

No. 306, JULY 2010



C.D. Howe Institute
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COMMENTARY

ECONOMIC GROWTH AND INNOVATION

Power Sharing: Developing Inter-Provincial Electricity Trade

Jan Carr



In this issue...

Fundamental east-west synergies in electricity generation and transmission are waiting to be more fully exploited. Doing so would require provinces to rethink their electricity trading relationships with each other and with the United States.

THE STUDY IN BRIEF

THE AUTHOR OF THIS ISSUE

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\$12.00

ISBN 978-0-88806-812-5
ISSN 0824-8001 (print);
ISSN 1703-0765 (online)

Canadians are in the enviable position of living in a country richly endowed with energy resources, especially regarding electricity. Nature has fortuitously located hydroelectric, gas, oil, coal and nuclear resources in an alternating pattern across the country, which creates natural synergies for east-west trade. Yet it seems like man has purposely conspired to undermine these natural facilitators of interprovincial electricity trade by putting in place another alternating pattern of monopoly and competitive commercial structures and public and private ownership that erects trade barriers at virtually every provincial border.

To ensure ongoing access to US markets, most Canadian provinces have complied with US laws that require reciprocal arrangements for transmission between neighbours. Because they allow large, provincial-owned utilities to control access, these transmission policies have resulted in provinces with competitive electricity markets, where electricity customers can choose their suppliers (Alberta and Ontario), being unable to share the benefits of trade with their neighbouring monopoly utilities.

Canada needs “Made-in-Canada” electricity policies that discourage monopolization of transmission access and allow provinces to equitably and fairly trade with each other regardless of market structures. To realize the national scope of Canada’s electricity resources, provincial commercial and transmission policies for electricity must be reformed to accommodate the Canadian reality, which is a patchwork of competitive markets and monopoly utilities.

Given that electricity policy is almost wholly a provincial responsibility, most of the initiatives this *Commentary* recommends are for provincial action. Provinces should:

- adopt policies for allocating transmission capacity on intertie lines between provinces whereby each province establishes the rules for allocating 50 percent of the capacity in each direction;
- adopt rules that encourage electricity importers and exporters to use longer-term contracts and discourage their use of the shorter-term, real-time market; and
- adopt policies that ensure that all electricity customers are represented in the longer-term market including the appointment of “load serving entities” to manage the supply needs for those customers who choose not to select their own suppliers.

One recommendation requires federal support of provincial initiatives as follows:

- provinces who design their own rules for increasing interprovincial trade in ways that do not comply with the reciprocity provisions required by the US Federal Energy Regulatory Commission should be supported by the federal government in a NAFTA challenge to protect their right to continue to buy and sell electricity in US markets.

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Canada could benefit from increased interprovincial trade in electricity, which would result in increased integration among the existing provincial electricity systems. The stumbling block is the inability to realize and equitably allocate economic benefits among transacting provinces.

While electricity transmission infrastructure is also lacking, new facilities cannot be justified in the absence of economic benefits to all the parties involved in each transaction. To facilitate increased interprovincial electricity trade, therefore, the focus should be on modifying the electricity sector's commercial structures. It is these commercial structures that would realize and allocate the inherent economic benefits that, in turn, would support any necessary investment in infrastructure.

Most Canadian provinces have adopted US transmission policies to ensure access to the US market. However, significant differences between the US and Canada in the legal and commercial structure of the electricity industry mean that a "Made-in-Canada" approach to regional integration is required rather than the continued adoption of US approaches. In this reform, there is limited scope for a federal role.

Initiatives have to be taken by various provinces to overcome significant differences – with respect to public versus private ownership and competitive versus monopoly commercial structures – between their electricity systems and those of their prospective trading partners. Moreover, the onus will fall on those provinces with competitive commercial structures for their electricity systems to lead the way.

Provinces should establish mechanisms that (i) allocate interprovincial transmission capacity such that no party can monopolize it; (ii) realize and equitably distribute the economic benefits of interprovincial trade; and (iii) ensure that a "Made-in-Canada" approach does not threaten existing US trade.

Existing Patterns in Electricity Trade and Infrastructure

Even to a casual observer, the map of major electric transmission facilities in North America (Figure 1) shows a major distinction between Canada and the United States. Whereas the US is served by what can truly be called a grid of lines interconnecting various areas of the country in all directions, Canada's transmission system is oriented north-south. Moreover, trade in electricity between Canada and the United States is considerably larger than interprovincial trade. In 2008, international trade (exports plus imports) was 78,800 gigawatt hours (GWh), while interprovincial trade was 52,900 GWh (Figure 2). The Churchill Falls generating station in Labrador, which primarily supplies the Quebec electricity system,¹ alone accounts for 60 percent of Canada's interprovincial electricity trade. Excluding this Labrador-to-Quebec transfer leaves a total "discretionary" interprovincial trade of 21,500 GWh, just 27 percent of the volume of international trade in 2008. That year, Canada's exports of electricity to the United States were worth \$3.8 billion, while its imports amounted to \$1.3 billion, for a net of \$2.5 billion in export revenue, equivalent to 9 percent of the \$26.1 billion gross revenue of Canada's electricity sector (National Energy Board 2008). By comparison, although statistics are not kept nationally on the value of interprovincial electricity trade, prorating from the 2008 production of 598,800 GWh by half of the 21,500 GWh of interprovincial trade (since an export from one province is an import to another) indicates an interprovincial value of just \$0.5 billion annually.

It appears, therefore, that Canada has pursued international electricity trade in preference to interprovincial electricity trade.

Infrastructure: Cause or Effect?

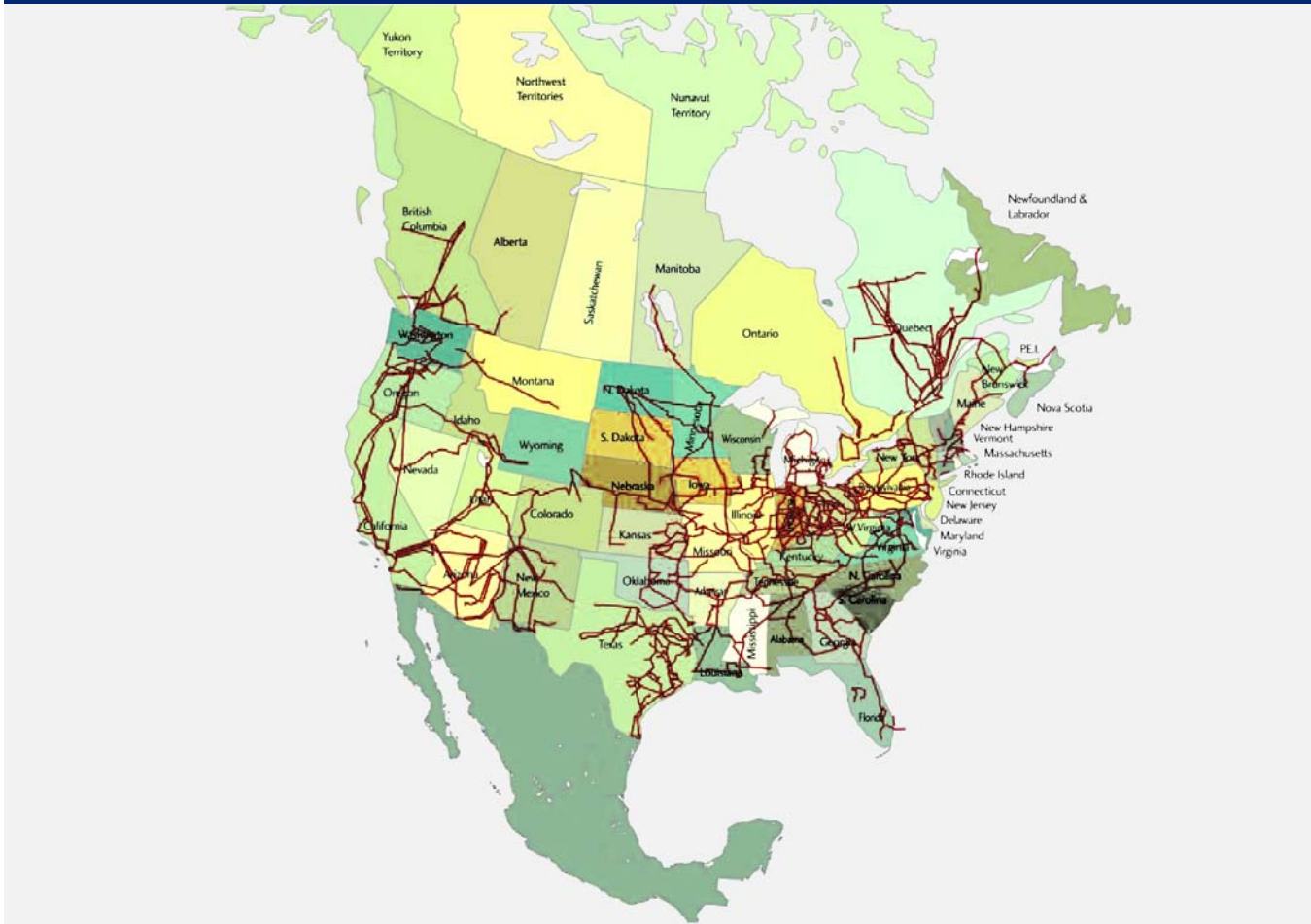
While trade cannot happen without appropriate transmission infrastructure, it must be concluded that any infrastructure deficit is the result, rather

