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Comments on the Proposed Justification for the Lower Churchill Project

submitted to the
Joint Review Panel
on the Lower Churchill Project

on behalf of Grand Riverkeeper Labrador Inc.

by

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1. Mandate and qualifications

1.1. Mandate

The Grand Riverkeeper has asked the Helios Centre to review and comment on the justification presented by the Proponent for the Lower Churchill Project ("the Project") and related issues.

In sections 2, we will describe the context in which this analysis was undertaken.

In sections 3 and 4, we will look at the issues of rate impacts in Newfoundland and the profitability of export sales via the Maritime Transmission Link.

In section 5, we will look at the implications of this approach for the eventual construction of the Gull Island facility.

Finally, in section 6, we will summarize our conclusions.

1.2. Qualifications

Cofounder of the Helios Centre, Philip Raphals has extensive experience in many aspects of sustainable energy policy, including least-cost energy planning, competitive market design, utility regulation (including transmission ratemaking) and green power certification. He is the author of numerous studies and reports and frequently appears as an expert witness in the regulatory arena. He has explored in detail the interaction between competition and regulation as well as the environmental implications of electricity trade.

Mr. Raphals is also an authority in the area of hydropower and the environment. From 1992 to 1994, he was Assistant Scientific Coordinator for the Support Office of the Environmental Assessment of the Great Whale hydro project, where he coauthored a study on the role of integrated resource planning in assessing the project's justification.[1] In 2001, he authored a major study on the implications of electricity market restructuring for hydropower developments, entitled *Restructured Rivers: Hydropower in the Era of Competitive Energy Markets*. In 2005, he advised the Federal Review Commission studying the Eastmain 1A/Rupert Diversion hydro project with respect to project justification. Later, he drafted a submission to this same panel on behalf of the affected Cree communities of Nemaska, Waskaganish and Chisasibi.

Mr. Raphals chairs the advisory committee for renewable energies of the Low Impact Hydropower Institute (LIHI) in the United States, and has participated actively in the developing the low impact renewable electricity guideline for the Canadian Ecologo programme.

Mr. Raphals is a frequent expert witness before the Quebec Energy Board (the Régie de l'énergie du Québec), notably with respect to transmission regulation.

He studied at Yale and at Boston University.

2. Introduction

Risk analysis is a critical issue for any large project, whether in the private or the public sector. However, the incentives for proper risk management are different in the two cases. In the private sector, a decision to embark on a large project without fully addressing and mitigating risks would have direct implications in capital markets. For governments, on the other hand, there are many incentives to proceed with large projects without fully addressing the underlying risks.

Like many major hydropower developments in recent years, the justification for the Lower Churchill Hydroelectric Project ("Lower Churchill") rests in large part on its perceived profitability. Until recently, the Proponent's apparent intent was to sell virtually all of the resulting power outside of the province of Newfoundland and Labrador, via the Hydro-Quebec

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1 J. Litchfield, L. Hemmingway, and P. Raphals. 1994. *Integrated resources planning and the Great Whale Public Review*. Background paper no. 7, Great Whale Public Review Support Office, 115 pp. *(also published in French).*

transmission system. However, with the announcement of the Partnership Agreement with Emera Inc., the picture has changed dramatically.

2.1. Project justification

In IR#JRP.26, the Proponent defined the justification for the Lower Churchill Project as follows:

> It is important to note that the Project is not designed to only meet the energy needs of the Province; rather the Project is to develop the hydro power resource of the lower Churhill River for the benefit of the Province of Newfoundland and Labrador. (underlining added)

It further stated, in IR#JRP26S:

> Construction of a single dam at Gull Island, or in other words, not constructing the Muskrat Falls generating site, would not meet the stated purpose of the Project, which is to develop the hydroelectr4ic potential of the Churchill River. Construction of a single dam at Gull Island in combination with alternative generation sources, or in other words, constructing Gull Island in conjunction with some other generating project, is also inconsistent with the stated purpose of the Project, as the second best project in Nalcor's portfolio remains undeveloped. (p. 8)

There is a certain circularity in the choice to describe the project justification in this fashion, whereby the purpose of the Project is, in effect, to develop the Project. Accepting this formulation would in effect exclude all questions related to alternatives, cost effectiveness, profitability and risk from the analysis.

At the same time, the Proponent describes the benefits from the project in economic terms, with respect to reducing rates on the Island of Newfoundland and making profits from sales in external markets. We recommend that the Joint Panel define the project justification in terms of these anticipated benefits. Doing so will permit analysis of the proposed Project and of alternatives to it.

2.2. Project description and sequencing

Under the transmission configuration announced last November, consumers on the Island of Newfoundland represent the primary market for power from the Muskrat Falls project. They are expected to use some 2 TWh/yr, or about 40% of the project's output. In addition, the Nova Scotia Block, consisting of approximately 1 TWh/yr, will be provided to Emera Inc. for use in Nova Scotia, in exchange for an investment of over $1.2 billion and 20% of the project's operating costs for 35 years.[2] The power made available for sale in external markets is thus reduced to 1.9 TWh/yr, or just under 40% of project output.

At the same time, another important modification has been made to the project description. As described in the EIS, the Gull Island facility was to be built first, followed by Muskrat Falls. However, the Proponent's letter dated November 12, 2010 states that it now intends to develop Muskrat Falls first. The letter quotes the response to IR#JRP.147, which stated that:

> Construction of either phase of the Project will not start until a level of market access that supports at least the construction of either Gull Island or Muskrat Falls is achieved. Greater available transmission capacity will favour Gull Island first, and lesser availability will favour Muskrat Falls first.

The letter further states that, given the uncertainty of access to the HQT system and negotiations with other markets:

> … it has become prudent to advance the planning of <u>Muskrat Falls first</u> followed by Gull Island <u>with an overlap in construction</u>. This Project phasing is considered viable and <u>we are seeking EA approval which includes this sequencing</u>. (underlining added)

This new sequence was further elaborated upon in the Proponent's response to IR#JRP.165, dated January 2011, in which three possible sequences are described:

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[2] Backgrounder, page 2.

