

BCUC INQUIRY INTO SITE C

**SITE C AND MUSKRAT
FALLS COMPARED**

A SUBMISSION TO THE BCUC

DAVID A. VARDY

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The submission compares Site C and Muskrat Falls and offers recommendations to assist the British Columbia Utilities Commission in its inquiry into whether Site C should be continued, terminated or suspended.

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EXECUTIVE SUMMARY AND ADVICE TO BCUC

In a Telegram article dated May 25, 2013 the Honourable John Crosbie¹ said that “Muskrat Falls is worth the risk”, quoting T. S. Eliot on the subject of risk: *Only those who would risk going too far can possibly find out how far you can go*. Since then we have sailed on a sea of risk and reaped the whirlwind. In Newfoundland and Labrador (NL) the challenge now is to prevent the risks from destabilizing the provincial economy. The risks of operating the project may prove to be just as daunting as those of building it, due to the impact of high power rates. The incidence of these power bills is likely to be placed on those with the least ability to avoid the burden, namely residential customers, whose only recourse will be to leave the province.

This paper compares Muskrat Falls with Site C and offers a detailed analysis of the many issues surrounding Muskrat Falls, which may be informative for the BCUC. The NL PUB undertook an inquiry into Muskrat Falls before construction began but it was incomplete, particularly because cost estimates based on detailed design were not available and the PUB was restricted from examining a full range of alternatives. In both cases the public utility boards were not allowed to undertake a full unfettered review before construction was started. The current BCUC review allows the Commission to advise whether the project should be terminated or suspended, even though it is well advanced, but its advice is not binding on the government of BC.

While the two projects are similar in size their impact on the province differs dramatically because of the difference in scale. British Columbia’s population is nine times that of NL and its growth in population and incomes is more robust, while the NL economy is reeling from the collapse of the fishery and shrunken oil royalties. Yet in both cases the projects are seen as being too large in relation to power demand, requiring a large capital outlay to overbuild capacity, rather than to build only according to the need.

There is another risk, a risk to personal safety, which looms above these financial and economic risks. The paramount risk of Muskrat Falls is the risk of landslides and earth movements in a one kilometre long hill known as the North Spur which is a natural dam imminently enclosing the run-of-the-river reservoir. This summer a graduate student released a thesis which concludes that the rise in the water level from 17 m to 39 m may trigger a landslide and that the “North Spur does not form a safe and reliable part of the impoundment wall.” His thesis supervisors support his conclusions. Both projects have an impact on the population living close to the generation sites and impose environmental risks that need to be mitigated. The risk of dam breach is common to both projects, along with methylmercury contamination. These risks to human safety

¹ John Crosbie, 10.

must be given absolute priority in reviewing the implications of the options at issue in the BCUC inquiry.

For both projects there are claims that the projects are preferred in terms of lower greenhouse gas emissions than many alternatives and that they provide sustainable energy over a long period. In addition, the power is dispatchable. Jaccard points out that cost comparisons with non-dispatchable sources require caution². In both BC and NL most baseload power is currently provided by hydro-electric sources and the presence of this dispatchable energy complements and enables non-dispatchable capacity to be developed.³

In both cases escalating costs are a major concern, along with estimates of demand that are too high, ignoring the price elasticity of demand.⁴ The level of public concern is escalating. In BC these concerns have led the new government to ask the BCUC to conduct a wide ranging and expedited inquiry. In NL there have been allegations of falsification of cost estimates to secure project approval, despite escalating costs. These allegations, and others, have led to a call for a judicial inquiry⁵ and/or a forensic audit.⁶

In NL the former CEO left abruptly, followed by the full Nalcor Board. This signals some of the frustration of the government with the cost escalation taking place on the Muskrat Falls project. A new Nalcor CEO was appointed quickly, along with a placeholder board. The appointment of a new Board followed some months later.

In both provinces the project proponents are powerful crown corporations which have been empowered to brook no opposition, including normal oversight from duly constituted regulatory authorities, such as the PUB. Provincial regulatory boards are more likely to be effective when they are dealing with investor owned utilities than they are when provincial premiers are the champions for megaprojects undertaken by crown corporations.⁷

In both provinces knowledgeable experts have given voice to strong opposition. In BC such opposition has been expressed by a former BC Hydro Chair⁸ and CEO and by the Chair of the Joint Panel⁹, while in NL the current CEO of Nalcor Energy admits the Muskrat Falls project is a “boondoggle.”¹⁰ More recently the former Chair of the NL PUB has also spoken out against the Muskrat Falls project.¹¹

In both provinces misgivings have been expressed over the ability of their respective crown corporations to manage the projects effectively and to ensure high quality control standards are enforced. In both cases criticism has been expressed with respect to tendering practices and the tendering of large bundles of activity, which would have elicited more competitive bidding if they had been broken down into smaller contracts. Concerns have been expressed with regard to the mitigation of risks, concerns that have increased in NL after the recent release of a report¹²

² Jaccard, 25.

³ Ibid.

⁴ Eliesen, 13.

⁵ Vardy, 60.

⁶ Sullivan, 55 and CBC, 5

⁷ Vardy, 59.

⁸ Eliesen, 13 and 14.

⁹ Swain, 56.

¹⁰ Marshall, 6.

¹¹ Wells, 63.

¹² SNC Lavalin report, 54.

from SNC Lavalin, Nalcor's engineering advisor. The former CEO of Nalcor claims he never received this report which catalogues many risks which had not been mitigated when the report was submitted in April 2013.

Major geo-technical problems confront both projects, problems which have the potential to escalate costs even higher. A recent thesis prepared by a graduate student in Sweden¹³ contends that the Muskrat Falls project is unsafe. His thesis supervisors, eminent geo-technical experts with considerable expertise in dealing with landslides and sensitive clays, agree with the findings of their graduate student, Robin Dury¹⁴.

The impact of methylmercury on country foods is also a shared problem. In NL an Independent Expert Advisory Committee (IEAC) was appointed last October in response to the occupation and shut down of the site but its Chair has only just been appointed¹⁵ just months before the dam is expected to be impounded and nine months after the government ended the project shutdown through a special emergency meeting with the Premier and community leaders. It appears unlikely that this approach to "adaptive management" accomplished anything other than to put an end to the occupation of the site.

In the case of NL the Muskrat Falls project is seen as a solution to long standing problems with Quebec relating to the unfair distribution of the economic rents from the Churchill Falls project. It is also seen as a way to bypass Quebec in future hydroelectric developments in Labrador, avoiding the need to use their transmission lines. This is a spurious argument sparked by the creation, through the Muskrat Falls project, of an alternative interconnection with North American markets. This alternative connection is known as the "Anglo-Saxon route", bypassing Quebec. It is spurious because the Maritime Link is designed to carry only Muskrat Falls power and also because the high cost power from Muskrat Falls will supplant the need for low cost Churchill Falls power when the 65 year contract with Quebec ends in 2041, thereby negating one of its benefits.

In both provinces there have been strong voices seeking a fundamental assessment of the wisdom of proceeding, notwithstanding the fact that the projects are well advanced. Such an assessment must focus on the future costs of continuing, compared with the future costs of terminating or suspending the project. Future costs are the key; sunk costs are not relevant. BC has accepted the logic of this argument. Sadly, NL has not.

The Ball government, which came into power in December of 2016, and the new Nalcor CEO, have both ignored calls for a benefit cost analysis of all options. However, there is growing recognition that the project poses an existential threat and that the evidence advanced to support it may have been contrived, manipulated, or even falsified¹⁶ in order to secure project sanction. This has led to calls for a full judicial inquiry, including a forensic audit¹⁷. The government and Nalcor are insisting that such an inquiry must await completion of the project. As the pressure builds, it is unlikely that demands for a full inquiry can be resisted much longer.

The economic and financial burden of Muskrat Falls appears to be beyond the capacity of NL on its own, even with the federal loan guarantee increased from \$5 billion to \$7.9 billion. The

¹³ Dury, 11.

¹⁴ Bernander and Elfgren, 2.

¹⁵ Government of NL, 22.

¹⁶ Sullivan, 55 and CBC, 5.

¹⁷ Vardy, 60.

project is likely to add \$800 million in incremental costs and NL ratepayers will not be able to pay. They will substitute other sources of energy as rates increase, driving down the demand for power and making it more difficult to cover the cost of operations. If this happens the project will be stranded and may have to be written off.

The BC government has done the right thing by mandating the BCUC to undertake this inquiry, despite the fact that Site C poses a relatively smaller risk to BC than Muskrat Falls does to NL. Perhaps BC's expedited action will inspire the NL government to emulate their example?

On the basis of the NL experience my advice to the BCUC and to the government of BC is as follows:

1. The BCUC must be guided by the policy objective of supplying least cost, reliable power. Yet there is an even higher social goal, which is to ensure the safety of those affected by the project, whether it be people living and working at Site C or Muskrat Falls. People living close to Muskrat Falls are not satisfied that environmental oversight mechanisms are sufficiently independent of the proponent. They are disappointed that the independent oversight mechanisms recommended by the joint panel have been compromised. They have been arrested and incarcerated because of their demonstrations, recognizing that only through peaceful action which affects progress on the project, will they be heard. Their concerns over the danger that sensitive soils will liquefy and undermine the natural dam have been marginalized. On May 9th, 2017 a petition to government signed by over 1,000 people was presented asking that an expert panel be appointed but no response has been received. My first recommendation is that the BCUC recognize that where human safety is at issue the precautionary principle must be followed, giving deference to those who are at risk. This means that people must have an independent authority to whom they can go to seek solutions, whether the problems be risk of dam failure or poison in their food.

2. The terms of reference for the inquiry include the words "advise on the implications" of continuing, suspending or terminating the Site C project. The BCUC should focus on supplying energy at least cost and up to a reasonable standard of reliability and not comment on the economic development or employment "implications" of the project. The projects are capital intensive and most of the cost will go for components, many of which, if not most, are imported. Project proponents emphasize the number of jobs created without describing the fact that the cost per job is very high and the leakages from the local economy enormous. Beware the lure of jobs and the lobbying effort of contractors and consultants to keep the project going!

3. Do not commit to a project unless a high level of engineering design has been done to anticipate problems and to build a high level of confidence in cost estimates. Otherwise there will be too many surprises. In the case of Muskrat Falls a lot of engineering work was left to be done after the project was sanctioned. The level of engineering design was not sufficient to provide reliable estimates for consideration by the NL PUB and in advance of sanction.

4. Do not overbuild the system; build according to your need. This is particularly appropriate in an era of rapid technological change when we need to design a system that is adaptable to change. For NL, Muskrat Falls was far too large for our needs and far too expensive.

5. Financing mechanisms should be as transparent as possible. In NL the financial arrangements surrounding Muskrat Falls are so byzantine that they are difficult to comprehend. Not only is the financial structure complex but the financing structure violates fundamental principles relating to the need for arm's length relationships between a regulated utility and its parent company. In the case of Muskrat Falls, the take-or-pay contract between NL Hydro and its parent company, Nalcor Energy, is the pivot around which the deal is contrived and has been given special legislative protection! The contract is a Power Purchase Agreement which commits NL Hydro, a regulated utility, to buy Muskrat Falls power from Nalcor Energy, its parent company, and prevents NL Hydro from securing lower cost energy. The number of legal documents is staggering, as is their complexity.
6. Seek input from all parties and prompt reticent stakeholders to participate even if they fail to register or file evidence. In the case of the 2011-12 PUB hearing in NL one of the major players remained silent, namely Newfoundland Power (NP), a Fortis subsidiary, which is a regulated, investor owned utility with a mandate primarily for the distribution of power to most of the Island's population. Their failure to participate denied the investigation access to a vast reservoir of expertise. NP manages the interface with the customers who consume power from Nalcor's subsidiary, NL Hydro, a regulated company which generates most of the power and operates the high voltage transmission system. This interface places them in a good position to advise on growth in consumer demand for electricity.
7. Seek input on energy efficiency, conservation and demand side management from a wide range of stakeholders and experts. The utilities, whose business it is to sell electricity, are not the best source of advice on how to avoid using power. NL has been faced with a high winter peak load caused by overuse of electrical space heating. Simple solutions were available but grandiose projects were perceived as more politically appealing. It has been observed that power companies prefer building bigger systems even where more modest approaches offer more cost effective solutions.
8. In evaluating the options of continuing the Site C project versus terminating or suspending it the key consideration must be future costs. Sunk costs are of historical interest only and are not relevant when deciding what to do in the future, despite the burden they will continue to impose on the taxpayer.
9. Create sound oversight mechanisms to ensure that, if construction continues on Site C, it is monitored closely by an independent body such as the BCUC. The Utilities and Review Board of Nova Scotia has performed yeoman service in monitoring Emera and its subsidiaries in building the Maritime Link and protecting the interests of the ratepayer. The BCUC should recommend measures which will ensure that BC Hydro is fully transparent. Here in NL we have had too many surprises, one of the most egregious being the escalation in cost of the contract between Nalcor Energy and Astaldi for the powerhouse and other civil works from \$1.1 billion to \$1.83 billion, with no explanation to the public as to why this escalation took place. This document contains additional reference to this matter.
10. The PUB hearings into the Muskrat Falls project were webcast. The BCUC should consider the benefit of public hearings and that of increasing their accessibility, along with

providing a package of information informing the public about the project and the due diligence performed by the project proponent. All evidence filed with the BCUC should be organized not only by date and by party but also by subject matter, so as to make it more readily accessible. Public utility tribunals need to become more accessible to the public, notwithstanding their predisposition to avoiding the spotlight.

