



Québec in North America / Le Québec en Amérique du Nord

Plugged into North America: Hydro-Québec in an Integrated Continental Energy Sector

Jean-François Talbot

M.Sc. Student

Department of Political Science

Université de Montréal

As energy demand grows larger each year, the need for a deeper integration in this sector is becoming more and more important to be able to cope with rising demand in the face of limited production capacity. North America must seek to use its energy capabilities in a more efficient manner. For example, Canada can help the United States deal with peak demand in the summer while the United States can help Canada during the winter where its need for energy is greater. A deeper integration can allow each state and province to satisfy its needs in terms of energy without having to construct new facilities to meet peak demand. In the current form of integration, a heavy snow pack in Canada during winter may allow New York to have cheaper electricity to deal with July heat waves, as the additional snow will result in higher reservoir levels for Canada's hydroelectric plants, translating a higher supply of electricity into lower prices.

When crises strike, such as the recent blackout in the U.S. northeast and in Ontario, the effects of a deeper integration of our energy markets become evident. This closer integration means that when one part of the "power grid" fails, others can come into play

Branché sur l'Amérique du Nord : Hydro-Québec et l'intégration continentale dans le secteur de l'énergie

English summary on p. 15.

Résumé :

Cette note brosse un tableau sommaire du secteur de l'énergie en Amérique du Nord, particulièrement en ce qui concerne l'énergie électrique. L'objectif est de situer la place du Québec dans le marché nord-américain de l'énergie électrique et de la comparer avec les autres provinces et États. Nous passons d'abord en revue l'évolution du marché nord-américain de l'énergie en soulignant les étapes majeures de son développement, dont l'entrée en vigueur de l'Accord de libre-échange nord-américain (ALÉNA) et la déréglementation du secteur énergétique, à la fois aux niveaux international et national. Nous examinons ensuite ce qui distingue le secteur québécois de l'énergie des secteurs comparables dans le reste de Canada et aux États-Unis, sur le plan de la consommation et de la production. Nous nous penchons enfin sur Hydro-Québec et sur les stratégies que cette société d'État a adoptées pour s'adapter aux défis qu'elle a rencontrés jusqu'à aujourd'hui et à ceux qui l'attendent dans l'avenir.

and provide energy to the region in need. The result is that North America should have a more stable energy supply along with access to better prices resulting from an increase in competition and a greater supply of energy.

This note is part of a special series “Québec in North America,” edited by Stephen Blank, Guy Stanley, and Pasquale Salvaggio. A detailed presentation of this project can be found on this Web page:

<http://cepea.cerium.ca/article340.html>

The Chair in American Political and Economic Studies (Chaire d'études politiques et économiques américaines; CÉPÉA; <http://cepea.cerium.ca>) is a constituent part of the Centre of International Studies (Centre d'études et de recherches internationales de l'Université de Montréal; CÉRIMUM; www.cerium.ca). The Chair benefits from the financial support of Québec's Ministry of International Relations (www.mri.gouv.qc.ca).

The series « Notes & Analyses » publishes research briefs and more in-depth analyses, in French or in English, produced as part of the Chair's activities.

To receive these texts at time of publication, please register by writing us: cepea@umontreal.ca.

Editorial responsibility for the series is shared by the Chair's research team: Pierre Martin (director), Michel Fortmann, Richard Nadeau, and François Vaillancourt (research directors). Responsibility for the contents of these “Notes & Analyses” rests solely with their authors. © CÉPÉA 2007

While the links in the energy sector are getting stronger in all domains, including natural gas, petroleum, electricity, coal, we will focus only on electricity and see how those links have been strengthened in the past years and we will examine the current state of integration in this sector.

The energy policies of Canada, Mexico and the United States

In order to fully understand the current state of integration in the energy sector it is important to examine the current situation in each country of the North American Free Trade Agreement (NAFTA) as well as what are their motivations.

Canada

In Canada, western provinces have access to large resources of natural gas and petroleum, Québec and Ontario have good hydroelectric potential, while the maritime provinces have, with the discovery of oil reserves in the Atlantic Ocean and the Gulf of the St-Lawrence good energy potential.

According to government sources¹, Canada has three basic objectives for its energy policy; that “Canadians have access to reliable, affordable and secure sources of energy”, “creating a policy context that will allow energy industries to contribute to the prosperity and quality of life of all Canadians” and finally “reconciling our voracious appetite for energy with our environmental objectives”. However, the federal government does not have exclusive jurisdiction when it comes to natural resources, since the provinces have some autonomy in that sector².

In recent years, the focus has been on sustainable development. To achieve this objective, the Canadian government has opted to let the markets fix energy prices and allocate resources, while providing some regulation to ensure the correct functioning of markets. To make sure that the population is well served, the government is also dedicated to invest in order to “supply goods and services that the market cannot or will not supply”³ such as constructing large dams and other projects which require a lot of capital. The federal government also reiterated its commitment to respect the jurisdiction given by the constitution to the provinces in that sector.

Canada has always wanted to retain its independence vis-à-vis the United States and as such it could not go for complete integration of its energy markets with those of the United States and Mexico. Canada has constantly fought to keep its institutions and its own regulatory environment but has also moved for better coordination with its Mexican and American counterparts. The need for better coordination between the three member countries of NAFTA gave birth to some discussion forums to ensure compatibility between the different electric networks, to have the same standards of safety and maintenance, in order to have a stable and effective power grid.

¹ Natural Resources Canada, *Energy Sector*, available online at http://www2.nrcan.gc.ca/es/es/policy_e.cfm

² For more information in the legal framework in Canada, see below

³ Natural Resources Canada, *Energy Sector*, *op. cit.*

United States

The United States, the largest of the three partners in NAFTA, has the most to gain from a deeper integration of the North American energy markets as it has had difficulty producing enough energy to meet its needs, thus needing to turn to its partners. With deeper integration, it would be able to deal more efficiently with rising demand without having to invest massively to construct new facilities and it would benefit from cleaner energy (hydroelectricity and natural gas) instead of relying on heavy polluting energy sources such as coal. Also energy integration would be positive for the United States because of lower prices due to increased competition, with the additional assurance that there would be no shortage of energy, resulting in a lower reliance on petroleum for their energy needs. As a whole, the United States is a net importer of energy while Canada and Mexico are net exporters⁴.

Mexico

Mexico also has major incentives for pushing towards more integrated energy markets as the increased revenues can help the country to create jobs in that sector, raising the living standards which would in turn help to maintain political, social and economic stability of the country.

The problem that we can see for Mexico is that its petroleum industry is deeply underfunded, requiring private investment to speed up the exploration and the development of new facilities. Such a result is unlikely to occur as the sector is state run and denationalizing the industry is politically difficult as such an initiative would be political suicide in the current Mexican situation. Another point that Joseph Dukert brings forward is that the heavy reliance on American markets means that Mexico is more vulnerable to political pressure in domains such as

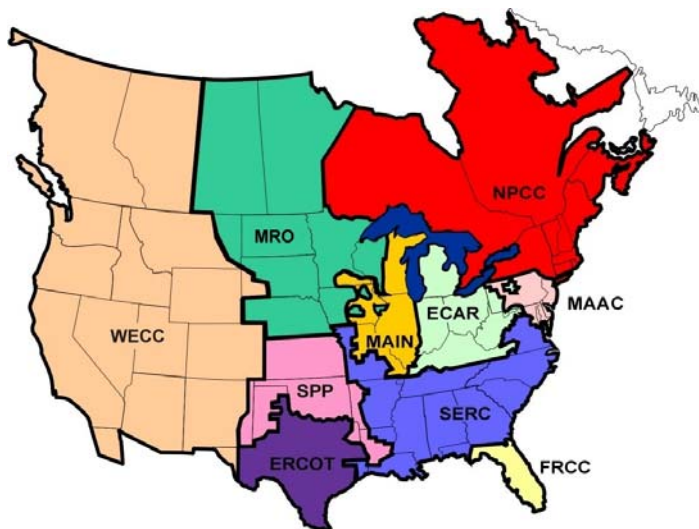
immigration, which are not related with natural resources⁵.

