

[REDACTED]
[REDACTED] Newfoundland and Labrador

Commissioner Richard Leblanc
Commission of Inquiry Respecting the Muskrat Falls Project

Dear Justice Leblanc,

Please accept the following submission regarding the terms of reference for the Muskrat Falls Inquiry. I apologize for not meeting the February 15th submission date as I was unable to complete due to work commitments.

A General Commentary

Under any objective assessment it is clear that the Muskrat Falls Project will have a detrimental impact on our tiny province, and future generations of Newfoundlanders and Labradoreans. From the doubling of our public debt, to ensuring we have the highest electrical rates in Canada for the next 60 years, this project will accomplish the exact opposite of what was originally sold to the people of the province. In the absence of any meaningful recovery in energy prices, I have a deep concern that our province will not survive the burden it will impose on our economy. It will be especially punitive on the weakest members of our society who will simply be unable to adjust to even the mitigated rates, and lack the means to convert to alternative methods of heating their homes.

Considering the substantial and sustaining negative impact this project will have on the Province I do believe that a Commission of Inquiry is an absolute requirement. This Inquiry must be well funded, and have a terms of reference which is both substantive and meaningful. The Inquiry should provide the public the opportunity to understand elements of the project which have been previously shielded from them. Most importantly the Inquiry should as its primary objective determine if Nalcor and the Government of Newfoundland and Labrador acted in the best interest of both rate payers and tax payers in sanctioning the project.

The Provincial Government, Nalcor and Newfoundland and Labrador Hydro (as a separate legal entity from Nalcor) each had a specific responsibility to ensure that due diligence was performed prior to the sanctioning of the project. Their respective responsibilities were not always clear, and often overlapped. This was especially true in 2012 when the Provincial Government publically assumed a lead role in validating the business case for Muskrat Falls¹.

¹ There is perhaps no better example of the Provincial Government role as proponent, than the obligation to review the "Lowest Cost Option" for supplying power to the island. This responsibility initially sat with Nalcor, and was partially completed within the initial submission to the PUB (Ref. 1). However, following the PUB indecision on the project the Provincial Government, and not Nalcor, directly (i) retained ZIFF energy to evaluate Natural Gas (Ref. 2), (ii) prepared a report entitled "Electrical Demand Forecast: Do We Need the Power" (Ref. 3), and (iii) completed the Economic Impact Analysis of Iron Order Mining in Labrador (Ref. 4). The role of Government as project proponent is well documented, and was well understood by stakeholders prior to Sanctioning.

It is the opinion of the undersigned that the relationship between Nalcor and the Provincial Government should be a key aspect which is studied within the Inquiry into the Muskrat Falls Project. As a co-signer of the agreements, and a clear proponent of the project, the role of the Government of Newfoundland and Labrador in the sanctioning and execution of the project cannot be excluded from any meaningful terms of reference.

Based on this conclusion, I write to you today to express my concern regarding the terms of reference prepared for the Muskrat Falls Inquiry (Ref. 5). Specifically, that Article 4 does not include the role of Government itself in leading to the sanctioning of the project, and the responsibility which Government, and the Legislature, had in completing due diligence prior to undertaking the largest commitment of public funds in our history.

Therefore, I recommend that specific elements of Article 4 should be broadly interpreted to include the role of Government in addition to Nalcor. I believe that this expansion of the terms of reference is both contemplated and consistent within the considerations set forth in Articles 5d and 5e; as the Government of NL was the final and absolute steward of “public accountability”, and “interests of taxpayers” as it related to the ultimate funding and approval of the Muskrat Falls project.

B Specific Issues For Consideration

Although Article 4 of the terms of reference is detailed in terms of the scope I believe there are specific issues which should be investigated by the Commission of Inquiry. The investigation of these issues would assist in achieving the broad goals of the Inquiry; namely did Nalcor and the Government of Newfoundland and Labrador consistently act in a manner best representing the interest of ratepayers and taxpayers of the Province. It is important to investigate the issues below to understand the process which started with the decision to proceed with Muskrat Falls first (in June 2010), leading to the sanctioning of the project in 2012, and continuing during the early phases of the project when substantial issues were identified.

Issue 1: Response of Nalcor and Provincial Government to CEAA JRP

The joint Federal-Provincial environmental assessment panel released their final report on the Lower Churchill Project in August 2011. This report was very damning of Nalcor’s view of the options, and in establishing the entire business rational for the project (Ref. 6):

Because of this, the Panel concluded that Nalcor had not demonstrated the justification of the Project as a whole in energy and economic terms, and that there are outstanding questions related to both Muskrat Falls and Gull Island regarding their ability to deliver the projected long-term financial benefits to the Province, even if other sanctioning requirements were met. The Panel therefore recommended that the Government of Newfoundland and Labrador carry out separate formal financial reviews before sanctioning either Muskrat Falls or Gull Island to confirm whether the component being considered for sanction would in fact deliver the projected long-term financial benefits.

However, the Panel concluded that Nalcor's analysis, showing Muskrat Falls to be the best and least-cost way to meet domestic demand requirements, was inadequate and recommended a new, independent analysis based on economic, energy and environmental considerations. The analysis would address domestic demand projections, conservation and demand management, alternate on-island energy sources, the role of power from Churchill Falls, Nalcor's cost estimates and assumptions with respect to its no-Project thermal option, the possible use of offshore gas as a fuel for the Holyrood thermal generating facility, cash flow projections for Muskrat Falls, and the implications for the province's ratepayers and regulatory systems.

The Joint Review Panel (JRP) was the only truly independent review of the Muskrat Falls Project, which completed a holistic assessment regarding the need for the project. The directness of the language within the recommendations should have caused concern for Nalcor, the Provincial, and Federal Governments. Hindsight has shown the joint review panel to be the proverbial canary in the coal mine.

In the opinion of the undersigned the Inquiry should investigate the actions and response taken by all parties in response to recommendations 4.1, 4.2 and 4.3 from the Joint Review Panel. If there was proper and due consideration for the recommendations set forth by the JRP, Muskrat Falls may not have been sanctioned. As such I believe it is essential that the inquiry investigate the response from both Nalcor and the Provincial Government (and Cabinet) to the JRP panel in August 2011, and the series of events which lead to the commissioning of the Navigant Report [Ref. 7], and the PUB review in 2011.

I believe this activity should be included as part of the activity associated with Article 4a of the Terms of reference.

Issue 2: PUB Terms of Reference and Review Process

In July 2011 the Government of Newfoundland provided the Public Utilities Board the terms of reference for the Muskrat Falls Review [Ref. 8]. The terms of reference for the PUB review was curious, for several reasons. First, the limitation of only 2 options was a serious shortcoming which appears to have contravened the lowest cost obligation of earlier versions of the Electrical Power Control Act [Article 3b - Ref. 9]. Secondly, by omitting the Maritime Link, the PUB was prevented from reviewing the project as was agreed and implemented [Ref. 10]. It can be argued that this omission limited the PUB and the public the opportunity to review several critical aspects of the project such as reliability, energy supply, and the risk profile shared with Emera (which history has shown to be heavily skewed towards the NL ratepayer).