- **Sequence One (S1):** Gull Island followed by Muskrat Falls, with an overlap in construction.
- **Sequence Two (S2):** Muskrat Falls followed by Gull Island, with an overlap in construction.
- **Sequence Three (S3):** Muskrat Falls followed by Gull Island, with no overlap in construction.

According to the letter quoted above, the Proponent has apparently rejected S1 in favour of S2. However, its responses to JRP.165, dated January 2011, suggest that it is still considering S3 as well.

However, there is a fourth scenario which has not been mentioned by the Proponent, which we will call "Scenario Four (S4)". This scenario could occur in the event that the evolution of export markets and/or market (transmission) access is inadequate to support the addition of the Gull Island facility. Under this scenario, only the Muskrat Falls facility would be built. To the best of our knowledge, no information on the economic or environmental implications of this scenario have been provided, or sought, by the Panel.

In an email to Roberta Frampton Benefiel of the Grand Riverkeeper Labrador Inc. dated February 24, 2011, the Lower Churchill Joint Review Panel Secretariat suggested that this fourth scenario is in fact identical to sequence S3:

> In response to your second suggestion, the Panel's view is that your "fourth scenario" is in fact S3 as described by the proponent in its response to IR 165. The Panel will be exploring with the proponent the likelihood and implications of only Muskrat Falls proceeding and welcomes the views and questions of participants on this issue.

However, the Proponent's response to IR 165 clearly states:

> **Sequence Three (S3):** The Project phase sequence of Muskrat Falls generation facility <u>followed by the Gull Island generation facility</u> with no overlap in construction. (underlining added)

The Proponent goes on to respond that:

> The S2 and S3 sequences do not result in changes to the scope of the Project or the location of transmission lines, generation facilities, dam heights, areas of inundation, or power output, or the duration of discrete construction or operation activities. (underlining added)

And:

> Cost estimates have been updated to reflect the S2 and S3 sequences. Overall there is no substantial cost difference. (underlining added)

It goes without saying that the underlined parameters would differ greatly in a scenario in which the Gull Island facility is never realized. Thus, we conclude that, for the Proponent, S3 **does not** include the non-realization of Gull Island, and that no information has been provided with respect to Scenario 4, as described above. Indeed, as we shall see in section 5, there is reason to believe that the transmission choices of the Partnership Agreement with Emera may in fact reduce the likelihood that the Gull Island project will eventually go forward.

The economic implications of S4 — i.e., of a stand-alone project as announced in the Emera term sheet — are very different than S2 or S3, in several different ways. These include:

- Rate impacts on the Island of Newfoundland,
- Profitability of sales of residual energy, and
- Effects on the eventual cost-effectiveness of the Gull Island project.

In its response to JRP.26e (p. 23), the Proponent stated that any decision to delay construction of one of the other plants, or to switch the sequencing of Gull Island and Muskrat Falls, would "be based upon a careful and rigorous review of the consequences of the change in sequencing."

However, IR#JRP.165, which addressed the implications of these variants, is silent as to their implications with respect to revenues from sales to in Newfoundland or in external markets – the primary benefits invoked to justify the Project.

The implications for these benefits of Scenario S4, which at this time appears to be the most likely to occur, have not been presented, nor has this possibility even been acknowledged by the Proponent. *A fortiori*, no "careful and rigorous review" of its economic implications has been presented.

We therefore recommend that the Joint Review Panel insist on a serious examination of the implication on the Proponent's economic costs and benefits of S4 – the construction of Muskrat Falls only, together with the Labrador-Island and Maritime Transmission Links – before concluding its environmental assessment process.

3. Rate impacts

As defined in the Backgrounders, a significant part of the energy output will be dedicated to serving native load on the island of Newfoundland. It is indicated that "initially, 2.0 terawatts [sic] will be allocated to the Island to meet domestic demand to displace bunker C oil used at Hollyrood."[3] As rates for serving domestic demand are set by the Newfoundland and Labrador Public Utilities Board under cost of service principles, this statement raises two important questions:

- Under what terms and conditions will the energy from the Muskrat Falls Project be provided to the utilities serving Newfoundland load, and
- What will be the consequences for their regulated electric rates?

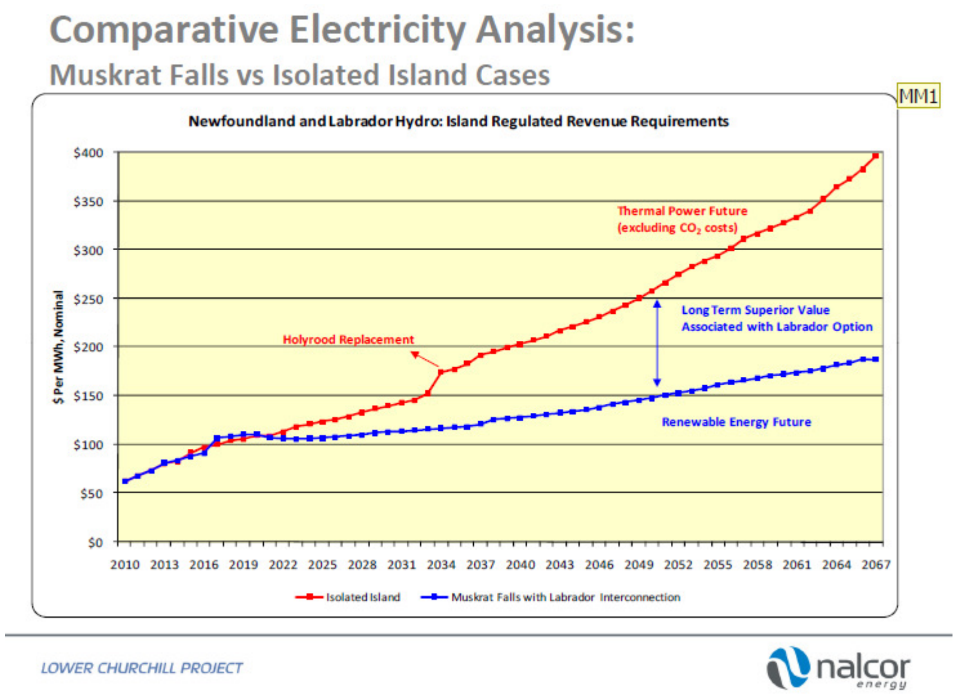
[3] Backgrounder, p. 2 of 11.