The analysis, views, conclusions and recommendations in this *Commentary* are entirely my own and should not be considered as representing those of either my former employers, including the Ontario Power Authority and the Ontario Energy Board, or organizations on whose boards I presently serve, including the Alberta Electric System Operator.

No topic as complex as interprovincial electricity trade can be examined adequately by a single mind and I have benefitted greatly from observations, information, suggestions and assistance from many people across Canada who have contributed from their considerable professional experience both directly and in reviewing drafts of this *Commentary*.

1 Churchill Falls serves some load in Labrador, but of the 34,800 GWh generated in 2008, 31,400 GWh (90 percent) was exported to Quebec.

Figure 1: Major Electric Transmission Lines in North America



Note: Lines shown are 345kV and above. There are numerous interconnections between Canada and the US under 345kV that do not appear on this map.

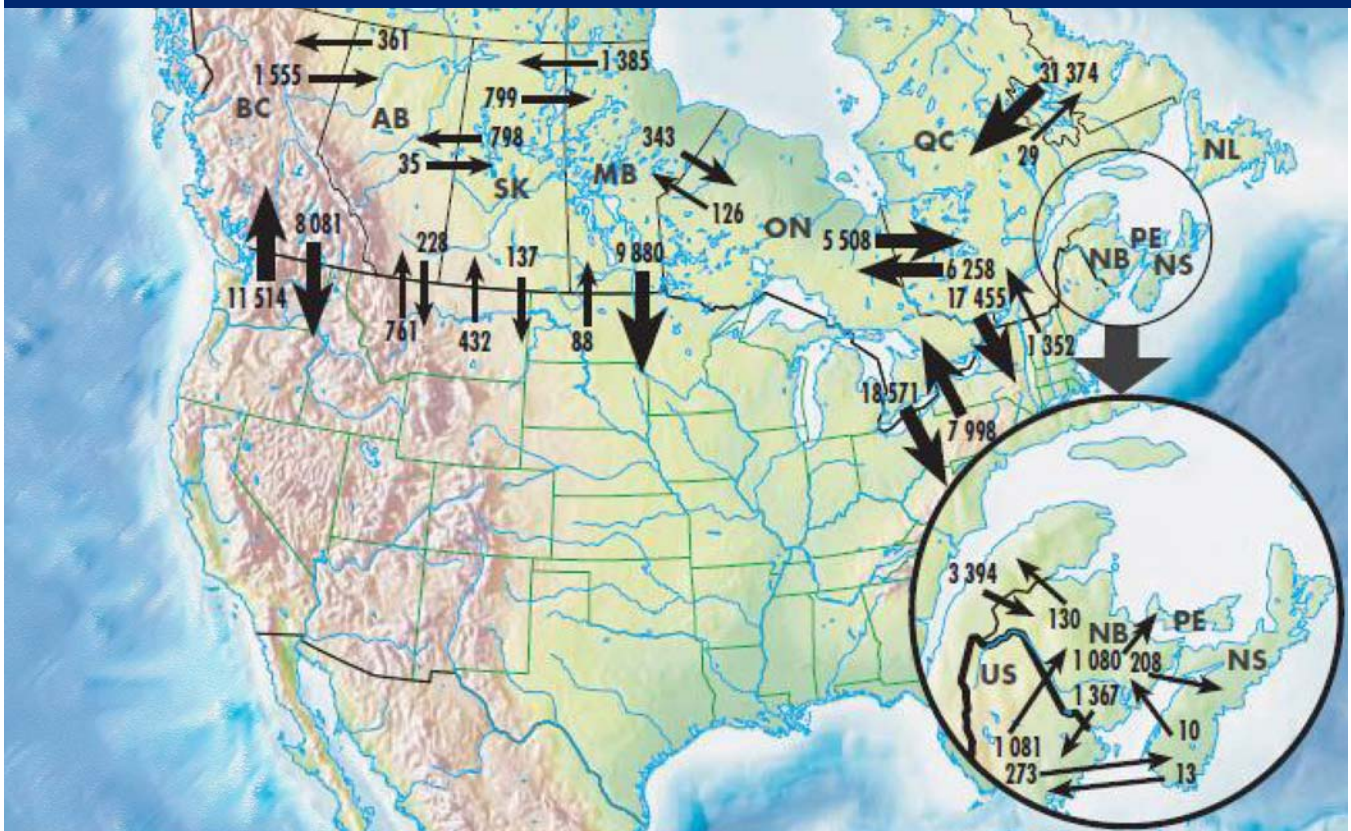
Source: Canadian Electricity Association (CEA). Map copyright of CEA.

than the cause, of limited trading potential. There are some formidable physical barriers to east-west transmission lines – the Great Lakes, sparsely inhabited areas between major urban centres, and major mountain ranges – which raise the cost of the necessary transmission infrastructure. But transmission costs are more sensitive to distance than they are to the particular terrain involved. As well, since transmission costs average around 15 to 20 percent of a typical electricity bill, the economic impact of higher transmission costs related to difficult terrain and sparse population are proportionately diluted. Therefore, while high transmission costs rule out some seemingly worthwhile opportunities for interprovincial trade, many others are still feasible, so that, over time, the pattern of transmission lines will develop

to follow the preferred pattern of economically justifiable trading (Carr 1999).

A recent report by the Canadian Academy of Engineering (2010) underscores these observations and identifies the motivations for increased interprovincial trade. It suggests that “current business practices” do not support investment in interprovincial transmission projects and that federal subsidies or incentives are necessary to make such projects feasible. In contrast, this *Commentary* takes the view that investment in transmission infrastructure should be made only if there are net economic benefits and even then only if commercial arrangements are aligned to realize and fairly allocate the costs and benefits.

Figure 2: International and Interprovincial Transfers of Electricity – 2008 (GWh)



Note: Data for interprovincial transfers of electricity are from January 1, 2008 to December 31, 2008 and are compiled from Statistics Canada's Electric Power Statistics, Monthly (megawatt hour) table. Data for US imports and exports are for 2008 (excludes exchanges) and are compiled by the NEB (National Energy Board). Arrows indicate import/export transactions and may not represent the actual electricity flow route from source to destination. Source: National Energy Board (NEB).

Sources of Value in Electricity Trade

Canada's geographic distribution of energy sources provides an opportunity unique in the world for developing an electricity supply that is both robust and economic.

Long-Term Planning Benefits

Electrically, Canada consists of three regions dominated by hydroelectric generation separated by regions dominated by fossil- or nuclear-fuelled generation.² Three provinces (British Columbia, Manitoba, and Quebec) have extensive hydroelectric resources that allow storage of energy in the form of water impounded in reservoirs, and

each has at least one neighbour that relies heavily on fossil- or nuclear-fuelled generating capacity.

The weakness of hydroelectricity is that the amount of energy available is limited by the volume of water available, which, in turn, is subject to unpredictable fluctuations in precipitation over the years. Generating systems in the "hydroelectric provinces" historically have been sized to ensure that there is adequate energy available under worst-case precipitation conditions. This means that they have inherently installed capacity in excess of the maximum in-province peak demand. In contrast, "fuelled" generation that uses coal, natural gas, or uranium can produce energy on demand. Accordingly, fuelled systems are sized to ensure that maximum peak demand can be met. This means that they inherently have

² Mainland Labrador and the island of Newfoundland could also be added to this list as a hydro-fossil pair within the single province of Newfoundland and Labrador.

the ability to produce more energy than is needed in-province. In electricity industry parlance, hydroelectric systems are “energy limited” while fuelled systems are “capacity limited.”