This narrow terms of reference shielded the public from being able to review key aspects of the project. The result is that the rate payers of the province were not provided the transparency, details, and protection which was afforded to the ratepayers of Nova Scotia through the UARB process.

The omission of the Maritime Link from the "lowest cost analysis", may have also altered the expansion scenarios forming part of the DG2 and DG3 cumulative present worth (CPW) assessment, and therefore influenced the final recommendation of MHI.

Although the initial plan was the 20% of the energy would flow to Nova Scotia, 40% for island use, and 40% for export, the business case for Muskrat Falls was based on a 50-year Power Purchase agreement. The original analysis presented by Nalcor in both DG2 and DG3 had 40% of the energy (1960 GWhr) being delivered to NL Hydro in 2018, growing to the full output of Muskrat Falls (4900 GWhr) by 2052 [Ref. 11]. This is shown graphically in Figure 1.:

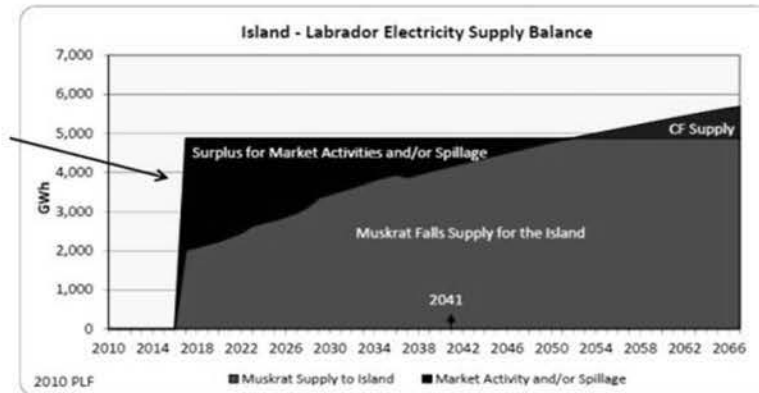


Figure 1: Muskrat Falls Generation Used on the Island Forming the DG2 Expansion Analysis (Ref. 11)

The deal with Emera required a 1 TWhr per year block of energy being provided to Nova Scotia (The Nova Scotia Block) for a period of 35 years. When it is overlapped on Figure 1, there is clear that there would have been an energy shortfall in the 2035 period, as illustrated in Figure 2. This energy shortfall would require some additional supply of energy, at a cost which was not included in the DG2 or DG3 interconnected cost analysis presented to the PUB.

What was not disclosed during the PUB review was that Nalcor were selling the same energy twice, to both Emera and to Newfoundland and Labrador Hydro.

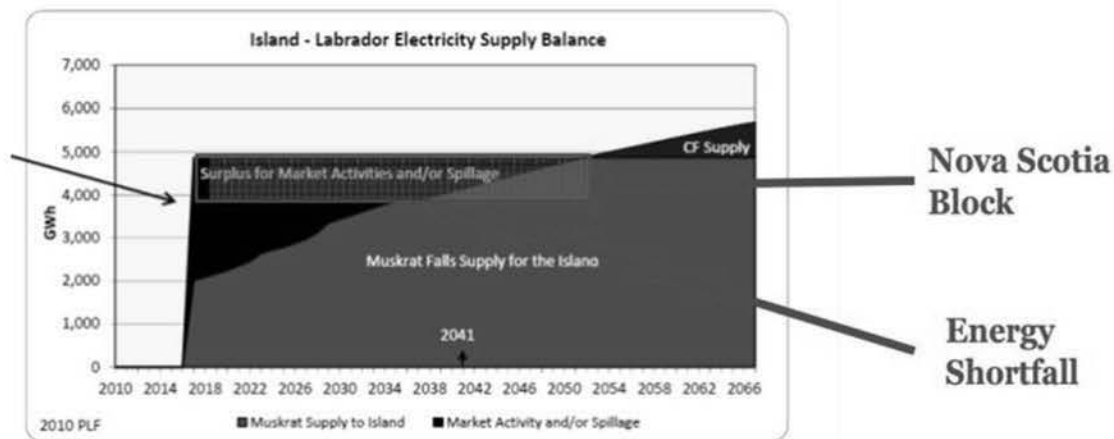


Figure 2: Energy Balance with the Nova Scotia Block Delivery

In addition, the Nova Scotia block was delivered at 167 MW, during the peak daylight hours. The DG2 and DG3 lowest cost analysis did not take this 167 MW delivery into account [Ref. 13]².

Within the DG2 and DG3 interconnected expansion scenarios Nalcor met the reliability targets by placing 50 MW thermal generators on the island, using oil to meet peak period demands. Within the DG2 analysis there was no additional generation or capacity brought onto the island until 2036. Meanwhile during the

² This issue is explained in more detail within an Uncle Gnarlly Blog Post entitled "The Snow Job" [Ref. 14], and on the Sir Robert Bond Papers "Muskrat Falls - The importance of Transparency" [Ref. 45].

DarkNL PUB hearings Nalcor confirmed that due to the delivery of 167 MW to Nova Scotia, that additional capacity would be required as early as 2025 [Ref. 15], 11 years earlier than was priced within the DG2 analysis. This earlier generation would have increased the CPW cost of the expansion analysis (on a NPV basis) thus closing the gap between the Infeed and Isolated Island options.

It is not clear if the inclusion of the Maritime Link element of the project would have had a material impact on the lowest cost analysis which was presented to the PUB and the people of the province. One thing is clear is that the independent reviews provided by Manitoba Hydro and Navigant submitted to the PUB did not include the Emera portion of the agreement. These independent reviews were often referenced by both Nalcor and the Government to gain public support for the project.

Hindsight can clearly demonstrate that the terms of reference of the PUB review precluded very important details of the project from being reviewed by the NL ratepayer. It is recommended that the Commission of Inquiry investigate why the PUB was specifically excluded from reviewing the project as it was conceived, signed and being implemented. It is clear that the ring fenced terms of reference for the PUB review contributed to the obfuscation of information on the entire project.

In the opinion of the undersigned the narrowed terms of reference for the PUB review should be investigated by the Commission of Inquiry per Article 4c of the Terms of Reference.

Issue 3: Governance of a State Owned Enterprise

It is expected that as this inquiry unfolds there will be a common narrative, that people in positions of responsibility made decisions on the project based on the best available data at the time. The members of the project team were tasked to develop Muskrat Falls, and not specifically look at options to meet the lowest cost requirements set forth by the EPCA. Nalcor leadership made the decision to recommend Muskrat Falls based on the best available information developed by the project team, and other work completed by the Provincial Government. Senior Bureaucrats were not experts, and based their decision based on the recommendation put forth by Nalcor, and other public servants. Politicians were told by both Nalcor and the Bureaucrats that we needed the power, and that Muskrat Falls was the lowest cost option. They based their decision on what information was made available to them.