The institutions overlooking the North American electricity markets

North American Electric Reliability Council (NERC)

The North American Electric Reliability Council (NERC) was created in 1968 as a voluntary organization made up of members from all sectors related to the electricity industry, from the independent utilities to power marketers and government agencies. The NERC is divided into ten Regional Reliability Councils (RRC) that cover the United States, Canada and part of Baja California Norte, Mexico.

Map 1 NERC Regional Reliability Councils⁶

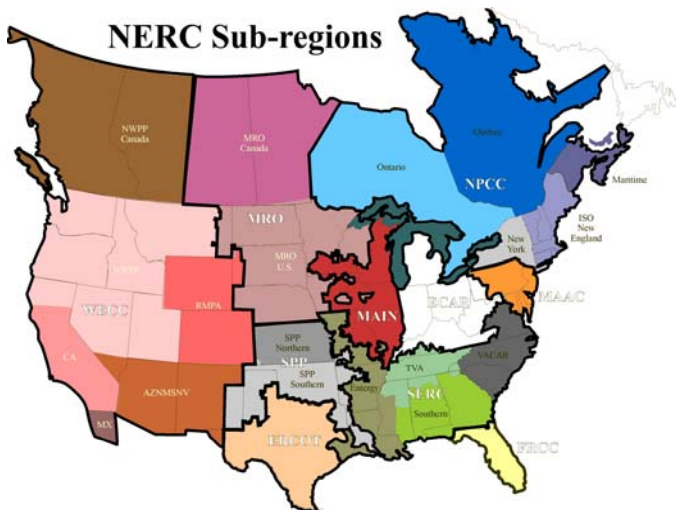


⁵ Joseph M. Dukert, "The Evolution of the North American Energy Market" p.3, available online at www.csis.org/americas/pubs/pp/ppNAenergy.pdf

⁶ North American Electric Reliability Council, *Map of the NERC Regional Reliability Councils*, available online at www.nerc.com/regional/nercmap.jpg

⁴ The North American Energy Working Group, *North America: The Energy Picture*, available online at www.eia.doe.gov/emeu/northamerica/engsupp.htm#VPID_1

Map 2 The sub-regions of NERC⁷

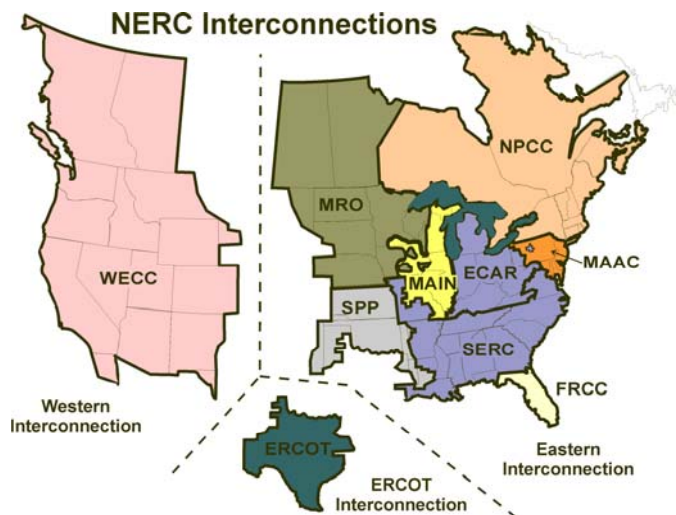


This organization produces reports on the reliability and the security of the electric installations in each region, which can help policymakers address issues more rapidly and more efficiently. The NERC is also a forum where the different actors in the energy sector discuss new changes, push for a deeper integration and present new standards so that all actors are on the same page and ready for the changes, as well as maintaining the interconnections between the different networks and regions. While there are 10 regions, they operate in three blocs with interconnections between the different regions.

Those interconnections illustrate the level of integration in the North American electricity markets. Québec's electricity can be sold as far south as Florida if required. This level of integration has enabled North America to have one of the most reliable and robust electric system in the world.

⁷ North American Electric Reliability Council, *NERC Sub-regions*, available online at www.nerc.com/regional/nercmapsubregions.jpg

Map 3 The NERC interconnections⁸



Québec's role in NERC

Québec is part of the Northeast Power Coordinating Council (NPCC) that includes New York, the six New England states, Ontario, Québec, and the Maritime Provinces in Canada. It is represented by Hydro-Québec's subsidiary, Hydro-Québec TransÉnergie⁹, which is in charge of the Québec Control Area, which includes Québec, Labrador and the Alcan and Maclaren power systems¹⁰. Since this system is overviewed by the NPCC, the different companies must respect the NPCC norms concerning the exportation of electricity. Hydro-Québec TransÉnergie has raised the export restrictions affecting its interconnections from 250 to 500 megawatts, allowing the company to offer more reliable service for their customers in Québec and beyond its borders¹¹. As a member of NERC with Hydro-Québec TransÉnergie, Québec also contributes to the elaboration of new standards in terms of reliability and efficiency of the interconnected systems, while abiding to

⁸ North American Electric Reliability Council, *NERC Interconnections*, available online at www.nerc.com/regional/NERC_Interconnections_color.jpg

⁹ We'll explain the corporate structure of Hydro-Québec later in this paper.

¹⁰ Hydro-Québec TransÉnergie, *Features of Our Power System*, available online at <http://www.hydroQuebec.com/transenergie/en/reseau/caracteristiques.html>

¹¹ *Ibid.*

the rules in order to retain its privileges as a power marketer in the North American market.

The North American Energy Working Group (NAEWG)

In the spring of 2001, at the summit of the Americas held Québec City, the Canadian Minister of Natural Resources, the Mexican Secretary of Energy and the United States Secretary of Energy created the North American Energy Working Group (NAEWG) in order to “foster communication and cooperation among the governments and energy sectors of the three countries on energy-related matters of common interest, and to enhance North American energy trade and interconnections consistent with the goal of sustainable development, for the benefit of all¹²”. While the NERC is a more decentralized structure with more actors involved in the process, the NAEWG serves as a forum to exchange views and coordinate policies between the three member countries of NAFTA. It is interesting to note that the creation of the NAEWG dates back to 2001, eight years after the introduction of NAFTA. We can explain this delay due to realization by the member countries that such an institution could help them to coordinate more efficiently the ongoing integration in the electricity sector by adopting more coordinated policies. The leaders of the three countries have come to realize that as the energy sectors in all three countries move towards greater integration, a problem in one country could result in problems in another member country, so energy merited a regional attention, not just at the national level.

