Submission to the Board of Commissioners of Public Utilities

In my opinion proceeding with the Muskrat Falls development as scheduled and structured would be premature and imprudent. In what follows, I elaborate on that opinion. I organize my submission according to three main sections and then offer a brief conclusion.

1. Difference in the Present Value of Costs

For its reference case, Nalcor has estimated that over the period to 2067, the difference between the CPW of the Muskrat Falls Interconnected Plan and the Isolated Island Option is approximately $2.2 billion. I think that this difference should be adjusted for the following considerations.

a) Pollution Abatement Equipment.

I am in favour of pollution abatement. The issue here is the means of abatement. Nalcor proposes, under its Isolated Island option, to spend $582 million on pollution abatement equipment at its Holyrood thermal plant. The justification for doing so is that this is a policy direction given in the 2007 Energy Plan, but that Plan gives no justification either, other than the obvious implication that abating pollution is a desirable objective. However, that expenditure is not likely to generate as much benefit as anticipated in 2007, plus other means of abatement appear to be cheaper.

First, the fuel used at the plant has been changed after 2007 from 1% sulphur to 0.7%. This has substantially reduced the amount of the sulphur dioxide emissions and particulate emissions. In 2010, compared to 2004, the former was 60% less per MW hour and the later was down 40% per MW hour.

Secondly, in 2007, no one could have known that the Grand Falls mill would be permanently closing. I understand that its closure, and the availability of its former hydro assets, has freed up a substantial amount of hydro power. That additional amount of energy, plus the fact that the mill will no longer be purchasing any supplemental energy from Newfoundland and Labrador Hydro (which both total, I understand, something in the order of 500,000 to 700,000 MW hours annually), means that the future higher demand on Holyrood, and the associated pollution, will be less than would have been anticipated in 2007. Also, the recent moves at the Corner Brook mill to improve efficiencies for long-run viability will likely lead it to consume less electricity than might have been forecast back in 2007.

Thirdly, if the pollution abatement equipment is installed at Holyrood then it will actually cause **an increase** in greenhouse gas emissions and nitrous oxide emissions. I understand that these would increase by up to 5% because the pollution abatement equipment reduces the energy efficiency of the plant. [1] That means having to burn up to 5% more fuel.

Fourthly, Nalcor has indicated that the Holyrood plant will have to be replaced by the early to mid 2030s. Unless it can be salvaged, the $582 million capital expenditure would be of no benefit after only 18 to 20 years. Thus, the initial capital cost and the interest cost would be spread over a fairly short time, which makes the annual cost very high.

In short, the capital expenditure on pollution abatement does not appear to be justified. However, pollution abatement is justified. This has been accomplished by moving to lower sulphur fuel. This could even be improved upon by moving from the current 0.7% sulphur content fuel to 0.3%. I

[1] http://www.nalcorenergy.com/assets/infocentre_infosheets_scrubbersandprecipitatorsfinal.pdf

understand that this cleaner fuel is 5% to 10% more expensive but avoiding the capital expenditure on abatement equipment would also avoid increased fuel consumption by up to 5%. Therefore, moving to 0.3% sulphur content fuel could result in only a slight change in net fuel cost. The benefits would be reduced emissions per MW hour and the avoidance of a $582 million expenditure and the associated operating and maintenance cost. Greenhouse gas emissions and nitrous oxide emissions would also be less. Also, I understand from the MHI report (Vol. 2, p.164) that lower sulphur fuel significantly improves the plant boilers' future life, improves boiler performance and lowers maintenance requirements.

b) Reliability Cost

The MHI report raised important qualifications with respect to its conclusion that the Interconnected Plan was less costly than the Isolated Island Option. Given the distance of Muskrat Falls from the main centre of consumption, namely, the Avalon Peninsula, reliability is extremely important. In this regard, I note that MHI (Vol. 2, p.121) observes that Nalcor selected a 1:50-year reliability return period for its HV dc transmission line, which it states is inconsistent with the recommended 1:500 year standard. MHI goes on to "strongly" recommend that Nalcor adhere to the higher standard and notes that even a 1:150 year standard, which is acceptable when an alternate supply is available, would cost approximately $150 million.

c) The use of Churchill Falls Power

Nalcor's Interconnected plan includes the use of some Churchill Falls power from 2057 to 2067. Its reference case analysis puts the cost of that power at $2 per MW hour. That cost is incredible; it is absurd; and no explanation is needed to justify those adjectives. However, as Nalcor points out in its submission to the PUB (p.128), so little of the power is used and the effect of discounting over so many years means that even if its projected market rates are used, the cost of this power in present value terms would be only $12 million higher. Still, the judgement call to cost this power at $2 per MW hour is discomforting. Also, it is not clear to me which market prices Nalcor used to adjust its figures, although I agree that discounting over such a long period would limit the adjustment to double-digit millions of dollars in present value.

Also, I note that MHI (Vol. 2, p.101 and 103) refer to Nalcor's use of some of the 300MW of recall capacity available under the 1969 Churchill Falls contract. However, in CA/KPL-Nalcor-219, Nalcor indicates that none of the 300 MW is used for its Interconnected Plan.

d) Use of Identical Consumption Scenarios

The estimated cost of each option is based on identical annual consumption, for example, in 2067 both scenarios have firm energy requirements at 11,976 GW Hours. I understand that Nalcor may have chosen to make this assumption because of the convenience and desirability of comparing costs for the same amount of energy. However, in the Isolated Island Option as constructed by Nalcor, electricity prices will be substantially after the 2020s. Therefore, is it really appropriate to assume that energy requirements of consumers will stay unchanged when they are paying substantially higher prices? This

is an important consideration because the higher consumption in the later years drives fuel cost and thermal capacity additions under the Isolated Island option. Yet, if consumers face higher prices, they are unlikely to consume as much.