Major economic benefits can result if the long-term development of both types of systems – hydroelectric and fuelled – is integrated, thereby reducing the capital invested in each. Integrated development would make it more economical for one province’s energy-limited hydro system to import some of the energy surplus available from a neighbouring province’s fuelled system than to build and operate to ensure energy self-sufficiency. At the same time, it would be more economical for the capacity-limited fuelled system to import some of the capacity surplus available from the neighbouring hydroelectric system than to build and operate to ensure capacity self-sufficiency.

Short-Term Operational Benefits

Even without integrated planning and investment, there are economic benefits to be gained by coordinating the operation of hydroelectric and fuelled systems that have been built for separate self-sufficiency. The hydroelectric system’s storage capability allows it to import fuelled generation off peak, when it is in surplus and therefore low in value, and to save hydroelectric energy for peak times, when it has higher value.

In addition to this, there are often other operational synergies that come into play – such as taking advantage of the different timing of peak demands between systems in different time zones to reduce the running time of the most expensive generation, which is often also the least efficient generation. Exploiting time zone diversity has an east-west, rather than a north-south axis, making the advantage more important for interprovincial than for international trade.

A similar situation exists with respect to seasonal diversity, since all provinces except Ontario experience their peak electricity requirements in winter (Canadian Academy of Engineering 2010). Of course, seasonal diversity might have stronger north-south benefits and therefore be more favourable to international than to interprovincial trade; even within Ontario, electricity demand in the northern part of the province peaks in winter while in the south it peaks in the summer.

Untapped International Synergies

Most provinces import very little electricity from the United States compared to their exports there. The large differences between export and import volumes for most provinces with international trade indicate that little advantage is being taken of the synergies between different types of generation. Across the border from both Manitoba and Quebec, which have almost exclusively hydroelectric generation, the US electricity systems are basically fuelled systems using coal, natural gas, or nuclear.

In contrast, British Columbia has a very large trading volume with the United States in both directions. This might seem surprising, since the generating mix immediately south of the border is quite similar to British Columbia’s and as a result there is a relatively less diversity among generation types to exploit. However, major transmission interconnections connect the US Pacific Northwest and California, which is supplied largely by coal, gas and nuclear generation. So in fact, the aggregate US market accessed from British Columbia has a generation mix that is complementary to its own.

The remaining provinces with direct transmission connections to the US – Saskatchewan, Ontario and New Brunswick – also face generation portfolios across the border that are quite similar to their own but, unlike the case for British Columbia, this is reflected both in their modest trading volumes and their bias toward trade in one direction compared to the other.

The Interprovincial Imperative

The single national legal, financial, and political framework within which all provincial electricity systems work should also facilitate coordination of both long-term plans and shorter-term operations. All else being equal, the relative ease of interprovincial coordination compared with international coordination should result in east-west trade being more attractive than north-south trade. The fact that the north-south trade is dominant indicates that all else is not equal.

International and Interprovincial Price Differences

Of course, international trade would dominate interprovincial trade if US electricity prices were generally higher than Canadian prices – as they are. But the input costs of electricity generation – fuel, machinery, capital, labour – are not fundamentally different on either side of the border because they are priced either by global markets or in the context of the broader economies of the two countries. Those broader economies are kept in long-term alignment by innumerable well-entrenched interdependencies.

Any sustained pricing differences across the border must therefore result from differences in the commercial structures of the electricity industry. This could include implicit subsidies of Canadian electricity prices through such things as below-market return on investment and the non-taxable status of the publicly owned utilities that dominate Canada's electricity sector. But even if such factors encourage trade in the direction of the international border, they do not detract from the economic advantages that could be simultaneously available from increased interprovincial trade. Fundamental east-west synergies exist that are waiting to be more fully exploited, and doing so need not result in diminished north-south trade.

Energy Policy and Trade Barriers

Beyond this intuitive economic rationale, there are other motives for increasing the level of interprovincial electricity trading. Key among these is the fact that energy is taking on a new significance in government policies in virtually every country in the world. Electricity, as one of the most flexible, essential, and ubiquitous forms of energy, holds a special spot in those energy policies (see Carr 2010).

There are also important reasons to reduce interprovincial trade barriers in general. The recent exemption for Canadian businesses from the “Buy American” provisions in US economic stimulus programs resulted directly from the provinces agreeing to remove their individual trade barriers. Interprovincial trade barriers have

also been cited as obstacles to a European Union-Canada trade deal (see McCarthy 2010). As well, the recovery initiatives spawned by the 2008/09 global economic crisis have raised consciousness of protectionism and stimulated widespread “no barriers” discussions. At a time when Canada's sentiments lie in the direction of trade liberalization, continued provincial isolation in electricity policy is an anachronism.

National Renewable Energy Resources

Another factor driving interest in a more integrated national approach to electricity is public concern about climate change. This has resulted in a desire to integrate more renewable resources – particularly, wind – into the supply mix. As well, the value of expanding the use of electricity and integrating the use of renewable generating resources over wider geographic regions has been recognized in a recent study (Pembina Institute and the David Suzuki Foundation 2009) of the economic impact of climate change policies. It appears that resulting discussions about increased interprovincial transmission initiatives are ongoing.³

Because wind power is intermittent, however, there is increased awareness of the just-in-time nature of electricity and the important role that storage and the exploitation of time-zone differences for diversity in peak demand could play. Electricity systems covering bigger geographic areas would be useful in maximizing the use of renewable sources such as solar and wind. To some degree, the intermittency of these sources is statistically smaller when localized variations in sunlight and wind levels are averaged over larger geographic areas (Adams and Cadieux 2009).

Concerns about climate change have also raised awareness of the different sources of raw energy that are used in various provinces and the opportunities this might present, such as Ontario using hydroelectric power from Labrador instead of building new nuclear generation.

In summary, there is an increased awareness of the value of having a mixed portfolio of supply sources for electricity and the potential for achieving that across Canada through interprovincial electricity trade.

³ See, for example, Jeffrey Simpson, “Canada suffers for its energy incoherence,” *The Globe and Mail*, April 23, 2010.

Electricity System Development in Canada and the United States

There are historic roots to some of the factors important to the patterns of electricity trade in Canada and the United States. An awareness of this history, and its different course in the two countries, is key to designing any initiative to facilitate interprovincial electricity trade. Chief among these different histories is that, in Canada, electricity is a provincial responsibility, while in the US, law and custom give the federal government a significant role. This allocation of responsibilities to the provincial level has been reinforced by several factors, discussed below, with the result that provincial boundaries define the Canadian electricity industry to a far greater extent than do state boundaries in the United States.

Provincial Self-Sufficiency

Electricity is an intermediate form of energy and most provinces have raw energy resources to operate generators whereas most states do not. British Columbia, Manitoba, and Quebec have adequate water to supply virtually their entire electricity requirements; the island of Newfoundland, Saskatchewan, Ontario, and New Brunswick have enough hydroelectric power for around 25 percent; Saskatchewan and Ontario have uranium; and Alberta, Nova Scotia, and Saskatchewan can call on significant coal and natural gas resources. When electricity systems were first built, energy self-sufficiency was a realistic option for most provinces and remains so to this day for the majority. Energy resources in the US are much less evenly distributed with the vast majority of states being either major importers or major exporters of raw energy resources.

Public Ownership

In turn, provincial energy self-sufficiency, along with a generally more socialized approach to life in Canada, led to political support for the public ownership of electric utilities to a far greater degree than in the United States. With a few notable and stand-alone exceptions,⁴ electricity

development in the United States proceeded along strictly commercial lines, with basically no social agenda or influence. Thus, US urban centres were electrified with the most economical source of energy and connected to other urban centres and sources as economics dictated and without regard for state lines or regional energy self-sufficiency.

In contrast, Canada's electricity systems developed in the context of public ownership, more widely separated urban centres, and regional supplies of raw energy. Commercial factors were at once weaker and less important politically than leveraging provincial resources for provincial betterment. So far from there being a spirit of interprovincial sharing in electricity, there tends to be one of competition and of safeguarding competitive advantages. Self-sufficiency remains a goal of British Columbia's most recent energy policy (British Columbia 2007) even though its confidence in the value of trading with neighbours is evident in its becoming Canada's largest net importer of electricity both in absolute volume and relative to in-province production (see Figure 2).