The role of Québec and of Hydro-Québec in the NAEWG

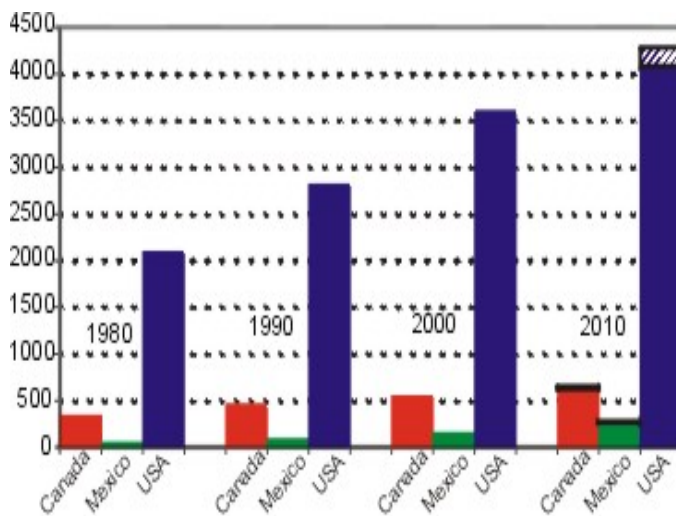
Since the NAEWG is a tripartite organization that includes the Canadian, Mexican and American governments, Québec and Hydro-Québec does not have an official channel like in the NERC for them to voice their opinions. As a result they have to resort to using

informal channels and pressure the Canadian government for them to move in the direction they desire instead of adopting a more “hands-on” approach. A way for them to influence the NAEWG is to produce papers on a variety of issues that concern them and to inform the federal government so they can be taken into consideration when the policies are being elaborated.

The North American energy sector and the future of integration

According to projections made by the NAEWG, the demand for electricity is expected to grow significantly in the next few years (figure 1), stressing the need for better coordination of policies and of a deeper integration to face these new challenges.

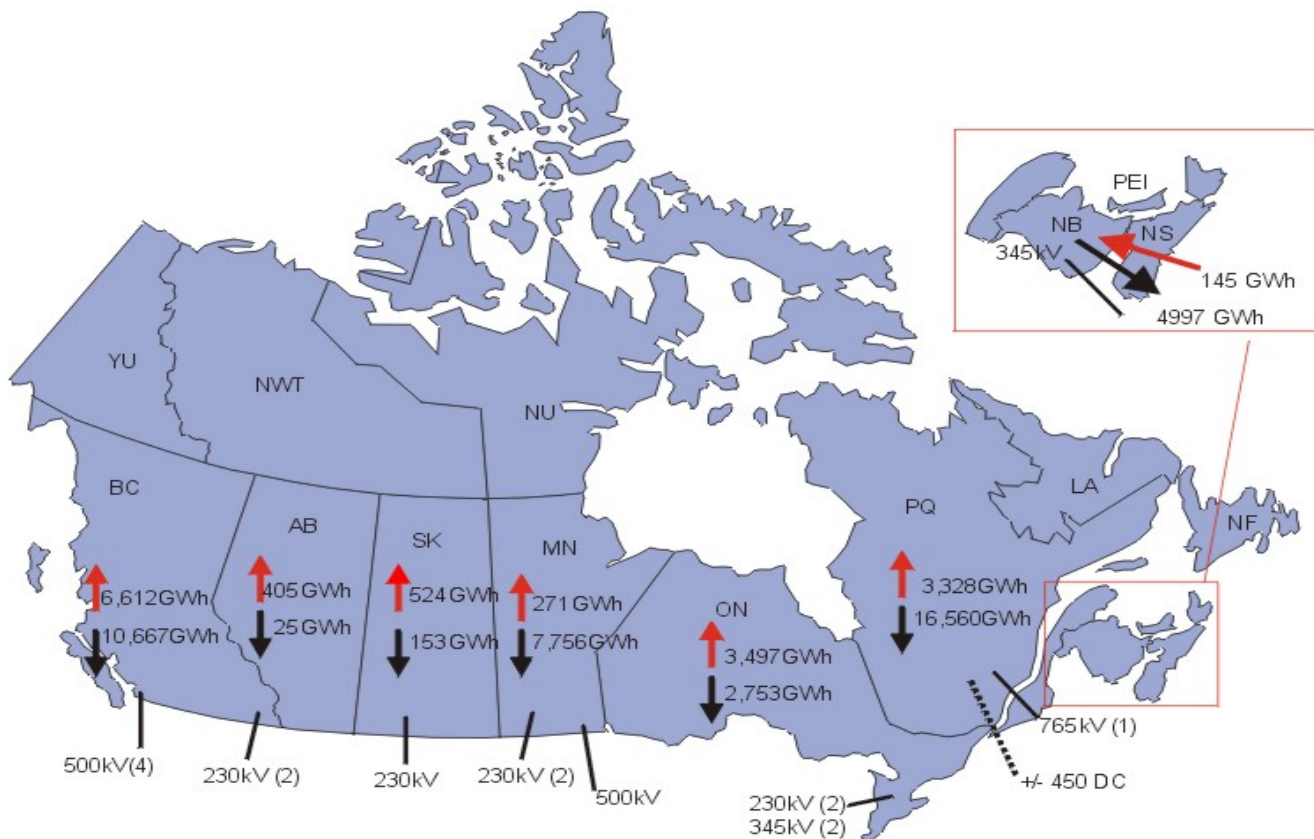
Figure 1
Electricity demand projections in Twh¹³



We also have to point out that the Canadian and American electricity markets are well integrated as Map 4 shows (next page).

¹² North American Energy Working Group, *op. cit.*

¹³ *Idem*



Map 4
Major international interconnections and electricity trade (1999)¹⁴

The integration on the energy sector, and specifically of electricity, is moving forward as institutions are being created to assist the countries achieve a more reliable, more secure, less expensive, and more efficient electricity sector in each country.

We can't find solid data on the evolution of the integration in the energy sector with hard facts for the three countries but we found some good figures for Québec's energy balance (see **Table 1**, next page)¹⁵.

Looking at this data, we can conclude that integration is deepening with time and that Québec is securing a bigger role in the energy sector in North America.

The three NAFTA countries therefore have plenty of incentives to push for a deeper integration of their energy markets, both on the environmental side, as they can cut the production at heavy polluting coal plants and buying energy from cleaner sources such as hydroelectricity, and on the economic side with lower prices for energy and an increased energy security, with the interconnections between the different networks. Each country has something to gain from deeper integration and with the creation of the North American Energy Working Group, they have given themselves a tool to help organize and deepen the current links between them.

¹⁴ *Idem*

¹⁵ Ministère des ressources naturelles du Québec, *L'énergie au Québec édition 2004*, p. 49.

BALANCE COMMERCIALE DU SECTEUR ÉNERGÉTIQUE (1982-2002)

En millions de dollars courants

Années	Charbon ¹		Pétrole brut		Produits pétroliers ^{2, 3}		Gaz naturel		Électricité		Solde de la balance commerciale du secteur énergétique
	Importations	Exportations	Importations	Exportations	Importations	Exportations	Importations	Exportations	Importations ⁴	Exportations	
1982	44		5 124		612	1 191	434		87	473	-4 637
1983	44		4 460		1 048	1 217	559		90	529	-4 455
1984	51		4 197		1 100	1 099	645		95	626	-4 363
1985	58		3 932		1 050	1 263	734		91	673	-3 930
1986	86		2 177		1 012	858	748		89	648	-2 606
1987	65		2 122		1 055	713	732		88	713	-2 635
1988	75		1 838		1 020	644	704		108	469	-2 633
1989	76		1 915		1 272	702	633		229	306	-3 116
1990	88		2 759		1 613	1 180	664		253	292	-3 906
1991	50		2 295		1 021	928	689		137	304	-2 959
1992	44		2 185		1 183	809	714		228	387	-3 159
1993	47		2 183		1 136	850	682		158	400	-2 955
1994	69		2 356		1 253	985	742		142	532	-3 046
1995	75		2 659		895	1 069	607		143	655	-2 655
1996	82		3 335		1 061	1 319	666		178	662	-3 340
1997	94		3 360		1 058	1 424	716		167	692	-3 278
1998	104		2 480		1 076	1 338	770		218	723	-2 587
1999	77		3 155		1 198	1 402	857		263	910	-3 238
2000	103		5 867		1 067	2 563	1 376		226	1 065	-5 011
2001	126		5 298		1 275	2 199	1 543		358	1 018	-5 382
2002	115		5 321		1 270	2 292	962		336 d.p.	1 348 d.p.	-4 364 d.p.

d.p. : donnée préliminaire

1. Comprend le charbon et le coke de charbon.

2. Comprend les produits pétroliers énergétiques suivants : essence et essence aviation, carburacteur, kérosène, carburant diesel, mazout léger et mazout lourd, coke de pétrole et gaz de pétrole liquéfiés d'origine primaire.