Neither of these questions is addressed in the EIS. A preliminary review of the issues leads to the following observations.

The majority of domestic electric load on the Island is served by Newfoundland Power (NP), and the majority of NP's electric supply is provided by Newfoundland Labrador Hydro (NLH). In its 2010 rate application, power supply accounted for over 60% of NP's revenue requirement. Under the principles of cost-of-service regulation, both NLH and NP flow through the costs of purchased power to their customers, and earn a regulated rate of retun on their own generation assets.

Thus, a first question is, will the Muskrat Falls Project be owned and operated by NLH? If so, the costs that flow through into NP rates would normally depend on the annual cost related to the facility, including interest, depreciation, return on equity, etc. If, on the other hand, NLH purchases power from Muskrat Falls from its parent Nalcor, it would normally be the purchase cost that would be flowed through to NP. In this second scenario, the rate impact obviously would depend on the contractual arrangement between Nalcor and its subsidiary NLH. Would Nalcor sell power to NLH at a rate lower than its actual costs, in order to mitigate the rate impact and thereby absorb the negative cash flow referred to in IR#JRP.146? To the best of our knowledge, these questions have never been publicly addressed.

A graph released by the Government with its Backgrounder of November 18, shown below, suggests that, in the long run, rates would be lower with the project than without it.



Unfortunately, no supporting documentation was provided with the graph, either with respect to its assumptions or to a sensitivity analysis. Obviously, it is based on certain assumptions concerning the evolution of the price of oil over the period 2010-2067, as well as other financial parameters. Just as obviously, these estimates are highly uncertain. Thus, it is impossible to rely on this graph without additional information.

According to media reports, the Premier has indicated that the unit production cost from Muskrat Falls will be on the order of 14.3¢/kWh.[4] Without supporting documentation, it is hard to know how to interpret this figure. It clearly relies on assumptions including, among others, interest rates, depreciation rates, return on equity, none of which have been specified. It is not clear if this is a levelized cost or, more likely, an estimate of accounting cost for the first years. Presumably, it is based on the current estimate of the construction costs of Muskrat Falls ($2.9 billion, according to the Backgrounder, up from $2.2 billion in the EIS[5]), and of the Labrador-

[4] CBC Morning Show, Nov. 24, 2010, as quoted in http://bondpapers.blogspot.com/2010/11/muskrat-falls-expensive-power.html.

[5] IR#JRP.146, Attachment A, p. 32.

Island Link ($2.1 billion, according to the Backgrounder). Any cost overruns would of course increase these unit costs, which will diminish over time.

Without further details, it is impossible to properly assess the evolution of these costs over time, and hence the impacts on rates for Newfoundland electricity consumers — or on the provincial treasury, if the government intends to support the "negative cash flows" mentioned earlier. In its response to JRP.25S/26S (b), the Proponent declined to analyze rate impacts on the Island, deferring the question to the Board of Commissioners of Public Utilities.

That said, it seems safe to conclude that, without subsidization, the Project will lead to substantial upward pressure on rates in Newfoundland until such time as the project's unit costs decline. (As no mention has been made of energy supply from the Project to Labrador, we presume there will be no rate impacts there.) Whether this upward rate pressure is greater or smaller than that which would flow from continued reliance on Hollyrood obviously depend on the evolution of fossil fuel prices.

Furthermore, insofar as the justification for the proposed project is to reduce the fuel costs and air emissions from use of the Hollyrood oil-fired power station, it remains to be shown that similar benefits could not be obtained through other alternatives, ranging from converting Hollyrood to natural gas or reducing its use, for instance through a combination of on-Island wind power and energy efficiency. In IR#JRP.25S/26S (d), an energy efficiency potential of 1 TWh/yr is identified, which represents 50% of the energy to be delivered to the Island from the Project. In its response to IR#JRP.26 (b), the wind potential is very briefly addressed. The response suggests that the missing 1 TWh/yr could be provided by a 350 MW wind farm, costing only $0.5 billion (in 2006 $). Given these very limited data already provided by the Proponent, the alternative of replacing much of the fuel consumption of Hollyrood with energy efficiency and wind power is certainly a hypothesis that deserves serious investigation.

Other possibilities could include, for example, refurbishing Hollyrood to run on natural gas instead of oil, which would reduce both fuel costs and GHG and other air emissions. The brief discussion of natural gas in the EIS makes no mention of the economic or technical feasibility of this option.[6]

Again, the question of whether or not the upward rate pressure from Muskrat Falls is greater or smaller than that which would flow from a combination of alternative power supply and conservation solutions cannot be answered based on the information provided to date.

4. Profitability of sales of residual energy

Like several recent large hydro projects (Eastmain 1A/Rupert Diversion, La Romaine), the justification of the Lower Churchill project relies to a large extent on the exploitation of a natural resource to produce energy that would be sold at a profit, to the benefit of the Proponent and its sole (governmental) shareholder. As initially presented, the justification of the Lower Churchill Project was essentially that of a merchant power plant, with no long-term power purchase agreements but with financial benefits intended to eventually result from the net cash flow.[7] While it is indicated that net cash flows will be negative in the early years, there is no indication of the depth of the financial cushion to be provided by the Proponent or its shareholder, or of the date when cumulative cash flows are expected to turn positive.[8]

Based on the figures provided in the Backgrounder, it appears that, initially, almost 2 TWh/yr of electricity will be available for sale to markets in the Maritimes and/or New England, (the 4.9 TWh/yr to be produced by the Muskrat Falls Project, minus the 2 TWh/yr to be initially

[6] EIS, v. 1A, p. 2-19.

[7] IR #JRP.146, Attachment A, p. 34.

[8] Figure 4 of IR#JRP.146 (p. 36) refers to economy-wide benefits, not to the effects on the Proponent and its shareholder.

consumed in Newfoundland, minus the 1 TWh/yr of the Nova Scotia Block, to be provided to Emera Inc. in exchange for its transmission investment).