As the inquiry commences it is likely that this circular but collective defense of decisions will become a very clear theme.

It is clear that throughout the Muskrat Falls process there has been a very close relationship between Nalcor and the government of Newfoundland and Labrador. Within Nalcor there has also been limited separation between the separate divisions and legal entities; where in many instances that there were common boards between the various legal entities of Nalcor. It can be argued that this lack of separation clouded the decision making responsibility, and independence of each agency.

Of all the issues investigated I believe that the Inquiry must examine the separation between Nalcor and State as it related to the key Muskrat Falls decisions. Was there clear definition of roles and responsibilities? The Inquiry should establish what this relationship looked like, and if it met best practice of how state owned enterprise should be governed [Ref. 18].

In the opinion of the undersigned the relationship between Nalcor and Government, and the governance of a Crown Corporation should be investigated by the Commission of Inquiry under considerations set for in Article 4d, 5c, 5d and 5e of the Terms of Reference.

Issue 4: Load Forecast

“We Need the Power” was the first declaration of proponents of the project. In the political sell of the project it was a statement which was considered irrefutable. In support of this statement Nalcor developed a demand forecast which would extend over the 50-year economic review period for which the DG2 and DG3 analysis concluded Muskrat Falls to be the lowest cost option.

The data presented to the PUB had total energy requirements growing from 7,585 GWhr in 2010 to 11,979 GWhr in 2067 (Ref. 1). This was a 58% increase in demand, in the absence of any material growth to the provinces population. This estimate was a combination of econometric modelling for the first 20 years, then simple linear extrapolation for the remainder of the economic analysis period.

During the CEAA review the joint panel questioned the need for power (Ref. 6):

However, the Panel concluded that Nalcor’s analysis, showing Muskrat Falls to be the best and least-cost way to meet domestic demand requirements, was inadequate and recommended a new, independent analysis based on economic, energy and environmental considerations. The analysis would address domestic demand projections, conservation and demand management, alternate on-Island energy sources, the role of power from Churchill Falls, Nalcor’s cost estimates and assumptions with respect to its no-Project thermal option, the possible use of offshore gas as a fuel for the Holyrood thermal generating facility, cash flow projections for Muskrat Falls, and the implications for the province’s ratepayers and regulatory systems.

The Panel also recommended consideration of Integrated Resource Planning as a better planning approach compared to the traditional approach of forecasting loads and then finding the lowest cost solution for meeting them

In response to the damning report of the Joint Review Panel, Nalcor commission Navigant to complete an “Independent Supply Decision Review” (Ref. 7). In the opinion of the undersigned this Navigant Report was not sufficient in scope and depth to fulfil the recommendations of the JRP. However, Navigant stated that Nalcor did follow good utility practice in generating the demand forecast. It further verified the forecast by stating that the 0.7% annual growth was reasonable, when compared to a predicted 1% growth in Canada.

On a personal note, the Navigant report was one of the first documents I read on Muskrat Falls. It was this acceptance of the 0.7% annual growth, in the absence of any population growth, which gave me such initial concerns with the project. It was one of the main reasons I challenged the econometric modelling techniques used by Nalcor within my own submission to the PUB in February 2012 (Ref. 13). Within this submission I advocated that Nalcor should develop a bottom up assessment of the demand, and take a probabilistic approach. At the time I believed (as I still do) that Nalcor’s demand forecasting was too rudimentary to substantiate the major investment for Muskrat Falls.

As part of their DG2 review Manitoba Hydro shared this opinion and noted that Nalcor did not follow best industry practice in developing the long term forecasting models [Pg 26, Ref. 19]. They explicitly recommended end use modelling techniques, which to my knowledge has not yet been incorporated by Nalcor.

Even today Nalcor's current forecast can be questioned. Within the June 2017 update (Ref. 20) an updated forecast was provided. I maintain my position that Nalcor's econometric modelling is not accurate. An element of common sense will dictate that the expected increases in electrical rates will have a much larger impact on demand growth than predicted in the 2017 demand curve. A more reasonable forecast of future demands, will further exasperate the predictions for future electricity rates in the province.

I believe it is essential for the inquiry to investigate the demand forecasts. Aspects of the demand forecast which should be investigated by an inquiry include:

- I. When was the 50 year forecast first produced, and why?
- II. Why was a 50-year economic review period chosen? Would this be normal practice in planning for domestic electricity demand, when Nalcor has only ever completed 20 year forecasts previously [Ref. 21]. Who dictated a 50-year economic review cycle?
- III. Who produced the forecast? Did that person ever communicate caution to the senior leadership of Nalcor?
- IV. Were Newfoundland and Labrador Hydro's planning engineers consulted in the simple extrapolation from year 21 to year 50. Were they in agreement with this methodology?
- V. Was there ever recommendations or consideration for a more robust forecast considering the size and expenditure of the project?
- VI. Why did Nalcor not complete end use modelling as recommended by Manitoba Hydro in DG2?
- VII. Why were the same econometric models considered acceptable for DG3, considering that MHI clearly stated that it did not constitute good utility practice during their DG2 assessment?
- VIII. During their DG2 assessment Manitoba Hydro compared historical predictions versus actuals of the models. However, did MHI's benchmark include a comparison of the provinces actual economic inputs compared to the predicted values used in the models? I would expect that the performance of the provinces economy in the period of 2003-2013 was much stronger than would have been predicted in 2002?

Of all the issues on the Muskrat Falls project I have reviewed over the last 6 years, I maintain my sharpest criticism for the demand projections. It was this 58% increase in growth which underpinned the economic model justifying the project, yet it was the data which was so at odds with common sense when considering our province's demographic changes and economic realities.

In my opinion it was and continues to be indefensible. It should be investigated by the Commission of Inquiry pursuant to Article 4a(i) of the Terms of Reference.

Issue 5: Cost Estimates

"Muskrat Falls is the Lowest Cost Option" was the second fundamental question which formed the stump speech of the project proponents prior to sanctioning. It was a compelling argument when the estimate to complete the project was \$5 Billion. The breakdown of the DG2 estimate is provided in Table 1 (Ref. 1):

Project	Base Estimate	Historical Cost (pre 2010)	Adjusted Base Cost (Base Cost – Historical)	Estimate Contingency 15%	Escalation Allowance	Total Project Cost (excluding IDC)
Muskrat Falls Generating Facility	\$2,206	\$20	\$2,186	\$328	\$335	\$2,869
Labrador – Island Transmission Link (with Overload Capacity)	\$1,616	\$42	\$1,574	\$236	\$208	\$2,060
Total						\$4,929

Table 1: Muskrat Falls Costs Estimates as Presented to the PUB

The accuracy of this estimate was debated within the PUB hearings back in 2012. The project leadership exuded great confidence on this estimate at the time. Some relevant quotes from the Muskrat Falls PUB hearings are provided below [Ref. 22]:

MR. HARRINGTON: Well, I would say that +50 percent, - 30 percent, are on the extreme edge. I don't believe that we will be there, I don't believe. I think we'll be closer to the narrower range, which is - 15 to +20.

