
LOWER CHURCHILL RIVER HYDROELECTRICITY DEVELOPMENT

*The Project's Day in the Sun May Have
Finally Arrived*

TD Economics

Special Report

June 16, 2005



Bank Financial Group

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Executive Summary

With much of Canada facing prospects of electricity shortages, there has been considerable focus placed on the need to develop new sources of power. This study shines the spotlight on one major supply-enhancing opportunity that is currently making waves – namely, the potential for a hydroelectric development at Lower Churchill in Newfoundland & Labrador.

The Lower Churchill project comprises both the proposed generation facilities at Gull Island and Muskrat Falls and the associated transmission infrastructure. Combined, this development would carry a direct capital cost of roughly \$3.3 billion (2004 dollars) and have a planned generation capacity of nearly 3,000 MW, representing the fourth largest hydroelectric project after La Grande in Quebec, Newfoundland & Labrador's Churchill Falls, and Manic complex in Quebec. In short, while this hydroelectricity development would be smaller than its counterpart in Churchill Falls, it would still mark one of the largest of its kind in Canadian history.

On again, off again

The idea of developing the Lower Churchill hydro resource is not new. In fact, proposals to develop the area have been floated around as far back as the early 1970s, shortly after work on the Churchill Falls project began to gear up. But, while the Churchill Falls development was ultimately completed in 1974, Lower Churchill never managed to get off the ground. Over the past three decades, there have been several efforts to kickstart the project. And, each time, hopes have ended in disappointment – most recently in 2002.

The events surrounding Churchill Falls have been most important impediments that have blocked successful development of Lower Churchill. With Labrador situated be-

tween Quebec to the west and the Atlantic Ocean to the east, the most economically viable option – especially at that time – was to transmit the power across Quebec's territory. As such, in 1969, the Churchill Falls (Labrador) Corporation Limited entered into a 65-year deal to sell electricity to Hydro-Quebec. Unfortunately for Newfoundland & Labrador, the price in the contract proved to be leaps and bounds below that which ultimately prevailed in the market, generating a windfall gain for the province of Quebec. For an Atlantic province that has recorded a per-capita income well below the national average rate, these events left some deep and long-lasting scars among the residents.

What's more, the sour legacy of the Churchill Falls contract enormously complicated the chances of arriving at a deal between Newfoundland & Labrador and Quebec to develop Lower Churchill. Not only was trust between the parties damaged, but negotiations over Lower Churchill were usually tied in some shape or form to re-configuring aspects of the 1969 contract. But, while Quebec has addressed some of Newfoundland's concerns in two side deals in the 1990s, re-negotiating the contract has been a non-starter.

Lower Churchill Project – the time is right

Since taking office in 2003, Newfoundland & Labrador Premier Danny Williams has placed the development of Lower Churchill at the top end of his list of priorities. Although the question has been raised as to why the Premier would be interested in resuscitating a project that has failed in so many earlier attempts, a closer look at the dramatic shift in the landscape provides a good explanation. Most importantly, market opportunities have improved significantly over the past few years, following the 2003

power blackout and warnings issued by both the Ontario and Quebec governments that their respective provinces are confronting looming power shortages. Even in Newfoundland & Labrador, which has enough electricity to supply its domestic needs, there is the potential to displace power generated by the less-environmentally-friendly oil-fired generation at Holyrood, not to mention facilitating the operations of large industrial projects.

Federal appetite has grown for east-west power grid

Another tailwind blowing in favour of the Lower Churchill development has been the increasing interest of the federal government in the power file, and notably, in assisting the development of an east-west power grid. In the past, the federal government has elected to stay on the sidelines with respect to electricity infrastructure development, owing in part to the fact that electricity falls under provincial jurisdiction. However, armed with a strong fiscal position, the rising concerns about power supplies in the country's two largest provinces, and the need to meet Canada's commitments under the Kyoto Accord, the federal government appears to be changing its tune. The April 2005 federal Kyoto plan announced some \$10 billion for environmental measures by 2012, a portion of which will be eligible for investments in "clean" electricity.

First Nations must be part of the process

There is no doubt that there remain some roadblocks that will need to be dealt with before the vision of developing Lower Churchill becomes reality. And, chief among them is addressing the needs of aboriginal communities. The Labrador Innu, Labrador Metis and Innu peoples of Quebec have all claimed aboriginal rights and title to land in Labrador, including the proposed development area. The Labrador Innu are the only aboriginal party with a land claim overlapping the proposed development area that has been accepted for negotiations by the governments of Canada and Newfoundland & Labrador. Happily, the players involved in the negotiations, namely the government of Newfoundland & Labrador, have got the message that aboriginal communities will need to be involved in the process from the outset if there is any hope in achieving success.

Environmental impacts less with Lower Churchill

A selling feature of the proposed hydroelectric project is the potential to lower greenhouse gas emissions. But, while this is only one, albeit important, aspect of the environment – and the overall impact will need to be assessed before development can proceed – there are other factors that would help the project pass the overall environmental test. For one, although large-scale hydroelectric projects often result in the displacement of local communities along the route, this is not an issue in the case of Lower Churchill. Second, the area around the proposed project is in a temperate and boreal climate, implying that emissions from the reservoirs would be considerably less than those located in tropical regions. And, above all, Lower Churchill would be a "run-of-the-river" development, and thus, result in relatively little flooding.

Project's economic benefits could be substantial

A reliable and abundant supply of power has been, and always will be, a key driver of Canadians' living standards. And, to the extent that hydroelectric power flowing from Lower Churchill can supply markets that are facing the prospect of power shortages down the road, notably Ontario, this would provide a boost to the nation's long-term growth rate. Undoubtedly, though, the largest share of benefits would be enjoyed by Newfoundland & Labrador. Coming up with precise measures of these benefits is made virtually impossible at this stage, since the configuration of the project, the price the power would be sold at, and what share of labour and materials could be supplied locally remain big question marks. In the short run, there will be a significant boost to both employment and economic growth associated with the construction phase of the project. The longer-term rewards related to development would stem primarily through raising incomes increases, and hence, provincial government revenues. This higher revenue profile would lend a helping hand to the Newfoundland & Labrador government as it tackles its fiscal challenges.

Calls for proposals generate a wave of interest

In January 2005, the Williams government issued a request for expressions of interest and proposals in the

development of the Lower Churchill project. At the time of writing, the March 31st, 2005 deadline had expired, and the government announced it had received a total of 25 proposals. Based on a preliminary review, up to 10 were considered to be comprehensive. While most of the proposals have been kept under wraps, one public-private partnership consisting of the governments of Ontario and Quebec and the engineering construction group SNC-Lavalin Inc. issued a press release to indicate they had made a joint submission. A committee consisting of representatives from the provincial government and Newfoundland & Labrador Hydro are currently making an initial assessment, with the complete process – including feasibility studies and commercial negotiations – expected to take up to 18-24 months.

The Bottom Line

With Ontario and Quebec thirsty for new power, and with Canada ramping up efforts to lower greenhouse gas emissions, market conditions are highly supportive of a Lower Churchill hydroelectric development in Labrador. And, recently, the federal government has shown an increased desire to put its financial weight behind the establishment of an east-west power grid, and hence, possibly in lending a helping hand to this power project. And, while a number of challenges remain in bringing aboriginal communities on board and in passing the environmental test, these roadblocks appear more surmountable today than in the past. *All in all, despite encountering storm clouds since the mid-1970s, the Lower Churchill development's day in the sun may have finally arrived.*

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TD Economics' March 2005 Special Report entitled *Electricity in Canada: Who Needs it? Who's Got It?* focused on the supply-demand squeeze facing many of Canada's regional markets. In that report, we highlighted the need to encourage conservation by increasing electricity prices to better reflect costs of production. Still, in our view, the solution to the squeeze could not rest on improved demand-side management alone. In addition, scouting out new sources of "clean" power would need to be an important ingredient, not only to shore up stagnating or declining generation capacity in parts of Canada, but also to assist in the nation's goal of lowering greenhouse gas emissions.

This study will shine the spotlight on one major supply-enhancing opportunity that is currently making waves – namely, the potential for a hydroelectric development at Lower Churchill in Newfoundland & Labrador. Although a number of barriers have scuttled hopes to develop Lower Churchill in the past, these impediments are becoming increasingly surmountable. Most importantly, Ontario and Quebec, two nearby markets that have enjoyed adequate supplies of power historically, are now eager to secure

additional electricity sources. Add to that the renewed enthusiasm of the Newfoundland & Labrador government in harnessing the economic potential of the Lower Churchill resource – along with the increased interest shown by the federal government in supporting such an initiative – and the likelihood that the project will go ahead has never been greater.