Over and above the generation cost, Nalcor will also have to pay transmission charges in Nova Scotia and New Brunswick,[9] as well as the relevant import charges into the New England system. While these “pancaked” transmission charges have not been specified, it seems clear that Nalcor’s break-even point for sales in New England, during the early years after project commissioning, will be over 15¢/kWh. If the Canadian dollar continues to appreciate against the US dollar, the break-even point would be even higher.

Given current market conditions, it is difficult to imagine seeing such prices on a sustained basis. As we shall see below, recent forecasts for the New England electricity market are similarly pessimistic over the long term.

4.1. Temporal distribution of power production

It is important to keep in mind that the Muskrat Falls Project, like the Lower Churchill Project generally, has little if any reservoir storage, and thus is obliged to turbine and sell power based on generation levels at the Churchill Falls plant upstream. As Churchill Falls is operated to meet the needs of Hydro-Quebec, which has a winter-peaking system, it seems clear that the timing of releases will not be optimized to maximize sales revenues in the US market, where peak prices occur in the summer. Thus, it is not obvious to what extent Nalcor will be able to benefit from that market’s highest price levels.

More specifically, the EIS shows average daily flows at Upper Muskrat Falls for the period 1978-2006, as follows:[10]

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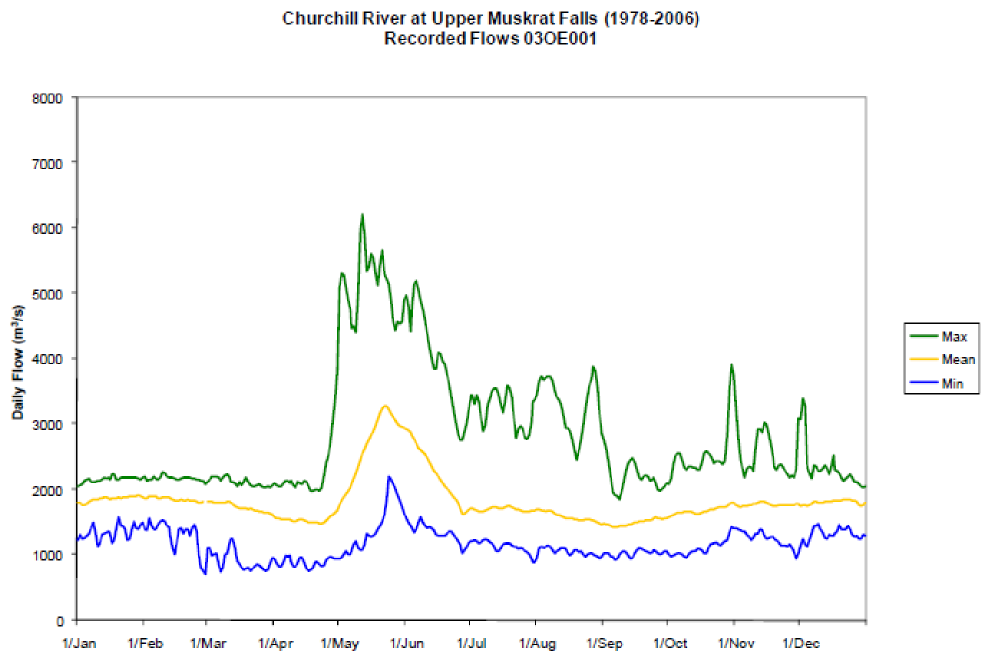
9 Backgrounder, page 4.
10 EIS, vol. 1A, p. 10-9.



We see a spring peak in the months of May and June, presumably due to inflows from the tributaries downstream of Churchill Falls. Unfortunately, this peak falls off before the beginning of July, which, as we shall see below, represents the beginning of the peak price period in New England.

Annette Luttermann's study examines flow variability in considerably greater detail.[11] The following graph shows, for the years 1997-2001, a very sharp drop-off in flows following the spring freshet, suggesting even lower flows during the peak market price periods for New England in July and August.

[11] Annette M. Luttermann, Historical Changes in the Riparian Habitats of Labrador's Churchill River Due to Flow Regulation: The Imperative of Cumulative Effects Assessment, p. 169. (EIS document #169, filed May 21, 2009)

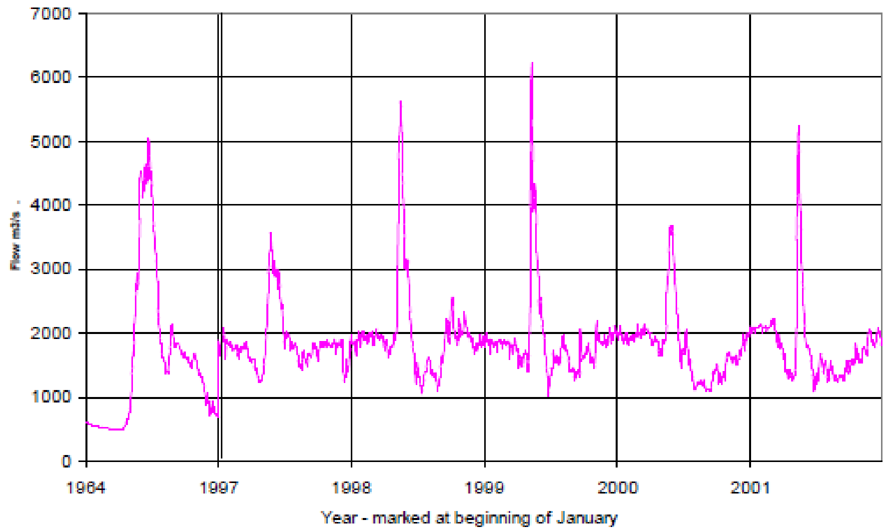


Figure 67. Daily Flow above Muskrat Falls in a Post-Regulation Period 1997-2001 Compared With Pre-Regulation 1964 (Data source: Water Survey of Canada).

Given the significant price premiums available in New England markets in July and August, it would be important to determine historical flow levels for these months, in order to properly estimate future revenues.

4.2. Price risk

The Proponent explains its approach to market demand and price risk as follows:[12]

[12] IR#JRP.146, p. 43.

7.5.2 Market Demand and Price Risk

Market demand and price risk are strategic risks against which Nalcor has options to control and mitigate. As described in Section 3, Nalcor has collected extensive market intelligence regarding market demand and price in order to understand its exposure due to market demand and price risk, as well as develop a mitigation strategy that is aligned with Nalcor's risk appetite.

