sup> Energy Plan, Page 44.



conditions with the need to encourage support of industries which significantly contribute to the provincial economy.

Another key theme of the Energy Plan is that the Province will leverage its short term non-renewable oil and gas wealth into a renewable future by investing non-renewable resource revenues in long term renewable energy assets, the Lower Churchill Projects being foremost among them.

### **5.1.2 Domestic Energy Requirements**

In addition to the need for undertaking the Lower Churchill Projects to fulfill the requirements of the Energy Plan, generate positive returns for the Province and create further opportunities for the development of other resources within NL's Energy Warehouse, the need is also being driven by the findings from Nalcor's Integrated Resource Planning which identified the requirement for new generation capacity to serve the long term domestic energy needs for the Island of Newfoundland by as early as 2015.

This need to address the Island system's shortfall is in line with directives contained in the Energy Plan, which explicitly states that the development of the Lower Churchill Projects cannot be done in isolation; rather it must be considered in the context of Nalcor's broader Integrated Resource Planning initiatives. A significant part of that integrated planning involves the future of the Holyrood Thermal Generating Station (HTGS) and how best to meet the Province's domestic energy needs.

Longer term, the development of the Lower Churchill Projects will also provide surplus power for future industrial developments in Labrador and on the Island while also meeting normal forecasted growth in the energy requirements for both Labrador and the Island. In particular, Gull Island will have considerable energy capacity that could be used for large industrial projects in mining or heavy industry. These developments could be in existing industries, including expansion of iron ore projects in Labrador West, underground expansion of the Voisey's Bay nickel mine or development of the Aurora Energy uranium mine. Nalcor is also exploring opportunities in new power-intensive industries that would use the power from the Lower Churchill Projects.

This need to meet the Island load growth and the replacement of the HTGS is the main driver for the need for Phase 1 of the Projects. The timing of this need for domestic requirements necessitated that a decision be made to proceed by the end of 2010.

### **5.1.3 Export Markets**

Growth in export markets is being driven by a need to replace aging infrastructure, a need to displace thermal generating capacity with non-emitting energy, general long term growth and

the need for dispatchable<sup>4</sup> energy sources that can enable development of other renewable energy sources. The Lower Churchill Projects' competitive advantage in the marketplace is that they can meet all of these market drivers and provide sufficient quantities of energy and capacity to make it economically viable to do so.

Nalcor believes that there are enough long-term export market opportunities to justify the Projects, beginning with Muskrat Falls followed by Gull Island. Nalcor recognizes that in order to avail of export market opportunities, the delivered cost of energy must be competitive with alternative supply sources in the export markets, which Nalcor assumes will be predominantly driven by natural gas prices. The export market opportunities identified at the time of Gateway Phase 2 can be summarized as follows:

- By 2020, market potential in Nova Scotia and New Brunswick is estimated to be almost 13 TWh/year. A large portion of this amount, 7.6 TWh/year (60%), is potential displacement of fossil fuel generation, with 5.4 TWh due to potential replacement of aging generation capacity. Market potential is not driven by load growth, primarily because Nova Scotia has very aggressive targets for conservation, including an 8% decrease in demand between 2010 and 2020. If these conservation targets are not achieved, market potential would be correspondingly higher. The potential to avail of the opportunity to displace fossil fuel generation is considerable, particularly in Nova Scotia where hard GHG caps have been established and an aggressive 40% target of renewables by 2020 has been adopted.
- Ontario plans to retire 6,000 MW of coal plants and 3,000 MW of nuclear plants by the end of 2020, representing 44 TWh/year. While the coal generation will be decommissioned prior to the Project in-service date, 15 TWh of the 44 TWh relates to the retirement of units at the Pickering nuclear facility. Another 8 TWh/year of market potential comes from the opportunity to displace gas fired generation, and 4.5 TWh from load growth. The introduction of at least 2,500 MW of renewable generation under the Feed in Tariff program will also increase the need for dispatchable generation in this market.
- New York and New England are very large markets and together represent 96 TWh/year of market potential, of which approximately 15 TWh is attributed to load growth, and approximately 81 TWh/year from displacement of fossil generation. As noted in the methodology, no attempt has been made to quantify the potential for replacing aging generating capacity in these two markets. This is a conservative approach to estimating the market potential in these markets and consistent with our planned shorter term strategy in these markets.
- The analysis shows a relatively low market potential of approximately 3 TWh in Quebec by 2020; this is due to the anticipated commissioning of the Romaine Project as reflected in the initial five years of the study period. This low market potential may not

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<sup>4</sup> A dispatchable energy source is a source of electricity that can be dispatched at the request of power grid operators; that is, it can be turned on or off upon demand.

manifest as sales to Quebec itself, but rather as reductions in exports from Quebec to the other regions, creating opportunities for replacement sales from the Project.

- Overall, the identified markets offer a combined energy market potential of about 135 TWh, including 22 TWh from load growth (net of committed new capacity), 13 TWh from replacement of aging Canadian generating capacity, and about 100 TWh from the opportunity to displace existing fossil generation.

Analysis of the forecast net change of the demand/supply balance and potential for displacement of carbon production in the identified markets demonstrates significant market potential to 2030.

## 5.2 Phase 1 Objectives

The key objectives for Nalcor's Lower Churchill Project Management Teams coming out of Decision Gate 2 are as follows:

- Develop Phase I of the Generation Project (Muskrat Falls Project generating facility plus associated HVac transmission in Labrador).
- Develop the Labrador to the Island Link Project.
- Achieve first power within six (6) years of EA release.
- Ensure that the targets contained within the Lower Churchill Construction Projects Benefits Strategy with the Government of Newfoundland and Labrador and the Impacts and Benefits Agreement with the Labrador Innu Nation are met.
- Proceed with the Maritime Link Project.
- Pursue market access opportunities using the Open Access Transmission Tariff process for Gull Island power – Phase II of the lower Churchill River development.

## 5.3 Cost Estimate of the Projects

The Gate 2 Capital Cost Estimate builds upon the estimating work completed since late 2007 for the Projects, and reflects the latest project configuration as defined in the Basis of Design for the Lower Churchill Projects. Its principal purpose was to support the evaluation and selection of the potential development scenarios for each project. This capital cost estimates reflect the key timelines and sequences, and execution approach as documented in the Execution Plan (Scope and Approach), which indicates early works construction commencing in Spring 2012 following release from Environmental Assessment and ends with commissioning of the final turbine/generator unit and thus full power in May 2017.

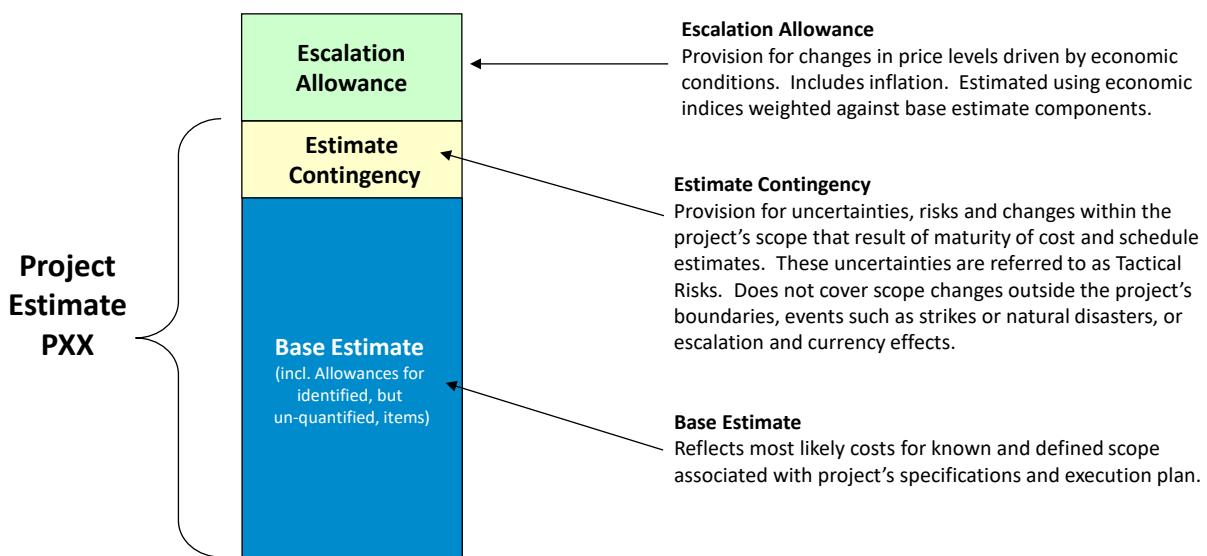
In the case of Phase 1 Generation Project (Muskrat Falls) and the Labrador Island Link Project the capital cost estimates are considered to be commensurate with the requirements to be considered an AACEI Class 4 estimate, having an accuracy of -15% / + 30%, thereby meeting the requirements for Gate 2. This capital cost estimate is inclusive of all incurred / forecast cost up

to the end of 2010, detailed engineering, construction / completions, construction management, project management and owner's cost.

The Maritime Link estimate is considered to be a Screening Level estimate only.

Figure 3 below illustrates the components of a project cost estimate, including the role of Estimate Contingency determined through this Project Risk Analysis, in the overall estimate. Table 1 provides a summary of the cost estimate for the Project used in Gate 2 economic modeling undertaken by Nalcor.

**Figure 3: Project Cost Estimate Components**



**Table 1: Phase I Direct and Escalated Nominal Capital Costs (\$ Billions CDN)**

	Muskrat Falls	Labrador Island Link	Maritime Link	Total
Direct 2010 \$ (=Base Estimate + Estimate 15% Contingency)	\$2.5	\$1.9	\$1.0	\$5.4
Escalated Nominal \$	\$2.9	\$2.1	\$1.2	\$6.2

## 5.4 Economics of Recommended Development Scenario

Nalcor utilizes a specific methodology for the consistent evaluation of investment activities to ensure commercial investments are analyzed with an appropriate level of rigor and analysis using a structured approach to support informed investment decisions. For major development projects such as Phase 1, Nalcor's investment evaluation methodology is integrated with the various phases of the Project Development Gateway Process.

Given the size and scope of the Projects, the evaluation procedures performed have been extensive. Project finance models have been developed by Nalcor, with advice from Pricewaterhouse Coopers LLP, who has been retained as financial advisors for the Projects. Nalcor uses a discounted cash flow ("DCF") modeling technique which involves estimating and projecting net future cash flows on a period-by-period basis and the selection of an appropriate discount rate to apply to such projected cash flows. Key inputs to the financial model, including hydrology, market prices, sales portfolio, capital expenditures, operating costs, and economic assumptions were developed by Nalcor's Investment Evaluation and Project groups, along with external experts. Financing assumptions, including capital structure, debt terms and conditions, and an equity target rate of return were developed by Nalcor with the assistance of PwC. Primary outputs of the financial modeling include prospective cost-out prices and market-based returns, including net present value ("NPV") and internal rate of return ("IRR").

Table 2 presents several key metrics for the Project's economics.

**Table 2:** Lower Churchill Project Economics – Key Metrics

Metric	Value to Nalcor of Muskrat Falls and Lab-Island Link, Island Demand Only
Capital Expenditure, nominal dollars, before interest during construction and fees	\$4.4 Billion
Capital Expenditure, In-Service <sup>(1)</sup>	\$5.1 Billion
Equity Requirement, total	\$1.5 Billion
Net Present Value (NPV) on capital, discounted at 7.5%	\$433 Million
Internal Rate of Return (IRR) on capital	9.2%
Dividends over 50 years from In-Service	\$17.7 Billion

(1) Includes IDC and AFUDC.

## 5.5 Financing Strategy

Key assumptions relating to the financing strategy for the Projects are as follows:

### Ownership

- Muskrat Falls (and eventually Gull Island) owned 100% by Nalcor
- Labrador-Island Link owned 71% by Nalcor and 29% by Emera
- Maritime Link owned 100% by Emera for the first 35 years, and then 100% by Nalcor thereafter

### Capital Structure

- Muskrat Falls – 66/34 debt-equity
- Labrador-Island Link – 75/25 debt-equity for Nalcor's portion and 55/45 for Emera's portion
- Maritime Link – 63/37 debt-equity
- Federal loan guarantees on debt currently estimated at \$4.8 billion

The investments and related financing strategy are summarized in Table 3.

**Table 3:** Investment and Financing Profile (In-Service Cost includes IDC and AFUDC)

(\$ Billions)	
<b>Investments</b>	
Muskrat Falls	3.3
Labrador-Island Link	2.4
Maritime Link	1.4
<b>Total Investments</b>	<b>7.2*</b>
<b>Financing</b>	
Equity from NL/Nalcor	1.5
Equity from Emera	0.8
Muskrat Falls Debt	2.2
Lab-Island Link Debt – Nalcor Portion	1.3
Lab-Island Link Debt – Emera Portion	0.4
Maritime Link Debt	0.9
<b>Total Financing</b>	<b>7.2*</b>

*\*Totals may not add due to rounding*

### 5.5.1 Strategy Validation & Findings

In validating the above strategy, the following steps were taken:

- Senior officials from the Provincial Department of Finance were consulted with respect to the proposed equity requirement from the Province of Newfoundland and Labrador (NL).

- High level consultations were held in September 2010 with the company's capital markets advisors RBC Capital Markets (RBC) and Scotia Capital Markets (SCM), as well as with the three major credit rating agencies in Canada, namely; Standard and Poor's (S&P), Moody's and Dominion Bond Rating Service (DBRS).
- Nalcor's advisor on financing matters for the Projects, PricewaterhouseCoopers LLP (PWC), has provided ongoing feedback regarding the proposed project debt financing strategy.
- Ongoing discussions with Emera on financing strategy have followed the execution of the term sheet on November 18, 2010.

