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Newfoundland's Electricity Options: Making the Right Choice Requires an Efficient Pricing Regime

By
James P. Feehan

- The Government of Newfoundland and Labrador is assessing whether to authorize the multi-billion dollar Muskrat Falls hydroelectricity project on the lower Churchill River in Labrador. Proponents say it is needed to handle expected increases in electricity consumption.
- A better first step, however, would be to reform provincial regulations that set artificially low prices for electricity and support excessive power consumption, which is a problem in Newfoundland as it is in other provinces.
- Changing regulatory regimes so that the price of electricity reflects underlying costs would make economic sense and promote energy conservation. For Newfoundland, such a change could make the expensive Muskrat Falls project unnecessary.

On the island of Newfoundland, electricity demand will soon press production capacity to its limits: so says the province's Crown Corporation for energy, Nalcor Energy. In step with its subsidiary, Newfoundland and Labrador Hydro (NLH), Nalcor favours the first of the following two solutions to this problem:[1]

1. the Muskrat Falls Plan (MFP): immediately developing this hydro site on the lower Churchill River and bringing its electricity to the island and the Maritime Provinces; or
2. the Isolated Island Option (IIO): adding a mix of new wind, small on-island hydro, and oil-fired electricity generation facilities to existing capacity as needed.

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1 In Newfoundland, NLH provides most generation and transmission and some distribution services. The other major player is Newfoundland Power, a private company that is primarily a distributor. It buys most of its power from NLH, but also has some generation capacity. There are also some small non-utility generators. See Newfoundland and Labrador Hydro (2010), p.7.

This *e-brief* argues that proceeding now with Muskrat Falls is premature at best. Instead, the Newfoundland government, like those of other provinces where electricity consumption is implicitly encouraged by inappropriate prices, should reform its pricing regime and then reconsider the options.

Background

In its 2007 Energy Plan, the Newfoundland government supported a Nalcor-led development of the lower Churchill, including a transmission link to the island. That plan acknowledged that the alternative is continued reliance on a 490 megawatt (MW) oil-fired electricity plant at the town of Holyrood on the island.[2] The Holyrood plant has long been a significant source of greenhouse gases and air pollutants and has incurred rising costs – its fuel cost per MW hour has followed an upward trend since 1999, reaching about $135 in 2011 (Chart 1). Also, Nalcor argues that, unless the lower Churchill is developed, consumption growth will push Holyrood to its capacity, with the result that additional oil-fired generation plants will have to be in place by the early 2020s.

Federal and provincial legislation required that Nalcor complete an environmental impact statement for its lower Churchill project and that it be subjected to a review. Accordingly, the two levels of government established a Joint Review Panel. During the review process, Nalcor opted to develop the lower Churchill's Muskrat Falls site (824 MW), leaving lower Churchill's other, larger site, Gull Island, to be developed at a later, unspecified time.[3] To develop Muskrat Falls, Nalcor has partnered with Emera, the owner of Nova Scotia Power.[4] According to terms announced in November 2010, Nalcor will incur a capital cost of $4.4 billion to develop Muskrat Falls and bring the power to the island. Emera will invest $1.8 billion and its main role is to provide a $1.2 billion undersea transmission cable between Newfoundland and Nova Scotia, for which it would receive 20 percent of Muskrat Falls' annual generation as compensation. Additionally, Nalcor gets access to that cable, ending Newfoundland's isolation from the North American electricity grid.

This arrangement has its appeal. It would displace oil-fired generation in Newfoundland and enable Nalcor to export electricity supply that exceeds island demand.[5] As well, it would benefit the Maritimes by providing energy from a renewable source, which is consistent with those provinces' energy plans.[6]

On the other hand, Muskrat Falls' electricity will be expensive. Doubts have been raised by critics who ask if there are not better alternatives, such as new small on-island hydro developments, wind energy, and conservation.[7] Moreover, the Joint Review Panel, which published its report in August 2011, concluded: "Nalcor's analysis that showed Muskrat Falls to be the best and least-cost way to meet the domestic demand requirements is inadequate..."[8]