Restructuring for Competition

Another factor important to any policy changes related to interprovincial electricity trade is the commercial structure of the electricity industry: how investment decisions are guided and how the revenues are organized. Again, it will become evident that differences between Canada and the US, as well as differences among provinces, constrain alternatives for enhancing interprovincial electricity trade.

Until 10 or 15 years ago, electricity was provided under a commercial structure dominated by vertically integrated utilities. Each utility had a complete monopoly on all aspects of the production and delivery of electricity within its service territory. In Canada, this meant that generation and transmission was operated on a provincial basis; or in some cases, such as British Columbia, Alberta, and Newfoundland and Labrador, with provinces subdivided into two or three service territories, each with its own generation and transmission utility.⁵

4 The Tennessee Valley Authority is one such exception. Founded in 1933 by the federal government to stimulate the regional economy in the wake of the Great Depression, one of the TVA's major roles is electricity generation.

5 Many provinces also subdivided for the local distribution of electricity by utilities that often are owned and operated by local municipalities. In the 1990s, Ontario had more than three hundred such local distribution utilities, delivering in aggregate about three-quarters of the province's electricity to end users.

Beginning in the 1990s, many countries restructured the commercial arrangements of their electricity sectors. Each restructuring was unique, but they all centred on introducing competition and reducing the extent of monopolies. A typical electricity sector restructuring involved dismantling the vertically integrated utility into separate transmission and distribution companies as well as a number of generating companies. Customers were free to buy electricity from whomever they wished, and the generating companies competed to supply them.⁶ The transmission and distribution “wires” companies remained protected monopolies, with rates set by a regulatory agency but, as will be discussed in more detail shortly, with “open access” obligations to deliver electricity between any generator and any customer connected to their systems. Thus, in an electricity system that has been commercially restructured, the price of electricity is set by market forces as generators compete for customers, while the delivery costs are established through a regulatory process.

Interties and Restructuring

Under the monopoly structure, it was feasible for interconnections to be built between neighbouring transmission systems by the simple expedient of the two monopolies in their respective provinces agreeing to share the costs and operations of the “intertie” between them.⁷ In effect, both monopolies could share the benefits of improved integration of the two systems since each was responsible for the entire range of electricity services and had complete control of operations so as to ensure that they both provided and capitalized on those advantages. Importantly, as well, the vertically integrated monopoly structure in the two provinces ensured that the benefits of interprovincial trade reached electricity customers in each province. Typically, arrangements resulted in the sharing of benefits

equally, although one utility might derive benefits from reduced operating costs for its generators while the other might benefit from deferring the need to invest in new generation. Virtually all the interprovincial interconnections that exist today were put in place under this commercial model.

Separating the vertically integrated structure into separate generation and transmission elements and having different commercial models for each creates a much more complex allocation of costs and benefits. In essence, this *Commentary* is motivated by the need to match the new commercial structures of the electricity sector with new methods of allocating the costs and benefits of interties between provinces.

Electricity Restructuring in Canada and the United States

In Canada, Alberta was the first province to restructure along competitive lines, and is really the only one to have made the transition successfully. Ontario followed closely, but quickly reversed course by suddenly freezing prices in response to a backlash from consumers, who reacted to the poorly thought out arrangements for setting retail prices (Carr 2003); competition has had a decreasing influence on the setting of electricity prices in Ontario ever since.

In the United States, electricity restructuring had a strong federal involvement, with the Federal Energy Regulatory Commission (FERC) exercising its authority over interstate trade. This federal involvement brought a measure of uniformity of approach, but the focus on interstate affairs meant that uniformity was restricted to transmission and wholesale matters.

Specifically, with respect to open-access transmission, FERC implemented reciprocity provisions⁸ and issued a model, or “pro forma,” open-access transmission tariff (OATT).⁹ Under the reciprocity

6 There are many detailed variants of the basic restructuring theme of competitively priced supply with regulated delivery prices using open-access monopoly wires. One of the biggest variations relates to whether retail customers connected to distribution systems are free to choose their suppliers – retail competition – or whether that choice is available only to large-scale customers connected directly to the transmission system – wholesale competition. As it relates to interprovincial and international trade, however, this detail is not important in that interconnections between neighbouring systems always involve only the transmission system.

7 In an electricity system, the term “intertie” or “interconnection” refers to a transmission line that connects to a neighbouring system.

8 Federal Energy Regulatory Commission (1996).

9 A tariff outlines the terms and conditions, including price, under which a service is provided. Thus, an OATT implements a specific policy on allocating the costs and benefits of transmission capacity to users of the transmission system.

provisions, a party is allowed to use the open-access provisions of a transmission system only if the jurisdiction they are supplying from or delivering to has comparable open-access transmission provisions. While each transmission system developed its own unique tariff, the FERC pro forma OATT was universally adopted as the basis on which customized features were added and modifications made.

This arrangement worked well in the US context and contributed to harmonizing the commercial structure and arrangements for electricity over wide geographic regions. Importantly as well, the reciprocity requirement resulted in clearly defined boundaries between competitive systems that had been restructured and monopoly systems that had not.¹⁰ It eliminated economic disconnects at the interface of market- and non-market-based systems by erecting a commercial barrier at the border; monopolies could not take advantage of their potential to dominate a neighbouring competitive marketplace.

The Influence of US Policy on Electricity in Canada

One consequence of the FERC reciprocity provision was that all the remaining provinces that

had not adopted competitive restructuring for their own reasons now did so in order to access US customers. Bearing in mind that for every province that borders the United States, except Alberta, international electricity trade (net) in 2008 accounted for about 10 percent or more of total sales, and as high as 28 percent in Manitoba (National Energy Board 2008), it can be seen that compliance with US requirements is a high priority (see Box 1). In fact, with the exception of Newfoundland and Labrador, Prince Edward Island, Ontario, and Alberta, all provinces actually adopted the FERC pro forma rules and regulations in developing their own open-access provisions. Newfoundland and Labrador and Prince Edward Island have no direct connection or trade with the United States, while Ontario and Alberta, being the only provinces that restructured for purely domestic reasons, chose to design their own open-access provisions. Thus, most Canadian electricity systems incorporate commercial arrangements designed in the US to meet US policy requirements.

Open-Access Transmission without Competition

Since most provinces did not restructure for domestic reasons, they have not attempted to give

Box 1: FERC Reciprocity Requirements and NAFTA

It is probable that the North American Free Trade Agreement (NAFTA) would take legal precedence over FERC regulations (see Saunders 2001). NAFTA requires "national treatment," which falls short of reciprocal treatment. National treatment allows each country to establish its own commercial rules but requires that those rules treat foreign companies the same way as domestic companies. Reciprocal treatment requires, in contrast, that companies are treated the same way in the foreign country as they are in their home country. With respect to electricity, national treatment would allow Canadian companies to move energy on US transmission systems because that is what US companies are allowed to do. Under national treatment, the only grounds for complaint that a US

company might have is if it were not treated the same as a Canadian company when doing business in Canada.

But the issue of national versus reciprocal treatment with respect to electricity transmission arrangements has never been tested through litigation. While exemptions from reciprocal treatment were requested with respect to allowing BC Hydro, Ontario Hydro, and Hydro-Québec to operate in the United States, FERC stood firm in requiring the three Canadian systems to provide open access similar to that required in the United States (Saunders 2001). As a result, every province that is home to energy companies that trade with the United States has adopted open-access transmission provisions that comply with FERC requirements.

10 In the United States, restructuring was undertaken on a widespread basis through a somewhat byzantine combination of federal and state initiatives. The result is that most electricity users are served competitively but with notable exceptions in areas of traditional low-cost supply, forming a swath that runs diagonally from the southeast to the northwest.

practical effect to the restructuring. Specifically, they have not attempted to have internal competition but instead have preserved a monopoly, single-supplier arrangement. Under such circumstances, there is no practical value in having an open-access transmission system – indeed, as will be seen below, having one that operates under US rules can actually be a disadvantage.