MR. BENNETT: . This is Gilbert Bennett. I just might add some broader context to that. I think at the end of the day if you look at the techniques and approaches that are used in the industry for estimating, there is a level of uncertainty, but there is a set of best practices, and the intent of those best practices is to pull yourself from the extremes of the range closer in, and as we progress with engineering definition, we reduce that uncertainty. As we continue to focus on issues that have been identified as risks early in the work program, and understand them better, the whole concept of front end loading, that serves to reduce that risk, but the establishment of what those risk ranges are, that comes from a probabilistic analysis and that's something that will continue to be done as we continue through the design progression. So it's not really appropriate for us to say, well, we think the range is this or that at this point in time, but to continue with the process that we're following and to continue to define the project, with a view to minimizing that range.

MR. JOHNSON: I guess what I'm trying to focus in on is as of DG 2, how likely is it in your assessment that we're going to pitch somewhere between the narrower range that Mr. Harrington spoke about?

MR. BENNETT: We think there's a much higher probability of being at that point than being at the extreme edges using the techniques that we've identified and the practices that are being followed.

Hindsight has shown that this optimism and confidence on the cost estimates were clearly premature. The inquiry should have full access to the estimate files used to build the DG2 estimate, and subsequently the changes used to develop the DG3 estimate, for which the project was sanctioned. There are some fundamental questions which must be addressed:

- 1) Who prepared the cost estimates?
- 2) If the estimates were prepared by an international engineering firm, what qualifications were provided with the estimate?
- 3) What was the range of the estimates proposed by the EPCM contractor, and did that range match the language used within the PUB hearings?

- 4) At the time the DG2 estimate was reported what was the P50 estimate of the project costs considering all reasonable risks?
- 5) What benchmarking was done to other NL based projects to confirm the cost estimate?
- 6) What percentage of the DG3 estimate was based on firm contract values? Was this at odds which was publically communicated by Nalcor leadership at the time of Sanction?
- 7) For the powerhouse was there any estimates from reputable Canadian based contractors which were used in the compilation of the estimates?
- 8) As a partner in the Hebron project, Nalcor were privy to the cost escalations being seen on Hebron. Was any of the lessons learned from Hebron applied to the Muskrat Falls estimate?

The last question is of keen interest. History has demonstrated that the DG2 and DG3 estimates clearly did not factor in some site specific factors such as labour inefficiency, harsh environments, impact of weather and labour availability. The closest reference project to Muskrat Falls within Eastern Canada was the Hebron project. In January 2013 the Hebron partners announced that the cost estimates for the project had increased from 5.8 Billion to 14 Billion (Ref. 23). Nalcor is a partner in the Hebron project, and as such should have had prior knowledge and direct access to the Hebron estimates. Were the management of the Muskrat Falls project proactive and engage with their partners in Hebron to help validate their own estimates?

It is recommended that these questions should specifically form part of the investigation within the inquiry under Articles 4a(i) and 4b of the Terms of Reference.

Issue 6: Nalcor's CPW Methodology

In arriving at the lowest cost option Nalcor employed a Cumulative Present Worth assessment. In the opinion of the undersigned there were several variables in this analysis which favored the Interconnected Option scenario:

- (i) Timescale: Newfoundland and Labrador were in the enviable position of having an almost unlimited supply of near free energy become available in 2041, providing a transmission line to the Island was constructed. Instead of trying to bridge a 25 year gap, Nalcor decided that the CPW should be based on a 50 year timescale. This protracted timescale would allow the full costs of the Muskrat Falls Project to be recovered.

A 50-year time period was selected against Nalcor's own planning being a 20 year time frame (Ref. 21), and earlier versions of the Electrical Power Control Act which limited licenses for power generation to be limited to 30 years (Ref. 9).

A 50-year economic review period did not match convention, the local market factors, or the legislation at the time. Why was it chosen?

- (ii) Discount Rate: Nalcor adopted a similar discount rate for both the interconnected and isolated island option. By doing so they did not impose a hurdle rate, or other penalty, upon the capital heavy interconnected island option. Due to the immense risk associated with the upfront expenditure of capital it would be common to apply a hurdle rate, or a differential

discount rate, to penalize the capital intensive option. This was not done in the CPW analysis. The planning engineers should be questioned why a hurdle rate was not applied in an effort to quantify the immense risk associated with the capital intensive project.

- (iii) Power and Capacity: Within the CPW analysis Nalcor assumed that the Labrador Island Link would produce 900 MW. Within Strategist it was modelled as a thermal unit, implying that 900 MW would be available when required. This assumption did not reflect reality for several reasons (i) the Emera Agreements had 167 MW delivered to Nova Scotia during peak periods, and (ii) there was uncertainty regarding water management. The methods used by Nalcor to model the Energy and Capacity supplied by Muskrat Falls in the Strategist lowest cost calculations were incorrect, and potentially assisted the determination of Muskrat Falls as being the lowest cost alternative.
- (iv) Timing: The Inquiry should seek written verification when Nalcor completed the analysis indicating that the interconnected option was lower cost than the isolated option. Was this detailed analysis completed before or after the term sheet with Emera was signed in November 2010? As late as October 2010 the CEAA had not yet received any knowledge of the Muskrat first option, and specifically asked for the economic analysis [Ref. 24]. The inquiry should specially request what analysis was completed by Nalcor to establish Muskrat Falls as the lowest cost option, prior to signing the term sheet on Nov. 10, 2010. In addition, what due diligence was also completed by the Government of Newfoundland prior to executing the term sheet to ensure the obligations of the Electrical Power Control Act were respected.

In the opinion of the undersigned the CPW methodology should be investigated by the Commission of Inquiry pursuant to Article 4a(iii) of the Terms of Reference.

Issue 7: Nalcor's Decision Gate Methodology

The Gated Management Process initiated by Nalcor in 2006 was used for the development of the Lower Churchill. Decision Gate 1, completed in February 2007, was not used for the purpose of providing the lowest cost power to the Province. Rather, its purpose was to develop the Lower Churchill, primarily for export. The Decision Gate 2 report, presented to the PUB (Ref. 25), offered limited discussion of alternatives to the project. It engaged in even less discussion about project economics, noting that the agreement of a final Power Purchase Agreement (PPA) with NL Hydro would "not be a problem". The DG2 review was not a review of options to meet the islands power requirements, it was purely a readiness review.