11. Regulatory boards sometimes face unusual pressures when the proponent is a crown corporation which has been chosen as the instrument to deliver on a high profile political commitment. Governments are often more supportive of a strong regulator when the public utility is investor owned and not a crown corporation. There are times when regulatory boards have to speak truth to power, whatever the consequences. The NL PUB was faced with a dilemma when asked to make choices on the basis of flawed and incomplete information. The government of the day attempted to bully them in many ways, some of which are gradually emerging into public view. Yet the Board had the courage to tell government that they needed more time and better information before they could answer the reference question. They issued a report which prompted a strong rebuke from government. I recommend that the BCUC cling steadfastly to its independence and integrity.
12. One of the great unknowns for NL is whether Muskrat Falls is capable of providing reliable power, recognizing that the power source will be very remote from the customer base, mostly in the St. John's area. In addition to 1450 km of transmission line passing through windy mountains where icing of lines and towers is common we also have a subsea crossing between the Island and the generation site in Labrador. It is likely that the thermal plant will continue to be needed, making the reference question, which asked the PUB to choose between the thermal plant and Muskrat Falls, a moot question. The question posed to the PUB was the wrong question because it assumed that Muskrat Falls would enable the thermal plant close to St. John's to be decommissioned. The issue of reliability of power from Site C should be evaluated by the BCUC and compared with alternatives, in responding to its reference question.
13. Selection of the preferred option, based on cost and reliability, cannot be separated from the capacity to execute the preferred solution. If the utility does not have the resources or expertise to manage a major project then it is important that skilled project management be retained from outside. At present Nalcor Energy is leading a project that is beyond its capacity and the same may be true of BC Hydro's capacity to build Site C. There is a price to be paid when the owner decides to build a project for which it does not have sufficient expertise. The BCUC must look at the realism of the cost estimates which will be presented to them to assess whether they reflect both engineering design and the capacity to build a complex project, where quality control is vitally important.
14. Finally, the BCUC must be vigilant to reflect the interests of present and future generations. The present generation has an obligation to protect our assets, including our environment, for future generations. We also have an obligation to pay for the services we consume, including electric power, and not to foist our costs upon future generations through byzantine financial arrangements which amortize costs well beyond the lifetime of people living today, as epitomized by the 70 year time horizon in BC for Site C and the 50 year horizon adopted in NL for Muskrat Falls.

INTRODUCTION

This essay attempts to describe the Muskrat Falls project and to compare it with Site C in British Columbia. Part 1 will compare Muskrat Falls with Site C, Part 2 will provide the factual context relating to Muskrat Falls, while Part 3 will offer an analysis of the issues currently in contention. My recommendations to the government of NL are contained in Part 4 while my conclusions follow in Part 5. The essay was written to inform the BCUC and to enable it to gain perspective for its inquiry into the Site C dam. Recommendations to the BCUC are listed as part of the Executive Summary.

The author is an economist and has served as Chair of the Public Utilities Board of Newfoundland and Labrador (NL) as well as Secretary to the Cabinet of the province. He served for close to 30 years as a senior public servant in the government of NL, prior to which he was a member of the Economics Faculty at Queen's University. He has written extensively on the Muskrat Falls project and made two submissions to the NL PUB in 2012, when it was considering the project, on a reference from the provincial government.

1.0 PART 1: COMPARISON OF MUSKRAT FALLS AND SITE C

Marc Eliesen is a former President and CEO of BC Hydro. He is quoted in DeSmog Canada's blog as follows¹⁸:

The decision to proceed with the Site C dam was “reckless and irresponsible” and continuing the project will result in a “series of devastating high electricity rate increases” that will lead to job losses and business failures, the former President and CEO of BC Hydro has told the B.C. Utilities Commission in a formal submission.

Marc Eliesen, who was at the helm of BC Hydro from 1992 to 1994, outlined why he believes the only financially responsible course of action is to cancel the \$8.8 billion project and remediate the Peace River site in order to minimize Site C's negative impact on BC Hydro customers and taxpayers.

“Both the former government and BC Hydro's Board abdicated their fiduciary responsibility to the rate payers and tax payers of this province,” Eliesen said, in his 22-page submission to the BCUC, which is conducting a fast-tracked review of Site C's finances and construction schedule.

“There never was a business case for the start-up of construction of Site C, and there is not a business case to support its continuation or postponement.”

This is similar to comments made by former Fortis CEO Stan Marshall after he took on the role of CEO of Nalcor Energy, which is building the Muskrat Falls project in NL. When asked whether Muskrat Falls was a “boondoggle” he confirmed that it was¹⁹ and said that he never supported the project because it was speculative, overbuilding capacity, instead of increasing capacity incrementally to meet demand.

¹⁸ Eliesen, 14.

¹⁹ Marshall, 6.

Stan Marshall said *“I knew this was a boondoggle ... It should never have been built. How many times do I have to say that? But it's too late to stop. We couldn't go and get a refund.” He said the 2012 cost estimates were “significantly below industry standards.”*

He went on to say *“I don't know what the motivation was. I don't know what happened and who made the decisions. Unfortunately I have seen a lot of evidence ... which suggests to me that intentionally or otherwise, the costs were significantly underestimated.”* As a result, Marshall said, the project will be an economic burden for Newfoundland and Labrador for at least the next four years. *“This is a project that should not have been done because it's too big for the needs of the province,”* he said. *“We took a risk on what energy prices would be, and we've lost the bet.”*

The former chair of the NL PUB, Andy Wells, recently spoke out and said that *“at this point it's almost certainly too late to avoid an economic disaster for the province from the Muskrat Falls project.”* The St. John's Telegram reported that Wells²⁰ *said that in his role as PUB chairman, he tried to warn people that it would be a problem back in 2011 and 2012.*

Eliesen refers to a \$1.75 billion civil contract award to Peace River Hydro Partners (PRHP) for the construction of Site C. The problems encountered on this civil contract are somewhat similar to the problems which Nalcor encountered in its dealings with Astaldi, an Italian company which was awarded a contract for the powerhouse and other civil works at Muskrat Falls. This company required working capital at the beginning and experienced major problems keeping the project within the limits of the original contract. Last fall Nalcor renegotiated this contract, bringing it to \$1.83 billion, up from \$1.1 billion, and remarkably close to the value of the contract awarded to PRHP. Best practices in tendering call for smaller packages and demand pre-qualification for any large contract awards. Without construction experience in the Canadian North, Astaldi would probably not have been pre-qualified.

The Muskrat Falls site includes a natural dam on a peninsula known as the North Spur. The North Spur is underlain by sensitive glacio-marine clays which may liquefy when disturbed. Nalcor has invested heavily in mitigation but there remain concerns as to whether the safety factor has been tested using the appropriate methodology.

There appear to be similar issues in the Peace River region. Eliesen²¹ quotes the Geological Survey Branch of British Columbia as saying that *“Valley slopes throughout the region are subject to slope failure and colluviation and the development of these sites should be minimized.”* Eliesen goes on to quote a report dated June 2016 from BC Hydro to the BCUC which *“acknowledged numerous issues including unexpected slope failure on the Project's north bank, larger than expected deterioration of shale bedrock exposed during construction, and a phenomenon called rock-exposed swell.”*

Remediation of these problems has the potential, according to Eliesen, of raising costs from \$8.8 billion to \$12 billion, bringing the cost close to that of Muskrat Falls.

The Muskrat Falls and Site C projects have a number of similarities and some differences. They are similar in size, with Site C generating 1,100 MW of power and 5.1 TWh of energy, while

²⁰ Wells, 63.

²¹ Eliesen, 13, p. 10.

Muskrat Falls is rated at 824 MW and its average energy is 4.9 TWh. The current estimated cost of Site C is \$8.8 billion, compared with \$12.7 billion for Muskrat Falls, up from \$6.2 billion in 2010, when the project was first announced. The Muskrat Falls project was sanctioned on December 17, 2012 and construction began in the summer of 2013 while the Site C project was sanctioned on December 16, 2014 and began in the summer of 2015. Both projects had been announced in 2010 and both have experienced significant cost escalation since that time.

	Site C	Muskrat Falls
2010	6.6	6.2
2011	7.9	
2012		7.4
2013		
2014	8.5	8.3
2015		
2016	8.8	11.4
December 2016		11.7
2017		12.7

Eliesen²² reports escalation from \$6.6 billion in 2010 to \$8.8 billion currently. See Table 1 on escalating costs above comparing the two projects. In Newfoundland and Labrador (NL) the Muskrat Falls project was exempted from the jurisdiction of the Public Utilities Board, as was the case also for Site C, where the government of BC decided to proceed without a review by the British Columbia Utilities Commission. In both cases the projects were referred for review by their respect PUBs in the context of a “reference” seeking advice from the Boards but without any legal jurisdiction to approve or to reject.

In NL the reference was issued a year and a half before the project was sanctioned. The March 31, 2012 report to government of the NL PUB took an agnostic approach, finding that, on the basis of the information presented, including imprecise cost estimates based on preliminary engineering design, they could make no recommendation between the two alternatives, namely the interconnected option involving Muskrat Falls and the isolated Island option, which would have called for the Holyrood thermal plant to remain in service, supplemented by a number of small hydro and thermal combustion facilities on the Island.

²² Ibid., p. 6.

Only 5-10% of the engineering design work for Muskrat Falls had been completed, leaving the reliability of the cost estimates to be very questionable. The NL PUB was prevented from examining other options, such as gas-fired thermal or demand side management. The BCUC inquiry is taking place two years after the start of construction at Site C. Unlike the NL PUB the BCUC is free to consider alternatives to Site C, apart from those exempted by legislation, as well as to recommend whether the project should be terminated, suspended or continued.

The BCUC has been given three months to complete the review. The PUB review in NL took nine months from the date of the reference. The PUB had asked for an extension so that it would have the benefit of more refined cost estimates, but their request was declined. The government of NL was incensed with the PUB for failing to endorse its pet project. They commissioned a number of consulting studies to buttress the case for proceeding and to rebuke the PUB for its refusal to choose between the two options on offer. These “independent” studies were a blatant effort to fabricate a case for this project, having circumvented due process and abandoned prudent management principles.

In both NL and BC there had been environmental hearings conducted by a joint review panel and both panels questioned whether the business case had been established. Both recommended that more detailed financial analysis be undertaken before proceeding with the projects. The Site C joint panel concluded that, before proceeding, the “project costs and hence unit energy costs and revenue requirements” should be referred to the BCUC²³ for detailed examination.

The two projects bear the following similar characteristics:

1. Both joint environmental panels recommended further analysis before sanctioning. The joint panel in BC asked for a review by the provincial utility board.
2. Both projects are being carried out by crown corporations with strong political support from their respective premiers: Premier Christy Clarke in BC and Premiers Danny Williams (for the original announcement) and Kathy Dunderdale (for sanctioning).
3. Both projects are located at some distance from the major population centres, requiring lengthy transmission lines.
4. Both impact upon indigenous people and will both will release methylmercury into the environment.
5. Both were promoted for their environmental benefits, reducing greenhouse gas and carbon emissions.
6. Both were promoted as being necessary to meet growing demand and to reduce reliance on thermal generation.
7. Both were promoted as generating benefits to ratepayers and taxpayers over a 50-70 year period.
8. Both were described as offering lower cost power than alternatives and generating large savings.
9. In both provinces most power is currently generated by hydro-electric facilities and the low cost of these “heritage” facilities has in the past stabilized rates.
10. In both provinces the outlook for cost compensatory exports, both within Canada and to the US, is uncertain at best.

²³ Joint Panel on Site C Project, 27.

11. Marc Eliesen²⁴ points out the “lack of professional and management expertise at BC Hydro with respect to large scale construction projects.” The same judgement has been made about Nalcor Energy.
12. Geo-technical problems at Site C and Muskrat Falls threaten to increase the costs required to make both projects safe.
13. Both betray a fixation with energy megaprojects on the part of governments and hydro corporations.
14. Both suffer from the tendency of governments to use crown corporations to promote political goals and to disempower public utility regulators as useless impediments. This contrasts with jurisdictions where the public utilities are investor owned and where politicians tend actively to support regulators in the discharge of their duty to protect electrical consumers.²⁵

Differences

- a. NL has had a long standing dispute with Quebec²⁶ over the unfair distribution of the benefits from the Churchill Falls project, with most of the power sold to Quebec at one fifth of a cent per kilowatt hour until 2041. In the past Quebec has insisted that any power exported through Hydro Quebec’s transmission lines must be sold to Quebec, making it impossible for NL to deal directly with other customers.²⁷ Supporters of Muskrat Falls claim that the transmission lines from the generation site and across the Cabot Strait to Nova Scotia will break the strangle hold that Quebec has over NL. This claim is spurious, for reasons set out later in this paper. Such interprovincial disputes are not a factor for Site C.
- b. In NL the Crown Corporation, Nalcor Energy, is not regulated by the PUB while BC Hydro is a regulated utility.
- c. British Columbia expects growth in population of 1 million people over the next 20 years while the NL Department of Finance projects a decline in population.
- d. BC Hydro is planning to meet 78% of new electricity needs through conservation and efficiency initiatives by 2020 and thereby needs to meet only 22% of expected load growth with new supply. Nalcor Energy in NL is projecting minimum benefits from conservation and efficiency initiatives, such as demand side management.
- e. In BC the Site C project will provide an 8% increase in supply, while in NL the increment will be a 40% increase in capacity on the Island, indicating that for NL the Muskrat Falls project represents a much more speculative venture, overbuilding in advance of need instead of adding capacity incrementally.
- f. BC Hydro planned an eight year construction period, compared with five years for Nalcor.
- g. Federal support for Muskrat Falls was provided through a federal loan guarantee, giving access to funds at the federal government’s borrowing rate. The federal government has required the province to provide a completion guarantee. The loan guarantee has been

²⁴ Eliesen, 13, pp. 8-9.