In the cases of British Columbia, Manitoba, and Quebec, it might be said that moves have been taken to discourage competition by setting very high rates for the use of the transmission system. All three hydroelectric provinces have extensive transmission facilities necessary to tap into generating resources that are remote from the populated areas where most of the electricity is used. It is a matter of interpretation whether many of these long and expensive transmission facilities are part of the grid, which all customers should share in paying for, or whether they are system elements specific to the particular generators they connect, the cost of which only the generators should bear.

Since in all three provinces both generation and transmission are owned by government, for any cost-revenue scenario it is not important to government how the revenues and costs are split between generation and transmission. As well, since in-province electricity customers pay the aggregate of generation plus transmission costs, they too are substantially indifferent to the allocation of costs between generation and transmission. But to external users of the open-access transmission system who pay only for this use and not for in-province generation, the classification of facilities between grid and generation is very significant.

All three provinces, in fact, have adopted the most expansive definition of “grid,” which increases the cost of using transmission but reduces the cost of operating in-province generators. This choice for allocating transmission costs means that, while there is open access in a strict legal sense, each system is a closed monopoly to all practical commercial intents and purposes.¹¹

In the case of Quebec, the absence of meaningful commitment to open-access transmission was noted in a complaint filed in respect to Newfoundland and Labrador’s frustrated attempts to access markets beyond Quebec from Labrador. An expert witness in the hearing before Quebec’s regulatory body, La Régie de l’énergie, stated that Hydro-Québec’s “actions go beyond the natural inertia of a monopolist and instead reflect a pro-active effort to inhibit [Newfoundland and Labrador’s] access to the grid.”¹² The complaint was decided in favour of Hydro-Québec¹³ but has been appealed in an unusually strongly worded and comprehensive fashion that questions no less than 16 “manifest errors in the interpretation of facts that play a determining role and that set aside several rules of law” (Régie de l’énergie 2010).

Any doubts about British Columbia’s commitment to open-access transmission will be heightened by recently introduced legislation that merges the previously separate BC Transmission Corporation (BCTC) and BC Hydro.¹⁴ BCTC was formed just seven years ago by separating the transmission and system dispatch functions from BC Hydro. The purpose of the separation was to demonstrate that BC Hydro did not have preferential access to transmission capacity in British Columbia and therefore met FERC’s requirements for being allowed to use US transmission systems for buying and selling power. While there is no intention to change the arrangements for transmission access immediately, it remains to be seen whether this corporate merger affects the allocation of transmission capacity in British Columbia in the longer term. Given the importance to British Columbia of electricity trade with the United States, the provincial policy likely will be to continue to recognize FERC reciprocity requirements while administering compliance processes entirely within the vertically integrated BC Hydro.

11 Ontario also adopted the same arrangement, but remote hydroelectric generation is a relatively smaller portion of the province’s overall supply system, so transmission tariffs are not as heavily burdened as in the other cases.

12 Robert A. Sinclair, testimony on behalf of Newfoundland and Labrador Hydro, Régie de l’énergie files, P-110-1565 and P-110-1597, October, 2008.

13 Decision D 2010-053 Régie de l’énergie, May 11, 2010.

14 Part 7, Bill 17-2010, *Clean Energy Act*, Legislative Assembly of British Columbia, First Reading April 28, 2010.

The Allocation of Transmission Capacity under Open Access

An important factor resulting directly from the adoption of the US pro forma open-access tariff by most provinces is the method of allocating capacity on the transmission system among users.

Transmission Rights Models

The US FERC pro forma open-access transmission tariff is based on a system of transmission capacity rights that can be bought and sold. In contrast, both Alberta and Ontario, the two provinces that restructured for domestic reasons rather than to ensure continued access to US markets, treat transmission access as the right of any generator that has been dispatched to operate by the system operator. In effect, Alberta and Ontario treat transmission as a public amenity whereas all other provinces treat it as a commodity to be bought and sold – albeit one for which, in some cases, it is not expected there will be any buyers other than those owned by the provincial government that owns the transmission system.

Under the FERC pro forma open-access tariff, transmission rights are bought and sold basically through an auction process in which the availability and price of transmission capacity are publicly posted and buyers offer to purchase various classes of service over varying periods of time (a month, several years). Since the price is fixed, competition is on the basis of quantity. Capacity is awarded to the party offering to buy the largest combinations of capacity for the longest durations, until all offers are filled or all available capacity allocated. “Roll-over” provisions give existing rights holders priority in extending their duration by allowing them to match any competing offer. All contracts are “take or pay” and any rights that are not being used must be offered for resale.

In Canada, as detailed later, this process of allocating transmission capacity has led to market dominance and anti-competitive behaviour at

many of the transmission interties between provinces. The process is particularly problematic for interties between neighbouring systems that use different allocation mechanisms and where one or more potential rights holders are publicly owned. In the United States, by contrast, the number of competitors apparently has been sufficient to avoid having users exercise market power and dominate the ownership of transmission rights across interties. And since US federal law encourages both sides of an intertie to follow the same pro forma tariff, users have not found it difficult to route electricity between adjacent systems.

The Effect of the Exercise of Market Power on Canadian Interties

Perhaps because many of the open-access provisions and transmission rights systems put in place in Canada did not have competitive electricity markets as their primary objective, experience in Canada has been quite different from that in the United States. No attempt appears to have been made, for example, to limit the exercise of market power in the acquisition of rights to access interties in those markets working under the FERC pro forma tariff.

NEW BRUNSWICK AND HYDRO-QUÉBEC: In the initial auction process for capacity on a recently constructed 300 MW intertie between New Brunswick and Maine, a unit of Hydro-Québec was allowed to purchase 100 percent of the export capacity from New Brunswick to Maine for the next 20 years.¹⁵ Any further use of that capacity, will therefore, be at the discretion of Hydro-Québec and dependent on that utility’s short-term requirements. The capacity available to others is reduced by the fact that 670 MW of the 700 MW export capacity on the original intertie is owned by NB Power through a number of rights contracts of between 15 and 20 years each. There may be some policy justification for NB Power having some priority access in that they have obligations to serve customers in New Brunswick

15 Information on the size, term, and ownership of transmission rights is posted on websites maintained by the relevant electric system operators. While the information is not confidential, public access is difficult due to cyber-security arrangements on most sites, and interpretation is challenging due to heavy use of industry jargon and abbreviations. The information provided here was facilitated by a number of electricity market participants who wish to remain anonymous.

except when it is realized that these are export rights and not import rights.

While the entire transaction has since been cancelled, it is worthwhile examining what effects Hydro-Québec's purchase of NB Power assets would have had on transmission access to the United States. During the time when the transaction was still a possibility, most discussion implied that ownership of the physical transmission infrastructure made it possible to control imports and exports between New Brunswick and Maine. In fact, the initial proposal was amended so that New Brunswick maintained ownership of transmission assets, in part, apparently, to calm fears of Hydro-Québec's having undue control of the access to US markets via New Brunswick. However, under the FERC pro forma tariff, which is the basis for the open-access transmission tariff in New Brunswick, access belongs not to the transmission owner but to the owner of the rights to use that infrastructure. According to the summary of the amendment to the memorandum of understanding,¹⁶ Hydro-Québec would still have obtained the 670 MW of transmission rights presently owned by NB Power to export to Maine.¹⁷ Even as amended, the proposed transaction would therefore have resulted in Hydro-Québec controlling 970 MW of the 1,000 MW intertie capacity available for export from New Brunswick to US markets for the next 15 years.

ONTARIO-QUEBEC ELECTRICITY TRADE: An even more complex situation exists at the newly built 1,250 MW capacity intertie at the Quebec-Ontario border. Ontario's capacity allocation system for interties is different from that used in Quebec. Under Quebec's open-access arrangements, a unit of Hydro-Québec has acquired 100 percent of the capacity from Quebec to Ontario for 50 years.¹⁸ Ontario's capacity allocation rules do not allow for long-term rights ownership so, in effect, Quebec's rules govern access to the intertie. This apparently is acceptable to Ontario since the province seems always to have looked on interties from the perspective of short-

term operational aspects, with little or no attention given to the longer-term commercial aspects of importing and exporting. From the perspective of Ontario's system operator (the Independent Electricity System Operator), there is no difference to the impact on reliability of an import whether it is assured for one season or one decade. To an investor, however, there is a significant difference. Due to the operational focus of Ontario's intertie reservation rules, Ontario-based intertie users must use the rights reservation systems and rules of neighbouring provinces and states if they want to enter into long-term contracts with parties outside the province.