Fourth largest hydro project in Canada

The Lower Churchill hydroelectric project comprises both the proposed generation facilities at Gull Island and Muskrat Falls and the associated transmission infrastructure. Gull Island is located 225 kilometres downstream from an existing hydroelectric facility at Churchill Falls and is envisaged to have a capacity of 2,000 MW and the potential to produce 11.9 terawatt hours (TWh) of energy annually (one terawatt hour = 1,000,000 megawatt hours). Muskrat Falls is another 60 kilometres down the river, with a smaller planned production capacity of 824 MW and the potential to produce an average of 4.8 TWh annually. To put this in perspective, the total capacity at Lower Churchill (2,824 MW) would represent about 4 per cent of Canada's current hydroelectric capacity of about 70,400 MW and rank as the fourth largest hydroelectric development project in the country, after La Grande (15,000 MW), Churchill Falls (5,428 MW), and the Manic complex (5,000 MW). In short, while this hydroelectricity development would be smaller than its counterpart in Churchill Falls, it would still mark one of the largest of its kind in Canadian history.

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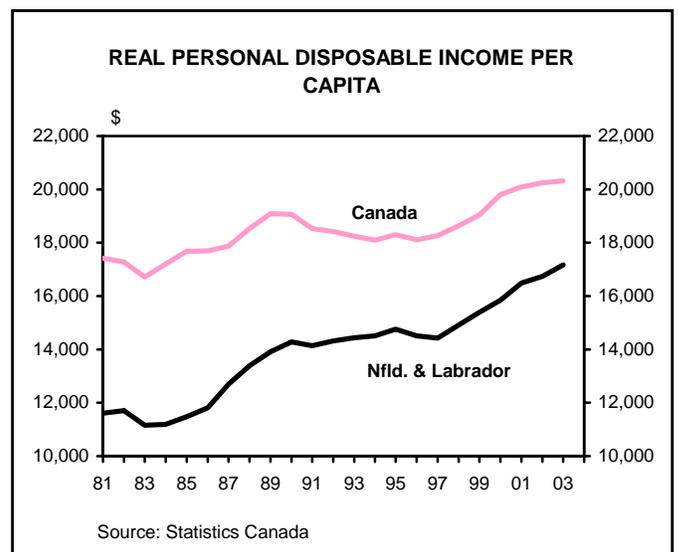
Source: Government of Newfoundland & Labrador

On again, off again

The idea of developing the Lower Churchill hydro resource is not new. In fact, proposals to develop the area have been floated around as far back as the early 1970s, shortly after work on the Churchill Falls project began to gear up. But, while the Churchill Falls development was ultimately completed in 1974, Lower Churchill never managed to get off the ground. Over the past three decades, there have been several efforts to kickstart the project. And, each time, hopes have ended in disappointment – most recently in 2002.

Unquestionably, the most important impediment that has blocked the successful development of Lower Churchill has been its counterpart at Churchill Falls. As we explain in the text box on page 4, the Churchill Falls (Labrador) Corporation Limited entered into a 65-year deal to sell electricity to Hydro-Quebec at a rate that proved to be leaps and bounds below the level which ultimately prevailed in the market, yielding a windfall financial gain for

Quebec. According to a study carried out by the Centre of Spatial Economics, the low contract price has cost roughly \$1.2 billion in foregone economic activity, 6,000 jobs, and about \$200 million in lost government royalties.¹ For a



CANADA'S LARGEST HYDRO GENERATING STATIONS

Name of Generating Station	Location	Water Source	Date	Capacity
			Commissioned	MW
La Grande complex*	Quebec	La Grande Riviere		15,552
Robert-Bourassa (formerly called La Grande-2)			1979-81	5,616
La Grande-3			1982-84	2,418
La Grande-4			1984-86	2,779
La Grande-2A			1991-92	2,106
La Grande-1			1994-95	1,436
Laforge-1			1993-94	878
Laforge-2			1996	319
Churchill Falls	Labrador	Churchill River	1971-74	5,428
Manic complex	Quebec	Manicouagan		5,044
Manic-2			1965	1,024
Manic-1			1966	184
Manic-5			1970	1,528
Manic-3			1975	1,244
Manic-5PA			1989	1,064
Stations on the Nelson River	Manitoba	Nelson River		3,925
Kelsey			1961	223
Kettle			1974	1,220
Jenpeg			1979	132
Long Spruce			1979	1,010
Limestone			1990	1,340
Gordon M. Shrum	British Columbia	Peace River	1968	2,730
Sir Adam Beck (SAB) complex	Ontario	Niagara River		2,174
SAB 1			1922	595
SAB 2			1954	1,405
SAB-PGS		1957	174	
Bersimis	Quebec	Bersimis		1,970
Bersimis-1			1956	1125
Bersimis-2			1959	845
Aux Outardes	Quebec	Aux Outardes		1,926
Aux Outardes-3			1969	824
Aux Outardes-4			1969	630
Aux Outardes-2			1978	472
Revelstoke	British Columbia	Columbia River	1984	1,843
Mica	British Columbia	Columbia River	1973	1,736
Beauharnois	Quebec	St. Lawrence River	1932-61	1,658
R.H. Saunders	Ontario	St. Lawrence River	1958-59	1,016
Sainte-Marguerite	Quebec	Sainte-Marguerite	2003-04	882
Seven Mile	British Columbia	Pend d'Oreille River	1979-2003	804
Peace Canyon	British Columbia	Peace River	1980	694

* The more appropriate name for what is usually referred to as James Bay project.

Source: Hydro-Quebec, Manitoba Hydro, BC Hydro, Ontario Power Generation

1969 Churchill Falls Contract Left its Mark on History

The Churchill Falls Hydroelectric facility in Labrador, with a capacity of 5,428 megawatts (MW), is currently the second largest power-producing development in Canada after La Grande complex in Quebec. The development accounts for just under one-tenth of Canada's current hydroelectric capacity.

A few key facts about the project:

- Churchill Falls was built during the period of 1967-74 at a cost of nearly \$950 million (about \$4.4 billion in 2004 dollars).
- From its inception, the project has been owned and managed by Churchill Falls (Labrador) Corporation Limited – or CF(L)Co – a separate and independent company set up by the British Newfoundland Corporation Ltd. in 1958. The latter was a private company formed by British investors in 1953 in order to develop Newfoundland and Labrador's water and mineral resources. In 1974, the Newfoundland & Labrador government nationalized CF(L)Co. The company is now owned by the Crown Corporation Newfoundland and Labrador Hydro (NLH), which holds a 65.8-per-cent equity share. The remaining interest of 34.2 per cent is held by Hydro-Quebec.
- Negotiations on the sale of power produced at Churchill Falls started in 1963, well before the start of construction, and continued until 1966, when Hydro-Quebec signed a letter of intent with CF(L)Co. The agreement removed a significant impediment to the development of the project.
- The final power contract and financial arrangements were not concluded until May 1969. Even then, the effective date of the contract would not start until September 1, 1976.
- Initially, the term of the contract was for 40 years. However, even before the signing of the contract, Hydro-Quebec asked for a 25-year extension be added to it at renewal, which CF(L)Co agreed to. This meant that the deal would last until 2041.
- Under the contract, all of the power from Churchill Falls would be sold to Hydro-Quebec, with the exception of 300 MW, which was reserved for Newfoundland & Labrador, and 225 MW allocated to the Twin Falls Power Corporation Limited for use by the two iron ore mines in Labrador. (The latter allocation was to compensate for the closure of a hydro plant owned by the Twin Falls company. The hydro plant,

which used to supply the power requirements of the iron ore mining industry in Labrador, was mothballed in 1974 as the water from the facility was diverted to the Churchill Falls project. The Twin Falls company, which still exists, owns the transmission facilities that connect Churchill Falls to western Labrador.)