Nalcor's response is that the Isolated Island Option is inconsistent with the policy direction in the Energy Plan, creates air pollution (by including additional oil-fired facilities) and, largely due to rising fuel costs, is $2.2 billion more expensive

2 There is no natural gas availability nor any plans for bringing liquefied natural gas to the island.

3 This de-emphasis on developing Gull Island and its 2,250 MW in generation capacity likely reflects Nalcor's difficulties in obtaining access to Quebec's electricity grid; see www.releases.gov.nl.ca/releases/2011/nr/0407n10.htm. Such access is necessary to export the huge surplus that it would generate. That dispute may take several years to resolve.

4 The parties are still working on finalizing their agreement. Its initial terms are at www.nalcorenergy.ca/muskrat-falls-agreement.asp.

5 Considering Nova Scotia's and New Brunswick's proximity and reliance on oil and coal-fired electricity generation, they are the obvious export markets. Selling in the New England market is also likely but the additional transmission costs, competition from Hydro-Quebec and potential use of shale gas as a new energy source in that region come into play there.

6 See New Brunswick Energy Commission (2011) and Government of Nova Scotia (2010).

7 For example, see Vardy (2011).

8 Joint Review Panel (2011), p.34.

Figure 1: Holyrood Fuel Cost per MW Hour (nominal $)

Source: Newfoundland and Labrador Hydro.

based on present-value cost projections up to 2067: $8.8 billion versus $6.6 billion for the MFP. However, that cost difference is based on a number of critical assumptions, including continuation of regulated prices that encourage consumption.

Inefficient Pricing Leads to Waste

The price of electricity in Newfoundland is determined by cost-of-service regulation as implemented by the Public Utilities Board. This practice, which is similar to that of most provinces, sets the price at the average cost of production. Yet, a fundamental economic principle is that efficient resource allocation requires that the price of a commodity equal the cost of producing an additional unit of it, which is more than the average cost.[9] Also, this efficiency rule implies that variable prices are needed to deal with seasonal differences in electricity consumption and peaks in demand. With the price set at average cost and not permitted to change in light of seasonal and peak demands, efficiency cannot be achieved.

On the island, low-cost hydro-electric facilities produce most of the electricity but must be supplemented by oil-fired generation at Holyrood to match consumption. The cost of a MW hour from Holyrood greatly exceeds the system's average cost. Setting the price at average cost therefore creates a net loss to the economy. For instance, in 2011, the regulated price for most residential consumers was $105 per MW hour. Yet, a MW hour from Holyrood costs at least $135, based on fuel

9 Therefore many economists advocate electricity-pricing reform along those lines; see, e.g., Dewees (2010) and Boyer (2005) in regard to Ontario and Quebec, respectively.

cost alone.[10] Consumers facing a price of $135 would choose to purchase less power than when it is priced at $105. Producing the extra amount wastes resources; in this case at least $30 per additional MW hour. This waste worsens over time because costly additions to capacity are needed to accommodate higher-than-otherwise levels of consumption and peak demands.

A move to efficient pricing would handle these problems and, despite the figures above, would not imply a 30-plus percent across-the-board price increase. That is because Holyrood's costs are not relevant during part of the year. During the warmer months of June to September, consumption is low and can be met by hydro generation alone. With the Holyrood plant either not operating or operating at very low levels, little or no price change is needed during this time. For the coldest months, December to March, Holyrood operates continuously and at times peak demand pushes it to its limit. A higher price – one that reflects Holyrood's production cost – is required during this season. If time-of-day prices are feasible, then higher prices should be used in those hours when peak demand threatens black-outs.[11] However, consumers can avoid those peak prices by changing the time of electricity use. For the remaining four months (April, May, October and November) there is moderate reliance on Holyrood so an intermediate price increase is called for.