### **5.5.2 Comments of the Provincial Department of Finance**

The Provincial Department of Finance considers it reasonable to expect that the Province of NL equity requirement can be appropriately funded, although they indicated that variability in future resource revenues is a critical consideration.

### **5.5.3 Comments of Capital Market Advisors RBC and SCM**

RBC and SCM advised that the degree of leverage in the capital structure will be dependent upon the type of regulation applied. Full cost of service recovery might enable higher leverage of the magnitude contemplated. They consider the means by which construction risk, cost over runs risk and completion risk are handled to be keys to the success of the financing strategy. They expressed a level of comfort with the Province's ability to fund their equity contribution over the construction time period.

### **5.5.4 Comments of Rating Agencies**

With respect to the rating agencies, their preliminary comments were provided with the proviso that they were subject to a further review of more detailed information. To address this matter, Nalcor has scheduled meetings with the rating agencies in March 2011 to provide an update on the financing strategy as contemplated above.

### **5.5.5 Comments of Project Financial Advisors PWC**

PWC considers both Muskrat Falls and the Labrador-Island Link to have the potential to be credible as a borrower on a limited recourse project finance basis. Key success factors mentioned by PWC were:

- Ratepayer obligation / committed minimum revenues, for both the Labrador Island Link and the Island customer portion of Muskrat Falls output;
- Clear revenue "line of sight" for the applicable borrowing entities:

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- For Labrador-Island Link: clear line of sight to regulated revenue stream;
- For Muskrat Falls:
  - Definition of the customer revenue streams, regulated and non-regulated – who is buying and at what price and terms;
  - Confirmation of the credit-worthiness of revenues , in particular non-regulated; and
- Achieving in-service and commencement of revenues.

### 5.5.6 Other Financing Considerations

While Nalcor has obtained a level of comfort that the financing strategy as proposed is potentially viable, it is recognized that the viability of the equity component contributed by the Province of NL is impacted by market prices for oil.

A greater level of comfort as to the viability of contemplated external debt financing will be obtained during the course of in-depth market sounding, at which time it will be imperative that Nalcor demonstrate a clear and plausible strategy with respect to the critical success factors as outlined above, as well as other factors such as construction estimates and schedule, aboriginal relations, environmental release and other key factors. At this point in time, Nalcor is not aware of any such factors that cannot be adequately addressed to the satisfaction of potential debt holders in the time frames allotted.

### 5.6 Forward Looking Appropriation Plan

Required funds for the Project will be provided using Nalcor's annual budget and business planning process, while capital required for project commitments will be appropriated at key schedule milestones via the approval of Authorization for Expenditure (AFE) requests. These milestones and the estimated funding required are summarized in Table 4.

**Table 4:** Lower Churchill Project Authorization for Expenditure Milestones 2010/2011

Funding Step	Planned Date	Estimated Amount (M CDN \$)
Milestone: Award EPCM Agreement for Project	December 2010	\$60
Milestone: Completion of Environmental Assessment Public Hearings for Generation Project	July 2011	\$180



## 6.0 RECOMMENDED DEVELOPMENT SCENARIO

### 6.1 Project Scope

Phase I of the lower Churchill River's development will include the Phase 1 of the Generation Project (Muskrat Falls 824 MW generating station), the Labrador Island Link Project (a 900 MW HVdc Transmission Link to the Island via a submarine cable crossing the Strait of Belle Isle) and the HVdc Maritime Link Project. Phase II of the lower Churchill River's development, which is expected to proceed no earlier than three years after the start of Phase I, will consist of the 2,250 MW Gull Island hydroelectric generation project and associated transmission to export markets.

The scope of the physical facilities to be constructed during Phase I of the development is highlighted in Figure 4. It includes the following main project components:

#### Phase I

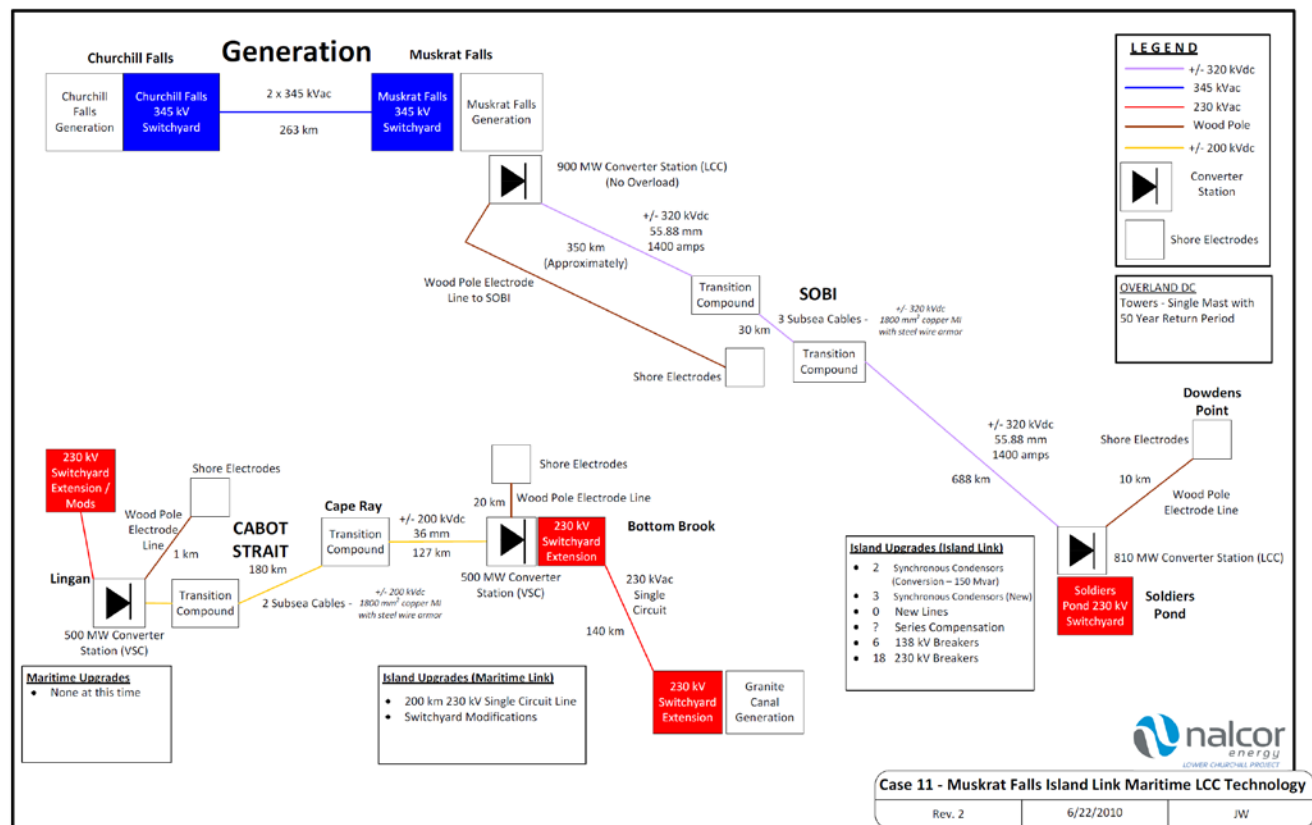
- Phase 1 Generation Project (Muskrat Falls Generation Facility)
  - 824 MW powerhouse and supporting structures
  - 345 kV HVac transmission interconnect between Muskrat Falls and Churchill Falls
- Labrador-Island Link 900 MW +/- 320 kV HVdc transmission Project with a connection from Muskrat Falls to Soldier's Pond
  - ~ 1050 km Overhead Transmission Line
  - HVac to HVdc converter stations at Muskrat Falls and Soldier's Pond
  - Shore Electrodes at SOBI and Dowden's Point
  - 3 cables crossing the Strait of Belle Isle
  - Island System Upgrades
- Maritime Link 500 MW +/- 200 kV HVdc transmission connection from Lingan, NS to Bottom Brook, NL
  - ~ 127 km Overhead Transmission Line
  - HVac to HVdc converter stations at Bottom Brook and Lingan
  - Shore Electrodes in NL and NS
  - 2 cables crossing the Cabot Strait from Cape Ray to Lingan
  - Island System Upgrades
  - HVac line from Bottom Brook to Granite Canal, NL

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Phase II

- Phase II Generation Project (Gull Island Generation Facility)
  - 2250 MW powerhouse and supporting structures
  - HVac transmission interconnect with Muskrat Falls and Churchill Falls
- HVac transmission system additions to support domestic and/or export use of energy.

**Figure 4:** Schematic Depiction of Recommended Development Scheme**6.2 Schedule and Key Milestones**

The following reflect the planning basis of the Phase 1 at the end of Gateway Phase 2.

- Final feasibility engineering studies to be finalized in Q1-2011.
- Early Site Infrastructure Works for Muskrat Falls (access, accommodations, communications, construction power) to commence following EA release and permitting in August – September 2011.

- Project Sanction / Gate 3 in October – November 2011 triggers the issue of purchase orders for major components (e.g. turbines, generators, submarine cable, and transmission hardware).
- EA release for the Island Link in late Q1-12 following which right-of-way clearing will begin.
- First Power from Muskrat Falls via Churchill Falls in Q4-2016.
- Power from Muskrat Falls via the Labrador – Island Transmission link in Q1-2017.
- Full Power available from Muskrat Falls in Q2-2017.

### 6.3 Project Delivery Strategy

Phase 1 of the Generation Project (Muskrat Falls) and the Labrador -Island Link Project will be executed utilizing a traditional Engineering, Procurement and Construction Management (EPCM) delivery method. In the EPCM model NE-LCP provides focused management and control over the overall project and the selected EPCM consultant(s). The EPCM consultant(s) are responsible for the completion of all engineering and detailed design, construction execution planning, procurement of permanent plant equipment, issue and management of all supply and construction contracts, and overall construction management for the Projects, including as custodian for the Projects' work sites, and Project Completions. The construction contractors will be responsible for the safe and successful execution of their work in accordance with their contracts and approved safety programs, while the suppliers are responsible for delivery of goods and services for the Projects.

The scope of Muskrat Falls and Island Link Projects has been divided into three components for Project management purposes:

- Muskrat Falls Hydroelectric Development
- HVdc Specialties, including converter stations and transition compounds
- Overland Transmission – both HVac to Churchill Falls and HVdc to Soldier's Pond

Excluded from the above scope is the SOBI cable crossing. The delivery approach for this component will be confirmed early in Gateway Phase 3, however from a planning basis an EPC arrangement is being assumed. In this arrangement, NE-LCP acts as overall Project Manager.

The Maritime Link Project is planned to be a joint venture arrangement (details to be confirmed) using either an EPC or an EPCM project execution model.

### 6.4 Proposed Owner Organization

The focus of the NE-LCP Owner's organization as reflected in the Gate 2 Organization Plan is to progress the Projects through the mobilization of the EPCM consultant(s), detailed design activities, and Early Infrastructure Works. This organization plan will be revisited and revised in

Gateway Phase 3 following a review of the overall performance of the Projects, including that of the EPCM consultant(s).

Objectives of the current organizational plan include:

- Successfully prepare for the mobilization and ramp-up of the EPCM consultant(s) and early design activities.
- Facilitate the on-going management of the Environmental Assessment process.
- Encourage functional support, alignment, and buy-in via the Project Management Teams.
- Recognize the need to support on-going investigations of the Newfoundland – Nova Scotia HVdc Maritime link.
- Recognize the extensive system integration and planning involvement regarding integrating the Island's electrical system with mainland North America.
- Safely support project execution including Early Works.
- Promote team alignment and alignment with Nalcor functional departments.

The overall strategic management of the NE-LCP teams will be through the Project Director who has a line reporting relationship to the NE-LCP Vice President. The Project Director will reside within the Home Office Team located at Hydro Place in St. John's.

Reporting to the Project Director will be designated Project Managers, with supporting teams, for each of Muskrat Falls, Island Link, and SOBI projects. These Project Managers will lead the Project Management Teams for each of these Projects, which will be comprised of full-time, embedded functional expertise provided by the Home Office Team.

The Project Director will provide all Project Managers with policies, procedures, priorities, a higher level of financial approval, strategic direction, performance feedback, and instructions in order to effectively deliver their respective projects.

The Project Managers and their supporting functional teams for the Muskrat Falls and Island Link projects will be co-located with the EPCM consultant(s) during the engineering and construction phases, with on-site presence as deemed appropriate. These Project Teams will take functional direction from Home Office Team and operate within the agreed Project procedures and policies established by Home Office Team.

The NE-LCP Home Office Team Functional Managers have overall functional responsibility to provide functional expertise and direction, including people, processes and tools to support the Project Director and Project Managers in delivering the Projects.

## 6.5 Key Risks and Management Strategies

Nalcor has implemented a best-in-class risk management program for the Projects, which is built upon the lessons learned from other mega-projects. As a key component of Nalcor's project governance structure, this risk management program has effectively allowed Nalcor to

work with third party specialist advisors / consultants to identify and manage project risks. The fullest application of this program has afforded decision quality assurance through robust risk-based decision making tactics that will help assure the predictability of the outcome of the Project.

Table 4 lists the key risks faced by the Project that are significantly influencing the execution strategy and management approach for the Project.