The price has raised a storm

In return for taking on the risk of guaranteeing a long-term purchase arrangement, Hydro-Quebec fought for a favourable price of power. The 1969 contract established a periodically declining base price to be paid by Hydro-Quebec for the Churchill Falls power. These base rates were to be adjusted once the final capital costs were known. The final adjusted prices declined every five years from an initial price of 0.296 cents per kWh starting in 1976 down to 0.272 kWh effective from 1991 to 2001, to 0.254 cents per kWh from 2001 to 2016, and then to 0.200 cents for the final 25 year contract extension period from 2016 to 2041. Thus, not only was there no inflation protection built in, but prices actually dropped in nominal terms during the first 40 years of the contract. The erosion in real terms would increase rapidly during the oil price shocks of the early 1970s and 1980s, as inflation was sent skyrocketing.

To get a better understanding of how Quebec has benefitted from the Churchill Falls contract, compare the contract prices to that of Quebec's "heritage" pool of electricity (i.e., the wholesale price at which Hydro-Quebec transfers its electricity to its distribution subsidiary.) This pool, which is reserved for domestic customers and has a maximum volume of 165 TWh, is priced at a rate of 2.79 cents per kWh, or about *eleven times* the acquisition cost. Even despite this huge markup, end-consumers in Quebec continue to enjoy the second or third lowest electricity rates in the country. This profit spread is even more pronounced when the power purchased from Labrador is exported outside of Quebec, instead of consumed domestically. In 2003, Quebec realized an average price of 8.8 cents per kWh, or 35 times the price of Churchill Falls power.

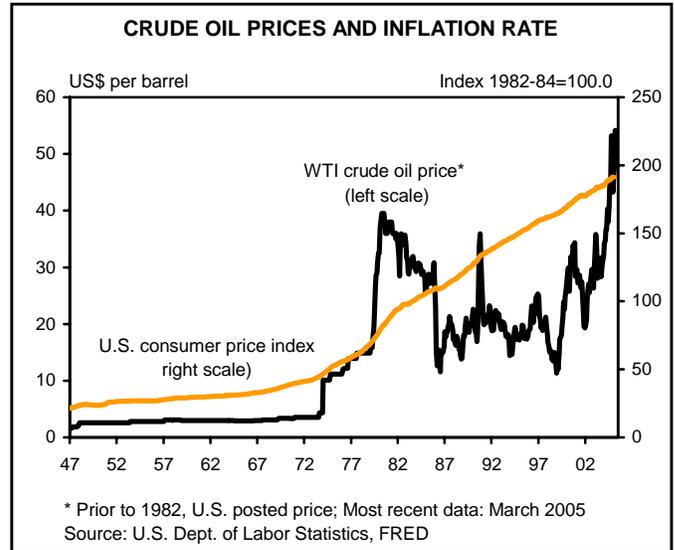
The government of Newfoundland & Labrador has tried in vain to renegotiate the terms of the Churchill Falls contract. In 1985, the Supreme Court found invalid the legislation which would have revoked the water rights granted to CF(L)Co, and in 1988, the Supreme Court rejected Newfoundland's 1976 request to recall additional power.

province that has recorded a per-capita real personal income some 20 per cent below the national average, this development unsurprisingly left some deep and long-lasting scars among its residents.

The million-dollar question that is often raised is how Newfoundland & Labrador could have found itself in such a predicament in the first place. One reason put forward is that CF(L)Co felt pressure to reach a deal in light of the fact that the company had already earmarked significant amounts towards developing the site. Secondly, and perhaps more importantly, it has long been argued from the side of Newfoundland & Labradorians that Hydro-Quebec exacted the most from the contract because it recognized the province's dilemma – notably, that owing to the location of the Churchill Falls development, the only potentially viable option at the time was to transmit the power across Quebec's territory. According to Newfoundland & Labrador, Quebec's bargaining position was driven by "the revenge of geography", which relates to the dispute between the two provinces over the boundary of Labrador. That dispute was settled in 1927, when England ruled on the side of Newfoundland & Labrador. Still, Quebec felt at that time that it could control the terms under which the Labrador hydro resources could be developed.

In response, Quebec has argued that by taking on the price and market risk implicit in a long-term deal, the province was entitled to the full rewards. Indeed, nobody could have predicted the take-off in energy prices, and accompanying surge in inflation, in 1973-74, since up until that point, both the price of power and inflation had been low and stable. What's more, it was not clear at the time that there would be a market for power in the United States. But, while Quebec has refused to re-negotiate the 1969 contract – something that Newfoundland & Labrador has deemed "unconscionable" – the province has since addressed some of Newfoundland & Labrador's concerns in two side deals, which we will discuss later.

Incidentally, the problem presented by Labrador's geography could have been addressed, or at least mitigated, had Ottawa exercised its federal authority in the same way it did in the development of natural gas pipelines, the national railway and highways. In those cases, the federal government has established a "right of way" across provincial territory in support of the national interest. But, while the federal government offered to act as mediator in the dispute in the 1980s – a request that was turned down



by Newfoundland & Labrador over concerns about bias towards the interests of Quebecers – the right to build the grid without Quebec's approval was never granted. The reasons behind the federal thinking on this issue become clear on page 11.

In any event, the sour legacy of the 1969 Churchill Falls contract was a factor that enormously complicated the chances of arriving at any deal between Newfoundland & Labrador and Quebec to develop Lower Churchill over the subsequent three decades. Not only was trust between the parties damaged, but negotiations over Lower Churchill were usually tied in some shape or form to re-configuring aspects of the 1969 contract. For example, during the discussions in the late 1970s, Quebec agreed to grant generous terms under a new Lower Churchill arrangement provided that Newfoundland & Labrador would give up any right to challenge the 1969 contract. However, the province's Minister of Mines and Energy at the time – Brian Peckford – refused to give up this right, and hence thwarted the plan.²

1990s bring the two sides closer together

Still, the 1990s marked a step forward in breaking the logjam over Lower Churchill. Building on some progress made in the early part of the decade, the two parties reached an ambitious framework agreement for negotiations in March 1998 that encompassed four major elements:

- The enhancement of the existing Churchill Falls facility aimed at increasing its capacity by 1000 MW. This expansion would involve a partial diversion of two riv-

1998 deals provide N&L with new revenues

The 1998 negotiations managed to spawn two independent side deals that were signed by the parties and then implemented. Notably, under the terms of the 1969 contract, Newfoundland & Labrador was allocated 300 MW of Churchill Falls power that would be made available for use in Labrador conditional with a three-year notice. In a 1998 deal, rather than demand the lengthy lead time, Hydro-Quebec agreed to transfer the unused share of this power – about 130 MW at the time – immediately. Better still, the power would be bought by Newfoundland and Labrador Hydro at the same low prices agreed to in the 1969 contract, but then sold back immediately to Hydro-Quebec at a more attractive price. The deal was renewable every three years originally but when it was renewed for the second time in March 2004, the term was extended to five years. While the deal yielded \$68.5 million to NLH in the first three years and about \$80 million in the first renewal, the projected revenues from the 2004 renewal were expected to reach \$230 million.

The other side deal involved the stipulation that the Churchill Falls facility make additional capacity available during the winter months, with Hydro-Quebec agreeing to purchase the 682 MW of additional capacity. The price for the capacity was \$5/kW per year during the first year of the deal but it would increase to \$50/kW per year by 2007-08. Thereafter, the price will increase by 1 per cent per year until the deal expires in 2041, simultaneous with the 1969 Churchill Falls contract. Given the NLH's 66 per cent share in the Churchill Falls project, this deal is worth more than \$1 billion. Combined, these deals yielded significant additional revenues and helped to ensure the financial viability of CF(L)Co.

ers in Quebec – the Saint-Jean and Romaine – in order to bring more water into the Smallwood Reservoir in Labrador.

- The development of the Gull site on the Lower Churchill River, which would include the construction of eight generators at a combined capacity of 2,284 MW.
- The construction of two transmission lines of 735 kV each – one from Gull Island to Churchill Falls and another from Gull Island into Quebec.
- Finally, a study of a transmission line to be built run-

ning from Gull Island, across the Strait of Belle Isle, to the island of Newfoundland. This would lay the groundwork for 800 MW of power from Gull Island to be reserved for use in the island of Newfoundland and 200 MW for Labrador.

While the Muskrat Falls site was not one of the core ingredients in the proposal, Newfoundland and Labrador Hydro and Hydro-Quebec agreed to jointly spend up to \$20 million to examine the feasibility of the project. At an estimated capital cost of approximately \$2 billion, the addition of Muskrat Falls would bring the total cost of the March 1998 deal to \$12 billion.