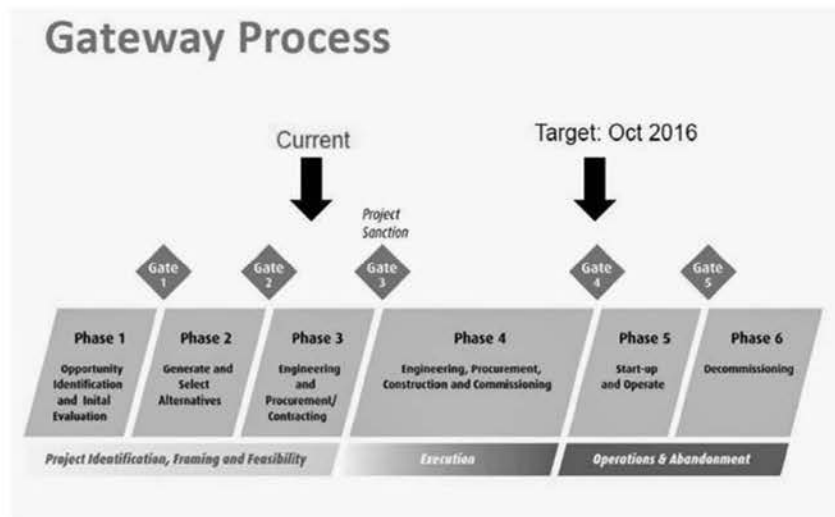


Figure 3: Nalcor's Decision Gate Process [Ref. 1]

When the decision was made in July 2010 to abandon Gull Island (for export) and to proceed with Muskrat Falls, ostensibly to meet the Island's growing electrical requirement, the DG2 mandate should have changed to examine all potential alternatives for meeting our electrical needs. The principal outcome ought to have identified the lowest cost alternative to NL ratepayers. Nalcor's DG2 reports submitted to the PUB showed little evidence of such analysis.

In the opinion of the Author, this deficiency constituted not just a failure in Nalcor's management processes; it potentially contravened its legislated responsibility under the Electrical Power Control Act. It must be asked what Governance did the executive management team of Nalcor, and the Board of Directors provide, to ensure between June 2010 and the calling of the PUB review in 2011 to ensure Muskrat was the lowest cost option?

In July of 2011 then Minister Shawn Skinner wrote in the Telegram [Ref 26]:

These professionals manage and plan your electricity system based on their expertise and understanding of electricity supply and demand. Hydro must comply with legislation and regulations that require it to ensure sufficient electricity is available at all times. If supply is required to meet demand, then the Electrical Power Control Act states that this new generation must come from the least-cost source.

I have heard the question many times; where is the demand coming from? Simply put, the demand for electricity is coming from residential and commercial growth. Our economy is growing, and this growth triggers new electricity demand. Hydro has completed an assessment of possible options to meet this new demand and after careful analysis determined that Muskrat Falls is the least-cost option.

What evidence did the Minister of Natural Resources have of these options prior to making this public statement in July of 2011?

It must be stated it was not the remit of the Lower Churchill Project team to deliver the lowest cost option; by very definition they were tasked with developing a project. The decision to look or not examine other options clearly sit outside the LCP team with both the senior management of Nalcor, and/or the government of the province. Based on the conclusions from the DG2 review (Ref. 25) that in September 2010 "there remains significant work to completed the Gate 2 Estimating Package", how mature was the cost and schedule estimates when the term sheet was signed just 2 months later?

Any reasonable inquiry into the Muskrat Falls project would closely examine the decision to abandon Gull Island in July 2010, and commence with Muskrat Falls first. What was produced, reviewed and approved to ensure signing the Emera Term Sheet was in the best interest of the province just 4 months later in November 2010?

In the opinion of the undersigned this investigation is an essential task to meet the requirements of Article 4d of the terms of reference.

Issue 8: Examination of Options

Prior to the Muskrat Falls PUB review Nalcor released a quantitative assessment of 2 options, the isolated option (Holyrood), and the interconnected option (Muskrat Falls). This was clearly limited, and in response to the PUB decision, and growing opposition to the project, the Government of Newfoundland broadened the options reviewed during 2012. In 2012 there were a series of reports issued by the Government of Newfoundland and Labrador which intended to validate Muskrat Falls as the lowest cost option. These reports can be found on the Muskrat Falls project website [Ref. 27].

However, even with this expanded review there were some of the more plausible options which were excluded. Small scale gas development using 'associated' gas, or power import scenarios were not quantitatively studied. Likewise, there was no review of a phased development which had the Labrador Island Link constructed, RECALL accessed, and wind and other smaller additions made to meet the provinces growing electricity needs until 2041. With the LIL built first there were several options for meeting the provinces energy demands [Ref. 28, 29].

During the 2012 PUB review the undersigned recommended [Ref. 13] that Nalcor complete the following table prior to any firm recommendation to proceed with Muskrat Falls.

Option	Description	Growth Profile	PIRA Oil Note 3	MF + ULCost Overrun	CPW Value	Incremental Cost 2012 ¹ \$/MWhr	Blended Costs 2012 ² \$/MWhr
1	Reference Case Interconnected Island	2010-PLF	Medium		6,652,000	240	"95
1A	Medium Growth	Slide 39 - Medium	Medium	10%	TBA	TBA	TBA
1B	Low Growth	Slide 39 - Low	Low	10%	TBA	TBA	TBA
1C	High Growth	Slide 39 - High	High	10%	TBA	TBA	TBA
2	Reference Case - Isolated Island	2010-PLF	Medium		8,810,000	TBA	"87
2A	Medium Growth	Slide 39 - Medium	Medium	10%	TBA	TBA	TBA
2B	Low Growth	Slide 39 - Low	Low	10%	TBA	TBA	TBA
2C	High Growth	Slide 39 - High	High	10%	TBA	TBA	TBA
3	UL + Recall Churchill + Portland Creek (Review period till 2041 only)						
3A	Medium Growth	Slide 39 - Medium	Medium	10% on UL	TBA	TBA	TBA
3B	Low Growth	Slide 39 - Low	Low	10% on UL	TBA	TBA	TBA
3C	High Growth	Slide 39 - High	High	10% on UL	TBA	TBA	TBA
4	UL + Recall Churchill + Hydro Quebec Power Purchase at Market Rates						
4A	Medium Growth	Slide 39 - Medium	Medium	10% on UL	TBA	TBA	TBA
5	Gas To Wire Option						
5A	Medium Growth - White Rose Gas	Slide 39 - Medium	Level 5 Cost Estimate to be developed		TBA	TBA	TBA
5B	Medium Growth - LNG	Slide 39 - Medium	Level 5 Cost Estimate to be developed		TBA	TBA	TBA
5	Emera Deal - Include the Commitments to Emera and 1 TWhr of annual sales at market rates when capacity exists						
5A	Medium Growth	Slide 39 - Medium	Medium	10%	TBA	TBA	TBA
5B	Low Growth	Slide 39 - Low	Low	10%	TBA	TBA	TBA
5C	High Growth (additional generation required)	Slide 39 - High	High	10%	TBA	TBA	TBA

(I) A complete CPW is required. This should have been a DG2 deliverable.