Market demand and value will vary in different jurisdictions with the demand/supply drivers present in each jurisdiction such as: current market size, industrial/commercial demand – the potential for growth or shrinkage, fuel reliance, government energy and environmental policies, demographic and economic shifts, technological advances and resource development opportunities. These factors will be tempered to some degree, but not totally, by increased regionalization of transmission grids. The Project is a large generation resource with access both south-east to the Maritimes and west to Quebec, Ontario and the US, therefore diversification of markets is possible and prudent.

Nalcor intends to adopt a portfolio sales strategy as the core of this risk mitigation strategy. A portfolio strategy will be based on building a sales portfolio comprised of long, medium and short term sales to different customers and in different markets in order to effectively mitigate both demand and price risk. A mixed portfolio will provide predictable cash flow to meet financing and equity requirements, while providing opportunities over the medium and longer term to meet changing demand in Newfoundland and Labrador, and opportunities in both the short and longer term to capitalize on future shifts in market demand and market value. The diversification of the portfolio will be finalized based on the magnitude of risk-adjusted capital investment for each of the Gull Island and Muskrat Falls generation sites.

However, given the decision set forth in the Emera Backgrounder, most of this risk mitigation strategy becomes non-operative. By excluding, for the time being, the western transmission option, access is no longer available to markets in Quebec, Ontario or New York. The only markets remaining are the Maritimes and New England. The opportunities to develop a portfolio of sales "to different customers and in different markets in order to effectively mitigate both demand and price risk" are thus far more limited than they appeared at first.

IR#JRP.146 presents estimates of market prices for the period 2015-2030, based on projections prepared by the PIRA Energy Group.[13] Neither the PIRA report nor its methodology was made public.

The PIRA forecasts, as presented in IR#JRP.146, present ISO-New England and the Maritimes as a single market.[14] However, given the nodal structure of the New England market, prices can

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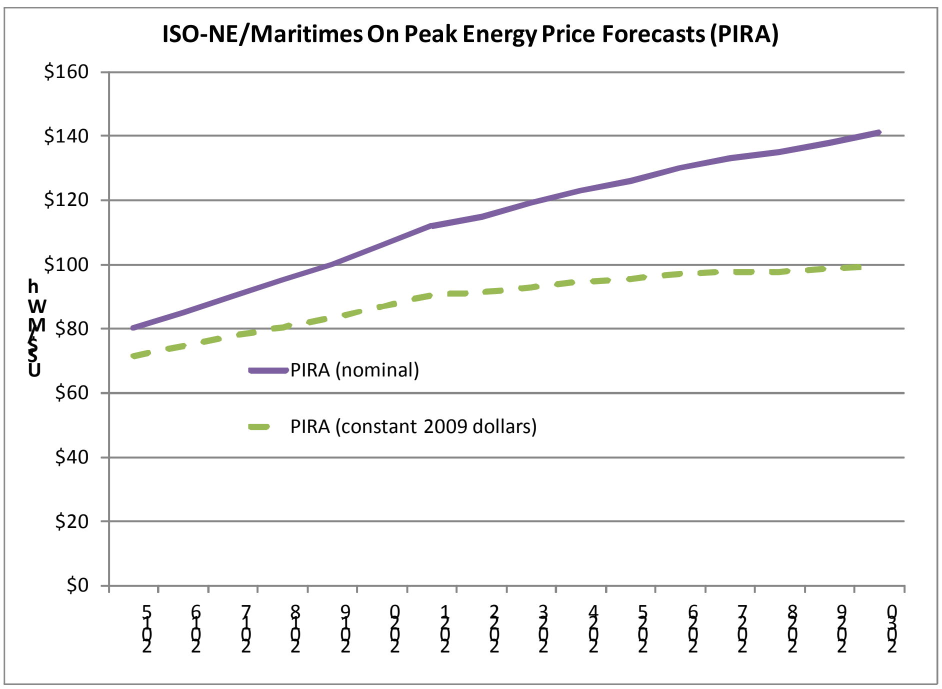
[13] IR#JRP.146, pp. 30-31.

[14] Table 22, page 31.

vary within ISO-NE. The limited interconnections between ISO-NE and the Maritimes can also lead to substantial price differentials.

According to the PIRA forecasts, nominal on-peak electricity prices in New England/Maritimes will increase to over $140/MWh by 2030.[15] The following graph shows this forecast, as stated in nominal dollars, and also in constant 2009 dollars (derived using the stated inflation rate of 2% per annum).



This forecast is somewhat optimistic compared to others we have consulted.

While a number of consulting firms regularly produce forecasts of future electricity market prices, most of these are not in the public domain. One exception is the study produced biannually by a consortium of New England electric utilities periodically commissions a study of

15 IR#JRP.146, p. 31.

avoided supply costs in New England, for the purposes of evaluating their energy efficiency programs.

Since the restructuring of the New England electric system into a competitive marketplace, these avoided cost studies are based projections of future market prices, rather than of future generation costs. The most recent study, carried out by Synapse Energy Consulting and published in December 2009,[16] is based on in-depth, hour by hour modeling of the New England electric and natural gas supply systems.

The sponsors of the study, known as the Avoided Energy Supply Component (AESC) Study Group, includes a broad spectrum of electric and gas utilities or their representatives from Massachusetts, New Hampshire, Vermont, Rhode Island, Connecticut, and Maine.[17] Prices are forecast for each of 14 regions within New England.

It is important to emphasize that these projections are based on detailed modelling of the oil and gas markets. The forecast prices represent the *market clearing price* for each region, taking into account generation costs, congestion costs and marginal transmission losses.