Re-considering the Isolated Island Option

The Isolated Island Option starts with a wind and three small, on-island hydro projects but by the early 2020s requires new oil-fired electricity generation plants to keep up with growing consumption. According to Nalcor, if consumption growth is half of what it expects, the MFP still has a cost advantage over the IIO, at $0.75 billion.[12] However, in arriving at that figure, Nalcor assumed that the need to increase capacity would not change.[13] That is highly questionable. With such moderation in consumption growth, planned additions of oil-fired generators in the 2020s appear redundant.[14] Also, with less consumption, the need for pollution abatement equipment at Holyrood may be unnecessary (see Box 1 for elaboration). The resulting savings would be about an additional $1 billion.[15] So, halving consumption growth eliminates MFP's cost advantage.

One way to reduce consumption growth is better pricing. And since Holyrood, is the "topping-up" provider of electricity, a price increase can be leveraged for maximum effect. For example, various studies suggest that a, say, 20 percent price increase would induce consumers to cut back by about 5 percent.[16] But if all the corresponding reduction in generation is concentrated at Holyrood then, since it supplies about 15 percent of all electricity, reliance on it would be reduced by one-third.[17] That would save fuel, cut pollution, and avoid the need for costly additions to capacity. Presumably, properly designed seasonal and peak prices could lead to an even better outcome. Moreover, such pricing would increase NLH's profits and the provincial government, as NLH's owner, could draw on that additional revenue to address adverse impacts on electricity consumers or fund other worthwhile public policies.

10 The environmental damages from burning fuel and the additional operating costs make the true figure somewhat higher.

11 Time-of-day rates require installation of "smart" meters and consumer education on how to adapt to peak pricing.

12 The lower forecast still includes a substantial increase in demand due to a new nickel processing plant that will be in full production by 2016. However, completing the IIO's wind and hydro projects by then would largely counteract this.

13 See Navigant Consulting Ltd. (2011), p. 59.

14 Newfoundland and Labrador Hydro (2010), Figure 7-2, shows forecasted consumption and generation under the IIO. A gleaning of Figure 7-2 suggests no need for additional oil-burning capacity if consumption growth is reduced by half.

15 For the costs of the abatement equipment and the oil-fired units scheduled for the 2020s, see www.nalcorenergy.com/assets/infocentre_infosheets_meetingloadonanisolatedislandsystemapril18final.pdf

16 This figure is based on Canadian estimates in Bernard and Chatel (1985) and Teig (2010) as well as information from Newfoundland Power and Nalcor.

17 In 2010, NLH's oil-fired generation was 14 percent of total electricity made available by it and Newfoundland Power for sale. This percentage varies with hydrological conditions and consumption levels.

Box 1: Pricing as a Substitute for Pollution Abatement Equipment

Under the Isolated Island Option, which entails a continued reliance on Holyrood, the Energy Plan requires NLH to install abatement equipment at the facility. Its capital cost is approximately $580 million and, adding to that cost, the equipment would slightly reduce the plant's efficiency. The benefits would be the elimination of SO_2, NO_X and particulate emissions. However, those emissions have been substantially cut in recent years. That is because the plant switched to higher quality oil and because it now burns less oil due to the loss of two energy-intensive industrial customers. According to data provided by Nalcor, in 2010 Holyrood's NO_X emissions were down 49 percent from 2004 levels; particulate emissions were 72 percent lower; and SO_2 emissions were 82 percent less. This does not leave a lot to abate. Moreover, appropriate pricing would complement these achievements. It could stem growth in electricity consumption to keep reliance on Holyrood in check and thereby avoid this $580 million expense.

In short, supplementing the IIO's wind and hydro projects with proper pricing could make it less costly than the Muskrat Falls Project – at least up to the time when Holyrood will have outlived its working life, which, Nalcor confirms, is in the early 2030s. This implies that the time to consider Muskrat Falls among the possible alternatives to Holyrood is in the mid-2020s; not now.

Conclusion

The electricity options facing Newfoundland are costly. Making the right choice, getting the timing right, and maximizing the net benefits have to be based on the correct price signals. The provincial government should allow efficient pricing and then reconsider the options. Authorizing Muskrat Falls now would be premature and imprudent.

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James P. Feehan is Professor of Economics at Memorial University of Newfoundland.

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