Transmission Rights and New Investment in Transmission

While Ontario's reservation system might seem less than ideal, questions should be asked about the efficacy of the whole rights allocation process under the FERC pro forma tariff. It is unlikely that either of the two new interties at the New Brunswick/Maine and Quebec/Ontario borders would have been built had somebody not stepped forward to guarantee their long-term revenues. In both cases, the respective provincial regulatory body was able to approve the new investment safe in the knowledge that it would result in incremental revenue over an amortization period long enough to avoid increasing costs to existing customers of the transmission system.

If market dominance was Hydro-Québec's objective, it would have been logical to achieve that by building control through strategic short-term commitments. After all, the tariff's rollover provisions give incumbent users the right of first refusal to match any competing offers for rights that come up for renewal at the end of their term. Hydro-Québec could argue justifiably that its willingness to commit to the ownership of long-term rights was born of the need to get infrastructure built, without which rights would not exist.

16 Memorandum of Understanding between the government of New Brunswick and the government of Quebec, October 29, 2009; "Summary of Agreement on Energy between the governments of Québec and New Brunswick," January 20, 2010.

17 In addition to the two main interties, which account for 1,000 MW of export capacity between New Brunswick and Maine, two smaller ones account for an additional 115 MW. Of these, one is rated at 100 MW and serves an isolated area in northern Maine that is not connected into the US grid.

18 A 50-year reservation is so unusually long that the duration is documented as a comment in the reservation system, which allows a maximum of 10 years in its standard log.

Further evidence of difficulties with the FERC tariff can be seen in the United States, where construction of new transmission has declined significantly since electricity restructuring was introduced (Edison Electric Institute 2005). In response, US regulators have been giving transmission owners higher cost-of-capital allowances (United States Library of Congress 2005). Both of the above examples are indications of the higher risk involved in committing to transmission investments under the FERC tariff. The paradoxical effect of the tariff, which was intended to stimulate competition, is that the process of creating new transmission rights encourages market concentration of those rights. At least, this is the situation in Canada, where there are no federal policies or powers related to the exercise of market power with respect to electricity transmission as there are in the United States.

The Unintended Consequences of Selling Transmission Rights

Alberta is the only province bordering the United States that does not yet have an international intertie.¹⁹ This would not appear to be a serious difficulty since there is an intertie between Alberta and British Columbia and another between British Columbia and the United States. However, the section of transmission in British Columbia between Alberta and the US brings the British Columbia open-access provisions into play and there are complaints that these have been used to block potential Alberta-US trade.

One situation received public scrutiny and was reversed by the British Columbia Utilities Commission (BCUC), the provincial energy regulator (British Columbia Utilities Commission

2009). It involved the transmission owner, British Columbia Transmission Company (BCTC), making rights available in excess of the maximum usable capacity on the British Columbia to Alberta intertie.²⁰ Under provisions of the transmission tariff, which is based on the FERC pro forma, this action triggered prorating of the rights held by all rights holders so that total transfers did not exceed usable capacity.²¹ In effect, it discriminated against out-of-province rights holders, since BC Hydro bought virtually all of the newly created rights²² and might be considered an affiliate of BCTC by virtue of their common ownership by the provincial government. As a result, BC Hydro's share of total capacity increased from 69 percent to 78 percent but the total capacity available did not increase. In effect, BC Hydro gained additional transfer capacity equal to what other users lost in prorating.

As was previously discussed, open access provisions in British Columbia were adopted primarily to ensure ongoing eligibility for BC Hydro generation to access US markets. But under the FERC pro forma system for allocating transmission rights British Columbia loses all the discretion it used to have when allowing outsiders to use the provincial transmission system to move electricity between the US and Alberta.

A similar situation appears to exist in Quebec, where testimony on behalf of the previously mentioned complaint filed by Newfoundland and Labrador Hydro²³ paints a picture of a province struggling to maintain its preferred vertically integrated monopoly electricity system while working within the rigid procedures for allocating transmission capacity that were adopted to satisfy US requirements. From the perspective of British Columbians and Quebecers, these respective regulatory cases exemplify

19 There are a number of proposals to build direct interconnectors between Alberta and the United States, but these are all "merchant" projects. Unlike conventional interties, where the physical infrastructure is economically regulated and financed as part of the broader grid, merchant transmission facilities operate as standalone entities, where financing and the sale of access rights and collection of tolls are handled by the owner.

20 The rating of transmission lines is a technically complex process that can create a wide range of numbers to fuel legal arguments. In general, a line in isolation has a higher rating than it does when in the operational context of an integrated power system, so disputes can arise about what constitutes the most appropriate operational context.

21 Prorating involves the rights of all parties being reduced in proportion to the amount of rights they hold such that the total of all rights does not exceed the capacity actually available.

22 Of the 305 MW of new rights sold, all but 25 MW were bought by BC Hydro.

23 Robert A. Sinclair, testimony on behalf of Newfoundland and Labrador Hydro, Régie de l'énergie files, P-110-1565 and P-110-1597. October, 2008.

the unintended consequences that can result from the extra-jurisdictional reach of FERC.

Public versus Private Ownership

Public versus private ownership appears to influence the degree to which intertie capacity is available to potential market participants. In the case of both the Maine/New Brunswick and Quebec/Ontario interties, publicly owned Hydro-Québec has been able to commit to taking a huge proportion of available capacity rights for long periods. This represents a considerable commercial risk since the capacity is take or pay – that is, it has to be paid for whether it is used or not, though this risk can be mitigated by selling unused capacity on the secondary market.

Higher levels of commercial risk require higher amounts of capital for the guarantees rights purchasers must provide to the transmission company. These guarantees, in one way or another, rely on and affect the purchaser's creditworthiness. For most businesses, capital is a scarce resource and allocating it to the most productive uses occupies a major part of the corporate effort. It is on the success of this allocation effort that the creditworthiness of a private sector company rests. In contrast, the creditworthiness of a state-owned entity benefits greatly from the right of its owner to levy taxes; in effect, its creditors know that revenue is available from elsewhere than the business itself.

Either explicitly or implicitly, lenders see government ownership as insurance against bankruptcy, and they reflect that view through more liberal capital financing arrangements for public companies. Whether this results in higher credit ratings, cheaper capital, higher borrowing limits, or some combination, the result is the ability of a public-sector entity to take on bigger business risks. This includes committing for larger blocks of intertie capacity for longer periods of time than would be possible for an otherwise similar private-sector entity. Since the allocation of rights under the FERC pro forma tariff favours those offering purchase rights with longer periods of time, public-sector entities have an advantage.

Leapfrogging Neighbours

While most of the discussion in this *Commentary* relates to interprovincial trade between adjacent provinces, there are situations where the synergies are greater “next door but one.” Thus, the nuclear- and fossil-fuelled generation in Ontario and the Maritimes makes them more attractive than Quebec as markets for Newfoundland and Labrador's generation resources in Labrador.

Section 58.4 of the *National Energy Board Act* provides that the federal government can “designate” an interprovincial transmission line, which effectively would put it under National Energy Board (NEB), rather than provincial, regulation. Such a designation would allow a transmission line to be built between two provinces separated by a third province even if the third province did not want the line to be built. Newfoundland and Labrador, for example, could use this approach to access markets in Ontario or New Brunswick should it remain unsuccessful in obtaining firm transmission rights on the Quebec system. Presumably, this interprovincial designation could also be combined with the NEB's jurisdiction under section 58.15 of the NEB Act related to international transmission lines to designate a transmission line originating in one province and routed through a neighbouring province to the US border, an approach that Alberta might pursue to reach US markets via British Columbia.

These federal powers of designation under the NEB Act are clearly designed to ensure that no province can frustrate the legitimate objectives of another to access external markets that are not adjacent. The process for designating transmission lines that involve more than one province is not specified in the NEB Act, however, and since none has so far been designated there are no precedents. Given that it is a government decision, though, federal-provincial political considerations would clearly be involved and the history of provincial control in electricity matters would make a federal initiative unlikely. Any such designation process, therefore, most likely would begin with one or more provinces petitioning the federal government.

