Montreal
Economic Institute
Research Papers

Claude Garcia

How would the privatization of Hydro-Québec make Quebecers richer?

February 2009

Web site: www.iedm.org

The Montreal Economic Institute (MEI) is an independent, non-profit, non-partisan research and educational organization. It endeavours to promote an economic approach to the study of public policy issues. The product of a collaborative effort between entrepreneurs, academics and economists, it does not accept any public funding.

The opinions expressed in this study do not necessarily represent those of the Montreal Economic Institute or of the members of its board of directors. The publication of this study in no way implies that the Montreal Economic Institute or the members of its board of directors are in favour or oppose the passage of any bill.

Graphic Design: Valna Graphisme & Impression

ISBN 2-922687-25-2

Legal deposit: 1st quarter 2009
Bibliothèque et Archives nationales du Québec
Library and Archives Canada

Printed in Canada

Claude Garcia

How would the privatization of Hydro-Québec make Quebecers richer?

Montreal Economic Institute Research Paper

•

February 2009

Montreal Economic Institute

Ideas for a More Prosperous Nation

Table of contents

List of tables

List of abbreviations

kW : Kilowatt

MW : Megawatt (1 thousand kilowatts)

kWh : Kilowatt-hour

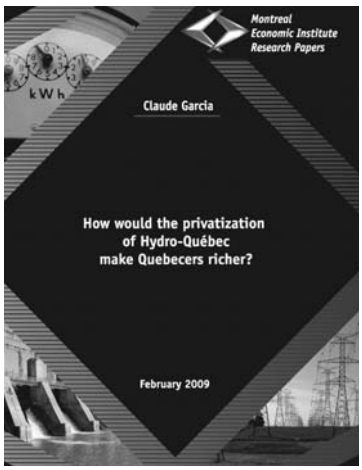
MWh : Megawatt-hour (1 thousand kilowatt-hours)

GWh : Gigawatt-hour (1 million kilowatt-hours)

TWh : Terawatt-hour (1 billion kilowatt-hours)

km : Kilometre

Executive Summary



The study begins with the early days of electricity in Quebec and outlines the reasons that led Quebec to nationalize the production and distribution of electricity and to entrust its management to Hydro-Québec. A summary is also presented of the developments undertaken to enable Hydro-Québec to boost substantially its exports to the United States following liberalization of the American market toward the end of the 20th century.

To analyze Hydro-Québec's performance from various standpoints, we create a comparison group of U.S. companies involved in the production, transmission and distribution of electricity. We show using several measures that Hydro-Québec achieves a lower operational efficiency level than comparable businesses. It could save at least $1 billion a year if it reduced its operating expenses to bring them in line with those of the most efficient private businesses.

Hydro-Québec has not shown great financial discipline when building power stations over the years, since the cost price of the electricity it will produce with some of those power plants is more than double the cost price of electricity produced by small private sector power plants. The construction cost of a Hydro-Québec power plant surpasses its projected budget by 26% per project, on average. These noted shortcomings in the management of large investment projects are not limited to the Production division, as we have revealed similar shortcomings in the firm's other divisions. Better management of investment projects would enable Hydro-Québec to cut, over time, more than $1 billion from its annual spending on debt servicing and amortization of fixed assets.

Moreover, we show that Hydro-Québec's annual profit would shrink from $2,882 million to $709 million if it had to pay the market price for the electricity it obtains from Churchill Falls. Is it reasonable to be content with such a trifling contribution from our principal collective resource? Why such limited profits from the exploitation of such a large hydroelectric development? This figure alone supports our position that Hydro-Québec's annual profit would surpass $5 billion if it made better use of the capital entrusted to it, and if it were as productive as the most efficient businesses in exploiting it.

There are many similarities between the British experience before privatization and the picture of Hydro-Québec we have sketched in this study: overabundance of personnel; unnecessarily high cost structure; unnecessarily large investments; and lack of competition. Privatization enabled the United Kingdom to enjoy renewed profits despite a rate drop of over 30% from 1990 to 2005 (after taking inflation into account). If it was successful, though, it is because privatization was accompanied by a two-part reform in the industry's governance. First of all, the regulatory model was modified to encourage market participants to increase their efficiency. In addition, competition was freed up as much as possible, notably by allowing all British consumers to choose their electricity provider.

In addition to taking necessary measures to improve Hydro-Québec's efficiency for the benefit of all Quebecers, we also propose modifying our aluminum industry strategy. Increasing Quebec's aluminum production capacity—90% of which is exported to the

United States—coincided with a reduction in production capacity for this metal south of the border. Meanwhile, the deregulation of the American energy market has increased the value of electricity produced in Quebec by a considerable amount. Unlike the situation that prevailed in the 1980s during which we had a surplus of electricity for which there were no takers, the American market is now thirsty for energy and ready to pay a lot more for it. We estimate that Quebec deprives itself on average of at least $2 billion a year by continuing to subsidize electricity supplied to aluminum smelters. If we add this $2 billion in lost profits to the $5 billion of potential profits if Hydro-Québec had better financial results, this means that Hydro-Québec's profits could reach $7 billion without raising Quebec's current low electricity rates.

It is time to modify our strategy and obtain returns from Hydro-Québec worthy of the best Quebec businesses. As one government after another since 1944 has been either unwilling or unable to obtain acceptable financial results from Hydro-Québec, we must take inspiration from the British example and privatize Hydro-Québec. In our opinion, privatizing Hydro-Québec will quickly encourage its management to take the necessary measures to improve the firm's productivity and financial results. This privatization will reap many benefits for Quebecers insofar as it will also be accompanied by a reform of the Régie de l'énergie's role, and it will allow Quebecers to choose their electricity provider. To facilitate this choice, it is essential for electricity rates in Quebec to rise to market levels. To ensure that all Quebecers, as opposed to future Hydro-Québec shareholders, benefit fully from this rate hike, the author proposes that 90% of additional revenues coming from the adjustment to market electricity rates be paid to the Quebec government in the form of annual royalties. The government will receive $8 billion a year in royalties once rates have risen to market levels, and will collect $24.7 billion from the progressive sale of its Hydro-Québec stock. Privatization will also enable true market prices to play their full role. In the future, if the Quebec government wants to subsidize the aluminum sector, it will have to do so explicitly by soliciting funds from the National Assembly rather than by ordering Hydro-Québec to do it.

It is clear that Quebec consumers will have to pay more for their electricity if this proposal is accepted. Electricity consumers will react and quickly adapt to the proposed rate hike by reducing their consumption and by choosing other forms of energy better suited to their needs. We propose to compensate, in full or in part, all residential Hydro-Québec customers by granting them free Hydro-Québec shares at the time of its initial public offering.[1]

Failing to adopt the set of measures we propose here, Quebecers leave over $10 billion on the table every year, calculated as follows:

Improving Hydro-Québec's productivity:	$2.1 billion
Increased royalties:	$6.1 billion
Subsidies to the aluminum sector:	$2.0 billion
Total:	$10.2 billion

1. Some will argue that this sum of $10.2 billion should be reduced by an amount equal to the revenues generated by the proposed rate hike. We do not agree with this argument, because additional royalties will allow for a substantial decrease in the taxes paid by Quebecers.

Foreword

Hydro-Québec has an important place in Quebec's history and collective imagination. Following successive nationalizations in 1944 and 1962, it received a mandate to develop Quebec's main source of wealth: hydroelectric power. Given the fragile state of Quebec's public finances, a number of commentators have suggested raising electricity rates so that this government-owned corporation can provide a more substantial contribution than in the past. In an opinion piece published in Montreal daily *La Presse* on June 2, 2007, I tried to put a figure on Hydro-Québec's value were electricity rates to rise to the North American market level. That would make Quebecers more keenly aware of the scope of this collective wealth.

The Montreal Economic Institute (MEI) organized a debate between its vice president and chief economist, Marcel Boyer, and myself to discuss this. Upon seeing the interest shown in this issue, Paul Daniel Muller, then the president of the MEI, suggested publishing a more detailed research paper on the topic. That is how this study began.

Mr. Boyer and Mr. Muller read several preliminary versions of this document; their many suggestions helped me improve it greatly. I also wish to thank Yvan Allaire, Claude Dalphond, Claude Descoteaux and Pierre Lortie, who offered many comments aimed at enhancing the text further. I also received pertinent suggestions from another person, who preferred to remain anonymous.

Danielle Grégoire went through the first two versions of the manuscript. Her many suggestions made the text much easier to follow.

I assume total responsibility nonetheless for any errors that may still be found in this document.

Claude Garcia
September 25, 2008

Chapter 1
The origins of Hydro-Québec

At the official opening of National Electricity Week on February 12, 1962, Quebec's minister of Natural Resources, René Lévesque, was the invited speaker. He noted that 46 companies shared Quebec's electricity production, involving no less than 9,710 megawatts (MW) of power. Four of them controlled 85% of this power: Hydro-Québec (35.7%), Aluminum Company of Canada (Alcan) (27.5%), Shawinigan Water and Power Company (16.5%) and Gatineau Power Company (5.6%). The minister added that electricity rates varied considerably throughout Quebec, being inordinately high in regions far from Montreal, which hindered potential industrial development in those areas.

That historic moment could serve as an introduction to this document. If we recall what was going on before 1962 in Quebec's electrical production, what comes to mind is a profusion of activity, creativity, rivalries, inventions, failures and successes. Without going into detail, we can see the trajectory that led from the "electric candle" in 1878 to the decision by the Quebec government under Adélard Godbout to buy the assets of the Montreal Light, Heat and Power Company in 1944 to create an electricity production and distribution company under government authority, and we can follow the development of the young Hydro-Québec up to 1962.

This new source of energy could replace gas lighting in the streets of municipalities and provide energy for large and small industries alike. Starting in the late 19th century, industrialists, engineers and businessmen had invested in the production, transmission, distribution and sale of electricity. At that time, it still was considered a luxury product. In Montreal, the base rate in 1909 was 15 cents a kilowatt-hour![1]

Profits were needed, financing a company was tough and sometimes unstable, some investors lost their shirts, while others grew rich. Between 1880 and 1920, electricity became part of our way of life. Its applications transformed the face of cities, streetcars ran through the streets, which were festooned with the famous wooden poles supporting the electric wires. Engineers and businessmen understood the energy potential of the main waterways, especially the St. Lawrence and the St. Maurice.

Some electricity companies became prominent in terms of financing and of mergers or buyouts of competitors and small companies, and dominated the electricity markets in outlying regions. In the 1920s and 1930s, the major players were the Montreal Light Heat and Power Company, the Shawinigan Water and Power Company, the Quebec Power Company, the Southern Canada Power Company, the Gatineau Power Company and the Lower St. Lawrence Power Company. In Montreal, the Montreal Light Heat and Power Company built a small empire by acquiring its competitors' production networks. It held firm in the face of the 1929 financial crisis, although its revenues fell in 1932 and it had to cut its electricity rates radically. In 1924, these rates were four cents a kWh.[2]

The shadow this empire cast on the Montreal area became associated with the rigours of the economic crisis that continued into the 1930s and with relatively high electricity costs. This gave rise to considerable animosity. Some politicians, including T.D. Bouchard, the mayor of St. Hyacinthe, spoke out against the concentration of electricity in the hands of a few companies and denounced the electricity monopolies or trusts. The province of Ontario had taken over

1. This historical report is inspired above all by the following work: André Bolduc, Clarence Hogue and Daniel Larouche, *Québec, un siècle d'électricité*, Libre Expression, 1984 (the 15-cent rate is mentioned on p. 71).
2. *Id.*, p. 107. Based on a series of articles in the *Montreal Herald.*

electricity production and distribution early in the century and provided an example for these politicians.

In 1933 and 1934, the protest movement gained strength. The government, headed by Louis-Alexandre Taschereau, set up a commission of inquiry with the following mandate: to study the merits of nationalizing the electricity companies and putting urban networks under municipal ownership; to consider the resulting effects in rural districts; to examine the possibility of lowering electricity rates; and to look into the requirements and costs of rural electrification. Ernest Lapointe, a Liberal member of the House of Commons, chaired the commission.

The Lapointe Commission did not favour nationalization, but it did recommend creating a body with authority over the establishment of new power plants and rate levels, mergers and assessment of those companies' real assets. Premier Taschereau followed up and created a three-member Electricity Commission which, in just over a year, issued nearly 100 orders.

During the following legislative session, the Union Nationale party was in power. The Electricity Commission was replaced by the Provincial Electricity Board, and the number of members was raised to five. In 1938, the Board inquired into electricity rates with a view to lowering them. It ordered the companies to establish and update registers of their titles, real estate holdings, and rights and easements, as well as those of their subsidiaries. Producing an inventory of these assets would be a long, arduous process, especially for Montreal Light Heat and Power Consolidated (MLHPC), whose archives were incomplete. Over the years, it had gone through numerous corporate reorganizations intended to hide the true rate of return on invested capital.[3]

The Board's report was not favourable to MLHPC because the book value was higher than the real value.[4] The new leader of the opposition, Adélard Godbout, turned to these analyses and the experience in Ontario. He put the acquisition of MLHPC into the Liberal Party's electoral program and won the 1939 general election.

The writing of the law instituting the young Hydro-Québec had been entrusted to Louis-Philippe Pigeon, a lawyer. The new corporation, called the Quebec Hydro-Electric Commission, received the following mandate: "to supply energy to municipalities, industrial or commercial enterprises and the citizens of this province at the lowest rates compatible with sound financial administration. It (the Commission) must set the rate applicable to each category of users based on the real cost of the service provided to this category to the extent that this is practical." Note the accent on municipalities, industry and the province's citizens, and not just Montreal, and on the lowest rates – but reflecting the real cost of the service provided to the various categories of users.

In March 1944, Godbout submitted the bill authorizing the acquisition of MLHPC's assets and the creation of the Quebec Hydro-Electric Commission. The law was adopted on April 14, and on the next day, a Saturday, the five commissioners took over.[5]

Each year, the Commission had to report to the Legislative Assembly through the minister responsible. It also had to seek authorization through the same channels for the building of dams, power plants and energy transmission lines.

3. John H. Dales, *Hydroelectricity and Industrial Development: Quebec, 1898-1940*, Harvard University Press, 1958, p. 119.

4. André Bolduc, Clarence Hogue and Daniel Larouche, *op. cit.*, footnote 1, pp. 115 et 116. The author is relying on inventory reports by engineers J. A. Beauchemin and J. R. Desloover (1942) and on a 90-page report that chartered accountant Cecil A. Ellis would complete in 1946.

5. *Id.*, p. 122. The commissioners, as the corporation's managers were called, held 1,997 meetings between 1994 and 1978 (see p. 399).

Electricity rates for domestic and commercial use were reduced by 13%, and the standard rate was reduced by a further 10% in 1947, remaining unchanged until 1963. In 1947, the Union Nationale government led by Maurice Duplessis, back in power, completed the acquisition of MLHPC's assets at $25 a share for a total of $112 million. The Duplessis government would make no other acquisitions of this type and chose to institute a system of cooperatives to bring electricity into the regions furthest from urban centres or from major electrical installations.[6]

The development of hydroelectric power (1944-1962)

One of the young Hydro-Québec's first challenges was precisely to "supply energy." At the end of the Second World War, an increase in demand could be expected, though this was not certain. Electricity demand indeed doubled between 1944 and 1954. In 1944, Hydro-Québec had four electric power plants producing a total power of 616 MW: Chambly, Les Cèdres, Rivière-des-Prairies and almost all of Section 1 of Beauharnois. This was not even enough to meet existing requirements, much less to deal with future demand. Production capacity had to be increased.

In the 18 years leading up to 1962, Hydro-Québec developed its production capacity, which would go from 616 MW to more than 4,000 MW. During this time, it would complete the Beauharnois power plant (in 1958), fulfilling the four-decade-old dream of Beauharnois's designer, R.D. Sweezey. The full Bersimis development would go into operation in 1959. In addition, Hydro-Québec bought several small power plants belonging to the government, it developed Rapide 2 on the Ottawa River and, in 1959, began work on the future Pointe Carillon power plant.

The Liberal government of Jean Lesage

In 1960, Jean Lesage and his dynamic ministerial team sometimes called the "équipe du tonnerre," took power under the Quebec Liberal Party. This was a time of change on many fronts. René Lévesque became minister of Natural Resources. He was aware of the economic leverage offered by Quebec's hydroelectric power.

In a speech given on February 12, 1962, the minister emphasized the importance of standardizing electricity rates to promote industrialization in remote mineral-rich areas. He sought to integrate the electricity networks under common management in order to take full advantage of waterways and reservoirs and to minimize electricity losses in transmission. He also wanted to coordinate investment, reduce fixed administrative costs and avoid paying $15 million in taxes to the federal government.

The audience may have been won over by his determination to undertake another major acquisition of electricity company assets, but studies by specialists in the Department of Natural Resources were already prepared, the problems having been analyzed some years earlier. In January 1962, the Economic Orientation Council set up by the premier had endorsed the department's conclusions.

After the February 12 event, a polemic broke out in the newspapers between the minister and representatives of the electricity companies. Pamphlets were published, and speeches were made. René Lévesque methodically laid out the advantages of integrating networks and exploiting water resources in a rational manner. He went around with a wall map showing each company's territories, spelling out the financial stakes on a blackboard.

6. Jean-Louis Fleury, *Les porteurs de lumières : l'histoire de la distribution de l'électricité au Québec*, Éditions MultiMondes, 2004. See in particular Chapter 2, p. 91.

On the one hand, the French-language newspapers published a series of articles on the issue, in agreement with the minister. On the other hand, there was no unanimity in the provincial cabinet or in the Liberal Party. Premier Lesage called an election on this issue for November 14, 1962.

During the election campaign, the Liberal Party promised lower electricity bills for 458,541 households. On November 14, the Liberals won the election, and on December 28, they were ready to proceed. The government adopted orders in council authorizing Hydro-Québec to acquire the common shares of the 10 companies that existed to distribute electricity. The final cost would be $604 million for the seven companies that were listed on the stock exchange; the technical committee formed by the minister before the election had forecast $600 million. Hydro-Québec's offer to the shareholders of the various companies was made on February 22, 1963, and on April 19 more than 90% of these seven companies' common shares were tendered to the designated trustee.[7] One year and 10 days had passed between the speech and the offer to shareholders![8]

On May 1, 1963, the Quebec Hydro-Electric Commission took possession of the seven companies and of their subsidiaries. History was repeating itself, with the 1944 law still in force. Hydro-Québec designated one executive to manage each of the seven companies: the Southern Canada Power Company, the Shawinigan Water and Power Company, the Lower St. Lawrence Power Company, the Gatineau Power Company, the Northern Quebec Power Company, the Saguenay Electric Company and the Quebec Power Company. The task was not a small one for the new Hydro-Québec. It involved creating a unified company out of unrelated entities while ensuring service continuity to subscribers.

In May 1965, Robert A. Boyd, Hydro-Québec's chief executive, presented an analysis of the results of nationalization. Most rates were lowered to levels comparable to those applying in Montreal, at a cost of $6 million to Hydro-Québec in 1964. Hydro-Québec also planned to economize by improving management of reservoirs and reselling excess energy to Ontario Hydro and to the Alcoa plant in New York.[9] Agreements with suppliers were renegotiated downwards.[10]

To adjust to the scope of the new tasks, the administrative structure was overhauled. In 1965, Boyd became chief executive, Léo Roy headed the Distribution and Sales division, and J. Villeneuve headed the Production and Transmission division. The territory was divided into administrative regions, and all administrative structures were reorganized at the provincial level. On January 1, 1966, the new Hydro-Québec was ready.[11]

The epic years

Hydro-Québec in the 1960s cannot be mentioned without emphasizing the hydroelectric developments on the Manicouagan and Outardes rivers. The work conducted at Carillon and Bersimis showed the command of the engineers and other project architects over these works. It was possible to think big.

The first power plant on the Manicouagan River, commonly called Manic 5, was begun in 1959-1960. Hydro-Québec built 25 generator groups spread over seven power plants, four on

7. André Bolduc, Clarence Hogue and Daniel Larouche, *op. cit.*, footnote 1, p. 282.
8. The three companies not listed on the stock exchange were acquired for under $1 million a little later. In December 1963, the operation was completed with the acquisition, for $11 million, of most of the electricity cooperatives created under the Union Nationale regime. In 1977, Hydro-Québec offered to buy out 60 small independent networks, 27 of which accepted the offers.
9. In 1940, MLHPC was already selling 1.5 TWh to these two clients, amounting to 40% of its total sales. See John H. Dales, *op. cit.*, footnote 3, p. 116.
10. André Bolduc, Clarence Hogue and Daniel Larouche, *op. cit.*, footnote 1, p. 284.
11. In the 1980s, the last financial vestiges of the 1963 nationalization disappeared: in 1984 the long-term debt of the acquired companies was extinguished with the repayment of a $775,000 bond contracted in 1959 by the Lower St. Lawrence Power Company, and a $300-million loan was repaid in 1988.

the Manicouagan and three on the Outardes River. This group of plants was able to provide 5,517 MW of power when work was completed in 1978. A highlight of the work on the Manicouagan came on November 29, 1965, when the generator groups were ready to produce electricity and Premier Jean Lesage inaugurated the 735-kilovolt transmission line.[12] The problem of transmitting electricity over great distances, such as from Manicouagan to Montreal, was resolved by engineers through a 735-kilovolt high-tension line. Another historic moment was the inauguration of the great Daniel Johnson Dam, the purpose of which was to regulate the flow of water to the power plants on the Manicouagan. It was truly a sight to behold.

Alongside the development of the Manicouagan and Outardes rivers, Hydro-Québec and the Churchill Falls (Labrador) Corporation Limited [CF(L)Co] signed a contract on May 12, 1969, under which Hydro-Québec was committed to purchasing nearly all the energy produced by the Churchill Falls power plant, which had a nominal capacity of 5,428 MW. Ending in 2016, this contract is to be renewed automatically for the following 25 years under the agreed-to conditions.[13] The negotiations preceding the signing of the contract lasted more than 15 years. The price of each kilowatt-hour fluctuated according to the period, but the average price was below 0.3 cents for the entire length of the agreement. Hydro-Québec, which had obtained a 20% share in CF(L)Co Churchill Falls through the Shawinigan Water and Power Company in 1963, raised it to 34.2% and also holds bonds maturing in 2010.[14] It was in December 1971 that the first generator group fed the Hydro-Québec transmission line.

The project of the century

The 1960s were generally fruitful for Hydro-Québec. Integrations were achieved, energy capacity was managed and developed, and difficulties were overcome. However, there would be an even more spectacular energy development in the following decade.

On April 30, 1971, after a year in power, Premier Robert Bourassa announced his decision to develop the James Bay basin at a cost of $5 billion to $6 billion. The decision aroused both enthusiasm and opposition. After heated debates, the bill instituting the two corporations that were to be the prime contractors for the James Bay development was adopted on July 14, 1971.

Without going into detail, we can say that the two corporations, the James Bay Development Corporation and the James Bay Energy Corporation, would have overlapping responsibilities. It was the second of them that finally headed the project under the practical responsibility of Hydro-Québec, and it pushed development forward. On December 28, 1971, the choice was made to develop La Grande River, and it would be evaluated at $6 billion. Everything was arduous, the preparation of special labour agreements failed, and in 1974 serious conflicts erupted, forcing suspension of the work and leading the government to set up a commission of inquiry into labour relations in the construction industry (the Cliche Commission). Work at James Bay did not resume until seven weeks after the confrontations.

Concerns surfaced in relation to the ecological consequences of the James Bay development. First Nations living on the territory took action in Quebec Superior Court. This resulted in the signing on November 11, 1975, of a long-term agreement known as the James Bay and Northern Quebec Agreement. In addition to other arrangements, financial compensation of $225 million was to be paid to the Cree and Inuit nations.

In August 1976, the cost of developing the planned 14,354 MW of power, after rising gradually, reached $16 billion. The project's pertinence was not called into question, but

12. André Bolduc, Clarence Hogue and Daniel Larouche, *op. cit.*, footnote 1, p. 317.
13. Hydro-Québec, *Annual Report 2007*, p. 97.
14. *Id.*, p. 86.

observers agreed that it had been launched rather hurriedly. Public attitudes had changed, people were more critical, and citizens mobilized to preserve the environment, rivers, fauna and farmland. The euphoria was over.

A change of approach

On November 15, 1976, the Parti Québécois led by René Lévesque won the provincial election. The new minister of Energy wanted to lay the bases for an energy policy for Quebec. Against the backdrop of a world oil crisis that had begun in 1973, and with prices shooting up and inflation rising, he convened a legislative commission in 1977. Several stakeholders attacked Hydro-Québec for failing to consult the public before setting to work on the territory. It was criticized for what was referred to as its excessive size, and the choice of developing nuclear energy was called into question. There was frustration, and a revolt was brewing, perhaps ill founded.

In 1978, the government published a white paper called *Ensuring the Future*, with the keywords being autonomy, economy, employment, consumers and environment. A bill proposing changes in how Hydro-Québec was organized passed in the legislature and received sanction on June 13, 1978. The status of the James Bay Energy Corporation was clarified, and the door was opened to creating a subsidiary responsible for exporting the know-how of Quebec engineers. The Quebec Hydro-Electric Commission, set up in 1944, was abolished and replaced by an 11-member board of directors. The environment became a cause of great public concern. In 1978, the government created a bureau for public hearings on the environment (known by its French acronym BAPE), and Hydro-Québec appeared before to answer questions about the remaining work at James Bay.

In December 1980, the chairman of Hydro-Québec presented a 10-year development plan to the government. This plan required investments of $55 billion, with a new complex, on the Great Whale River, to go into service in the early 1990s. Protests ensued, often with contradictory positions: some wanted no slowing in development while others wanted to stop investments that were too onerous for Quebec and did not produce sufficient returns. Some called for increased use of natural gas in heating, while others for the complete abandonment of nuclear energy.

In 1980-1981, the minister of Energy and Resources held legislative hearings, at the end of which he concluded that Quebec should slow the development of installations and construction for electric energy and that it should promote energy savings and study the possibility of using natural gas. He had already created a body with a mandate to explore new forms of energy.

Around the same time, in March 1981, the minister of Finance, in presenting his budget, announced that Hydro-Québec would have to pay the government a first annual dividend of $150 million. He justified this dividend by saying that "Hydro-Québec expects a slowing of its investments while rates, in keeping with Quebec's energy policy, will have to come into line with the prices of other forms of energy, which are going up."[15] At the same time, he suggested guidelines to limit the annual dividend based on net profit and the level of capitalization at the end of its fiscal year. These guidelines are still in force.[16]

During study of the bill that followed the budget announcement, the chairman of Hydro-Québec noted the importance of this moment by discussing the mandate given to Hydro-Québec from then on. Rates became a way of managing demand based on changes in the energy situation,[17] and Hydro-Québec no longer had to set its prices "at the lowest rates compatible with sound financial administration," as had been the case since 1944.

15. André Bolduc, Clarence Hogue and Daniel Larouche, *op. cit.*, footnote 1, p. 418.
16. Hydro-Québec, *Annual Report 2007*, p. 93.
17. André Bolduc, Clarence Hogue and Daniel Larouche, *op. cit.*, footnote 1, p. 418.

