



Muskrat Falls

Opportunities to Reduce Risk and Enhance Benefits

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Foreword

AIMS is pleased to publish *Muskrat Falls: Opportunities to Reduce Risk and Enhance Benefits* by Dr. Gordon Weil, the Senior Fellow in Electricity Policy for AIMS. Dr. Weil's paper makes an important contribution to public discourse surrounding the Muskrat Falls project in Labrador, enumerating several important risks that stem from the project while outlining policy strategies that can help mitigate those risks and help to maximize its potential benefits.

We invited Ed Martin, the President and Chief Executive of Nalcor Energy, the project's developer, to address the subjects covered in the paper: regional approaches to reliability and the use of power from Muskrat Falls. Mr. Martin offered his perspective on a number of related issues, including reliability, efficient use of generating resources, and the rationale for developing Muskrat Falls. Mr. Martin's response follows the original paper.

A note is appended, in which Dr. Weil addresses a point of fact raised by Mr. Martin.

With the question about whether the Muskrat Falls project will proceed settled, there is now a pressing need for informed public discussion about how the project can be most effectively managed—how risks can be mitigated and opportunities maximized. AIMS is pleased to be able to facilitate this important exchange of views on key issues surrounding the future of the Muskrat Falls Project.

This paper is offered in a new and unusual manner by presenting contrasting views in a single publication. As in all AIMS publications, this exchange was completed independently by the authors, and the opinions expressed within are those of the authors. They do not necessarily reflect an institutional opinion of the organization or of its Board of Directors.

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The Muskrat Falls hydro station at Lower Churchill Falls in Labrador will create a new electricity system for Newfoundland and Labrador and will be the most significant single addition to Atlantic Canada's electricity generation infrastructure in many years.

The project is unusual as a generation and transmission undertaking by an electric utility. The risks of a higher price tag must fall entirely on customers, almost without limit, because there is no regulatory cap or possible help from shareholders. This AIMS backgrounder describes the risks facing provincial customers stemming from the Muskrat Falls project, and identifies several opportunities to mitigate these risks and enhance the benefits of the project.

Specific opportunities to reduce risk and enhance benefits include:

- *Consistent with normal utility practice, revenues from off-system sales of Muskrat Falls power could be committed to offsetting NL customer cost*
- *Nalcor could take the initiative with Atlantic Provinces to begin talks on a power pool, which might provide more assured revenues than is available from spot market sales*
- *Nalcor could consider the development of a reliability coordinator in conjunction with other Atlantic province*

Background

The Muskrat Falls hydro station at Lower Churchill Falls in Labrador will create a new electricity system for the province of Newfoundland and Labrador (NL) and will be

the most significant single addition to Atlantic Canada generation in many years.

While Muskrat Falls faced opposition when it was proposed, and was not subject to regulatory review in NL, little further doubt is possible about its ultimate creation. Recently, Nalcor, the project developer, has announced the total cost of the facilities will be higher than originally anticipated.

The project as planned provides for Muskrat Falls output to be allocated to three uses: (1) NL's own requirements, (2) commitments to Emera, the Nova Scotia (NS) utility providing essential development support and building the important transmission link from NL to NS, and (3) serving other markets in the Maritimes and New England. Some of the output has not been committed in the belief that it could be sold in the spot market until new NL industrial development occurs, encouraged in part by its availability.

Newfoundland has been the home of the quintessential so-called "islanded utility." Lacking links with the regional or international grid, the provincial utility has been required to deal with reliability on its own and, with the exception of its still small share of Upper Churchill output, to remain outside of any larger market.

Muskrat Falls is intended to improve this situation. Not only is the facility itself a reliable generator independent of potentially costly fuel imports, but the Maritime Link offers access to advantageous relationships outside the province.

Risk Factors Facing Provincial Customers

The latest news about the increased cost of the Muskrat Falls hydro station may have

been inevitable. But it served to heighten the risks imposed on electric customers in Newfoundland and Labrador.

The project is unusual as a generation and transmission undertaking by an electric utility. The risks of a higher price tag must fall entirely on customers, almost without limit, because there is no regulatory cap or possible help from shareholders.