Table 2: Recommended Option Matrix – 2012 PUB Review [Ref. 13]

With the impending completion of the LIL and the ML there is now the option to purchase power until the MF plant comes online. This was the most obvious method to meet the islands energy requirements.

Even the most rudimentary analysis completed by the Author demonstrated that if imported power was provided at market rates, it was clearly a lower cost alternative compared to Muskrat Falls. (Ref. 28). Yet in 2012, Nalcor advised that Upper Churchill power was not a reliable alternative even post 2041 [Ref. 30].

In the opinion of the undersigned it is important for the inquiry to understand how much work was done by Nalcor to determine if remaining RECALL power could have been supplemented by Upper Churchill power purchases or other imports. Recently it has been in the news that Hydro Quebec has commenced a 20 year contract to sell power to New England [Ref. 31]. Did Nalcor engage Hydro Quebec on the potential purchase of energy from the Upper Churchill?

There is no doubt that the work completed prior to sanction to establish the “lowest cost option” was deficient. It is important for the Inquiry to establish what was done prior to signing the term sheet, and prior to sanction. Furthermore, was there any direct action taken to exclude some of the more obvious alternatives which has been previously submitted by the author and others?

In the opinion of the undersigned the above matters should be investigated under the requirements set forth under Article 4a(iii).

Issue 9: Emera Ownership in Labrador Island Link

When the project was originally presented to the public Emera would take a 29% equity stake in the Labrador Island Link (pg 37, Ref. 11), with 71% owned by Nalcor. Emera were also entitled to own up to 49% of the Lower Churchill Project transmission assets [Pg. 9, Ref. 33], based on the following principles:

LTA	100% Nalcor Owned
ML	100% Emera Owned
LIL	Percentage based on the estimated capital costs of each transmission asset at sanction of the Labrador Island Link, adjusted when the actual costs are finally determined.

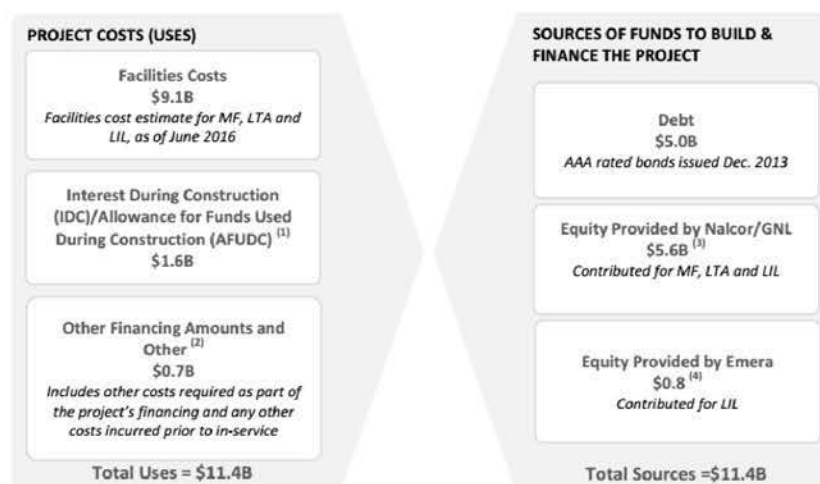
The Maritime Link has been largely delivered on budget while the cost of the Labrador Transmission Assets (LTA) and the Labrador Island Link (LIL) have increased. Thus if Emera are permitted to keep 49% of the total ownership, we must conclude their share of the LIL has increased from the 29% originally referenced.

The following table provides a summary of the calculation used to determine Emera’s percentage interest in the LIL in order to maintain the overall target of 49%. At DG2 the plan was that Emera would own 29% of the Labrador Island Link to have 49% of total transmission assets. Following the logic within Table 3 Emera should now have 39% ownership within the Labrador Island Link. Yet it has been advised that Emera now has 59% share capital within the Labrador Island Link [Page 5 Ref. 33].

Table 3: Summary of Emera Ownership of LIL to Maintain 49% of Transmission Assets

	DG2		DG3		Current	
	Cost	%Total	Cost	%Total	Cost	%Total
ML	1.2	19%	1.6	21%	1.6	14%
LIL	2.1	34%	2.6	33%	3.7	32%
LTA	0.4	6%	0.7	9%	0.9	8%
MF Plant	2.5	40%	2.9	37%	5.5	47%
Total CAPEX	6.2		7.8		11.7	
Total Transmission Assets	3.7	Billion	4.9	Billion	6.2	Billion
ML Portion		32%		33%		26%
LTA Portion		11%		14%		15%
Emera Ownership in LIL to have 49% of total Transmission		29%		31%		39%

Within the following “Sources of Funding” provided by Nalcor, it is confirmed that Emera has \$800 million invested in the LIL. Of that sum, Nalcor has stated that \$400 million is invested as equity, and \$200 million is provided under the “Allowance for Funds Used During Construction” (AFUDC). What, then, is the remaining \$200 million investment used for? Does the total \$600 million equity investment account for the increase in share capital to 59%?



At DG2 estimates, and maintaining a 75:25 debt to equity ratio, Emera would invest $0.29 \times 0.25 \times 2100$ Million = 152 Million within the Labrador Island Link. This equity contribution would earn a ROE of 8.9%, or roughly \$13.5 Million in the first year after commissioning of the Labrador Island Link. Emera now have increased their investment to a level where they will presumably obtain 59% of the return on equity on the Labrador Island Link. If true, Emera are entitled to make \$50-60 million in annual profits from the Newfoundland ratepayer, which is about 3 times the profits to Emera on the LIL when the term sheet was signed.

I think it is critical for the Inquiry to understand how and why this ownership structure of the Labrador Island Link changed between 2012 and 2015. Why has there been such a shift of equity, and subsequent returns, from Nalcor to Emera. More importantly when was these decisions made and who were privy to them?

The commission must inquire if Nalcor's cash flow position (and that of the government's) forced them to ask Emera for additional equity contributions to maintain the 75:25 debt to equity ratio as required under the Federal Loan Guarantee? Personally I would like to know if the Government of Newfoundland were aware of this change (in real time) which will appear to cost NL ratepayers ~40 million a year in additional profit being delivered to the shareholders of Emera?

In the opinion of the undersigned these issues should be investigated under Article 5c, 5d and 5e of the Terms of Reference.