Asymmetrical Benefits in Interprovincial Electricity Trade

Ensuring an equitable allocation of intertie capacity is not the only commercial barrier impeding electricity trade between neighbouring provinces. Another important barrier is the relative advantage a monopoly has in transacting electricity in a neighbouring competitive market. The number and size of participants operating in the competitive market is controlled through rules and regulations to ensure there is, in fact, competition. But in Canada such rules and regulations cannot be imposed outside the province in the same way as in the United States because in Canada there is no overarching federal policy or legal structure that facilitates competition in the electricity sector.

When a province adopts a competitive electricity market and its neighbour does not, a balance must be struck on the use of the intertie between them. That balance is between providing adequate protection to the health of the in-province competitive market, on the one hand, and capturing a reasonable share of the economic benefits of interprovincial trade, on the other. The onus is on the competitive market to achieve this balance since the monopoly system inherently captures any economic benefits available to it. This is because the monopoly can choose among several potential buyers and sellers in the competitive market but those in the competitive market have only one potential customer for imports or exports. In any marketplace, the chances of arranging a satisfactory transaction, and hence realizing a benefit from trading, increase with the number of potential partners. But, in reverse, market participants have only one potential partner outside the province, which restricts both the number and the attractiveness of transactions. In such a situation and without careful design of rules governing imports and exports, the long-run economic benefit from interprovincial trade will be disproportionately allocated to the province with the monopoly structure.

Alberta's arrangement for electricity trade with its neighbours is a useful example of one approach to striking the balance. To ensure internal competition, Alberta has established special rules that limit the ability of imports and exports to influence market price. Neither of Alberta's provincial neighbours has restructured for internal competition but both have adopted FERC-based open-access transmission

tariffs that allow their respective utilities to trade competitively in external markets.

As in all North American electricity systems with competitive commercial structures, all transactions in the Alberta market occur at a single "clearing price": all buyers pay the clearing price, and all sellers receive the clearing price regardless of their individual bids and offers. All imports to Alberta are required to offer into the internal market at the minimum acceptable price of zero and all exports must bid at the maximum acceptable price, which is \$999.99/MWh. Along with all other sellers and buyers, both imports and exports are actually settled at the clearing price, so, in effect, imports agree to sell at any price above the minimum and exports agree to buy at any price below the maximum. This puts them in the position of being price takers, which means they can influence price only by the volumes they choose to transact. It also means that they are at risk of having to accept any price set by in-province market participants, who are free to choose both price and volume. This, in turn, results in volumes of imports and exports that are lower than they otherwise would be. While this is not the most desirable result from a broad economic perspective, it does mitigate some of the competitive disadvantages of in-province market participants with respect to a neighbouring monopoly.

The Consequences of Current Interprovincial Electricity Policy

In summary, interties need trade to justify them and the relative lack of east-west transmission facilities is the result of existing barriers to interprovincial electricity trade. The approach to facilitating interprovincial electricity trade is not one of "build it and they will come" but rather one of aligning commercial benefits between neighbours.

Interprovincial synergies exist that could result in commercially valuable trade. Most notably three provinces have extensive hydroelectric resources that allow storage of energy in the form of water impounded in reservoirs, and each has at least one neighbour that relies heavily on fossil- or nuclear-fuelled generating capacity. As well, time zones result in east-west time differences in peak electricity demand and consequent economic opportunities for sharing generating capacity. Yet the organization of electricity along provincial lines

and the absence of a federal mandate to exert a unifying force inhibit the growth of interprovincial energy trade. Barriers to interprovincial commercial trade are further reinforced by the adoption by most provinces of US commercial structures and practices that do not match Canadian conditions. These conditions include, for example, commercial competition between public and private sector entities and no mechanisms to prevent the exercise of market power on intertie capacity.

Recommendations for Provincial Initiatives

Several initiatives could be undertaken by provinces to enhance interprovincial electricity trade.

Vertically Integrated Utilities

In the absence of federal regulatory authority for electricity similar to that of FERC in the United States, most changes in Canada to facilitate increased interprovincial electricity trade would have to be implementable at the provincial level. In some parts of the country where there is significant public ownership and limited private ownership, such changes could happen through bilateral agreements between neighbours. In effect, these would be government-to-government arrangements, although provincially owned utilities or other appropriate provincial Crown agencies could be the legal signatories. Such an approach might be feasible for ties between Saskatchewan and Manitoba. Quebec – Newfoundland and Labrador is also a possibility with respect to new generation development in Labrador. Quebec – New Brunswick falls in this same category and the aborted purchase of some NB Power assets by Hydro-Québec could have achieved many if not all the benefits of inter-provincial trade by effectively merging the two provincial systems.

In all of these cases, the electricity sectors in both provinces involved are, for practical purposes, publicly owned monopolies. All provinces, except for Newfoundland and Labrador, have altered their former vertically integrated structure to ensure that anybody has the legal right of non-discriminatory access to their transmission systems. This change has had no real impact, however, since none has taken

further steps – such as allowing customers a choice of suppliers – to alter the practical effect of the existing monopoly structure. The combination of public ownership and monopoly structure ensures that all the costs and benefits of interprovincial trade accrue to the public at large either through their bills as electricity users or their taxes as owners of the utility.

The allocation of the costs and benefits accruing from interprovincial trade gets more complex where there is some combination of private-sector ownership and multiple independent entities in the electricity supply chain. In these circumstances, the costs and benefits are distributed at various levels throughout the supply chain. Fair allocation requires either the prescriptive hand of price regulation or the invisible hand of competition. Only a federal regulatory arrangement similar to that in the United States would have sufficient impartiality to adjudicate electricity trade benefits between provinces. But the introduction of any such regulation would be strongly resisted by many provinces. It therefore appears that, absent two monopolies that can enter into a bilateral contract, fair allocation requires that interprovincial trade be based on competitive market concepts.

Competitive Electricity Markets

Other than the two pairs of provinces mentioned above, there are significant differences in commercial structure between neighbouring provinces as well as public-private factors. Market-based approaches to facilitating interprovincial electricity trade will therefore be essential in the majority of situations.

At issue is how to level the playing field between a province that has chosen to adopt an open competitive market and a neighbour that has chosen to stay with a monopoly structure. This is the situation that exists between British Columbia and Alberta, Alberta and Saskatchewan, Manitoba and Ontario, and Ontario and Quebec. The situation also exists between Quebec and New Brunswick, New Brunswick and Prince Edward Island, and New Brunswick and Nova Scotia, although to a lesser extent since both New Brunswick and Nova Scotia nominally have partial competitive markets. The regulatory changes associated with the proposed purchase of NB Power assets by Hydro-Québec would have significantly altered the context for interprovincial electricity trade. It remains to be seen

whether the cancellation of that transaction will stimulate consideration of a regional approach to electricity in the Maritimes.

Reciprocal Intertie Capacity Allocations

One approach to enhancing interprovincial electricity trade would be for one province to impose reciprocity provisions on another – in effect, to mimic the provisions FERC imposes in the United States to foster fair and open interstate trade. Two types of reciprocity arrangements might be necessary from the perspective of participants in the market-based system: one that ensures equitable access to intertie capacity and another that ensures the equitable allocation of economic benefits from electricity trade.

One approach to allocating intertie capacity would be to have different rules for 50 percent of the capacity in both directions. For example, suppose one province had a competitive market structure and the other had an open-access transmission tariff and monopoly structure. In order for both provinces to benefit equally from the intertie, the province with the competitive market could allow half the intertie capacity on its side to be allocated under the non-market province's rules in return for the reciprocal right to allocate half the capacity on the other side according to competitive-market rules. At the same time, the competitive-market province would disallow intertie transactions in excess of 50 percent of intertie capacity unless the other province agreed to the 50-50 arrangement. In

theory, this could result in a standoff, with the intertie left idle; in practice, commercial realities would assure that the non-market province would accept such an arrangement.²⁴

The result would be a simpler reservation system than the current one, where matching reservations often must be lined up on both sides of the border using two separate and different reservation systems in order for a transaction to proceed. As well, the competitive-market province's allocation rules would be designed to prevent the monopolization of intertie capacity, which would ensure that no one party could lock up more than the 50 percent of the intertie capacity – that is, the portion that would be allocated under the non-market province's rules.

Forward Contracting

With respect to equalizing economic benefits from electricity trade, provinces with competitive electricity markets could change the way import and export transactions with non-market neighbours are treated. For example, the volume of imports and exports allowed in the real-time spot market could be limited by requiring or incenting buyers and sellers to make arrangements through forward commitments, whereby they agree to exchange electricity and money at some time in the future – anywhere from one day to one or more years ahead. This is in contrast to the real-time spot market where electricity and money are exchanged at the time the buyer and seller agree to the transaction (see Box 2).