Space does not permit an exhaustive description of the study's methodology. To summarize:

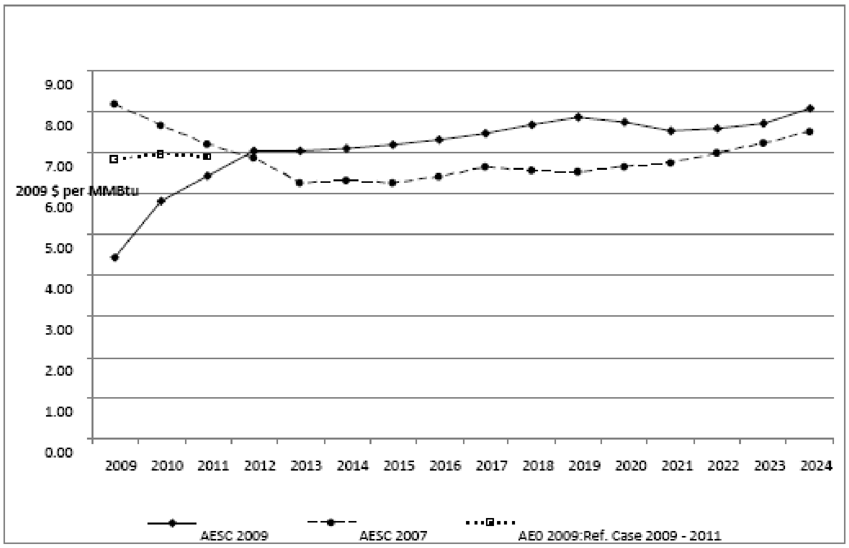
- As electricity prices are closely tied to natural gas prices, the forecast is in large part determined by natural gas price forecasts. The forecasts in the study, which are based in

[16] Synapse Energy Economics, Avoided Energy Supply Costs in New England: 2009 Report.

[17] The sponsors of this project include: Berkshire Gas Company, Keyspan Energy Delivery New England (Boston Gas Company, Essex Gas Company, and Colonial Gas Company), Cape Light Compact, National Grid USA (Massachusetts Electric Company, New England Gas Company, NiSource Inc., NSTAR Electric & Gas Company, Northeast Utilities (Western Massachusetts Electric and Public Service of New Hampshire), Unitil (Fitchburg Gas and Electric Light Company, United Illuminating, Concord Electric Company and Exeter & Hampton Electric Company), the State of Maine, and the State of Vermont. Additional members of the Study Group include Connecticut Energy Conservation Management Board, Massachusetts Department of Telecommunications and Energy, Massachusetts Division of Energy Resources, Massachusetts Low-Income Energy Affordability Network (LEAN) and other Non-Utility Parties, New Hampshire Public Utilities Commission, and Rhode Island Division of Public Utilities and Carriers.

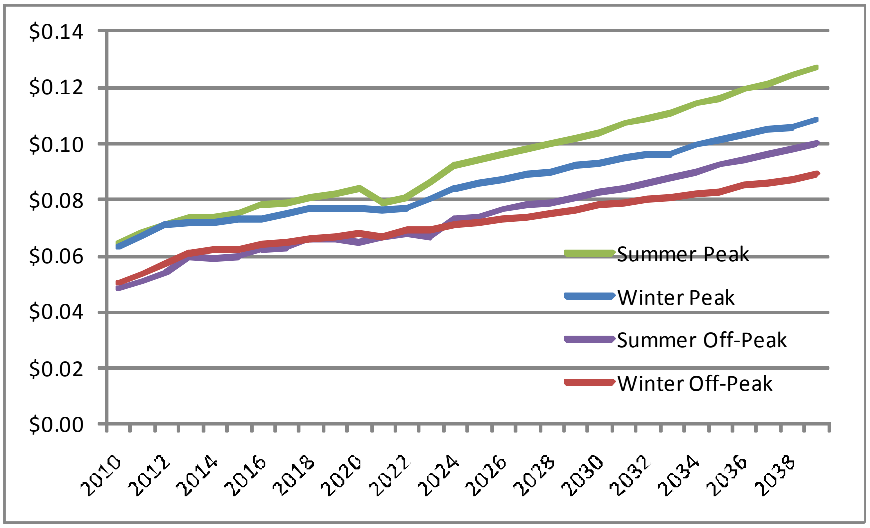
large part on those of the US Energy Information Agency, are described in the following chart, which compares Synapse's forecasts with those of the EIA's previous Annual Energy Outlook.

Exhibit 1-11: Comparison of Henry Hub Gas Price Forecasts



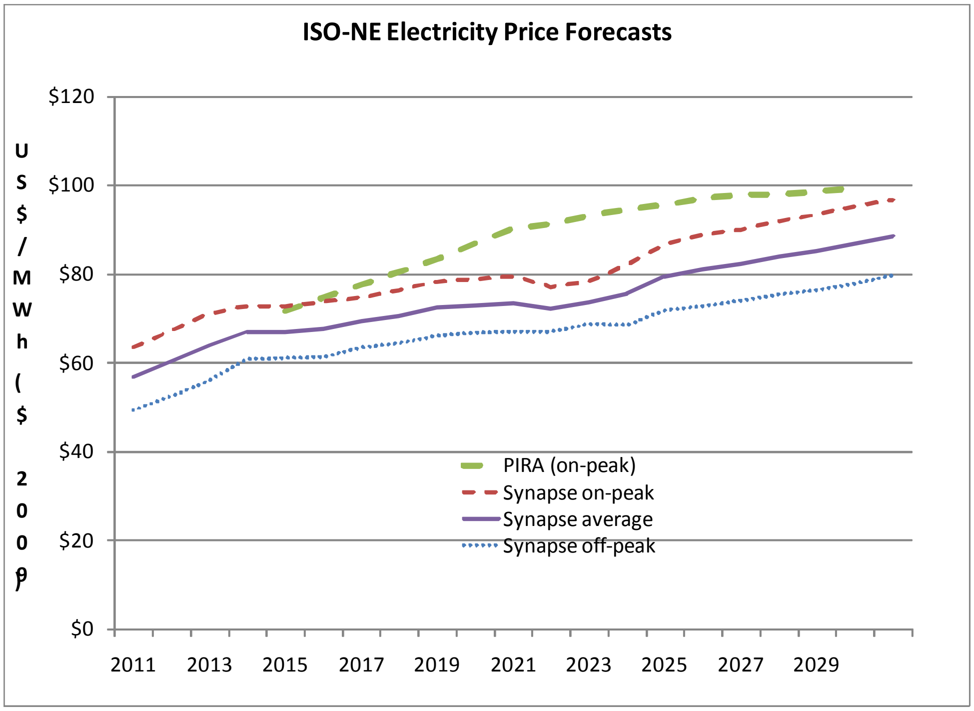
- Oil price forecasts are also an important driver. The Synapse short-term forecasts are based primarily on futures contracts, and its long-term forecasts are based on the EIA forecasts based in turn on supply-demand balance.