Issue 10: Water Management Agreement

During the initial Muskrat Falls debate there was much discussion regarding the applicability of the Water Management Agreement to the Muskrat Falls business case. There is now an issue before the courts concerning the interpretation of the 1969 Power Contract. If HQ are again successful in the appeal, only 300 MW will be potentially made available as recapture applied to the island. This will make the energy sharing concept entrenched in the WMA nearly ineffective, as the WMA will always respect the priority of pre-existing contracts³.

Not having access to in excess of 300 MW of power from the Upper Churchill will limit the ability to rely on 900 MW of firm energy from the Labrador Island Link, as was originally assumed by Nalcor. The results of the HQ declaratory judgement may preclude the ability to balance the production between the two plants on the Churchill River, therefore invalidating the DG2/DG3 assumptions that 900 MW was available on the Labrador Island Link in a manner consistent with a thermal unit. It represents a fundamental change to the Muskrat Falls business case in meeting the energy and capacity requirements of the Province.

With respect to the Water Management Agreement, the Inquiry should potentially investigate:

- 1) Nalcor's assessment of this risk prior to signing the term sheet with Emera.
- 2) Nalcor's assessment of this risk prior to sanctioning the project.
- 3) If this risk assessment matched the reassurance that Nalcor and the Government provided that the WMA or the declaratory judgement would not impact the Muskrat Falls business case [Ref. 38]. The Commission of Inquiry should specifically seek to review the legal opinions that Premier Dunderdale referenced when advising the public on the subject [Ref. 38].
- 4) What specific actions, and reviews did Nalcor undertake when CFLCo would not sign the 2009 WMA as they could not achieve shareholder approval [Ref. 37]?
- 5) What reviews did Nalcor and/or the government completed in July 2013 when (i) HQ launched their declaratory judgement and (ii) the UARB placed conditions of approval of the project. Did Nalcor or the Government complete a stop gap assessment of the project at that time? Did the increase in capital costs also form part of that review?
- 6) What is the potential impact of losing the interpretation on the power rates in NL? To the knowledge of the undersigned this has never been communicated to the public.

³ Reference is made to the Uncle Gnarley Blog Post "Vision Based on Delusion" [Ref. 35] for additional information commentary regarding the Water Management Agreement.

In the opinion of the undersigned these aspects of the project should be investigated pursuant to Article 4a(i) of the Terms of Reference.

Issue 11: Risk Management, and the SNC Report

EY in their 2016 report identified that Nalcor were not costing all project risks in their estimates. EY took exception to Nalcor's methods [Ref. 43]:

- Risks defined by Nalcor as strategic are not allowed for in the financial forecast;
- The potential cost and schedule impacts of all individual risks are recorded in the Project's risk register but are not systematically reflected in the overall reported forecasts for cost and schedule; and
- Some anticipated material cost variances have only been reflected in the forecast cost when they are contractually committed.

Within the 2013 report [Ref. 44] SNC as EPCM contractor effectively delivered a quantitative probabilistic assessment of the entire risk envelope for the project. The likely financial impact of the risk was nearly an order of magnitude higher than the contingency allowed by Nalcor within the DG3 estimate.

Like most followers of this project I am deeply troubled by the allegation that the SNC report was presented to Nalcor management. The Risks raised by the SNC report, in combination with the events of July 2013, should have been sufficient to put the entire project under evaluation.

It is recommended that the Terms of Reference for the inquiry should be expanded to further investigate the issues of risk management and the SNC report. The Inquiry should investigate who was made aware of this report, and why it was not communicated to the public.

This should be specifically included under Articles 4d and 5d of the Terms of Reference.

Issue 12: Nalcor's Cost Control and Forecasting Methodology

Although the robustness of the original estimates need to be examined (as noted in Issue 5 above), it is important that the inquiry review the methodology used by Nalcor in preparing the updates to the capital cost estimates following the sanctioning of the project. Table 4 provides an historical review of each of Nalcor's cost estimates which were reported to the public.

Table 4: Summary of Project Capital Cost Estimates

	DG2 2010	DG3 2013	Update Jun-14	Update Sep-15	Update Jun-16	Current 2017
LIL	2.1	2.6	2.7	3.1	3.5	3.7
LTA	0.4	0.7	0.8	0.88	0.88	0.9
MF Plant	2.5	2.9	3.4	3.7	5.1	5.5
Total CAPEX	5.0	6.2	6.9	7.7	9.5	10.1

Of particular interest is the updates provided in September 2015. During the summer of 2015 it was clear to any pundit that the Muskrat Falls project was in serious trouble [Ref. 55, 56]. Following the 2015 election the new government retained EY to perform an assessment of the reasonableness of the cost

and schedule presented by Nalcor in the September 2015 update. Their findings are noted below [Ref. 43]:

Key cost management process and control risks and issues

1. The conditions and processes for rebaselining cost and schedule are not defined in the Project's control processes and procedures. The Oversight Committee's understanding of such conditions and processes is an important foundation as it conducts its oversight activities.
2. Nalcor uses a relatively basic approach to its updating of forecasted contingency requirements which in our experience is not consistent with the expected practices for a project of this scale and complexity. Given this, it is not clear whether the cost contingency as forecasted in reports for the Project will be adequate.
3. The Project does not define thresholds for variance management, reporting, and escalation purposes. We would normally expect these to be in place as they assist in giving clear indications of the severity of issues and the need to escalate to key stakeholders, such as the Oversight Committee.
4. Fully quantified risks or trends have not been documented for certain significant challenges on the project. The scale of potential challenges is also not quantified in the summary reporting made available to the Oversight Committee.

We recognize that Nalcor is using many conventional management processes and controls for the Project. However, while certain contractor Earned Value data is being collected, Nalcor is not reporting using a full Earned Value Management System across the whole of the project. Reporting on Earned Value performance would however, provide additional useful data and information to the Oversight Committee on both individual contractor and overall Project performance where available.

Until such time as the management process and controls risks and issues identified in this report and the detailed supplementary report are addressed, the completeness and accuracy of Project cost and schedule status reporting to the Oversight Committee cannot be fully verified.

As has been documented by EY, Nalcor were not properly accounting for the total anticipated costs of the project for things such as all risks. Between the September 2015, and the June 2016 update there was nearly a 40% increase in the estimate cost for the generation portion. Could an over-run of this magnitude not be reasonably foreseeable during the Fall of 2015?

The inquiry should review the methods used by Nalcor in the cost forecasting to determine if they met best practice. However, I do believe it is important for the Inquiry to investigate whether the language used by Nalcor and the Provincial Government to explain the robustness of the September 2015 cost estimate was reasonable? It should also be investigated whether that these updated estimates properly accounted for additional overruns which should have been reasonably foreseen at the time. There are 3 fundamental questions:

- 1) Were the updated public cost updates communicated to the public intentionally kept low?
- 2) Was there any intervention by the Government to keep these estimates lower as to not potentially impact the general election of October 2015, or the equity contributions required from the Government?
- 3) Did Nalcor maintain a separate sensitivity report which would take a probabilistic review of the final cost estimate for the project based on all delays, inputs and other variables. If yes, who else was privy to such a report?