The rules were changing visibly. In February 1981, Robert A. Boyd, the chief executive of Hydro-Québec, resigned after a long and successful career, and he was replaced by Guy Coulombe on December 10, 1981. The new head of Hydro-Québec restructured the administration into five major divisions. Many executive posts were abolished, 1,000 employees left the company, and 700 employees made surplus by the reorganization found new positions. The development of the Manicouagan-Outardes complexes, the production from Churchill Falls and the development of La Grande River at James Bay had, in a relatively short time span, created surplus production capacity. Remember that each of these three sites on its own provided more electricity than Hydro-Québec had before the 1963 nationalization.[18] Add to this the economic situation in the early 1980s that brought about a decline in electricity consumption by industry as did campaigns to save energy, and all this created a surplus. Hydro-Québec anticipated excess production of 430 terawatt-hours (TWh) between 1984 and 1993.

Managing the product: exports or industrial development

Managing electricity as a product has always been complex. Until the 1960s, electricity was meant to serve economic development and lighting. It was a heresy to heat homes and buildings with electricity. Little by little, thanks to inventions by electrical engineers, and thanks also to technological improvements, the all-electric concept emerged starting in 1963. Electric home heating went from 3% in 1966 to 44% in 1981.

During much of the second half of the 20th century, Hydro-Québec endured a constant shuffle between electricity production and consumption. Electricity was produced to meet demand, production was high, the product was promoted, demand increased, there were incentives to save energy or make better use of the product, the campaign succeeded or markets stagnated due to an economic slowdown, there were surpluses again, promotions began anew, then dams were not filling up enough, there were fears of not being able to meet demand – it was endless.

In 1983, Hydro-Québec had huge electricity surpluses to dispose of, along with a reserve of highly qualified human resources. Both the resources and the power were redirected to improving manufacturing processes in Quebec. This was a very exciting time at research centres and for staff on the ground, who were finding made-to-measure solutions to industries' problems. These solutions involved increased use of electricity, which was offered at preferential rates, often as part of long-term contracts.

This was perhaps a sensible solution for those industries and for the era, but experience teaches us that generous long-term contracts are rarely the right choice for a producer.

18. The Manicouagan-Outardes and La Grande complexes account for 21,000 of the 33,305 MW of Hydro-Québec's installed power as of December 31, 2007.

Chapter 2
Liberalization of the North American market

Despite the abundance and low cost of its hydroelectric resources, Quebec could not stay out of the debate on liberalization of the electricity market that began years ago in the United States and some European countries.[1] The adoption by the United States Congress in 1978 of the *Public Utility Regulatory Policies Act* (PURPA) would turn out to be what set off the eventual dismantling of the former American electric order.[2] The technique that was adopted consists of deregulating the activity of electricity producers less than 80 MW in size while requiring the major public production and distribution companies to buy any electricity offered to them, at a guaranteed price.[3] Between 1980 and 1987, the production capacity of PURPA facilities grew four times more quickly than that of traditional producers.[4]

In 1982, industry leader William Berry, president of the Virginia Power Company, advanced the idea (taken up in the United Kingdom, as we shall see in Chapter 5) of grouping the assets of major electricity companies into new companies. Their activities focused exclusively on one of three main functions – production, transmission or distribution. Under this system, distribution companies could go into direct competition to attract clients, using the transmission networks belonging to third parties.[5] This idea made some headway, and in 1986 President Ronald Reagan appointed Martha Hesse to head the Federal Energy Regulatory Commission (FERC) and gave her a mandate to study ways of bringing more competition to the production and distribution of electricity.[6] After a long debate during which traditional electricity companies began to see the advantages of greater competition, the California regulatory authorities proposed in 1994 allowing consumers to buy their electricity from the supplier of their choice. This proposal took effect in March 1998.[7]

In 1992, Congress adopted a law enabling any electricity production or distribution company to apply to the FERC to obtain an order obliging owners of electricity networks to supply it with all the transmission services they needed (including, if required, the installation of new transmission capacity where it was). Drawing upon this law, the FERC published two new rules in April 1996 obliging traditional electricity companies: 1) to allow the transit of supplies sent by competing producers (the open access rule); and 2) to agree to a number of common standards and procedures to make these access rights truly equal for all.[8]

As we shall see in Chapter 12, Hydro-Québec wanted to participate in the U.S. market. It applied to the FERC for status as an electricity broker on the wholesale market. The regulator agreed, imposing the same conditions that apply to any competitor: a) getting a permit from the FERC; b) meeting an obligation to offer non-discriminatory access to its transmission network; c) providing exchanges based on the market price; d) meeting an obligation to segment production activities, in particular keeping its transmission activities apart because of their natural monopoly character.[9]

1. Henri Lepage and Michel Boucher, *La libéralisation des marchés de l'électricité*, Éditions Saint-Martin and Montreal Economic Institute, 2001, pp. 12 and 13.
2. *Id.*, p. 26.
3. *Id.*, p. 27.
4. *Id.*, p. 28.
5. *Id.*, p. 31.
6. *Id.*
7. *Id.*, p. 47.
8. *Id.*, pp. 48 and 49.
9. *Id.*, pp. 299 and 300.

Changes related to liberalization of North American energy markets also influenced the Quebec government, which published a white paper in 1996. It noted that the reforms instituted at that time in several European countries and in North America all aimed "to lower electricity prices by favouring competition between producers."[10] Competition was created by relying on reciprocity: if Quebec wanted to export electricity, it would have to offer foreign companies on the Quebec market conditions equivalent to those from which it hoped to benefit on outside markets.[11] Foreign companies can thus compete with Hydro-Québec on Quebec territory. This prospect does not worry Hydro-Québec because it enjoys the lowest electricity production costs in North America.[12]

In the wake of this reform, the Quebec government created the *Régie de l'énergie* (Energy Board) to provide transparency and equity in the energy sector, both in monopoly areas, such as natural gas and electricity distribution, and in certain sectors that come under the free market, such as oil products.[13] The Régie monitors the operations of the electricity carrier and distributors to ensure that consumers pay "fair and reasonable rates". It has the role of monitoring the operations of distributors to ensure that consumers are adequately supplied. It also approves electricity distributors' supply plans and commercial programs as well as investment projects in electricity transmission or distribution.[14] In addition, this seven-member board has the power to examine citizens' complaints.[15]

But how is it possible to take account of economic concerns and participate in the North American free market in energy if the Régie regulates rates? Efforts were taken to resolve this problem by building firewalls around Hydro-Québec's divisions and reserving a pool of electricity production for the Quebec market, with the rate structure for this pool subject to approval by the Régie. In 2000, the Quebec National Assembly adopted the *Act modifying the Act respecting the Régie de l'énergie* the primary aim of which was to preserve the "social pact" in electricity and to guarantee Quebec consumers that they could continue to benefit from low rates. For this purpose, the government established a quantity of heritage pool electricity representing Hydro-Québec's current hydroelectric production and long-term purchase contracts. This amounted to a maximum annual quantity of 165 TWh of energy, with the price set at 2.79 cents per kWh.[16] Beyond this quantity, the law opens the wholesale market to competition. Hydro-Québec's transmission and distribution costs, which continue to be set by the Régie de l'énergie, are added to the cost of supply.[17] Despite the deregulation of production, Hydro-Québec maintains full responsibility for developing hydroelectric production sites of more than 50 MW.[18]

By 1997, Hydro-Québec had already isolated its electricity transmission activities from its production, distribution and marketing activities, resulting in the birth of its new TransÉnergie division. TransÉnergie now provides access to its network capacity for those wishing to transit it, namely Hydro-Québec, electricity distributors in Quebec, private producers, neighbouring networks, and energy brokers in Canada and the United States. These are the requirements of functional separation, and more particularly of neutrality, which led TransÉnergie to organize its services to take account of the new energy market context.[19] Four years after it was established, 20 clients had been accredited to transmit their electricity on the TransÉnergie network.[20]

10. Quebec Department of Natural Resources, *L'énergie au service du Québec : une perspective de développement durable*, 1996, p. 16.
11. *Id.*
12. Quebec National Assembly, *Journal des débats, Standing Committee on the Economy and Labour*, December 13, 1996, p. 23.
13. Régie de l'énergie, *Annual Report 2006-2007*, p. 2.
14. See: *Id.*, p. 17. Each investment project of at least $10 million for distribution or $25 million for transmission must be approved separately.
15. *Id.*, p. 5.
16. The heritage pool includes the 31.8 TWh purchased from the Churchill Falls (Labrador) Co.
17. Hydro-Québec, *Annual Report 2000*, p. 5.
18. Hydro-Québec, *Annual Report 2000*, p. 19.
19. Hydro-Québec, *Annual Report 1997*, p. 18.
20. Hydro-Québec, *Annual Report 2001*, p. 19.

Following the adoption in 2000 of the *Act modifying the Act respecting the Régie de l'énergie*, which deregulates electricity production in Quebec, Hydro-Québec finalized the reorganization of its administrative structure begun in 1997. It grouped a number of responsibilities under three business units: production, transmission and distribution.[21] In addition to these three divisions, a 17-member board of directors, the Hydro-Québec Équipement division and the James Bay Energy Corporation round out Hydro-Québec's organization.

Hydro-Québec Production supplies the Quebec market with electricity from the heritage pool.[22] Beyond this quantity, it sells the electricity it produces both on Quebec markets and outside Quebec. In 2007, Hydro-Québec Distribution bought 90% of its production. Hydro-Québec Production's facilities represent installed power of 35,647 MW, of which 93% is hydroelectric. It also has 26 large reservoirs with a capacity of 175 TWh.

Hydro-Québec TransÉnergie operates and manages an electricity transmission network encompassing 33,000 kilometres of lines and 509 substations. This division markets its transit capacity by ensuring the network's reliability. To this are added the many interconnections providing for exchanges of electricity with the Ontario, New Brunswick and northeastern U.S. networks. The main client is Hydro-Québec Distribution, which absorbed 91% of transmission services; North American wholesalers bought 7%.

The mission of Hydro-Québec Distribution is to ensure a reliable electricity supply and quality service to Quebec customers, with an eye to efficiency and sustainable development. The division has 109,618 kilometres of lines, a customer relations centre spread over nine sites, and five distribution operations centres. Its clients in 2007 were split as follows: residential, 51%; commercial and business, 19%; large companies, 30%.

Hydro-Québec Équipement and the James Bay Energy Corporation handle the engineering and construction work needed to provide facilities for the production and transmission of electricity for Hydro-Québec Production and TransÉnergie. Its services cover all stages and aspects of development projects right up to implementation. Hydro-Québec Production and TransÉnergie accounted for 98% of its business in 2007.

21. Hydro-Québec, *Annual Report 2000*, p. 5.
22. The rest of the chapter comes from Hydro-Québec's 2007 annual report.

Chapter 3
Operational efficiency

With the history Hydro-Québec's development – a legitimate source of pride – as a backdrop, I suggest studying the organization's operations and performance from the standpoint of operational efficiency. The aim of this exercise is not to judge individuals but rather to seek out facts and data that, once established, may help us to think more clearly about the future of this collective wealth. To determine operational efficiency, I shall look to a comparative analysis and to examination of two specific cases in which Hydro-Québec divisions appeared before the Régie de l'énergie. As noted recently by Michel Clair, who headed a commission of inquiry on Quebec's health care network, "performance measurement is essentially a tool that helps to improve an organization and ensure its survival in the face of threats and to perfect ways of doing things."[1]

With these goals in mind, we shall constitute a comparison group of electricity production, transmission and distribution companies that are as comparable as possible to Hydro-Québec in their functions and size. Given the absence of Canadian companies comparable in size to Hydro-Québec, the comparison group consists of American firms listed on the New York Stock Exchange and declaring annual revenues of between $10 billion and $20 billion. These companies are: American Electric Power, Consolidated Edison, Entergy, Exelon, FirstEnergy, Florida Power and Light (FPL), Pacific Gas and Electric Company (PG&E), Pennsylvania Power and Light (PPL), Southern Company and Xcel Energy.[2] The activities of each company are described briefly in Appendix 1.

1. Michel Clair, "Refus de traitement," *La Presse*, February 23, 2008, p. A26.
2. We have excluded: AES Corporation because its activities take place outside the United States; Dominion Resources, because it is also an oil and gas producer; and Duke Energy, Edison International and Public Service Electric and Gas Company (PSE&G) because of incomplete data.

Table 3.1
Sources of energy used

	Purchase	Coal	Oil or natural gas	Oil, natural gas, or coal	Nuclear	Renewable
American Electric Power		68%	23%	<	6%	3%
Entergy		10%	67%	<	23%	0%
Exelon		>	>	25%	68%	7%
FirstEnergy		55%	12%	<	28%	5%
FPL	15 %	6%	60%	<	19%	0%
PPL		56%	5%	<	31%	8%
Southern Company		70%	15%	<	14%	1%
Xcel Energy		49%	37%	<	10%	4%
Hydro-Québec		>	>	5%	2%	93%

Source: Author's calculations based on: American Electric Power, *Annual Report 2007*, p. 4; Entergy, Form 10-K 2007, p. 181; Exelon, Form 10-K 2007, p. 4; FirstEnergy, http://www.firstenergycorp.com/Corporate_Profile/FrirstEnergy_Generation_S; FPL, Form 10-K 2007, p. 9; PPL, Form 10-K 2007, p. 5; Southern Company, *Annual Report 2007*, p. 31; Xcel Energy, *Triple Bottom Line Report 2007*, p. 14; Hydro-Québec, *Annual Report 2007*, p. 102.
Note: In the case of Entergy, we took into account only the production reserved for retail activities. For Exelon, the calculation is based on its own production capacity. The data in the table are based on energy produced or power installed, depending on availability.

The comparison is not perfect because these companies do not produce electricity in the same way as Hydro-Québec (see Table 3.1). Eight of the nine companies on which we have data rely on fossil fuels for at least 60% of the energy produced. A majority of the remainder comes from nuclear energy and under 10% from renewable energy. Exelon gets 68% of its electricity from nuclear energy and has the largest network of nuclear power plants in the U.S.[3] Hydro-Québec is the only company that can count on as high a proportion of hydroelectric energy. Electricity production based on nuclear energy requires higher operating expenses than production based on hydroelectric energy. For example, Hydro-Québec had operating expenses[4] of only 0.5 cents per kWh[5] to produce its electricity in 2007, whereas PPL had to spend 1.3 cents per kWh produced.[6] Exelon had even higher operating expenses, at 1.6 cents per kWh.[7] Hydro-Québec could therefore be expected to have a big lead in terms of operational efficiency.

We will use two measurements to assess the performance of Hydro-Québec. The first is the customer/employee ratio. The second is a comparison of operating expense per customer.

The customer/employee ratio

Readers will find this ratio in Table 3.2 for all 10 companies and for Hydro-Québec. We have used public data on the total number of employees in all the companies listed in the table. There is one exception: in the case of American Electric Power, we have excluded the employees of its maritime transport subsidiary. We see that Hydro-Québec

3. Exelon, http://www.exeloncorp.com/ourcompanies/powergen/nuclear/.
4. Operating expenses do not take account of the cost of raw materials used in energy production.
5. Calculations by the author, using Hydro-Québec, *Annual Report 2007*, pp. 9 and 59. We have excluded electricity purchased from Churchill Falls (Labrador) Corporation Limited in this calculation.
6. Calculations by the author, using PPL, *Annual Report 2007*, p. 31, and Form 10-K, 2007, p. 5.
7. Calculations by the author, using Exelon, *Annual Report 2007*, p. 32, and Form 10-K, 2007, p. 15.

Table 3.2
Number of customers per employee

	Number of customers (thousands)	Number of employees	Ratio
American Electric Power	5,191	20,046	259
Consolidated Edison	4,700	15,224	309
Entergy	2,846	14,322	199
Exelon	5,880	17,800	330
FirstEnergy	4,491	14,534	309
FPL	4,509	14,602	309
PG&E	9,400	20,050	469
PPL	1,387	7,120	195
Southern Company	4,377	26,742	164
Xcel Energy	5,182	11,987	432
Weighted average			295
Hydro-Québec	3,869	23,369	166

Source: American Electric Power, *Annual Report 2007*, inside cover page; Consolidated Edison, Form 10-K 2007, pp. 9 and 28; Entergy, Form 10-K 2007, pp. 173 and 215; Exelon, Form 10-K 2007, pp. 17, 20 and 25; FirstEnergy, *Financial Report 2007*, p. 112 and Form 10-K 2007, p. 23; FPL, *Annual Report 2007*, p. 2; PG&E, Form 10-K 2007, p. 1; PPL, Form 10-K 2007, p. 28 and *Annual Report 2007*, *At a glance* (American operations only); Southern Company, *Annual Report 2007*, p. 2 and Form 10-K 2007, p. I-12; Xcel Energy, *Triple Bottom Line Report 2007*, pp. 9 and 12; Hydro-Québec, *Annual Report 2007*, pp. 101-2.
Note: We excluded employees involved in American Electric Power's maritime transport activities, around 815 employees. We used the number of subscribers as an approximation of the number of Hydro-Québec customers. We are aware, however, that the actual number of customers is smaller. See Hydro-Québec, *Annual Report 2007*, pp. 23 and 101.

has one employee per 166 customers[8] while the number of customers per employee varies from 164 to 469 in the comparison group. A ratio far below the weighted average – 166 compared to 295 – raises questions, especially since experts agree that hydroelectric production requires fewer employees than any other form of electricity production.

Operating expense for transmission and distribution

Once electricity is produced, companies in this industry must equip themselves with transmission networks and must establish distribution activities to reach their customers. Even if the electricity is produced differently, there should not be great disparities in their transmission and distribution practices. In Table 3.3, we have compiled data enabling us to compare per-customer operating expenses for transmission and distribution for Hydro-Québec and for two companies in the comparison group.[9] These expenses are US$293 for Exelon and PPL, whereas Hydro-Québec had expenses of $486. Moreover, Exelon must deal with competition on its territory and distribute electricity from competing producers on its own network.[10] This competition does not prevent Exelon, along with PPL, from having the highest productivity in transmission and distribution activities.

Can this large difference in Hydro-Québec's operating expenses for transmission and distribution be explained by the extent of its network? For example, in its annual report, "TransÉnergie claims to operate the most extensive transmission system in North America."[11] Unfortunately, this statement is inaccurate since Xcel Energy's transmission system is four times as long as TransÉnergie's and American Power Company's system is twice as long. In Table 3.4, we compiled the available data on the extent of the transmission and distribution networks of Hydro-Québec and of eight companies in the comparison group. Only two of these eight companies have transmission and distribution networks smaller than Hydro-Québec's. Furthermore, when calculating the number of kilometres per group of 1,000 customers, we see that only FPL and Exelon need fewer kilometres per 1,000 customers than Hydro-Québec to reach their customers. Unlike Hydro-Québec, the companies in the comparison group do not serve contiguous territories. This could explain why they need more extensive networks to serve their customers.

8. We have used the number of customer accounts as an approximation of the number of Hydro-Québec customers. See Hydro-Québec, *Annual Report 2007*, p. 101.
9. The other companies in the comparison group segment their activities differently.
10. Exelon, Form 10-K, 2007, pp. 102 and 108.
11. Hydro-Québec, *Annual Report 2007*, p. 15.

Table 3.3
Operating expenses per customer for transmission and distribution

	Operating expenses ($ millions)	Number of customers (thousands)	Average cost per customer
Exelon	1,721	5,880	$293
PPL	406	1,387	$293
Hydro-Québec	1,881	3,869	$486

Source: Exelon, Form 10-K 2007, pp. 17, 20, 99 and 106; PPL, Form 10-K 2007, p. 28 and *Annual Report 2007*, p. 33; Hydro-Québec, *Annual Report 2007*, pp. 64 and 101; Hydro-Québec TransÉnergie, *Rapport annuel au 31 décembre 2007 à la Régie de l'énergie*, HTQ-2, Document 1, p. 3.
Note: In the case of Exelon, the data take into account clients who have natural gas delivered.

Since the length of the transmission and distribution network cannot explain the disparity in operating expenses between Hydro-Québec and the private U.S. companies, is it a matter of climate? We recognize that average temperatures are much lower in Quebec than in the United States. Is this sufficient to explain the big cost difference between Hydro-Québec and the U.S. companies? In its 2007 annual report, Hydro-Québec says nothing in this regard. Some people will say that freezing rain could explain part of the difference in operating expenses. Freezing rain is not a phenomenon unique to Quebec; it also occurs over much of the United States. On the other hand, we rarely suffer from tornadoes, and hurricanes do not come this far north.

If Hydro-Québec brought its operating expenses for transmission and distribution down to the level of Exelon and PPL, it would save $747 million a year. This saving, which does not take into account possible savings in production activities, would result in an equivalent increase in annual profit, pushing it up by a quarter.

As we saw above, we are not able to draw a perfect comparison between Hydro-Québec's operating expenses in energy production and those of the comparison group because the latter use costlier technologies than Hydro-Québec to produce their electricity. But let us suppose that Hydro-Québec's productivity in electricity production is comparable to that observed in energy transmission and distribution. Based on this hypothesis, we can state that the $2.5 billion[12] in operating expenses incurred by Hydro-Québec in 2007 for all its activities could have been reduced by slightly over $1 billion.

Let us examine this same question from a different angle. In Table 3.5, we have compiled the data on operating expenses for all activities of FPL, Xcel Energy and Hydro-Québec. Even though the two U.S. firms produce electricity from fossil fuels or nuclear energy, both of which are far costlier than hydroelectric energy, their operating expenses per 1,000 customers for all their activities taken together are substantially lower than those incurred by Hydro-Québec. FPL spends $322 per customer and Xcel Energy $361. The $2.5 billion in operating expenses incurred by Hydro-Québec in 2007 reflects the spending of $658 per customer, which is $315 more than the weighted average observed at FPL and Xcel

12. *Id.*, p. 73.

Table 3.4
Length of transmission and distribution network

	Transmission network (km)	Distribution network (km)	Total (km)	Number of km per 1000 customers
American Electric Power	62,764	342,438	405,202	78.1
Consolidated Edison	3,140	218,409	221,549	63.3
Exelon	10,942	171,965	182,907	33.9
FirstEnergy	22,542	189,326	211,868	47.2
FPL	10,688	107,412	118,100	26.2
PG&E	30,063	226,409	256,472	50.3
PPL			64,393	46.4
Xcel Energy	132,744	306,442	439,186	131.5
Hydro-Québec	33,008	109,618	142,626	36.9

Source: Table 3.2; American Electric Power, Form 10-K 2007, p. A-2; Consolidated Edison, Form 10-K 2007, p. 18; Exelon, Form 10-K 2007, pp. 60-1; FirstEnergy, Form 10-K 2007, p. 35; FPL, Form 10-K 2007, p. 24; PG&E, Form 10-K 2007, p. 19; PPL, Form 10-K 2007, p. 20; Xcel Energy, *Triple Bottom Line Report 2007*, p. 14; Hydro-Québec, *Annual Report 2007*, p. 102.
Note: One mile equals 1.609344 km. Only electricity customers are taken into account.

Energy. Multiplying this $315 figure by the number of Hydro-Québec customers, we find $1.22 billion in excess spending. Our estimate of a $1-billion reduction in Hydro-Québec's operating expenses in the previous paragraph seems entirely realistic.

The Régie de l'énergie and benchmarking

On more than one occasion, the Régie de l'énergie, has asked Hydro-Québec divisions appearing before it to apply benchmarking in assessing their returns or their ability to limit costs. I shall provide two examples.

In a brief published in 2007, Hydro-Québec Distribution sought to increase its rates as of April 1, 2008.[13] In its brief, it mentioned that it took part in a benchmarking program by PA Consulting Group encompassing data for 2005 from 25 participating companies.[14] Hydro-Québec Distribution recognizes that its costs place it in the third quartile of the participating companies. However, it got to this position only after converting its unit costs into U.S. dollars, thereby reducing them by 17%.[15] In our exercise, we compared Hydro-Québec solely with large companies of a similar size. As regards the PA Consulting study, we do not have the names of the participating companies, but considering the large number, it is almost certain that many are smaller than Hydro-Québec. It would be interesting to know Hydro-Québec's position in this benchmarking study after excluding companies that are much smaller.

The second example involves the TransÉnergie division; there also, the Régie wanted benchmarking studies, which were never done. On February 28, 2006, the Régie de l'énergie issued its ruling on TransÉnergie's application to connect the Chute-Allard and Rapides-des-Coeurs power plants to the electricity transmission network. It noted that "the overall unit cost of the Project is $757 per kW, which means that the maximum of $522 per kW that the Carrier is authorized to assume as set out in the Tariff is exceeded by 45%. The amount exceeding the maximum contribution authorized for the Carrier is thus assumed by the Producer…. The Régie wishes to emphasize that cost analysis of the Carrier's projects would be facilitated in the future if it could use the results from a benchmarking study, especially on the real costs of supplying and building substations."[16]

13. See in particular the document titled *Efficience et performance* submitted by Hydro-Québec Distribution, Application R-3644-2007 HQD, Document 1.
14. *Id.*, p. 21.
15. *Id.*, p. 23.
16. Régie de l'énergie, *Demande d'autorisation du Transporteur relative au projet de raccordement des centrales de la Chute-Allard et des Rapides-des-Coeurs au réseau de transport de l'électricité*, Ruling D-2006-36, February 28, 2006, p. 10.

Table 3.5
Operating expenses per customer

	Operating expenses ($ millions)	Number of customers (thousands)	Average cost per customer
FPL	1,454	4,509	$322
Xcel Energy	1,869	5,182	$361
Weighted average			$343
Hydro-Québec	2,545	3,869	$658

Source: FPL, Form 10-K 2007, p. 55; Xcel Energy, Form 10-K 2007, p. 72; Hydro-Québec, *Annual Report 2007*, p. 73.

The Régie approved this project reluctantly. There is reason to wonder if this ruling by the Régie makes sense for Quebec. TransÉnergie, a regulated Hydro-Québec division, plans to spend more than authorized in building a connection to its network. For this project to be accepted, it asked Hydro-Québec Production to assume the excess cost from its budget. It agreed, and the Régie ratified this arrangement, which converts a spending item subject to the Régie's control to a spending item outside its control. This additional outlay will reduce Hydro-Québec's future earnings by an equivalent amount. Moreover, this way of doing things does not seem to respect the principle, adopted by Hydro-Québec in 1997, of maintaining a separation between its divisions in order to enable it to sell and purchase electricity on the U.S. market.

If we go by the report of a task force published 17 months later, the Régie de l'énergie did not force TransÉnergie to use outside benchmarking in assessing its returns, following testimony by two experts: "Outside benchmarking is scarcely feasible in the current state of affairs. In effect, the absence of standardized public data on costs, as well as the specificity of TransÉnergie's transmission network, makes any comparison awkward."[17] This expert testimony is surprising in light of the data in Table 3.4 and the benchmarkers' working method since "PA Consulting divides transmission and distribution activities based on the following assets: transmission lines, transmission substations, distribution substations and distribution lines."[18] The experts justified their view on the inadvisability of benchmarking by invoking "the absence of standardized public data on costs". Benchmarking is intended precisely to fill in for the absence of such data through the use of a third party to exchange it between competing companies while ensuring confidentiality. What are the particularities of TransÉnergie's network that would prevent it from using outside benchmarking for things such as the real costs of transmission substations (of which TransÉnergie has 508)? The cost of building and maintaining electricity transmission lines could also be measured. Benchmarking allows management to achieve improvement in a company's returns by determining which activities use more resources than necessary. The required benchmarking has not been done; when it has, the returns seem to be rather low.

Conclusion

These three examples – a below-average customer/employee ratio, operating expenses in transmission and distribution that are two-thirds higher than those of comparable U.S. companies, and a refusal to submit to benchmarking exercises – lead us to think that operational efficiency is not quite up to generally accepted standards.