**Table 4:** Key Risks and Management Strategies

Key Risk	Management Strategy
Achieving timely release from the Generation Environmental Assessment in order to facilitate a spring 2011 start of infrastructure works construction at Muskrat Falls.	<ul style="list-style-type: none"> <li>• Focus on ensuring quality information is provided to the EA Panel.</li> <li>• Proactively address Muskrat Falls first development plan with JRP.</li> <li>• Maintain consultation efforts, in particular with aboriginal groups.</li> <li>• Bolster team resources to allow for efficient management and support of the EA process.</li> </ul>
Achieving timely release from the Labrador-Island Link Environmental Assessment.	<ul style="list-style-type: none"> <li>• Strategically manage the EA process leveraging lessons learned from Generation EA</li> <li>• Prepare a comprehensive draft of the EIS prior to release of draft guidelines.</li> <li>• Conduct extensive stakeholder consultation activities</li> <li>• Understand and put plans in place to manage aboriginal interests.</li> <li>• Bolster team resources to allow for efficient management and support of the EA process.</li> </ul>
Installation and protection of the SOBI submarine cable crossing.	<ul style="list-style-type: none"> <li>• Evaluate all available opportunities as soon as possible</li> <li>• Employ team resources with marine installation experience in East Coast harsh environments.</li> <li>• Execute exhaustive studies encompassing all cable installation options for both a seabed and a tunnel crossing solution.</li> <li>• Engage best consultants for subsurface conditions.</li> </ul>
Labor productivity and performance aligned with expectations.	<ul style="list-style-type: none"> <li>• Establishing a benefit / reward relationship with the EPCM consultant and construction contractors that entices them to put the "A-team" on the job.</li> <li>• Consider appropriate incentives for the EPCM consultant that are strategically aligned with achieving design and construction readiness outcomes that support increased worker productivity.</li> <li>• Recognize threat of competition from other mega-projects (i.e. Hebron) and proactively manage.</li> <li>• Actively recruit Newfoundlanders home – leverage the</li> </ul>

	<p>"legacy" theme to entice end of career experienced supervisors to work on the Project.</p> <ul style="list-style-type: none"> <li>• Making the work and work site appealing to Newfoundlanders (e.g. attractive camp, compensation, rotation and transportation).</li> <li>• Developing a construction schedule based upon achievable labour productivities.</li> <li>• Negotiating a labour agreement that supports trade flexibility / work team concepts.</li> <li>• Training aboriginal workers in appropriate areas.</li> </ul>
Achieving a Zero Harm – Nobody Gets Hurt mindset in a transient construction workforce.	<ul style="list-style-type: none"> <li>• Early and proactive program to promote and secure commitment to best practices.</li> <li>• Work with EPCM to develop and implement a behavioural based safety program across the Project.</li> <li>• Engaging and retaining contractors who are leaders in safety performance and have demonstrated the ability to proactively manage all aspects of HSE performance on remote worksites.</li> <li>• Recognizing HSE performance is imperative and start embedding an HSE culture early in the project. It all starts with management's commitment to safety.</li> <li>• Maintaining team awareness and establish strong &amp; open communication channel on all aspects of HSE.</li> </ul>
Attracting a capable EPCM contractor who has a strong background in all engineering, procurement and construction management activities for large hydro and transmission projects.	<ul style="list-style-type: none"> <li>• Developing an innovative contracting strategy to make project attractive to contractors with risk/benefit balance.</li> <li>• Implement a rigorous EPCM selection process.</li> <li>• Taking early and aggressive action to secure required engineering competencies and resources.</li> <li>• Scheduling sufficient time for engineering completion prior to start of construction.</li> <li>• Implementing a project-wide Quality Management System and embed QA requirements in all contracts.</li> </ul>
Site conditions worse than geotechnical baseline.	<ul style="list-style-type: none"> <li>• Mitigate the risk by maximizing geotechnical investigations to determine conditions as well as possible before bidding. Residual risk will have to be accepted by Nalcor since contracts will not accept it. Hence the focus on the 2010 field program for Muskrat Falls.</li> </ul>
Limited number of creditworthy hydro turbine suppliers.	<ul style="list-style-type: none"> <li>• Engage existing "bankable" suppliers in model testing scope in order to build and maintain interest during this slower demand period.</li> <li>• Explore contracting model and risk allocation strategy.</li> <li>• Enhanced oversight during design and manufacture phases.</li> </ul>
Availability of experienced high-voltage transmission line	<ul style="list-style-type: none"> <li>• Split into 5 to 6 smaller contracts for cost and scheduling reasons</li> </ul>

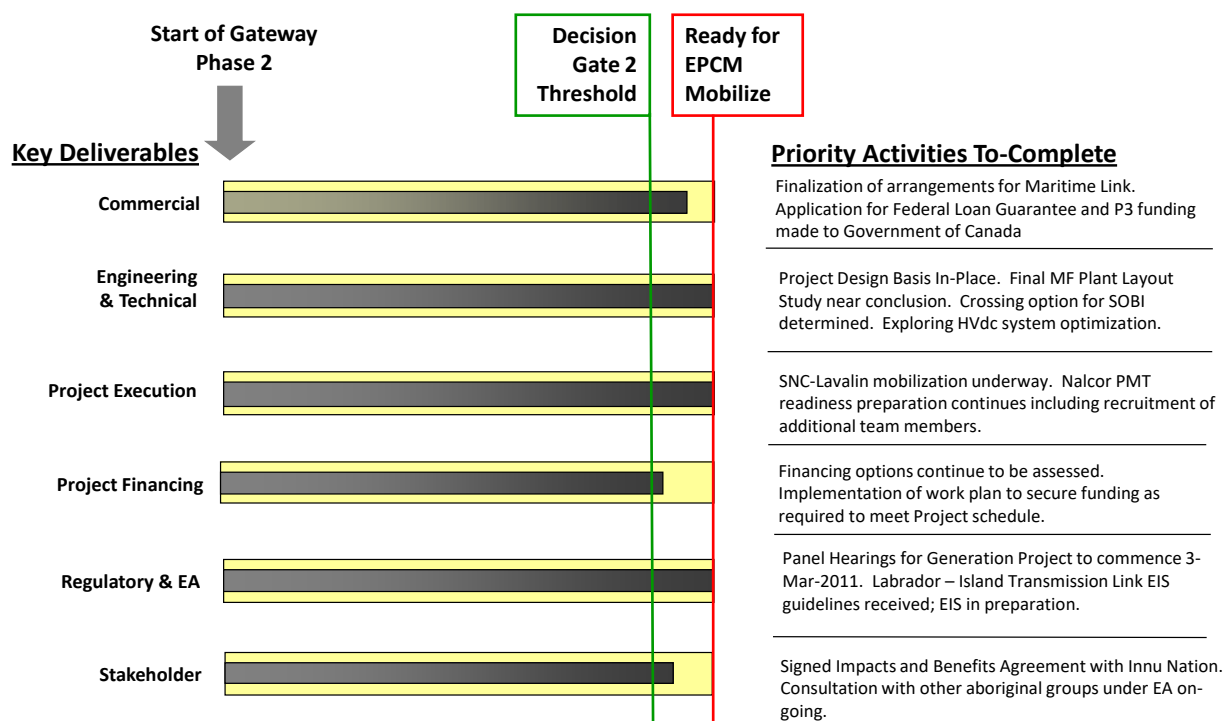
contractors and skilled labour.	<ul style="list-style-type: none"> <li>• Actively pursue potential suppliers and expand to worldwide considerations</li> <li>• Phase the transmission build in order to flatter resource demands</li> <li>• Actively support the training of linespersons.</li> </ul>
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## 7.0 READINESS TO PROCEED TO GATEWAY PHASE 3

### 7.1 Declaration of Readiness

In accordance to the Summary of Overall Readiness for Decision Gate 2, shown in Figure 5, the Project Teams declare that the required level of readiness to develop Phase I of the lower Churchill River has been achieved and that any remaining work associated with the Gateway Phase 2 is not considered to be a showstopper for the Decision Gate 2 consideration. Attachment A.1 provides a readiness report against the Gateway Phase Key Deliverables with the status as of November 16 2010. Figure 5 provides a summary of the overall readiness status for Decision Gate 2.

**Figure 5: Summary of Overall Readiness for Decision Gate 2**



Attachment A.2 contains the Declaration of Readiness as endorsed by the Project Team.

## 7.2 Verification of Readiness

Consistent with the Decision Gate Assessment Process, an independent verification of readiness for the Gate was carried out by Independent Project Analysis (IPA) using their proprietary "Pacesetter Evaluation Process." IPA's final report was provided to NE-LCP in September 2010 and is included as Attachment A.3. A core element of IPA's assessment of readiness is the quantitative measurement indicator known as the Front End Loading Index. Through a systematic evaluation of both the Muskrat Falls and Island Link projects, IPA concluded that:

*the "Project is better prepared than a typical megaproject at end of Front-End Loading (FEL) 2," and the "Project has clear objectives and a well-developed project team that has closed the project scope and achieved optimal project definition."*

Quantitatively, the assessment revealed that the Project scored in the optimal range of the FEL Index for a mega project. This confirms, by independent evaluation, that the Project is both ready for Gate 2 and is on track to achieve the business objectives.

Following IPA's evaluation, an Independent Project Review was undertaken by a four-person team of experts with over 160 years of combined project experience on hydro projects and other megaprojects. The findings from this high-level independent expert assessment are included in Attachment A.4. Consistent with IPR team's mandate, the team reviewed the Project's status on some 25 focus areas to determine readiness to pass through Gate 2 and nine areas to determine priorities for the readiness to mobilize the Engineering, Procurement and Construction Management (EPCM) consultant, currently scheduled for Q1 2011.

The IPR determined that the Project is ready to pass through Gate 2 with 17 of 25 areas being fully compliant and eight areas being compliant with some minor work suggested. The IPR Team concluded that:

*"Overall, the Project is ready for a Gate 2 Decision.*

- Complies with applicable best practice*
- Consistent with this Project's specifics"*

In total nine priority focus areas were identified by the IPR team as requiring action prior to the mobilization of the EPCM consultant. Of these, four were considered high priority, three as medium, and two as low. The overall finding of the IPR team was that the Project Team understood the priorities, had knowledge of them prior to the review and with continued focus would be ready for the EPCM consultant mobilization. The Project Team agrees with these focus areas and has plans in place or under development to address each of them.

## 8.0 PATH FORWARD

Following passage through Gate 2, and into Gateway Phase 3, work will commence with a concentrated effort towards ensuring readiness to mobilize the successful Engineering, Procurement and Construction Management (EPCM) consultant. This EPCM consultant will work with Nalcor to finalize any remaining feasibility studies for the Muskrat Falls and Island



Link projects, completing all essential engineering and procurement activities to support a start of site infrastructure at Muskrat Falls following the release from environmental assessment.

Gateway Phase 3 culminates at Gate 3, which is predicated upon the release of the Generation Project from Environmental Assessment, and the completion of a sufficient amount of engineering and contracting activity in order to confirm the Projects' cost and schedule targets. There will also be an Independent Project due diligence review to support the achievement of all Gateway Phase 3 Key Deliverables and readiness to move through Gate 3. At this point the Project will transition into a full construction project moving ahead to complete the Project in order to produce and transmit power to the Island in 2017.

The development of Phase 1 of the Generation Project (Muskrat Falls), the Labrador -Island Link Project, and the Maritime Link project will be a tremendous enabler for the development of Gull Island. Concurrent with Phase I of the development moving into the engineering and detailed design program, Nalcor will continue with all legal remedies to appeal the Régie's decision regarding its denial of fair access to use Hydro-Québec's transmission system. A team will remain focused on developing business opportunities with potential offtakers, both outside the Province and within the Province with industrial customers, to enable the commencement of the development of Gull Island within 3 to 5 years.

## 9.0 AUTHORIZATION TO PROCEED REQUEST

Attachment A.5 to this *Decision Support Package* contains Step 2 – Readiness Acceptance form signed by the Steering Committee. Following this acceptance of readiness, the Gatekeeper signed the Readiness Approval form (Attachment A.6).

## 10.0 ATTACHMENTS

- A.1: Status of Decision Gate 2 Key Deliverables**
- A.2: Declaration of Readiness for Decision Gate 2**
- A.3: IPA Pacesetter Review Summary Report**
- A.4: Gate 2 Independent Project Review Report**
- A.5: Readiness Acceptance Form for Decision Gate 2**
- A.6: Readiness Approval Form for Decision Gate 2**

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November 16, 2010

Updated March 1, 2011



## Lower Churchill Project

Gatekeeper's Decision Support Package:

Request for Approval to Proceed to Gateway Phase 3



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**Revision History**

<b><u>Revision</u></b>	<b><u>Date</u></b>	<b><u>Reason for Issue</u></b>
<u>1</u>	<u>1-Mar-2011</u>	<u>Issued to reflect changes since November 16, 2010</u>
<u>0</u>	<u>16-Nov-2010</u>	<u>Issued for November Decision Gate 2 Approval</u>

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## 1.0 EXECUTIVE SUMMARY

### 1.1 Current Decision

This *Gatekeeper's Decision Support Package* for Decision Gate 2 of the Nalcor Energy Gateway Process requests authorization for the Lower Churchill ~~Project-Development~~ (LCP or the ~~Project~~ Projects) to pass through Decision Gate 2 and into Gateway Phase 3 for the Generation Project Phase 1 i.e Muskrat Falls, associated HVac transmission, the HVdc Labrador-Island Link Project and associated island upgrades. The readiness to move through Gate 2 for the scope identified is supported by achievement of the required prerequisite Key Deliverables for the Gate as well as the findings from an Independent Project Review team.

### 1.2 Gateway Phase 2 Recommendation

After a thorough and comprehensive assessment of the options and alternatives to develop the hydro potential of the lower Churchill River for domestic use and export, a phased development of the Project has been selected as the basis of the Gateway Phase 2 recommendation. Nalcor Energy (Nalcor) believes this is the best alternative to meet the Island's electricity needs, when considering the circumstances with respect to options for energy export.