3. À partir de 2001, les échanges de gaz de pétrole liquéfiés d'origine primaire avec les autres provinces canadiennes sont exclus, ces données étant non disponibles.

4. Inclut les achats des chutes Churchill.

Sources : Ministère des Ressources naturelles, de la Faune et des Parcs du Québec et Statistique Canada.

Table 1: Québec's commercial balance in energy (1982-2002)

How does the integrated system work?

In order for this integrated electric system to work, it must have a wholesale market where the producers of electricity can offer their excess capacity to retailers, who then sell it to consumers. The amount of electricity that can be sold depends on the transmission lines and how many interconnections exist between the different networks, which will in turn affect the price of electricity. For example, if a line has excess capacity and there is a demand elsewhere, electricity will have to follow a longer route to reach its destination, which will in turn increase the loss of electricity in its transport and thus its cost. The price at which the electricity is sold depends on a variety of factors, including supply and demand and also the structure of the market.

A bidding process to buy and sell energy exists which determines a supply and demand equilibrium price, which can be “carried out for each 5-minute, half-hour or hour (depending on the market) intervals at each input and exit node on the transmission grid¹⁶”. This way of doing business can be convenient since it does not bind the producer and the retailer in a middle or long-term contract, thus allowing them to address a temporary issue in a fast and efficient manner. The problem with this method is that prices can be highly volatile, inciting the generators and the retailers of electricity to sign a hedging contract to protect themselves from the risks associated with a highly volatile market. There are also other agreements which can be reached such as a middle or long-term contract where the generator and the retailer agree to a certain price for a certain quantity of electricity for a fixed period

¹⁶ Wikipedia, *Electricity Market*, available online at http://en.wikipedia.org/wiki/Electricity_market

of time, making this the most secure for both parties as they know how much they will have to pay and how much they will earn by buying and selling energy on the markets.

Once the retailers have access to the electricity, they then sell it to their consumers at the market price or at the price that they are allowed to sell it to the end-users as set by regulators such as Québec's *Régie de l'énergie*.

Québec in North America

Québec enjoys an advantageous strategic position in the 21st century with its impressive energy capabilities and its geographic position near the US's Northeast. Energy production has driven Québec's economy by making it possible to provide cheap and clean energy to industries which in turn made them more competitive, thus creating jobs, knowledge and wealth in Québec. In this section, we will look more specifically at Québec's role in the North American energy sector, its specificities as well as take an historical perspective. We will end this section by talking about Québec's energy policy and its continental dimension and the impact of the Kyoto Protocol measures both on Québec and its role in North America as a supplier of "clean" energy.

Legal aspects of the energy sector in Canada

The Constitution divided the jurisdiction over energy between the provinces and the federal government. The provincial governments are responsible for the development and the management of energy, its commercial and environmental considerations residing inside their jurisdiction, while the federal government overviews the provincial governments in regards to resource management on border territory, nuclear power, the commerce and trade between provinces, between provinces and other countries, the trans-boundary environmental impact, and is also responsible for elaborating a policy of national interest concerning the economic development, energy security and also federal energy science and technology.

This division between the provinces and the federal government means that while provinces are responsible for the equipment used inside their border, the federal government regulates the power lines and pipelines which cross provincial or international borders. For example, the government of Québec solely regulates its energy sector up to the border with the United States, at which point the federal government's authority governs. Another interesting point is that nuclear energy falls under federal regulation so Québec's Gentilly-2 nuclear plant is subject to federal laws.

Thus, the complexity of the legal framework, over-viewing provincial trade on the international markets and with other provinces, is something that can slow down the integration in the North American energy sector.

A brief history of the electricity sector in Québec

The energy sector began to emerge in the second half of the 19th century as gas created from coal provided fuel to light Montreal back in 1873. As industrialization advanced, the demand for energy became stronger and was a catalyst for the construction of the first hydroelectric centrals around Montreal, at the very end of the 19th century. Shawinigan also saw the construction of a powerful hydro plant on the Saint-Maurice River which attracted aluminum, paper and chemical industries. Québec experienced a multiplication of plants in the 1920s and 1930s as the demand for energy surged. The sector consisted of only private investors and the with the government only getting involved in the production and distribution of energy in 1944 in Montreal when Québec's government nationalized the Montreal Light, Heat and Power Company Consolidated, creating Hydro-Québec. That same year, Hydro-Québec developed its production capabilities by constructing new power plants. But only in 1963 that the second phase of nationalization began when Hydro-Québec bought 45 out of the 46

electricity cooperatives along with numerous municipal networks. With the demand for electricity growing at 7% a year, Hydro-Québec realizes that it would have to double its generating capacity every ten years, therefore it launches the construction of three major hydroelectric complexes: Manic-Outardes, Churchill Falls (formerly called Hamilton Falls) and the La Grande complex along with some experimentation with nuclear power at the Gentilly-1 nuclear plant.

In 1994 with NAFTA signed, changes were expected in the energy sector to allow for a deeper integration with the United States; by 1997 the North American electricity market finally opened its door to competition. Hydro-Québec obtained a power marketer license for the US wholesale market which made it possible for Hydro-Québec to benefit from short-term buying and selling.

A simple example of this would be that Hydro-Québec can reduce its production during the night where it could buy power at below-average prices from Ontario and the north eastern part of the United States and provide them with energy when they need it during the day, at higher than average prices, effectively making a profit.

In January 1998 however, a major incident caught Hydro-Québec by surprise, an unprecedented ice storm which severely damaged its transmission and distribution system, leaving many customers without electricity for a couple of days and other in the dark up to four weeks. This particular incident exposed Hydro-Québec's vulnerabilities in its distribution network. It has since then taken a number of measures to strengthen its network such as adding new power lines, especially in areas considered vulnerable to ice storms.

It should be noted that the focus has been almost exclusively on hydro, which is explained by the fact that hydro power accounts for almost 97%¹⁷ of the production of

electricity in Québec, with the second source being the Gentilly 2 nuclear plant which accounts for a little more than 2%¹⁸ of all electricity produced.

When we consider energy in a broader picture, data from 2002 show that coal constitutes 0,99% of the total disposable energy compared to 37,63% for petroleum, 12,91% for natural gas, 38,04% for electricity and 10,44% for biomass.¹⁹ The industrial sector consumes the largest part with 38,74% while the transportation sector accounts for 24,60%, the residential sector for 19,65% and finally, the commercial sector accounts for 17,01% of the energy.²⁰

A comparison of the energy sector between Québec and the rest of Canada

One could be tempted to think that Québec's energy situation is similar to the rest of Canada but we can observe a big difference between western Canada, Québec and the Atlantic provinces regarding electricity sources.