The purpose of utility regulation is to ensure the company can gain sufficient revenue for its operations, while protecting customers from excessively high bills. Such regulation has been lacking for Muskrat Falls, leaving consumer costs to the political process.

Three key risk factors face provincial customers:

- *New charges will result from increased project costs*
- *There is no assurance that revenues from off-system sales will be used to offset customer charges*
- *The events of the past winter in NL reveal the need to pay greater attention to increasing system reliability without which customers may suffer or face higher costs of replacement power*

The rising cost of this major project is hardly surprising. It is almost axiomatic that final costs exceed estimates made at the outset of any such project due to increased procurement costs, changes to the project, and initially optimistic assumptions.

In defense of such costs, history has shown that charges seeming to be excessive may prove to be economical in the end. Long-term forecasting of utility costs and revenues is an imprecise business.

Still, when utility rates are regulated, revenues from off-system sales are credited to the cost of service, thus reducing the

amount to be recovered from local customers. In the current NL situation, whether this will happen remains an open question.

Another question looms about how significant such offset revenues can be. Nalcor expects to sell excess Muskrat Falls power to the spot market. However, little is known about what conditions in that market will be like in the years after Muskrat Falls begins operating. With the growth of distributed generation and conservation, that market has already stabilized, and it may shrink.

Nalcor appears to plan for its electric market activities similar to its role in fossil fuel markets. Yet, the operating conditions of various energy markets are often non-comparable, so relying on the market is itself a risk factor, even if revenues were to be committed to offsetting Muskrat Falls costs.

Muskrat Falls and its related generation could readily adopt solutions consistent with provincial policy and needs that could increase reliability, provide market support and less dependence on hope for industrial development and future market conditions, and substantially reduce ratepayer risk. Such solutions could be carried out without jeopardizing the broad development planning of both the province and Nalcor.

Muskrat Falls and System Reliability

Customers expect reliable electric service at the lowest cost. Thus, reliability is the most basic element of electric service. It is completely unrelated to who owns and controls generators or markets.

Because Nalcor will be connected to the transmission system subject to the North American Electric Reliability Corporation (NERC) rules as administered by the Northeast Power Coordinating Council (NPCC), it will be required to meet reliability standards. Participation is required if interconnected with other utilities subject to

NERC. All other Atlantic provinces are under NPCC, as are Quebec, New England, and New York.

Subareas of NPCC each must have a “reliability coordinator” responsible for ensuring the utility systems in the area maintain required reliability. NL will be required to have a reliability coordinator, because operations on its system can affect other utility systems.

The problems of winter 2013-14 resulting from NL’s need to deal with outages of major generating resources indicate that Nalcor, no longer operating as an islanded utility, could derive substantial benefit from its participation in NPCC.

Atlantic Canada, an interconnected system as a result of the addition of the Maritime Link, could agree to have a single reliability coordinator for all systems. In that way, all resources through the region could contribute to the support of reliability on other systems within the limits of the transfer capability of transmission links.

If Nalcor experiences outages or reliability problems, a regional reliability coordinator could provide assistance from interconnected generators in the Maritimes. Similarly, NL could help others.

One important element in maintaining reliability is being able to replace, virtually instantaneously, the largest single contingency—the area’s largest generator. Maintaining the operating reserve capacity to meet this need can be costly for individual utilities. By sharing access to generating resources, a reliability coordinator may reduce the costs of participating utilities to create and maintain reserves.

The regional effort to protect electric reliability may be seen as a mutual aid program among utilities. This practice is also common throughout the industry. In addition, it can

assure that planned continuous flows from one system to another are maintained at expected levels, another contributor to reliability. The six New England states follow this approach and have a single reliability coordinator.

The alternative for NL is a provincial reliability coordinator. This approach could impose higher system reserve costs on customers to prevent another situation requiring brownouts (voltage reductions) or blackouts. It would not provide incremental reliability, but almost certainly would impose higher reserve costs than necessary. In addition, administrative and operational costs would be higher than in a regional approach.