Phase I will include the development of the following projects, Muskrat Falls 824 MW generating station, associated HVac transmission along with an HVdc Transmission Link to the Island, associated Island upgrades, and an HVdc Maritime Transmission Link to Nova Scotia. First power from Muskrat Falls is targeted for the end of 2016.

Phase II, which is expected to proceed no earlier than three years after the start of Phase I, will consist of the 2,250 MW Gull Island hydroelectric generation project and associated HVac transmission to Churchill Falls and export markets.

### 1.3 Opportunity

#### 1.3.1 Background

The best undeveloped hydroelectric resource in North America, the Lower Churchill ~~Project~~ represents a tremendous prospect for the production of clean, renewable and affordable energy for generations to come. Combined, the Gull Island and Muskrat Falls generation facilities will have a capacity of over 3,000 megawatts, the potential to produce almost 17 terawatt hours (TWh) of electricity annually and the ability to displace up to 16 megatonnes (Mt) of carbon dioxide emissions every year from thermal power generation.

Historically an obstacle hindering the development of the lower Churchill River's hydro resources has been obtaining market access to allow energy transmission. This is attributable to the Project's geographical isolation and the fact that the island portion of the Province is not connected to the mainland grid. In late 2006, both generation facilities were registered for environmental assessment, following which a program of feasibility and planning studies commenced in order to determine the optimal development scheme for harnessing the lower

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Churchill River's hydro potential. Concurrently, significant planning and investigation of options to achieve a viable, long-term market access focussed on (1) an overland route through the Province of Quebec, through application to Hydro Quebec TransEnergie's pursuant to its Open Access Transmission Tariff (OATT); and (2) a subsea route from the Island into the Maritimes, enabled by the transmission link from Labrador to the Island.

### 1.3.2 Current Situation

Nalcor has taken the time required to thoroughly complete investigations into the feasibility of ~~this Project~~these Projects. The Lower Churchill Project team has been vigorously pursuing the project ~~development~~developments on multiple fronts. Like any development project of this magnitude, there are many components being addressed, including the Environmental Assessment (EA) processes; analysis of market access options; analysis of domestic industrial opportunities; development of a financing strategy; finalization of a Water Management Agreement; negotiations for an Impacts and Benefits Agreement (IBA) with Innu Nation of Labrador; review of previous engineering design work and preparation for further studies and field work; understanding cost, schedule and risk; and determination of the optimum Project configuration.

Nalcor's Gateway Process (see Section 4.0, Figure 1) ensures that requisite levels of due diligence are conducted at each stage of the development process before a commitment of significant funds is made. Consistent with this approach, Nalcor has considered all available development options in a prudent manner based on thorough analysis and investment evaluation in order to arrive at the recommended phased development approach.

The recommendation to proceed is based on four years of thorough business assessment as well as a confluence of events and circumstances that have created the winning conditions for the Project to move forward. These conditions are both internal to Nalcor and include the ~~Project's~~Projects' readiness to proceed in such time to meet the Province's domestic needs as well as external conditions that include market demands for renewable energy, securing transmission access, and the Province's fiscal capacity.

## 1.4 Strategic Fit and Alignment

The phased development of the Lower Churchill ~~Project~~Development is consistent with commitments made in the Government ~~in~~of Newfoundland and Labrador's Energy Plan. The first priority is ensuring the current and future power needs of the province are met with environmentally friendly, stable, competitively priced power. In considering this, the Energy Plan states that the development of the Lower Churchill ~~Project~~ must be considered in the context of Nalcor's broader Integrated Resource Planning initiatives. This assessment has been completed and Nalcor's subsidiary, Newfoundland and Labrador Hydro (NLH) has submitted a Generation Planning Issues Report to the Public Utilities Board. This report ~~signals~~signalled that a generation planning decision ~~must~~had to be made by December 2010 if the appropriate planning, approvals and construction ~~can~~are to take place to meet anticipated demand. Nalcor

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has evaluated all practical supply options for generation sources to meet the Island's long term electricity needs and it has determined that Muskrat Falls with a transmission link to the Island provides the least cost and most environmentally friendly solution to meet this need. Supplying the needs of the Island with power from Muskrat Falls via a transmission link from Labrador is a financially viable stand-alone proposition and is the most economic long term solution for both rate payers and the Province.

The Energy Plan also states that, if a decision is made to proceed with the Lower Churchill Project then the Holyrood Thermal Generating Facility will be replaced with electricity from the Lower Churchill ~~Project~~. Nalcor plans to proceed with this commitment and supply the displaced capacity with power from Phase 1. The replacement of this facility will reduce GHG emissions in the province by 1.3 million tonnes annually, eliminating the province's dependence on the supply of imported fuel and remove future volatility in electricity prices.

The development of Phase I of the ~~Project~~ Lower Churchill Development means that the forecasted domestic energy requirements for both Labrador and the Island will be met for the foreseeable future and the Holyrood facility will be decommissioned. Phase I will also provide sufficient capacity for future industrial developments throughout the province. However, the capacity of generation at Muskrat Falls is currently greater than that which the domestic market can absorb. This surplus presents an opportunity for Nalcor to monetize the available power. In the absence of selling this power to other markets, water that would have been used to generate the power would be spilled over the dam and an incremental value opportunity would be lost.

As a means to monetize the excess power, Nalcor is committed to forming long term, positive strategic relationships with willing entities to purchase power and enable transmission access to key markets. One such relationship is with Emera Energy, a publicly traded entity based in Nova Scotia which is the parent company of Nova Scotia Power, Bangor Electric and Northern Maine Electric. Nalcor and Emera have reached an agreement on Phase 1 that includes an equity investment by Emera, power sales to Nova Scotia Power, construction of a Maritime transmission link project between provinces, and assignment of transmission rights in the Maritime provinces and Maine to Nalcor. This agreement will generate value for both companies and builds on Nalcor's existing relationship with Emera for the marketing of a portion of Recall power from the Upper Churchill in the United States.

Phase II ~~of the Project~~ will provide considerable energy and capacity that could be used in the domestic market for large industrial projects in mining or heavy industry. These developments could be in existing industries, including expansion of iron ore projects in Labrador West, underground expansion of the Voisey's Bay nickel mine and development of the Aurora Energy uranium mine or by new, yet to be identified power-intensive industries that may be interested in bringing business to the province as a result of the availability of predictably priced electricity. Phase II will also provide significant energy and capacity that could be made available to markets in eastern and central Canada and the northeast United States. Nalcor has been advancing access to Quebec's transmission system for a large portion of the power from

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Phase 2. Markets have been identified in Ontario, the Maritimes and Northeastern United States and interest is high to purchase blocks of power from the Project. In the spring of 2010 Quebec's Régie d'Énergie (Régie) rendered a decision denying access to markets through Hydro Quebec's system. Nalcor has commenced an appeal of the decision and will pursue all other means to access the Hydro Quebec transmission system. Work will continue on market identification in conjunction with the ~~Project's~~ development of Phase I.

The development approach for Phase I being recommended by Nalcor is viable and is supported by a business case. Strategic support from the Shareholder in the form of an equity investment is critical and is key in achieving the commitments government made in the Energy Plan respecting the development of the lower Churchill River resource and the decommissioning of the Holyrood facility. The strategic agreement achieved with Emera will open the door to the North American market place for power sales to other jurisdictions and demonstrates that projects can be developed with a partner while maintaining control of the Province's resources.

## 1.5 Summary of Work Completed To-Date

### 1.5.1 Conclusions from Gateway Phase 2

The extensive body of cross-functional work and investigations from Gateway Phase 2 has enabled Nalcor to recommend the phased development sequence for the lower Churchill River. Extensive feasibility investigations and studies, combined with project planning activities, have provided the critical information required to validate the robustness of the business case.

The Nalcor Energy-Lower Churchill Project Management Team (NE-LCPMT) believes that all pre-requisites or Key Deliverables for Gateway Phase 2 are at a level of readiness sufficient for the Gatekeeper to approve the passage through Decision Gate 2 and commencement of Gateway Phase 3 activities. Confirmation of this assertion was provided by both Independent Project Analysis, Inc. (IPA) and a third party Independent Project Review (IPR) team consisting of four experienced and recognized hydro and megaproject experts. Both groups concluded that the project was in an optimal range for gate passage, with no showstoppers identified.

### 1.5.2 Recommendations from Gateway Phase 2

The confirmation of the phased development sequence has afforded the ability for Phase I ~~Projects~~ of the development to transition into Gateway Phase 3 and focus on ensuring the level of readiness required to mobilize the Engineering, Procurement and Construction Management (EPCM) consultant(s) that are essential enablers for the development to proceed. Both IPA and the IPR confirmed a number of key focus areas for the Project Team in order to ensure a level of readiness to effectively mobilize the EPCM consultant and undertake the level of activity required to achieve a target of first power by the end of 2016.

### 1.5.3 Gateway Phase 3 Strategy

Gateway Phase 3 will culminate ~~with~~ in a ~~decision to fully~~ sanction ~~the Project~~ decision.

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During the Gateway Phase 3, significant engineering and project execution planning work will be undertaken to both confirm the business case and allow the award of key supply and construct contracts immediately following Decision Gate 3. Until this Gate is achieved, effort will continue towards ensuring a balance of progressing the work required to maintain the ability to achieve the target project schedule and limiting long-term financial commitments and liability.

The estimated capital expenditure for Gateway Phase 3 scope of work and planned duration of 12 months is approximately \$~~160~~240 million, which will be appropriated progressively by the Project Team with the achievement of key milestones within Gateway Phase 3.

## 2.0 DEFINITIONS

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Term	Definition
Base Estimate	Reflects most likely costs for known and defined scope associated with project's specifications and execution plan.
Decision Gate	A Decision Gate is a predefined moment in time where the Gatekeeper has to make appropriate decisions whether to move to the next stage, make a temporary hold or to terminate the project. The option to recycle to the current stage is considered an undesirable option unless caused by changes in business conditions.
Decision Gate Review	A review of the project prior to a Decision Gate to provide the degree of assurance required by the Gatekeeper.
Escalation	Provision for changes in price levels driven by economic conditions. Includes inflation.
Estimate Contingency	Provision made for variations to the basis of an estimate of time or cost that are likely to occur, and that cannot be specifically identified at the time the estimate is prepared, but experience shows will likely occur. Contingency does not cover either of scope changes outside the project's boundaries, events such as strikes or natural disasters, or escalation and currency effects.
Gatekeeper	The person responsible for making the decision at the Decision Gate of the Gateway Process.

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Gateway Phase	Refers to the period between Gates during which the <u>applicable</u> Project Team completes various work activities are completed in order to produce Key Deliverables required to move the <u>specific</u> Project forward.
Integrated Resource Plan	Process stewarded by Newfoundland and Labrador Hydro to evaluate future electricity demand on the Island and available options to meet such demand, in order to make a recommendation on the timing for developing new generation sources.
Island	The island portion of Newfoundland and Labrador.
Key Deliverable	High-level listing of key outputs/documents which collectively demonstrate that objectives of the relevant Phase of the Gateway Process have been attained.
NE-LCP Management Team	All managers and their delegates who report directly to the NE-LCP Project Director.
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.
Shareholder	For Nalcor Energy, the Shareholder is the Province of Newfoundland and Labrador.
Steering Committee	For Gateway Phase 2, the Steering Committee is a largely comprised on the VP LCP and the CFO / VP Finance.
<del>Strategic Risk</del>	<del>Identified background risks that are outside of the controllable scope of the project team, typically pertaining to external issues such as enterprise-level issues, governance, financial markets, stakeholders, hyperinflation, regulatory approvals, etc. Managing these risks requires significant effort and influence by the Gatekeeper with external stakeholders. Strategic risk is also referred to as the risk of a failure of a planned execution strategy.</del>
<del>Strategic Risk Exposure</del>	<del>Provision for occurrence of Strategic Risks that can be defined.</del>
<del>Tactical Risk</del>	<del>Refers to risks associated with the base capital cost estimate as a result of uncertainties with the four components of the estimate: (1) project definition / scope, (2) construction methodology and schedule, (3) performance factors, and (4) price. It excludes escalation and inflation.</del>

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### 3.0 ABBREVIATIONS AND ACRONYMS

AFE	Authorization for Expenditure
<u>AFUDC</u>	<u>Allowance for Funds Used During Construction</u>
DCF	Discounted Cash Flow
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPCM	Engineering, Procurement and Construction Management
FEL	Front-end Loading
GHG	Greenhouse Gas Emissions
HTGS	Holyrood Thermal Generating Station
HVac	High Voltage Alternating Current
HVdc	High Voltage Direct Current
IBA	Impacts and Benefits Agreement
<u>IDC</u>	<u>Interest During Construction</u>
IPA	Independent Project Analysis, Inc.
IPR	Independent Project Review
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
MW	Megawatt
NE-LCP	Nalcor Energy Lower Churchill <del>Project</del> <u>Projects</u>
NE-LCPMT	Nalcor Energy Lower Churchill Project Management <del>Team</del> <u>Teams</u>
NLH	Newfoundland and Labrador Hydro
NPV	Net Present Value
OATT	Open Access Transmission Tariff
PEP	Project Execution Plan
PLF	Planning Load Forecast
PWC	Price Waterhouse Coopers
RACI	Responsible, Accountable, Consult and Inform
SOBI	Strait of Belle Isle
TWh	Terawatt hour
VSC	Voltage Source Converter

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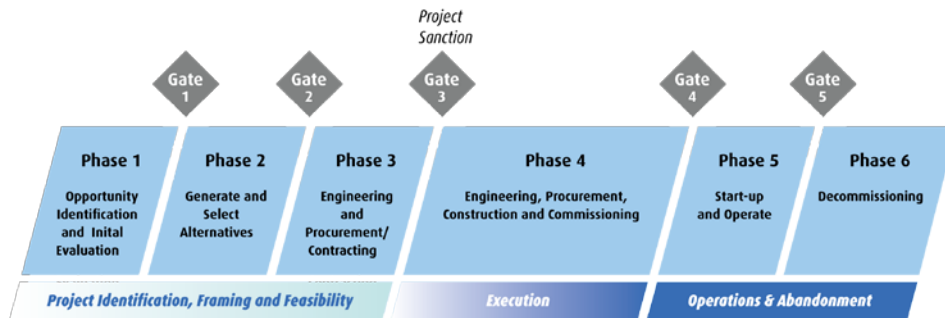
### 4.0 APPLICATION OF THE GATEWAY PROCESS

The Nalcor Energy Gateway Process, illustrated in Figure 1, is a staged or phased decision gate assurance process that is used to guide the planning and execution of ~~the~~ a Project from identifying the opportunity through determining how it should be developed (e.g. transmission access, plant capacity, etc.), obtaining project approvals, completing engineering and commencing construction. It serves as a means of quality assurance for key decisions at crucial points in a project's lifecycle.