²⁵ Vardy, 59.

²⁶ Feehan and Baker and Feehan, 15 and 16.

²⁷ Vardy, 58.

raised from \$5 billion to \$7.9 billion due to the project's escalating cost. No such federal guarantee is in place for Site C but the project is backed by a provincial guarantee.

- h. NL has committed a large block of energy to Emera Energy of Nova Scotia, providing energy to Nova Scotian ratepayers at much lower rates than NL ratepayers will enjoy.

The population of BC is nine times that of NL so, while the two projects are of similar scale, the proportional impact of Muskrat Falls will be a much larger burden for NL, which is running a large deficit in its operating and capital budgets. The impact on rates in NL will be much greater because Muskrat Falls will double the revenue requirements.

Table 1²⁸ shows how the costs of the two projects have escalated from 2010 to the present. Site C has already escalated from \$6.6 billion in 2010 to \$8.8 billion in 2016. Muskrat Falls has escalated from \$6.2 billion to \$12.7 billion in 2017. Note that the cost figures for the Muskrat Falls project do not include that for the Maritime Link, which is funded by Emera Energy.

Additional escalation is likely, as predicted by an Oxford Study cited by Eliesen.^{29 30}

Major hydro infrastructure projects experience staggering construction overruns and implementation delays. This is a world-wide phenomenon. In a series of studies on mega-construction projects, Oxford University researchers have shown that large hydro projects built in 65 countries were, on average, 90 percent higher (in real—inflation adjusted—dollars) than forecast at the time the project was approved.⁸

Both Muskrat Falls and Site C are being financed by unusual mechanisms which are designed to defer costs into the future. In the case of Site C BC Hydro has been using larger than normal deferrals of expenses as a mechanism to shift costs into the future and to create a flow of dividends from Hydro to the BC government. Rick McCandless describes the financing as follows:

BC Hydro has not released any detailed calculations of the annual operating impact, therefore the following has been inferred from the information available. BC Hydro has said that all the cost will be borrowed, and that the financing (amortization) period will be 70 years at an assumed 5% rate. BC Hydro has also stated that there will not be a positive return until Year 71, which I have interpreted as there will be a significant number of years of net operating losses followed by annual operating profits, which eventually net to zero by Year 70.

Including estimated debt service, water rental fees, grants in lieu and operating costs, the annual gross increase in BC Hydro's annual operating cost is estimated at \$500 million.³¹

The concept is that the project will pay for itself over 70 years, but not in the first ten or twenty years. This is somewhat similar to the way Muskrat Falls is being financed over a 50 year period, as described later in this paper. When Muskrat Falls comes on stream annual revenue requirements will be \$800 million, compared with the \$500 for Site C. In the case of Muskrat Falls this increase will drive rates from their current level of about 12 cents per kWh to 23.3

²⁸ This draws upon a table provided by Mark Eliesen in 13.

²⁹ Ibid., 13 p. 6.

³⁰ See literature survey by Manitoba PUB, 29.

³¹ McCandless, 34, pp 2-3.

cents, a doubling of rates! McCandless estimates that Site C, if continued, will result in a 7% rate increase for the first ten years.³²

Hydro Quebec³³ has prepared comparisons of power rates across Canada. Residential rates in St. John's (11.96 cents per KWh) and in Vancouver (10.70 cents) on April 1, 2016 are shown in the chart below from the Hydro Quebec report, indicating that power rates in the two provinces were at comparable levels in 2016, but with slightly lower rates in British Columbia.



Rates are projected to double in NL when Muskrat Falls comes on stream with full power in 2020 and this will have a dramatic effect on household budgets, especially for customers heating a family home with electric resistance space heating.

On June 24, 2016 Marshall³⁴ said *“In my opinion the Muskrat Falls project was not the right choice,”* Marshall told a news conference Friday.

Still, he said he expects the project will “finish strong.”

Full power from Muskrat Falls to the island of Newfoundland and on to Nova Scotia through subsea cables is expected in mid-2020.

Marshall says original cost estimates were optimistic or overly aggressive.

He also says some contractors lacked experience working in harsh environments and that early execution by some “was poor.”

About \$6.7-billion has been spent or is already committed to the project.

Marshall says most problems stem from construction of the power plant. He says Nalcor is in “a major dispute” with construction contractor Astaldi Canada. He said it’s the major uncertainty for Muskrat Falls but that talks continue.

³² Ibid, p. 3.

³³ Hydro Quebec, 23.

³⁴ Marshall, 17.

Marshall says electricity rates for domestic customers are now expected to rise to 21.4 cents per kilowatt hour in 2021, before tax. That's up 6.3 cents from forecasts when the project was sanctioned in 2012.

Sales of available export power would bring those estimates down by less than a cent, Marshall predicted.

Consumers in the province paid about 12 cents per kilowatt hour last year before tax. That compares to almost 15 cents in Ontario and 16 cents in Nova Scotia.

A year later³⁵, on June 26, 2017, Marshall said that rates would escalate even further as a result of further cost escalation, beyond the 2016 forecast of 21.4 cents per kWh, to 23.3 cents, dramatically higher than the 15.3 cents per kWh estimated for 2022 forecast when the project was sanctioned in December 2012.

In five years' time, power rates are expected to nearly double, to 23.3 cents per kilowatt hour, for customers in Newfoundland. It's worth noting that is a huge jump from the 15.3 cents per kilowatt hour estimate for 2022 when Muskrat Falls was given the green light five years ago.³⁶

2.0 PART 2: DESCRIPTION OF THE MUSKRAT FALLS PROJECT

2.1 Nalcor's Rationale for Muskrat Falls

Nalcor was created as a Crown Corporation by the Energy Corporation Act in 2007, with a broad mandate to manage the energy resources of the province, including electricity and oil and gas. Its wholly owned subsidiary, Newfoundland and Labrador Hydro (NLH or NL Hydro), operates most of the power generation and high voltage transmission systems in the province. Nalcor also holds the province's shares in the Churchill Falls Limited Corporation, CF(L)Co, which operates the 5,428 MW generating plant on the Churchill River in Labrador. Nalcor has majority control of CF(L)Co.

Nalcor was given broad powers to operate as a commercial enterprise including the power to withhold information due to its commercial sensitivity. It is exempted from the public tendering Act, unlike NLH, so that its activities in building Muskrat Falls are outside of the rules that apply to other government entities. It enjoys a large measure of independence in all matters but is subject to policy direction by the provincial government, which sanctioned the Muskrat Falls project in December 2012.

Nalcor is identified with Premier Danny Williams who made it the custodian of "our energy warehouse" and vested it with a large measure of autonomy in executing his goal of developing the hydro-electric resources of the Lower Churchill. With Premier Williams as its champion, Nalcor was charged with implementing this project and deflecting any opposition, from within or without. The project became an end in itself, with Nalcor resisting any attempt to change course in response to changed circumstances.

The exemption of the project from the oversight of the PUB demonstrates the single minded commitment to avoid any challenges or critical analysis. The refusal to allow the PUB to conduct an unfettered hearing betrayed a measure of insecurity as to the ability of the project to withstand

³⁵ CBC June 26, 2017, 7.

³⁶ Ibid.

critical scrutiny. During the hearings of the Joint Federal Provincial Environmental Panel (the joint panel) it was clear that government departments were guided by Nalcor to ensure that objections to the project were muted. In the planning and execution of the Muskrat Falls project the executive branch of government and senior Nalcor officials have been joined at the hip.

Muskrat Falls is located on the Lower Churchill, downstream from the Churchill Falls power plant, which reached full production in 1974, and below the other major potential hydro-electric site at Gull Island. Construction began at Muskrat Falls in 2013 shortly after the province sanctioned the project on December 17, 2012. Upon completion in 2020 (delayed by two years) it is projected to produce 824 MW of power and 4.9 TWH of energy.

The estimated capital cost, as of August 2017, is \$12.7 billion, including the cost of funds used during construction (AFUDC), or capital financing costs. This compares with the estimated cost of \$6.2 billion (the Decision Gate 2 estimate) when the project was announced on November 18, 2010, by the Premiers of Newfoundland and Labrador and Nova Scotia.³⁷

The Newfoundland and Labrador project components are being managed by Nalcor Energy, a crown corporation, while the Nova Scotian component, the Maritime Link, is being built by Emera Energy, an investor owned utility. The original target date for full production was the second quarter of 2018, which has now slipped to the second quarter of 2020. The Maritime Link is expected to be available for use by the end of 2017, on time and within budget. While estimated costs of Muskrat Falls have more than doubled it is likely that further escalation will take place.

Nalcor has argued that the Muskrat Falls project is a better fit for the needs of the province than the larger Gull Island project. Additional energy was projected to be required to meet load growth, while the Holyrood thermal plant is reaching the end of its life and depends upon burning Bunker C, which emits greenhouse gases and other pollutants.

The focus of attention is on the Island part of the province, which does not yet have an electrical connection with Labrador. Relatively low cost power is available to customers on the Labrador interconnected system because a block of power remains available from the 300 MW of Recall power, to which domestic customers are entitled under the 1969 Churchill Falls power contract with Hydro Quebec whose 65 year term ends in 2041.

When the project was announced in November of 2010 crude oil prices were high and many expected them to increase. The growth potential for shale oil and gas was just emerging and many forecasters were slow in accepting that it would have the global impact on oil prices which has materialized over the past seven years. While OPEC has tried to put the shale producers out of business, by relaxing the cartel's control over production, the American shale industry has kept production high. The result is that oil prices are dramatically lower today than they were when the project was sanctioned.

Nalcor's plan was to use 40% of the energy or 2 TWH to replace production at the Holyrood thermal plant and to meet any growth in demand, to export 20% or 1 TWh of energy to Nova Scotia and to market the remaining 40% to various Canadian and US customers. The Maritime Link provides the means whereby energy can be sold outside the province as well as to gain access to emergency power when needed and available. The Maritime Link and its sub-sea

³⁷ Government of NL News Release, 20.

cables across the Cabot Strait, along with the cables across the Strait of Belle Isle, complete the interconnection with the rest of North America.

The Holyrood plant began production in 1971 and was expanded over time. Most of the Island's energy needs are met by hydro-electric power, particularly from the Bay D'Espoir development, which began in 1965. The use of electricity for space heating is a relatively recent phenomenon and its growth called for the Holyrood plant to be used more and more, starting as a source of emergency power and gradually becoming a part of the base load during the winter months.

Oil prices started to rise sharply in the early 70s, causing substitution of electricity for oil. Over the period 1970-90 demand for power grew substantially, at a compound annual rate of 4.4%, mostly caused by residential use, with strong growth in electric space and water heating. Many converted their homes to electric space heating, causing the penetration rate to rise from 10% to 70%. This was also a time of increasing acquisition and use of electrical household appliances. Industrial load also increased with the addition of a new paper mill and a refinery.

The period 1990-2010 demonstrated a slowing of growth, with a compound rate of growth of only 0.1%. Over that period the province lost two paper mills while another reduced its scale of operation. Utility load grew at 1.1%, much lower than the previous 20 year period. During this second 20 year period the province experienced a fishery moratorium in 1992, which led to the loss of 70,000 people. The later part of this 20 year period was more robust, buoyed by oil and gas development. Production at the Hibernia oilfield began in November 1997. Oil megaprojects have kept economic growth high up until 2014, when oil prices slumped globally, resulting in collapsing oil royalties.

Growth in electricity demand over the past few years has been low. Nalcor substantially reduced its forecast from its previous projections after the appointment of Stan Marshall as the new CEO in April 2016, replacing Edmund Martin, who left abruptly along with the full Nalcor Board of Directors. Martin was quickly replaced by Marshall.

Even before the 2014 crash in oil prices population projections showed little growth. The latest projection shows population falling from 527 thousand in 2016 to 502 thousand in 2036.

Electric space heating has risen over the years and has driven up the amount of oil burned at the Holyrood thermal plant in the winter months. This could have been avoided if our utilities had used marginal cost pricing to reflect the demands on the system. With higher prices the penetration of electric heat would have been lower and we would not have become as dependent on oil for electric space heating. An effective program for energy efficiency and conservation would have been a better solution than a \$12.7 billion capital project. Such a program would lower the peak in demand and reduce the requirement for investment in expensive generation and transmission capacity.

Nalcor's plan is to shut down the Holyrood plant and use it instead as a synchronous condenser. Such a move has to be approached with caution in light of the fact that the reliability of Muskrat Falls power may be questionable. The transmission line, the Labrador Island Link (LIL) crosses the ice-scoured Strait of Belle Isle and must pass through mountains where high winds and icing conditions have always been experienced. In this environment, interruptions have the potential to be protracted. We will likely continue to need reliable, dispatchable emergency power close to the Avalon Peninsula, which is the main market on the Island, and will therefore continue to need power from Holyrood, or from some other power source on the Avalon Peninsula.

2.2 Joint Panel Report

The Joint Federal Provincial Panel³⁸ was appointed in 2009 and reported in August of 2011. It produced 83 recommendations, many of which deal with environmental impacts and remediation. They identified issues relating to sensitive clays at the North Spur and the potential for landslides. They also dealt with the leaching of methylmercury from the soil and how that might be mitigated by measures such as clearing of the full reservoir. They also questioned the need for additional power and the fact that when the Churchill Falls³⁹ contract ends in 2041 the province will have full access to all 5428 MW. The panel questioned whether the business case for the Muskrat Falls project justifies such a massive investment.