The difference between Québec, Canada and the United States in terms of how they produce energy also has an impact on greenhouse gas emissions, with Québec emitting 11,6 tons of carbon dioxide per person compared to a Canadian average of 23,1 tons per person and the United States' 24,1 tons per person²¹. There is an even greater difference when we look at the carbon dioxide emissions caused by energy activities where Québec with its cleaner energy emits 7,8 tons per person of carbon dioxide compared to a Canadian average of 17,0 and 19,8 tons per person in the United States²². Québec produces energy in a different manner than the rest of Canada and the United States thanks to hydroelectricity, a much cleaner energy source than petroleum or coal.

¹⁸ *Ibid*, p. 60.

¹⁹ *Ibid*, p. 13.

²⁰ *Ibid*, p. 17.

²¹ *Ibid*, p. 20

²² *Ibid*, p. 21.

¹⁷ Ministère des ressources naturelles du Québec, *L'énergie au Québec édition 2004, op. cit.*, p. 50

That being said, when it comes to the consumption of energy in Québec, in Canada and in the United States, consumption figures reveal that Québec consumes as much energy as the Canadian average. Moreover, when compared to production, Québec is once again at about the Canadian average²³.

The distribution of Québec's energy capabilities differ from the rest of Canada with electricity taking a much bigger share of its production than any other province, 42,47% for Québec compared to a Canadian average of 25,0%²⁴. In order to have a clearer picture, we need to compare Québec, not only with the average, but with the other provinces individually since there are large differences between the Atlantic provinces, Québec, Ontario, the prairies and British Columbia. Québec relies massively on electricity for its energy needs while the Atlantic provinces show a dependency on petroleum. Ontario uses twice as much coal than the Canadian average and 75% of all the coal in Canada²⁵. For their part, the Prairies use far more natural gas than the rest of Canada while British Columbia reflects of the Canadian average. The situation is much more diversified than what a single glance at the Canadian averages might suggest, as provinces use different means to produce energy.

We can conclude this section by restating the main difference between Québec and its provincial neighbors, where Québec relies more on hydroelectricity to meet its energy needs, thus producing a cleaner energy than the rest of Canada.

Québec's place in a North American power grid

As Québec's North American presence in the energy sector grows, the links between Québec, the other provinces, and the Northeastern states gain in importance. Hydro-Québec now buys and sells electricity from the other provinces and the United States' Northeastern states. Québec has strong connections with its contiguous states and provinces²⁶ and increasingly buys and sells electricity on international markets, with other energy industries such as coal, petroleum, and natural gas, remaining important in terms of imports and exports (see Table 1)²⁷

As with other aspects of integration between Canada and the rest of North America, there exist stronger ties between some Canadian provinces and the United States than among the Canadian provinces. Hydro-Québec's exports are mainly directed to the U.S.'s Northeastern states as table 2 shows.

Table 2
Import and export capacity of Hydro-Québec with contiguous networks²⁸

Réseaux voisins	Mode importation	Mode exportation
Terre-Neuve-et-Labrador	5 200 MW	0 MW
Nouveau-Brunswick	785 MW	1 200 MW
Ontario	670 MW	1 295 MW
Nouvelle-Angleterre	1 870 MW	2 305 MW
New York	1 000 MW	2 125 MW

²³ *Ibid*, p. 22

²⁴ *Ibid*, p. 23

²⁵ *Ibid* p. 24.

²⁶ See annex 1 for a map of Hydro-Québec's distribution network and its connections.

²⁷ Ministère des ressources naturelles du Québec, *L'énergie au Québec édition 2004, op. cit.*, p. 6.

²⁸ *Ibid*, p. 49.

ÉCHANGES¹ D'ÉLECTRICITÉ (1982-2002)

En millions de kWh

Années			Réceptions		Livraisons	
	des États-Unis	des autres provinces canadiennes ²	des chutes Churchill	aux États-Unis	aux autres provinces canadiennes	
1982	7	57	35 779	8 530	9 383	
1983	9	53	31 229	10 228	9 349	
1984	8	68	36 012	11 250	11 706	
1985	3	103	31 836	9 581	14 627	
1986	35	30	30 696	12 674	14 387	
1987		90	30 392	16 401	12 488	
1988	86	632	30 727	11 863	5 258	
1989	1 187	2 138	24 371	5 627	4 101	
1990	1 188	1 555	26 163	3 403	3 710	
1991	730	1 507	26 367	5 957	4 109	
1992	1 388	2 747	25 985	8 856	3 752	
1993	684	250	29 942	13 009	2 132	
1994	28	1 131	27 446	17 337	3 082	
1995	838	783	26 721	16 874	7 698	
1996	546	1 306	25 779	15 251	4 370	
1997	903	1 416	30 333	11 845	4 571	
1998	2 212	1 966	34 166	13 058	4 109	
1999	2 613	3 836	31 438	15 949	7 726	
2000	3 992	1 704	31 793	20 704	4 723	
2001	3 471	2 246	29 719	14 924	2 158	
2002	2 547	2 774	32 291	14 841	4 810	

1. Inclut les échanges d'électricité non facturés ainsi que les compensations effectuées.

2. Exclut les achats des chutes Churchill.

Source: Statistique Canada, catalogues 57-003 et 57-202.

Table 3
Actual import and export of electricity²⁹

Hydro-Québec has stronger links when it comes to the integration of the electricity markets with New England and New York states if we exclude the privileged relationship with Newfoundland and Labrador. For the moment, it is difficult to tell what proportion of the electricity that is sold goes beyond the northeastern American states since the energy is sold to distribution networks, who can sell it back to other distribution networks in this interconnected network. The bottom line is that Québec exports more electricity to the United States than it does to the rest of Canada while it relies on its agreement with Newfoundland and Labrador for its imports of electricity with the Churchill Falls complex.

Hydro-Québec

Since its creation in 1944, Hydro-Québec enjoys a favorable position in Québec's energy markets, being the largest producer of electricity and one of the only companies allowed to sell electricity to consumers (other companies such as Alcan produce energy for their own use but cannot sell energy to customers in Québec. Since 1997, it has been permitted to sell energy to other entities outside the province and to Hydro-Québec, which then distributes it). Hydro-Québec also has the largest hydroelectricity complex in the world and has developed an expertise in transporting electricity with the development of the 735 kv lines that allow the company to transport electricity from its centrals, especially in Québec's far north, to its customers who are for the most part located in southern Québec.

²⁹ *Ibid*, p. 65.

With its large dams, Hydro-Québec has also developed an expertise in the security of its installations. A failure to insure the integrity of the structures would have devastating effects on Hydro-Québec, its reputation, production capabilities, on the surrounding regions which would certainly be flooded. Québec has recently witnessed the effects of a dam failure in La Baie when a dam owned by Abitibi-Consolidated failed, resulting in the flooding of the nearby city, causing heavy damage to the residences, commercial areas and infrastructures. Keeping in mind that this was a relatively small dam compared to La Grande complex, we can only imagine the extent of the damage that could result from such a failure.