17. Régie de l'énergie, *Rapport du groupe de travail sur la réglementation de la performance du transporteur*, HQT-3, Document 2, July 28, 2007, p. 38.
18. Hydro-Québec Distribution, *op. cit.*, footnote 13, p. 24.

Chapter 4
Use of capital

Since it made its first acquisition in 1944, Hydro-Québec has accumulated plenty of capital, something that is perfectly normal. At this point in the story, it would be useful to pause and see if this capital is being used optimally for Quebec society as a whole. This is not a task that is easy to handle from outside the company. I suggest looking first into Hydro-Québec Production, which uses more than half of Hydro-Québec's capital.[1] Financial analysis of production operations will look into the cost of building power plants, the cost price of the electricity produced, and project management in the construction of new hydroelectric plants. After that, we will compare the installed power utilization factor, as well as risk management for energy shortages, with those of the companies in the comparison group. We will then look into the practices of the TransÉnergie division and will produce a detailed analysis of a major investment by the Distribution division.

The cost of building power plants

Hydro-Québec builds hydroelectric power plants with variable-level reservoirs; it also builds run-of-river power plants. In a variable-level power plant, the reservoir is filled by the spring run-off. During the summer and fall, the reservoir is kept close to its maximum operating level by sending only the natural flow into the turbines. During the winter, turbine flow exceeds natural flow, and the reservoir falls gradually to the minimum operating level, which normally is reached just before the spring run-off. In a run-of-river power plant, the natural flow is simply sent into the turbines without any effort to vary electricity production based on demand. Power plants with variable-level reservoirs are thus more valuable to an electricity producer because they allow for electricity production to be modulated based on demand.

There are few examples of hydroelectric power plants being built by the private sector in Canada or the United States. The major sites have already been developed or reserved for public sector companies. There are, however, some private sector companies that develop small run-of-river power plants. In Table 4.1, we have compiled financial data on a certain number of run-of-river power plant projects by distinguishing between projects conducted on sites that were not developed previously and power plants built below existing dams.

Let us first analyze projects that required building a dam and developing a run-of-river power plant. Innergex, a Quebec company involved in renewable energy, is working on two projects in Ontario and British Columbia[2] that it plans to develop for $2.61 million and $2.65 million per MW respectively. Brookfield, a private sector company that also appears in Table 4.1, was directing six construction projects in late 2007; these should increase its installed power by 145 MW at an average cost of $2.43 million per MW. During 2007, Brookfield also acquired five power plants in the northeastern United States and British Columbia with total power of 28 MW, at an average cost of $2.39 million per MW.[3] We note that there is little variation in the cost per MW of those power plants, whether in Canada or the U.S. These data suggest that the value of a run-of-river hydroelectric plant is about $2.5 million per MW. We will attempt now to compare these costs with those assumed by Hydro-Québec for similar activities.

1. Hydro-Québec, *Annual Report 2007*, pp. 9 and 74.

2. Innergex, *Annual Report 2007*, p. 10.
3. Brookfield Asset Management, *Annual Report 2007*, pp. 19 and 50.

Hydro-Québec has two run-of-river power plants of this type: Péribonka and Chute-Allard / Rapides-des-Coeurs. The one that comes closest in size and span to the private sector projects mentioned above is the Chute-Allard / Rapides-des-Coeurs power plant. The Péribonka plant is much bigger and probably benefits accordingly from economies of scale. It has not been completed and is in only partial production.

The Chute-Allard / Rapides-des-Coeurs project aimed to use part of the residual potential of the St. Maurice River, which has been exploited for hydroelectric purposes since the turn of the 19th century. Hydro-Québec built two surface power plants there that will be run-of-river operations, one at Chute-Allard, with installed power of 62 MW, and the other at Rapides-des-Coeurs, 12 kilometres downstream, with installed power of 76 MW.[4] The total cost of this project comes to $960 million, or $6.91 million per MW.[5] This cost of $6.91 million per MW is nearly triple the average cost borne by Brookfield for the purchase or development of run-of-river power plants located in Canada or the United States. Brookfield's power plants are much smaller, with an average of 16 MW of installed power, compared to 68 MW for the Hydro-Québec project. If we compare them now to the two power plants being built by Innergex, we see almost as great a cost disparity per MW: $6.91 million compared to $2.63 million.

How can so great a disparity between the costs borne by Hydro-Québec and the private

4. Bureau d'audiences publiques sur l'environnement, *Projet d'aménagement hydroélectrique de la Chute- Allard et des Rapides-des-Coeurs*, Rapport d'enquête et d'audience publique, January 2005, p. 2.
5. As indicated in Table 4.1, the total installed power is now 139 MW.

Table 4.1
Construction cost of power plants per MW by developer

Project	Developer	Total cost ($ millions)	Capacity (MW)	Cost per MW ($ million)
Run-of-river power plants				
Umbata Falls	Innergex	60	23	2.61
Ashlu Creek	Innergex	132	50	2.65
Five North American power plants	Brookfield	67	28	2.39
Six power plants under construction	Brookfield	352	145	2.43
Chute-Allard and Rapide-des-Coeurs	Hydro-Québec	960	139	6.91
Peribonka	Hydro-Québec	1,400	385	3.64
Run-of-river power plants built at the foot of an existing dam				
Matawin River	Innergex	18	15	1.20
Magpie River	Hydroméga	70	41	1.72
Rapides-des-Quinze	Manulife	55	25	2.20
Mercier	Hydro-Québec	176	51	3.45
Power plants with variable level resevoirs				
Eastmain-1	Hydro-Québec	2,300	480	4.79
Eastmain-1-A	Hydro-Québec	5,000	893	5.60
Toulnustouc	Hydro-Québec	1,000	526	1.90

Source: Innergex, *Rapport de gestion pour l'exercice terminé le 31 décembre 2007*, p. 10; Bureau d'audiences publiques sur l'environnement, *Projet d'implantation d'une minicentrale hydroélectrique au pied du barrage Matawin*, Rapport d'enquête et d'audience, February 2006, p. 2; Brookfield Asset Management, *Annual Report 2007*, pp. 19 and 50; http://www.hydromega.com/fr/projets/Magpie.html; Bureau d'audiences publiques sur l'environnement, *Projet d'aménagement hydroélectrique à Angliers*, Rapport d'enquête et d'audience, August 2003, pp. 2-3; Hydro-Québec, *Annual Report 2007*, p. 11; Hydro-Québec, *Annual Report 2006*, pp. 10-12.
Note: For certain projects, we used the proposed budget, while for others, we used the observed cost.

sector companies be explained? Hydro-Québec certainly cannot claim distance as a factor since the two St. Maurice River worksites can be reached by Highway 25 and then by existing forest roads under redevelopment and by new stretches of road built near the sites.[6] The cost disparity in producing a comparable good is a serious source of concern.

We have also compiled in Table 4.1 four power plant projects developed using an existing dam. The existence of the dam, insofar as it can be used in whole or in part, will bring down the project's cost. On the other hand, the rehabilitation work that each dam may require will make it harder to compare the costs of these various projects. The three projects by the private producers will be built at a cost per MW that will vary from $1.2 million to $2.2 million. Hydro-Québec built a surface hydroelectric plant immediately downstream from the existing Mercier dam[7] at a cost of $3.45 million per MW. Here again, we see a big gap between the private promoters' costs and those of Hydro-Québec.

Eastmain-1, Eastmain-1-A and Toulnoustouc are variable-level power plants that together will generate 13.2 TWh annually once they are completed. The cost of developing the Toulnoustouc plant is much lower than the cost of the two Eastmain plants. A dam had already been built at this spot in 1957, intended to regularize the flow of the Toulnoustouc River to help with electricity production at the three power plants downstream on the Manicouagan River, namely Manic-2, Manic-1 and McCormick.[8] The new dam was built 14 kilometres downstream from the existing dam, which was withdrawn from service while keeping the reservoir's maximum operating level at the previous level of 301.75 metres. Just one new dike was needed to complete this project,[9] whereas 33 dikes were needed for the dam at the Eastmain-1 power plant[10] and 72 are planned for the Eastmain-1-A plant.[11]

The average cost of the two Eastmain plants has already climbed to $5.32 million per MW, more than double the amount a private sector company is willing to pay to buy a run-of-river power plant. With construction of the Eastmain-1-A plant having begun in 2007, we cannot know yet at this stage if Hydro-Québec will stay within the announced $5-billion budget. This budget was already up by $1 billion: in its 2006-2010 strategic plan, Hydro-Québec had set a budget of $4 billion for this project.[12] According to the documents submitted by Hydro-Québec to the environment commission responsible for assessing it, this project will increase Quebec's electricity production by 8.5 TWh. However, there was no mention of the fact that water impoundment at this plant would reduce electricity production at the Eastmain-1 plant from 2.7 to 2.0 TWh.[13]

The cost price of electricity

The cost per MW of power should not be used as the sole basis for judging the advisability of investing in a hydroelectric plant. Other considerations include the likely quantity of electricity produced and its cost price. As shown in Table 4.2, the average cost price of electricity produced by the two small Innergex plants, calculated according to the same financial parameters as those used for Hydro-Québec, is

6. Bureau d'audiences publiques sur l'environnement, *op. cit.*, footnote 4, p. 2. The reference to Highway 25 is from this source. This is probably a mistake, the nearest highway being the 155.
7. Hydro-Québec, *Centrale Mercier*; see http://www.hydroquebec.com/production/projets/pop/pop_mercier.html.
8. M. Gaudette and G. Bulota, "Improving the flood control at a lower cost for a future Hydro-Québec hydroelectric facility on the Toulnoustouc River, Canada," *Canadian Journal of Civil Engineering*, Vol. 30 (2003), No. 4, p. 775.
9. *Id.*
10. Hydro-Québec, *Aménagement hydroélectrique de l'Eastmain-1*; see http://hydroquebec.com/eastmain1/fr/batir/resume.html.
11. Federal Review Panel, Eastmain-1-A and Rupert Diversion Project, *Report*, November 30, 2006, p. 17.
12. Hydro-Québec, *Strategic Plan 2006-2010*, adjusted version of September 15, 2006, p. 17.
13. Régie de l'énergie, *Demande du Transporteur d'électricité afin d'obtenir l'autorisation requise pour l'acquisition et la construction d'immeubles ou d'actifs destinés au transport d'électricité et requis pour l'intégration de la centrale d'Eastmain-1 au réseau de transport d'électricité*, Ruling D-3527-2004, HQT-12, Document 1, p. 10.

4.8 cents per kWh.[14] However, the cost price of electricity produced at Chute-Allard and Rapides-des-Coeurs is 10 cents per kWh.

When we calculate the cost price of electricity produced by power plants developed using an existing dam, we also see major disparities between projects by private producers and those by Hydro-Québec. The cost price of electricity from the three private power plants ranges from 3.2 to 3.6 cents per kWh, whereas it reaches 5.5 cents per kWh for the Mercier plant.

When water impoundment begins at the Eastmain-1-A plant, the cost price of electricity produced at Eastmain-1 will rise to 10.8 cents per kWh.[15] Since we have no comparable projects developed by the private sector, we are not able to draw a comparison between the cost price of electricity produced by this plant and the cost at a plant of similar size built by a private company. All the same, we may wonder why the cost price of electricity produced at Eastmain-1, a large power plant, is 125% higher than the cost price of electricity that will be produced by the two small Innergex plants. Can this huge gap between Hydro-Québec's costs and the private companies' costs be explained solely by the fact that Hydro-Québec built a variable-level plant at Eastmain-1 rather than a run-of-river plant?

These prices of 10 and 10.8 cents per kWh exceed the price of 6.5 cents per kWh obtained by Hydro-Québec in its first call for tenders for wind energy and 8.7 cents per kWh in the second call for tenders.[16]

14. Calculation by the author. The price per kWh calculated here is not necessarily the selling price granted to Hydro-Québec by the private producer. This price calculation does not take account of any difference that may exist between operating expenses borne for electricity production by Innergex and by Hydro-Québec.
15. The cost price might have been 8 cents per kWh if electricity production had reached 2.7 TWh annually.
16. Hélène Baril, "Les projets éoliens communautaires menacés," *La Presse Affaires*, July 10, 2008, p. 2.

Table 4.2
Cost price of electricity by developer

Project	Developer	Cost of the power plant ($ million)	Production (TWh)	Cost price per kWh (¢)
Run-of-river power plants				
Umbata Falls	Innergex	60	0.11	5.2
Ashlu Creek	Innergex	132	0.27	4.7
Peribonka	Hydro-Québec	1,400	2.20	6.0
Chute-Allard and Rapides-des-Coeurs	Hydro-Québec	960	0.90	10.0
Run-of-river power plants built at the foot of an existing dam				
Matawin River	Innergex	18	0.06	3.6
Magpie River	Hydroméga	70	0.18	3.6
Rapides-des-Quinze	Manulife	55	0.16	3.2
Mercier	Hydro-Québec	176	0.30	5.5
Power plants with variable level resevoirs				
Eastmain-1	Hydro-Québec	2,300	2.0	10.8
Eastmain-1-A	Hydro-Québec	5,000	8.5	5.5
Toulnustouc	Hydro-Québec	1,000	2.7	3.5

Source: Data from Table 4.1. We estimated the cost price per kWh using information published on page 17 of Hydro-Québec's Strategic Plan 2006-2010.

Even if the data we have are incomplete, they suggest that the cost price of electricity produced by power plants built by Hydro-Québec is much higher than the cost price of electricity from private producers.

Management of construction projects

Five of the Hydro-Québec projects in Tables 4.1 and 4.2 have been completed or are in partial production. In Table 4.3, we have compiled the budget forecasts by Hydro-Québec when each of these five projects were announced, comparing these budgeted amounts with the project cost or, in the case of Péribonka (partial production), the available estimate of the most recent total cost. Hydro-Québec seems to have trouble controlling the costs of its investment projects. All these projects, without exception, cost more than forecast, and the average overrun is 26% of the original budget. Since the Péribonka project is not yet finished, this 26% disparity could change.

Cost overruns in the construction of hydroelectric plants are not a recent phenomenon for Hydro-Québec. As we saw in Chapter 1, the cost of developing all the James Bay power plants was $16 billion, or $1.1 million per MW. The Churchill Falls project cost $950 million, or $175,000 per MW. It thus cost six times less per MW, and the first two turbines went into operation on December 6, 1971, nearly six months before the date set out in the timeline. The exceptional quality of the Churchill Falls site for hydroelectric production no doubt explains part of the difference. However, we cannot avoid mentioning that the cost of developing James Bay was three times as high as the budget announced at the start.

Analysis of the installed power utilization factor

Hydroelectric production requires substantial investment to generate the electricity demanded by customers. Construction of a facility necessitates long-term production planning. Forecasting is based on observations of a river's flow and the height of its drop, along with the site's topography. The installed power utilization factor [17] can serve as one indicator of the use of invested capital. Caution is required, however, since it is easier to obtain a higher utilization factor when electricity is produced at a nuclear or thermal plant rather than at a hydroelectric plant.

17. This factor is obtained by dividing annual electricity production by the product of installed power and the number of hours in a year.

Table 4.3
Analysis of proposed budgets for Hydro-Québec construction projects relative to final costs

	Project budget ($ million)	Final cost ($ million)	Percentage over budget	Year announced	Year completed
Toulnustouc	800	100	25%	2001	2005
Eastmain-1	2,000	2,300	15%	2002	2006
Mercier	120	176	47%	2003	2007
Peribonka	1,000	1,400	40%	2001	2007
Chute-Allard and Rapides-des-Coeurs	700	960	37%	2005	2008
Total	4,620	5,836	26%		

Source: Hydro-Québec Annual Reports for the years mentioned in the table.
Note: The Peribonka project is only partially online. The project is not yet completed.

We are using a comparison here with a comparison group of comparable companies active in the same sector and fairly similar in size to Hydro-Québec. We have constituted a group of U.S. companies that meet these criteria. As in the previous chapter, they are American Electric Power, Consolidated Edison, Entergy, Exelon, FirstEnergy, Florida Power and Light (FPL), Pacific Gas & Electric Company (PG&E), Pennsylvania Power and Light (PPL), Southern Company and Xcel Energy.

In Table 4.4, we compiled the installed power utilization factor of Hydro-Québec and seven of the 10 companies in the comparison group.[18] For companies in the comparison group, it ranges from 49% to 67%. With a utilization factor of 56% for its total installed power, Hydro-Québec is in the middle of the pack among these companies in this regard.

Two of the companies show a better performance than Hydro-Québec, namely American Electric Power, with a utilization factor of 66% of installed power, and Exelon, with a factor of 67%. Since Hydro-Québec has more installed power than either of these companies, an operating rate higher than 56% would have a considerable impact on its profitability. For example, for each 1% rise in its utilization factor, it would recover 424 MW of power, equal to 88% of the installed power of the Eastmain-1 plant, which required a $2.3 billion investment.

According to Hydro-Québec's strategic plan, energy inventories and the annual margin of flexibility are key elements in managing the risk of low runoff. Because the company's main risk consists of fluctuations in the flow of water, with a typical annual disparity of 20 TWh, the 6,000 MW in the margin of flexibility between available installed power and the historic consumption peak of 36,268 MW experienced in 2003 (see Table 4.5) ought to enable Hydro-Québec to reconstitute its energy inventory after a period of low runoff with no break in the deliveries to which it is committed.[19] In determining its margin of flexibility, Hydro-Québec does not seem to take account of the availability of electricity from the Bécancour plant belonging to TransCanada Energy, which can produce 4.3 TWh of electricity a year. Why sign a supply contract and pay TransCanada Energy $149 million and then have it not produce a single kilowatt-hour of electricity

18. These data are not available for three of the companies in the comparison group.

19. Hydro-Québec, *Strategic Plan 2006-2010*, adjusted version of September 15, 2006, p. 9.

Table 4.4
Installed power utilization factor

	Available installed capacity (MW)	Electricity generated (TWh)	Installed power utilization factor
American Electric Power	38,000	219.5	66%
Entergy	22,087	108.2	56%
Exelon	32,322	189.7	67%
FPL	25,100	108.6	49%
PPL	11,418	53.6	54%
Southern Company	41,948	204.4	56%
Xcel Energy	16,042	77.7	55%
Hydro-Québec	42,417	209.8	56%

Source: American Electric Power, Form 10-K 2007, p. 10 and http://aep.com/about/default.htm; Entergy, *Annual Report 2007*, p. 27 and *Statistical Report 2006*, p. 7; Exelon, Form 10-K 2007, pp. 4 and 15; FPL, *Annual Report 2007*, p. 2 and Form 10-K 2007, p. 9; PPL, Form 10-K 2007, p. 5; Southern Company, *Annual Report 2007*, pp. 2 and 91; Xcel Energy, *Triple Bottom Line Report 2007*, pp. 12 and 14; Hydro-Québec, *Annual Report 2007*, p. 102; Newfounland and Labrador Hydro, *Annual Report 2006*, p. 4 and 28.
Note: In the case of Entergy, we excluded capacity reserved for wholesale activities.

in 2008?[20] Hydro-Québec also ignores its ability to make purchases throughout the year on short-term markets. For example, in 2006, it purchased 7.5 TWh at an average price of 4.5 cents per kWh, or 3.0 cents less per kWh than the average reference price for energy based on the Day Ahead Market in Zone M of the New York Independent System Operator (NYISO).[21] This is the reference market used by Hydro-Québec Distribution to set the price of the post-heritage electricity it buys from Hydro-Québec Production. Hydro-Québec could increase its purchases considerably in low-runoff situations before the average cost of these purchases on the short-term market reaches 7.5 cents per kWh, NYISO's reference price. Even if Hydro-Québec is alone in having to manage the risk of low runoff, the large size of its energy inventory should not be forgotten. Hydro-Québec has 26 reservoirs with a storage capacity of 175 TWh, with enough water as of December 31, 2007, to produce 116.6 TWh.[22] The scope of this energy inventory gives it enough time to reconstitute its margin of flexibility in the event of low runoff through short-term purchases and the use of TransCanada Energy's production capacity.

The investment required to manage peak consumption could be reduced by emphasizing an excellent initiative, namely agreements for service modulation with large-power customers. These agreements allow the distributor to reduce the electricity it supplies to these clients for the duration of peak periods. To meet very short-term fluctuations, Hydro-Québec Distribution can ask its large-power customers subscribing to the interruptible electricity option to reduce the power called upon, in return for financial compensation. The 2005-2014 Supply Plan suggests renewal of this option, involving available power of 500 MW.[23] This represents just over 1% of its installed power. FPL is more proactive in this regard: it can count on 1,668 MW,[24] or nearly 7% of its installed power.

Another possibility is available to Hydro-Québec to improve the yield of its power plants. Since Quebec's electricity consumption reaches its peak in the winter (see Table 4.6), the flows

20. Konrad Yakabuski, "Did Hydro-Québec miscalculate?," *The Globe and Mail*, January 3, 2008.
21. Régie de l'énergie, *Demande relative à l'établissement des tarifs d'électricité pour l'année tarifaire 2008-2009*, Ruling D-2008-024, February 26, 2008, pp. 39 and 40.
22. Hydro-Québec, *Annual Report 2007*, pp. 9 and 10.
23. Hydro-Québec, *Strategic Plan 2006-2010*, adjusted version of September 15, 2006, p. 8.
24. FPL, Form 10-K, 2007, p. 9.

Table 4.5
Peak consumption relative to average consumption

	Available installed capacity	Peak (MW)	Average (MW)	Ratio
Entergy	22,087	22,001	12,342	1.8
Exelon	32,322	32,545	21,655	1.5
FPL	25,100	22,361	12,397	1.8
Southern Company	41,948	40,870	23,329	1.8
Xcel Energy	16,042	21,327	13,408	1.6
Hydro-Québec	42,417	36,268	23,952	1.5

Source: Entergy, *Annual Report 2007*, p. 27; Exelon, Form 10-K 2007, pp. 15, 18 and 21; FPL, Form 10-K 2007, p. 9; Southern Company, *Annual Report 2007*, pp. 8 and 91; Xcel Energy, *Triple Bottom Line Report 2007*, p. 12 and Form 10-K 2007, pp. 11, 19 and 22; Hydro-Québec, *Annual Report 2007*, p. 102.
Note: Xcel Energy's installed capacity does not take into account the capacity obtained through its long-term purchasing contracts since this information is unavailable. It produces only 66% of the electricity that it sells.

that Hydro-Québec sends into its turbines exceeds natural flows, and the reservoirs drop gradually toward their minimum operating levels, which are normally reached just before the spring runoff. As well, natural flows are likely to be lower during this season of peak demand. Moreover, every company in the comparison group, apart from Xcel Energy, has its consumption peak in the summer. Instead of increasing the capacity of its reservoirs and the installed power of its plants, Hydro-Québec could do a seasonal swap with one or more U.S. producers. Exelon, for example, says its winter peak is about 25,000 MW;[25] this leaves it with 8,000 MW of excess capacity at that time of year.

Unlike most of the companies in our comparison group, Hydro-Québec does not plan explicitly, in its strategic plan, to rely on exchanges or purchases with neighbouring networks to meet demand. This desire for self-sufficiency emerges clearly in its latest strategic plan. It aims to meet Quebec's additional needs up to 2015 essentially by increasing its hydroelectric production and by putting wind production into service.[26] This requires Hydro-Québec to maintain high reserves, more than 6,000 MW, according to Table 4.5. Of all the companies in the comparison group for which these data are available, only FPL has a similar strategy of self-sufficiency, although it maintains lower reserves than Hydro-Québec. Since FPL distributes electricity exclusively along the eastern and southwestern coasts of Florida,[27] it is more difficult for it to rely on neighbouring networks to supply it in case of unforeseen demand. It has to deal with relative geographic isolation and a consumption peak that coincides with the neighbouring networks' consumption peaks. If Hydro-Québec did an energy swap with companies located south of the border, it would not need as large a reserve and could reduce its investment in the development of new energy sources. This reduction could climb to $10 billion if Hydro-Québec managed to raise its installed power utilization factor from

25. Exelon, Form 10-K, 2007, pp. 18 and 21.

26. Hydro-Québec, *Strategic Plan 2006-2010*, adjusted version of September 15, 2006, p. 16.
27. FPL, Form 10-K, 2007, p. 6.

Table 4.6
The seasonal nature of electricity consumption

	High season		Low season	
	Proportion of revenue	Quarter	Proportion of revenue	Quarter
American Electric Power	28%	Summer	24%	Spring
Consolidated Edison	27%	Summer	23%	Spring
Entergy	29%	Summer	23%	Winter
Exelon	27%	Summer	24%	Spring
FirstEnergy	28%	Summer	23%	Winter
FPL	30%	Summer	21%	Winter
PPL	27%	Summer	24%	Winter
Southern Company	31%	Summer	22%	Fall
Xcel Energy	28%	Winter	23%	Spring
Hydro-Québec	29%	Winter	22%	Spring

Source: American Electric Power, *Annual Report 2007*, p. 21 and Form 10-K 2007, p. A-135; Consolidated Edison, Form 10-K 2007, p. 61; Entergy, Form 10-K 2007, p. 171; Exelon, Form 10-K 2007, p. 90 and Form 10-Q, p. 5; FirstEnergy, *Financial Report 2007*, p. 111; FPL, Form 10-K 2007, p. 96; PPL, Form 10-K 2007, p. 206; Southern Company, *Annual Report 2007*, p. 89; Xcel Energy, Form 10-K 2007, p. 130; Hydro-Québec, *Annual Report 2007*, p. 103.
Note: The winter quarter finishes on March 31, and so on.

56% to 61% through seasonal energy swaps. Interconnection capacities with the United States would, of course, have to be increased to cope with these swaps, and this has been difficult in the past. In this case, however, we could count on U.S. partners who would also find it to be in their interest, which should facilitate things on the U.S. side. By acting this way, Quebec's energy security could be increased while reducing required investments considerably.

The TransÉnergie division

TransÉnergie is the second biggest user of capital at Hydro-Québec, with fixed assets of $15.2 billion as of December 31, 2007,[28] representing 29% of invested capital. The Régie de l'énergie sought, in a ruling issued on April 4, 2003, to know more about the efficiency of this division in its use of capital:

"As part of the Project, the Carrier awarded a mandate exceeding $20 million to its affiliate HQE (Hydro-Québec Équipement) with no call for tenders. The evidence also indicates that all of the Carrier's projects (there are currently nearly 160 of them) are entrusted to HQE for preliminary studies, engineering, project management and environment. These projects are invoiced to the Carrier at full cost, including direct and indirect costs, with a profit margin added. According to the evidence submitted, this base cost, which will ultimately affect the Carrier's fees, has corresponded over the last few years to a mark-up rate on salaries of 2.25 for HQE. The Régie is concerned by this policy of not calling for proposals for engineering, project management and environmental study services, especially for investments of the scope of the Project. The Carrier compares the mark-up rate on salaries with that in the private sector. The Régie is not satisfied with the evidence in this matter. It considers that the Carrier's affiliate is assured of receiving a large amount of business each year on a stable and foreseeable basis. This must be taken into account in a comparison with private firms that operate in a competitive environment. Their mark-up rates on salaries must cover solicitation, preparation of service offers and contract negotiations, while their labour costs and other expenses cannot be invoiced. The Régie also notes that the costs of the Project include $2.4 million in general expenses, whereas the Carrier entrusts the management to HQE, and HQE's full cost already includes office space, data system costs and administrative management. For these reasons, the Régie considers that HQE's mark-up rate on salaries remains to be justified. In the public interest, and to ensure that consumers benefit from the best service at the best price, the Régie recommends to the Carrier that it call for proposals so as to test the market and thereby obtain cases of real benchmarks. The Régie is not issuing an opinion on the full cost for HQE, which is equivalent to a mark-up rate on salaries of 2.25. The Carrier will have to justify this cost when including the costs of the Project in its service cost. The Régie asks the Carrier to present, when submitting the real project costs, details of HQE's costs, including a calculation of the mark-up rate on salaries. It expects this rate to come down over time. It also asks for these comparative studies with the private sector on salary mark-up levels to be continued and for concrete examples to be presented in future applications for authorization, based on Article 73 of the *Act*. The Régie considers that validation of HQE's costs is essential to ensuring the reasonableness of charges added to the Carrier's service cost and ultimately applied in its fees."[29]

TransÉnergie reacted to this request from the Régie in attempting to obtain authorization to connect the Eastmain-1 power plant with the transmission network. It asked a former employee to benchmark industry practices. Fourteen of the 25 companies contacted for the study in North

28. Hydro-Québec, *Annual Report 2007*, p. 15.

29. Régie de l'énergie, *Décision concernant la demande du transporteur d'électricité relative au raccordement de la centrale Toulnoustouc, en vertu de l'article 73 de la Loi sur la Régie de l'énergie,* Ruling D-2003-68, pp. 20 and 21.