I have not attempted to adjust the reference case for consideration (d). A rough calculation of the implications of (a) is about $400 million in present value; (b) is about $100 million in present value if Nalcor accepts only the 1:150 year standard and (c) is $10 million to $20 million in present value. Therefore, I think that the differential in favour of the Interconnected plan should be between $500 million and $600 million lower. That puts it at about $1.5 billion rather than $2.2 billion. If an adjustment for consideration (d) were made then that difference would be lower. It would be desirable for the PUB to consider whether such an adjustment is appropriate and what its magnitude might be. I am not in a position to provide an estimate.

2. Debt and Risk

As a result of offshore oil revenues, the provincial government has made a great deal of progress with respect to its debt situation over the past few years. Measured in terms of either the Provincial Net Debt or the Public Sector Debt (which includes Nalcor-Newfoundland and Labrador Hydro debt), the improvement is substantial; according to the 2011 Budget estimates:

	As of March 2007	As of March 2011	Decline in Debt
Public Sector Debt	$8.5 billion	$7.1 billion	$1.4 billion
Provincial Net Debt	$11.6 billion	$8.2 billion	$3.4 billion.

I expect that we will see a further improvement in the forthcoming provincial budget for 2012/13.

However, the Interconnected plan has a great deal of upfront capital cost. From 2012 to completion in 2017, the cost to Nalcor/Newfoundland and Labrador Hydro will be about $4.4 billion. How it will be financed has not been finalized but clearly a substantial amount of borrowing will have to be done. The province may borrow to finance its equity injection in the project and also Nalcor will likely borrow, with the provincial government guaranteeing its debt. Overall, its seems reasonable to conclude that between $2 billion and $3.5 billion may be borrowed in the name of the province. This will likely reverse the recent trend of declining provincial debt. It may also risk the province's improved credit rating.

Of course, there are other risks. These include changes in oil prices, declines in which would not only hurt the Interconnected project relative to the Isolated Island option but would adversely affect the province's fiscal position. There are also construction cost risks and many others that have been highlighted by other submissions and presenters and considered in Nalcor's submission as well as emphasized in the MHI report. Therefore, I will not repeat them.

3. The Advantage of the Isolated Island Option

The Isolated Island option offers an opportunity to avoid the risk associated with a single large capital-intensive and irreversible investment.

In particular, the first years of this option are characterized by additions of four renewable energy projects: three hydro and one wind. These projects would ease the demands on Holyrood. Also, with efforts to ensure that freed-up hydro power from central and western Newfoundland, rather than being spilled, can be transmitted to the Avalon peninsula, more of Holyrood generation may be displaced. Moreover, as emphasized earlier, the capital expenditure on abatement equipment at Holyrood should not be carried out at all. Pollution abatement can be kept at current levels by continuing to use 0.7% sulphur fuel or even improved by moving to 0.3% sulphur fuel.

The advantage of following this variation on the Isolated Island option allows more time for assessments of other options for the Muskrat Fall development. Admittedly, it must be recognized that Holyrood's useful life is likely to end in the 2030s, and it is also desirable to move from polluting thermal generation. Still, reliance on Holyrood can be contained for several years to come.

Use of time simply to delay Muskrat Falls is not wise. However, there are options that I think need further exploration. Studying these options has been placed outside the PUB's reference question. And I do not present them for the PUB's consideration. Rather, I am merely listing them to highlight the potential advantage of following the Isolated Island option up to when on-island renewable projects cannot meet further load growth. Briefly, the list is:

- Natural Gas. Both the use of natural gas from the offshore and, quite distinctly, the use of liquefied natural gas using a floating conversion vessel as suggested by Stephen Bruneau and Cabot Martin, respectively, seem worth more exploration. Burning natural gas creates far less pollution, and, if it can be economically delivered by either method, would likely require less upfront capital cost. I have no sense as to how economic or feasible these options might be but they seem attractive enough to warrant more careful study.

- Pricing and Conservation. I have argued elsewhere that the absence of any pricing signal that reflects marginal cost is a great impediment to efficiency in the electricity sector.[2] Some commentators have misconstrued this to mean raising prices drastically (implicitly, more drastically than they would go up under the Interconnected plan). However, consider the use of peak pricing: with a high price during peak demand consumers pay more but offering a lower price during off-peak times can allow the consumer to save. Similarly, consider prices based on block rates. If, for example, domestic consumers are allowed to purchase a block of electricity at the current rate but a second block or third block at higher rates for those blocks then low-income consumers can be sheltered from substantially increased bills while large consumers will have an incentive to reduce consumption/adopt energy saving technologies. Allowing these

[2] A copy of that publication accompanies this submission.

sorts of pricing improvements to end-users requires that the provincial government re-assess its current regulatory policy. That takes time.

- Access to Gull Island/Churchill Falls. Currently there are court cases under way which involve (1) the right of Nalcor to use the Quebec transmission grid for export of electricity, which is relevant for the potential development of Gull Island, and (2) CFLCo's challenge to the pricing arrangements in the 1969 Churchill Falls contract. The outcome of either could have significant implications for access to electricity. These challenges could be resolved in the coming years and could lead to a more attractive option. If they do not, then Muskrat Falls will remain available, and if oil revenues continue to improve the province's debt situation over the next several years then it will be in a better financial position at that time.

4. Conclusion

Muskrat Falls does have its attractions and it may be less costly than the Isolated Island option as structured but is it the lowest cost option? For the next several years the Isolated Island option, with certain adjustments, offers lower cost per year. That time could be put to good use to consider other options before committing to such a high-cost irreversible capital investment.

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