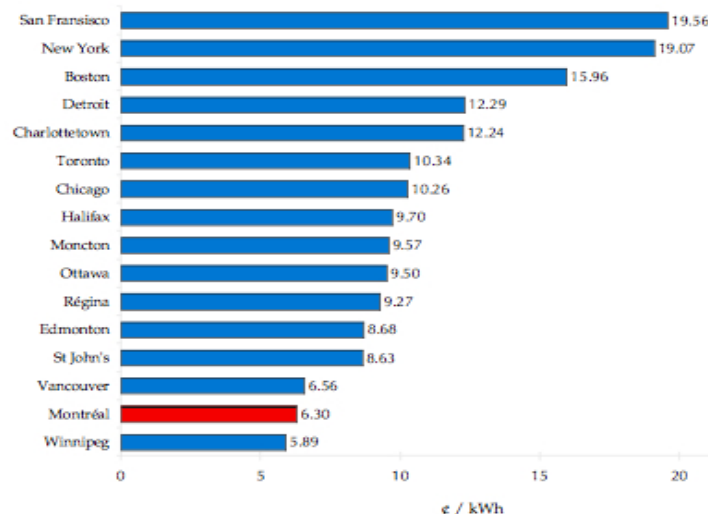
Particularities

Although Hydro-Québec enjoys a monopoly, it cannot set the prices of energy by itself. The *Régie de l'énergie* has the power to set prices as well as determine price increases if justified. This situation forces Hydro-Québec to deal with two prices for its energy; the domestic price, which is set by the *Régie de l'énergie*, and the prices on the North American energy markets which are set by the markets and are higher than what Hydro-Québec can charge consumers in the province. According to a study prepared by Hydro-Québec and used by the C.D. Howe institute, Quebecers have access to one of the cheapest prices in the electricity markets. The following table shows how much more Hydro-Québec can charge for its electricity when sold outside Québec.

According to the C.D. Howe Institute, Hydro-Québec would be able to generate \$5.3 billion in government revenue if electricity was sold at market prices instead of at the heavily subsidized and controlled domestic prices³⁰. This raises the question of whether cheap electricity is good for economic development and job creation or if it distorts the markets and discourages energy saving in Québec, which in turn forces Hydro-Québec to build new facilities in order to meet a rising

demand. Unfortunately, we do not have access to research on this matter but it would be interesting to learn the real cost and advantages of providing electricity at such a low price for Québec.

Figure 3
Price of electricity in April 2004 for residential customers³¹



An additional point regarding Hydro-Québec and its competitors, is the fact that it operates in a different situation in the sense that its profits are in a large part³² returned to the government instead of going to shareholders or for new investments. The period of financial austerity in the last two decades meant that few new projects were started and that the government used Hydro-Québec as a means of financing social expenditures and contributing to the reduction of deficits, instead of further developing Québec's energy capabilities. Recent talks have also brought the subject on the table such as the Ménard report³³ which proposes that the government increase the price of electricity in order to use increased

³¹ Marcel Boyer, "Raise Electricity Prices in Québec - and Benefit Everyone" in C.D. Howe e-brief from March 16, 2005 available online at www.cdhowe.org/pdf/ebrief_13_english.pdf

³² Hydro-Québec made 2.4 billion dollars of profits in 2004, 1.35 of which were returned to Québec. Source: Radio-Canada, *Hydro-Québec fait de l'argent comme de l'eau*, available online at <http://www.radio-canada.ca/nouvelles/Economie/nouvelles/200503/31/004-Hydro-profits.shtml>

³³ The report can be found in French at <http://publications.msss.gouv.qc.ca/acrobat/f/documntation/2005/Rapportmenard.pdf>

³⁰ *Idem*

profits to finance the healthcare system. Hydro-Québec is therefore very different from its competitors who have to maximize their profits for their shareholders. Hydro-Québec maximizes its profits to permit the province of Québec to spend more on social services and debt repayment.

Corporate structure of Hydro-Québec

Hydro-Québec has been radically transformed in recent years, passing from a monolithic structure to a much more decentralized one. Hydro-Québec's expertise now consists of six domains: distribution, transmission, generation, oil and gas, construction and the last being technological innovation. Each of these domains have their own structure, their own subsidiaries and partnerships with private corporations³⁴.

On the international side, Hydro-Québec has four divisions; Hydro-Québec Production, Hydro-Québec TransÉnergie, Hydro-Québec Équipement and Hydro-Québec Distribution, each responsible for international projects in their sphere of competence, even though the projects are done by Hydro-Québec International. The contracts are negotiated by Hydro-Québec International, as well as coordinates the project with the different divisions of Hydro-Québec.

Hydro-Québec Distribution has the mandate to ensure the supply of energy to Hydro-Québec's customers. In order to meet this challenge, it counts on the already existing 165 terawatts hours (TWh) that Hydro-Québec produces and has the option of buying energy through supply contracts by issuing calls for tenders among interested power suppliers. To put things in perspective, the demand for Québec in 2005 is forecasted at 169,3 TWh³⁵. But, due to the particularities of Hydro-Québec, the contract must then be reviewed by the *Régie de l'énergie* before it can take

effect. Prior to the approval, Hydro-Québec Distribution must submit a forecast of the energy needs of the Québec market for the next ten years in addition to the nature of the contracts that Hydro-Québec Distribution intends to enter into to meet demand above 165 TWh.

Hydro-Québec Production is responsible for producing electricity and selling it on wholesale markets, both inside and outside Québec. This division allows Hydro-Québec to earn profits on international markets by selling energy and expertise, achieved through targeted investments and technical services contracts.

Hydro-Québec TransÉnergie has the mandate to transport energy from the power stations to its customers, while Hydro-Québec Construction oversees the engineering and construction of the plants. It also has the mandate of constructing the power lines and the substations within Québec.

Hydro-Québec: A new era of cooperation with the private sector?

Traditionally, Hydro-Québec has built its power stations, its power lines and maintained its installations by itself, except for Churchill Falls, maintained in cooperation with Newfoundland and Labrador. Hydro-Québec has recently launched a call for tenders to buy energy generated by wind power from the private sector. According to its website this is the first in a series of these public-private partnerships in the energy sector³⁶. The official reason behind this move is to reciprocate with other North American energy producers but another explanation can be seen. The government of Québec does not want to commit important amounts of money like it did in the 1970s to develop its energy capabilities and has thus turned to the private sector to build and maintain facilities, while Hydro-Québec continues to transport the

³⁴ The organizational charts of the different sectors of Hydro-Québec can be found in annexes 2 through 7.

³⁵ The load forecast can be found at http://www.hydroQuébec.com/distribution/en/marcheQuébécois/pdf/prev_ventes.pdf

³⁶ Hydro-Québec, *History of Electricity in Québec*, available online at

<http://www.hydroQuébec.com/learning/history/index.html>

energy and sell it to its customers. It is still too early to tell if this is the first step in the development of a private energy sector in Québec, creating competitors for Hydro-Québec, or if this is only a move toward public-private partnerships in the energy sector where Hydro-Québec would not entirely control its production facilities, something that could have an effect on the reliability of energy supply in Québec.

One thing to keep in mind though is that this is a fairly new situation for Québec, having opted for a new system where private producers can enter in direct competition with Hydro-Québec's centrals in the production of electricity. They can, as was the case in the past, construct and exploit small stations³⁷ and starting in 2002, they can sell this energy to Hydro-Québec. It is pertinent to ask what are the reasons behind this decision since the production of these small stations are insignificant when compared to Hydro-Québec's existing production capabilities. A potential answer is that Québec is preparing to privatize Hydro-Québec, a political signal that may be sent to the private sector. Privatization of Hydro-Québec was put on the table in 2000 by the economist Pierre Fortin who called for a privatization of 40% of Hydro-Québec in order for the government to pay its down its debt and that a greater involvement and ownership by the Québec public, the Cree and Americans would have a positive effect on their relations, in particular with native Quebecers since they would be shareholders of the new entity, thus gaining from its profitability and reducing their tensions with Québec³⁸.