The transmission interconnections associated with Muskrat Falls thus can help reduce NL reliability problems if Nalcor has access to a regional reliability coordinator.

Efficient Use of Generating Resources

Over a period of many years, the Atlantic Provinces, sometimes with the assistance of the federal government, have tried to find ways to cooperate in the electricity sector to produce benefits to all. (A reliability coordinator has not been the focus of discussions.)

With the advent of open access competition and the creation of power markets in the United States, Canada’s utilities began to consider creating their own markets. True competition would allow independent non-utility generators to produce and transmit power to customers on utility grids. While this was happening in the U.S., Canadian utilities were wary of giving up generation monopolies.

Provinces prefer to be able to make decisions about the type and location of new generation. Generating units are often seen as provincial assets. A regional market would undermine the provincial control that

accompanies ownership. The lengthy discussions over a regional approach to creating a unified market of any kind foundered on the strong desire of provinces to maintain control of their assets.

In the United States, before the development of regional markets, several so-called “power pools” existed. Each participating utility retained control of its own generation, transmission, and distribution systems and related policy and planning decisions. Power pools featured two elements: maintenance of reliability, similar to what reliability coordinators do today, and the economic use of energy.

An Atlantic power pool could virtually solve the Nalcor challenge in ensuring the profitable sale of excess power until industry in NL develops to absorb that production. That would protect NL customers from having to bear unwanted costs if some energy goes unsold or only enters the market at low prices. Of course, it would bring benefits to others in the region as well as result in the increased efficiency of the energy market. A power pool also serves as reliability coordinator.

A power pool is based on daily decisions being made to dispatch the amount of power required to meet demand by using the most economical energy available.¹ The cost of energy is determined by the cost of the fuel used in each generator to produce a unit of power. That means hydro units, with no fuel cost, are among those to be dispatched first.

Because hydro units, such as Muskrat Falls, have no fuel cost, an agreed artificial price is set to be paid to the owner of the generator. This payment is made to the owner, which has incurred no cost to produce the energy. Each unit also has capital costs for what is called “capacity”—building and maintaining the

generator itself. The utility recovers the capacity cost from its own customers. It has complete discretion in building plants or buying power from others, and it has the right to exclude generators from the power pool. As a result, in a power pool, a Canadian utility would be in exactly the same position with respect to ownership and control as it is today.

Participants in a power pool obtain savings from using the most economical units among themselves. In addition to the payments to compensate utilities for their fuel costs, all pool participants receive payments from a savings fund. That means all utilities in a power pool gain financial benefit from the most efficient use of generators in the pool area.

Further steps can make a power pool even more economically advantageous. New transmission can be funded by all pool utilities if it is constructed with the intention of aiding new generators to enter the pool and produce lower costs. Transmission-owning utilities can recover all of their costs from a single customer—the pool itself, which sets a single, regional rate to recover all costs. While these measures are desirable, they remain optional and their absence does not prevent a basic power pool from operating. For example, the New England Power Pool operated using the basic model from 1972 until 1996, adding pooled transmission facilities along the way, but did not begin the transition to a single rate until 1997. A regional regulator was not required.

Using an Atlantic power pool, Nalcor could find a ready customer for its excess hydro production with virtually complete security, thus reducing the risk inherent in holding a certain amount of power for sale in the spot market while waiting for increased industrial load. Energy could be recalled for industrial needs as they developed, virtually from one day to the next.

¹For a detailed discussion of power pool operations, see Gordon L. Weil and Ross McEachern, “Regional Cooperation in Electricity Exchanges in Atlantic Canada: Steps toward the Creation of an Atlantic Power Pool” (Halifax: Atlantic Institute for Market Studies, October 2012)

Muskrat Falls, as one of the principal hydro facilities in the region, along with New Brunswick's Mactaquac, would be assured of being used daily in the region. Its power price could be indexed to protect Nalcor from underpayment in a changing energy market.

The alternative for Nalcor to receive assured revenues from off-system sales would be fixed-period contracts with purchasers much like Hydro Quebec uses. Such contracts could include price protection for Nalcor, though they would entail commitments precluding the use of the excess power for new industry in Labrador.