Unfortunately, this deal, too, never came to fruition. The main stumbling block was the failure of the two parties to reach a consensus on the particularly thorny issues of price and marketing arrangements. Some observers also cited concern over the timing of the project, citing the glut of low-cost power that had been developing in both Ontario and the United States. On a happier note, during the negotiations, the provincial governments managed to address some of Newfoundland & Labrador's longstanding concerns in the 1969 contract in two independent side deals (see accompanying text box).

A scaled down version of the 1998 proposal – a \$4-billion, 2,000-MW hydroelectric development at the Gull Island site – was contemplated by the two sides in 2002, but ultimately met a similar fate, the draft was not finalized. Interestingly, the parties were able to get around the price hurdle this time. Hydro-Quebec agreed to purchase the power at 3.55 cents per kWh, along with an annual price escalator and a guarantee that the amount could not fall below 3.35 cents per kWh for the first 10 years. (The details of this deal were not released publicly until 2004). Nevertheless, opposition to the proposed arrangement in Newfoundland & Labrador dealt the fatal blow. The main conclusion of those who opposed the deal was that Quebec would have too much control over the project. The 2002 experience served up a reminder that some wounds remained unhealed from three decades prior.

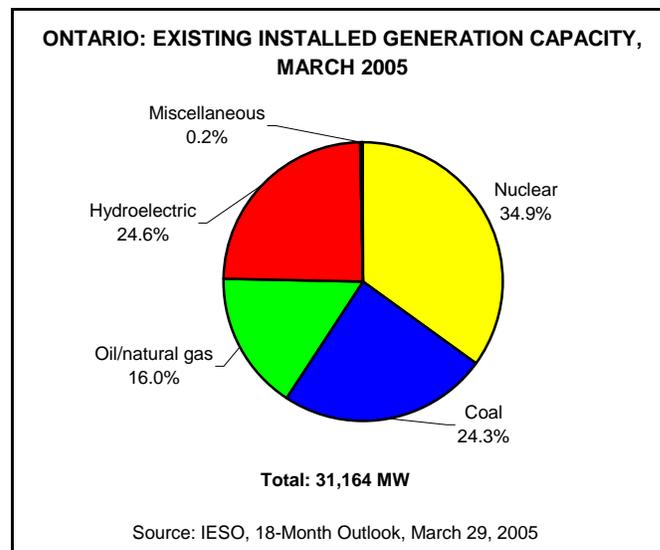
Lower Churchill Project – the time is right

Since taking office in 2003, Newfoundland & Labrador Premier Danny Williams has placed the development of Lower Churchill at the top end of his list of priorities. But, while some may wonder why the Premier would be interested in resuscitating a project that has fizzled in so

many earlier attempts, a closer look at the dramatic shift in the landscape – even since the last failure in 2002 – provides a good explanation. Most importantly, market conditions for hydroelectricity have brightened considerably over the past few years, particularly following the 2003 power blackout and warnings issued by both the Ontario and Quebec governments that their respective provinces are confronting looming power shortages. The extent of renewed enthusiasm in turning the vision of Lower Churchill power into reality was evidenced earlier this year by the considerable response to the provincial government's recent request for expressions of interest in developing the project.

Wanted in Ontario: new sources of power

As was underscored in the TD Economics March 2005 report, *Electricity in Canada: Who Needs It? Who's Got It?*, the country's most populous province – Ontario – is facing enormous pressure to secure new supplies of clean power. The provincial government, which initially planned to close all five of its coal plants by the end of 2007, recently announced that it would extend this deadline to early 2009. The sheer enormity of the task of taking the coal-fired generators out of service is highlighted by the fact that this source accounts for a huge one-quarter, or 7,580 MW, of total provincial generation capacity. The process commenced in April 2005, with the closure of the Lakeview



unit, which had a capacity of 1,140 MW. But, while other power sources have been secured to take up the slack resulting from that closure, the same cannot be said for the remaining four units, which have a combined capacity of 6,420 MW.

As shown in the accompanying table, the steps taken so far are still insufficient to close the 6,420-MW gap. After considering the projects resulting from the two requests for proposals for natural-gas-fired plants issued in April and September 2004, the ongoing refurbishment of Pickering A unit 1, and a possible – but still iffy – restart

ONTARIO'S COAL STATIONS AND STEPS TAKEN BY THE ONTARIO GOVERNMENT TO REPLACE THE PLANNED COAL CAPACITY CLOSURES			
	In-Service Date	Number of Units	Capacity (MW)
Coal stations: Total		19	7,578
Lakeview	1962	4	1,140
Lambton	1969	4	1,975
Nanticoke	1972	8	3,938
Thunder Bay	1963, 1982	2	310
Atikokan	1985	1	215
Capacity gap to be filled after closing Lakeview in April 2005:			6,438
Steps taken by the Ontario Government: Total			6,160
Request for proposals, April 2004			395
Request for proposals, September 2004			2,500
Repair of Pickering A, unit 1			515
Possible restart of Bruce A, units 1 and 2			1,500
Conawapa project with Manitoba			1,250
Remaining gap after the above steps			278

Source: Ontario Ministry of Energy, Ontario Power Generation

of Bruce A units 1 and 2, there is still a remaining gap of 1,510 MW. Even taking into account the proposed plan by the governments of Ontario and Manitoba to jointly construct a 1,250 MW hydroelectric development at Conawapa in northern Manitoba would leave Ontario short of meeting its projected requirements.

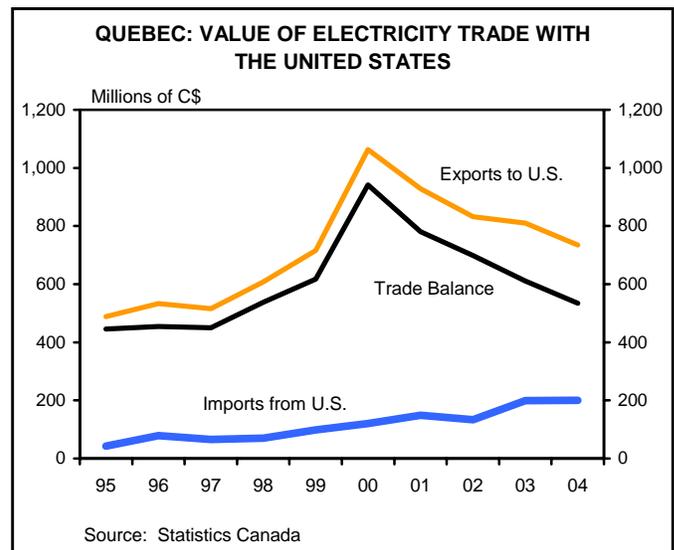
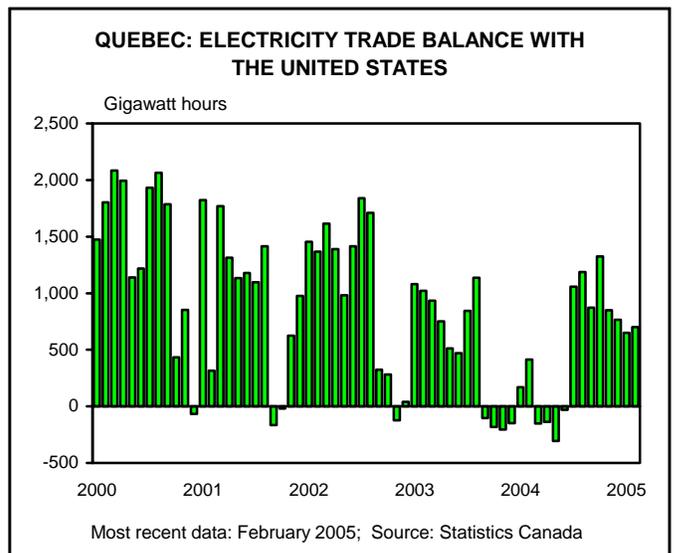
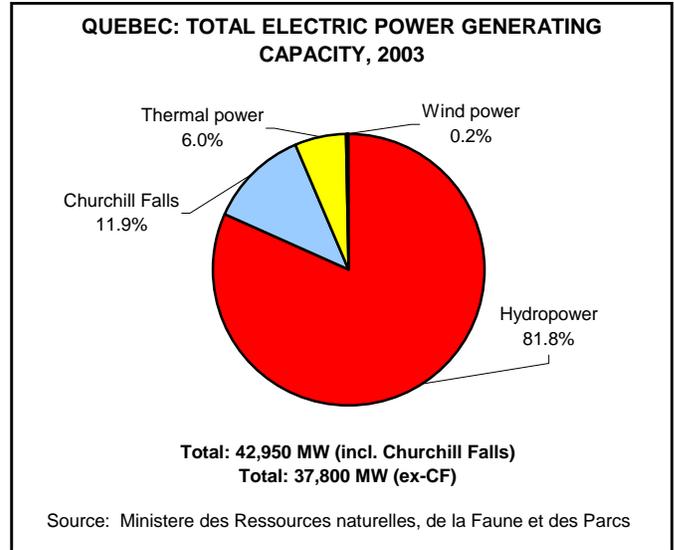
The risks to Ontario's power supply come into even sharper focus if Ontario's aging nuclear reactors are considered. Not only is the province highly dependent on nuclear energy – the 15 operating reactors account for just over one-third of current generation capacity in the province – but more than 70 per cent of the installed nuclear capacity of 13,800 MW will need to be refurbished or replaced within the next decade. Indeed, the decision of how much to re-invest in the province's nuclear program is not made any easier by the cost over-runs that stemmed from the rehabilitation of one of the province's nuclear units.