They concluded⁴⁰ *“that Nalcor’s analysis that showed Muskrat Falls to be the best and least cost way to meet domestic demand requirements is inadequate and an independent analysis of economic, energy and broad-based environmental considerations of alternatives is required.”*

The panel asked *“why Nalcor’s least cost alternative to meet domestic demand to 2067 does not include Churchill Falls power which would be available in large quantities from 2041, or any recall power in excess of Labrador’s needs prior to that date, especially since both would be available at near zero generation cost (recognizing that there would be transmission costs involved.)”*

It is clear that the joint panel was not convinced that a business case had been presented for the project. They recommended the adoption of integrated resource planning as a mechanism to identify demand and supply solutions and involving interested stakeholders in a review of alternatives.

The federal government’s response to the recommendations was subdued, deferring to the province on most matters outside of those relating to fisheries and oceans. The province also provided a tepid response deferring on most matters to Nalcor. Both governments ignored the warnings issued by the joint panel on the need for a financial analysis to confirm that a business case for the project has been developed.

2.3 Churchill Falls

The Churchill Falls project was a successful engineering project which continues to generate power for its owners at little cost but which has been a source of frustration in NL. The frustration arises from the fact that our royalties and rentals are so small a proportion of the economic rent, most of which accrues to Hydro Quebec, which owns a minority equity stake in CF(L)Co. The controlling interest is held by Nalcor, which owns 66% of the shares, compared with the 34% owned by Hydro Quebec. The 65 year contract with Hydro Quebec, for purchase of the power, ends in 2041. Currently the price charged by the Churchill Falls Limited Corporation is \$2.00 per MWh or 0.2 cents per kilowatt hour.

NL was placed in a position where the power from Churchill Falls could not be wheeled through Quebec. Instead we were compelled to deal with Hydro Quebec who bought the power and sold it to its own customers. This inability to deal with Quebec and to gain open access to their transmission lines has frustrated successive governments, who have tried to develop the two

³⁸ Joint panel report, 26.

³⁹ For information on Churchill Falls see Jason Churchill, Philip Smith and Peter Green (IEEE) at 9, 52 and 24.

⁴⁰ Joint panel report, 26, p. 33.

projects on the Lower Churchill, Gull Island and Muskrat Falls. Part of the rationale for the Muskrat Falls project was to create an alternative to the use of Hydro Quebec's HVDC lines. I will return to this rationale for the transmission lines to Nova Scotia, crossing both the Strait of Belle Isle between Newfoundland and Labrador and the Cabot Strait, between the Island of Newfoundland and Nova Scotia.

Hydro Quebec controls the flow of water at Churchill Falls through the power contract. In order to operate the plant at Muskrat Falls there must be an agreement on water management which can be implemented by the Churchill Falls Limited Corporation. Hydro Quebec has refused to enter into the Water Management Agreement which resulted from a PUB hearing in 2009. This remains a major problem and one to which I will return.

2.4 Financing Arrangements

On November 18, 2010 Premiers Danny Williams (Newfoundland and Labrador) and Darrell Dexter (Nova Scotia) announced a Term Sheet⁴¹ to undertake development of the Muskrat Falls project on the Churchill River in Labrador, for the benefit of their two provinces. The total cost, including the cost of building the Maritime Link across the Cabot Strait, was estimated at \$6.0 billion plus \$1.4 billion in capital financing cost (allowance for funds used during construction) for a total of \$7.4 billion. The capacity of Muskrat Falls is estimated at 824 MW, with average energy of 4.9 TWH and firm capacity of 4.5 TWH.

The Maritime Link was estimated to cost \$1.2 billion including capital financing costs. The components to be built in NL were estimated to cost \$6.2 billion, including \$1.2 billion in capital financing cost. These three components were 1) the 1100 km HVDC transmission line from Muskrat Falls to St. John's (known as the Labrador Island Link or LIL), across the Strait of Belle Isle, 2) the 350 km HVAC transmission line from Muskrat Falls to Churchill Falls, and 3) the generation project itself, at Muskrat Falls. Most of the costs cited in this document will refer to these three components in NL and will not include the Maritime Link.

The 2010 cost estimates were known as Decision Gate 2 cost estimates (DG2) and they were replaced two years later by DG3 estimates, with greater accuracy and based on more advanced engineering design work. The DG2 (Decision Gate 2) cost estimate for the NL components was \$6.2 billion, which rose to \$7.4 billion in December of 2012 (DG3 estimates), based on more detailed, yet incomplete, design. The PUB hearings of early 2012 drew upon the DG2 estimates and these are the base numbers which will be used in this document as a base to track subsequent cost escalation. The PUB hearing was successful in placing a lot of information in the public domain, focusing around the assumptions made at the time. No comparable database has been placed in the public domain to describe the assumptions surrounding the current cost estimates.

2.5 Term Sheet with Nova Scotia

The Term Sheet provides for Emera of Nova Scotia, the owner of Nova Scotia Power Maritime Link (NSPML), to contribute 20% of the capital cost of the project, in the form of their investment in the Maritime Link, in exchange for access to 20% of the energy, about 1 TWH, known (along with 240 GWh of "supplemental energy" annually, for five years) as the "Nova Scotia Block". The capacity of the Maritime Link is 500 MW, of which 170 MW will be used to transmit the Nova Scotia Block. Nalcor Energy of NL was to receive access to the Maritime Link

⁴¹ Term Sheet, 38.

and to transmission lines in the Maritimes and New England, in order to export surplus Muskrat Falls power and thereby generate export revenues.

The quid pro quo for the Nova Scotia Block was to be access to the Maritime Link which would enable Nalcor to sell surplus power, having committed 170 MW to Emera's subsidiary (NSPML). Emera was to purchase 49% of the equity in the LIL and would receive a rate of return on equity commensurate with the rate earned by regulated public utilities. Nalcor Energy would also receive access to transmission rights held by Emera in Nova Scotia, New Brunswick and in New England. This would enable Nalcor to export additional power and to earn export revenues from all sales, beyond the Nova Scotia Block, wheeled through these transmission lines.

Nalcor Energy was to be responsible for all cost escalation on the NL project components and to share cost overruns on the Maritime Link with Emera. Emera was required to inject additional equity into the transmission line in order to maintain its share but was not required to contribute to any cost escalation for the generation project itself, including the transmission line from Muskrat Falls to Churchill Falls. The Term Sheet provided that 20% of the power (the Nova Scotia Block) would be allocated to Emera Energy with no energy charge.

2.6 Power Purchase Agreement

Nalcor Energy entered into a power purchase agreement (PPA) with Newfoundland and Labrador Hydro (NLH)⁴², its wholly owned subsidiary, for the sale of 40% of the power from Muskrat Falls. This was a "take-or-pay" contract whereby Nalcor would recoup its costs, including the cost of supplying Emera with power under the Nova Scotia block for transmission over the Maritime Link. While NLH is a fully regulated utility, Nalcor remains as the parent company, an energy corporation with a mandate relating to oil and gas, as well as electrical energy. It is Nalcor which holds the province's 65.8% interest in Churchill Falls Limited CF(L)Co, in which Hydro Quebec is a minority shareholder, with 33.2% equity. The PPA stipulates that government will earn 8.4% on its equity participation in the generation component.

The transmission company owning the LIL was to be financed through a combination of equity from Emera energy, equity from the government of NL and bonds guaranteed by the federal government. Annual revenue requirements were to be recouped under the PPA using standard cost of service (COS) methodology which allowed return on equity to be paid on an annual basis, as would have occurred if the transmission company were fully regulated by the Public Utilities Board (PUB). For clarity, neither the transmission assets nor the generation assets of Nalcor are regulated by the PUB. This means that the PUB, in regulating NLH, must accept without question payments under the PPA, as the cost of purchased power, payments which cannot be challenged by the Board.

In stark contrast, the COS approach was not followed for the generation component or for the transmission line between Muskrat Falls and the Island, the Labrador Island Link (LIL). The reasoning was that application of COS methodology and the need to pay a return on provincial equity in the early years would have created rate shock and would have led to ratepayer resistance and substitution of other energy sources. The pricing methodology adopted by Nalcor

⁴² Nalcor Energy, Power Purchase Agreement, 39.

was to combine generation and transmission costs annually over a 50 year period and to levelize the costs over the period, adding a 2% escalation in each year.

To quote from Exhibit 36 at the 2012 PUB hearing⁴³: *In order to derive an appropriate price for Hydro's power purchase requirements for the Island, Nalcor has undertaken a supply pricing analysis for MF assuming that Hydro is the only viable customer. The objective of this analysis is to determine the "escalating supply price" (that is, the price per MWh of power actually used by ratepayers, expressed in real dollars subject to escalation at CPI), which recovers all costs – operating costs over time, debt service costs for the debt portion (as applicable) of the capital investment, and an equity return on the equity portion of the capital investment at a defined Internal rate of Return ("IRR") over the life of the project. This escalating supply price is lower than would be indicated initially by the COS framework. It escalates evenly over time, and is applied only to power actually used by ratepayers – the early-year burden placed on ratepayers at that time is minimized. This is accomplished essentially by requiring that the equity investor "wait" for its return over the project life. It should be noted that the equity investor is not forgoing any return for waiting; it still earns its rate of return on the entire investment over the course of the term of the PPA.*

The result of this complex procedure is that generation costs (including the costs of the Labrador TL connecting Muskrat Falls with Churchill Falls) will escalate over time and shift the burden toward future generations. Effectively the province receives no return on equity until late in the 50 year period. Such a financing plan is unorthodox and would not be attractive to private investors who would be reluctant to wait decades for a return.

2.7 Federal Loan Guarantee

On November 30, 2012, the federal government signed a loan guarantee agreement⁴⁴ to guarantee the debt incurred by the government of NL to develop the Muskrat Falls project. This agreement specified the amount of equity to be injected for each project component and allowed Nalcor and the subsidiaries it created for the project to borrow at the federal government's borrowing rate. The cap established for the NL components was originally \$5 billion. The agreement places responsibility on the province to ensure that the ratepayers are compelled to pay sufficient amounts to cover all costs and to complete the project, through what is effectively a "completion guarantee," which imposes the obligation on the province to provide all necessary additional financing. In November of 2016 the cap on the loan guarantee agreement was raised from \$5 billion to \$7.9 billion. The new agreement is not yet public so we do not know what other conditions may have been added.

Strangely, even though the Term Sheet was signed by Emera and by the Premier of Nova Scotia on November 18, 2010, it had been understood that the final agreement was to be subject to review by the Utilities and Review Board of Nova Scotia (UARB). The loan guarantee agreement with the federal government was signed on November 18, 2012, and shortly after, on December 17, 2012, the NL government sanctioned the project, without final approval by the UARB.

It was not until 2013 that the UARB held a hearing on Muskrat Falls and the agreement with Emera. They concluded that the terms for the Nova Scotia Block were not sufficiently attractive

⁴³ Nalcor Energy Exhibit, 41, p. 1

⁴⁴ Government of Canada Loan Guarantee Agreement, 18.

and they instructed Emera to go back to Nalcor Energy to seek more beneficial terms, increasing access to Muskrat Falls power. The UARB, in their decision⁴⁵ of July 22, 2013, demanded as a condition for their approval “Market-based” energy additional to the first “Nova Scotia block” already committed to Emera by Nalcor.

This “Nova Scotia block” amounts to 20% of the energy output from Muskrat Falls for 35 years, intended originally to begin, in 2017. The draft agreement between Emera and Nalcor, filed with the UARB on October 21, 2013, calls for the commitment of at least another 24% of the energy production at Muskrat Falls, rising potentially to 36% or more, over a 24 year period, also beginning in 2017. The result is that 44% to 56% of Muskrat Falls power would be committed to Nova Scotia at energy rates that are too low to recover the full transmission and generation costs.

Nalcor had, inexplicably, adopted a policy where export revenues will not be used to reduce domestic rates. The spot market rates charged to Emera for the additional commitment will be a small fraction of the full transmission and generation costs. While Nova Scotia will have low cost access to 44% to 56% of Muskrat Falls energy, Newfoundland ratepayers must pay the full cost of the energy which they will consume, as well as most of the cost of supplying energy consumers in Nova Scotia!

2.8 Reference to Public Utilities Board

While the Term Sheet recognized that the UARB of Nova Scotia must approve the terms for the Muskrat Falls project and the purchase of the “Nova Scotia Block” there was no such deference given to the PUB in NL. The PUB in NL has statutory duties to review all capital budgets and to implement the energy policy contained in the Electrical Power Control Act, to ensure power is supplied reliably and at least cost. Yet the Muskrat Falls project was removed from the Board’s jurisdiction. Shortly after the announcement of the project the undersigned and my colleague, Ron Penney, wrote to the Minister of Natural Resources on May 5, 2011 and asked that the jurisdiction of the Board be reinstated, due to the large impact of the project upon the province and upon ratepayers. The government subsequently decided to make a limited reference to the PUB. The reference was limited in time as well as in scope. The Minister responded to our letter on June 22, 2011.⁴⁶

On June 17, 2011, the government directed the PUB to review and report on the question as to whether the Muskrat Falls generation facility and the Labrador Island Link (LIL) is the least-cost option for the supply of power to Island interconnected customers, over the period 2011-2067, as compared with the isolated Island development scenario. The isolated Island scenario would involve a continuation of power supply from a thermal fired plant close to St. John’s, at Holyrood, along with a series of small hydro projects on the Island, supplemented by combined cycle combustion turbines (CCCTs) and simple cycle turbines (CTs). Due to a delay in Nalcor’s submission to the PUB the original deadline of December 2011 for a final PUB report was extended to March 31, 2012. The Board was not allowed to look at other supply alternatives, such as natural gas⁴⁷, wind, solar, demand side management or energy efficiency. Unlike the UARB, it had no real decision-making authority and could not look at other, better alternatives. While the UARB was fully mandated to protect ratepayers in Nova Scotia the ratepayers in NL

⁴⁵ UARB decision, July 22, 2013 with supplementary decision November 29, 2013, 57.