It is recommended that these questions should form part of the investigation per Article 4b of the Terms of Reference.

Issue 13: Nalcor Communications Strategy

As an observer of the Muskrat Falls project, I have admired the effectiveness of Nalcor's strategy in gaining public approval for the sanctioning of such a fundamentally unsound project. There was likely a detailed strategy which included gaining local community support, bringing aboriginal groups onside, and the crafting of an extremely effective communications strategy. The two questions of "Do we need the Power" and "Is Muskrat Falls the Lowest Cost Option" were extremely effective in reducing a very complex debate into very comprehensible 'sound bites'. The Nalcor communications team were very effective in their work.

Yet there were times in this debate where Nalcor appeared inconsistent in what was communicated to the public [Ref. 45,46, 47], and in some times clearly not consistent [Ref. 48,49]. Nalcor and the Governments message tended to change, depending upon the audience.

However, the most disturbing elements of the public debate on Muskrat Falls was the manner in which either the Government of the Province, or Nalcor, monitored public opinion on the project [Ref. 50]. The surveillance of social media to track the opinion of private citizens on Muskrat Falls seems to contravene fundamental rights and freedoms of individuals.

Personally, I believe that the Commission of Inquiry should be tasked to review the communications strategy of both Nalcor and the Government of Newfoundland and Labrador in the sanctioning of this project. Several tasks, or questions which the Inquiry should consider include:

- 1) Strategic or communication plans for the Lower Churchill Project(s) should be tabled to the Commission and available for public review.
- 2) Did Nalcor and/or the provincial government monitor the opinions of private individuals. Were records maintained on the 'naysayers'?
- 3) Did Nalcor and/or the provincial government actively engage in social media, or other media to provide support to the project. This would include such things as writing comments on the Telegram or CBC web sites? Was this part of any strategy and were public funds used to complete this manipulation of the media?
- 4) Was Bill 29 introduced in any part to assist the sanctioning of Muskrat Falls?

In the opinion of the undersigned these issues should form part of the investigation to fulfill the obligations set forth in Article 5c of the Terms of Reference, with the inclusion of the Government of Newfoundland, as per the general commentary provided above.

C Conclusions

Bent Flyvbjerg, from the University of Oxford, is an expert in Mega Projects. In early 2013 he co-authored a comprehensive paper entitled “Should we Build More Large Dams? The Actual Costs of Hydropower Megaproject Development” [Ref. 52]. This paper reviewed the performance of large scale dams and presented many interesting conclusions:

Our approach to address the debates about whether or not to build dams is to incorporate an evidence-based perspective that reflects how decisions among alternative options are actually made and on what basis. Theoretical and empirical literature on decision-making under uncertainty proposes two explanations—psychological delusion and political deception—that suggest decision-makers’ forecasts, and hence *ex ante* judgments, are often adversely biased (Tversky and Kahneman, 1974; Kahneman and Lovallo, 1993; Flyvbjerg, 2003; Lovallo and Kahneman, 2003; Kahneman, 2011).

First, experts (e.g., statisticians, engineers, or economists) and laypersons are systematically and predictably too optimistic about the time, costs, and benefits of a decision. This “planning fallacy” (Kahneman and Tversky, 1979b; Buehler et al., 1994) stems from actors taking an “inside view” focusing on the constituents of the specific planned action rather than on the outcomes of similar actions already completed (Kahneman and Lovallo, 1993). Thus, for example, the estimated costs put forward by cities competing to hold the Olympic Games have consistently been underestimated yet every four years these errors are repeated. Biases, such as overconfidence or overreliance on heuristics (rules-of-thumb), underpin these errors.

Second, optimistic judgments are often exacerbated by deception, i.e. strategic misrepresentation by project promoters (Wachs, 1989; Pickrell, 1992; Flyvbjerg et al., 2002, 2005, 2009). Recent literature on infrastructure delivery finds strong evidence that misplaced political incentives and agency problems lead to flawed decision-making (see Flyvbjerg et al., 2009). Flyvbjerg et al. (2009, p. 180) further discuss that delusion and deception are complementary rather than alternative explanations for why megaprojects typically face adverse outcomes. It is, however, “difficult to disentangle” delusion from deception in practice. Using quasi-experimental evidence from China, Ansar et al. (2013) suggest that while better incentive alignment can help to lower the frequency and, to a lesser extent, the magnitude of biases, it does not entirely cure biases.

It is expected that the transactional elements of the Inquiry will help identify if Muskrat Falls was indeed an *ex ante* judgement, and if there were elements of optimism bias which contributed to the decision. However, as we consider the true value that the Inquiry will bring, is it not more in the second observation? Did misplaced political incentives and agency problems lead to the wrong decision to sanction the Muskrat Falls Project?

I believe it is important for the Commission of Inquiry to help determine if sanctioning of the project was either a “Political” or a “Utility” decision. This is the very same question which was asked by the CEO of Nalcor during his February 15th public presentation at Memorial University.

Muskrat Falls will cost the people of Newfoundland and Labrador near \$13 Billion when interest during construction is considered. This project will more than double our public debt, and represents the largest single commitment of expenditure in our history. Yet the amount of public and political debate on the project was extremely limited in terms of depth and value:

- No debate within the House of Assembly prior to signing the term sheet.

- No clear reference question put before the PUB to understand if Muskrat Falls was truly the lowest cost option during the PUB review. The PUB review also had a politically accelerated review period.
- No clear question within the House of Assembly simple regarding the approval of Muskrat Falls. Bill 60 and Bill 61 were defacto votes on Muskrat Falls, but these were ancillary legislation and not a clear question.
- There was no formal recorded vote on Bill 60 and Bill 61. To this date it is still not clear what parties actually formally opposed Muskrat Falls in 2012.
- No regular and transparent updates to the House of Assembly on the cost of the project. Reference can be made to the UARB process on the PUB as perhaps a higher standard of transparency.
- Inadequate oversight, and little public transparency on project costs until 2016.

This project will not be undone; the bills will not disappear as a result of this Inquiry. What will remain is the long term consequences on the economy of our Province. It is more than a little depressing that not even 70 years after a return to democracy [Ref. 53], our self-rule is again being quietly questioned and threatened due to debt levels [Ref. 58].

The inquiry should not only be viewed as a way to find out what happened on Muskrat Falls, but it should provide a vehicle to determine what has to be done for the Province of Newfoundland and Labrador to ensure our political intuitions are strengthened. The true legacy of the Commission of Inquiry will hopefully be lasting change in improving our governance and strengthening our democratic institutions. It is a requirement to ensure decisions like Muskrat Falls will not be repeated in the future.

Respectfully Submitted,

Jason Muise

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