Box 2: Fostering a Forward Market

Trading volume could be shifted to the forward market and away from the real-time market by the adoption of a market design similar to that used in the United Kingdom, the essential element of which is that the price paid to sellers in the real-time market is lower than the price charged to buyers. Such dual-pricing discourages trade in the real-time market and makes contracting in the longer-term forward market comparatively attractive.

The revenue accumulated by the market operator in a dual-price arrangement could be made equivalent to the costs of

having idle generating capacity available to respond to momentary and unpredictable variations in electricity use. Ensuring adequate investment in generation so that this backup capacity is available has proved to be a major challenge for many competitive electricity markets. It is often referred to as the "missing money" problem when revenues to generators operating in competitive markets are compared to what they would be had they been determined under a regulated monopoly arrangement.

²⁴ This is, in fact, the essence of how intertie capacity has been allocated between some countries in the European Union; see European Transmission System Operators (2005).

In effect, moving imports and exports to the forward market takes away the advantage a monopoly has by virtue of its inherent base of revenue. Against this long-term revenue assurance, the monopoly can reap the rewards of taking more aggressive short-term positions in the more dynamic competitive marketplace. Put another way, pressure on participants in the province with the competitive marketplace to make eleventh-hour commitments to transactions with a neighbouring monopoly could be reduced by confining the monopoly to longer-term future commitments.

One way to achieve this would be to require that all import and export transactions be arranged in the forward market. Such a dictatorial approach, however, inevitably would reduce both the volume of trade and opportunities for in-province buyers and sellers. It would be better to design the in-province marketplace such that it is dominated by forward transactions and real-time transactions play a minor role. Such a marketplace would involve in-province participants in longer-term buying and selling commitments more closely aligned with the commercial time scales of the external monopoly. Since a participant is inherently less able to dominate a forward market than a real-time market,²⁵ it might be possible to remove special market rules for imports and exports. This, in turn, would maximize benefits for both in-province buyers and in-province sellers.

Load-Serving Entities

A logical extension of expanding the marketplace to encourage longer-term forward contracts and to reduce the role of the real-time market would be to create load-serving entities (LSEs), which would be responsible for meeting the needs of residential and small commercial customers by acquiring electricity in the wholesale market.

Such entities inherently already exist in places that have wholesale competition but not retail competition. They also exist to some extent in the

form of arrangements to supply customers who, by choice or chance, are not served by a retailer in places that have introduced retail competition. The distinguishing feature of a true LSE is that it actively manages a portfolio of wholesale supply contracts that includes forward contracts. By contracting forward in a marketplace that includes imports and exports, an LSE would capture a share of the economic value created by interprovincial trade on behalf of the retail customers it serves. Unlike most US markets, none of the Canadian markets have provided for LSEs. This means that in both Alberta and Ontario many consumers are basically passive price takers and do not actively participate in setting market price by committing to take supply.

Implementing LSEs has a dual benefit with respect to interprovincial trade. Firstly, it ensures that all customers, whether or not they choose to actively take advantage of the competitive marketplace, will share in any benefits from interprovincial trade because it ensures that all customers are actively represented in the marketplace where importing and exporting is being arranged. Secondly, LSEs will participate in the forward market in order to reduce their exposure to price volatility. By so doing, they add depth to the forward market which will enhance both the role of interprovincial trade and reinforce the ability of the competitively restructured province to realize its fair share of economic benefits from interprovincial electricity trade.

A Recommended National Initiative

Canada is in the unique situation among leading industrialized nations both for being energy-self sufficient and for not having a national electricity policy. Thanks to the massive disruptions to business and individuals which resulted from interprovincial wealth transfers under Canada's 1980 National Energy Program, the concept of an energy-related national policy will be an anathema to most Canadians and probably all politicians.

²⁵ The longer time between the commitment and delivery of a forward contract than of a real-time contract allows both parties to sell their interests to others and for those others, in turn, to do the same. Because of the resulting involvement of more sellers and buyers and increase in the number of transactions, the options increase for all sellers and buyers, which correspondingly reduces the ability of any one of them to exercise market power.

Looking without envy across the border to the very complex political and legal issues resulting from the involvement of both federal and state levels of government in US electricity, the Canadian electricity industry too has never been enthusiastic about an increased role for Ottawa.

But due to a lack of any nationwide vision about electricity the Canadian electricity industry is tying itself in knots with the implementation of interprovincial trade. The situations at the British Columbia-Alberta and the Quebec-Ontario borders exemplify the difficulties. All parties have clear and justifiable provincial policies but they don't mesh.

The main unifying influences are, in fact, coming from the US through the reciprocity provisions of FERC. But the FERC provisions and pro forma tariff reflect a US national policy of fostering competition in the electricity industry. No such policy exists in Canada and is unlikely to appear because many provinces eschew the notion of a competitive electricity sector. Yet these same provinces adopt open-access policies and follow the FERC pro forma tariff. Small wonder then that difficulties occur when policies based on a monopoly structure are implemented with tools designed to foster competition.

Through its reciprocity provisions, the FERC approach builds barriers to trade between electricity systems which have competitive commercial structures and those that don't. Canada needs a process that allows interprovincial trade without reciprocity so that trade can occur fairly between provinces that have adopted a competitive market and their neighbours who haven't.

NAFTA Challenge of US Reciprocity Rules

One initiative with national value would be to design an interface between market and non-market systems that facilitates trade by enabling a fair allocation of trading benefits. To preserve existing arrangements for accessing US markets it may also be necessary to pursue under NAFTA removal of the FERC requirement for reciprocal treatment.

An extensive analysis and commentary on this (Saunders 2001) concludes that through a series of decisions involving Quebec, Ontario and British Columbia FERC "...was overruling the principle of

national treatment set out in the NAFTA (and the GATT) and replacing it with the principle of reciprocity. Put differently, it was replacing the principle of free trade with the principle of fair trade, with FERC as the adjudicator of what is fair."

Indications that there may be room for arranging international trade in a fashion that better accommodates interprovincial trade is contained in a statement by FERC itself quoted recently by the British Columbia Utilities Commission (2009): "The Commission's concern is not transmission service to serve Canadian loads – it is transmission to serve United States loads." Indeed, as already demonstrated by the separate and different approaches to transmission in both Alberta and Ontario, obtaining access to US markets with FERC's blessing does not require the use of a tariff based on the FERC pro forma.

Any two provinces that could mutually benefit from improved arrangements for interprovincial trade in electricity could join forces to develop the policy, regulatory and commercial parameters that best fit their separate and mutual needs. If the resulting proposal fails to get assurance from FERC of unchanged access to US markets, appropriate steps could be initiated by the federal government under NAFTA. As already pointed out, the alternating pattern across Canada of competitive and non-competitive electricity systems yields many potential provincial pairings to take this initiative but obvious ones are Alberta-British Columbia and Ontario-Quebec.

Conclusion

Canadians are in the enviable position of living in a country richly endowed with energy resources at a time when the world is struggling with the challenges of meeting the energy needs of a modern economy in a way that is both economically and environmentally sustainable. There are clear opportunities to realize our national potential through increased interprovincial trading in electricity.

Nature has fortuitously located hydroelectric, gas, oil, coal, and nuclear resources in an alternating pattern across the country, and the daily east-to-west transit of the sun creates timing diversity between neighbours' patterns of electricity use. Yet

it seems as though humans have purposely conspired to undermine these natural facilitators of interprovincial trade by putting in place another alternating pattern of monopoly and competitive commercial structures and public and private ownership that effectively erects trade barriers at virtually every provincial border.

This manmade obstacle course is made all the more difficult by provinces with monopoly electricity systems having based their transmission arrangements on a US model. Designed as part of an overarching US policy to encourage the nationwide adoption of competitive electricity markets, these US transmission tariffs are entirely

out of place in Canada, where the national policy defaults to being the sum total of individual provincial policies, few of which embrace competition. Realizing the economic benefits that could result from an increase in interprovincial electricity trade will require developing interchange arrangements that fit the Canadian reality. That is, arrangements that facilitate bilateral transactions between electricity systems that are organized as vertically integrated monopolies, and neighbouring ones that have been commercially restructured for competitive supply and customer choice.

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