⁴⁶ Vardy and Penney and response from Minister Skinner, 61 and 51.

⁴⁷ Cabot Martin and Steven Bruneau presented alternatives relating to the use of natural gas from adjacent oil fields and for imported liquefied natural gas. See Martin 31, and Bruneau, 4.

were left unprotected and exposed to the monopolistic power of an unregulated utility, wielding a take-or-pay contract through its subsidiary NLH.

The PUB conducted its reference inquiry with due diligence, probing load forecasts, oil prices and capital cost estimates. The cost estimates were based upon preliminary engineering design work which made their reliability quite risky due to the fact that the amount of engineering design was in the 5 to 10% range, too little detail to provide any precision in cost estimates. My colleague Ron Penney and I raised a lot of questions during the hearing, focusing on the following issues:

1. The limited terms of reference, disallowing other options.
2. The risk of relying on power generated a long distance from the market.
3. Volatility of oil prices.
4. Low population growth, particularly in the age group driving housing starts.
5. Overestimation of demand.
6. Cost escalation due to competing megaprojects.
7. The reliance on preliminary engineering design.
8. The risk of overbuilding rather than building as needed.
9. The need for a water management agreement with Hydro Quebec.
10. The implications of gaining access to 5428 MW of Churchill Power in 2041.
11. The comparison of cost estimates based on vastly different methodologies, COS for the isolated Island option and a hybrid of COS (for the LIL) and PPA (non-COS) for the generation assets.

The Board concluded that the information presented did not allow it to reach a conclusion on the reference question, citing a variety of factors, including the fact that the engineering design work was only 5-10 % complete and even less for the isolated Island option. The information was too imprecise and unreliable to conclude that the interconnected option (Muskrat Falls) was lower in cost than the isolated Island option. The PUB had requested that it be given additional time to consider the more refined DG3 cost estimates which became available shortly after the deadline for the Board's report had passed. This request was turned down.

In October of 2012 Nalcor completed the DG3 estimates and these showed costs rising from \$6.2 billion to \$7.4 billion. Yet, despite the higher cost and the inconclusive report from the PUB, whose report was based on the DG2 estimates, government went ahead and sanctioned the project on December 17, 2012. This was shortly after signing the federal loan guarantee agreement, but before the UARB had reviewed the Nova Scotia Block and insisted in 2013 upon a fundamental realignment of the 2010 Term Sheet.

When the UARB demanded that Emera go back and reopen negotiations with Nalcor the stakes for NL were high. The federal loan guarantee depended upon the regional scope of the Muskrat Falls project, extending beyond the needs of NL alone. In order to maintain the federal loan guarantee Nalcor was under pressure to reach agreement with Emera Energy under the terms dictated by the UARB. Nova Scotia clearly outmaneuvered the province of Newfoundland when they empowered their UARB to reopen the negotiations and to demand additional low cost power.

Ironically the NL PUB was stripped of its power and could only watch as their Nova Scotian counterpart placed electrical consumers in Nova Scotia in a preferred position, with access to

Muskrat Falls power at lower cost than those available to ratepayers in NL, while consumers in Newfoundland were held in thrall to an unregulated monopoly, namely Nalcor Energy. Nalcor created a take-or-pay power contract with NLH (its wholly owned subsidiary) to impose upon Newfoundland customers an obligation to take power whatever the cost!

2.9 Cost Escalation and Power Rates

The cost of the project was estimated at \$6.2 billion in November 2010. Table 1 shows the cost increases which have taken place since 2010, in 2012, 2014, 2016 and 2017. The cost has escalated from \$6.2 billion to \$12.7 billion. The undersigned expects it will go to \$15 billion before the project is completed.

Nalcor's latest update was provided on June 23, 2017⁴⁸. It discloses a unit cost of 17.42⁴⁹ cents per kWh. Based upon 4.9 TWh average energy from Muskrat Falls, less line losses of 0.3 TWh, the estimated incremental cost of Muskrat Falls (4.6 TWh⁵⁰ x 17.42 cents per kWh) is \$801 million, less fuel savings. This includes revised cost estimates for operations and maintenance⁵¹ of \$109 million, up from the 2012 estimate of \$35 million, an increase of 211%.

Nalcor has projected that rates will double. Government has announced a rate mitigation plan but it has little credibility, simply robbing Peter to pay Paul. It is highly unlikely that government will pass these increases along to industrial and commercial customers, leaving the residential consumers to bear the brunt. Facing power rates of more than 23.3 cents per kWh their only recourse will be to leave the province or substitute energy alternatives.

3.0 PART 3: THE ISSUES

Having presented the context we now turn to an examination of the issues in contention, those that have impelled the undersigned to take issue with this project. My original concern was one of proportionality, the scale of the project relative to the size of our economy, as well as the failure to examine better solutions. The risks that were identified by the undersigned, and by others, have since been exacerbated. The risk factors which challenged the wisdom of embarking on this project have deteriorated. These include the unrealistic portrayal of lucrative export markets, domestic demand projections, low cost estimates, oil prices, the risk of sensitive clays, methyl mercury and concern that many of the underlying assumptions were fabricated or contrived to mislead the public.

3.1 A Gamble that failed

The sanctioning of the Muskrat Falls project in December of 2012 was a huge mistake, one which has spiralled into a major economic and environmental catastrophe. The warnings of the joint federal provincial panel were ignored, as were those of the Public Utilities Board. These warnings relate to the lack of a business case for the project, the high risk for a small province, the adverse demographic factors, the lack of export markets and the high unit cost.

In a Telegram article dated May 25, 2013 the Honourable John Crosbie said that "Muskrat Falls is worth the risk", quoting T. S. Eliot on the subject of risk: *Only those who would risk going too far can possibly find out how far you can go*. Since then we have sailed on a sea of risk and

⁴⁸ Nalcor, 47.

⁴⁹ Ibid, p. 15.

⁵⁰ Supplied by Nalcor in response to my question.

⁵¹ Nalcor, 47, p. 14.

reaped the whirlwind. The challenge now is to prevent the risks from destabilizing the provincial economy. The risks of operating the project may prove to be just as daunting as those of building it, due to the impact of high power rates. The incidence of these power bills is likely to be placed on those with the least ability to avoid the burden, namely residential customers.

The project was based on speculation that known risks would not turn against the project, risks of escalating costs, declining oil prices and decreasing demand for electricity. Cost estimates were contrived to ensure project sanction, by using unrealistic numbers, cost estimates that were known to be too low. It appears they were deliberately falsified to encourage sanction by government in December 2012 and this has fueled pressure for a full judicial inquiry, including a forensic audit of cost estimates and the estimation process itself.

Nalcor substantially reduced its demand forecast in 2016, indicating that the load forecast used to justify the project was as questionable as the cost estimates. A more cautious approach would have built capacity incrementally rather than incurring the large capital cost of overbuilding, taking the risk that lucrative markets to recover costs could be found for power surplus to domestic needs.

Risk borne by ratepayers

It was a fundamental mistake for the province to embark on this project, one where ratepayers bear all the risk. The “take or pay” power purchase agreement will place most of the burden on residential customers. When sanctioning this project government ignored the huge demographic transformation that is occurring and is projected to accelerate in the future, with more senior citizens, declining working age population and shrinking overall population.

Projections of demand ignored the first law of economics, the law of demand and price elasticity, which rules that people will substitute other alternatives when prices rise. Demand will decline, rather than grow, in the face of surging power rates. Government and Nalcor relentlessly insisted that we “need the power,” failing to recognize the possibility that unaffordable rate increases could very likely result in such a drastic reduction in demand that Muskrat Falls power could end up not being used within the province.

3.2 Power Purchase Agreement (PPA) and Amendments to the Electrical Power Control Act (EPCA)

In order to fulfill the covenants given to the federal government under the loan guarantee agreement the government of NL presented new legislation, which was passed into law just two weeks after the loan guarantee agreement was signed. All of this happened as the legislature was winding up for the Christmas break in 2012. A few days later, on December 17, the sanction agreement was signed by Premier Kathy Dunderdale, just two years after the announcement by her mentor, Premier Danny Williams.

Nalcor’s monopoly position was reinforced by new and anti-competitive legislation in December of 2012. In order to place electrical consumers under the iron grip of Nalcor, through the take-or-pay power purchase agreement, the government of NL amended the Electrical Power Control Act, along with other legislation, on December 13, 2012. The explanatory notes to the Bill describe its intent to:

✓ *expand the scope of the direction that the Lieutenant-Governor in Council may give to the Public Utilities Board as relates to the Muskrat Falls Project;*

✓ *provide to Newfoundland and Labrador Hydro the exclusive right to supply, distribute and sell electrical power or energy to a retailer or an industrial customer in respect of the business or operations of that retailer or industrial customer on the island portion of the province, subject to certain exceptions; and*

✓ *require that a retailer or an industrial customer buy electrical power or energy from Newfoundland and Labrador Hydro in respect of the business or operations of that retailer or industrial customer on the island portion of the province.*

These changes prevent the distribution retailer, Newfoundland Power, from sourcing power from outside the province. They impose the same restriction on industrial enterprises. They restrict independent power producers from building new generating facilities. At the same time the amendments gave the government the authority to issue directives to the PUB on a wide variety of matters, including the rate of return on equity and whether a hearing should be held. These changes represent a further weakening of the powers of the PUB, on top of the exemption of the project from its jurisdiction.

The PPA between NL Hydro, a regulated utility, and its parent company, Nalcor Energy, is most unusual. The NL PUB, along with its sister organizations across North America, monitors the relationship between regulated companies and related companies. The PUB audits the transactions between Newfoundland Power and Fortis and other Fortis subsidiaries to ensure that the ratepayer does not have to pay additional costs than they would have to pay for services procured in a competitive marketplace.

The PPA and its take-or-pay provisions violate the principle of maintaining an arm's length relationship between regulated utilities and related companies. It prevents NL Hydro from securing power at the lowest possible cost to consumers. It also prevents the PUB from discharging its statutory mandate under the EPCA to ensure that facilities are managed and operated in a manner *that would result in power being delivered to consumers in the province at the lowest possible cost consistent with reliable service* (EPCA, s 3). To date, the Liberal government has signalled no intention of reversing the 2012 amendments to the EPCA.

Nalcor plans to export a significant amount of power. Yet its transmission lines will not be open to wheel power through an open access tariff. The Federal Energy Regulatory Commission (FERC) in the US requires (Orders 888 and 889) all public utilities to provide non-discriminatory open transmission access. The 2012 amendments to the EPCA fly in the face of this access. The same legislation which places consumers in the iron grip of Nalcor Energy has the unintended consequence of limiting Nalcor's access to export markets!

3.3 Bargaining Position with Quebec

It was a mistake to believe that Muskrat Falls and the "Anglo-Saxon Route" would strengthen our position with Quebec. The two submarine crossings and the relationship between Nalcor and Emera have not helped us. We became prisoner to Nova Scotia in our quest to finalize a loan guarantee agreement with the federal government, who demanded, in *sotto voce*, an interconnection with the rest of Canada, across the Cabot Strait, as a precondition.

The Maritime Link is sized around Muskrat Falls and offers no redundant capacity to carry either Churchill Falls power, after 2041, or power from any future development at Gull Island, which continues, inexplicably, to be the Crown jewel for ambitious politicians. The unnecessary investment in high cost Muskrat Falls power precludes us from benefiting fully in 2041 from

access to low cost Churchill Falls power, because Muskrat Falls more than satisfies our needs for the medium and long term. For these reasons the logic of building the Muskrat Falls project, crossing two Straits, with the costly transmission line following the “Anglo-Saxon route”, bypassing Quebec, is fatally flawed. We did not need to demonstrate the technical feasibility of the long distance transmission lines with two submarine crossings. The question instead is its economic feasibility and on this score the sad verdict is negative, the route is too costly to be viable under current energy market conditions!

3.4 Nova Scotia

The Term Sheet with Nova Scotia provided for 20% of the power for 20% of the cost. That has gone by the wayside. The original deal has changed and now Nova Scotia is entitled to 44-56% of the energy at a blended energy rate, below the spot market rate and well below the rates that consumers in NL will be paying. To quote Nalcor CEO Stan Marshall⁵², *Nova Scotia will be getting electricity for "next to nothing" when the Muskrat Falls hydroelectric project starts producing energy. Mr. Marshall said that the poor arrangement with Halifax-based Emera Inc. is one of the reasons the \$11.4-billion Muskrat Falls project has proven to be a bad deal for Newfoundland and Labrador. "We only need about one third of (the electricity) on the island (Newfoundland)," Marshall said in an interview with The Canadian Press on Nov 2, 2016.*

"So what do we do with the other two thirds? To get it to market, we gave one third to Nova Scotia for 35 years, for nothing — other than it is in return for building the (Maritime Link). The remaining one third was supposed to be sold into the market at a big profit, but energy prices have collapsed in the northeast, and it will be sold for next to nothing." (CBC Nov 2, 2016)

As well, he said there are plans in the works to reconfigure parts of Nalcor, and he said the corporation will focus on signing more "firm energy" contracts with customers looking for 10- and 20-year commitments.

Marshall was hired to take over the delayed and over-budget project in April after the NL government determined Nalcor, a Crown corporation, had not provided proper oversight.