If the government is going towards privatization of Hydro-Québec and of the energy sector in general, consumers will be impacted in a number of ways, by mainly regarding prices. At the moment, customers enjoy heavily discounted energy prices, which

would not exist if Hydro-Québec was a private entity. A rise in energy prices for the residents of Québec would be inevitable. It can be argued that a loss of autonomy in the energy sector would ensue, meaning that private entities would make the future decisions on energy, decisions that would be driven by profits and not necessarily for the public good of Québec's residents. There are also fears that the monopoly enjoyed by Hydro-Québec would then be replaced by an oligopoly of private corporations which could then set the unfavorable energy prices. Another argument against privatization states that in a liberalized market, the product goes to the people who are willing to offer the most for the product, meaning that electricity currently considered to be a public good, could become a private good and that not everyone would then be able to afford it nor have access to it. There is a risk associated with a liberalization of the energy market and the privatization of Hydro-Québec as private corporations do not have the same motives as a government un company. Recent events such as the blackout in August 2003 showed that private operators spend as little as possible on maintenance and security in order to save on costs and maximize profits for their shareholders. Hydro-Québec is less concerned with profitability than with providing a reliable and inexpensive source of energy to its customers. Recent experiences with privately owned companies suggest that reliability is affected by the structure of the market. Another factor to consider is that Hydro-Québec is accountable to Québec's government and its citizens while a private company is only accountable to its shareholders. The last argument against the privatization of Hydro-Québec and the liberalization of Québec's energy sector is this sector's large influence in attracting private investments which in turn creates jobs and stimulates growth by the creation of wealth.

There are also arguments in favor of the privatization of Hydro-Québec and calls for greater involvement of the private sector like the proposal advanced by Pierre Fortin referred to earlier. The main arguments put

³⁷ A small central can produce less than 50 MW

³⁸ Claudine Magny, *Privatiser Hydro-Québec?*, available online at http://www.radio-canada.ca/nouvelles/dossiers/Hydro-Québec/situation_qc_3.html

forward by those in favor of privatization of Hydro-Québec suggest that it would allow Québec to lower considerably its debt, thus freeing resources for the many challenges arising today, such as the need for new investments in health care and education. The inevitable rise in prices would also lead to a more efficient use of energy, which could in turn lessen the need for new projects and have a positive impact on the environment. A privatization of Hydro-Québec and a liberalization of Québec's energy sector would also lead to stronger links between Hydro-Québec and foreign customers, such as the United States, improving its potential for new markets and growth. Critics of the actual system also state that Hydro-Québec is managed with political goals, a thing that could not happen if it was privatized. It would then be driven by economic imperatives instead of politics, for the greater good of Québec's citizens.

At this stage of integration in North America, Québec should remain in control of the energy sector. Letting Hydro-Québec construct, maintain, distribute and sell electricity is also a strong signal to investors that the incentives that were given in the past are to be respected and that a surge in electricity prices should not be expected, which could lead to plant closings such as in the aluminum industry which relies on cheap electricity to operate. Incentives could be replaced by tax breaks, bonds with very low interest rates, and subsidies, however, it is harder politically for governments to give millions of dollars to a multinational corporations than offering inexpensive electricity as incentive to set up in Québec.

Finally, glancing at the situation in California, Ontario, and Alberta following the energy privatization leads us to see that there is no rush towards privatization in Québec.

Conclusion

In the near future, we have to expect a deeper collaboration between Canada, Mexico and the United States in the energy sector and we can foresee a continuation in the liberalization

Plugged into North America: Hydro-Québec in an Integrated Continental Energy Sector

Abstract:

This note looks at the energy picture in North America and, more specifically, at the electricity sector. The aim is to paint a picture of Québec's place in this North American energy market by focusing on electricity, and see the challenges it faces and to compare with other provinces and states. First, it reviews the North American energy market, focusing on major changes, such as the introduction of NAFTA, and the deregulation of the energy sector, both at the domestic and international level. Second, it presents an overview of Québec's energy sector to see how it distinguishes itself from that of the rest of Canada and to compare it with the situation in the United States, both in terms of production and consumption of energy. Third, the focus turns to how Hydro-Québec has evolved to meet these challenges and what Québec's electricity giant can expect in the future.

process that is taking place in Québec's electricity sector, at least until the next election where this decision could be debated again. One thing seems certain, the process of integration of the electricity sector has benefited all its participants, with the expectation that there is still everything to gain from closer integration or from better cooperation between the different actors.

For Québec, the question is not whether to deepen integration in order to take advantage of this vast North American electricity market, but on terms Québec's position in that sector should be, to what extent it should build new power stations to generate electricity for export, and on its strategy to meet rising electricity demand. It is a question on how to achieve Québec's goals rather than of feasibility. We should therefore expect to see Québec maintain a privileged place in the North American electricity market with the forecasted construction of new power stations made to take advantage of the excellent business opportunities in that sector beyond Québec.

References

Boyer, Marcel. 2005. « Raise Electricity Prices in Québec - and Benefit Everyone » dans *C.D. Howe e-brief*

www.cdhowe.org/pdf/ebrief_13_english.pdf

Dukert, Joseph M. « The Evolution of the North American Energy Market » p.3,

www.csis.org/americas/pubs/pp/ppNAenergy.pdf

Hydro-Québec TransÉnergie, *Features of Our Power System*,

www.hydroquebec.com/transenergie/en/reseau/caracteristiques.html

Le groupe de travail nord-américain sur l'énergie, *North America: The Energy Picture*,

www.eia.doe.gov/emeu/northamerica/engsupp.htm#_VPID_1

Magny, Claudine, *Privatiser Hydro-Québec?*,

www.radio-canada.ca/nouvelles/dossiers/Hydro-Quebec/situation_qc_3.html

Ministère des ressources naturelles du Québec, *L'énergie au Québec édition 2004*, p. 49,

www.mrn.gouv.qc.ca/publications/energie/energie/energie-au-quebec-2004.pdf

North American Electric Reliability Council, *Map of the NERC Regional Reliability Councils*,

www.nerc.com/regional/nercmap.jpg

North American Electric Reliability Council, *NERC Sub-regions*,

www.nerc.com/regional/nercmapsubregions.jpg

North American Electric Reliability Council, *NERC Interconnections*,

www.nerc.com/regional/NERC_Interconnections_color.jpg

Ressources naturelles du Canada, *Secteur Énergie*,

http://www2.nrcan.gc.ca/es/es/policy_e.cfm



Québec in North America 
A project co-chaired by Stephen Blank and Guy Stanley, with the assistance of Pasquale Salvaggio



The *Québec in North America* project emerged from the presence of Professor Stephen Blank as a Fulbright Visiting Scholar at the Université de Montréal in 2004-2005. He co-chaired the project with Guy Stanley, with the assistance of Pasquale Salvaggio in the summer and fall of 2005. Project advisors were Michael Hawes, Executive Director of the Canada-U.S. Fulbright Program, Jean-François Lisée, Executive Director of the Université de Montréal's Center for International Studies (CÉRIUM), and Pierre Martin, Director of the Université de Montréal's Chair in American Political and Economic Studies. The financial contribution of the Canada-U.S. Fulbright Program and of the CÉRIUM (through a generous grant from the ministère des Relations internationales du Québec) is gratefully acknowledged.