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Figure 1: Gateway Process



The above phases of ~~the~~ Project are managed by cross-functional teams and are referred to as Gateway Phases, while the gates (known as Decision Gates) are structured decision points at the end of each Gateway phase. The use of formal Decision Gates facilitates decision-making by the Gatekeeper of the readiness of a project to move from one Gateway phase to the next. For each Decision Gate there are a number of pre-determined Key Deliverables that have been agreed with the Gatekeeper. These Key Deliverables must be delivered to an acceptable quality in order to facilitate efficient and effective decision making at the applicable Decision Gate regarding the forward direction of the Project by the Gatekeeper.

The Key Deliverables for each Gateway phase are developed specifically for the Project and are developed with consideration of both standard project execution best practice, but more importantly with the consideration of the overall risk spectrum and tolerance for the Lower Churchill ~~Project-Development~~. These Key Deliverables have been designed to address all ~~Project~~-focus areas of the Projects and encompass commercial arrangements, financing, regulatory, environment, aboriginal affairs, engineering and technical, project execution and stakeholder management.

Decision Gate 2 is of strategic importance to the NE-LCP as it signifies that the development scenario, including phasing and sequencing of the Projects has been confirmed, and that the Project ~~Team is~~Teams are ready to move forward with detailed engineering and procurement / contracting and prepare to commence early construction works following release from environmental assessment. During Gateway Phase 3, engineering will progress to a level of completeness required to facilitate the award of key construction and supply contracts required to maintain the overall ~~project~~-schedule as well as provide the level of cost and schedule certainty for a Decision Gate 3 passage.

Figure 2 illustrates the Decision Gate Assessment Process, which is made up of four sequential steps, culminating with a Gatekeeper recommendation to the Nalcor Energy Board of Directors and Shareholder. These steps are:

- Step 1a Readiness Recommendation by the Project Team.



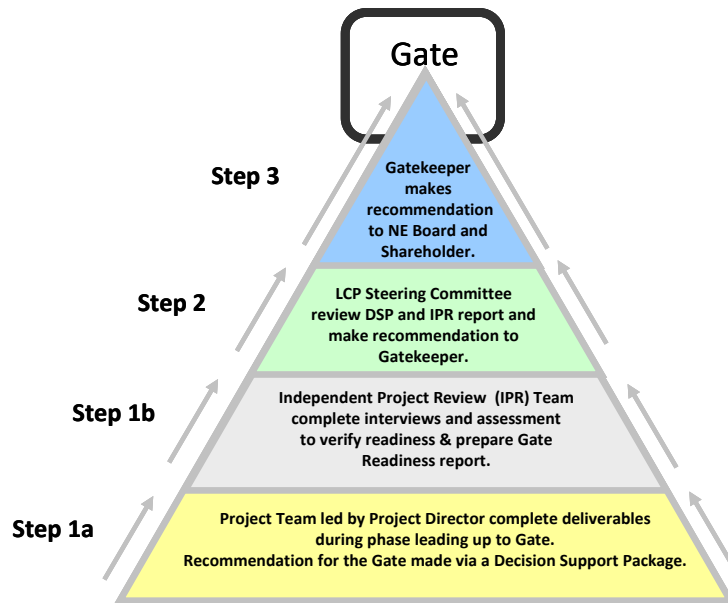
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- Step 1b confirmation of readiness recommendation following a third party verification by an Independent Project Review team.
- Step 2 confirms an Acceptance of Readiness by the Steering Committee.
- Step 3 approves that the Project is ready to move through the Decision Gate and onto the subsequent Gateway phase.

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Figure 2: Decision Gate Assessment Process



#### 4.1 Independent Project Review (IPR)

An IPR provides the degree of quality assurance by independent experts required by the Gatekeeper for major decisions. The reviews are regarded as an opportunity to assess readiness, to challenge the project ~~team teams~~, and provide assurance that the ~~project projects~~ will deliver the required business results. The findings, observations and recommendations from the Decision Gate 2 IPR, as well as a gap closure plan, are included as part of this *Decision Support Package*.

The general objectives of an IPR are:

- To provide external challenge to the project ~~team teams~~ at each Decision Gate, to help assess the validity and robustness of the work done, the key areas requiring focused attention and to assist in maximizing the value of the business opportunity.
- To assess the suitability of the ~~project projects~~' plans and strategies.
- To appraise the readiness and justification of the ~~project projects~~ to proceed into the next Gateway phase.

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## 5.0 BUSINESS CASE

### 5.1 The Need for the ~~Project~~Projects

The need to develop the Lower Churchill Project is driven by three inter-related factors:

- Directives outlined in the Energy Plan
- Domestic energy requirements
- Future growth in export markets

#### 5.1.1 Energy Plan Directives

Two core objectives of the Energy Plan, being environmental sustainability and economic self reliance for the best long-term interests of the people and the Province, define the need, purpose and rationale for development of the ~~Project~~Projects. The Energy Plan makes meeting the Province's current and future electricity needs with environmentally friendly, stable and competitively priced energy and power a priority, and endorses the development of the ~~Project~~Projects as a cornerstone public policy action to fulfill this obligation.

Nalcor's direction to proceed with planning of the ~~Project~~Projects was affirmed with the release of the Energy Plan and includes the following policy directives relevant to the ~~Project~~Projects:

- The Government of Newfoundland and Labrador will lead the development of the Lower Churchill Hydroelectric ~~Project~~Projects, through the Energy Corporation (Nalcor)<sup>1</sup>
- The Government of Newfoundland and Labrador will maintain the moratorium on small hydro developments, subject to a review concurrent with a decision on proceeding with the Lower Churchill ~~Project~~Projects<sup>2</sup>
- Export focus will be on achieving direct access to both long and shorter-term customers in a number of markets, including Ontario, New Brunswick, Quebec, Nova Scotia, P.E.I., New England and New York. Achieving direct access is necessary to ensure we:
  - a) Secure a fair share of the economic upside potential of developments over the long term.
  - b) Position ourselves properly for realizing the long term value of the Upper Churchill development.<sup>3</sup>
- In conjunction with development of the Lower Churchill, Nalcor Energy is in discussions with various parties on potential power sale arrangements. For existing customers, this may require that the Province assess the costs and benefits of continuing these historical arrangements, considering a combination of existing and future generation

<sup>1</sup> Energy Plan, Page 32.

<sup>2</sup> Energy Plan, Page 34.

<sup>3</sup> Energy Plan, Page 44.

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sources. These arrangements will be designed to balance the realities of market conditions with the need to encourage support of industries which significantly contribute to the provincial economy.

Another key theme of the Energy Plan is that the Province will leverage its short term non-renewable oil and gas wealth into a renewable future by investing non-renewable resource revenues in long term renewable energy assets, the Lower Churchill ~~Project being foremost among them. The considerable amount of revenue forthcoming to the provincial government from oil royalties and equity positions provides the Province with the financial strength to undertake a project such as the Lower Churchill Project.~~Projects being foremost among them.

### 5.1.2 Domestic Energy Requirements

In addition to the need for undertaking the Lower Churchill ~~Project~~Projects to fulfill the requirements of the Energy Plan, generate positive returns for the Province and create further opportunities for the development of other resources within NL's Energy Warehouse, the need is also being driven by the findings from Nalcor's Integrated Resource Planning which identified the ~~need~~requirement for new generation capacity to serve the long term domestic energy needs for the Island of Newfoundland by as early as 2015.

This need to address the Island system's shortfall is in line with directives contained in the Energy Plan, which explicitly states that the development of the Lower Churchill ~~Project~~Projects cannot be done in isolation; rather it must be considered in the context of Nalcor's broader Integrated Resource Planning initiatives. A significant part of that integrated planning involves the future of the Holyrood Thermal Generating Station (HTGS) and how best to meet the Province's domestic energy needs.

Longer term, the development of the Lower Churchill ~~Project~~Projects will also provide surplus power for future industrial developments in Labrador and on the Island while also meeting normal forecasted growth in the energy requirements for both Labrador and the Island. In particular, Gull Island will have considerable energy capacity that could be used for large industrial projects in mining or heavy industry. These developments could be in existing industries, including expansion of iron ore projects in Labrador West, underground expansion of the Voisey's Bay nickel mine or development of the Aurora Energy uranium mine. Nalcor is also exploring opportunities in new power-intensive industries that would use the power from the Lower Churchill ~~Project~~Projects.

This need to meet the Island load growth and the replacement of the HTGS is the main driver for the need for ~~Phase 1 of the Project~~Projects. The timing of this need for domestic requirements ~~necessitates~~necessitated that a decision be made to proceed by the end of 2010.

### 5.1.3 Export Markets

Growth in export markets is being driven by a need to replace aging infrastructure, a need to

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displace thermal generating capacity with non-emitting energy, general long term growth and the need for dispatchable<sup>4</sup> energy sources that can enable development of other renewable energy sources. The Lower Churchill ~~Project's~~ Projects' competitive advantage in the marketplace is that ~~it~~ they can meet all of these market drivers and provide sufficient quantities of energy and capacity to make it economically viable to do so.

Nalcor believes that there are enough long-term export market opportunities to justify the ~~Project~~ Projects, beginning with Muskrat Falls followed by Gull Island. Nalcor recognizes that in order to avail of export market opportunities, the delivered cost of energy must be competitive with alternative supply sources in the export markets, which Nalcor assumes will be predominantly driven by natural gas prices. The export market ~~opportunity~~ opportunities identified at the time of Gateway Phase 2 can be summarized as follows:

- By 2020, market potential in Nova Scotia and New Brunswick is estimated to be almost 13 TWh/year. A large portion of this amount, 7.6 TWh/year (60%), is potential displacement of fossil fuel generation, with 5.4 TWh due to potential replacement of aging generation capacity. Market potential is not driven by load growth, primarily because Nova Scotia has very aggressive targets for conservation, including an 8% decrease in demand between 2010 and 2020. If these conservation targets are not achieved, market potential would be correspondingly higher. The potential to avail of the opportunity to displace fossil fuel generation is considerable, particularly in Nova Scotia where hard GHG caps have been established and an aggressive 40% target of renewables by 2020 has been adopted.
- Ontario plans to retire 6,000 MW of coal plants and 3,000 MW of nuclear plants by the end of 2020, representing 44 TWh/year. While the coal generation will be decommissioned prior to the Project in-service date, 15 TWh of the 44 TWh relates to the retirement of units at the Pickering nuclear facility. Another 8 TWh/year of market potential comes from the opportunity to displace gas fired generation, and 4.5 TWh from load growth. The introduction of at least 2,500 MW of renewable generation under the Feed in Tariff program will also increase the need for dispatchable generation in this market.
- New York and New England are very large markets and together represent 96 TWh/year of market potential, of which approximately 15 TWh is attributed to load growth, and approximately 81 TWh/year from displacement of fossil generation. As noted in the methodology, no attempt has been made to quantify the potential for replacing aging generating capacity in these two markets. This is a conservative approach to estimating the market potential in these markets and consistent with our planned shorter term strategy in these markets.
- The analysis shows a relatively low market potential of approximately 3 TWh in Quebec by 2020; this is due to the anticipated commissioning of the Romaine Project as

<sup>4</sup> A dispatchable energy source is a source of electricity that can be dispatched at the request of power grid operators; that is, it can be turned on or off upon demand.

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reflected in the initial five years of the study period. This low market potential may not manifest as sales to Quebec itself, but rather as reductions in exports from Quebec to the other regions, creating opportunities for replacement sales from the Project.

- Overall, the identified markets offer a combined energy market potential of about 135 TWh, including 22 TWh from load growth (net of committed new capacity), 13 TWh from replacement of aging Canadian generating capacity, and about 100 TWh from the opportunity to displace existing fossil generation.

Analysis of the forecast net change of the demand/supply balance and potential for displacement of carbon production in the identified markets demonstrates significant market potential to 2030.

## 5.2 ~~Project~~ Phase 1 Objectives

The key objectives for Nalcor's Lower Churchill Project Management ~~Team~~ Teams coming out of Decision Gate 2 are as follows:

- ~~Develop Phase I of the lower Churchill River through-Generation Project (Muskrat Falls Project generating facility-~~
- ~~Develop a reliable plus associated HVac transmission link from in~~ Labrador).
- ~~Develop the Labrador~~ to the Island ~~of Newfoundland~~ Link Project.
- Achieve first power within six (6) years of EA release.
- Ensure that the targets contained within the Lower Churchill Construction Projects Benefits Strategy with the Government of Newfoundland and Labrador and the Impacts and Benefits Agreement with the Labrador Innu Nation are met.
- Proceed with the Maritime Link Project.
- Pursue market access opportunities using the Open Access Transmission Tariff process for Gull Island power – Phase II of the lower Churchill River development.