In June, Marshall agreed when asked if Muskrat Falls had become a "boondoggle," saying the project was based on faulty, high-risk assumptions.⁵³

Reaching a final agreement with Nova Scotia was understood to be vital to the federal loan guarantee, providing the “regional” or interprovincial dimension which would otherwise have been absent. A CBC report dated June 26, 2017 stated that *in five years’ time, power rates are expected to nearly double, to 23.3 cents per kilowatt hour, for customers in Newfoundland. It's worth noting that is a huge jump from the 15.3 cents per kilowatt hour estimate for 2022 when Muskrat Falls was given the green light five years ago.* However it could have been worse. *According to figures provided by Nalcor Energy, the second federal loan guarantee for Muskrat Falls lopped 1.5 cents per kilowatt hour off the projected cost. Without that help from Ottawa, power rates would be pushing towards 25 cents per kilowatt hour in 2022. ... And the coup de*

⁵² Marshall, 29.

⁵³ Marshall, 6.

grâce — Nalcor CEO Stan Marshall's description of the whole endeavour as "a hell of a lot worse ... deal than the Upper Churchill." ⁵⁴

At his first press conference since assuming office, on June 24, 2016, Stan Marshall admitted that the project was a “boondoggle” and that moniker has stuck.

3.5 False Premise

Reliance on Muskrat Falls ignores the fact that most of the demand is located on the Avalon and that we will still need emergency power based at, or close to, Holyrood. It was a huge mistake to think that Holyrood could be shut down and that our emergency power would be supplied from Nova Scotia. We cannot depend on 1450 km of transmission lines, crossing a variety of climatic zones, where icing and high winds will knock out lines and iceberg scouring in the Strait of Belle Island will threaten the submarine cables. We could never choose between Muskrat Falls and Holyrood because Holyrood, or its replacement, will continue to be needed.

The reference question put to the PUB in 2011 posited a choice between two complementary projects, which were never alternatives. This false premise was compounded by precluding the PUB from examining other alternatives, such as wind, solar power, energy efficiency and demand side management. Instead of Muskrat Falls OR Holyrood it should have been Muskrat Falls AND Holyrood vs. some other option.

3.6 The Brinco Model

Muskrat Falls began with an integrated management structure, with SNC Lavalin taking the lead in engineering, procurement, construction and management (EPCM). This changed over time with a downgrading in the role of SNC Lavalin and with Nalcor assuming the lead, relying on SNC Lavalin for engineering design, but with Nalcor officials signing off on procurement, contract awards, change orders and disbursements. This departs from the way Brinco built the Churchill Falls project and Muskrat Falls has suffered from rejection of the Brinco model. Brinco was the investor owned company which developed Churchill Falls. Brinco knew it did not have the expertise to manage the project on its own but Nalcor, sadly, had to learn the hard way.

Brinco knew it needed to bring in outside expertise and retained Acres Canadian Bechtel (ACB) to undertake construction at Churchill Falls, bringing it to completion within budget for \$946 million and ahead of schedule.⁵⁵

The Acres Canadian Bechtel (ACB) consortium acted as agents for CF(L)Co, charged with responsibility for engineering and construction management. The construction organization in the field had ultimate responsibility for contract administration, inspection and construction coordination.

All work on the project was carried out by contractors. More than 180 construction and services contracts were awarded, ranging widely in value, but with a maximum of \$75 million for a single contract.

⁵⁴ Marshall, 30.

⁵⁵ IEEE (Peter Green), 24.

The Astaldi contract for the powerhouse and related civil works began at \$1.1 billion and has risen to \$1.830 billion, without explanation. Brinco and Acres Canadian Bechtel had a limit of \$75 million for any single contract. The limit in Hydro Quebec is \$50 million for a single contract. Smaller contracts allow for more competition. We should at least have pre-qualified the bidders, probably removing Astaldi from consideration, due to its lack of Canadian and northern experience. Instead we opted to maximize the risk.

We have paid a big price for Nalcor's management of this project and failing to follow best practices in procurement and project management. Along the way Astaldi built a canopy or dome for \$120 million but subsequently discarded it as junk. The purpose was to allow the project to continue over the winter months in Labrador. We do not know who bore the cost of this mistake!

3.7 Public Tendering and Cost Plus

The tendering process has been byzantine, anything but transparent, and outside of the public tendering rules followed by the rest of government. Nalcor has never provided convincing evidence that it could not operate through public tendering nor have they explained why they did not place a cap on the value of large contracts, as was done for Churchill Falls. The Astaldi contract was essentially a cost plus contract, despite the statement by Ed Martin at the 2015 Nalcor AGM that it was a "lump sum" project, fixed in terms of the projected amount of concrete to be poured.

This point was confirmed by EY⁵⁶ in their April 2016 report when they said that *the payment mechanism is based on person-hours expended rather than m³ of concrete poured. This mechanism did not capture the potential for poor contract management labour and the consequent decoupling of labour paid from work completed.* It was the NL taxpayer, the owner of Nalcor, who took the risk, and not Astaldi!

3.8 Hydraulics and water management

One of the big advantages of Churchill Falls, apart from the large reservoir, was the "hydraulic head" of 312 metres, compared with 35 metres for Muskrat Falls, 100 metres for Gull Island and 176 metres for Bay D'Espoir. The hydraulic head measures how far the water falls from the reservoir to the tailrace.

Muskrat Falls shares the reservoir with Churchill Falls and that is a major advantage. However the lack of an effective water management agreement with Hydro Quebec makes it quite impossible to achieve the 824 MW of capacity that has been touted. The Quebec Superior Court decision⁵⁷ rendered by Justice Martin Castonguay last August confirms that Nalcor's solution to the problem, which was a water management agreement, approved by the PUB in 2009 but not agreed to by Quebec Hydro, is not practical or realistic. Resolution of this problem requires either a negotiated settlement with Quebec or winning our appeal of the Castonguay decision to the Supreme Court of Canada. The first step in the appeal process has been taken, namely the filing of a notice to appeal with the Quebec Court of Appeal by Churchill Falls (Labrador) Corporation. This water management question remains another unresolved risk.

⁵⁶ EY, 13. EY had been engaged by the previous government and were mandated in December of 2016 to review costs and schedules, without a mandate to consider continuation, termination or suspension of the project. To date they have issued only an Interim report, dated April 8, 2016.

⁵⁷ Quebec Superior Court, 49.

3.9 Empowering the PUB

The PUB was prevented from performing its duty on Muskrat Falls. It is time to strengthen the NL PUB and restore its power to undertake regulatory oversight and protect ratepayers from abuse by monopoly power, in this case from our Crown Corporation, Nalcor Energy. Consider the example set by British Columbia.

The new Premier of British Columbia has sent the Site C project to the BC Utilities Commission for independent review, to recommend whether it should continue, be placed on hold or cancelled completely. The Commission has been asked to provide its advice by November 1, 2017. Construction will continue but no major contract awards will be made during the review period.

The terms of reference call for the Commission to examine other energy options, including demand side management, which could provide similar benefits, at similar or lower energy costs as the Site C project.

The Site C project is similar in scale to Muskrat Falls and was removed from consideration by the provincial PUB, as was the case here. The new government is fearful that Site C will become another Muskrat Falls.

The undersigned has advocated an assessment of both the cost of stopping the Muskrat Falls project and the cost to complete it, through a benefit cost analysis of the options available to government.

The public no longer supports the project. Nalcor has not demonstrated its capacity to finish it and costs continue to escalate. Our government should reconsider the need for a fundamental reassessment, similar to what the BC Commission is now undertaking.

The expected appointment of a new Chair of the PUB is a good time to revitalize the Board and to reinstate its mandate. It is time to ask the PUB to advise on the major decisions confronting government, those that relate to the spiralling costs, including the sensitive clays, the water management agreement and the egregious quality control problems. Many of these problems center on Nalcor's inexperience and its inability to manage this complex project.

Demand forecasts have failed to reflect the expected low or negative population growth. With rates surging beyond our capacity to pay we will all search for less expensive alternatives and the result will be to make Muskrat Falls a useless asset, too expensive to use. Government cannot transfer money from necessary services, hospital, roads, and schools, to pay for Muskrat Falls. Export revenues will offer negligible revenues, too little to mitigate costs. We are facing an additional \$800 million in costs or more, doubling our power bills. This is similar in scale to the impact on households of the oppressive tax increases in the 2016 budget, many of which were rolled back due to public resistance.

The powers of the PUB should be reinstated and Nalcor should become a regulated utility. Government should recruit a new PUB Chair with impeccable qualifications, commensurate with the needs of a quasi-judicial body with effective oversight authority.

The PUB must have authority to:

1. Review the unsustainable prospect of increasing ratepayer billings by \$800 million (with continuous escalation thereafter for 50 years) against a scenario in which consumers will surely

substitute other energy alternatives, leading to an overall reduction in demand and the mothballing of Muskrat Falls as a “stranded” asset.

2. Consider the true economic case for the project given low oil prices and low electricity purchase prices in export markets.

3. Evaluate the reliability of power after interconnection, including the risks posed by the North Spur and other operational risks arising from poor design choice, quality control issues and an ineffective water management agreement.

4. Review the cost of terminating the Muskrat Falls project, either in whole or in part, bearing in mind the unreliability of cost estimates, the risks pointed out in the SNC Lavalin report of April 2013, and the potential for continued cost escalation.

3.10 The SNC Lavalin Report

The Premier recently released a report from SNC Lavalin⁵⁸ dated April 2013 on the risks associated with the project. The previous CEO of Nalcor claims he had not seen this report. This report raised huge questions about the project, including the potential for future cost escalation and the prospect that the North Spur may be incapable of remediation.

Vital equipment is being sourced in China and may be unreliable. The above report said, based on past experience *“quality, performance, warranty service and schedule problems can be anticipated with these Lump Sum turnkey packages (i.e., major claims and delays.”* Quality control is a problem because Nalcor does not have the experience to manage a project of this magnitude.

Commenting on the SNC Lavalin report and its reference to the possible need for “major design changes” Cabot Martin wrote in the Uncle Gnarley blog as follows⁵⁹:

Now “major scope change“ with regard to an admittedly unstable dam component like the North Spur is engineer code for “Your proposed North Spur stabilization design could be unsafe and to make it safe will require as yet unknown and un-costed extra work.”

And also unstated is that geotechnical conditions may be found (like Quick Clay) which will in effect be impossible to cure.

And if you can’t cure that problem, you will have to cancel the whole project because use of the North Spur as a key (nearly 50%) component of the overall dam system is an essential element of the project.

This was the situation at the date of sanction and still is a real and present risk.

To quote Des Sullivan in the Uncle Gnarley⁶⁰ blog, the largest risks are these:

(1) Failure to do adequate geotechnical investigations on the stability of the North Spur, demonstrating a cavalier attitude to project completion, operation and downstream safety.

(2) NO geotechnical investigations in the riverbed under the footprint of the dam and coffer dam; SNC emphasises that adverse conditions could be discovered during construction leading to major rework, cost overruns and delays.

⁵⁸ SNC Lavalin report, 54.

⁵⁹ Cabot Martin, 33.

⁶⁰ Sullivan, 55.

(3) Failure to do supporting engineering on the coffer dam that could lead to catastrophic failure causing injuries/fatalities and loss of equipment.

(4) Restricted pool of major contractors... The project will face multiple problems with the large EPC (engineering, procurement, construction) contractors who would hold the project's budget and schedule hostage...

(5) Gross underestimation of labour requirements (Nalcor was then using 1500 workers when SNC said 2500 were needed); a sure sign of cost low-balling to gain sanction. This, in SNC's eyes, was reflected in the unavailability of sufficient camp accommodations... which could lead to mobilization and start-up delays... resulting in claims and ultimately project schedule delays.

(6) A significant portion of the local labour market was working in Western Canada... workers are inexperienced... Unavailability of... manpower may lead to schedule delays and extra labour costs, as well as impacting on the quality of the work.

(7) Due to the heated market conditions in the transmission lines market (currently the case in Alberta; LCP Is dealing with the same bidders) and the size of the construction packages, fewer bids could be submitted and at higher than budgeted cost. Also, very few of these major contractors will be able to perform these large packages in the proposed time frame.

(8) Major components, such as turbines and gates, will be procured and manufactured in China. Based on SLI (system logistics integration) and past experiences, quality, performance, warranty, service and schedule problems can be anticipated...

(9) Powerhouse and spillway concrete works are planned on a three year duration (two winter seasons) with a very tight and aggressive schedule... which might result In additional delays... and costs.

(10) As the start-up of the spillway, river closure and river diversion are to be fulfilled during an "ice-free" window. There is no float in the schedule with the preceding activities... any delay in these previous activities may trigger missing the diversion window... in the project schedule. This actually happened, with river diversion in October 2016 missing the May 2015 target by 18 months.

(11) Large EPC (Turn-Key) bid packages were being sent to a restricted pool of specialized DC (Direct Current) manufacturing firms not used to performing all-inclusive Turn Key work... added risks will most likely result in higher than estimated Bid Budget costs.

The Report adds: "SNC-Lavalin, as the Project's E.P.C.M., has the legal obligation to advise its client of any risks that will cause prejudice to the project and which deviates significantly from its budget and schedule. Our concern is we foresee that the project will incur more than a 30% cost overrun if the project does not take action on the risk elements raised in the Risk Assessment Report. The actual project structure is contributing to this increasing risk factor. Client has limited experience in huge civil work and earth-filled dam work, power line and power station works."

We continue to dig a hole for the province as we pour money into this money pit. The surging rates will knock electricity demand back to the point where no demand for Muskrat Falls power will exist. Export markets will return only two cents per KWH, making a negligible contribution to rate mitigation.