America and elsewhere in the world were government enterprises.[30]

Handling management, engineering and supply work internally in implementing projects for transmission lines and substations is a widespread practice among these companies. The results of this benchmarking show that the electricity companies contacted handle the management, engineering and supply work on their transmission projects internally or entrust this work to subsidiaries without going to tenders. This practice is justified by a requirement to maintain know-how and to have on hand experienced resources who are indispensable in ensuring the quality of service and the reliability of installations.[31]

When the Régie asked to have costs benchmarked, the absence of standardized public data on costs, and the particularity of TransÉnergie's transmission network, were invoked in refusing this request. In defending the status quo, however, all these differences are forgotten, and a study is quickly produced to avoid calls for proposals that might have allowed the market to be tested.

It will be noted also that TransÉnergie chose not to respond to the Régie's second request, which dealt with the level of invoicing used by the Equipment division to be paid for the services provided to TransÉnergie. The Régie remained silent on this omission, even though the Régie member in charge of the hearing was one of the three members who had issued this request several months earlier in 2003.

Unlike Hydro-Québec, the companies in the comparison group generally do not publish the book value of investments in the production, transmission and distribution of electricity as separate items. We did notice one exception, however: according to Table 4.7, Southern Company had fixed assets of $5.4 billion in electricity transmission, compared to $15.0 billion for TransÉnergie. Despite this much lower level of investment, Southern Company has a more extensive transmission network than does Hydro-Québec and seven times more substations. We admit willingly that this comparison is far from perfect, but the scope of the disparities again raises many questions on TransÉnergie's management of investments.

The customer information system: a major project for the Distribution division

On June 17, 2002, Hydro-Québec Distribution presented an application to obtain authorization to invest $270 million to set up, by March 2007, a new customer information system, referred to by its French acronym as the SIC project.[32] The Régie de l'énergie approved this application on December 12, 2002, though with a budget that had already risen to $320 million.[33] "The SIC project has the general aim of improving the quality of customer service so as to meet the expectations of the Distributor's customers and to follow their evolution. The project will also enable the Distributor [...] to improve the productivity of activities associated with customer service. […] The new functions will, for example, provide for integrated billing of all products and services on a single bill and will provide management tools such as workload analysis. In addition, the new system aims to create a file on each customer and location. In comparison, the current system manages customer accounts based only on meter

30. Hydro-Québec TransÉnergie, *Enquête sur l'organisation des compagnies d'électricité pour la réalisation des projets de transport,* Application R-3527-2004, HQT-3, Document 2, March 19, 2004.
31. Hydro-Québec TransÉnergie, *Demande du Transporteur d'électricité afin d'obtenir l'autorisation requise pour l'acquisition et la construction d'immeubles ou d'actifs destinés au transport d'électricité et requis pour l'intégration de la centrale de l'Estmain-1 au réseau de transport de l'électricité,* Application R-3527-2004, HQT-3, Document 1, March 19, 2004, p. 10.
32. Hydro-Québec Distribution, *Demande du distributeur d'électricité afin d'obtenir une autorisation pour réaliser le projet « Système d'information clientèle »*, Application R-3491-2002, June 17, 2002, p. 3.
33. Régie de l'énergie, *Décision sur la demande du distributeur d'électricité afin d'obtenir l'autorisation de réaliser le projet Système information clientèle (SIC) en vertu de l'article 73 de la loi sur la Régie de l'énergie*, Ruling D-2002-280, December 12, 2002, p. 7.

numbers. A number of functions will be added in the area of sales, marketing and commercial strategies. The system thus provides for an improvement in the overall service offering."[34]

According to the Régie, "The Distributor also states that the system's entry into service will lead to substantial productivity gains that will help ensure the project's profitability compared to maintaining the current systems. In the course of the second period, HQD expects to achieve productivity gains ranging from $21 million to $24.5 million a year. Moreover, HQD also expects a reduction in the cost of service ranging from $27 million to $30 million a year."[35] When it analyzed the SIC project's economic value compared to the status quo over a 15-year period, Hydro-Québec Distribution reached the conclusion that the status quo was clearly more costly and that the proposed solution would provide for a saving estimated at $80 million, converted to the 2002 value.[36] Savings were to begin to appear in 2008, in other words the year that was to follow the system's full implementation. In 2007, comparable operating costs were expected for the status quo and for the proposed solution.

Implementation of SIC for residential customers began in January 2008[37] and now is to be complete by the end of 2008.[38] The project is a minimum of 21 months behind the calendar submitted to the Régie de l'énergie in 2002 in seeking authorization for this $320-million investment; its entry into service was supposed to be completed in March 2007.[39] After stating in 2002 to the Régie that SIC's entry into service would be neutral in terms of distribution costs in the year it went into service, the Distributor stated to the Régie in 2007 that SIC's entry into service was responsible for $34.5 million of the $38.8-million[40] increase in its distribution costs in 2008.[41]

What happened? As we noted above, implementing SIC was supposed to enable Hydro-Québec to reduce its operating expenses by $48 million to $54.5 million a year. The anticipated benefits are now just $20 million a year, starting only in 2009.[42] As well, much more than $320 million seems to have been invested in realizing this project. The planned amortization of $21 million and financial charges of $16 million are no longer enough.[43] In its application for a rate increase for 2008, the Distributor said: "SIC, the completion of which was spread over six years for a planned entry into service in January 2008, will produce amortization charges of about $39 million and financial expenses of $29 million."[44] These figures suggest that the project's initial cost has more than doubled and that it is now close to $600 million.

34. *Id.*, pp. 4 and 6.
35. *Id.*, p. 8.
36. Hydro-Québec Distribution, *Projet SIC*, Application R-3491-2002, HQD-1, Document 1, p. 31.
37. Hydro-Québec, *Annual Report 2007*, p. 23.
38. Régie de l'énergie, *Demande relative à l'établissement des tarifs d'électricité pour l'année tarifaire 2008-2009*, Ruling D-2008-024, p. 50.
39. Hydro-Québec Distribution, *Projet SIC*, Application R-3491-2002, HQD-1, Document 1, p. 21.
40. Régie de l'énergie, *Demande relative à l'établissement des tarifs pour l'année tarifaire 2008-2009*, Ruling D-2008-024, February 26, 2008, p. 48.
41. Calculations by the author based on Hydro-Québec Distribution, *Efficience et performance*, Application R-3644-2007, HQD-3, Document 1, pp. 8 and 9.
42. *Id.*, p. 20.
43. Hydro-Québec Distribution, *Projet SIC*, Application R-3491-2002, HQD-1, Document 1, Appendix 2.
44. Hydro-Québec Distribution, *Efficience et performance*, Application R-3644-2007, HQD-3, Document 1, p. 9.

Table 4.7
Investments in transmission

	Hydro-Québec	Southern Company
Length of transmission network (km)	33,008	43,552
Number of substations	508	3,400
Transmission assets (G$)	15.0	5.4

Source: Southern Company, http://investor.southerncompany.com/about.cfm; Hydro-Québec, *Annual Report 2007*, pp. 15 and 102.
Note: Hydro-Québec publishes different figures for the length of its transmission network on pages 15 and 102 (last figure used).

This example leads us to wonder why lawmakers forced Hydro-Québec Distribution to have its investment projects approved by the Régie de l'énergie. As the text of its ruling shows, the Régie was concerned by the project's risks: "Given the magnitude of the amount involved and the risks of overrun inherent to projects in information technologies, the Régie considers it essential that the follow-up provided by the Distributor be detailed and presented in timely fashion. The Régie is worried lest the Distributor's customers have to bear cost overruns, as has been seen with other public utility companies. It takes note of Hydro-Québec's experience in implementing information systems. […] To minimize these risks, the Régie is firm in demanding that this project be followed up; it is fundamental that actions be taken very quickly in case of problems. Accordingly, the Régie is requesting a follow-up report on this ruling on an annual basis […] It also requests, in addition to the annual follow-up, to be advised in a special report once the $20-million contingency provision has been exhausted. In such a case, the Distributor will then have to set out the measures instituted to avoid cost escalation and to report subsequently on the results of these measures."[45]

The Régie had correctly recognized the risks of uncontrolled timelines and cost overruns. It nonetheless accepted, in its ruling of February 26, 2008, all of the Distributor's requests in terms of operating expenses, including an additional $10-million budget to stabilize the SIC project. In its 2008 ruling, the Régie set out two very timid requests: it asked the Distributor to present, in its next rate filing, the exact amount of the savings that will be generated by the SIC project starting in 2009; it also asked for a report on the promised layoff, by late 2008, of the 205 temporary employees hired to ensure stabilization of the SIC project.[46] There is nothing in the text of its ruling that would lead us to believe that the Régie conducted the follow-up sought in 2002 on the management of this very large project.

Since Hydro-Québec is not a private company, it is not its shareholders who will have to pay for this major cost overrun or for the absence of a large proportion of the productivity gains hoped for in 2002 following the implementation of SIC. This will result in lower profits for Hydro-Québec, with an equivalent reduction in its contribution to Quebec society. Hydro-Québec Distribution suffers no penalty for this major budget overrun since it is regulated on the basis of costs. The project's total cost, including the cost overruns, is added to its accumulated fixed assets. The Régie agreed to have the presumed capital structure that theoretically finances the accumulated fixed assets consist 35% of owners' equity and 65% of debt. Since the Régie also authorized a 7.74% rate of return on equity,[47] Hydro-Québec will thus receive a 7.74% return on 35% of the SIC project's cost overrun and the return on a risk-free bond on the other 65% of the cost overrun. This means the Régie has given Hydro-Québec Distribution permission to spend $34.5 million more in 2008 than was planned in 2002 for the operation of SIC and is also allowing it to receive investment income on the project's entire non-depreciated cost!

Impact on profitability

Each year, Hydro-Québec invests substantial amounts. In 2007, it devoted $3.6 billion to its investments compared to $3.5 billion in 2006.[48] Its fixed assets totalled $53.2 billion at the end of 2007.[49] In 2007, it devoted $2.0 billion to amortizing past fixed assets and $2.5 billion to interest on the debt it has accumulated to finance all these investments. If Hydro-Québec were to show greater rigour in the management of its

45. Régie de l'énergie, *Décision sur la demande du distributeur d'électricité afin d'obtenir l'autorisation de réaliser le projet Système information clientèle (SIC) en vertu de l'article 73 de la loi sur la Régie de l'énergie*, Ruling D-2002-280, December 12, 2002, pp. 17 and 18.
46. Régie de l'énergie, *Demande relative à l'établissement des tarifs pour l'année tarifaire 2008-2009*, Ruling D-2008-024, February 26, 2008, pp. 54 and 55.
47. *Id.*, pp. 56 and 57.
48. Hydro-Québec, *Annual Report 2007*, p. 54.
49. *Id.*, p. 74

investments, this would have a major impact on its profit by reducing charges for amortization and debt interest. Without delving deeply into all of Hydro-Québec's investment activities, it is hard to put precise numbers on the impact. All the same, we can make an acceptable estimate thanks to the case studies we presented earlier in this chapter.

We have shown that the cost price of electricity from the power plants built by Hydro-Québec reaches and even exceeds twice the cost price of electricity produced by private sector power plants. Hydro-Québec's costs for building power plants exceeds substantially the budget announced at the beginning of the project. Hydro-Québec could invest less and better if it took greater advantage of the fact that its consumption peak coincides with a period of much lower consumption in the electricity distribution networks located south of the Canadian border. TransÉnergie entrusts all its projects to the same supplier as Hydro-Québec Production. It seems fair to hypothesize that quality in the management of their respective investments can be compared. We also showed that a major investment by Hydro-Québec Distribution to improve customer service cost more than double the budget planned initially without generating the expected operational savings, a situation that the Régie de l'énergie treated courteously.

Conclusion

All these data suggest that better management of investments would enable Hydro-Québec to reduce its investment spending by at least 25% and possibly by 50%. For the purposes of our study, we will take a cautious approach and use a reduction of one-quarter in investment spending. After a certain number of years, Hydro-Québec could reduce its annual amortization and interest charges from $4.5 billion to $3.4 billion and increase its profit accordingly. When the operational savings of $1.0 billion determined in Chapter 3 are added, it can be affirmed that Hydro-Québec's net profit, based on its current rates, would come close to $5.0 billion, which is $2.1 billion more than the $2.9 billion declared in 2007.

We can state that Hydro-Québec's annual profits should currently be close to $5 billion a year, rather than $2.9 billion, without rates going up. We get this figure by taking account of the impact on net profit of its low operational efficiency and overuse of capital. The premier of Quebec stated recently that "in some areas of our economy, we lack workers. Moreover, our economy is less productive than that of our neighbours."[50] With annual sales exceeding $12 billion, Hydro-Québec's activities represent 4% of the Quebec economy. Any improvement in Hydro-Québec's productivity would affect the productivity of the Quebec economy as a whole. We owe it to ourselves to take measures to help our society understand Hydro-Québec's true value. Energy production costs far lower than those of comparable companies constitute an extraordinary competitive advantage for Quebec society. We need to look lucidly at possible productivity improvements to have a truer picture of Hydro-Québec's potential financial results. In a world of limited resources and growing needs, this exercise cannot be avoided. To see things more clearly before drawing our conclusions, let us look at the British experience in privatizing its electricity production, transmission and distribution companies.

50. Jean Charest, "Un nouvel espace économique pour le Québec," *La Presse,* March 26, 2008, p. A22.

Chapter 5
The experience of the United Kingdom

In the 1970s, the table was set for privatizing the electricity industry in the United Kingdom.[1] Industry losses had grown considerably under Labour and Conservative governments. The idea that prices should be set based on cost plus a contractual margin (called "cost plus") had taken hold. The unions had abused their monopoly negotiating power, leading to extra staff and a culture of work-to-rule strikes. The industry had taken on huge engineering departments that insisted on managing fixed asset projects themselves, requiring costly technical specifications and larger investments than were needed.

Before privatizing the electricity industry, the government of the United Kingdom had privatized the natural gas industry in 1986. Under pressure from its management team, British Gas, a public monopoly, became a private monopoly, depriving consumers of the benefits of competition. This privatization showed the value of separating the production, transmission and distribution of electricity if the desire existed to create a more competitive environment than what prevailed in the natural gas industry.

Initially, the electricity industry was restructured starting on March 13, 1990. The Central Electricity Generating Board, in charge of producing and transmitting electricity in England and Wales, was split in four: three companies in charge of electricity production (National Power, PowerGen and Nuclear Electric) and one company in charge of the transmission network (National Grid Company). Electricity distribution already came under 12 area boards, which then were turned into 12 regional electricity companies in charge of distributing electricity in their respective regions.

The government privatized two of the three production companies but retained ownership of Nuclear Electric while asking it to compete with the two privatized companies to ensure its survival. It improved its productivity and increased its production to the point that the government privatized it in turn in July 1996 under the name British Energy. In 1997, it had become the world's most efficient electricity producer, generating 80% of the energy it had the capacity to produce. Privatization increased the number of electricity producers, which went from 10 in 1990 to 32 in 1999.

At the time of privatization, only the 4,550 customers requiring at least 1 MW of power could shop around for electricity. Success was such that in 1994, the free market was extended to all customers who needed 100 kW or more: supermarkets, hospitals, offices and small factories. This market then represented 70% of the electricity sold in the United Kingdom. Now, all consumers can choose their supplier; this is also the case in France.[2]

The most eloquent proof of electricity privatization's success in the United Kingdom is the fact that the British model, in other words the split between production, transmission and distribution for regulatory purposes, has been adopted in many parts of the world. As we saw in Chapter 2, Hydro-Québec, under pressure from the FERC, adopted this type of structure to be able to export its electricity to the United States. However, privatization provided many other advantages: prices fell by 20% from 1997 onwards

1. This chapter draws freely on the speech "The Privatisation of UK Electricity Industry" given on April 16, 1999, by Dr. R. Hawley, chairman of the Engineering Council (United Kingdom) and former president and chief executive of British Energy. See http://www.hkdf.org/newsletters/9906/0699_3.htm.

2. Thibaut Madelin, "Énergie : la concurrence commence à séduire les Français," *Les Échos*, September 2, 2008.

(adjusted for inflation). Financial returns improved, and there were 95% fewer power cuts.

According to another observer, privatization of the gas and electricity industries transformed state monopolies into competitive companies, enabling consumers to have a choice of suppliers while benefiting from lower prices.[3] From 1990 to 2005, the average electricity bill fell more than 30% after taking account of inflation.[4]

A number of commentators have criticized privatization, asserting that the goose that laid the golden eggs was given away. Their main argument was based on the fact that, on average, the electricity companies' initial public offerings were 10 times oversubscribed. This excess demand provided substantial gains starting the day shares began trading. Supporters of privatization reply that privatization was risky and that there was a need, at any price, to avoid failure. According to them, there was a lack of comparable companies to help set the price, and the nationalized companies' accounting systems were not adequate. It seems also that the impact of staff savings on the companies' stock market value was underestimated.

Since privatization, there have been some regroupings, with England and Wales now having only eight electricity distribution companies on their territory rather than the 12 companies that were privatized in 1990. Four of these eight distribution companies are owned by firms that also produce electricity.[5]

Market regulation

Privatization of electricity production and distribution companies does not mean they were left all alone in charge of setting the rules of the game. The government set up the Office of Gas and Electricity Markets (Ofgem). Ofgem's role is to protect consumer interests by promoting maximum competition between suppliers.[6] Competition is working: in March 2007, 900 000 gas and electricity consumers changed suppliers.[7] As for the quality of service, Energywatch, the public body that oversees consumer interests on British gas and electricity markets, revealed that this is no longer an issue: more than 97% of customers were satisfied with the service received.

Where competition is not a realistic option, Ofgem protects consumers by imposing the necessary controls. This applies to the companies that manage the gas and electricity transmission networks.[8] At the same time, Ofgem takes measures to encourage these companies to invest appropriate amounts to ensure continuity of service. In determining the rate structure for the period from 2007 to 2012, it took account of £3.8 billion in investments to be made in the United Kingdom's electricity transmission network during this period.[9]

Lessons for Quebec

There are resemblances between the pre-privatization British experience and the picture we drew of Hydro-Québec in Chapters 3 and 4: excess staff, a higher cost structure, greater investment than needed, and an absence of competition. The British opted for privatization to remedy this lack of productivity. Alongside this privatization, electricity producers and distributors went into competition. In addition, privatization was used to modify the regulatory system applying to the natural monopoly of electricity transmission to let it benefit for a certain time from the productivity improvements obtained in the management of its network. This way of doing things has been a success: over all, the reform has produced rate reductions of about 32% after taking account of inflation.

3. Nigel Essex, "Privatisation of Energy: Was it Necessary?," *Economic Affairs*, Vol. 24 (2004), No. 3, p. 16.
4. Enrico Giglioli and Alberto Marchi, "Next-generation regulation for European electric power," *McKinsey Quarterly*, June 2008.
5. Information found on the websites of these eight companies.
6. Ofgem, *Annual Report 2006-2007*, p. 16.
7. *Id.*
8. Ofgem, *op.cit.*, footnote 6, p. 22.
9. *Id.*

Hydro-Québec plays a major role in the Quebec economy, accounting for about 4% of Quebec's production of goods and services. Since 1944, its sole shareholder has been the Quebec government. Analysis of the British experience leads us to believe that government is not in the best position to manage a company that holds a monopoly.

If we wish to increase our productivity, we must take a cold, hard look at possible improvements for a true picture of Hydro-Québec's potential. Quebec's experience with the exclusive public sector management of our greatest resource requires a re-evaluation. It is time to introduce more competition and to improve regulation so as to optimize Hydro-Québec's efficiency. We will show in later chapters that Quebec can gain more from transferring ownership of Hydro-Québec to the private sector than from maintaining the status quo.

Chapter 6
The rise in electricity rates

According to a study prepared for the C.D. Howe Institute, "Quebec's energy potential is phenomenal, not only because of its natural resources, but also because it can apply the experience and competency it has acquired, as well as developing potential new markets. However, a poorly informed coalition of legislators, business and union leaders exercise inordinate control over its energy resources. The result is a misdirected resource development policy, based on price manipulation, that benefits only the groups directly involved, while squandering the potential gains from a socially optimal resource exploitation plan. That is a policy that can lead to collective impoverishment. The current low-price policy — implying higher public debt and taxes, and possibly leading to a deterioration of social services — is not only an inefficient subsidy to big energy consumers, including both individuals and corporations, but also a regressive transfer from poor to rich."[1]

A manifesto called *Manifeste pour un Québec lucide*, published on October 19, 2005, and translated under the title "For a clear-eyed vision of Quebec", takes up some of these arguments and suggests a major change in our attitude toward electricity:

"A clear-eyed vision should also lead us to reviewing our collective attitude toward electricity rates. Quebec is fortunate to have a resource that is every bit as valuable as oil. If Alberta is able to generate considerable revenue with its petroleum resources, why does Quebec deny itself part of the financial potential of its hydroelectric power? Hydro-Québec's current rate policy is just one way that Quebecers can benefit from this resource; it is neither the most productive nor the most efficient. Contrary to a widely held belief, low rates are more advantageous for people with higher incomes (who have the means to pay more) than for those who are less well off (who could be protected against rate hikes). Alban D'Amours, president of Mouvement Desjardins, has already proposed that hydro rates be increased and that a portion of Hydro-Québec's profits be used to repay the Quebec government's debt. We endorse this proposal, with the proviso that the increase in electricity rates be both substantial and progressive."[2]

We fully share the opinion of these authors on the subject of our greatest wealth creation engine. The ideas clearly sum up the strategic position of Quebec's hydroelectric potential. In studying the situation in a more detailed way, as we have done here, we discover as well that Hydro-Québec's productivity and financial results are weak and inadequate. They could be improved greatly, especially in a context of energy market deregulation. How can Quebecers be made to accept a substantial increase in electricity rates without at the same time taking the measures needed to make Hydro-Québec perform as well as other companies in the same field? We intend to propose a series of measures that can give Quebec society an optimal return on its investments in Hydro-Québec. But before we get there, let us examine how a "substantial and progressive" rate increase can be beneficial for all Quebecers.

In the last few years, the rise in electricity rates has been much slower than the rise in the prices of oil products. This is why Quebec citizens pay for their electricity at a price far below its market value. The residential electricity rate in Toronto is 71% higher than the Quebec rate.[3] The difference with our American neighbours is even greater: Boston pays a rate 224% higher and New

1. Marcel Boyer, *Raise Electricity Prices in Quebec – and Benefit Everyone*, C.D. Howe Institute, March 16, 2005.

2. Lucien Bouchard *et al.*, *For a clear-eyed vision of Quebec*, October 19, 2005.

3. Hydro-Québec, *Annual Report 2007*, p. 23. An average price is used, based on consumption of 1,000 kWh per month.

York pays 250% more than what we pay in Quebec.[4] The cities of Boston and New York are part of the northeastern United States, the region with the highest electricity rates in the U.S.[5] This difference is due essentially to the heritage pool, a concept developed, as we have seen, to allow Hydro-Québec to sell its surplus electricity on the U.S. market while protecting electricity prices in Quebec.

Hydro-Québec's potential

The world has changed enormously in the last 20 years. Deregulation of the North American energy market has increased Hydro-Québec's intrinsic value considerably. Moreover, as noted by professors Gérard Bélanger and Jean-Thomas Bernard of Laval University, "in its energy policy submitted in June 2006, the government considered developing La Romaine (1,500 MW) and Petit Mécatina (1,500 MW) that would supply electricity at more than 10 cents per kWh. A 1,000-MW wind energy project […] will deliver electricity at 8.3 cents per kWh. The era of low-cost hydroelectric development is thus coming to an end in Quebec."[6]

A Quebec residential customer who consumed 1,000 kWh of electricity per month in 2007 paid 6.7 cents per kWh. If electricity rates were increased by slightly less than five cents to 11.4 cents per kWh over a 10-year period, this would produce the same average rate as in Toronto in 2007.[7] An increase of this size would raise Hydro-Québec's profits by about $8.1 billion.[8] Since Hydro-Québec's profits were $2.9 billion[9] in 2007, the suggested rise would bring them up to $11 billion.[10] To get this figure, we hypothesize that the billions of kilowatt-hours Quebecers would refrain from consuming following this rate hike would easily find buyers on export markets, as we shall see in Chapter 12.

This $8.1-billion opportunity cost represents an equivalent subsidy to Quebec electricity consumers. Why should Quebec subsidize electricity consumption, both by the wealthy and the less well off? Housing is not subsidized, except for a tiny proportion of the population. Food is not subsidized either. On the contrary, Quebec's supply management policies in agriculture raise the price of milk, cheese, eggs and chicken. And yet housing and food are just as essential as electricity.

How to raise rates

If we wish to raise electricity rates to the market price, the heritage pool rules must be modified. As we shall see in Chapter 13, agreements with aluminum smelters already account for a sizable share of this pool, about 20 TWh out of a total of 165 TWh. Since we must abide by the long-term contracts between the aluminum smelters and the Quebec government, we cannot count on higher short-term revenues from the 20-TWh pool used by the aluminum smelters. We have to accept that this 20-TWh portion is untouchable now and leave it in the heritage pool until the long-term agreements end. But there remain 145 TWh. The easiest way to let electricity rates reach the market level over a 10-year period is to reduce the heritage pool by 14.5 TWh each year. The average rate will gradually come closer to the market rate since all the electricity at the disposal of Hydro-Québec Production, beyond the heritage pool, is sold in a context of free competition.

4. *Id.*
5. Entergy, *Annual Report 2007*, p. 17.
6. Gérard Bélanger and Jean-Thomas Bernard, *Subsidies for aluminum producers: benefits that don't add up*, Montreal Economic Institute, April 2007, p. 4.
7. Hydro-Québec, *Annual Report 2007*, p. 23.
8. With sales of 173.2 TWh in Quebec in 2007, Hydro-Québec sold 60.0 TWh to residential and agricultural customers. See Hydro-Québec, *Annual Report 2007*, p. 101.
9. *Id.*, p. 73.
10. According to Professor Marcel Boyer of the University of Montreal, raising rates to the market price would cause a 47% average increase in residential customers' annual electricity bills. See Marcel Boyer, *Higher electricity prices can unleash the value of Quebec's energy potential*, Montreal Economic Institute, April 2007, p. 2.