## 5.3 ~~Project~~ Cost Estimate of the Projects

The Gate 2 Capital Cost Estimate builds upon the estimating work completed since late 2007 for the ~~Project~~ Projects, and reflects the latest project configuration as defined in the Basis of Design for the Lower Churchill Project—Basis of Design-Projects. Its principal purpose was to support the evaluation and selection of the potential development scenarios for ~~the Project~~ each project. This capital cost ~~estimate reflects~~ estimates reflect the key timelines and sequences, and execution approach as documented in the ~~Project~~ Execution Plan (Scope and Approach), which indicates early works construction commencing in Spring 2012 following release from Environmental Assessment and ends with commissioning of the final turbine/generator unit and thus full power in May 2017.

Lower Churchill ~~Project~~ Projects

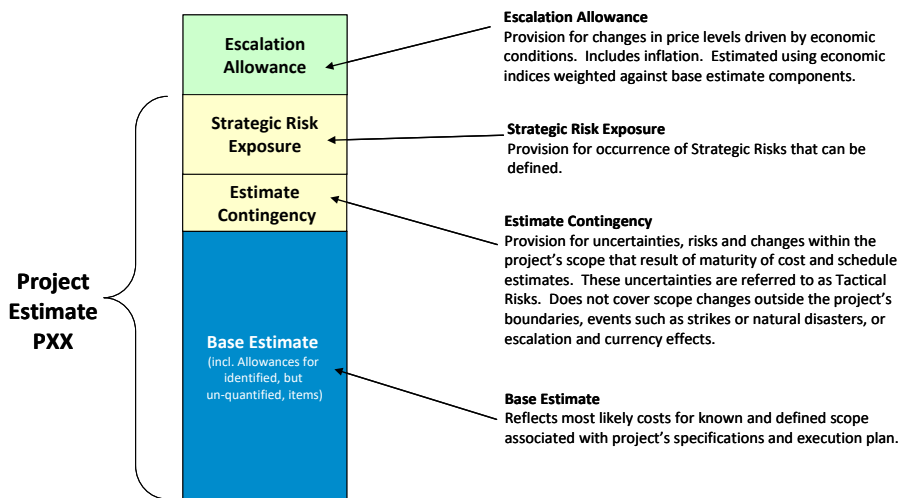
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In the case of Phase 1 Generation Project (Muskrat Falls) and the Labrador Island Link Project the capital cost ~~estimate~~ estimates are considered to be commensurate with the requirements to be considered an AACEI Class 4 estimate, having an accuracy of -15% / + 30%, thereby meeting the requirements for Gate 2. This capital cost estimate is inclusive of all incurred / forecast cost up to the end of 2010, detailed engineering, construction / completions, construction management, project management and owner's cost.

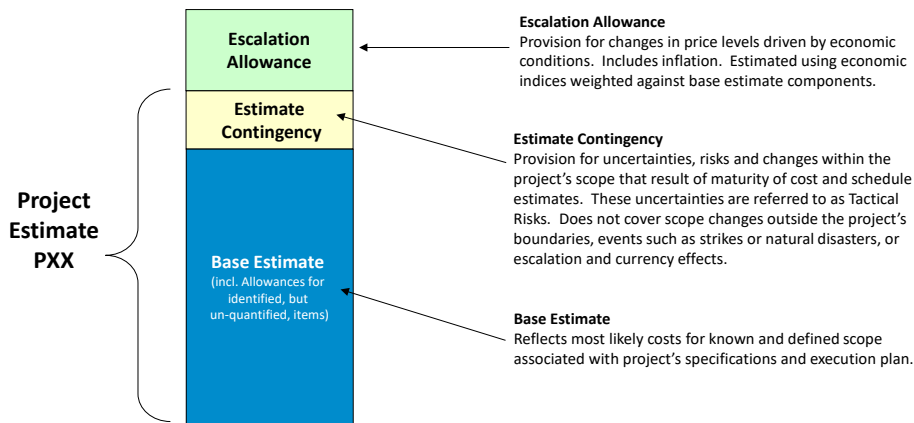
The Maritime Link estimate is considered to be a Screening Level estimate only.

Figure 3 below illustrates the components of ~~the~~ a project cost estimate, including the role of Estimate Contingency ~~and Strategic Risk Exposure~~, determined through this Project Risk Analysis, in the overall estimate. Table 1 provides a summary of the cost estimate for the Project used in Gate 2 economic modeling undertaken by Nalcor.

**Figure 3:** Project Cost Estimate Components



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**Table 1:** Phase I Direct and Escalated Nominal Capital Costs (\$ ~~Millions~~ ~~Billions~~ CDN)

	Muskkrat Falls	<del>Labrador</del> Island Link	Maritime Link	Total
Direct 2010 \$ (=Base Estimate + Estimate 15% Contingency* + Strategic <del>Risk Exposure</del> ) *Notional <del>P50</del>	\$2,534.5	\$1,852.9	\$1,031.0	\$5,417.4
Escalated Nominal \$	\$2,869.9	\$2,060.1	\$1,186.2	\$6,115.2

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#### 5.4 Economics of Recommended Development Scenario

Nalcor utilizes a specific methodology for the consistent evaluation of investment activities to ensure commercial investments are analyzed with an appropriate level of rigor and analysis using a structured approach to support informed investment decisions. For major development projects such as ~~the Project~~ ~~Phase 1~~, Nalcor's investment evaluation methodology is integrated with the various phases of the Project Development Gateway Process.

Given the size and scope of the ~~Project, Projects, the~~ evaluation procedures performed have been extensive. Project finance models have been developed by Nalcor, with advice from Pricewaterhouse Coopers LLP (~~"PwC"~~), who has been retained as financial advisors for the ~~Project, Projects~~. Nalcor uses a discounted cash flow ("DCF") modeling technique which involves estimating and projecting net future cash flows on a period-by-period basis and the



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selection of an appropriate discount rate to apply to such projected cash flows. Key inputs to the financial model, including hydrology, market prices, sales portfolio, capital expenditures, operating costs, and economic assumptions were developed by Nalcor's Investment Evaluation and Project groups, along with external experts. Financing assumptions, including capital structure, debt terms and conditions, and an equity target rate of return were developed by Nalcor with the assistance of PwC. Primary outputs of the financial modeling include prospective cost-out prices and market-based returns, including net present value ("NPV") and internal rate of return ("IRR"). ~~It is important to note that this does not consider monetization of the spill.~~

Table 2 presents several key metrics for the Project's economics.

**Table 2:** Lower Churchill Project Economics – Key Metrics

Metric	Value to Nalcor of Muskrat Falls and <del>Lab-</del> Island Link, Island Demand Only
Capital Expenditure, nominal dollars, before interest during construction and fees	\$4, <del>929.4</del> <u>Billion</u>
Capital Expenditure, In-Service <sup>(1)</sup>	\$5, <del>422.1</del> <u>Billion</u>
Equity Requirement, total	\$ <del>3,361.5</del> <u>Billion</u>
Net Present Value (NPV) on capital, discounted at 7.5%	\$ <del>527</del> <u>433</u> Million
Internal Rate of Return (IRR) on capital	<del>8.42%</del> <u>9.2%</u>
Dividends over 50 years from In-Service	\$ <del>29,843</del> <u>17.7</u> Billion

(1) Includes IDC and AFUDC.

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## 5.5 Financing Strategy

~~Financing~~Key assumptions relating to the financing strategy for the ~~Project has also been~~  
~~examined in phases. At a high level it can be characterized~~Projects are as follows:

### ~~Phase I~~

#### Ownership

- Muskrat Falls ~~—(and eventually Gull Island) owned 100% equity by Nalcor~~
- Labrador-Island Link owned 71% by Nalcor and 29% by Emera
- Maritime Link owned 100% by Emera for the first 35 years, and then 100% by Nalcor thereafter

#### Capital Structure

- Muskrat Falls – 66/34 debt-equity
- ~~Labrador-~~Island Link – 75/25 debt-equity for Nalcor's portion and 55/45 for Emera's portion
- ~~Maritime Link – TBC~~

### ~~Phase II~~

- ~~Muskat Falls —refinanced at 80/20~~63/37 debt-equity
  - ~~Gull Island —use equity funding created from Muskrat refinancing to provide a capital structure of approximately 60/40 debt-equity~~
- Federal loan guarantees on debt currently estimated at \$4.8 billion

The investments and related financing strategy are summarized in Table 3.

The requirement for equity from the Province of Newfoundland and Labrador equates to \$2.8 B in base equity and an additional contingent equity commitment (not reflected in Table 3) of \$300 to 600 M.

**Table 3:** Investment and Financing Profile (In-Service Cost ~~including~~includes IDC and AFUDC)

<del>\$billions</del> <u>(\$ Billions)</u>	
<b>Investments</b>	
Muskat Falls	<del>2.93</del> <u>3</u>
<del>Labrador-</del> Island Link	<del>2.6</del> <u>4</u>
Maritime Link	<del>1.5</del> <u>4</u>
Total Investments	<del>6.9</del> <u>7.2*</u>
<b>Financing</b>	
<del>New</del> Equity from NL/ <del>Nalcor</del>	<del>2</del> <u>1.5</u>
<del>Nalcor Cash Flow — Other</del> Equity from <del>Emera</del>	<del>0.7</del> <u>8</u>
<del>Muskat Falls Debt</del>	<del>2</del> <u>2</u>

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<del>New Debt – Lab-Island Link Debt –</del> <del>Nalcor Portion</del>	<del>2.01.3</del>
<del>Non-Capex Funding Lab-Island Link</del> <del>Debt – Emera Portion</del>	<del>0.24</del>
<del>NSPI – Rate Base Maritime Link Debt</del>	<del>1.50.9</del>
Total Financing	<del>6.97.2*</del>

\*Totals may not add due to rounding

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### 5.5.1 Strategy Validation & Findings

In validating the above strategy, the following steps were taken:

- Senior officials from the Provincial Department of Finance were consulted with respect to the proposed equity requirement from the Province ~~of Newfoundland and Labrador (NL)~~.
- ~~Consultations with regard to proposed financing strategy~~ High level consultations were held in September 2010 with the company's capital markets advisors RBC Capital Markets (RBC) and Scotia Capital Markets (SCM), as well as with the three major credit rating agencies in Canada, namely; Standard and ~~Poors~~ Poor's (S&P), Moody's and Dominion Bond Rating Service (DBRS).
- ~~Nalcor's advisor on financing matters for the Lower Churchill Project (LCP), Projects,~~ PricewaterhouseCoopers LLP (PWC), ~~was requested to prepare a report outlining their considerations~~ has provided ongoing feedback regarding the proposed project debt financing strategy.
- Ongoing discussions with Emera on financing strategy have followed the execution of the term sheet on November 18, 2010.

### 5.5.2 Comments of the Provincial Department of Finance

The Provincial Department of Finance considers it reasonable to expect that the Province of NL equity requirement ~~(including contingent equity) as outlined above~~, can be appropriately funded, although they indicated that variability in future resource revenues is a critical consideration.

### 5.5.3 Comments of Capital Market Advisors RBC and SCM

RBC and SCM advised that the degree of leverage in the ~~Island Link~~ capital structure will be dependent upon the type of regulation applied. Full cost of service recovery might enable higher leverage of the magnitude contemplated. They consider the means by which construction risk, cost over runs risk and completion risk are handled to be keys to the success of the financing strategy. They expressed a level of comfort with the Province's ability to fund ~~the their~~ equity contribution ~~as contemplated~~, over the construction time period.