The incremental costs will be around \$800 million annually and rising. Between \$120 and \$200 million of Bunker C might be displaced but the economics of replacing \$200 million of oil with \$800 million in capital costs defies economic logic. As noted earlier, the \$800 million is the same order of magnitude as the tax increases and other revenue measures introduced in the 2016 budget, many of which were rolled back because of public resistance. This is likely to become a big white elephant, one we cannot afford to operate, as consumer resistance to high rates stifles demand.

3.11 Transparency and Oversight

The promise “to open the books” on Muskrat Falls made by the new Liberal government of December 2016 has not materialized. The new government quickly announced a review of cost and schedules but EY⁶¹ produced only an interim report. The Muskrat Falls Oversight Committee has failed to produce the quarterly reports which were issued prior to the election, attempting to fill the void by posting a series of abbreviated monthly reports. The Oversight Committee was too close to government (and to Nalcor) to be effective, being solely comprised, until recently, of government officials.

The so called “Independent Engineer” (Montgomery, Watson and Harza, MWH) was taken over more than a year ago by Stantec, a big Nalcor contractor, without remedial action to correct the conflict of interest. These oversight bodies were far too reliant on data supplied by Nalcor, without critical testing. The PUB remains neutered while Nalcor continues as an unregulated government-owned utility, with unusual powers (e.g., exempt from public tendering) exceeding those of other crown corporations.

There are serious concerns with the implementation of the recommendations of the joint panel for which the provincial department of Municipal Affairs and Environment is responsible for providing environmental oversight. My recent correspondence with the Department discloses a lot of questions as to whether the oversight mechanisms are working. For example there is a requirement for Nalcor to prepare an annual report on its compliance with undertakings it has made but no such reports are available.

The joint panel report⁶² recommended (recommendation 15.5) an independent Monitoring and Community Liaison Committee with a community based nominating process for selection of members and an independent chair to function during construction and for 10 years thereafter, together with (recommendation 15.8) an effective Complaints Resolution Mechanism, which included, among other things, third-party adjudication in the event that complaints cannot be otherwise resolved to the satisfaction of both Nalcor and the complainant. In principle these mechanisms should be effective if they are truly independent of Nalcor. In practice they have not worked well.

Due to the lack of progress in dealing with the methylmercury problem there was a site shutdown which occurred on October 26, 2016 and this led to an emergency meeting of indigenous leaders with the Premier. The outcome was the creation of an Independent Expert Advisory Committee (IEAC) whose mandate “Is to recommend options for mitigating human health concerns related to methylmercury through the Muskrat Falls reservoir, as well as in the Lake Melville

⁶¹ EY, 12.

⁶² Joint panel report, 26, pp. 259-261.

ecosystem.” This was described by the Department as part of “adaptive management and adjustments as a standard component of project management within the Provincial Government”.

The fact of the matter is that the Committee Chair has only recently been appointed, nine months after the impasse and the “pressure cooker” meeting with the Premier. This IEAC is too little and too late but it only happened when the work site was closed down and government was placed under enormous pressure. This is not by any stretch of the imagination “adaptive management”. It is the reaction of a timid government to people who are compelled to take drastic action in order to secure any attention. Four protestors were recently incarcerated in St. John’s at a correctional facility to impress upon local people that their protests will be dealt with harshly. A large contingent of RCMP officers was recently pressed into service to protect transformers which were being transported from Cartwright, on the coast of Labrador, to the Muskrat Falls site. The transformers were moved without incident from Bay Bulls (near St. John’s) to the project site.

3.12 Sensitive Clays at the North Spur

Cabot Martin has performed a remarkable service in bringing the issue of sensitive clays to the attention of the public. This matter is covered in detail in his book *Muskrat Madness*⁶³, which provides a history and analysis of the entire Muskrat Falls project, and on his website⁶⁴. His description of the North Spur and its sensitive clays is as follows:

On the north side of the Rock Knoll is the now infamous 1 km long 50 m high North Spur an unstable mound of glaciomarine clay and sand scarred with numerous landslides. It is close to 300 m wide at the base but is now reduced in places by landslide activity to a mere 70 metres at the top.

*The concrete dams on the south side of the Rock Knoll together with the North Spur are to form a single reservoir containment system. The freeboard on the North Spur when the reservoir is full would be ~5m to 10m.*⁶⁵

*...At Muskrat, the Spur and whole hillside for 3km upslope is inherently unstable. The clay members are deteriorating chemically and physically. The soil mass is evolving from its present degree of instability to a higher state of instability. It has been doing this for some 15,000 or so years ever since the post glacial uplift put them upslope where their inherently weak salt leached matrix will make them unable eventually to resist sliding.*⁶⁶

Nalcor has implemented a number of remedial measures to stabilize the area, including control of the groundwater in the North Spur, erosion protection, building of cement cut-off walls, and improved drainage and relief wells in the lower aquifer. These measures were recommended by engineering consultants. Their safety now needs to be assessed by independent geo-technical experts. Without such assessment the risk of a slide is too high.⁶⁷

The April 2013 risk report from SNC Lavalin confirmed the high risks, risks which should have been mitigated in advance of sanction. We now know that this report did not get the attention it

⁶³ Cabot Martin, 31.

⁶⁴ Cabot Martin, 32.

⁶⁵ Cabot Martin, 31, p. 16.

⁶⁶ Ibid. p. 18.

⁶⁷ SNC Lavalin, 54.

merited. One of the high risk areas identified was the North Spur and the potential for sensitive clays to liquefy, due to water pressure, when the dam is impounded.

Sadly the PUB missed an opportunity to deal with this issue as part of its hearing into supply issues and reliability of power. This hearing began with DarkNL (a significant period of power outages experienced around New Year 2014) and is continuing. The PUB accepted Nalcor's argument that consideration by the PUB of the risks of the North Spur and of the ineffective water management agreement was outside the scope of the hearing. Nalcor also contended it would have defied the Exemption Order which prevented the Board from exercising its normal regulatory authority over the Muskrat Falls project. The PUB allowed the filing of evidence relating to the reliability of the transmission line but disallowed evidence concerning the generation project itself, including the North Spur and water management. These inexplicable decisions of the Board left these two issues, bearing enormous risk to the system's reliability, unresolved.

The North Spur continues to be a major problem with Nalcor and government failing to take the necessary step of appointing an independent panel of geo-technical experts to review the science, as well as the remedial action by Nalcor, and to advise on the safety of this natural dam, underlain by sensitive glacio-marine clays. The recently disclosed and disturbing SNC Lavalin risk assessment report of April 2013⁶⁸ refers to the need for further geo-scientific information to guide remedial measures and assess overall safety and stability. SNC Lavalin rated the risk as "very high." Whether Nalcor has successfully remediated these risks over the period from April 2013 to the present is as yet unknown. It will take the work of an independent expert panel to measure whether risks have been reduced or indeed whether they can be mitigated or eliminated.

Risk assessment using the "limit equilibrium" model, upon which Nalcor and its consultants rely, concludes that the glacial clays at the North Spur do not impose a high risk of failure to people living and working in the region. However, Dr. Stig Bernander, an eminent geo-technical scientist, advised that the methodology used to evaluate the safety and stability of the North Spur is not valid because the soil conditions at Muskrat Falls do not fit within the assumptions necessary for applying limit equilibrium analysis. Dr. Bernander was invited to visit the province several years ago to present his assessment of the safety of the North Spur.

Robin Dury⁶⁹, in his recent Master's Thesis at the Lulea University of Technology, has applied the more modern dynamic modelling that Dr. Bernander considers necessary to evaluate the North Spur. He concludes that the rise in the water level from 17 m to 39 m may trigger a landslide and that the "North Spur does not form a safe and reliable part of the impoundment wall."⁷⁰ This confirms Dr. Bernander's conclusion that further study, including field investigations, are needed to ensure that the Muskrat Falls project can rely upon the safety and stability of the North Spur. The critical load bearing capacity of the natural dam will not be able to stand up to the pressure, which could exceed twice its capacity to withstand the pressure, which means the North Spur could fail when the reservoir is filled, based on Dury's research.

An article written by his thesis supervisors, Dr. Lennart Elfgren and Dr. Stig Bernander⁷¹, adds credence to the argument that the remediation at the North Spur must be reviewed by a panel of

⁶⁸ Ibid.

⁶⁹ Robin Dury, 11.

⁷⁰ Ibid, p 44.

⁷¹ Bernander and Elfgren, 2.

eminent geo-scientists. It is a measure of confidence in the work of their graduate student that both of these geo-technical experts have come forward and offered their research to Nalcor's engineers as well as to critics of the project.

The risk of failure cannot be dismissed on the basis of the research undertaken to date, which must be updated, using the most modern models, applying tools which take full account of soil porosity and allow for realistic assumptions on "soil deformation behaviour". Unless this more modern and advanced approach is applied to model the dynamic properties of sensitive soils under stress we cannot claim that the North Spur is safe.

We have to entertain the possibility that the natural dam is not safe and cannot be remediated. This would be the worst case and most unthinkable scenario, requiring that the province write off its full investment at the generation site. In this context it is important that the research be updated as soon as possible. If remediation is not possible then the project should be terminated.

A project that has such a pervasive influence has to achieve a certain level of community acceptability and this is particularly true of Muskrat Falls, whose negative impacts bear so heavily, and perhaps unfairly, upon the residents of the adjacent region. Social license is the notion that such a project must achieve a level of community acceptance and maintain that acceptance and support during the construction and operations phases.

This concept has been missing from the relationship between government and community organizations. The failure to achieve meaningful progress on the new governance model negotiated in the early hours of October 26, 2016 for remediating the impact of methylmercury from the Muskrat Falls project is evidence of this problem. The lack of a response to a Petition signed on the North Spur by over 1000 people and presented by Labrador Land Protectors and the Grand River Keeper of Labrador, on May 9, 2017, is also disappointing. The Petition calls for government to appoint an expert panel on the North Spur.

3.13 Provincial Fiscal Situation

Our fiscal situation is desperate, more precarious than that of Puerto Rico, which is now under a federal board of supervision. Nova Scotia is running a surplus, without the high oil royalties we continue to enjoy. Our public sector is far too large, as shown by a recent AIMS report.

3.14 Forum for Debate

The House of Assembly has not been seized with the problems. No emergency sessions have been convened to avert a growing crisis. Oversight mechanisms are mostly inactive. Minimal information has been released by the new Board and Nalcor's CEO. No explanation has been given for the burgeoning cost of the Astaldi contract or whether the flaws in the original contract have been corrected. Citizens are left in the dark and this is not acceptable.

The latest monthly report shows that in May of 2017 expenditures were \$154 million dollars. At \$500,000 per person year this project cannot be rationalized as a make work project nor can it be explained as part of a rational energy strategy or economic development plan. It is simply a fiasco and one which poses an existential threat to the people of the province.

Is it normal for a society in crisis to be so blasé about its future? Are our institutions serving us well, including the provincial and federal governments, Nalcor Energy, Newfoundland Power and the PUB? Memorial University appears to be punching well below its weight in failing to encourage public engagement on this issue and the fundamental economic and fiscal crisis of

which the Muskrat Falls fiasco is a part? Has the media performed its role in making this evolving fiasco more transparent to our citizens? Why are citizens so fearful about speaking out on a project which will double the province's public debt and inflict penury upon future generations?

Public Inquiry Needed

A public inquiry is needed to determine why we now find ourselves in this position. The CBC Morning Show⁷² confirmed the allegation, first disclosed by blogger Des Sullivan⁷³, that cost estimates were falsified in order to secure project sanction. This demands a forensic audit which should be conducted as part of a full judicial inquiry into this project. In response to a media question the CEO Stan Marshall⁷⁴ confirmed that the project has become a "boondoggle."

This word does not come close to describing the depths of this fiasco, the fraudulent behaviour and the hubris which inspired this project and which will be a large burden for future generations. This inquiry should be undertaken immediately and should begin with the Energy Plan of 2007⁷⁵ which was the basis for the creation of a crown corporation, Nalcor Energy, which was placed beyond the reach of normal oversight bodies and allowed to operate outside of the public tendering rules that apply to other government organizations.

3.15 Lower Churchill Development Corporation

Is there a further role for the federal government? We could not have sanctioned the project without the loan guarantee of \$5 billion, which has now been increased to \$7.9 billion. Should we commend or condemn the federal government for its role in enabling us to embark upon this risky undertaking? The loan guarantee agreement was designed to ensure that the ultimate responsibility and financial risk was deflected back to provincial ratepayers, minimizing the risk to the federal government. The province is obliged under the 2012 agreement⁷⁶ to ensure that after the project is completed "*the regulated rates for Newfoundland and Labrador Hydro ("NLH") will allow it to collect sufficient revenue in each year to enable NLH to recover*" costs incurred. The province is also required to ensure that funds are provided to finish the project, known as a "completion guarantee."⁷⁷

Ultimately the risks came back to the NL ratepayers. Should we now ask the federal government to reactivate the inactive Lower Churchill Development Corporation (LCDC) and to share in the financial risks of both construction and operation? It is clear that the federal government will be called upon to take a larger role, beyond simply raising the cap on the loan guarantee. It is also questionable that we as a province are going to be able to operate the facilities on our own and to bear the full cost burden.

Will a renewed federal provincial corporation, bearing 49% of the risks, be the best vehicle to finish the project and to operate the facilities once completed? Or will we take the far greater risk of going to Quebec for a comprehensive agreement which will enable us to complete the Muskrat Falls project, as part of a package involving water management, Gull Island and

⁷² CBC, 5.

⁷³ Uncle Gnarley, 55.

⁷⁴ Marshall, 6.

⁷⁵ See Government of NL for Energy Plan, 19.

⁷⁶ 2012 loan guarantee agreement, 18.