The amount of royalties

Even before raising rates to bring them to the market level, we suggest replacing the dividend the Quebec government receives from Hydro-Québec each year with an annual royalty of $1.9 billion. Unlike the dividend, the royalty is an expense and, accordingly, paying it reduces net profit by the same amount. This is a gesture of a psychological nature since a lower net profit does not have the same impact on Hydro-Québec management or employees or on the general public.

We get this $1.9-billion figure based on the following hypotheses: half of the recurring profits, an amount equal to the capital tax paid in 2007 and to the loan-related guarantor fee that Hydro-Québec already pays to the Quebec government.[11]

Hydro-Québec paid about $450 million in capital tax and loan guarantee fees in 2007. We suggest this amount not be reduced even if the capital tax is reduced or eliminated as proposed by the minister of Finance in her budget speech of May 24, 2007,[12] and even if Hydro-Québec no longer benefited from the government guarantee on its new loans.

This $1.9-billion amount will be raised once the size of the heritage pool starts being reduced. The increase would amount to 90% of the rise in income due to the annual reduction in the size of the heritage pool. Since no additional royalty would be payable by Hydro-Québec on a 20-TWh portion of the heritage pool reserved for the agreements with the aluminum smelters, the royalties would go up by $600 million a year, reaching $8.0 billion at the end of the 10-year transition period, as shown in Table 6.1.[13] If we disregard the water royalties, total royalties would go from 15% of proceeds before the rate increase to 42% of proceeds in the final year of the transition period. Once the transition period is over, the amount of royalties payable to the government could fluctuate based on changes in the market price of electricity, at least as concerns the heritage pool. If the electricity price were to exceed the 11.4 cents (in 2007 dollars) envisaged for the end of the transition period, royalties would rise more both in absolute amounts and as a proportion of Hydro-Québec's proceeds. As for production capacity that will be added during or after the transition period, it will be necessary to establish an adequate royalty system to take account of the transfer of risk to the private sector if it is decided that the water royalties are not sufficient.

Is it reasonable to suggest this type of royalty level? Before answering this question, let us look briefly at the royalty system in effect in Alberta. The government of that province recently proposed a new royalty system that will take effect in January 2009.[14] The new system calls for royalty levels that vary based on the price of oil or natural gas. The maximum rate can reach 50% for conventional oil and natural gas. For this level to be reached, the price of a barrel of oil must rise to $120 and the price of a gigajoule of gas must go to $16.59. The royalty system that will apply to oil extracted from the tar sands has a dual level: up to a maximum of 9% of gross income and 40% of net income provided that a barrel of oil sells for at least $120.

What we are suggesting for Hydro-Québec seems sensible to us in light of the royalty system that will apply in Alberta. It must not be forgotten that the Quebec government will take 42% of Hydro-Québec's gross income if the price of a kWh is at 11.4 cents. In a world where oil could sell for $120 a barrel, it is not far-fetched to think that the price of electricity should also rise beyond 11.4 cents. Royalties would exceed 50% of income in a scenario where the market price of electricity reached 14 cents a kWh. In our view,

11. Hydro-Québec, *Annual Report 2007*, p. 45.
12. Quebec Department of Finance, *The Budget at a Glance*, May 2007, p. 3.
13. Hydro-Québec will also continue to pay the Generations Fund its share of water royalties, like the other electricity producers that exploit Quebec's resources. Hydro-Québec paid $263 million under this item in 2007. See Hydro-Québec, *Annual Report 2007*, p. 45.
14. Government of Alberta, *The New Royalty Framework*, October 25, 2007, pp. 2 and 3.

Quebec would be as justified in getting higher royalties for the exploitation of hydroelectric resources from its heritage pool as Alberta for the exploitation of its oil and gas resources. Unlike Alberta, Quebec has assumed the full risk in developing Hydro-Québec's current production capacity. It would thus be normal for Quebec's citizens to receive proportionately higher royalties than in Alberta.

A number of commentators have suggested raising Hydro-Québec's rates to the market price to enable Quebec to have a more productive economy. This would make it possible to reduce the debt burden and to finance public services more easily. Without exception, they all envisage raising rates to the market price without challenging public ownership of Hydro-Québec. Is that the best strategy? What can be done to make raising rates acceptable and to ensure that this increase goes entirely to the benefit of Quebecers? These are the questions we shall analyze now.

Table 6.1
Evolution of royalties during the transition period (pro forma)

Year	Average residential rate (¢)	Size of heritage pool (TWh)	Hydro-Québec revenue ($ billion)	Royalties ($ billion)	Royalties as a proportion of revenue
0	6.70	145.0	12.33	1.90	15%
1	7.17	130.5	13.01	2.51	19%
2	7.64	116.0	13.69	3.13	23%
3	8.11	101.5	14.37	3.74	26%
4	8.58	87.0	15.06	4.35	29%
5	9.05	72.5	15.74	4.97	32%
6	9.52	58.0	16.42	5.58	34%
7	9.99	43.5	17.10	6.19	36%
8	10.46	29.0	17.78	6.81	38%
9	10.93	14.5	18.46	7.42	40%
10	11.40	0.0	19.15	8.03	42%

Note: We reduced the initial size of the heritage pool by 20 TWh to take into account the 2002, 2006, and 2008 agreements mentioned in Chapter 13.

Chapter 7
A strategy for privatization

In light of the analysis in Chapters 3 and 4, there is a sizable risk that Quebec society may not get all the benefits hoped for from higher rates. Hydro-Québec has a productivity level that leaves much to be desired and uses much more capital than necessary for its fixed assets. Cost-based regulation of Hydro-Québec's TransÉnergie and Distribution divisions partly explains this low productivity. What guarantee do we have that this situation will improve in the future? Is this a recent situation, or is it a constant in the history of Hydro-Québec?

Hydro-Québec's low productivity is not a recent phenomenon. Already in 1991, "Hydro-Québec's operating expenses stood at 1.65 cents per kWh, compared to 1.41 cents for a majority of state corporations in Canada," one study notes.[1] This study also states that Hydro-Québec had set goals for longer-term cost reduction. More than 15 years later, as we saw in Chapter 3, cost reduction efforts have not produced the results that were hoped for.

At first sight, Hydro-Québec seems to have improved its financial results over the last six years, with pre-tax return on equity rising from 4.4% in 2001[2] to 14.5% in 2007,[3] if the activities carried out are the only ones taken into account. However, this increase conceals a problematic situation, for it was not until 2002 that Hydro-Québec's return on equity exceeded, for the first time in its history, its average debt cost.[4] It reached this level only after being called to order by the minister of Natural Resources during a hearing of the Standing Committee on the Economy and Labour on February 27, 1996, where Hydro-Québec's top executives had been asked to appear. "How do you explain that the rate of return was 3.3% in 1995 whereas Hydro-Québec had promised 6.4% in its performance commitments? How do you explain that the rate of return went from 8.4% in 1991 to 3.3% in 1995 while average rate increases were higher than inflation over the same period? […] How is it that senior management of Hydro-Québec settles for 3.3% while comparable corporations are getting rates of return of 10% to 12%? It must not be forgotten that, while Hydro-Québec is getting a rate of return as low as 3.3%, it is paying interest on its debts at a rate of 9%. Who would dare invest money in a institution offering so low a rate of return?"[5]

A publicly traded company would not survive for 60 years if it could not obtain a return on equity exceeding its debt cost, nor could it borrow capital at acceptable interest rates.

Hydro-Québec's course can be seen from several angles, and this is not to minimize its achievements. From a financial standpoint, it must be acknowledged that the Quebec government was borrowing the funds constituting Hydro-Québec's equity and that its financial management over 60 years did not contribute directly to enriching Quebecers since its returns were below its debt cost until 2002.[6] The government was thus borrowing throughout this period at a higher rate than the return it obtained from its investment in Hydro-Québec. The government, Hydro-Québec's sole shareholder, accepted a lower return on investment in this case than it ought normally to have received when taking account of the risks it assumed.

1. Yves Rabeau, *Les subventions et le secteur de l'électricité au Québec*, Centre de recherche en gestion, Université du Québec à Montréal, November 1995, p. 16.
2. Hydro-Québec, *Annual Report 2003*, p. 106.
3. Hydro-Québec, *Annual Report 2007*, pp. 73 and 74.
4. Hydro-Québec, *Annual Report 2002*, p. 4.
5. Quebec National Assembly, *Journal des débats – Commission permanente de l'économie et du travail*, February 27, 1996, p. 3.
6. The government and Hydro-Québec have similar borrowing costs since Hydro-Québec's debt is guaranteed by the government.

Hydro-Québec's returns are a complex matter to analyze. On the one hand, the government accepted a slim return on its investment, but this is the same government that obliged Hydro-Québec to sell much of its electricity production at a price below its market value, as part of the heritage pool.

If we examine the situation from a purely economic angle, we see that Hydro-Québec enjoys competitive advantages beyond the ordinary: a monopoly on its territory, a collection of existing hydroelectric plants, and low production costs thanks to exceptional natural resources. These advantages place Hydro-Québec in a very special situation in selling its product on the energy market. This potential for higher returns is destroyed by a pricing policy imposed by the government. The non-realization cost approaches $7 billion, as we shall see in Table 7.1. It could thus be argued that Hydro-Québec's annual profit is amputated by nearly $7 billion since this is the amount of income it fails to realize because of the government's pricing policy. In other words, this $7 billion represents a subsidy received each year by Quebec electricity consumers.[7]

Consequences: the impact of the Churchill Falls agreement

We will now turn to an exercise that can give us a better idea of how Hydro-Québec's current financial results will affect Quebec.

Starting in 2041, Hydro-Québec will have to pay the market price to continue relying on the 31.8 TWh obtained from Churchill Falls in meeting its customers' needs. We can see where Hydro-Québec's net profit would have been in 2007 had this agreement ended on December 31, 2006. Hydro-Québec would have had to find supplies on the market to replace the missing

7. For a more in-depth analysis, see Marcel Boyer, *Raise Electricity Prices in Quebec – and Benefit Everyone*, C.D. Howe Institute, March 16, 2005.

Table 7.1
Income statement for the transition period (pro forma)

Year	Hydro-Québec revenue ($ billion)	Operating expenses ($ billion)	Royalties ($ billion)	Other costs ($ billion)	EBITDA ($ billions)	Depreciation ($ billion)	Interest charges ($ billion)	After-tax profits ($ billion)	Profit per share ($)	Share value ($)
2007	12.33	2.55	0.00	2.39	7.39	1.99	2.51	2.88		
Pro forma income statement after privatization										
0	12.33	2.55	1.90	1.94	5.95	1.99	2.51	1.07	0.53	9.36
1	13.01	2.47	2.51	1.94	6.09	2.03	2.59	1.08	0.54	9.45
2	13.69	2.40	3.13	1.94	6.23	2.09	2.62	1.13	0.56	9.91
3	14.37	2.32	3.74	1.94	6.37	2.12	2.59	1.23	0.62	10.75
4	15.06	2.25	4.35	1.94	6.52	2.13	2.52	1.38	0.69	11.86
5	15.74	2.17	4.97	1.94	6.66	2.12	2.41	1.58	0.79	13.23
6	16.42	2.10	5.58	1.94	6.80	2.09	2.30	1.79	0.89	14.64
7	17.10	2.02	6.19	1.94	6.95	2.06	2.18	2.00	1.00	16.10
8	17.78	1.95	6.81	1.94	7.09	2.03	2.05	2.22	1.11	17.59
9	18.46	1.87	7.42	1.94	7.23	2.01	1.92	2.44	1.22	19.12
10	19.15	1.80	8.03	1.94	7.38	1.98	1.78	2.67	1.33	20.70

Note: We reduced the initial size of the heritage pool by 20 TWh to take into account the 2002, 2006, and 2008 agreements mentioned in Chapter 13.

electricity. It would have been possible to recover 17.5 TWh by reducing exports to zero, meaning the loss of export sales. Let us assume that it would have been able to import the missing 13.8 TWh at the price of 5.6 cents per kWh it paid in 2007 for electricity imported as part of its brokerage operations.[8] Here is what the impact would have been on its profit:[9]

Net profit in 2007:	$2.882 billion
No exports (17.5 TWh):	-$1.485 billion
Imports of 13.8 TWh at 5.6 cents per kWh:	-$773 million
No payment for the 31.8 TWh:	$85 million
Adjusted profit:	$709 million

Profit of $2.882 billion in 2007 would have been reduced to $709 million. If an end to the Churchill Falls agreement in 2007 were to be simulated, it could be concluded that the return on Hydro-Québec's activities on Quebec territory in 2007 would have been 3.6%[10], which is below the 5.4% cost of Hydro-Québec's borrowings in 2007.

Even though Hydro-Québec met the requirements of the minister of Natural Resources by obtaining a return on equity that is substantially higher than the cost of its debt, we have shown that the net profit could be increased from $2.9 billion to $5.0 billion at current rates if Hydro-Québec's results came closer to the level achieved by the most efficient of the comparable U.S. companies. If Hydro-Québec has a return on equity of 14.5% today, it owes this essentially to the Churchill Falls agreement, to its exceptional hydroelectric resources and to the fact that it is not taxed on its net profit. Successive governments in Quebec have accepted that Hydro-Québec has financial results below its potential.

As noted by Professor Marcel Boyer, "If we wish to achieve all the benefits that Quebec society can expect from its hydroelectric wealth, we should raise rates to the level of the market price and agree to follow the market subsequently. Proper pricing of energy and electricity involves setting prices objectively based on market value. This tool produces greater technological innovation and clearer behavioural changes than punitive or regulatory measures. It enables all businesses to adapt effectively, each in its own way, according to its technology along with information concerning competitive pressures on its suppliers' and customers' markets."[11]

Since we will reach market level at the end of the proposed 10-year transition period, Quebecers will be able to choose their electricity supplier from that moment onwards. Under this scenario, Hydro-Québec will have 10 years to improve its results and cope with competition. If it incurs capital spending or operating expenses more substantial than those of the companies that will be competing with it on the Quebec market after the transition period, it will have to accept much lower profit margins since it will not be able to count on the rate increases from the transition period to absorb its excess operating charges or to amortize higher-than-necessary spending on fixed assets. It will then be difficult for it to finance the investments required to maintain its competitive position. It will gradually lose a major share of the Quebec energy market.

Another scenario would involve raising rates to market level while maintaining public ownership of Hydro-Québec, unlike what we are going to propose below. Analysis of the past leads us to believe that, without the motivation created by privatization and a form of regulation that encourages improvement in the company's efficiency, Hydro-Québec will ask the government at the end of the transition period to lower its royalty payments so that it can finance investment. If,

8. This is an optimistic hypothesis since Hydro-Québec Distribution paid 11.4 cents per kWh in its purchases of post-heritage electricity in 2006. See Régie de l'énergie, *Demande relative à l'établissement des tarifs d'électricité pour l'année tarifaire 2008-2009*, D-2008-024, p. 39.
9. Hydro-Québec, *Annual Report 2007*, pp. 10, 73 and 74.
10. We have not excluded from equity the purchase cost and 34.2% ownership in Churchill Falls (Labrador) Corporation Limited for less than $100 million.
11. Marcel Boyer, *Higher electricity prices can unleash the value of Quebec's energy potential*, Montreal Economic Institute, April 2007, p. 3.

conversely, it knows it will have to rely on its own means to deal with competition at the end of the transition period, it is our view that the results will measure up. The experience of the United Kingdom is instructive in this regard.

The timing of privatization

In an article published in *La Presse* on June 2,[12] we suggested privatizing Hydro-Québec after raising electricity rates to the level of the surrounding market. The scope of the catching-up led us to spread the rate increase over a 10-year period, and privatizing Hydro-Québec would have to wait until the end of this period. If privatization occurred before the end of the transition, we would not benefit from full asset value. But in waiting 10 years, there are added risks because changes in the economy and in financial markets cannot be forecast over such a long time lapse. We should see if there is another path.

To the extent that our royalty proposal in the previous chapter is accepted, a quick privatization of Hydro-Québec can be envisaged. Faster privatization brings many advantages while reducing the risks inherent in a prolonged wait.

Privatization need not occur at the expense of Quebec's higher interests. The increase required to bring the rate up to market level would thus have to benefit Quebec society rather than future Hydro-Québec shareholders. Rates can be allowed to rise to the market price after privatization if, through appropriate royalties, a large proportion of the added income from the rate hike is recovered.

A lower value for Hydro-Québec at the time of privatization substantially reduces the risk in an initial public offering. If $130 billion must be obtained, as we estimated in June 2007, it will be necessary to go at it several times to get this vast an amount, even if part of the capital obtained took the form of debt rather than equity. It should not be forgotten that the largest initial public offering in the United States was for US$17 billion.[13]

Since rate hikes are never popular, it would be easier for a private company to raise rates than it would be for a state corporation. Rate increases would be viewed more negatively if public opinion judged the company's profits to be excessive. A private company that pays high royalties will make much lower profits, all things being equal, than a state corporation that raises its rates to prepare for privatization.

If privatization went ahead before rates were raised, a much smaller amount would be obtained from the sale of Hydro-Québec, as we shall see below. This amount will not eliminate Quebec's debt, as we had suggested last year. Some commentators were worried by this proposal because they felt there was nothing to guarantee that future governments would not put Quebec back into debt.[14] The government would then find itself with a sizable debt but would no longer own Hydro-Québec. According to the scenario we are suggesting now, the Quebec government will remain in debt but will receive the expected royalties as long as electricity is being produced. These royalties, as we shall see below, will rise gradually and, at the end of the transition period, will exceed the current amount of the government's debt service.

Some commentators assert that privatization is the same as "killing the goose that lays the golden eggs".[15] It does not have to be this way, as the Alberta example shows us. The government of that province announced in October 2007 that it was revising its royalty policy. From now on, royalty rates will follow oil or natural gas prices:

12. Claude Garcia, "Un Québec sans dette," *La Presse*, June 2, 2007, p. Plus 7.

13. Boyd Erman, "Visa's IPO taps into the world's love of plastic," *The Globe and Mail*, February 28, 2008, p. B1.
14. See Yvan Allaire, "Privatiser Hydro-Québec?," *Le Devoir*, September 10, 2007, p. 7.
15. Gabriel Sainte-Marie, "Vendre Hydro-Québec, c'est tuer notre poule aux oeufs d'or," *Le Devoir*, September 4, 2007, p. 7.

the higher the price of these commodities, the higher the royalty rates. In other words, the Alberta government is not taking a stance on changes in the price of its resources. On the other hand, it wants its residents to benefit more if energy prices continue to rise.[16] As we shall see below, Hydro-Québec's low production cost for the heritage pool would enable Quebec to obtain high royalties without harming Hydro-Québec's competitive ability after privatization.

There was also opposition to our proposal based on the argument that Hydro-Québec, once privatized, would have to pay a large proportion of its taxes to the federal government. Since royalties are deductible from taxable income, pre-tax profit will be reduced accordingly and taxes payables will fall in the same proportion. This approach is similar to the royalty system in effect in Alberta.

We will go into more detail in Chapter 13 on the long-term agreements with aluminum smelters. A privatized Hydro-Québec will respect each of these contracts until they expire but will not have to pay royalties on all the electricity sold at a preferential rate to aluminum smelters. Upon expiry of the contracts, Hydro-Québec can sell this electricity at the market price and pay appropriate royalties starting at the same time.

What Hydro-Québec is worth

We will now assess Hydro-Québec's likely market capitalization at the time of privatization. This valuation will depend essentially on Hydro-Québec's profits and the growth outlook for these profits over time. Following the expected productivity increase and the gradual rate rise proposed here, Hydro-Québec's profits will more than double on a pro forma basis during the transition period, according to Table 7.1, despite a substantial royalty increase. The pro forma profit will go from $1.07 billion before privatization to $2.67 billion at the end of the transition period. Readers will note that the data in Table 7.1 rely on the following hypotheses: Hydro-Québec's income statement for 2007 served as the basis for preparing this pro forma income statement; the heritage pool, amputated by 20 TWh to take account of the electricity reserved for the aluminum smelters under long-term agreements, would be reduced by 14.5 TWh each year during the transition period; Hydro-Québec would reduce its operating expenses by $750 million during the transition period at a rate of $75 million a year (although we estimate Hydro-Québec's excess operating expenses at $1 billion, we wish to be cautious in our forecasts in this regard); investment by the Production division could go from $1.8 billion a year before privatization to 0 with a $450 million annual reduction over four years, enabling it to complete projects under way; better management would enable other investment to drop by 12.5% in the first year of the transition period and by 25% subsequently; Hydro-Québec would pay half of its net profit in dividends to shareholders; to the extent that cash flow exceeded the amounts needed to finance investments and pay the planned dividends, Hydro-Québec would use it to lower its debt based on the conditions discussed in Chapter 11; and the tax rate on profits would be 26.1%, with 15% for the federal government (the rate announced for 2012) and 11.1% for the Quebec government.

To determine an estimated value for Hydro-Québec, we will compare its results, based on the preceding hypotheses, with the value of the 10 U.S. electricity production and distribution companies mentioned above. First we will look at the respective outlooks for profit growth.

Outlooks for profit growth

In Table 7.2, we have compiled, for the 10 companies in our comparison group and for Hydro-Québec, the average residential rate, the average rate for all customers of these companies, or both, depending on the availability of data. As

16. Government of Alberta, *The New Royalty Framework*, October 25, 2007, pp. 2 and 3.

shown in this table, five of the nine companies that published their average rate for all customers, are billing at least three cents more per kWh than the current rate in Quebec.[17] We know the average residential rate for seven companies in the comparison group; for six of them, the gap between their average rate and the average Quebec rate is 2.3 cents or more. Only one company, American Electric Power, shows rates close to current Quebec rates, but it will probably have to raise its rates since being forced, several months ago, to consent to investments of at least US$4.6 billion to reduce its emissions of atmospheric pollutants.[18]

In 2007, Hydro-Québec sold 17.5 TWh of electricity on outside markets at an average price of 8.5 cents.[19] The price obtained on the U.S. market, which excludes distribution costs of nearly four cents per kWh, compares very favourably to the average rate among the U.S. companies in the comparison group. This should not surprise us because the prices in the geographic areas neighbouring Quebec exceed the prices of the companies in the comparison group. As noted above, the average residential rate in Toronto already stands at 11.4 cents, while it is 22 cents and 23 cents in Boston and New York respectively.

In the pro forma statements in Table 7.1, Hydro-Québec's annual profits go from $1.07 billion before privatization to $2.67 billion 10 years later. Less than one-third of the profit increase comes from the rate rise. Productivity gains and lower financial expenses generated by a decrease in debt account for more than two-thirds of the increase in net profit. Also on a pro forma basis, the annual pace of profit growth exceeds 9%, which compares favourably with the pace of growth expected by financial markets for the companies in the comparison group.

Our analysis suggests that the proposed scenario is possible. Financial markets discount increases in proceeds and profits for the companies in the comparison group even though the rates they apply are already higher than those of Hydro-Québec. The announced Hydro-Québec rate hike leaves an adequate margin to absorb the required royalties without harming Hydro-Québec's competitive ability, to the extent, of course, that it

17. The rate of 6.0 cents used for Hydro-Québec is the average rate for all Quebec customers.
18. Devlin Barrett, "U.S. touts biggest pollution settlement," *The Globe and Mail*, October 10, 2007, p. B15.
19. Hydro-Québec, *Annual Report 2007*, p. 10.

Table 7.2
Average electricity rate in 2007

	Average rate per kWh (¢)	Residential rate per KWh (¢)	Residential-average ratio
American Electric Power	6.4	8.1	1.27
Consolidated Edison	19.5	20.8	1.07
Entergy	8.4	9.7	1.15
Exelon	10.8	11.9	1.10
FirstEnergy	9.5	n.d.	n.d.
FPL	10.7	n.d.	n.d.
PG&E	12.8	14.9	1.16
PPL	9.0	n.d.	n.d.
Southern Company	7.7	9.5	1.23
Xcel Energy	7.3	9.2	1.25
Hydro-Québec	6.0	6.9	1.15

Source: American Electric Power, Form 10-K 2007, pp. 4 and 10; Consolidated Edison, Form 10-K 2007, pp. 14 and 16; Entergy, *Annual Report 2007* , p. 27; Exelon, Form 10-K 2007, pp. 105 and 111; FirstEnergy, *Financial Report 2007*, p. 112; FPL, *Annual Report 2007*, p. 2 and Form 10-K 2007, p. 55; PG&E, Form 10-K 2007, pp. 21-2; PPL, Form 10-K 2007, p. 28; Southern Company, *Annual Report 2007*, p. 91; Xcel Energy, Form 10-K 2007, p. 24; Hydro-Québec, *Annual Report 2007*, p. 101.

achieves the same level of operational efficiency as the competing companies.

There have been suggestions that the company's worth should be calculated based on EBITDA (earnings before interest, tax and amortization) to minimize the impact of the capital structure on the company's valuation.[20] We shall use this method, because it is more appropriate for the scenario we have suggested, which calls for a sizable reduction in Hydro-Québec's debt during the transition period. We have compiled in Table 7.3 the company valuation/EBITDA ratio for the same 10 companies. Using an average ratio of 8.9, we obtain a valuation for Hydro-Québec of about $52.9 billion, which is 8.9 times the pro forma EBITDA of $5.95 billion (see Table 7.1). Once the debt of $34.2 billion is subtracted, the valuation comes to $18.7 billion.

Conclusion

In this chapter, we have analyzed Hydro-Québec's average return on invested capital. We saw that governments have accepted lower returns than they should normally have got.

Since the 1990s, the energy production and distribution industry has been liberalized in North America. Our water wealth can serve as an economic lever if the way we exploit it is changed. For this to happen, the heritage pool has to be absorbed over a 10-year transition period and management of Hydro-Québec tightened to help it face competition in an open market.

In an opinion piece in 2007, we urged privatizing Hydro-Québec at the end of the transition period. We are now suggesting a faster privatization, with a smaller public offering. The valuation of Hydro-Québec is expressed differently, since we are proposing royalties for the government that can cover the debt service. Notwithstanding a rate increase spread over 10 years, most of which would return to the Quebec government in the form of royalties, the model we are suggesting allows for a 9% annual rate of profit growth over the next 10 years. This would enable Hydro-Québec to compare favourably with the companies in the comparison group and presages an enviable growth potential.

20. Yvan Allaire, "Combien vaudrait Hydro-Québec, société privée?," *Les Affaires*, August 4, 2007, p. 13.

Table 7.3
Financial ratios for the comparison group

Company name	Enterprise value/EBITDA	Interest coverage ratio	Debt-to-equity ratio
American Electric Power	7.6	3.01	1.55
Consolidated Edison	7.8	3.63	1.00
Entergy	9.7	3.49	1.36
Exelon	11.1	5.91	1.35
Firstenergy	9.6	3.83	1.31
FPL Group	10.1	3.20	1.28
PG&E	5.9	3.03	1.24
PPL	10.4	3.75	1.38
Southern Company	9.3	3.90	1.14
Xcel Energy	7.2	2.65	1.26
Average	8.9	3.64	1.29

Source: http://golddb.globeinvestor.com and http://finance.yahoo.com on July 26, 2008.

Chapter 8
The public offering

In Chapter 7, we estimated the likely valuation of Hydro-Québec's equity at $18.7 billion. To allow for privatization, this equity will be divided into two billion common shares. It is unlikely that so large an amount can be raised in an initial public offering because this would be the biggest public offering in North American history. It is more likely that the process will have to occur in stages. The government will keep the shares that are not part of the initial public offering. Since the number of shares remaining in government hands will probably be quite high, we suggest that these shares be non-voting as long as they remain under public ownership. The principle of non-interference in the fulfilment of business goals will thereby be respected. This principle is essential to the success of the proposed model. By acting in this way, the government will obtain greater value for the Hydro-Québec shares it will dispose of in this initial public offering. The government will benefit, as will the other shareholders, from a future premium on Hydro-Québec shares and will even receive dividends on its non-voting shares.