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#### 5.5.4 Comments of Rating Agencies

With respect to the rating agencies, their preliminary comments were provided with the proviso that they were subject to a further review of more detailed information. ~~As a general comment, there was considerable rating agency focus on the Province's ability to fund its equity investment. Only Dominion Bond Rating Service (DBRS) suggested that the size of the Project and in particular, the Province's related equity investment, might result in a downgrade in the Province's credit rating. A key consideration for them would be the degree to which the Province accepts the construction risk associated with the Project. DBRS went on to say that upon Project completion, the removal of this risk would be a positive influence for the Province's credit rating. DBRS did not suggest that a downgrade was a definite outcome, but rather only a possibility and that a more in-depth understanding of the project configuration and the Province's current and forecast financial position would be required before a final determination of rating impact could be determined. To address this matter, Nalcor has scheduled meetings with the rating agencies in March 2011 to provide an update on the financing strategy as contemplated above.~~

~~Moody's stated that if the Province were to borrow its entire equity investment of \$2.8 billion, such a level of borrowing would be considered "a significant increase in its debt load". The implication was that a credit rating impact was possible, but again not definite at this point.~~

~~S&P did not have a representative from their public sector group at the meeting and made no comment specifically on the Province's rating.~~

#### 5.5.5 Comments of Project Financial Advisors PWC

PWC ~~consider~~considers both Muskrat Falls and the Labrador-Island Link to have the potential to be credible as a borrower on a limited recourse project finance basis. Key success factors mentioned by PWC were:

- ~~Ratepayer obligation~~
  - ~~Clear revenue "line of sight" /~~
- ~~Achieving in-service~~

~~Regarding the future borrowing capacity of Muskrat Falls, they indicate that "project debt financing is potentially viable subsequent to in-service in an amount supported by committed minimum revenues, if satisfactory legal and regulatory frameworks are put in place".~~

#### 5.5.6 Equity Financing Considerations

~~The stability of the equity component is heavily dependant upon market prices for oil. The potential risks to the success of the equity financing component are viewed as significant. Key risks to the equity financing include the following:~~

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- ~~Oil price risk — At this point it remains to be determined how much of the market price risk to both the Province and Nalcor associated with oil can be offset through the use of derivative instruments. Production uncertainty may constrain the degree to which hedge instruments can be prudently deployed, thereby compromising the degree to which this exposure can be mitigated.~~
- ~~Island load risk — A significant gap between anticipated and actual Island load throughout the PPA period will put pressure on the anticipated returns to the Muskrat Falls Equity holders unless the NL Hydro PPA specifies a minimum level of take during its term. In view of the potential benefits of the Project to a wide range of stakeholders, some distribution of Island load risk might be possible; e.g. apportioned to Muskrat Falls equity holders, Newfoundland and Labrador Hydro, Newfoundland and Labrador Power and to the Island industrial customers.~~
- ~~Market Access Risk — The ability of the Muskrat Falls entity to monetize the power surplus to NL Hydro's needs via sales into US markets could be compromised depending on the degree to which regulatory risk is removed in order to "securitize" the Island Link debt load. However, no part of the business case relies on this monetization and the Island customer portion of Muskrat Falls output;~~
- Clear revenue "line of sight" for the applicable borrowing entities:
  - For Labrador-Island Link: clear line of sight to regulated revenue stream;
  - For Muskrat Falls:
    - Definition of the customer revenue streams, regulated and non-regulated – who is buying and at what price and terms;
    - Confirmation of the credit-worthiness of revenues , in particular non-regulated; and

#### Achieving in-service

- ~~Need for a Provincial Guarantee on Island Link Debt — In the event that the debt financing associated with the Island Link requires a Provincial guarantee in order to be economically viable, the presence of such a guarantee may put added pressure on the Province's ability to fund its base equity and contingent equity requirements.~~
- ~~Return to Equity Holders during Construction — The "non cash capex funding" as noted in Table 1 relates to the capitalization of equity returns during construction, with an added assumption that such costs will be recoverable from ratepayers. This assumption may be tested in a scenario that contemplates capitalizing Island Link costs outside of the NL Hydro regulated corporate entity.~~

~~Each of these risks to anticipated equity returns will need to be clearly understood by the equity investor and incorporated into any communications strategy for the Project.~~

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- ~~The financing strategy includes both debt and equity, with a significant proportion of the funding derived from the equity component. While Nalcor Energy and commencement of revenues.~~

#### 5.5.6 Other Financing Considerations

While Nalcor has obtained a level of comfort that the financing strategy as proposed is potentially viable, it is recognized that the viability of the equity component ~~is heavily dependant upon~~ contributed by the Province of NL is impacted by market prices for oil.

A greater level of comfort as to the viability of contemplated external debt financing will be obtained during the course of in-depth market sounding, at which time it will be imperative that ~~we~~ Nalcor demonstrate a clear and plausible strategy with respect to the critical success factors as outlined above, as well as other factors such as construction estimates and schedule, aboriginal relations, environmental release and other key factors. At this point in time, ~~we~~ are Nalcor is not aware of any such factors that cannot be adequately addressed to the satisfaction of potential ~~Island Link~~ debt holders in the time frames allotted.

#### 5.6 Forward Looking Appropriation Plan

Required funds for the Project will be provided using Nalcor's annual budget and business planning process, while capital required for project commitments will be appropriated at key schedule milestones via the approval of Authorization for Expenditure (AFE) requests. These milestones and the estimated funding required are summarized in Table 4.

**Table 4:** Lower Churchill Project Authorization for Expenditure Milestones 2010/2011

Funding Step	Planned Date	Estimated Amount (M CDN \$)
Milestone: Award EPCM Agreement for Project	December 2010	\$60— <del>80</del>
Milestone: <u>Completion of Environmental Assessment</u> <del>Release</del> <u>Public Hearings</u> for Generation Project	July 2011	\$ <del>160</del> —180

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## 6.0 RECOMMENDED DEVELOPMENT SCENARIO

### 6.1 Project Scope

Phase I of the lower Churchill River's development will include the Phase 1 of the Generation Project (Muskrat Falls 824 MW generating station ~~along with~~), the Labrador Island Link Project (a 900 MW HVdc Transmission Link to the Island via a submarine cable crossing the Strait of Belle Isle ~~with~~) and the ~~potential to export power through a~~ HVdc Maritime Link Project. Phase II of the lower Churchill River's development, which is expected to proceed no earlier than three years after the start of Phase I, will consist of the 2,250 MW Gull Island hydroelectric generation project and associated transmission to export markets.

The scope of the physical facilities to be constructed during Phase I of the development is highlighted in Figure 4. It includes the following main project components:

#### Phase I

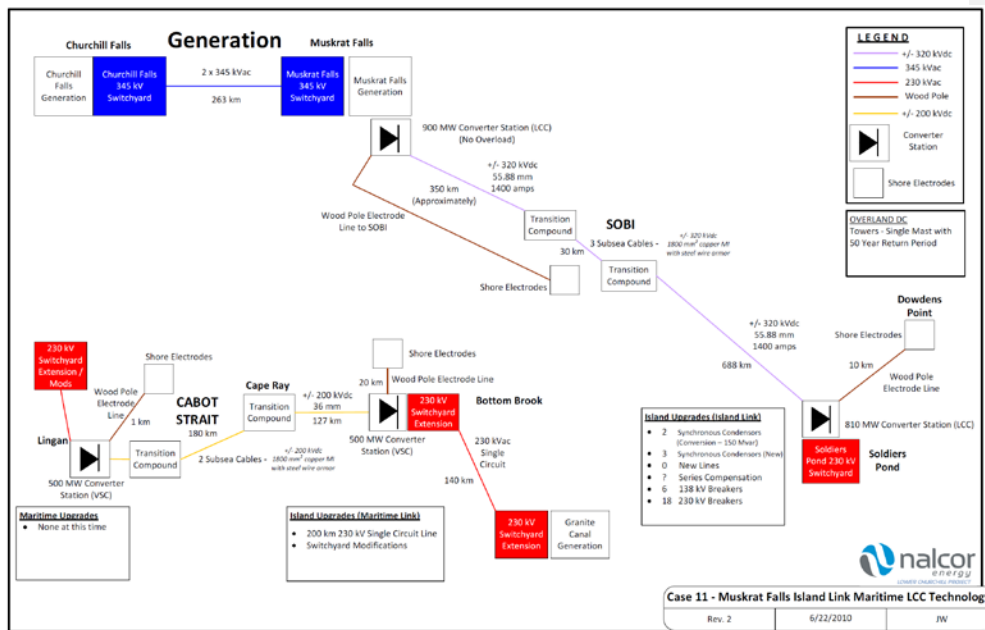
- Phase 1 Generation Project (Muskrat Falls Generation Facility)
  - 824 MW powerhouse and supporting structures
  - 345 kV HVac transmission interconnect between Muskrat Falls and Churchill Falls
- Labrador-Island Link 900 MW +/- 320 kV HVdc transmission Project with a connection from Muskrat Falls to Soldier's Pond
  - ~ 1050 km Overhead Transmission Line
  - HVac to HVdc converter stations at Muskrat Falls and Soldier's Pond
  - Shore Electrodes at SOBI and Dowden's Point
  - 3 cables crossing the Strait of Belle Isle
  - Island System Upgrades
- Maritime Link 500 MW +/- 200 kV HVdc transmission connection from Lingan, NS to Bottom Brook, NL
  - ~ 127 km Overhead Transmission Line
  - HVac to HVdc converter stations at Bottom Brook and Lingan
  - Shore Electrodes in NL and NS
  - 2 cables crossing the Cabot Strait from Cape Ray to Lingan
  - Island System Upgrades
  - HVac line from Bottom Brook to Granite Canal, NL

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## Phase II

- **Phase II Generation Project (Gull Island Generation Facility)**
  - 2250 MW powerhouse and supporting structures
  - HVac transmission interconnect with Muskrat Falls and Churchill Falls
- HVac transmission system additions to support domestic and/or export use of energy.

Figure 4: Schematic Depiction of Recommended Development Scheme



## 6.2 ~~Project~~ Schedule and Key Milestones

The following reflect the ~~project~~ planning basis of the Phase 1 at the end of Gateway Phase 2.

- Final feasibility engineering studies to be finalized in Q1-2011.
- Early Site Infrastructure Works for Muskrat Falls (access, accommodations, communications, construction power) to commence following EA release and permitting in August – September 2011.



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- Project Sanction / Gate 3 in October – November 2011 triggers the issue of purchase orders for major components (e.g. turbines, generators, submarine cable, and transmission hardware).
- EA release for the Island Link in late Q1-12 following which right-of-way clearing will begin.
- First Power from Muskrat Falls via Churchill Falls in Q4-2016.
- Power from Muskrat Falls via the Labrador – Island Transmission link in Q1-2017.
- Full Power available from Muskrat Falls in Q2-2017.

### 6.3 Project Delivery Strategy

~~The Phase 1 of the Generation Project~~ (Muskrat Falls) and ~~the Labrador~~ -Island Link ~~Projects~~ Project will be executed utilizing a traditional Engineering, Procurement and Construction Management (EPCM) delivery method. In the EPCM model NE-LCP provides focused management and control over the overall project and the selected EPCM consultant(s). The EPCM consultant(s) are responsible for the completion of all ~~project~~ engineering and detailed design, construction execution planning, procurement of permanent plant equipment, issue and management of all supply and construction contracts, and overall construction management for the ~~Project~~ Projects, including as custodian for the ~~Project~~ Projects' work sites, and Project Completions. The construction contractors will be responsible for the safe and successful execution of their work in accordance with their contracts and approved safety programs, while the suppliers are responsible for delivery of goods and services for the ~~Project~~ Projects.

The scope of Muskrat Falls and Island Link Projects has been divided into three components for Project management purposes:

- Muskrat Falls Hydroelectric Development
- HVdc Specialties, including converter stations and transition compounds
- Overland Transmission – both HVac to ~~CF~~ Churchill Falls and HVdc to Soldier's Pond

Excluded from the above scope is the SOBI cable crossing. The delivery approach for this component will be confirmed early in Gateway Phase 3, however from a planning basis an EPC arrangement is being assumed. In this arrangement, NE-LCP acts as overall Project Manager.

The Maritime Link Project is planned to be a joint venture arrangement (details to be confirmed) using either an EPC or an EPCM project execution model.

### 6.4 Proposed Owner Organization

The focus of the NE-LCP Owner's organization as reflected in the Gate 2 Organization Plan is to progress the ~~Project~~ Projects through the mobilization of the EPCM consultant(s), detailed design activities, and Early Infrastructure Works. This organization plan will be revisited and

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revised in Gateway Phase 3 following a review of the overall performance of the ~~Project~~Projects, including that of the EPCM consultant(s).

Objectives of the current organizational plan include:

- Successfully prepare for the mobilization and ramp-up of the EPCM consultant(s) and early design activities.
- Facilitate the on-going management of the Environmental Assessment process.
- Encourage functional support, alignment, and buy-in via the Project Management ~~Team~~Teams.
- Recognize the need to support on-going investigations of the Newfoundland – Nova Scotia HVdc ~~Maritime~~link.
- Recognize the extensive system integration and planning involvement regarding integrating the Island's electrical system with mainland North America.
- Safely support project execution including Early Works.
- Promote team alignment and alignment with Nalcor functional departments.

The overall strategic management of the NE-LCP ~~teams~~ will be through the Project Director who has a line reporting relationship to the NE-LCP Vice President. The Project Director will reside within the Home Office Team located at Hydro Place in St. John's.

Reporting to the Project Director will be designated Project Managers, with supporting teams, for each of Muskrat Falls, Island Link, and SOBI projects. These Project Managers will lead the Project Management Teams for each of these Projects, which will be comprised of full-time, embedded functional expertise provided by the Home Office Team.

The Project Director will provide all Project Managers with policies, procedures, priorities, a higher level of financial approval, strategic direction, performance feedback, and instructions in order to effectively deliver their respective projects.

~~Both~~The Project Managers and their supporting functional teams for the Muskrat Falls and Island Link projects will be co-located with the EPCM consultant(s) during the engineering and construction phases, with on-site presence as deemed appropriate. These Project Teams will take functional direction from Home Office Team and operate within the agreed Project procedures and policies established by Home Office Team.

The NE-LCP Home Office Team Functional Managers have overall functional responsibility to provide functional expertise and direction, including people, processes and tools to support the Project Director and Project Managers in delivering the ~~NE-LCP~~Projects.

## 6.5 Key ~~Strategic~~ Risks and Management Strategies

Nalcor has implemented a best-in-class risk management program for the ~~Project~~Projects, which is built upon the lessons learned from other mega-projects. As a key component of Nalcor's project governance structure, this risk management program has effectively

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~~allow~~ allowed Nalcor to work with third party specialist advisors / consultants to identify and manage ~~both tactical and strategic~~ project risks. The fullest application of this program has afforded decision quality assurance through robust risk-based decision making tactics that will help assure the predictability of the outcome of the Project.

Table 4 lists the key ~~strategic~~ risks faced by the Project that are significantly influencing the execution strategy and management approach for the Project.