⁷⁷ This comment is based on the 2012 Loan Guarantee Agreement. The new agreement has not been released.

extension of the Churchill Falls contract beyond 2041? This might offer short term gain but a mountain of long term pain if government makes major concessions in order to seek an escape from the slough of despair into which the province has fallen. If government is embarking upon negotiations with Quebec and considering any concessions on the Churchill Falls contract it should seek a mandate for such renegotiation and create a mechanism whereby the goals to be achieved are established by engaging the public.

4.0 RECOMMENDATIONS TO GOVERNMENT OF NL

The undersigned has advanced a number of recommendations to the provincial government. These recommendations include the following:

1. Government should restore regulatory oversight to the electricity sector and make Nalcor a regulated utility, along with NLH. The powers of the PUB should be restored. Government should ask the PUB to:
 - a. Review the unsustainable prospect of increasing ratepayer billings by \$800 million (with continuous escalation thereafter for 50 years) against a scenario in which consumers will surely substitute other energy alternatives, leading to an overall reduction in demand and mothballing Muskrat Falls as a “stranded” asset.
 - b. Consider the true economic case for the project, given low oil prices and low electricity purchase prices in export markets.
 - c. Evaluate the reliability of power after interconnection, including the risks posed by the North Spur and other operational risks arising from poor design choice, quality control issues and an ineffective water management agreement.
 - d. Review the cost of terminating the Muskrat Falls project, either in whole or in part, bearing in mind the unreliability of cost estimates, the risks pointed out in the SNC Lavalin report of April 2013 and the potential for continued cost escalation.
2. Appoint a public inquiry with the power to undertake a forensic audit and to review all major decisions relating to the sanctioning and execution of the Muskrat Falls project.
3. Consider creation of a joint federal provincial corporation to complete the project with equity shared between the federal and provincial governments on a 49/51 basis, along the lines of the Lower Churchill Development Corporation.
4. Appoint a review panel of eminent geo-technical experts to investigate the North Spur and the remedial measures that have been taken by Nalcor to ensure the design is safe.

5.0 CONCLUSIONS

My original concern was one of proportionality, the scale of the project relative to the size of our economy, as well as the failure to examine better solutions. Based on the current cost estimate of \$12.7 billion (certain to be exceeded) and our 2016 population of 527 thousand, the cost for every man, woman and child will be \$24,000. For a family of four this represents a mortgage of \$100,000, on top of the existing \$100,000 + mortgage which results from our net public debt as of March 31, 2017. The risks that were identified by the undersigned, and by others, have been exacerbated over the past six years, since I wrote my first article on the project for Action Canada, in August 2011.

The factors which challenged the wisdom of embarking on this project have deteriorated. These include the unrealistic portrayal of lucrative export markets, domestic demand projections, low cost estimates, oil prices, the risk of sensitive clays, methyl mercury and concern that many of the underlying assumptions were fabricated or contrived to mislead the public.

For British Columbia the Site C project represents a far smaller threat to a much larger and more resilient economy, at a cost per person of \$1800 vs \$24,000 for NL. For Newfoundland and Labrador the impact could be quite dramatic, invoking memories of the Commission of Government which was appointed in 1934 in order to avert bankruptcy and the collapse of what was then a full-fledged country.

The most disconcerting aspect of this existential crisis is the lack of public engagement and the failure of our institutions to respond. The solution has to come through increased awareness of the magnitude of the impact on our viability as a society.

Would the public have engaged if there had been a referendum on the Muskrat Falls project and if the stakes had been made public? One thing is clear and that is the importance of transparent processes in a democratic society. The byzantine structure of the power purchase agreement, the departure from normal cost accounting and the shifting of costs to future generations, combined with a multitude of lengthy legal documents all conspire to keep the public at bay and in disengagement mode.

If there is a lesson to be learned it is the need to allow due process when major public policy decisions are made. Governments should be cautious about curtailing public debate. Powerful crown corporations should be accountable and transparent. In the case of Nalcor, its behaviour has been less open and transparent than investor owned corporations who must make disclosures to their shareholders, disclosing information which Nalcor has been free to keep to itself, under the guise of protecting “commercially sensitive” information.

Crown corporations present challenges for oversight bodies such as the PUB when government anoints them with politically tuned missions and is prepared to weaken institutional safeguards that were intended to protect the public. In Nova Scotia the UARB has been free to challenge Emera Energy, in stark contrast to the PUB in NL, which has been forbidden to carry out its normal statutory duties.

Perhaps NL can learn from the BC experience and from the outcome of the expedited path on which the BCUC has embarked.

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PRESS RELEASE ON SUBMISSION BY DAVID A. VARDY AND CONTACT INFORMATION

Press Release on Submission to BCUC by David Vardy comparing Muskrat Falls in NL with Site C Project in BC

Today David Vardy forwarded a submission to the British Columbia Utilities Commission relating to their inquiry into Site C. This inquiry was initiated by the new Horgan government and is directed towards the determination of the costs of continuing, suspending or terminating the project. In his submission Vardy compares Muskrat Falls with Site C and notes many similarities and some differences. Table 1 compares the capital costs.

In both provinces there were joint federal provincial environmental reports. In each case the joint panel recommended further detailed financial and economic analysis to confirm the wisdom of proceeding, recognizing that no strong business case had been presented for either Site C or Muskrat Falls. Both provincial governments proceeded with little deference to the advice from the joint environmental panels.

In a Telegram article dated May 25, 2013 the Honourable John Crosbie⁷⁸ said that “Muskrat Falls is worth the risk”, quoting T. S. Eliot on the subject of risk: *Only those who would risk going too far can possibly find out how far you can go*. Since then we have sailed on a sea of risk and reaped the whirlwind. In Newfoundland and Labrador (NL) the challenge now is to prevent the risks from destabilizing the provincial economy. The risks of operating the project may prove to be just as daunting as those of building it, due to the impact of high power rates. The incidence of these power bills is likely to be placed on those with the least ability to avoid the burden, namely residential customers, whose only recourse will be to leave the province.

Also included in the risk of Muskrat Falls is the risk of landslides and earth movements in a one metre long hill known as the North Spur which is a natural dam which encloses the new run-of-the-river reservoir. This summer a graduate student released a thesis which concludes that that the rise in the water level from 17 m to 39 m may trigger a landslide and that the “North Spur does not form a safe and reliable part of the impoundment wall.” Both projects have an impact on the population living close to the generation sites and impose environmental risks that need to be mitigated. The risk of dam breach is common to both projects, along with methylmercury contamination. These risks to human safety must be given absolute priority in reviewing the implications of the options at issue in the BCUC inquiry.

People living close to the Muskrat Falls site have insisted on the need for an expert geo-technical panel to confirm the safety of the natural dam, which is underlain by sensitive clays which threaten to liquefy, placing residents and workers at risk, along with the capital investment. The government of NL has accepted Nalcor’s assurance that the dam is safe. The NL experience

⁷⁸ John Crosbie, 11.

suggests that stronger environmental oversight is needed, along with mechanisms for monitoring and community liaison and for complaint resolution, independent of the project proponent.

Both projects were exempted from the jurisdiction of their respective public utility board, preventing the utility boards from fulfilling their mandates to protect ratepayers by making decisions based on detailed assessments of alternatives.

Both projects are being financed in unorthodox ways. Both impose costs on future generations, drawing upon 50-70 year time horizons for repayment. Not only is the financial structure for Muskrat Falls complex but it violates fundamental principles relating to the need for arm's length relationships between a regulated utility and related companies (including the parent company). The take-or-pay power purchase agreement (PPA) between NL Hydro and its parent company, Nalcor Energy, is the pivot around which the deal is contrived.

The contract is a Power Purchase Agreement which commits NL Hydro, a regulated utility, to buy Muskrat Falls power from Nalcor Energy, its parent company, and prevents NL Hydro from purchasing lower cost energy in the market. NL Hydro is compelled by extraordinary provincial legislation enacted in 2012, pursuant to the federal loan guarantee agreement, to purchase power only from Nalcor.

In both cases the proponents are crown corporations which were mandated to build megaprojects embraced as legacy projects by their political masters. Both provincial governments have given their energy corporations a broad mandate but fettered their public utility boards by limiting their powers.

While the projects are similar in terms of energy, capacity and cost they are different in terms of the scale of the burden they will impose on each province. The population of British Columbia is nine times that of Newfoundland and Labrador and is projected to increase by one million over the next 20 years, while NL will experience a decline in population. The cost of Site C represents just 3.7% of the Gross Domestic Product of BC compared with 42% for Muskrat Falls and NL. The scale of Muskrat Falls, relative to the size of the province's fiscal capacity and population base, is a major concern. The per capita net debt in NL is \$26,883, compared with \$8,429 in BC. (RBC)

The Liberal government of NL inherited the Muskrat Falls project from their Progressive Conservative predecessors. The project was announced by Premier Danny Williams in 2010 and sanctioned by Premier Kathy Dunderdale in 2012. The Liberal government of Premier Dwight Ball, which took office in December 2016, has resisted calls for an investigation into the merits of stopping or suspending the project. Prior to sanctioning of the Muskrat Falls project the Dunderdale government presented a reference question to the NL PUB, a more limited question than has now been given to the BCUC, one which strictly limits the alternatives under consideration. The PUB concluded in its report to the government of Premier Dunderdale that the cost estimates and other supporting projections were too imprecise for them to offer an informed opinion, having asked for additional time to review revised and updated cost estimates, based on more detailed design work. This request was refused.

In NL there has been a call for a public inquiry into the escalating costs of Muskrat Falls and for a forensic audit to review allegations that cost estimates were falsified deliberately in order to secure project sanction. Government's response has been that any public inquiry should wait until the project is completed, a position rejected by most critics.

There has been a public debate about Muskrat Falls but many knowledgeable people have refused to engage openly in the dialogue. In a province where government plays a large role there has been a “fear factor” as people have been reticent to speak out for fear of retribution by government and by Nalcor, which can take many forms. Some people are concerned that the careers of their children may be jeopardized. In a community where Nalcor employs many engineers and engineering companies there is a concern about being blacklisted. I suspect this is not as big an issue in BC.

My submission provides a comparison of the two projects, along with a more comprehensive overview and analysis of the Muskrat Falls project. In my executive summary I offer the BCUC a list of 14 recommendations, of which the top six are as follows, beginning with human safety as an overriding priority.

15. The BCUC must be guided by the policy objective of ensuring a reliable supply of power at the lowest cost possible. Yet they must also keep in mind an even higher social goal, which is to ensure the safety of those affected by the project, both those working at the site and those living in its vicinity. People living close to Muskrat Falls have become convinced that the project poses a danger to themselves and to their way of life. They are concerned that the North Spur may collapse and cause a dam breach that may threaten their lives and they are concerned that their country food will be poisoned by methylmercury.

They have learnt a great deal more about these dangers and they have received no reassurance from government or Nalcor to allay their fears. They are not satisfied that the environmental oversight mechanisms are sufficiently independent of the proponent and they are disappointed that the independent oversight mechanisms recommended by the joint panel have been compromised. They have learnt that the only way to make their voices heard is to protest and occupy the site and they have been arrested and incarcerated because of such protest.

On May 9th, 2017 a petition to government signed by over 1,000 people was presented asking that a panel of geotechnical experts be appointed to review the North Spur remediation work to ensure that the dam will be safe but no response has been received.

My first recommendation is that the BCUC recognize that where human safety is at issue the precautionary principle must be followed, giving deference to those who are at risk. This means that people must have an independent authority to whom they can go to seek solutions, whether the problems be risk of dam failure or poison in their food.

16. Beware the lure of jobs and the lobbying efforts of contractors and consultants to keep the project going! The terms of reference for the Site C inquiry include the words “advise on the implications” of continuing, suspending or terminating the project. The BCUC should focus on supplying reliable energy safely, at least cost, and not on the economic development or employment “implications” of the project. Project proponents emphasize the number of jobs created without disclosing the fact that the cost per job is very high, the leakages from the local economy enormous and the jobs are short term.
17. In order to avoid nasty surprises it is best to avoid committing to a project unless a high level of engineering design has been done to anticipate problems and to build a high level of confidence in cost estimates. In the building of Muskrat Falls a lot of engineering work was left to be done after the project was sanctioned. The level of engineering design

completed was not sufficient to provide reliable estimates prior to consideration by the NL PUB and in advance of sanction.

18. Do not overbuild the system. Build accordingly to your need and ensure that the system is as adaptable as possible. This is particularly important in an era of rapid technological change. For NL, Muskrat Falls was far too large for our needs and far too expensive.
19. Financing mechanisms should be as transparent as possible. In NL the financial arrangements surrounding Muskrat Falls are so byzantine that they are difficult to comprehend.
20. Seek input from all parties and prompt reticent stakeholders to participate, even if they fail to register or file evidence. In the case of the 2011-12 PUB hearing in NL one of the major players remained silent, namely Newfoundland Power (NP), a Fortis subsidiary, which is a regulated, investor owned utility with a mandate for the distribution of power to most of the Island's population. Their failure to participate denied the investigation access to a vast reservoir of expertise. NP manages the interface with the customers who consume power from Nalcor's subsidiary, NL Hydro, a regulated company which generates most of the power and operates the high voltage transmission system. This interface places them in a good position to advise on growth in consumer demand for electricity.

David Vardy is an economist who served for 30 years in a number of executive positions including Chair and CEO of the Public Utilities Board of Newfoundland and Labrador. He can be reached at 709-753-6659 (home), 709-689-3339 (cell) and at david.vardy01@bellaliant.net.

	Site C	Muskrat Falls
2010	6.6	6.2
2011	7.9	
2012		7.4
2013		
2014	8.5	8.3
2015		
2016	8.8	11.4
December 2016		11.7
2017		12.7