The financial syndicate in charge of selling the shares in Hydro-Québec to the public and to institutional investors can draw upon the experience acquired in the demutualization of numerous financial institutions in the last few years.[1]

Since Quebecers already own Hydro-Québec through their government, we suggest that each of the 2.8 million residential customers[2] receive 110 common voting shares free of charge based on the terms we will set out in Chapter 9. Nobody will be able to receive more than 110 shares, even if they are multiple customers of Hydro-Québec. Only those who are customers on the day the legislation on the privatization of Hydro-Québec is submitted will be able to receive these free shares. According to this scenario, customers will receive 308 million free shares. The remaining 1,692 million shares will be divided into voting shares that will come under the public offering and non-voting shares that will remain temporarily under government ownership.[3]

Measures to encourage ownership

The legitimate pride that Quebecers hold in Hydro-Québec deserves support in the initial public offering. We thus suggest measures to encourage Quebecers to subscribe to shares in Hydro-Québec and to keep these shares in the long term.

Hydro-Québec's initial public offering will be preceded by an advertising campaign inviting Quebecers to subscribe to the share capital. To encourage Quebecers to purchase and retain Hydro-Québec shares, they could be granted one additional free share for every 100 shares, for each full year they are held after Hydro-Québec shares are listed on the stock exchange, up to a maximum purchase of 5,000 shares. This grant would be repeated over a period of five years.[4]

Now we will try to determine the number of shares Quebecers would agree to buy. According to Table 8.1, more than one million Quebecers

1. See Appendix 2 for a short description of the experience of demutualizing Standard Life.
2. Hydro-Québec, *Annual Report 2007*, p. 23. The number of domestic and agricultural customer accounts is higher, at 3,554,000. See Hydro-Québec, *Annual Report 2007*, pp. 23 and 101.
3. If a public institution such as the Caisse de dépôt et placement du Québec or the retirement fund of a Quebec university wished to acquire shares under this initial public offering, these would be voting shares.
4. It will probably be necessary to create a separate class for the shares that are to be given away or sold to Quebec residents as part of this privatization to meet the requirements of securities laws. Holders of this class of shares will enjoy the same voting rights as those holding common shares reserved for institutions or for persons who do not reside in Quebec.

declared incomes of $50,000 or more in 2005. Thirty per cent of taxpayers declared taxable dividend income, totalling $4.2 billion. This income comes exclusively from Canadian sources since dividends from foreign companies are listed under a separate heading on income tax statements. Because the taxable amount of dividends from Canadian sources is 25% higher than the amount really received, the amount actually received in dividends was $3.4 billion. Hydro-Québec, with a market capitalization of $18.7 billion, would represent about 1.3% of total market capitalization on the Toronto Stock Exchange.[5] It is thus not unrealistic to expect that the weight of Hydro-Québec shares could represent up to 1.3% of Quebecers' portfolios. Based on a dividend of 26 cents a share, Quebecers would have to buy 210 million shares to reach this weight.[6] These shares will be held directly by Quebec citizens or through investment funds to which they subscribe.

How many shares will be in Quebecers' hands on the day of privatization? We can say first that a certain number of beneficiaries of free shares can be expected to opt for the cash equivalent rather than the 110 common shares granted to them at the time of Hydro-Québec's stock exchange listing. We estimate that about 40% of the beneficiaries will act in this way.[7] Of the 308 million shares offered free of charge to Hydro-Québec residential customers, it can be expected that about 123 million shares will have to be exchanged for cash on the day of privatization. The amount needed to pay for these 123 million shares will be obtained from financial institutions and non-residents of Quebec who are buying shares at the same time. If we hypothesize that 600 million shares will be issued on the day of the initial public offering, ownership of Hydro-Québec on privatization day will be divided as follows:

Non-voting shares held by the government:	1.4 billion
Shares held by residents of Quebec:	395 million
Shares held by institutions and non-residents:	205 million
Total:	2.0 billion

5. Calculation by the author based on TSX eReview, *Monthly Summary*, September 2007, p. 21.
6. The proposed return of 2.8% on Hydro-Québec shares is higher than the overall dividend return for shares listed on the Toronto Stock Exchange.
7. In the demutualization of Standard Life, 30% chose payment in cash rather than in shares.

Table 8.1
Amount of taxable dividends for Quebecers with declared revenue of $50,000 or more in 2005

Total declared revenue	Number of declarations	Number of declarations including dividends	Taxable amount of the dividends ($ million)	Average declared dividend amount ($)
$50,000 to $100,000	846,150	215,460	1,183	5,491
$100,000 to $150,000	101,660	45,080	599	13,281
$150,000 to $250,000	41,460	23,710	571	24,078
$250,000 or more	23,310	16,790	1,849	110,122
Total	1,012,580	301,040	4,202	

Source: Canada Revenue Agency, Tax data for the year 2005.

The two measures suggested above mean that about 409 million Hydro-Québec shares will be in the hands of Quebecers when the government has disposed of all its shares.[8] Since there will be two billion outstanding shares when the government has disposed of all its non-voting shares, Quebecers will own slightly over 20% of Hydro-Québec, directly or through their investment funds. To this must be added the shares that will be held by Quebec institutions and retirement funds. In addition to ensuring that the Hydro-Québec head office remains in Montreal, as we shall see below, Quebecers will hold, directly and through their institutions, a substantial portion of Hydro-Québec's share capital.

The role of financial markets

There are only five electricity production and distribution companies listed on the Toronto Stock Exchange that have market capitalization over $2 billion. The biggest of these companies has market capitalization of nearly $7 billion.[9] These companies have as customers all, or a great majority, of electricity consumers in Alberta, Prince Edward Island, Nova Scotia, and Newfoundland and Labrador.[10] These companies are obviously much smaller than Hydro-Québec. In all the other provinces, electricity production and distribution is generally the responsibility of companies controlled by the governments of the provinces, and the private sector role is limited, though growing.

The situation is very different in the United States. Dozens of companies of this type are listed on the New York Stock Exchange. Twelve of these companies have market capitalizations greater than US$20 billion.[11] The two biggest are an Italian company, with market capitalization of over US$75 billion and a U.S. firm with market capitalization of US$57 billion.[12]

This means that large Canadian institutional investors wishing to invest in electricity production and distribution companies have many more investment opportunities outside Canada. Take the example of the Caisse de dépôt et placement du Québec. It held shares in only one of the five Canadian electricity production and distribution companies mentioned above, for a market value of $11 million as of December 31, 2006. On the same date, however, it held shares in each of the 12 biggest electricity companies listed on the New York Stock Exchange, for a total value of $233 million.[13]

Control of Hydro-Québec

Quebecers take great pride in Hydro-Québec, seen as one of the great successes of the Quiet Revolution. The privatization of Hydro-Québec must thus be accompanied by conditions to prevent control of the company from slipping outside the hands of Quebecers. To guarantee that the head office remains in Montreal, we suggest that this be written into the privatization law. We also propose that no shareholder be able to hold more than 10% of the common shares of Hydro-Québec. This is a condition that already applies to Canada's banks and large life insurance companies. We also note that the federal Parliament wrote similar conditions into the law on privatization of Canadian National Railways in the early 1990s.

This way of doing things guarantees Quebec control over the future of Hydro-Québec while favouring competition and ensuring that financiers cannot seize control.

8. We have added 14 million shares to take account of the shares that will be given to persons who hold them for five years. Readers will note that this granting of free shares is reserved for Quebec residents, for shares they will hold personally.
9. Data drawn from the GlobeInvestorGold site on December 7, 2007.
10. Compilation done by the author based on the Transalta, Canadian Utilities, Epcor, Fortis and Nova Scotia Power websites.
11. We included a company (TXU) in this group even though it was privatized during 2007. Its market capitalization greatly exceeded US$20 billion at the time of privatization.
12. Data drawn from the GlobeInvestorGold site on December 7, 2007.
13. Caisse de dépôt et placement du Québec, *Annual Report 2006*, pp. 74 to 163.

Chapter 9
Protecting Quebec's electricity consumers

Raising electricity rates to the market price would produce significant changes in consumers' habits. Individuals and companies would adopt more energy conservation measures to reduce their electricity bills. There would also be a major shift in energy demand toward other sources such as natural gas and geothermal energy. We will come back to this issue later.

Compensating customers

Because the Hydro-Québec privatization we propose is likely to favour improvement in public finances, taxpayers as a whole could benefit from the royalties paid to the government, if they are used sensibly. These royalties would enable Quebec to benefit from one of the most competitive tax environments in North America. Since Hydro-Québec's residential customers will have to cover the costs of this improvement in Quebec's public finances by paying more for their electricity, it would make sense to compensate them.

Let us examine the impact of the proposed rate increase on a consumer who does not use electricity for home heating. In this type of case, average electricity consumption is 10,600 kWh a year.[1] We are hypothesizing that the residential market rate will have increased from 6.7 cents per kWh to 11.4 cents at the end of the transition period, which is the rate today in Toronto. This consumer will see his electricity bill go up by $4.15 a month each year for the 10 years of the transition period, assuming that he takes no energy-saving measures. We shall propose a compensation mechanism inspired by a technique used in demutualizing some financial institutions.

At the time of privatization, this customer will receive, free of charge, 110 shares worth $9.36 each to compensate him for this rate increase. These shares will give him the right to receive the

1. Hydro-Québec Distribution, *Demande du distributeur relative à l'établissement des tarifs d'électricité pour l'année tarifaire 2008-2009*, Application R-3644-2007, HQD-12, Document 3, p. 19.

Table 9.1
Impact of the rate hike and the dividend on low income customers

Year	Average residential rate (¢/kWh)	Rate hike for 10,600 kWh per year ($)	Dividend paid out to shareholder customer ($)	Likely value of customer shares ($)
0	6.70			
1	7.17	49.82	29.80	1,040
2	7.64	99.64	31.63	1,102
3	8.11	149.46	35.22	1,207
4	8.58	199.28	40.33	1,344
5	9.05	249.10	46.86	1,513
6	9.52	298.92	54.10	1,691
7	9.99	348.74	60.60	1,859
8	10.46	398.56	67.20	2,032
9	10.93	448.38	73.92	2,209
10	11.40	498.20	80.75	2,391
Total		2,740	520	

Note: We added 1.1 free share starting the second year through to the sixth year inclusively.

dividends paid by Hydro-Québec starting with its privatization. We are also hypothesizing that Hydro-Québec will continue its current policy of paying half of its annual profit in dividends.[2] As shown in Table 9.1, each customer who holds onto the shares will receive $29.80 in dividends during the year after privatization. This amount will increase gradually each year because improved financial results and successive rate increases will push up Hydro-Québec's profits, as we shall see below. The dividend will reach $80.75 in the 10th year. As Table 9.1 shows, this consumer will have paid $2,740 more to Hydro-Québec due to the rate increase but will have received $520 in dividends during the transition period. The shares are likely to gain in value since the profit per share will have gone from $0.53 to $1.33. The 110 shares received at the time of privatization plus the additional shares receive will thus have a likely value of $2,391 at the end of the transition period; added to the $520 in dividends received, this comes up to $2,911. If the consumer is not paying income tax, the amount received compensates him fully for the rate increase during this period.

Since the dividends are taxable, however, a consumer who is paying income tax will not be fully compensated for the rate increase because he will have to pay tax on all amounts received. As shown in Table 9.2, a taxpayer with $50,000 in income will see his $80.75 dividend in the 10th year reduced to $68.31 and the value of all dividends received during the transition period will be reduced from $520 to $440. If he sells his shares at the end of the transition period, the $2,391 received will be reduced to $1,889 by the capital gains tax. This taxpayer will have seen his electricity bill rise by $2,740 if he has not modified his electricity consumption habits; he will have received $2,329 in compensation after taxes are paid.

If a taxpayer has a taxable income of $125,000, he will pay the same $2,740 increase for his electricity consumption. If he sells his shares at the end of the transition period, he will have received $2,123 after paying his taxes.

There are areas of uncertainty in the factors that form the basis of these projections. The market price of electricity could go down during

2. In her budget speech of March 13, 2008, the Quebec finance minister announced a government decision to ask Hydro-Québec to raise its current dividend to 75% of its profits. Nonetheless, we have stuck with the hypothesis that Hydro-Québec would pay 50% of its profits in dividends if privatization were to occur. The proposed royalties will be greater than the dividends currently paid to the government.

Table 9.2
Impact of taxes on the dividends and on the sale of shares

Taxable income	Tenth year dividend (after taxes)	Total transition period dividends (after taxes)	Sum obtained from the sale of shares at the end of the transition period (after taxes)
$0	$80.75	$520	$2,391
$25,000	$79.83	$514	$2,020
$50,000	$68.31	$440	$1,889
$75,000	$59.71	$385	$1,793
$125,000	$56.78	$366	$1,757

Note: We hypothesized that other revenue came exclusively from work and that the dividends paid out will be eligible dividends as defined by the tax laws. The calculations ignore all deductions and tax credits, except for eligible dividend credits. The shares will be taxable only when the taxpayer decides to sell them. The entire amount received will be taxable as a capital gain since the capital cost of the shares is nil.

the transition period, or it could rise to an even higher level. If the market price is below 11.4 cents per kWh at the end of the transition period, Hydro-Québec's profits will be lower and the share price will suffer. On the other hand, customers will see their electricity bills rise less, and those who have held onto their shares are likely to receive lower-than-expected dividends. If the electricity price rises more quickly than anticipated during the transition period, consumers will have to pay more for their electricity, but they will receive higher dividends, and their shares are likely to be worth more at the end of the transition period.

Energy savings

Consumers will be able to reduce their electricity consumption substantially as a way of saving money, however. At the 2008 rate, gas heating for a home equipped with a high-efficiency heater costs slightly less than electric heating. According to Table 9.3, the average household consumes 7,100 kWh a year for home heating. A homeowner will have an interest in modifying the heating system, because this change will provide savings of about $350 a year at the end of the transition period.[3]

3. Gaz Métro and Hydro-Québec have requested rate increases for 2009. The conclusions of our analysis may change following the rate adjustments that will probably occur in 2009 for both of these companies.

Table 9.3
Average consumption per use for households in 2007

Use	Annual consumption			Annual bill			
	Electricty kWh/year	Natural gas (high efficiency)		Electricty kWh/year	Natural gas (high efficiency)		
		kWh/an	m^3/an		kWh/an	m^3/an	Total
Household appliances							
-Stove	794	Gas	104	$53.97		$64.82	$64.82
-Dryer	900	Gas	93	$61.17		$57.96	$57.96
-Other	3,020	3,020		$205.26	$205.26		$205.26
Lighting	966	966		$65.66	$65.66		$65.66
Air conditioning	155	155		$10.53	$10.53		$10.53
Others	1,340	1,340		$91.08	$91.08		$91.08
Subtotal	7,175	5,481	197	$487.66	$372.53	$122.78	$495.31
Hot water	3,447	Gas	486	$234.28		$302.67	$302.67
Heat	7,112	Gas	712	$483.38		$443.87	$443.87
Total	17,734	5,481	1,395	$1,205.33			$1,241.85

Hypotheses:

Energy performance	Gas	Electric
-Heat	92%	97%
-Sanitary hot water	60%	89%

-The price of electricity used is 6.80 ¢/kWh, according to prices in effect as of April 1, 2007. This price is estimated based on annual household consumption.

-For natural gas, the prices used are based on rates in effect in September 2007, namely 62,33 ¢/m^3

Source: Hydro-Québec, *Demande du distributeur relative à l'établissement des tarifs d'électricité pour l'année tarifaire 2008-2009*, Demande R-3644-2007, HDQ-12, Document 3, p. 19; correspondence between Gaz Métro and the author.

A household that is already using natural gas for heating will also be able to use this energy source for other purposes. An electric stove or dryer can be replaced by high-efficiency gas appliances; the operating costs of these gas appliances are about the same today as for electric appliance. According to Table 9.3, the household will reduce its electricity consumption by about 1,700 kWh a year. It can also use gas rather than electricity for water heating once electricity rates have gone up by 30%. It will thereby reduce its annual electricity consumption by 3,447 kWh. When the average rate has reached the level of 11.4 cents per kWh, this household will save $150 a year by using gas for heating its water, cooking its food and drying its clothes. It will have reduced its electricity consumption to 5,481 kWh. Once the rate has gone up, this electricity will cost the household $250 more per year. Taking account of the $150 saved by switching to natural gas from electricity, this household will be paying about $100 more per year.

Other savings are possible. Of the 10,600 kWh consumed in the course of a year, the average household consumes nearly 1,000 kWh for lighting. Compact fluorescent bulbs provide lighting equivalent to traditional bulbs with three-quarters less energy consumed. The saving will not be quite as great, however, because these new bulbs contribute much less than traditional bulbs to keeping the house warm.[4] For the purposes of our analysis, we have reduced by half the energy saving made possible by the use of these bulbs to take account of this factor. The average consumer will thus be able to obtain an additional saving of slightly over $35 during the last year of the transition period.

Summary

In brief, to compensate a Quebec consumer who will see his electricity bill rise more quickly during a 10-year period, we give him 110 shares worth $9.36 each and Hydro-Québec dividends starting with its privatization. A low-income taxpayer is favourably compensated. A taxpayer who is better off receives lower after-tax compensation but is likely to benefit from a general improvement in public finances due to the privatization of Hydro-Québec. We also hypothesize that the rate increase will generate energy savings.

4. Fabien Deglise, "Pas si vertes, les ampoules fluocompactes dites écologiques," *Le Devoir*, May 5, 2007.

Chapter 10

The role of the Quebec government

The Quebec government will have an essential role to play in ensuring the success of the privatization of Hydro-Québec. The most important elements of this role are: ensuring an orderly transition between Hydro-Québec as a government-owned corporation and Hydro-Québec as a company listed on the stock exchange; determining if Hydro-Québec should be privatized in a single block or in a different way; reviewing Hydro-Québec's role in the construction of power plants; and reviewing the role of the Régie de l'énergie. Finally, we will assess the value of privatization for the government.

An orderly transition

An orderly transition will enable the amount obtained for Hydro-Québec at the time of privatization to be maximized. As we saw in Chapters 3 and 4, Hydro-Québec will have the challenge of improving its efficiency substantially to bring it up to the efficiency of future competitors. If there truly is a wish to maximize the amount obtained in privatizing Hydro-Québec, financial markets will have to be convinced that management has a clearly defined plan to raise productivity without jeopardizing customer service. The government would normally give the board of directors a mandate to prepare such a plan within three or four months. It is important that a credible plan be drawn up before moving on to privatization. Without such a plan, the $18.7-billion valuation forecast for this state corporation could suffer. In addition to a substantial decrease in profits expected after privatization, the multiple of 8.9 times EBITDA that we used in Chapter 7 to determine the value of Hydro-Québec would be reduced.

As we showed in Chapter 9, consumers will be able to make up for the impact of the proposed rate increases to a substantial degree by using other energy sources such as natural gas and geothermal energy. The government may have a role in applying the best means to optimize competition between the various energy sources available to Quebecers. This is an important factor in ensuring the success of privatization.

Privatization in a single block?

The government will also have to determine if Hydro-Québec should be privatized as is or whether Hydro-Québec will have to be divided into more than one company. As we saw in Chapter 5, the British experience speaks volumes. At the time of privatization, the British government isolated the transmission network and distinguished between producers and distributors; subsequently, however, it allowed mergers between producers and distributors but kept the transmission network in a separate company. The British Columbia government incorporated a new state-owned company on May 29, 2003, the British Columbia Transmission Corporation, and gave it a mandate to manage and develop the province's electricity transmission network while guaranteeing equal access to all electricity producers who wish to use it.[1]

Hydro-Québec's transmission network, TransÉnergie, is a natural monopoly resembling an oil or gas pipeline. It would make sense to privatize TransÉnergie separately, as this would assure all its customers that it does not favour Hydro-Québec at their expense. TransÉnergie gets 9% of its revenues from companies other than Hydro-Québec.[2] This proportion is likely to grow after the rate increase following privatization because Hydro-Québec will be increasing its sales on outside markets considerably to

1. BC Transmission Corporation, *About BCTC*, voir http://www.bctc.com/about_BCTC.
2. Hydro-Québec, *Annual Report 2007*, p. 15.

compensate for the expected consumption decrease in Quebec. In making TransÉnergie a separate company, its management will have to justify all its investment decisions before its board of directors. It will also have to have its rates and its business plan approved separately by the Régie de l'énergie. Later in this chapter, we will specify the impact of these modifications on the role the Régie de l'énergie can play.

We have not sought to isolate the stock market value of TransÉnergie, but we think it unlikely the government could get more by dividing Hydro-Québec before privatization. This proposal aims to raise transparency for all companies that wish to supply Quebecers with electricity.

New power plants

We saw above that the Quebec government reserves the harnessing of rivers with a potential of 50 MW or less for private producers while Hydro-Québec has the exclusive right to build power plants that will generate more than 50 MW. We believe the time has come to do away with this distinction so as to favour competition between Hydro-Québec and private producers in the construction of new power plants. This type of measure will be highly beneficial because it will provide for rapid elimination of the more than 100% gap that seems to exist between the cost price of electricity from power plants built by private producers and those built by Hydro-Québec. Such a measure will be very much to the advantage of Quebec electricity consumers.

The government would seek proposals from interested firms, including Hydro-Québec Production, and the best proposal would win. In this way, Hydro-Québec should be able to optimize the cost/benefit ratio of a proposed structure and obtain a government mandate to build it. This procedure could be applied to projects that are already authorized, as long as the work is not very far advanced. In the longer term, competition between Hydro-Québec Production and private producers would increase, which again would benefit Quebec consumers.

As we saw in Chapter 4, there are a number of private companies that wish to develop hydroelectric plants. Unfortunately, current policies force them to bring their expertise to other territories. We believe these companies, and possibly others, would respond with enthusiasm to any call for proposals from the Quebec government for developing new power plants of more than 50 MW on Quebec territory. Private

Table 10.1
Government revenue following the sale of its shares

Year	Shares held before the sale (millions)	Shares sold at the beginning of the year (millions)	Shares held after the sale (millions)	Dividends received ($ billion)	Likely value of shares sold ($ billion)
1	1,678	278	1,400	0.38	1.47
2	1,400	0	1,400	0.39	
3	1,400	350	1,050	0.32	3.76
4	1,050	0	1,050	0.36	
5	1,050	350	700	0.28	4.63
6	700	0	700	0.31	
7	700	350	350	0.18	5.63
8	350	0	350	0.19	
9	350	350	0		6.69
10	0	0	0		
Total				2.42	22.19

Note: We reduced the amount obtained in year 1 to take into account the 123 million shares that will be exchanged for money at the time of the initial public offering. We reserved 14 million shares to be distributed free of charge.

producers already meet 13% of British Columbia's electricity needs,[3] a much higher proportion than in Quebec. In June 2008, BC Hydro submitted to the B.C. Utilities Commission its forecasts on electricity demand for the next 10 years. It relies essentially on private producers and on energy savings to meet the growth in electricity demand in that province.[4]

This proposal should apply only after privatization. We believe it would be best for the government to refrain from authorizing Hydro-Québec to build new power plants between the moment it decides to privatize Hydro-Québec and the time privatization takes effect. Any new construction would be reserved for the private sector during this period. It is difficult to do otherwise in light of the analysis in Chapter 4. After privatization, any error by Hydro-Québec in estimating the cost of a new power plant, an error that could help it get a sought-after construction contract, will be the responsibility of its shareholders rather than of Quebec citizens. As we shall see in Chapter 11, Hydro-Québec's balance sheet in the first few years after privatization will not give it easy access to the loan market under conditions that compare to those enjoyed by the comparison group. Competition between Hydro-Québec and private producers for the building of new power plants will be possible only after Hydro-Québec has cleaned up its balance sheet.

The role of the Régie de l'énergie

Some people are opposed to the privatization of Hydro-Québec because they prefer a government monopoly to a private monopoly.[5] It is not necessary to maintain a monopoly after Hydro-Québec is privatized because, once Quebec's electricity rates have reached market level, Quebecers will be able to choose their electricity supplier, and the market can be allowed to determine prices rather than having them submitted to regulatory authorities. We should take advantage of privatization to stimulate the greatest possible competition that is compatible with the public interest and let market forces set the price of electricity.

Some people are opposed to this proposal because, occasionally, some unfortunate experiences have occurred in market deregulation to provide for competition. Everyone has learned from these experiences, and a number of countries around the world now let consumers choose their electricity supplier. Chile, New Zealand and Australia were pioneers.[6] A directive on opening the European electricity market came into force in January 1997. The United Kingdom is not alone: the Netherlands, Germany, Spain and Italy have taken the initiative. France recently fell in behind other European countries.[7] Eastern European countries and several emerging countries, such as Mexico, Brazil, Indonesia, the Philippines and India, have questioned the traditional industrial model of electricity.

If we wish to ensure success in privatizing Hydro-Québec, the mandate of the *Régie de l'énergie* will have to be modified so as to apply competition rather than regulation, where feasible. If competition is not possible, we should opt for a regulatory mechanism that will encourage suppliers to improve their efficiency while protecting consumers against abuses. Cost-based regulation is disappearing around the world, but it is still the model being followed in Quebec. We will now discuss the role of the Régie de l'énergie with regard to the production, transmission and distribution of electricity in Quebec after privatization.

3. BC Hydro, *Annual Report 2008*, p. 10.
4. BC Hydro, *Annual Report 2008*, p. 5.
5. See, for example, François Rebello, "Le faux privé," *Commerce*, November 2007, p. 18.
6. Henri Lepage and Michel Boucher, *La libéralisation des marchés de l'électricité*, Éditions Saint-Martin and Montreal Economic Institute, 2001, pp. 12 and 13.
7. Thibaut Madelin, "Énergie : la concurrence commence à séduire les Français," *Les Échos*, September 2, 2008.

After the disappearance of the heritage pool, Hydro-Québec Production will be able to sell all the electricity it produces at the market price. The transition period will have provided for greater electricity production in the private sector as wind farms go into service. The new way of doing things that is proposed here will also allow for competition between Hydro-Québec and private firms in the building of new hydroelectric plants on Quebec territory. We will also have taken advantage of the transition period to augment interconnection capacity with networks in neighbouring provinces and states, as we shall see in Chapter 12. Hydro-Québec Production will be free to sell all the electricity at its disposal to Hydro-Québec Distribution or on outside markets. The Régie de l'énergie plays no role today in setting Hydro-Québec Production's selling prices. This will continue to be the case after privatization.