The following chart shows the AESC forecasts for wholesale electricity prices in the state of Maine, from 2010 to 2039. Separate annual forecasts are made for on- and off-peak periods in winter and in summer. The peak period is from 6 am to 10 pm, Monday through Friday. The summer includes the months of May through August. Values are given in constant 2009 US cents per kWh.

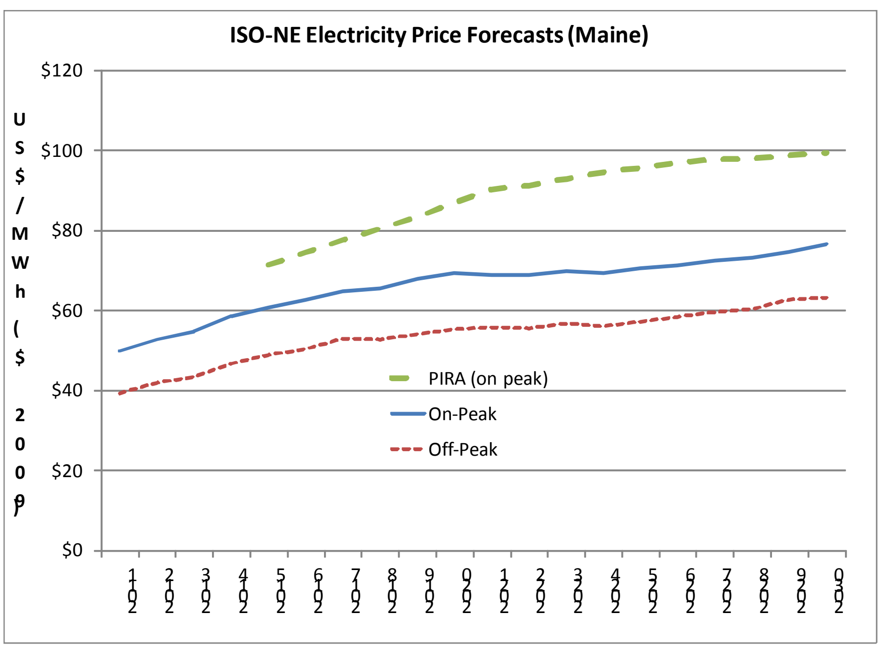


Thus, it is forecast that average summer peak market prices for Maine will not reach 10¢/kWh until 2029, and that average winter peak market prices will not reach this level until 2035. As for off-peak prices, they are forecast to remain below this level during summer through 2040, and winter off-peak prices do not even reach 9¢ by 2039.

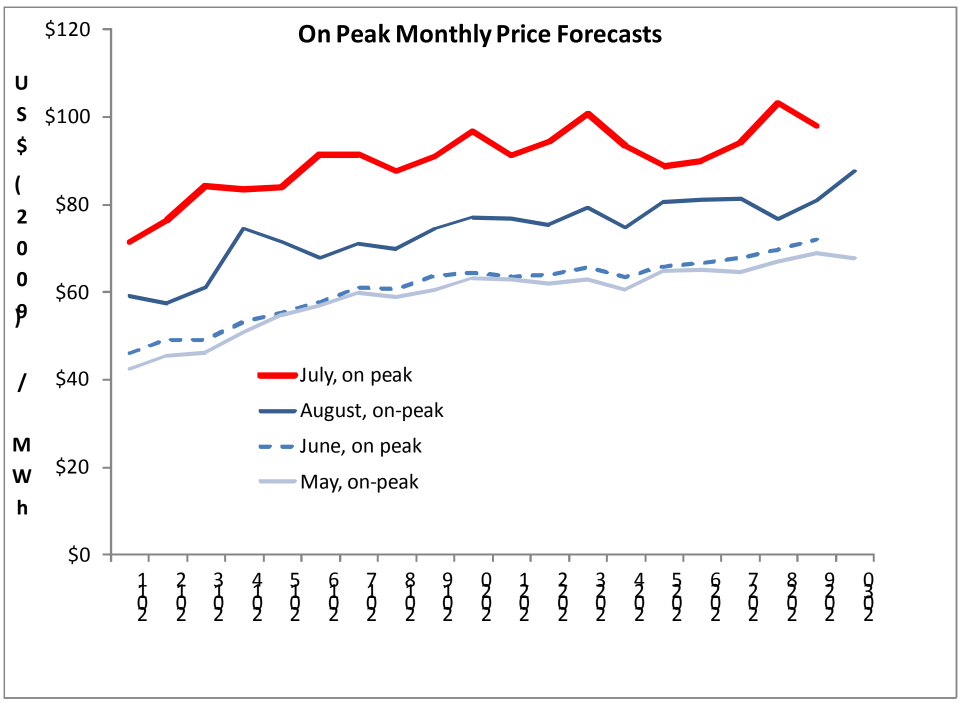
These price forecasts are somewhat lower than the PIRA forecasts presented by the Proponent, as seen in the following graph. As no details are available concerning the methodology or the data sources used by PIRA, it is not possible to analyze the reasons for the differing results.



Another forecast we consulted provides an even less rosy portrait. According to these forecasts, on-peak average prices in New England will remain below 8¢/kWh (in 2009 dollars) through 2030, as seen in the following graph.



Furthermore, the fact noted earlier that the months of May and June represent a disproportionate share of the annual flows at Muskrat Falls also has a negative effect on market expectations. These months are considered part of the summer period (May through August); however, in New England, the market prices during May and June are substantially lower than those for July and August, as is shown in the following graph:



On-peak average prices are an arithmetical average of weekday prices throughout the year, ignoring seasonal variation. The increased production at Muskrat Falls during the spring freshet, which arrives before the July-August price peak in New England, will thus diminish revenues below the average values described above.