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**Table 4:** Key ~~Strategic~~ Risks and Management Strategies

<del>Strategic</del> Key Risk	Management Strategy
Achieving timely release from the Generation Environmental Assessment in order to facilitate a spring 2011 start of infrastructure works construction at Muskrat Falls.	<ul style="list-style-type: none"> <li>Focus on ensuring quality information is provided to the EA Panel.</li> <li>Proactively address Muskrat Falls first development plan with JRP.</li> <li>Maintain consultation efforts, in particular with aboriginal groups.</li> <li>Bolster team resources to allow for efficient management and support of the EA process.</li> </ul>
Achieving timely release from the <del>Labrador</del> -Island Link Environmental Assessment.	<ul style="list-style-type: none"> <li>Strategically manage the EA process leveraging lessons learned from Generation EA</li> <li>Prepare a comprehensive draft of the EIS prior to release of draft guidelines.</li> <li>Conduct extensive stakeholder consultation activities</li> <li>Understand and put plans in place to manage aboriginal interests.</li> <li>Bolster team resources to allow for efficient management and support of the EA process.</li> </ul>
Installation and protection of the SOBI submarine cable crossing.	<ul style="list-style-type: none"> <li>Evaluate all available opportunities as soon as possible</li> <li>Employ team resources with marine installation experience in East Coast harsh environments.</li> <li>Execute exhaustive studies encompassing all cable installation options for both a seabed and a tunnel crossing solution.</li> <li>Engage best consultants for subsurface conditions.</li> </ul>
Labor productivity and performance aligned with expectations.	<ul style="list-style-type: none"> <li>Establishing a benefit / reward relationship with the EPCM consultant and construction contractors that entices them to put the "A-team" on the job.</li> <li>Consider appropriate incentives for the EPCM consultant that are strategically aligned with achieving design and construction readiness outcomes that support increased worker productivity.</li> <li>Recognize threat of competition from other mega-projects (i.e. Hebron) and proactively manage.</li> <li>Actively recruit Newfoundlanders home – leverage the "legacy" theme to entice end of career experienced supervisors to work on the Project.</li> <li>Making the work and work site appealing to Newfoundlanders (e.g. attractive camp, compensation, rotation and transportation).</li> <li>Developing a construction schedule based upon achievable labour productivities.</li> <li>Negotiating a labour agreement that supports trade flexibility / work team concepts.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Training aboriginal workers in appropriate areas.</li> </ul>
Achieving a Zero Harm – Nobody Gets Hurt mindset in a transient construction workforce.	<ul style="list-style-type: none"> <li>• Early and proactive program to promote and secure commitment to best practices.</li> <li>• Work with EPCM to develop and implement a behavioural based safety program across the Project.</li> <li>• Engaging and retaining contractors who are leaders in safety performance and have demonstrated the ability to proactively manage all aspects of HSE performance on remote worksites.</li> <li>• Recognizing HSE performance is imperative and start embedding an HSE culture early in the project. It all starts with management's commitment to safety.</li> <li>• Maintaining team awareness and establish strong &amp; open communication channel on all aspects of HSE.</li> </ul>
Attracting a capable EPCM contractor who has a strong background in all engineering, procurement and construction management activities for large hydro and transmission projects.	<ul style="list-style-type: none"> <li>• Developing an innovative contracting strategy to make project attractive to contractors with risk/benefit balance.</li> <li>• Implement a rigorous EPCM selection process.</li> <li>• Taking early and aggressive action to secure required engineering competencies and resources.</li> <li>• Scheduling sufficient time for engineering completion prior to start of construction.</li> <li>• Implementing a project-wide Quality Management System and embed QA requirements in all contracts.</li> </ul>
Site conditions worse than geotechnical baseline.	<ul style="list-style-type: none"> <li>• Mitigate the risk by maximizing geotechnical investigations to determine conditions as well as possible before bidding. Residual risk will have to be accepted by Nalcor since contracts will not accept it. Hence the focus on the 2010 field program for Muskrat Falls.</li> </ul>
Limited number of creditworthy hydro turbine suppliers.	<ul style="list-style-type: none"> <li>• Engage existing "bankable" suppliers in model testing scope in order to build and maintain interest during this slower demand period.</li> <li>• Explore contracting model and risk allocation strategy.</li> <li>• Enhanced oversight during design and manufacture phases.</li> </ul>
Availability of experienced high-voltage transmission line contractors and skilled labour.	<ul style="list-style-type: none"> <li>• Split into 5 to 6 smaller contracts for cost and scheduling reasons</li> <li>• Actively pursue potential suppliers and expand to worldwide considerations</li> <li>• Phase the transmission build in order to flatter resource demands</li> <li>• Actively support the training of linespersons.</li> </ul>

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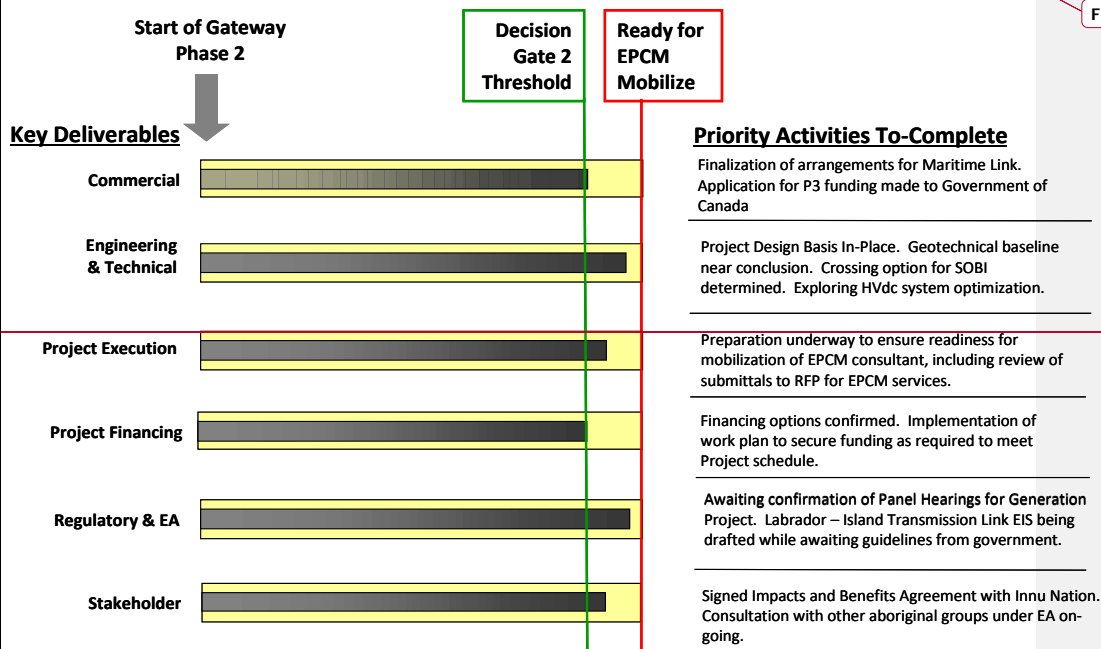
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Gatekeeper's Decision Support Package • Request for Approval to Proceed to Gateway Phase 3

## 7.0 READINESS TO PROCEED TO GATEWAY PHASE 3

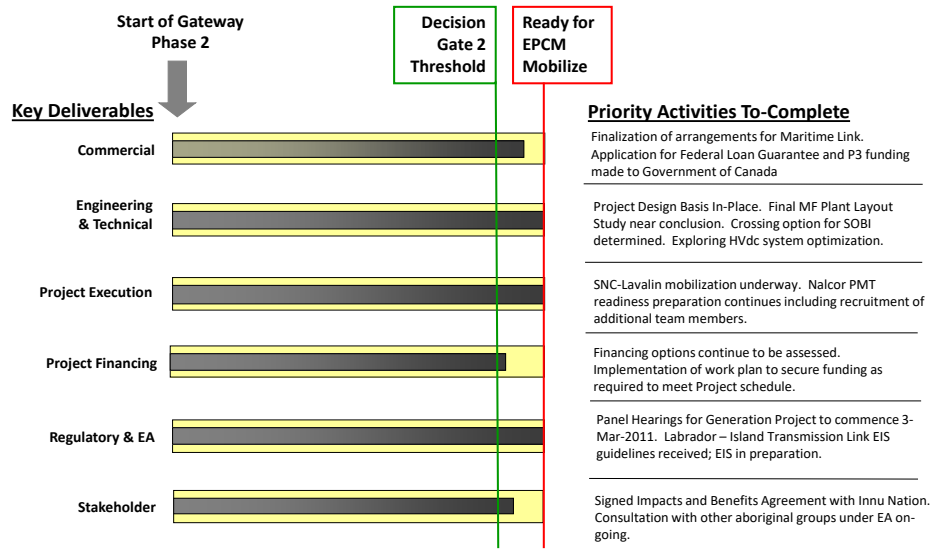
### 7.1 Declaration of Readiness

In accordance to the Summary of Overall Readiness for Decision Gate 2, shown in Figure 5, the Project ~~Team declares~~Teams declare that the required level of readiness to develop Phase I of the lower Churchill River has been achieved and that any remaining work associated with the Gateway Phase 2 is not considered to be a showstopper for the Decision Gate 2 consideration. Attachment A.1 provides a readiness report against the Gateway Phase Key Deliverables, with the status as well as details any incomplete work being carried over to Gateway Phase 3, of November 16 2010. Figure 5 provides a summary of the overall readiness status for Decision Gate 2.

Figure 5: Summary of Overall Readiness for Decision Gate 2



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Attachment A.32 contains the Declaration of Readiness as endorsed by the Project Team.

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## 7.2 Verification of Readiness

Consistent with the Decision Gate Assessment Process, an independent verification of readiness for the Gate was carried out by Independent Project Analysis (IPA) using their proprietary "Pacesetter Evaluation Process." IPA's final report was provided to NE-LCP in September 2010 and is included as Attachment A.4-3. A core element of IPA's assessment of readiness is the quantitative measurement indicator known as the Front End Loading Index. Through a systematic evaluation of both the Muskrat Falls and Island Link projects, IPA concluded that:

*the "Project is better prepared than a typical megaproject at end of Front-End Loading (FEL) 2," and the "Project has clear objectives and a well-developed project team that has closed the project scope and achieved optimal project definition."*

Quantitatively, the assessment revealed that the Project scored in the optimal range of the FEL Index for a mega project. This confirms, by independent evaluation, that the Project is both ready for Gate 2 and is on track to achieve the business objectives.

Following IPA's evaluation, an Independent Project Review was undertaken by a four-person team of experts with over 160 years of combined project experience on hydro projects and other megaprojects. The findings from this high-level independent expert assessment are included in Attachment A.5-4. Consistent with IPR team's mandate, the team reviewed the Project's status on some 25 focus areas to determine readiness to pass through Gate 2 and nine areas to determine priorities for the readiness to mobilize the Engineering, Procurement and Construction Management (EPCM) consultant, currently scheduled for Q1 2011.

The IPR determined that the Project is ready to pass through Gate 2 with 17 of 25 areas being fully compliant and eight areas being compliant with some minor work suggested. The IPR Team concluded that:

*"Overall, the Project is ready for a Gate 2 Decision.*

- *Complies with applicable best practice*
- *Consistent with this Project's specifics"*

In total nine priority focus areas were identified by the IPR team as requiring action prior to the mobilization of the EPCM consultant. Of these, four were considered high priority, three as medium, and two as low. The overall finding of the IPR team was that the Project Team understood the priorities, had knowledge of them prior to the review and with continued focus would be ready for the EPCM consultant mobilization. The Project Team agrees with these focus areas and has plans in place or under development to address each of them.

## 8.0 PATH FORWARD

Following passage through Gate 2, and into Gateway Phase 3, work will commence with a concentrated effort towards ensuring readiness to mobilize the successful Engineering, Procurement and Construction Management (EPCM) consultant. This EPCM consultant will work with Nalcor to finalize any remaining feasibility studies for the Muskrat Falls and Island

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Link projects, completing all essential engineering and procurement activities to support a start of site infrastructure at Muskrat Falls following the release from environmental assessment.

Gateway Phase 3 culminates at Gate 3, which is predicated upon the release of the Generation Project from Environmental Assessment, and the completion of a sufficient amount of engineering and contracting activity in order to confirm the ~~Project~~ Projects' cost and schedule targets. ~~Pending the completion of a~~ There will also be an Independent Project due diligence review to support the achievement of all Gateway Phase 3 Key Deliverables and readiness to move through Gate 3, ~~the Lower Churchill Project will be sanctioned.~~ At this point the Project will transition into a full construction project moving ahead to complete the Project in order to produce and transmit power to the Island in 2017.

The development of Phase 1 of the Generation Project (Muskrat Falls), the Labrador -Island Link Project, and the Maritime Link project will be a tremendous enabler for the development of Gull Island. Concurrent with Phase I of the development moving into the engineering and detailed design program, Nalcor will continue with all legal remedies to appeal the Régie's decision regarding its denial of fair access to use Hydro-Québec's transmission system. A team will remain focused on developing business opportunities with potential offtakers, both outside the Province and within the Province with industrial customers, to enable the commencement of the development of Gull Island within 3 to 5 years.

## 9.0 AUTHORIZATION TO PROCEED REQUEST

Attachment A.5 to this *Decision Support Package* contains Step 2 – Readiness Acceptance form ~~for consideration of signed by~~ the ~~Project~~ Steering Committee. Following this acceptance of readiness, the Gatekeeper ~~is requested to approve readiness to proceed through Gate 2 by signing signed~~ the ~~Step 3~~ Readiness Approval form (Attachment A.6).

~~We look forward to your endorsement of the Project to proceed through the Gate 2.~~

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## 10.0 ATTACHMENTS

- A.1: Status of Decision Gate 2 Key Deliverables
- A.2: Declaration of Readiness for Decision Gate 2
- A.3: IPA Pacesetter Review Summary Report
- A.4: Gate 2 Independent Project Review Report
- A.5: Readiness Acceptance Form for Decision Gate 2
- A.6: Readiness Approval Form for Decision Gate 2

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