TransÉnergie manages energy movements on Quebec territory and sells the capacity of the transmission network while maintaining the required level of reliability. This is a natural monopoly that the Régie de l'énergie will have to continue regulating. The regulatory mechanism should be modelled on the performance-based rate (PBR) system. In that type of system, the regulator lowers the real rate each year while allowing the regulated company to keep the entire value created by any productivity improvement beyond the regulator's prescriptions.[8] This regulatory model has achieved great success in the United Kingdom since its adoption in 1990; the rate applicable to local electricity distribution decreased by more than 30% from 1990 to 2005, taking inflation into account. The average length of power cuts fell by 39%, while the companies' EBITDA margin rose by 51%. Italy followed the example of the United Kingdom and is experiencing a comparable success. By 2007, a majority of European countries had instituted this type of system and were already reaping the benefits.[9]

The Régie de l'énergie could set TransÉnergie's return on capital by looking to the observed rate of return and the financing structure used in remote transactions for the acquisition of an oil or gas pipeline or even an electricity transmission network, to the extent, obviously, that these transactions occur in a comparable regulatory model. This sort of regulatory model would not be as finicky as the current model. At present, TransÉnergie has to have all its decisions on investments over $25 million approved individually by the Régie.[10] This way of doing things stems from the fact that the Régie sets TransÉnergie's rates by allowing it to obtain the revenues it needs to handle its costs and leaving it a profit margin equal to the average weighted cost of capital applicable to the fee base. Its rulings do not explicitly allow TransÉnergie to keep the additional profits that it could earn from greater productivity.[11] It would be desirable to look to the experience of the British regulator Ofgem, which sets the rules of the game for a five-year period while allowing a rate increase below the increase in the cost of living for that period.[12] Ofgem lets a regulated company receive a premium if network reliability is better than expected but requires it to pay a penalty if the contrary applies. Ofgem also lets the company keep the income from better-than-expected results, but the company must absorb the losses in the opposite case.[13]

Hydro-Québec Distribution ensures the supply of electricity to Quebecers and keeps an eye on the reliability of the distribution network. It now gets nearly all its electricity from Hydro-Québec Production and the rest from private producers. The private sector will become a larger supplier with the gradual entry into service of wind farms. At the end of the transition period, Hydro-Québec Distribution's role will be

8. Enrico Giglioli and Alberto Marchi, "Next-generation regulation for European electric power," *McKinsey Quarterly*, June 2008.
9. *Id.*.
10. See also the following cases before the Régie de l'énergie: R3656-2008, R3651-2007, R3646-2007, R3641-2007, R3635-2007, R3634-2007 and R3627-2007.
11. Régie de l'énergie, *Décision relative à l'approbation finale des tarifs des services de transport et du texte des Tarifs et conditions des services de transport d'Hydro-Québec*, Ruling D-2008-027, February 29, 2008, p. 5.
12. National Grid Electricity Transmission plc, *Annual Report and Accounts 2006/07*, p. 20.
13. *Id.*

modified; once rates are at market level, Quebec consumers will have the choice of buying their electricity from Hydro-Québec or from a private producer that may be based in Quebec, elsewhere in Canada, or in the United States.[14] Hydro-Québec Distribution will send its customers the electricity from the producer they have chosen. It will have to modify its commercial practices to take account of this new reality.

As we saw before, the nationalization of electricity provided for uniform rates across Quebec for every category of customer. It will be possible to maintain this uniformity, following the privatization of Hydro-Québec and the implementation of competition, through appropriate mechanisms that will be under the surveillance of the Régie de l'énergie. It is the various electricity producers who will be attempting to attract electricity consumers. A Quebec customer who chooses a producer other than Hydro-Québec will pay this producer's rate plus the cost of transmission and distribution to his home. If the Régie sets a uniform rate for transmission and distribution throughout Quebec, a consumer in the Abitibi region will pay the same price for electricity as someone in Montreal if both consumers are using the same electricity supplier.

As with TransÉnergie, the distribution network constitutes a natural monopoly that the Régie de l'énergie will continue to regulate. The regulator will lower rates (adjusted for inflation) each year while allowing Hydro-Québec Distribution to keep all the value created by any productivity improvement beyond the Régie's prescriptions.

The Régie de l'énergie will also get a mandate to ensure than Quebec consumers have the opportunity to choose their electricity supplier, as is the case in a number of countries, including France. Private producers who are interested in the Quebec market will have to reach agreements with Hydro-Québec Distribution to sell their electricity in Quebec. This would work a little like telephone service today. Consumers have the choice between various suppliers for local or long-distance service. These choices are implemented through the same distribution network or through interconnected distribution networks. Quebecers can buy their electricity today from a U.S. supplier, but Hydro-Québec's current rates allow for no competition. To the extent that competition exists, it would not be necessary for the Régie de l'énergie to have jurisdiction over electricity prices. The Régie would also have a role as arbiter in ensuring that private producers are not subjected to above-market prices for access to the TransÉnergie and Hydro-Québec Distribution networks for distributing their electricity in Quebec.

Some people will ask how market prices can be defined. Prices will have reached the market threshold when they enable other producers to compete with Hydro-Québec on Quebec territory. If there is a desire to adopt the proposed reform, it is thus essential to deregulate the market as much as possible so as to enable other private producers, private or public, to penetrate the Quebec market. Moreover, the 10-year transition period will enable a certain number of small producers, already active on the Quebec and Canadian market, to increase their production and sell their electricity directly to Quebec consumers through Hydro-Québec Distribution.

We have just proposed a major reform in the role of the Régie de l'énergie. Such a reform is possible only with the privatization of Hydro-Québec. As long as Hydro-Québec has the government as its sole shareholder, these changes cannot be made.

We should not hesitate to use the British deregulation experience as a model. Public utilities there, such as electricity, gas, water and airports, have been privatized. This has created a financial environment that has attracted the private capital needed to modernize infrastructure while reducing prices.

14. It would be desirable to facilitate competition with producers in other provinces. This will call for the opening of the Canadian electricity market.

The value of privatization to the government

In an article published in *La Presse* in June of last year,[15] we estimated Hydro-Québec's value at $130 billion if it were to be sold after electricity rates were raised to the market price. We are suggesting now that Hydro-Québec be sold before raising rates and that Hydro-Québec be asked to pay substantial royalties to the government, royalties that will rise with each of the rate hikes needed to reach the market price. How much would the government get following the sale of the 1,692 million shares that will not be distributed free of charge to Hydro-Quebec's 2.8 million customers?[16]

In calculating the figures that appear in Table 10.1, we hypothesized that the government would keep 1.4 billion non-voting shares after the initial public offering. It would dispose of the remaining shares in four addition public offerings that would take place every two years. The risks inherent to a very large issue will be reduced by proceeding this way. The government will get $24.6 billion from the sale of all its shares and from the dividends it will receive on the non-voting shares it holds onto for a few years. In addition, Hydro-Québec's customers will have received 322 million free shares that will be worth $6.7 billion at the end of the transition period. The holders of these shares will have got about $1.5 billion in dividends during the transition period.

The government will receive this $24.6 billion more quickly, however, and after privatization will get annual royalties that will be higher than the dividend received for 2007. These royalties will climb by slightly over $600 million each year during the transition period and will total $8.0 billion 10 years after privatization. An amount of $148 billion would have to be invested at a 5.4% annual interest rate to receive $8.0 billion each year.[17] It will be easy to see that this proposal is clearly more advantageous for the Quebec government than the proposal we made in 2007. It represents a value of more than $172 billion ($42 billion more than our 2007 proposal) while considerably reducing the risks of privatization.

Conclusion

In this chapter, we have suggested a series of reforms that will enable Hydro-Québec to play fully the role that it should have, that of the primary wealth creator for Quebec. This reform relies essentially on increased competition between electricity producers interested in the Quebec market and on a redefinition of the role of the Régie de l'énergie. The Régie's mandate will be modified to make it comparable to the most effective regulators in the energy field while giving it the responsibility to ensure that Quebec consumers can easily choose their electricity supplier.

15. Claude Garcia, "Un Québec sans dette," *La Presse*, June 2, 2007, p. Plus 7.
16. We have taken account of the 14 million shares that will be given free of charge to those who hold onto their shares for at least five years and have rounded out the result obtained.
17. We have used a rate of 5.4% in this calculation; this is the rate paid by Hydro-Québec on its new borrowing in 2007.

Chapter 11
The role of Hydro-Québec

Once the decision to privatize is made, based on the scenario presented in previous chapters, Hydro-Québec will have to adapt its balance sheet to its new life as a company listed on the stock exchange and revise its investment priorities to take account of the impact of higher rates on customers.

Managing the balance sheet

Hydro-Québec's long-term debt stood at $34.2 billion as of December 31, 2007.[1] As shown in Table 11.1, the debt/equity ratio is 1.64 and the interest coverage ratio will go from 2.15 before privatization to 1.57 on a pro forma basis at the time of privatization. This decrease in the interest coverage ratio results essentially from the fact that the dividends Hydro-Québec was paying to the government will become royalties, thus a charge against profit, starting at the time of privatization. Hydro-Québec can finance itself currently at lower cost because the Quebec government guarantees its long-term debt. The government forces Hydro-Québec to pay a fee of 0.5% for this guarantee.[2] In the normal course of affairs, a private company cannot turn to this type of guarantee. Since Hydro-Québec will not be able to rely on the government guarantee after privatization, it will have to present a more solid balance sheet if it wishes to borrow at competitive costs. How would Hydro-Québec do when compared with other electricity production and distribution companies?

We began by analyzing the interest coverage ratio of the companies in the comparison group. As we see in Table 7.3, these companies enjoy interest coverage ratios ranging from 2.54 to 5.91 as of December 31, 2007, and debt/equity ratios varying from 1.00 to 1.55. They also have credit ratings with a BBB minimum from Standard & Poor's.[3] Their balance sheets are thus much more solid than that of Hydro-Québec, once the latter loses the privilege of having its loans guaranteed by the Quebec government.

If we take an interest coverage ratio of 3.0 as a minimum goal, Hydro-Québec has $16 billion too much debt as of December 31, 2007. It would thus not be able to borrow at acceptable rates until it improves its balance sheet through an increase in equity or a reduction in debt. Hydro-Québec will thus have to use the transition period to improve its balance sheet and recover its borrowing power. Will this be possible without endangering the energy security of Quebecers? Before answering this question, we should recall three of the hypotheses underlying the privatization scenario we set out in Chapter 7: investments in the Production division will go from $1.8 billion per year before privatization to zero based on a reduction of $450 million a year for four years, to allow projects already under way to be completed; better management of other investments will enable amounts to come down by 12.5% the first year of the transition period and 25% after that; to the extent that cash flow exceeds the amounts required to finance investments and pay the planned dividends, Hydro-Québec uses it to reduce its debt.

Based on this scenario, the calculations in Table 11.1 indicate to us that Hydro-Québec's debt comes down each year during the transition period. Following this debt reduction, the interest coverage ratio rises gradually, finally reaching the desired level 10 years after privatization. This means that Hydro-Québec would normally have to wait 10 years before going to the loan market.

1. Hydro-Québec, *Annual Report 2007*, p. 74.
2. *Act respecting guarantee fees in respect of loans obtained by government agencies*, R.S.Q., c. F-5.1, Section 2.
3. Information obtained from the websites of these companies.

If the timeline on its long-term debt as of December 31, 2007, were in force on the date of privatization, Hydro-Québec would have to face maturities of $7.4 billion during the five years following privatization whereas, again according to Table 11.1, its long-term debt will go from $34.2 billion to $32.8 billion, a decline of only $1.4 billion.[4] To make up for this foreseeable shortage of liquidity, it would be desirable for the government to agree to guarantee any loan that arose during this five-year period, provided any such loan aimed to refinance debt that existed at the time of privatization, up to an amount of $6 billion.

The investment budget of Hydro-Québec Production represented more than half of Hydro-Québec's investments in the last five years. In Chapter 10, we suggested a moratorium on Hydro-Québec's development activities during the period preceding privatization. Since this short moratorium will not be enough to provide for a satisfactory balance sheet, Hydro-Québec will have to refrain from taking part in the calls for proposals that we suggested in Chapter 10 for the construction of new power plants until such time as it has obtained a credit rating equivalent to those of the companies in the comparison group. It must not be forgotten that the rate increase that will be caused by the gradual disappearance of the heritage pool will encourage Quebecers to reduce their consumption of electric energy, which in turn will reduce the pressure on Hydro-Québec to increase the quantity of electricity available.

Energy efficiency

After obtaining authorization from the Régie de l'énergie to invest $245 million in energy efficiency in 2007,[5] Hydro-Québec instead invested $381 million in these programs.[6] It is

4. Hydro-Québec, *Annual Report 2007*, p. 87.

5. Régie de l'énergie, *Annual Report 2006-2007*, p. 7.
6. Hydro-Québec, *Annual Report 2007*, p. 82.

Table 11.1
Financial ratios during the transition period (pro forma)

Year	Investments ($ billion)	Fixed assets ($ billion)	Long-term debt ($ billion)	Equity ($ billion)	Interest coverage ratio	Debt-to-equity	Enterprise value ($ billion)
2007	3.60	56.41	34.20	20.89	2.15	1.64	
Pro forma ratios after privatization							
0	3.60	56.41	34.20	20.89	1.57	1.64	52.91
1	2.93	58.02	35.28	21.42	1.57	1.65	54.18
2	2.25	58.91	35.63	21.97	1.58	1.62	55.46
3	1.80	59.07	35.23	22.53	1.64	1.56	56.73
4	1.35	58.75	34.29	23.15	1.74	1.48	58.01
5	1.35	57.98	32.82	23.84	1.89	1.38	59.28
6	1.35	57.21	31.27	24.63	2.05	1.27	60.55
7	1.35	56.47	29.64	25.52	2.25	1.16	61.83
8	1.35	55.76	27.92	26.52	2.47	1.05	63.10
9	1.35	55.08	26.13	27.63	2.72	0.95	64.38
0	1.35	54.42	24.25	28.86	3.03	0.84	65.65

paradoxical to devote such large sums to encouraging Quebecers to reduce their electricity consumption. As noted by Professor Boyer, "selling electricity at a subsidized price lower than its opportunity cost […] sends signals that are unfavourable to sustainable development. To top the irony, Quebecers must now spend tax dollars to finance government programs that promote energy conservation. We should rely on the cheapest, most equitable, most effective and most efficient mechanism to create the right level of conservation: a price equal to the real economic cost."[7]

Hydro-Québec can allow itself a sizable reduction in its investments to promote energy savings once it is privatized. Because electricity rates will gradually approach the market price during the transition period, it can be expected that economic agents will not need subsidies to modify their behaviour in the future. Consumers, like businesses, willingly adopt energy conservation measures to reduce their electricity bills.[8]

7. Marcel Boyer, *Raise Electricity Prices in Quebec – and Benefit Everyone*, C.D. Howe Institute, March 16, 2005.
8. We did not take account in our simulations of the abandonment or possible diminution of investments in energy efficiency programs.

Chapter 12
The "social contract"

Some people will argue that our proposal does not respect the "social contract" that came about between Quebecers and their government when electricity was nationalized.

We should examine this issue more closely. Research teaches us that the "social pact on electricity" was born when the Quebec government purchased the assets of Montreal Light, Heat and Power in 1944. Jurists put the following principles into the law: " […] Hydro-Québec's rates must be uniform within Quebec's territory as a whole; its rates must be set at the lowest levels compatible with sound financial management."[1]

In 1962, the government of Jean Lesage completed the operation by acquiring the assets of all the other electricity companies and, a little later, of nearly all the electricity cooperatives. The same principles were reiterated by René Lévesque, minister of Natural Resources, as we saw in Chapter 1. The minister stated that electricity rates varied considerably from one region to another and that they were inordinately high in regions far from Montreal, thereby hindering potential industrial development in those places.

From 1944 to 1962, the government's position on the social pact on electricity did not deviate. Remember that in 1944, and again in 1962, many Quebec electricity consumers benefited from lower rates following nationalizations.

According to an article published in 1995, this social contract has been modified gradually since 1981.[2] On December 19, 1981, the Quebec government freed Hydro-Québec from the obligation to supply electricity "at the lowest rates" and demanded annual dividends from the state corporation as a return on the assets invested by the government. Hydro-Québec was thus converted into a business corporation and subject to the capital tax like all companies that do business in Quebec.

Ten years later, in 1991, the Quebec National Assembly adopted the *Act respecting guarantee fees in respect of loans obtained by government agencies.*[3] Since January 1, 1992, Hydro-Québec has had to pay the government guarantee fees equivalent to 0.5% of the capital balance of loans guaranteed by the government on the consolidated revenue fund and outstanding at the end of the preceding fiscal year, as it appears in its financial statements. In short, Hydro-Québec had to compensate the government for the guarantee provided to it on loan markets. This provision was seen by Hydro-Québec as a new attack on the social contract.[4]

On February 27, 1996, during a session of the Permanent Committee on the Economy and Labour at which the top executives of Hydro-Québec had been called to appear, the minister of Natural Resources brought out the disparity between the cost of debt and the rate of return obtained by Hydro-Québec on its capital. The minister emphasized that Hydro-Québec was getting a rate of return as low as 3.3% on the shareholder's equity, whereas it was paying an average rate of 9% in interest on its debt.[5]

The least that can be said is that the paradigm had shifted. The world was going through profound change in political, economic and environmental terms, and the rules were no longer the same as in the 1970s. The central element here was the liberalization of the North American electricity market: the biggest modification to the social contract occurred at the moment the government and Hydro-Québec made the adaptations required to take part in this market. These

1. Georges Lafond, *Hydro-Québec : louve ou vache à lait*, in Yves Bélanger and Robert Comeau (ed.), *Hydro-Québec : autres temps, autres défis*, Presses de l'Université du Québec, 1995, p. 293.
2. *Id.*, pp. 293 and 294.
3. R.S.Q., c. F-5.1.
4. Georges Lafond, *op. cit.*, footnote 1, p. 294.
5. Quebec National Assembly, *Journal des débats, Commission permanente de l'économie et du travail*, February 27, 1996, p. 3.

changes took place over a fairly long period that ended in 2000. Firewalls were erected between Hydro-Québec's divisions, and a pool of heritage electricity, sold at a wholesale price of 2.79 cents per kWh, was created for the Quebec market. Beyond this block, the wholesale market was opened to competition while leaving Hydro-Québec with full responsibility for developing hydroelectric production sites of more than 50 MW.[6]

Concerns related to the environment and the preservation of natural resources also had an impact on government decisions. In the 2006 budget, the minister of Finance announced that Hydro-Québec would have to pay royalties on the use of water resources starting in January 2007. Royalties apply to Hydro-Québec's entire hydroelectric production, including the portion intended for the heritage pool. The minister emphasized in his speech that private producers of hydroelectricity were also subject to these water royalties. In addition, Hydro-Québec would also have to pay part of the profits obtained from the export sale of electricity from its new production capacities.[7] There may be a long wait for these profits, however, because the cost price of Hydro-Québec's new power plants often exceeds the price it gets on its exports to the U.S. market. We saw in Chapter 4 that the cost price of the electricity produced by the Eastmain-1 power plant will be 10.8 cents per kWh, to which must be added transmission costs of about 1.5 cents per kWh, for a total of 12.3 cents per kWh. In 2007, Hydro-Québec obtained an average price of 8.5 cents per kWh for its sales on the U.S. market, or 3.8 cents less per kWh! All the levies listed in this paragraph are intended for the Generations Fund, created on the same occasion to achieve a gradual reduction in Quebec's debt burden. In our view, this is the most recent modification to the 1944 social pact with Quebecers.

The proposal we are setting out fits in with the aforementioned modifications. It will enable the Quebec government to receive annual royalties of $8.0 billion at the end of the transition period, triple the amount it is currently receiving (excluding what is paid to the Generations Fund). The government will also receive a number of lump-sum payments totalling $24.7 billion following the sale of its Hydro-Québec shares. The additional amounts will come from the proposed rate increase on the heritage pool and from greater productivity at Hydro-Québec. Quebec society will thereby be able to benefit from a substantial increase in royalties as long as Quebec's rivers shall flow into Hydro-Québec's power plants.

To sum up, if we examine the nature of the social pact on electricity and the history of its implementation from 1944 to 2006, we see that the major changes that have occurred on the world scene since the 1973 oil crisis have forced the Quebec government gradually to modify it so that today it is limited to the heritage pool. Our proposal fits in with the continuity of these changes. The social pact we speak about no long exists in its initial form. What we are suggesting is to revive it in a dynamic and up-to-date form.

We showed in Chapter 4 that Hydro-Québec's profits could reach $5.0 billion at current rates if its productivity were comparable to that of U.S. companies active in the same field. The difference between these potential profits of $5.0 billion and the amount declared in 2007 comes to $2.1 billion. These potential profits are currently evaporating each year into the system, and they cannot be channelled for the good of society.

By giving each Hydro-Québec customer 110 shares at the time of privatization, we will compensate this customer for the proposed rate increase. In addition to receiving this compensation, each Hydro-Québec customer, who is also a taxpayer, will be able to enjoy a highly competitive tax environment without sacrificing Quebec's social programs (among the most generous in North America).

6. Hydro-Québec, *Annual Report 2000*, p. 19.
7. Quebec Department of Finance, *The Generations Fund: to foster intergenerational equity, sustainable social programs and prosperity*, March 2006, p. 30.

Chapter 13
Electricity exports

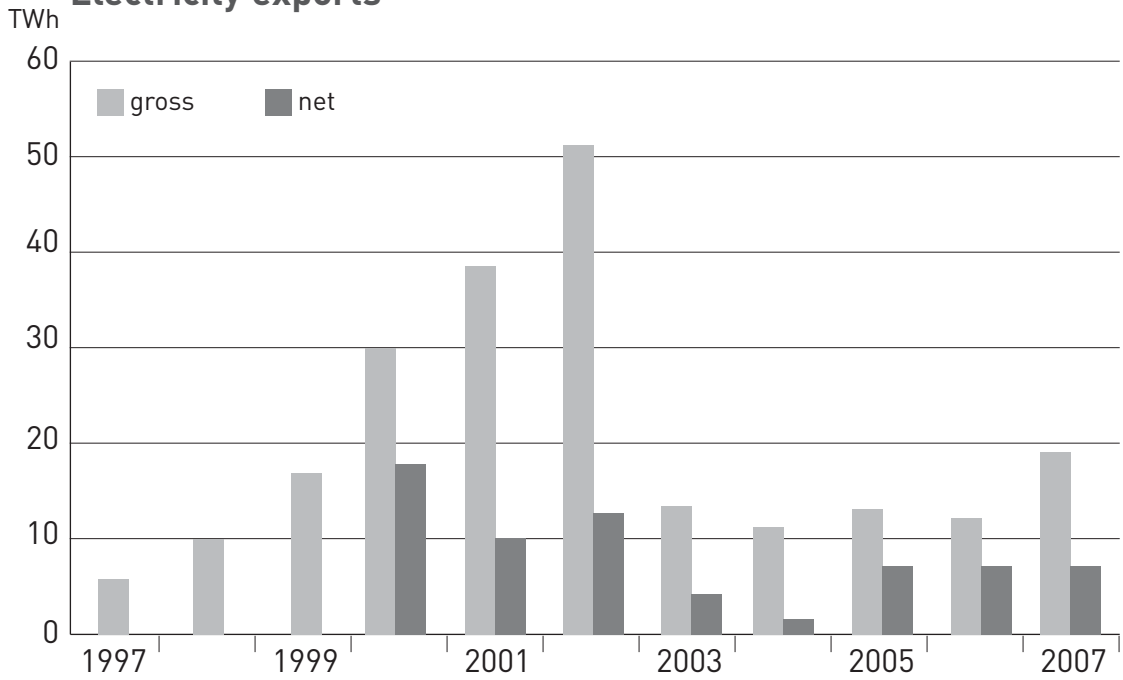
The success of privatization relies on a substantial increase in electricity exports from Quebec. In Chapter 9, we analyzed the various opportunities that will be available to Quebec consumers to reduce their electricity bills and minimize the impact of the rate increase. Part of the billions of kWh that will no longer be needed will be absorbed by Quebec's economic growth. This will not be sufficient, however. A strategy focused on exports will also have to be implemented. Do we have the capacity to do this? We will see that Hydro-Québec has already taken steps toward meeting the challenges of export markets. By acting in this way, Hydro-Québec was merely following the example of the Montreal Light, Heat and Power Company, which was already very active in export markets before its nationalization. In 1940, it exported more than 40% of the electricity it sold, splitting its sales almost even between Ontario and New York State.[1]

Hydro-Québec enthusiastically seized the opportunities provided by deregulation of the North American electricity market during the 1990s. In 1997, a U.S. subsidiary of Hydro-Québec obtained a permit from the Federal Energy Regulatory Commission to sell electricity directly to wholesalers in the United States, improving its profit margin on trans-border sales.[2]

In 1998, Hydro-Québec created its HQ Energy Marketing subsidiary with a mission of conducting energy transactions in Canada, including sales, purchases and exchanges at the Canada-U.S. border. This subsidiary "asked the National Energy Board for umbrella authorization to export more to the United States … from all Canadian provinces. Hydro-Québec already has a permit authorizing it to export up to 4,300 MW of power and up to 30 TWh of energy annually to the United States from Quebec."[3] Hydro-Québec opened business offices in Pittsburgh and Boston, and its U.S. subsidiary became a member of the

1. John H. Dales, *Hydroelectricity and Industrial Development: Quebec, 1898-1940*, Harvard University Press, 1958, p. 117.
2. Hydro-Québec, *Annual Report 1997*, p. 4.
3. Hydro-Québec, *Annual Report 1998*, p. 21.

Figure 13.1
Electricity exports



New England Power Pool, as well as seeking admission to the New York Power Pool.[4] The aim of these steps was to participate in drafting the rules governing the new electricity market and to develop business relationships in the United States. [5]

As shown by Graph 13.1, the market responded well to these Hydro-Québec initiatives. Electricity exports grew constantly from 1997 to 2002 because Hydro-Québec seized the opportunities provided by deregulation of the North American electricity market during the 1990s. "In 2007, net exports by Hydro-Québec Production represented only 5.6% of sales volume but generated 25% of the company's income from continuing operations."[6] Despite this major contribution to Hydro-Québec's profit, electricity exports decreased starting in 2002. The spectacular drop in exports from 2002 to 2003 can be explained in this way, according to the Hydro-Québec annual report: " […] because of strong growth in electricity demand in Quebec, heritage pool deliveries to Hydro-Québec Distribution rose 5.5%. This in turn meant a considerable decline in net exports to markets outside Québec."[7] Net exports, in other words gross sales minus purchases, fell by 8.6 TWh, and deliveries in Quebec rose by 8.7 TWh.

Electricity exports under long-term contracts declined starting in 2000. They went from more than 9 TWh in the late 1990s to 2.4 TWh in 2006 and 2007.[8] Hydro-Québec sought this reduction to free up quantities of energy that can be sold at a high price in connection with short-term transactions or to meet growing domestic demand.[9] It is clear for Hydro-Québec management that it is preferable to focus export strategy on short-term sales rather than to sign long-term supply contracts.

The capacity to export

Hydro-Québec "equipped itself in May 2000 with a trading floor to be able to increase its participation in these markets, particularly in the area of electricity brokerage as well as purchase and sale transactions, thanks to the flexibility provided by its hydroelectric installations."[10]

The capacity to export requires interconnections between Hydro-Québec's network and the neighbouring networks. By 1997, Hydro-Québec had about 5,500 MW in export capacity to Ontario, New Brunswick and the states of the northeastern U.S.[11] Hydro-Québec now enjoys export capacity of more than 6,900 MW because it has increased its interconnection potential toward the United States since that time.[12] Meanwhile, excluding the link with Labrador, its import capacity is only 4,400 MW.

In 2006, Hydro-Québec launched a $684-million project to establish a 1,250-MW interconnection in the Ottawa Valley to expand electricity exchanges with Ontario.[13] This line will be put into service in 2010. This is the first major investment in more than 10 years aimed at increasing export and import capacity with another Canadian province.