Possible Actions by NL and Nalcor

Neither a regional reliability coordinator, nor an Atlantic power pool, would be a groundbreaking concept. Both are familiar and tested mechanisms, which create reliability and certainty for participants.

For NL and Nalcor, they offer highly desirable ways of reducing risk to the province's electricity customers, in terms of both system reliability and cost, while maximizing the value of Muskrat Falls. Most attractively, they would not adversely affect in any way the complete discretion the NL government and Nalcor now have over the development and use of Muskrat Falls.

What changes is the place of the province in the electricity world. It has taken the steps necessary to end its "islanded" electric system by the development of Muskrat Falls and related transmission. However, without a regional reliability coordinator or a power pool, these steps create greater risk for provincial customers, already legitimately concerned about the reliability of their electric system.

Nalcor and the provincial government could reduce risk and enhance Muskrat Falls' value by now seeking to initiate regional discussions on a regional reliability

coordinator and power pool. While acceptance by other provinces and utilities is not assured, the development of Muskrat Falls and related transmission can provide a powerful impetus to measures that benefit all participants.

Summary of Opportunities to Reduce Risk and Enhance Benefits

- 1) Consistent with normal utility practice, revenues from off-system sales of Muskrat Falls power could be committed to offsetting NL customer costs
- 2) Nalcor could take the initiative with Atlantic Provinces to begin talks on a power pool, which might provide more assured revenues than is available from spot market sales
- 3) Nalcor could consider the development of a reliability coordinator in conjunction with other Atlantic provinces



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Response from Ed Martin, President and CEO of Nalcor Energy

Nalcor welcomes discussion on topics related to the development of the Muskrat Falls hydroelectric generation facility and related transmission projects, and appreciates the opportunity to offer some perspective on the issues raised in the AIMS discussion paper “Muskrat Falls: Opportunities to Reduce Risk and Enhance Benefits”. The paper is primarily focused on discussing the perceived risks and benefits associated with the overall project implementation, which will be the focus of this letter.

From a balanced perspective, however, it is important to note that the document offers a number of statements that are really opinions stated as fact. While this response does not address all of those statements, we feel it is important to address the incorrect statement that the project “was not subject to regulatory review in NL”.

As part of a comprehensive evaluation process for the Muskrat Falls Project, including the Labrador-Island Transmission Link, the Government of Newfoundland and Labrador (Government) asked the Newfoundland and Labrador Board of Commissioners of Public Utilities (the Board) to provide a supplemental review of the process used to determine that the project represents the least-cost option for the long-term supply of power to island electricity customers in the Province of Newfoundland and Labrador.

This comprehensive regulatory review, conducted between June 2011 and March 2012, included a review of the Decision Gate 2, or feasibility cost estimates for the project, involved the province’s consumer advocate, employed formal requests for information and involved public hearings. In its review, the Board’s external consultant concluded that the Muskrat Falls option is the lowest-cost method of meeting the future electricity requirements of the province. Following the Board’s review, the Government took the additional steps of requesting further independent analysis by industry experts. To that end, suggesting that the project “was not subject to regulatory review in NL” is clearly incorrect.

The remainder of the comments in this response focuses on the two key areas of discussion outlined in the AIMS paper:

- 1) Reliability of the Newfoundland and Labrador electricity system following Muskrat Falls Project completion, and
- 2) Efficient use of generating resources

Reliability

The AIMS paper is correct in its assertion that connecting the island of Newfoundland to the North American grid via two separate routes, the Labrador-Island Transmission Link and the Maritime Link, will greatly enhance the reliability of the island electricity system.

The paper promotes a “regional reliability coordinator” as a preferred method for Newfoundland and Labrador to avail of reliability benefits. While a regional reliability coordinator is certainly one way in which the shared benefits of interconnection may be executed, it is not the only way.