The government remains committed to closing the coal-fired plants. Still, looking at alternative sources of power – such as hydroelectricity and other renewables – would move the government closer to keeping its election promise, while at the same time diversifying the energy supply away from its heavy reliance on both coal and nuclear generation. The closure of the coal-fired generators is expected to provide up to half the province's greenhouse-gas-reduction contributions under the Kyoto Protocol.

Even hydro-rich Quebec faces challenges

One of the more surprising findings in the March 2005 TD study was the fact that supply concerns arose even in those provinces that are widely perceived to have an abundance of low-cost hydro power, namely, Quebec. In a document released in June 2004, the Quebec government admitted publicly and unequivocally that it is approaching a tight supply situation, reflecting in part growing demand within the province.³ There were several months in 2003 and 2004 when the province was a *net importer* from the United States. In fact, with exports declining and imports rising in recent years, Hydro-Quebec's trade surplus in power has been much reduced. Hydro-Quebec's net earnings from its electricity trade with the United States alone were almost 50 per cent lower in 2004 than in 2000.

Recognizing this tightening supply-demand balance, the Quebec government has moved aggressively on a long-term plan to develop new sources of supply at home, with



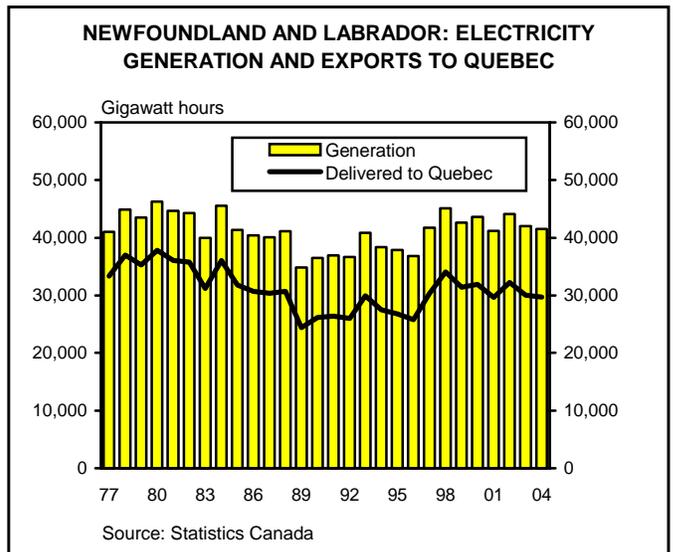
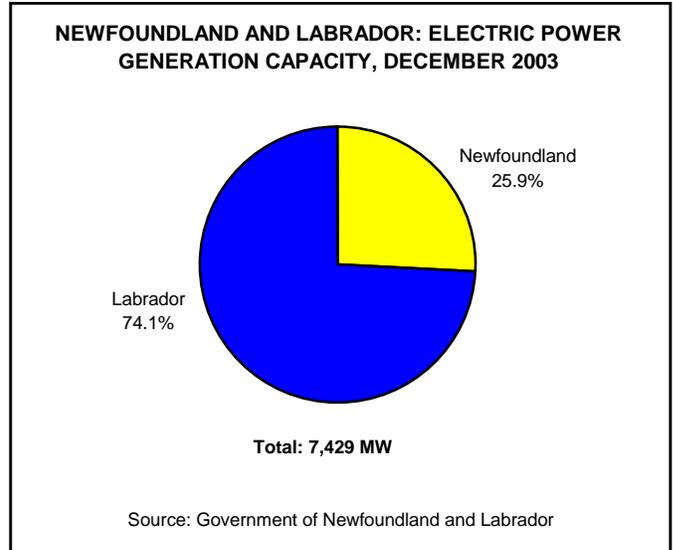
particular emphasis on realizing the province’s own hydroelectric potential. Indeed, the province still has enough undeveloped sources of hydroelectricity to more than double its present generation capacity of just under 40,000 MW. There are currently five projects with a combined installed capacity of 1,500 MW expected to come on stream by 2008, and three more totaling 2,400 MW that could be completed by 2015. As well, there are several potential smaller water and wind power projects that are likely to be constructed, providing yet another boost to the supply side of the equation.

Happily, these efforts to raise generation capacity, combined with some demand-side measures, are projected to close much of the gap in supply as far as domestic needs are concerned. Where the motivation for additional power in Quebec arises, however, is on the external side. As we noted above, the province’s historically-strong trade position in electricity, which has been assisted in part by re-exporting the power from Churchill Falls to the United States, has been eroding in recent years. And, with the Charest government championing the goal of turning Quebec into a powerhouse in the area of hydroelectricity, the province will be looking for new ways to bolster its electricity supply position. Lower Churchill could assist in achieving those ends.

New hydro power would benefit N&L

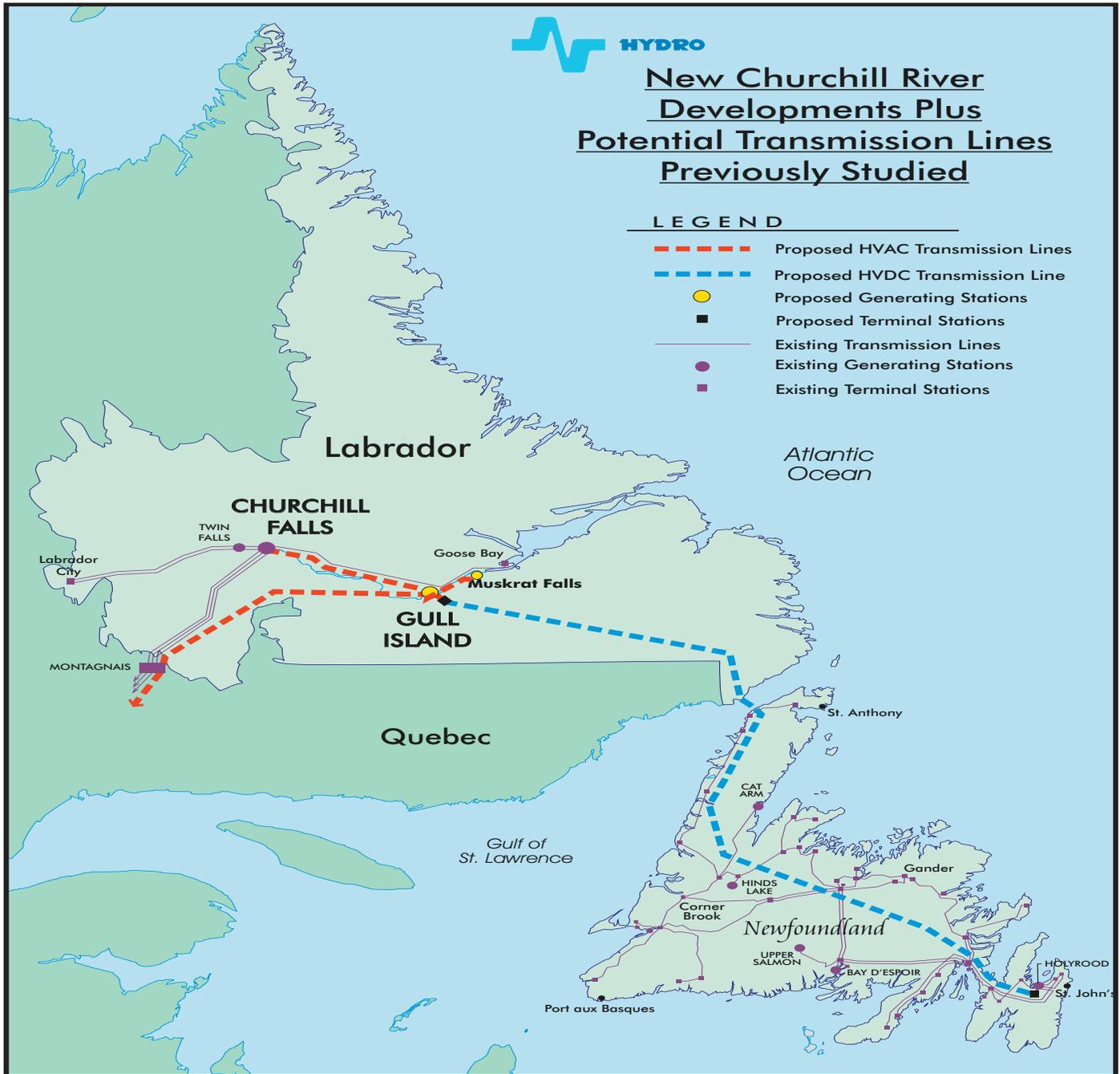
As is the case with Quebec, it would appear that Newfoundland & Labrador has more than enough supply capacity to cover its domestic requirements. The province generates more than three times its consumption, exports more than 70 per cent of its generation and does not rely on imports. Yet, most of the Newfoundland & Labrador’s output is committed to Quebec until 2041 under the 1969 contract. At the same time, there is no transmission interconnection with Labrador, leaving the island of Newfoundland isolated. And, while the island is self-sufficient in electricity – with lots of installed hydro capacity, supplemented by seasonal help from production at the Holyrood oil-fired generation facility – prospects for continued rapid economic growth in the province could lift demands for electricity down the road.