4.3. Evolution of annual cash flow

The Proponent has not presented a full financial model for the Muskrat Falls project. However, based on a borrowing term of 30 years,[18] the constant dollar unit costs for power produced from Muskrat Falls can be expected to fall off dramatically after that period. Thus, it seems likely that the cash flows related to power sold in Maritime and New England markets, resulting from the difference between their share of the annual costs for Muskrat Falls and the related transmission investments and the revenues realized — net of transmission tariffs, losses and other transaction costs — are likely to remain negative for a number of years.

Presumably, these "negative cash flows" will be supported by Nalcor's shareholder, the government of Newfoundland and Labrador, out of general revenues. The extent and duration of this negative cash flow have not been estimated.

5. Likelihood of eventual development of Gull Island

As we saw earlier, the sequences S2 and S3 mentioned on page 3 of IR#JRP.165 both presume that the Muskrat Falls project will be followed by the Gull Island project. The Scenario 4, described above, is the only one that acknowledges the possibility that the Gull Island project might not eventually be built.

However, the choice to proceed with Muskrat Falls with the transmission configuration described in the Emera term sheet will probably make the eventual realization of Gull Island less likely, for the simple reason that it will substantially increase the unit costs for the Gull Island project. This is because, all else being equal, it is always less expensive to build one high-capacity transmission link than two smaller ones.

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[18] IR#JRP.146, Attachment A, p. 30.

In its response to IR#JRP.147 (quoted in its letter of Nov. 12, 2010), Nalcor described the following transmission options:

- 1100 to 2824 MW via HQT (application under appeal)
- 740 MW via HQT (queued valid application with HQT)
- 800 MW via Labrador-Island Transmission Link (under EA)
- 500 to 1000 MW from Newfoundland to Nova Scotia (under study by Nova Scotia Power)

These last two options are essentially those described in the term sheet: a 900 MW link between Labrador and the Island, and a 500 MW link from Newfoundland to Nova Scotia. This link is adequate for Muskrat Falls (824 MW), but there is no residual transmission capacity available for even part of the power from Gull Island, should it go ahead. Thus, the remaining options, via HQT, are apparently the only ones under consideration for Gull Island.

It should also be noted that the 740 MW "queued valid application with HQT" is not remotely sufficient to transmit the 2,250MW that would flow from Gull Island.[19]

It is also important to realize that, according to the judgment of the Régie de l'énergie (decision D-2010-053) the application to HQT for 1100 to 2824 MW is no longer valid, because Nalcor failed to meet procedural requirements. Because it found the application invalid, the Régie did not even rule on the substantive elements of Nalcor's complaints. As a result, even if the Régie's decision should be overturned on administrative review or judicial appeal, it remains entirely possible that it will be rejected for other reasons. In that event, Nalcor will be back at square one in reserving sufficient capacity on the HQT system for the Gull Island Project.

The importance for Nalcor of confirming the validity of its reservation made on January 19, 2006 is related to the two reservations made the following day by HQ Production for 1200 MW each,

[19] EIS, v. 1A, page 1-8.

on the Québec interconnections to New York and New England. Had Nalcor's 2006 application been found to be valid, it would have had priority over HQP for that export capacity.

Instead, should Nalcor require transmission capacity for Gull Island through Quebec into New York and New England, HQT will inevitably have to proceed with major system upgrades, very possibly including a new transmission line across Quebec. While Hydro-Québec's Open Access Transmission Tariff does require it to endeavor to build upgrades needed by transmission customers, the costs will be enormous, not to mention the public and political opposition that such a line could engender.

There is thus no reason to assume that the investments required to transmit the 2,250 MW of Gull Island will be substantially less than those that would have been required to transmit the full power output of the Lower Churchill Project, including Muskrat Falls. By spreading these costs over a smaller quantity of energy it seems inevitable that the per-kWh transmission cost of the HQT option will be greater for Gull Island only, compared to Gull plus Muskrat.

In other words, the choice to proceed with Muskrat Falls first, with a dedicated (and expensive) transmission component, can only increase the unit transmission costs for Gull Island — thereby reducing the likelihood that market conditions will allow its eventual development.

6. Conclusions

It is inappropriate to describe the current proposal to proceed with the Muskrat Falls project based on the Emera term sheet as simply a temporal variant (Sequence 3) of the Lower Churchill Project as originally proposed. Sequence 3 presupposes that Gull Island will proceed, though without overlap in construction. However, with no resolution in sight to the provision of transmission access through Quebec, and taking into account the higher unit costs that will result from developing two new transmission pathways rather than just one, it seems rather that the Lower Churchill Project has in fact been broken into two separate projects, namely the Muskrat

Falls Project (with the associated Labrador-Island and Maritime Transmission Links), and the Gull Island Project, which will require an eventual Quebec Transmission Link. At this point in time, there is no reason to believe that the Gull Island Project will be realized.

Putting aside the question of the appropriateness of addressing separately the generation and transmission components of the Muskrat Falls project, the fact remains that the project justification information presented to date concerns the integrated Lower Churchill Project, not the Muskrat Falls Project.

In its reponse to JPR.26S (g) (p. 8), the Proponent stated that:

> <u>Construction of a single dam</u> at Gull Island, or in other words, not constructing the Muskrat Falls generating site, <u>would not meet the stated purpose of the Project, which is to develop the hydroelectric potential of the Churchill River</u>. Construction of a single dam at Gull Island in combination with alternative generation sources, or in other words, constructing Gull Island in conjunction with some other generation project, is also inconsistent with the stated purpose of the Project, as the second best project in Nalcor's portfolio remains undeveloped. (underlining added)

From this point of view, Scenario 4 is also inconsistent with the stated purpose of the Project, and for the same reasons. As noted above, it is tautological to describe the project justification in this fashion, whereby the purpose of the Project is, in effect, to develop the Project. Accepting this formulation would in effect exclude all questions related to alternatives, cost effectiveness, profitability and risk from the analysis. It is difficult to see how reducing project justification to a tautology is consistent with the goals of environmental assessment.

In our view, the information provided to date is not adequate to support careful analysis of the rate impacts for Newfoundland Island electricity consumers, the revenues that can be expected from the sale of residual energy in New England or Maritime markets, the extent and duration of negative cash flows to be supported by the Proponent or its shareholder, or the long-term risks and benefits the Muskrat Falls project will create for them.