Twelve students from HEC-Montréal, Université de Montréal, and Université du Québec à Montréal attended the project's seminars and prepared research papers. Guests at the seminar meetings included Albert Juneau (Québec Chamber of Commerce), Diane Wilhelmy (former Québec deputy minister of International Relations) and Konrad Yakabuski (Globe and Mail).

The picture of Québec in North America that emerges from these studies is that of a vibrant source of economic and cultural activity with an important presence throughout the continent. Québec is a major source and destination along trade corridors with New York and New England, and by far the largest Canadian supplier in an integrated North American electricity market. In 2004, Québec ranked sixth among countries of the world in terms of exports to the U.S. and fourth in the world as a destination for U.S. exports. Mexico is Québec's most important trading partner in Latin America. Québec is the fourth largest center of film production in North America, as well as the fourth largest biotechnology hub in North America.

The papers also illustrate hurdles that must be overcome as Québec pursues its integration within the continent. More generous provincial programs for biotech—especially Ontario—are eroding some of Québec's luster. The challenge of managing cross-border enterprises is also significant, as shown by the example of Québecor World. Exporting presents additional issues since the tragic events of September 11, 2001. Some of these are illustrated in the paper on CLIC Import-Export. Taken together, these papers shed light on how North America is evolving as an

economic zone. Although trade amongst companies continues between Québec and the rest of North America, trade increasingly is occurring within shared networks, or within firms. In this context, the barriers to trade between Québec and the rest of North America are becoming barriers to common economic growth.

The bottom line is that North America is rapidly reaching the point where many economic problems are shared no matter where they emerge. This has obvious implications for public policy and for policy capacity, or the ability of North American governments to recognize and solve common problems.

“Québec in North America” Project Home Page:
<http://cepea.cerium.ca/article340.html>

Alain-Michel Ayache, [*Exporter aux États-Unis dans le nouveau contexte de sécurité: l'expérience de CLIC Import-Export / Exporting to the United States in the New Security Context : The Case of CLIC Import-Export*](#), Notes & Analyses # 8.

David Descôteaux, [*Québecor World et les atouts d'une plateforme nord-américaine / Québecor World and the benefits of a North American Platform*](#), Notes & Analyses # 9.

Lauris Apse, [*Hollywood Nord-Est? La production de films nord-américains au Québec / Hollywood Northeast? North American Film Production in Québec*](#), Notes & Analyses # 10.

Rolando Gonzalez, [*Le Québec et le secteur de la biotechnologie en Amérique du Nord / Québec and the Biotech Industry in North America*](#), Notes & Analyses # 13.

Minea Valle Fajer, [*Le corridor Québec-New York / The Québec-New York Corridor*](#), Notes & Analyses # 14.

Jean-François Talbot, [*Branché sur l'Amérique du Nord: Hydro-Québec et l'intégration continentale dans le secteur de l'énergie / Plugged into North America: Hydro-Québec in an Integrated Continental Energy Sector*](#), Notes & Analyses # 18.

Anne-Elisabeth Piché, [*Un partenariat en pleine expansion : les relations économiques entre le Québec et le Mexique depuis 1994 / An Expanding Partnership : Economic Relations between Québec and Mexico Since 1994*](#), Notes & Analyses (forthcoming).

Sandra D'Sylva, [*Le Corridor Québec-Nouvelle-Angleterre / The Québec-New England Corridor*](#), Notes & Analyses (forthcoming).

Notes & Analyses sur les États-Unis/on the USA

Cette série est publiée par la Chaire d'études politiques et économiques américaines de l'Université de Montréal (www.cepea.umontreal.ca). Elle présente des travaux de synthèse, des analyses plus approfondies et des notes de recherche sur des enjeux contemporains touchant la politique et l'économie aux États-Unis ou les relations entre le Québec, le Canada et les États-Unis.

This series is published by the Chair in American Political and Economic Studies at the Université de Montréal (www.cepea.umontreal.ca). It features short notes, analytical works and working papers on contemporary political and economic issues in the United States, or relations between Québec, Canada and the United States.

18. Jean-François Talbot, [Branché sur l'Amérique du Nord: Hydro-Québec et l'intégration continentale dans le secteur de l'énergie / Plugged into North America: Hydro-Québec in an Integrated Continental Energy Sector](#). (Note), Février/February 2007.
17. Laura O'Laughlin, [Red States, Blue States: Examining Federal Transfers to the States, 1983-2004](#). (Analysis/analyse), January/janvier 2007.
16. Marie-Douce Primeau et Pierre Martin, [La situation de l'avortement aux États-Unis : le contexte juridique national et les politiques restrictives dans les États](#) (Note), décembre 2006.
15. Jean Philippe Brosseau, Stéphanie Rault & François Vaillancourt, [Healthcare and Welfare Reforms in the United States and Canada in the 1990s: Description and Evaluation](#) (Analysis/analyse), October/octobre 2006.
14. Minea Valle Fajer, [Le corridor Québec-New York / The Québec-New York Corridor](#) (Note), « Le Québec en Amérique du Nord / Québec in North America », Septembre/September 2006.
13. Rolando Gonzalez, [Le Québec et le secteur de la biotechnologie en Amérique du Nord / Québec and the Biotech Industry in North America](#), (Note), « Le Québec en Amérique du Nord / Québec in North America », Avril/April 2006.
12. Stephen Blank, [North American Trade Corridors : An Initial Exploration](#) (Analysis/analyse), March/mars 2006.
11. Christian Trudeau & Pierre Martin, [L'impact des délocalisations sur l'emploi dans les services : estimations préliminaires pour le Québec, le Canada et les États-Unis](#) (Note), mars 2006.
10. Lauris Apse, [Hollywood Nord-Est? La production de films nord-américains au Québec / Hollywood Northeast? North American Film Production in Québec](#), (Note), « Le Québec en Amérique du Nord / Québec in North America », mars 2006.
9. David Descôteaux, [Québecor World et les atouts d'une plateforme nord-américaine / Québecor World and the benefits of a North American Platform](#), (Note), « Le Québec en Amérique du Nord / Québec in North America », février 2006.
8. Alain-Michel Ayache, [Exporter aux États-Unis dans le nouveau contexte de sécurité: l'expérience de CLIC Import-Export / Exporting to the United States in the New Security Context : The Case of CLIC Import-Export](#), (Note), « Le Québec en Amérique du Nord / Québec in North America », février 2006.
7. Linda Lee, Christian Trudeau & Pierre Martin, [Délocalisation outre frontière de l'emploi : mise à jour sur l'activité législative aux États-Unis](#) (Note), septembre 2005.
6. Linda Lee, [Inventaire des politiques industrielles aux États-Unis : portrait d'un paradoxe](#) (Note), août 2005.
5. Pierre Martin & Christian Trudeau, [The Political Economy of State-Level Legislative Response to Services Offshoring in the United States, 2003-2004](#) (working paper / note de recherche), April/Avril 2005.
4. Richard Nadeau & Pierre Martin, [La présidentielle de 2004. Une lutte serrée, des conventions au vote... et au delà](#) (Analyse), novembre 2004.
3. Daniel Brisson, Alexandre Carette & Pasquale Salvaggio, [Élections présidentielles américaines. Comment se distinguent les candidats sur les principaux enjeux de politique étrangère ?](#) (Note), octobre 2004.
2. Linda Lee, [Les politiques d'achat chez nous à l'américaine : le retour en force des lois « Buy American » aux États-Unis](#) (Note), septembre 2004.
1. Linda Lee, [Délocalisation outre frontière de l'emploi : le point sur l'activité législative aux États-Unis](#) (Note), juin 2004.