Given that building a submarine cable between Labrador and Newfoundland has been on the table in past discussions involving the development of Lower Churchill, the provincial government has long recognized the potential benefits that could flow from such a link. In particu-



lar, a renewable source of energy could be tapped to meet the growing needs on the island and potentially displace power generated by the burning of more expensive and less-environmentally-friendly fossil fuel. Moreover, it could facilitate the operations of large industrial projects.

It is important to note that with hundreds of undersea connections already built around the world, the use of this technology is already well developed. In Canada, there are two submarine cables underneath the Northumberland Strait, which link the power resource of New Brunswick with consumers in PEI. And, at a length of about 40 kilometres, a submarine cable required to cross the Strait of Belle Isle to Newfoundland would be considered on the short end of projects around the world. Still, the fact that it is a well-developed technology does not mean that it



Source: Government of Newfoundland & Labrador

will be immediately competitive with other options. Moreover, the logical markets for such a route would not be Ontario nor Quebec, but the island of Newfoundland, the Maritimes, and possibly New England and New York.

Federal appetite grows for east-west development

As we discussed earlier, the federal government has not been a big player in electricity development projects

in Canada, primarily because electricity is under the purview of provincial governments. Still, the government has always had the option of exercising special powers – including a right of way – in areas that it deems to be of national interest. It has, however, elected not to exercise those powers in the case of electricity. This has dampened any hope of constructing an east-west power grid in Canada. And, given where Labrador is situated, a feder-

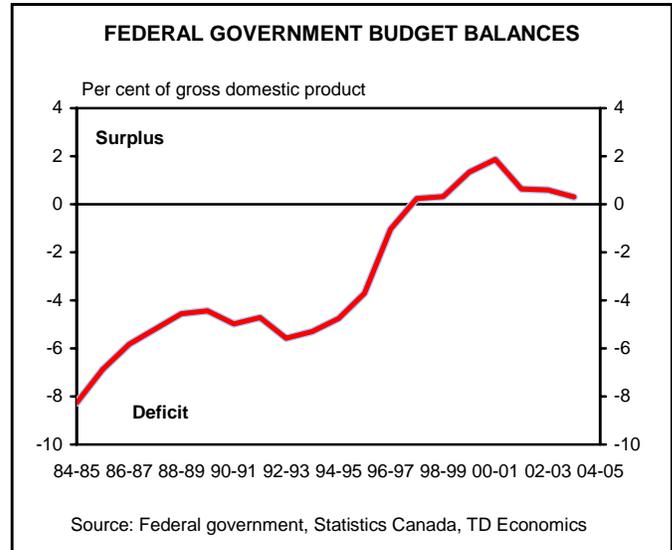
ally-granted right of way would allow for Lower Churchill to be developed even in the absence of Quebec's involvement in the project.

Why has the federal government remained on the sidelines? While fears of political fallout in Quebec may have been an important factor in staying the federal hand from invoking its right of way power across the province, an even bigger factor has been more economic in nature. In particular, the price tag attached to a new east-west grid was high and the offsetting benefits marginal. That was the major conclusion of a 1967 federal committee report on long distance transmission. And, although the report also recommended that the government take steps to promote stronger regional ties – which could ultimately lead to a national power grid – the combination of increasing access to U.S. markets and lower costs of trade with neighbouring jurisdictions Stateside took pressure off the federal government to spearhead the construction of such a pan-Canadian network.

Recently, however, the idea of building an east-west power grid has regained some momentum as a result of a number of developments over the past few years:

- The power blackout sideswiping Ontario and eight U.S. states in August 2003, which was largely caused by failures Stateside related to transmission and adherence to industry policies, has put into the spotlight the need for a made-in-Canada solution.
- With Ontario and Quebec – accounting for roughly two-thirds of electoral seats – in need of new power sources, electricity development has quickly become a national issue.
- The federal fiscal position has greatly improved, leaving the government with additional resources to invest in priorities.
- The recent coming into effect of the Kyoto Accord has cast the spotlight on the need for Canada to begin to make significant strides in meeting its targets for cuts in greenhouse gas emissions. Hydroelectricity development could support the nation in meeting those commitments, although the potential role of this energy source within the Kyoto framework is not well understood (see text box on next page).

The February 2005 federal budget, and April 2005 Kyoto Plan, provided hard evidence of the federal gov-

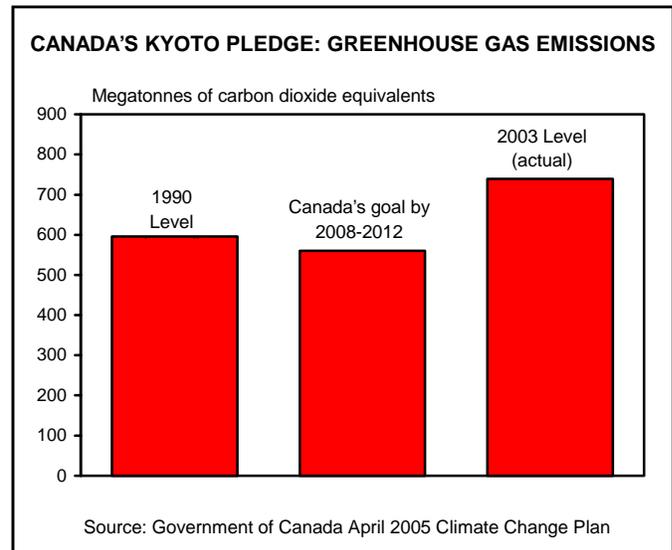


ernment's increased interest in financially backing hydroelectricity infrastructure development. In Budget 2005, the government allocated \$5 billion for environmental measures over the next five years, and in the Kyoto Plan released last April, this amount was increased to \$10 billion to cover the period until 2012. Both measures include a \$1-billion Climate Fund that could be used for electricity transmission lines and other big-ticket projects. It also includes a Partnership Fund, with an initial capital of \$250 million that could grow to up to \$2-3 billion over the next decade, which could be used for sharing the costs of "green" energy projects between the federal government and the provinces and territories. At the same time, however, both the budget plan and the Kyoto plan are short on details on how the money will actually be spent. What is clear, however, is that even if the full Climate and Partnership Funds were allocated to an east-west power grid, it would likely cover only a part of the overall cost, suggesting that the federal government's involvement in the national power grid would be limited, at least initially. The government could opt to increase funding for this purpose in future budgets.