Arrangements such as those contemplated in the Interconnection Operators Agreement established between Newfoundland and Labrador Hydro (Hydro) and Nova Scotia Power Inc. (NSPI) is another method that would provide similar benefits through contractual provisions for emergency assistance and emergency energy transactions. Technical advantages associated with the high-voltage direct current interconnections between the island of Newfoundland and the North American grid provide Newfoundland with greater flexibility in controlling transmission flows and reliability interfaces. Nalcor will be assessing the implications of the various alternatives before landing on a final reliability model.

Efficient Use of Generating Resources

The AIMS paper describes a perceived risk that, in the absence of an [Atlantic] power pool, Nalcor may not be able to sell its excess energy or may not be able to achieve the best prices for such energy. This is not the case. Nalcor will be able to market and trade the province's excess electricity output in markets across Canada and the United States at the best possible prices, which will create value for the people of the province.

Through the agreements with Emera Inc., Nalcor has secured transmission access to and through the Maritime Provinces that will enable export of surplus energy. The Maritime Link will connect the island of Newfoundland to Nova Scotia and to the North American transmission grid for the first time and is designed to transmit power to and from the island of Newfoundland. This interconnection to the North American grid will provide access from the island of Newfoundland to markets in Atlantic Canada and New England allowing Nalcor to export energy not required in Newfoundland and Labrador to other markets throughout Atlantic Canada and New England, thereby returning revenue back to our province.

The additional Energy Access Agreement (EAA) signed in November 2013 between Nalcor and Emera's subsidiary NSPI enables the sale of energy that is surplus to Newfoundland and Labrador's needs to Nova Scotia at market prices. Under the EAA, NSPI will be provided the opportunity to compete for Nalcor's surplus energy that is offered only when it is not required in Newfoundland and Labrador. The power sold will be at the best prices that Nalcor would have obtained if the power had been sold in markets in the United States. The EAA secures another market for Newfoundland and Labrador's surplus power and creates value for the people of the province.

Nalcor also has transmission access to and through Quebec and has been conducting transactions in Eastern Canada and the North East United States since 2009. Finally, the hydroelectric reservoir systems in Newfoundland and Labrador enable Nalcor to manage its resources to further increase value from its energy export activities.

Combined, Muskrat Falls and the associated transmission projects, transmission agreements to and through the Maritimes, long-term transmission access through Quebec, and our ability to manage our hydroelectric resources has secured access to a diverse collection of export markets including Nova Scotia, New Brunswick, New England, Quebec, Ontario and New York. Profits realized from export market activity will benefit Newfoundlanders and Labradorians.

Rationale for the Muskrat Falls Development

The Muskrat Falls Project is being developed first and foremost for the benefit of Newfoundland and Labrador. Muskrat Falls will meet our province's growing electricity demand with clean, reliable energy for generations to come. Decades of studies and analyses of potential

alternative energy sources have continually shown that this project is the lowest-cost way to meet our electricity needs.

The business case for developing Muskrat Falls and the Labrador-Island Link is the same today as the day it was announced in November 2010. The economics of the project have never relied upon any additional revenue being generated through the sale of energy from Muskrat Falls that is surplus to our needs. Surplus energy not needed in our province will be sold outside the province and profits realized will be for the benefit of Newfoundlanders and Labradorians for generations to come.

Thank you for the opportunity to provide our perspective on these important subjects.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ed Martin', with a stylized flourish at the end.

Ed Martin
President and CEO, *Nalcor Energy*

Appendix I: Gordon Weil’s Response to Ed Martin

Note: The communication from Mr. Martin was made in response to an earlier draft of Dr. Weil’s paper. There was no change in the substance of the original paper and it was not edited to respond to Mr. Martin.

On the question of regulatory review, the Newfoundland and Labrador Board of Utility Commissioners was asked only to compare the Muskrat Falls project, called the “Interconnected Option,” with a single “Isolated Island Option.” The conclusion in its report (not a regulatory order) stated, “The Board concludes that the information provided by Nalcor in the review is not detailed, complete, or current enough to determine whether the Interconnected Option represents the least-cost option for the supply of power to Island Interconnected-customers over the period of 2011-2067, as compared to the Isolated Island Option.”