Mirroring the change in federal attitudes, the Quebec government also appears to be warming up to the idea of an east-west power grid, saying that it would participate in the grid under certain conditions. First, Quebec needs to be compensated for the use of the transmission network it has built and developed using its own financial resources. And, second, the province wants assurances that it would be part of the talks. Those conditions appear to be reason-

Canada and the Kyoto Accord – An Update

- The Kyoto Protocol became legally binding on February 16, 2005. Although a total of 149 countries, both developed and developing, signed on to the treaty by ratification, accession, acceptance or approval, the Protocol is legally binding only on 34 developed countries that ratified it. Under that accord, those 34 countries agreed collectively to reduce their emissions of six greenhouse gases by at least 5 per cent below 1990 levels during the period 2008-2012.
- Canada agreed to an ambitious cut of 6 per cent. Since Canada's emissions in 1990 amounted to 596 megatonnes (MT) of carbon dioxide equivalents, that meant that by 2008-2012, Canada's emissions should not exceed 560 MT. By 2003, the country's emissions had grown to about 739 MT. Therefore, the pledge of Canada is now tantamount to a cut of 24 per cent below recent levels.
- In April 2005, Canada released its latest plan to achieve its Kyoto target, building on the plans put forward in 2000 and 2002. Among others, the new plan includes measures for industries that are largely responsible for the emissions and also for individual participation through an enhanced "One-Tonne Challenge" program. It also includes measures already announced in the federal budget for 2005 such as the Climate Fund and the Partnership Fund.
- Canada had worked in the past to be given Kyoto credits for its exports of clean energy such as hydroelectricity and natural gas. However, it has not been successful so far. In the last Protocol meeting held in Argentina in December 2004, Canada withdrew its request that the matter be considered in the next commitment period for the Kyoto Accord post-2012. One stumbling block to Canada's request was a basic accounting principle in the Accord where emissions are accounted for where they arise. It appears that Canada's request cannot be accommodated without re-writing the Kyoto rules.



- Canada will host the 11th meeting of the parties that established the Kyoto Protocol. The meeting, technically known as COP-11, will be held in Montreal from November 28 to December 9, 2005. It will be held in conjunction with the first of the so-called "Meeting of the Parties", a group which will set the goals for the second commitment period that will start after 2012. Canada hopes to spearhead the efforts to produce a more inclusive agreement by bringing back the participation of the United States and including developing nations such as China and India.
- The United States, which accounts for nearly a quarter of the global fossil fuel-related carbon dioxide emissions, withdrew from the Kyoto process in 2001 citing concerns about the economic costs of implementing the treaty and the exemptions of developing countries. Nonetheless, even if the government has decided against the treaty, many individual U.S. states are adopting or planning to adopt emissions cuts in keeping with the spirit of the protocol. Many businesses are also active and keen to join the emission trading schemes and markets opening up.

able. Finance Minister Ralph Goodale has said that he would not force Quebec to accept a national grid, but he hoped – through negotiations and discussions and funding set aside for such projects – to persuade the province to join in.

Quebec's more receptive attitude of late towards the transmission of power through its territory probably stems

in part from the changes in the electricity marketplace in the United States. Since the mid-90s, the U.S. Federal Energy Regulatory Commission (FERC) has required reciprocity rights from exporting entities to the United States. Entities that export electricity to the United States must provide open non-discriminatory access to their own transmission lines. For example, if the Lower Churchill re-

source were developed and there would be a buyer in the United States, then, under the FERC reciprocity requirement, Hydro-Quebec should allow the use of its transmission wires for wheeling the Labrador power to the U.S. customer, if Hydro-Quebec wants to have continued access to the U.S. market.

There's no doubt that funding out of the public treasury of an east-west power grid remains controversial. Most importantly, public subsidies of this magnitude can take a heavy toll on the treasury without generating significant offsetting private and social benefits. An extensive cost-benefit analysis of such a major development, however, is beyond the scope of this study. Not only are costs difficult to pinpoint, so too are the benefits flowing from increased electricity production and trade, a more secure domestic electricity supply, and potential reductions in greenhouse gas emissions.

First Nations must be part of the process

While the focus has largely been on the inability of Quebec and Newfoundland & Labrador to reach a deal on Lower Churchill, the assertion of rights by aboriginal communities to the area is also an important consideration in recent years. The Labrador Innu, Labrador Metis and Innu peoples of Quebec have all claimed aboriginal rights and title to land in Labrador, including that in the proposed development area. Only the land claim of the Innu from Labrador has been accepted for negotiation by the governments of Canada and Newfoundland & Labrador.

Amid these tall challenges, however, there is a silver lining. Notably, governments appear to have got the message from past experience – particularly from March 1998 – that aboriginal communities will need to be involved in the process right from the outset if there is any hope of achieving success. In addition to demanding a piece of the economic pie that would result from the Lower Churchill project, aboriginal peoples may seek for redress from the existing Churchill Falls development which has not compensated them for the economic losses that they suffered. But, while it is unlikely that the 1969 contract will be reopened, it is possible to make side deals – as those reached in the failed March 1998 framework agreement – to address these outstanding issues.

Environmental impacts less with Lower Churchill

A selling feature of the proposed Lower Churchill hydroelectric project is the opportunities that it offers in terms

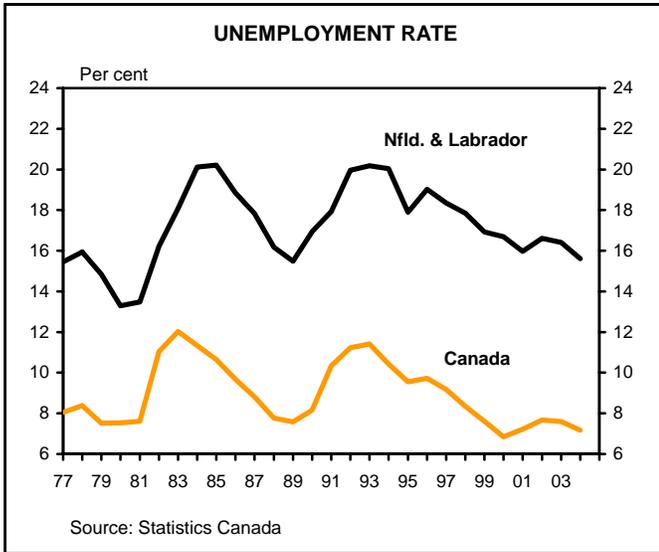
of lowering greenhouse gas emissions. Still, this is only one aspect of the environment, and the overall impact would need to be assessed before development proceeded. For one, with any large-scale hydroelectric project, there is always a concern that the construction of dams needed to generate the power would dislocate the local communities that live along the route. In addition, dams can have a negative impact on ecosystems both upstream and downstream, which in turn can harm aquatic plants and the animal species that depend on them. And, although the output from a hydroelectric unit is “clean”, some studies have shown that dams and their associated reservoirs also emit incremental bits of greenhouse gases such as carbon dioxide.

While some of these concerns may still be valid with respect to the Lower Churchill development, other characteristics of the project will indeed work in its favour. For one, there are no communities located along the path of the project, so displacement worries do not exist in this case. Second, it is in a temperate and boreal climate, which indicates that the emissions from the reservoirs would be considerably less than those located in tropical regions. And, lastly, the Lower Churchill project will be a run-of-the-river development, which would result in relatively little flooding.

Project's economic and fiscal benefits substantial

If these ongoing challenges to Lower Churchill development are overcome – and the likelihood that this will occur has never been greater – then the project has the potential to deliver enormous economic benefits not only to residents of Newfoundland & Labrador but also to other Canadians. Most generally, a reliable and abundant supply of power has been, and always will be, a key driver of Canadians' living standards. And, to the extent that hydroelectric power flowing from Lower Churchill can supply markets that are facing the prospect of power shortages down the road – notably Ontario – this would provide a boost to the nation's long-term growth rate, not to mention government coffers.

Still, there is little doubt that the region that would benefit the most from developing Lower Churchill would be Newfoundland & Labrador. That being said, coming up with precise measures of the economic and fiscal benefits is made virtually impossible at this stage, as the configuration of the project, and the price the power will be sold at, remain big question marks. Still, this has not stopped



the Newfoundland & Labrador government from taking a stab at it, predicting that the Gull Island project alone would generate directly and indirectly 17,000 person years of employment over the six-year construction period.⁴ Given that a person year is equivalent to one person working full-time at an occupation for one year, that would translate into 2,800 jobs per year on an annual average basis, and has the potential to bring down the province’s unemployment rate by about one percentage point over the period. A similar analysis that was conducted at the time of the 1998 proposal estimated the same number of jobs and a positive impact on Canadian GDP of about 0.5 per cent cumulatively over the 6-year construction period.⁵

In addition to uncertainties related to the size of the project, the share of the benefits that would accrue to the residents of Newfoundland & Labrador vis-a-vis other regions is also a wild card. That would depend largely on what share of labour and capital is supplied locally. While the large pool of available labour in the province would suggest that a sizeable proportion of the human-capital needs could be met in-province, much of the capital requirements would almost certainly need to be imported from markets such as Quebec.

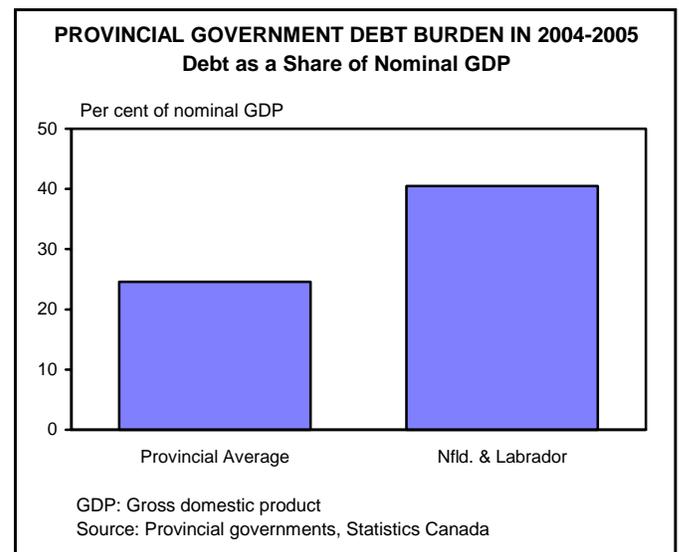
It is also important to keep in mind that these benefits are largely construction-related, which would be one-time in nature. Over the long run, the direct benefits that would be enjoyed would be primarily through increases in government revenues in Newfoundland & Labrador. And, while it is too early to even take a wild guess of what the fiscal benefit to Newfoundland & Labrador (net of equalization clawback) from the project would be, given that

the province would likely only enter into a deal with generous terms, the revenues generated would be significant. The higher revenue profile would lend a major helping hand to the provincial government in tackling its fiscal challenges.

Call for proposals generates a wave of interest

In January 2005, the Williams government issued a request for expressions of interest and proposals in the development of the Lower Churchill hydro resource. Not surprisingly, the terms of the request mirrored earlier visions of the project, with development of Gull Island, at a combined generation and transmission direct capital cost of \$2.2 billion (in 2004 dollars), at its heart. Moreover, the direct capital cost of Muskrat Falls would be an additional \$1.1 billion, including transmission infrastructure, while the government is looking for a possible link to the Island at an estimated direct capital cost of about \$1.5 billion. Thus, the total direct capital cost of all of these elements could reach \$5 billion. Still, with few requirements, the government has left considerable scope for creativity in coming up with development proposals.

The process for reaching a development arrangement could take as long as 18-24 months from the January launch of the call for expressions of interest. First, a committee composed of representatives from the provincial government and Newfoundland and Labrador Hydro (NLH) will make an initial assessment of all the proposals received. Out of those proposals, a short list will be generated. Successful proponents would then enter into an agreement to conduct a feasibility study of the proposal with the gov-



ernment and NLH, which could take up to six months. Next, the proponent(s) of the most viable and attractive development concept(s) will be selected, and they may be invited to enter into a letter of intent for negotiation of commercial principles. Successful negotiations will lead to an execution of a Memorandum of Understanding (MOU). Lastly, the negotiations of a detailed commercial arrangement would take place, and a deal would then be finalized.

At the time of writing, the March 31, 2005 deadline had expired, and the government announced that it had received a total of 25 proposals. Based on a preliminary review, up to 10 were considered comprehensive. While details of all the expressions of interest have been kept under wraps for the time being, there is one proposal that managed to make the headlines – notably, a group consisting of the Ontario government, Hydro-Quebec and the engineering construction firm SNC-Lavalin Inc issued a press release recently announcing a joint bid (see text box). Perhaps most interesting, the participation of Hydro-Quebec in the submission shows that, notwithstanding the several failed attempts, the utility remains interested in participating in the Lower Churchill development. Furthermore, Hydro-Quebec's participation in this bid would ensure that the right-of-way issue would not be a factor in the negotiations. Moreover, the partnership of the three governments raises the potential to lower the costs associated with transmitting power over long distances. This is because the full amount of Lower Churchill power could be transmitted to Quebec, while Ontario's share could be provided from power produced in Quebec.

Private sector's role to vary across proposals

The Ontario-Quebec-SNC Lavalin proposal applies a model of public-private-partnership (P3) that has been commonly used in the past for electricity infrastructure development. Given the fact that most electricity sectors across the country – including those in Ontario and Quebec – remain the domain of provincially-owned crown corporations, governments have taken a lead role in the financing and operations of projects. At the same time, however, this has not stopped the public entities from contracting out services to private-sector engineering and construction firms – such as SNC-Lavalin – in order to take advantage of expertise in the area.

While this more traditional type of P3 model might

Ontario, Quebec and SNC-Lavalin Band Together

The expression of interest submitted by the Ontario government, Hydro-Quebec, and SNC-Lavalin offers two different options:

First option:

- Ontario and Quebec would create a joint venture company to fund the development of the Lower Churchill.
- Ontario would own one-third of the company and Quebec would own two-thirds.
- The joint venture company would lease the sites from Newfoundland & Labrador for 50 years.
- SNC-Lavalin would be responsible for the engineering, procurement and construction contracts for the generation and transmission facilities, as well as for the preparation and documentation of the required environmental impact statement.

Second option:

- Newfoundland & Labrador would finance and build Lower Churchill facilities.
- Ontario and Hydro-Quebec would buy the power, with Ontario getting 945 MW (one third of the output) and Quebec buying the rest.

Both options include a proposal to build a new 1,250 MW interconnection between Ontario and Quebec, which could be in service by the summer of 2009. Until the Gull Island project is ready, Hydro-Quebec is prepared to supply Ontario with 670 MW of power, equivalent to Ontario's share in the Gull Island resource. The Quebec power is expected to come from its Eastmain 1-A Rupert Diversion project, where construction is scheduled to start in the summer of 2006, for a likely completion date of 2011.

Source: Hydro-Quebec, Ontario Ministry of Energy Press Releases, March 30, 2005

still be the dominant structure among the list of proposals, others may contain more sophisticated arrangements, including those where the private sector takes on a more active role in both financing and operating the project. In general, projects that are somewhat smaller in scope (i.e., encompass only an element of the Lower Churchill development being considered), and backed by large multinational companies, would be more conducive to this heightened degree of private-sector participation.

One distinct advantage in allowing the private sector to carry out the borrowing within a P3 framework is that Canada's provincial governments – Newfoundland & Labrador, Quebec and Ontario among them – are facing significant debt-loads and pressures to spend in a plethora of areas. And, while there is a compelling argument that governments can borrow at a lower rate and do not strive for a profit, this oversimplifies the cost issue, since it does not factor in the opportunity cost of not earmarking the public funds for other purposes such as health care or education. Moreover, it must also be considered that a degree of risk is transferred from taxpayers to the private sector for that additional compensation, and that projects often can be carried out by the private operator more quickly and on budget. Still, this does not imply that private-sector financing is always the best route to go – the structure of each proposal has to be assessed on its own merits.

Conclusion

With Ontario and Quebec thirsty for new power, and with Canada now starting to step up its efforts to lower greenhouse gas emissions, market conditions are highly supportive of a new hydroelectric project at Lower Churchill River in Labrador. And, recently, the federal government has shown an increased desire to put its financial weight behind the establishment of an east-west power grid, and hence, possibly in lending a helping hand behind the development of Lower Churchill power. And, while a number of challenges remain in bringing aboriginal communities on board and in passing the environmental test, these roadblocks appear more surmountable today than in recent decades. *All in all, despite encountering storm clouds in the past, the Lower Churchill development's day in the sun may have finally arrived.*

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