We have already emphasized the strong profitability of Hydro-Québec's electricity brokerage operations. If we want to increase exchanges with neighbouring networks, we have to have more interconnections. Since electricity prices vary in the course of a day based on supply and demand, it is not always advantageous to sell electricity to outside markets. The same applies to

4. *Id.*, p. 48.
5. *Id.*, p. 21.
6. Hydro-Québec, *Annual Report 2007*, p. 10. This assertion does not take account of the export of 2.1 TWh in 2007 by Hydro-Québec Distribution following a ruling by the Régie de l'énergie (see p. 22 of the *Annual Report 2007*).
7. Hydro-Québec, *Annual Report 2003*, p. 11.
8. Hydro-Québec, *Annual Report 2007*, p. 101.
9. Hydro-Québec, *Annual Report 1999*, p. 51.
10. Hydro-Québec, *Annual Report 2000*, p. 23.
11. Hydro-Québec, *Annual Report 1997*, p. 15.
12. Hydro-Québec TransÉnergie, *Notre réseau en bref*, http://www.hydroquebec.com/transenergie/fr/reseau/bref.html.
13. Hydro-Québec, *Annual Report 2006*, p. 16.

purchases. If we wish to optimize the financial results of these operations, we will have to accept having some redundancy in our interconnections because they will never be used continuously. The data that would enable us to judge if Hydro-Québec will have all the interconnections needed for optimal financial results for brokerage operations are not made public for obvious commercial reasons. We have doubts, however, considering Hydro-Québec's 2002 results. To export 54 TWh and import 42 TWh, a sustained presence by Hydro-Québec on outside markets was needed that year. With the rate increases that will follow privatization, there will probably be a need to increase our interconnections to seize opportunities in the short-term energy market.

In short, it appears that the financial success of the operation will require an increase in energy exports and, accordingly, special attention to creating sufficient energy transmission infrastructure.

Chapter 14
Electricity and aluminum producers

Quebec's aluminum production capacity has more than doubled since 1990, increasing from a little less than 1.3 million metric tons[1] to 2.6 million metric tons in 2005.[2] Quebec is responsible for a little over 8% of global aluminum production, which approached 32 million metric tons in 2005.[3] This makes Quebec the fourth largest producer of aluminum in the world.[4]

Producing all of this aluminum required around 39 TWh of electricity, which makes the aluminum industry Hydro-Québec's biggest customer,[5] supplying a little over half of the 39 TWh used.[6] Over 95% of aluminum produced is exported and nearly 60% of these exports consist of unconverted (or partially converted) aluminum[7]. We can therefore say that the aluminum industry exported, in the form of converted aluminum or aluminum bars, over 95% of the 39 TWh of electricity it used in 2005.

Based on a leaflet published by the aluminum industry in 2004, we estimate that the industry paid about 2.7¢ per kWh that year.[8] Since the price of aluminum[9] was slightly higher in 2005 than in 2004, we estimate the price paid by the industry in 2005 at 3.0¢ per kWh.[10] During that same year, Hydro-Québec exported 15.3 TWh of electricity at an average price of 9.6¢ per kWh. Since Hydro-Québec also made energy purchases over the course of the year, its net energy exports amounted to 6.7 TWh during that same year. The aluminum industry's electricity exports were therefore nearly six times larger than Hydro-Québec's net energy exports, but the price obtained for each kilowatt of electricity exported in the form of aluminum bars was three times lower!

The average price obtained for each kilogram of unconverted aluminum sold in export markets was $2.19 in 2005. As the production of a kilogram of aluminum requires around 15 kWh of electricity, each kilogram of aluminum used around 45¢ of electricity that year, which is less than a quarter of the sale price obtained. Each kilogram of aluminum exported benefited from a 99¢ subsidy (that is, (9.6¢ - 3.0¢) x 15 kWh). The subsidy therefore makes up around 45% of the sale price, and exceeds by 54¢ the cost of the electricity used to manufacture a kilogram of aluminum.

Who benefits from these export subsidies? In 2005, the United States bought about 90% of Canadian aluminum exports. Why subsidize our southern neighbour so generously? Why would we increase our subsidies for aluminum production and export even more when this action does not benefit all Quebecers? Where is our economic advantage?

While Quebec's aluminum production capacity more than doubled from 1990 to 2005, the Canadian aluminum industry stated in 2005 that "aluminum production in the United States decreased by nearly 30% in the last ten years."[11] We can conclude that Americans are replacing their aluminum production with imports from Quebec. This has occurred since the deregulation of the

1. Aluminum Association of Canada, *Aluminum and Electricity*, 4th quarter, 2004, p. 4.
2. Aluminum Association of Canada, *Primary Aluminum in Quebec – World-Class Production: Regional Leverage*, 2006, p. 8.
3. Aluminum Association of Canada, *Statistics – History of the Production of Aluminum around the World*, http://www.aac.aluminium.qc.ca.
4. Aluminum Association of Canada, *op. cit.*, footnote 2.
5. Hydro-Québec sold 169 TWh of electricity in Quebec in 2005.
6. Aluminum Association of Canada, *op. cit.*, footnote 1, p. 3.
7. Author's estimate based on data from Statistics Canada, *Exports by Commodity*, December 2005, Table 3, taking into account the fact that, according to the Canadian aluminum industry, 90% of Canadian aluminum production originates in Quebec.
8. Author's estimate based on data contained in Aluminum Association of Canada, *op. cit.*, footnote 1, pp. 3 and 5.
9. Global InfoMine, *Aluminum Price Comparison of different time periods.*
10. The price paid for electricity by the industry fluctuates with the price of aluminum.
11. Aluminum Association of Canada, *Mémoire de l'Association de l'aluminium du Canada déposé à la Régie de l'énergie du Québec*, Demande R-3563-2005, April 18, 2005, p. 15.

market price of electricity in the United States. Americans have understood that it is more profitable for them to use their electricity for purposes other than aluminum production. Why should Quebec not do the same?

A study carried out for the Canadian aluminum industry concludes that the cluster of aluminum companies in Quebec represents nearly $2 billion of value added per year. Quebec's production of 2.6 million metric tons of aluminum in 2005 cost Quebec society $2.57 billion in lost earnings, if we assume that all the required electricity, including that produced by the aluminum industry's own power plants, were to earn this amount for Hydro-Québec.[12] These lost earnings erase all the value added to the Quebec economy by the aluminum industry.

The amount of these lost earnings for Quebec will certainly fluctuate from year to year with the price obtained for exported electricity and with the price of aluminum, since the rate charged to aluminum smelters fluctuates, in certain cases, in conjunction with the price of aluminum. In 2006, for example, the price of aluminum was more expensive than in 2005 and the electricity sold in external markets earned 7.9¢ per kWh. We can nonetheless state that Quebec deprives itself of a sum of at least $2 billion a year on average by continuing to subsidize electricity supplied to aluminum smelters in this way. We do not have the means, and it is not in our interest, to continue to subsidize aluminum production in this manner. In our opinion, there is no reason to consent to new agreements, and we instead recommend that the

12. To obtain these figures, we hypothesized that we could have sold all of the electricity used by the aluminum industry in 2005 to external markets at 9.6 ¢ per kWh. Next, we subtracted 3.0 ¢ from the price of 9.6 ¢ to obtain total lost earnings. We included all of the electricity used rather than just that supplied by Hydro-Québec since the estimation of the effects are based on Quebec's entire aluminum production.

Table 14.1
Unemployment rate by administrative region in 2007

Administrative region	Unemployment rate	Number of aluminum smelters
With aluminum smelters		
Capitale-Nationale	4.9%	1
Centre-du-Québec	6.7%	1
Côte-Nord and Nord-du-Québec	**8.7%**	2
Mauricie	**9.2%**	1
Montérégie	6.1%	1
Saguenay-Lac-Saint-Jean	**9.1%**	4
Without aluminum smelters		
Abitibi-Témiscamingue	**9.2%**	
Bas-Saint-Laurent	**8.9%**	
Chaudière-Appalaches	6.0%	
Estrie	7.0%	
Gaspésie-Îles-de-la-Madeleine	**17.3%**	
Lanaudière	7.0%	
Laurentides	6.9%	
Laval	5.1%	
Montréal	**8.5%**	
Outaouais	6.3%	
Province of Quebec	7.2%	

Source: Institut de la statistique du Québec, *État du marché du travail au Québec : le point en 2007*, p. 28; Aluminum Association of Canada, *Primary Aluminum in Quebec – World-Class Production: Regional Leverage*, p. 7.
Note: The unemployment rate is indicated in bold if it exceeds the Quebec average.

industry be informed that the current agreements will not be renewed at a preferential rate when they expire.[13]

Regional development

According to one commentator, "Our regional economies depend on our main comparative advantage over other countries: high quality electricity at a good price […] Increasing electricity rates would plunge several regions into economic depression."[14] The aluminum industry shares this opinion, writing that the presence of aluminum smelters "continues to be the foundation for creating wealth in Quebec's resource regions."[15]

What is the real story? Quebec is divided into 16 administrative regions. There are 10 aluminum smelters in Quebec located in six of those 16 regions. In Table 14.1, we compared the 2007 unemployment rates in regions with aluminum smelters and regions without them. Among the six regions with at least one aluminum smelter, three have unemployment rates above the Quebec average. In fact, the only two regions with more than one smelter are included in those that have above average unemployment rates. The Saguenay-Lac-Saint-Jean's four aluminum smelters make up a disproportionate fraction of the regional economy: they are the first, third, fourth, and fifth largest employers in the region.[16] Despite this major presence, the region has an unemployment rate of 9.1%, which is practically the worst rate in Quebec's 16 administrative regions, except for Gaspésie-Îles-de-la-Madeleine. The presence or absence of aluminum smelters does not seem to be a factor that can explain the observed gaps in unemployment rates between different regions of Quebec.

Should this finding surprise us? Aluminum plants offer wages more than 45% higher[17] than Quebec's average manufacturing wage. They represent a formidable competitor for any entrepreneur who would want to establish his business in the same neighbourhood. If he does not offer the same wages, he risks losing good employees he has trained. If he offers wages comparable to those offered by the aluminum smelter, his business will probably not be profitable. Unlike the aluminum industry, he does not benefit from subsidies for the cost of his largest input.

We saw above that each kilogram of aluminum benefited from a 99¢ subsidy in the form of a reduced rate for electricity: a part of this subsidy helps aluminum smelters offer wages that are above the Quebec average. The average hourly manufacturing wage in Quebec in 2005 was $19.06.[18] For workers in the aluminum industry, the average wage was at least $27.64. Aluminum producers therefore used 6¢ of the 99¢ subsidy per kilogram of aluminum produced in Quebec in 2005 for this purpose.[19]

Long-term agreements

Once privatized, Hydro-Québec could no longer be forced by the Quebec government to supply electricity at long-term preferential rates in order to keep aluminum smelters in the province. If the government wishes to promote the establishment of energy-intensive businesses, it will have to negotiate with Hydro-Québec and reimburse the firm for any subsidy it wants to grant. In such circumstances, it is highly unlikely that the government would agree to pay such subsidies, for it would be difficult to justify them to the public. But if the government did decide to do it, the subsidies should be included in the

13. For an analysis of this question from a different angle, see Gérard Bélanger and Jean-Thomas Bernard, *Subsidies for aluminum producers: benefits that don't add up*, Montreal Economic Institute, April 2007.
14. See Gabriel Sainte-Marie, "Vendre Hydro-Québec, c'est tuer notre poule aux oeufs d'or," *Le Devoir*, September 4, 2007, p. A-7.
15. Aluminum Association of Canada, *op. cit.*, footnote 2, p. 5.
16. Aluminum Association of Canada, *op. cit.*, footnote 11, p. 5.
17. Aluminum Association of Canada, *Aluminum and Electricity*, p. 5.
18. Institut de la statistique du Québec, *Average hourly earnings of workers in goods-producing industries by various characteristics, annual averages, 1997 to 2007 (in current dollars).*
19. Based on industry data, we estimated that there were around 10,000 workers in aluminum smelters in 2005 working an average of 35 hours a week.

budget voted on in the National Assembly. The decision would be transparent and the facts would be visible to all—which is not the case at present.

It is highly unlikely that such subsidies are in keeping with Canada's international trade agreements. We can wonder why there have not yet been any challenges to the preferential electricity rates granted to existing aluminum producers by the Quebec government. In the softwood lumber dispute, the American government's challenge was based on the fact that the administratively set stumpage fees charged to Canadian businesses were lower than they would have been had they been determined by the market. The absence of challenges in the case of aluminum is probably due to the fact that the three large, global producers have access to Quebec's hydroelectric resources, and that their business strategy everywhere in the world is based on obtaining favourable electricity rates.

Before the December 2006 and March 2008 announcements, the agreements already signed for the provision of electricity expired from 2010 to 2020,[20] with one exception. This is the agreement reached in September 2002 for the execution of Phase 2 of Alouette's Sept-Îles aluminum plant: the sale of 500 MW at the high-voltage "L" rate downwardly adjusted for 30 years.[21] On December 14, 2006, the Quebec government announced a contract extension from 2024 to 2045 for the sale of 342 MW delivered by Hydro-Québec at the high-voltage "L" rate and the granting of another block of 225 MW from 2010 to 2045 also provided by Hydro-Québec.[22] On March 4, 2008, the Quebec government announced its support for Alcoa's project to modernize and expand its Bécancour plant. This support takes the form of the allocation of an additional block of 175 MW of electricity and the renewal, starting January 1, 2015, of the current block of 517 MW.[23] The government also committed itself to renewing the long-term contracts for the provision of 1045 MW to the Bécancour and Deschambault plants until 2040.[24]

In our pro forma financial statements, we have reduced the heritage pool by 20 TWh in order to account for the electricity that Hydro-Québec is currently forced to sell to the aluminum smelters. Any price increase for this 20 TWh block is very likely limited by the agreements reached between the Quebec government and the aluminum producers. As for the additional 400 MW promised to Alcan and Alcoa, they will be sold at a loss since the cost price of the additional electricity that will be required in several years will greatly exceed the current "L" rate. In fact, the cost price of two power plants we discussed in Chapter 4 is already more than double the "L" rate when transmission costs are included. In our privatization scenario, we assumed that the government would take on the lost earnings resulting from this additional 400 MW block.

The Churchill Falls agreement

The Churchill Falls agreement expires in 2041, which corresponds, approximately, to the expiration dates of the three agreements with aluminum producers just mentioned. The latter expire respectively in 2032, 2040, and 2045. Our society will have aged when it comes time either to renegotiate the Churchill Falls agreement or to find new supplies to replace the electricity we get from those falls. Whatever the outcome of those discussions, Hydro-Québec will face a large increase in costs for the 31.3 TWh that we now obtain from Churchill Falls. Will we then be in a position to continue to supply the aluminum smelters at a competitive price, or should we plan for their closure?

20. Aluminum Association of Canada, *op. cit.*, footnote 11, p. 15.
21. *Id.*, Professors Bélanger and Bernard therefore contradict this statement of the Aluminum Association of Canada before the Régie de l'énergie on April 18, 2005, which is cited above.
22. Gérard Bélanger and Jean-Thomas Bernard, *op. cit.*, footnote 13, p. 1.
23. Government of Quebec, *Modernization and expansion of the Alcoa aluminum smelter in Baie-Comeau*, Press release, March 4, 2008.
24. Canadian Press, "Alcoa commits to Baie-Comeau smelter," *Globe and Mail*, March 5, 2008, p. B4 and Alcoa, *Alcoa, Government of Quebec Reach New Renewable Power Agreement for Three Smelters in Province*, Press release, March 4, 2008.

Several commentators are worried about the impact of the aging population on our ability to finance Quebec's social programs. The population will age fairly rapidly from now until 2030 as baby boomers reach retirement age. We will therefore have to face the expiration of the Churchill Falls agreement and the possible closure of the aluminum smelters at a time when the burden of Quebec's social programs will be much heavier than at present.

Behind this bad news is some good news, however, since the end of the Churchill Falls agreement will greatly increase the value of Hydro-Québec's shares in CF(L)Co. If they were in a position to sell its electricity at today's market price, its value would be around $20 billion. Hydro-Québec, which holds 32.4% of the firm's shares, listed its investment's value as $77 million on its December 31, 2007 balance sheet.[25] At any rate, it would be better if ownership of the CF(L)Co shares were transferred to the Quebec government before the privatization of Hydro-Québec.

In summary, the long-term agreements in which the government provides aluminum producers with electricity at a competitive price result in considerable lost earnings for Quebec, including regions where smelters are located. The extension of these agreements mortgages the future of our society.

25. Hydro-Québec, *Annual Report 2007*, p. 86.

Conclusion

We showed in Chapter 3 that Hydro-Québec achieves a lower operational efficiency level than comparable businesses. This is the main reason why it could save at least $1 billion a year if it reduced its operating expenses to bring them in line with those of the most efficient private businesses.

Hydro-Québec has not shown great financial discipline when building power stations over the years, since the cost price of the electricity it will produce with some of those power plants is more than double the cost price of electricity produced by small private sector power plants. We also demonstrated that the construction cost of a Hydro-Québec power plant surpasses its projected budget by 26% per project, on average. These shortcomings in the management of large investment projects are not limited to the Production division, as we have revealed similar shortcomings in other divisions.

There are many similarities between the British experience before privatization and the picture of Hydro-Québec we have sketched in this study: overabundance of personnel; unnecessarily high cost structure; unnecessarily large investments; and lack of competition.

The British industry's losses had increased considerably under Labour and Conservative governments. Privatization enabled the United Kingdom to enjoy renewed profits despite a rate drop of over 30% from 1990 to 2005 (after taking inflation into account). If it was successful, though, it is because privatization was accompanied by a two-part reform in the industry's governance. First of all, the regulatory model was modified to encourage market participants to increase their efficiency. In addition, competition was freed up as much as possible, notably by allowing British consumers to choose their electricity provider.

We have shown that Hydro-Québec's annual profit would shrink from $2,882 million to $709 million if it had to pay market price for the electricity it obtains from Churchill Falls. Is it reasonable to be content with such a trifling contribution from our principal collective resource? Why such limited profits from the exploitation of such a large hydroelectric development? This figure alone supports our position that Hydro-Québec's annual profit would surpass $5 billion if it made better use of the capital entrusted to it, and if it were as productive as the most efficient businesses in exploiting it.

In addition to taking necessary measures to improve Hydro-Québec's efficiency for the benefit of all Quebecers, we also propose modifying our aluminum industry strategy. We showed in Chapter 14 that increasing Quebec's aluminum production capacity—90% of which is exported to the United States—coincided with a reduction in production capacity for this metal south of the border. Meanwhile, the deregulation of the American energy market has increased the value of electricity produced in Quebec by a considerable amount. Unlike the situation that prevailed in the 1980s (see Chapter 1) during which we had a surplus of electricity for which there were no takers, the American market is now thirsty for energy and ready to pay a lot more for it. We estimate that Quebec deprives itself on average of at least $2 billion a year by continuing to subsidize electricity supplied to aluminum smelters. If we add this $2 billion in lost profits to the $5 billion of potential profits if Hydro-Québec had better financial results, this means that Hydro-Québec's profits could reach $7 billion without raising Quebec's current low electricity rates!

It is time to modify our strategy and obtain returns from Hydro-Québec worthy of the best Quebec businesses. As one government after another since 1944 has been either unwilling or unable to obtain acceptable financial results from Hydro-Québec, we must take inspiration from the British example and privatize Hydro-Québec. In our opinion, privatizing Hydro-Québec will

quickly encourage its management to take the necessary measures to improve the firm's productivity and financial results. This privatization will reap many benefits for Quebecers insofar as it will also be accompanied by a reform of the Régie de l'énergie's role, and it will allow Quebecers to choose their electricity provider. To facilitate this choice, it is essential for electricity rates in Quebec to rise to market levels. To ensure that all Quebecers, as opposed to future Hydro-Québec shareholders, benefit fully from this rate hike, we propose that 90% of additional revenues coming from the adjustment to market electricity rates be paid to the Quebec government in the form of annual royalties. The government will receive $8 billion a year in royalties once rates have risen to market levels, and will collect $24.7 billion from the progressive sale of its Hydro-Québec stock. Privatization will also enable true market prices to play their full role. In the future, if the Quebec government wants to subsidize the aluminum sector, it will have to do so explicitly by soliciting funds from the National Assembly rather than by ordering Hydro-Québec to do it.

Failing to adopt the set of measures we propose here, Quebecers leave over $10 billion on the table every year, calculated as follows:

Improving Hydro-Québec's productivity:	$2.1 billion
Increased royalties:	$6.1 billion
Subsidies to the aluminum sector:	$2.0 billion
Total:	$10.2 billion

Some will argue that this sum of $10.2 billion should be reduced by an amount equal to the revenues generated by the proposed rate hike. It is clear that Quebec consumers will have to pay more for their electricity if our proposal is accepted. Electricity consumers will react and quickly adapt to the proposed rate hike by reducing their consumption and by choosing other forms of energy better suited to their needs, as we discussed in Chapter 9. Moreover, we propose to compensate, in full or in part, all residential Hydro-Québec customers by granting them 110 free Hydro-Québec shares at the time of its initial public offering.

Appendix 1:
A brief description of the companies from the comparison group

American Electric Power is headquartered in Columbus, Ohio. It produces, transports, and distributes electricity to 5.2 million customers in 11 states: Arkansas, Indiana, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, Tenessee, Texas, Virginia, and West Virginia.[1] It also operates a fleet of barges that transport coal and bulk dry goods along the Illinois, Mississippi, and Ohio Rivers.[2] We excluded these maritime activities as much as possible.

Consolidated Edison is headquartered in New York City. It produces, transports, and distributes electricity to 3.5 million customers in New York City, Westchester County, the southeast of New York state, and northern New Jersey. It also distributes natural gas to 1.2 million customers in the same area, and provides steam service to Manhattan.[3]

Entergy is headquartered in New Orleans, Louisiana. It produces, transports, and distributes electricity to 2.7 million customers in Arkansas, Louisiana, Mississippi, and Texas. It also operates a natural gas distribution firm with approximately 178,000 customers in Baton Rouge and New Orleans, Louisiana.[4]

Exelon is headquartered in Chicago, Illinois. It produces, buys, transports, and distributes electricity to 3.8 million customers in northern Illinois, including the city of Chicago, and to 1.6 million customers in Pennsylvania, including the city of Philadelphia. It also distributes natural gas to 480,000 customers in the Philadelphia area.[5]

FirstEnergy is headquartered in Akron, Ohio. It produces, buys, transports, and distributes electricity to 4.5 million customers in Maryland, Michigan, New Jersey, Ohio, and Pennsylvania.[6] In July 2007, it reduced its stake in a communications subsidiary from 31.85% to approximately 15%.[7]

Florida Power and Light (FPL) is the main subsidiary of *FPL Group*, which is headquartered in Juno Beach, Florida. FPL produces, buys, transports, and distributes electricity to 4.5 million customers along the eastern and southwestern coasts of Florida.[8] The *FPL Group* includes another large subsidiary, *FPL Energy Operations*, which concentrates its activities on the production of electrical energy for competitive markets across America. We have, as much as possible, excluded the activities of this second subsidiary.

Pacific Gas and Electric Company (PG&E) is headquartered in San Francisco, California. It produces, buys, transports, and distributes electricity to 5.1 million customers in northern and central California. It also buys, transports, and distributes natural gas to 4.3 million customers in the same areas. It receives 72% of its revenues from its activities in the electricity sector.[9]

Pennsylvania Power and Light (PPL) is headquartered in Allentown, Pennsylvania. It produces and sells electricity wholesale in the northeastern and western United States (in the states of Connecticut, Illinois, Maine, Montana, New York, and Pennsylvania). In addition, it

1. American Electric Power, Form 10-K, 2007, p. A-2.
2. *Id.*, p. A-6.
3. Consolidated Edison, *Corporate Profile*, see: http://investor.conedison.com/phoenix.zhtml?c=61493&p=irol-homeprofile.
4. Entergy, Form 10-K, 2007, p. 173.
5. Exelon, Form 10-K, 2007, pp. 2, 17, and 20.
6. FirstEnergy, *Financial Report 2007*, p. 9.
7. *Id.*, pp. 86-7.
8. FPL, Form 10-K, 2007, p. 6.
9. PG&E, Form 10-K, 2007, p. 1.

distributes electricity to 1.4 million customers in Pennsylvania and to around 2.6 million customers in the United Kingdom. We excluded United Kingdom customers from our analysis.[10]

Southern Company is headquartered in Atlanta, Georgia. It produces, buys, transports, and distributes electricity to 4.4 million customers in four southern U.S. states, namely Alabama, Florida, Georgia, and Mississippi. A subsidiary, *Alabama Power*, operates a coal mine for its own purposes and sells electrical appliances. Another subsidiary operates a wireless network.[11]

Xcel Energy is headquartered in Minneapolis, Minnesota. It produces, buys, transports, and distributes electricity to 3.3 million customers in eight Midwest and western states, namely Colorado, North and South Dakota, Minnesota, Michigan, New Mexico, Texas, and Wisconsin. It also buys, transports, and distributes natural gas to 1.8 million customers in five states, namely Colorado, Michigan, Minnesota, North Dakota, and Wisconsin. It receives 80% of its revenue from its activities in the electricity sector. Two thirds of its customers are in Minnesota and Colorado.[12]

10. PPL, Form 10-K, 2007, p. 1.
11. Southern, Form 10-K, 2007, p. I-1.
12. Xcel Energy, Form 10-K, 2007, pp. 7- 8.

Appendix 2:
Standard Life, an example of demutualization

On July 10, 2006, Standard Life[1] demutualized. There were over 2 million participating policyholders (members) who were eligible to receive the 1,472 million shares that had been set aside for them.

Over 70% of members chose to keep the shares they received on July 10, 2006. To encourage them to do so, the board of directors had decided to offer one free share for every block of twenty shares obtained at the time of demutualization. This free share was distributed to them July 20, 2007, on the condition that they had kept their shares up until that date. The members that chose not to keep their shares received a sum of money equal to the value of those shares calculated according to the integrated supply price paid by investors within the scope of the institutional offering. The company wished to benefit from its initial public offering to obtain an additional £1.1 billion of capital in order to pursue its development. It also had to obtain the capital needed to reimburse those members who chose not to become shareholders at the time of demutualization. As it wished to have as many shareholders as possible, it offered its members and its non-member clients the opportunity to buy shares at a 5% discount from the integrated supply price paid by investors within the scope of the institutional offering for all amounts applied for up to £50,000. Those who accepted this preferential offer also had the right to receive, after one year, one free share for each block of twenty shares applied for as long as they kept those shares for the entire year. More than 160,000 members and over 100,000 clients took advantage of this preferential offer. The offer was so popular that applicants only obtained 70% of the shares requested.

In November 2006, Standard Life had over 1.5 million shareholders, 99% of whom were also the company's clients. Ninety-five percent of its shareholders were individuals and they held 65% of the 2 billion shares issued at the time of demutualization.

1. The information in this appendix was drawn from the share prospectus issued to allow Standard Life to register its shares on the London Stock Exchange on July 10, 2006 and from the company's website.

About the author

After studying at Laval University and at the London School of Economics and Political Science, Claude Garcia joined the Department of Social Affairs in 1969, where he remained until 1978, when he was assistant deputy minister in charge of planning. He was a partner at Hébert, LeHouillier and Associates, actuaries-consultants, from 1978 to 1982. In 1983, he began working at Standard Life Insurance as principal vice president and actuary, and served as president of Canadian operations from June 1993 to December 2004. He was also a member of the board of directors there from January 2000 to December 2004. Since then, in addition to sitting on the boards of Cogeco, Cogeco Cable, Goodfellow, BTB Real Estate Investment Trust, and L'Excellence Life Insurance, he is president of the board of directors of the Agence des partenariats public-privé du Québec and director of the Caisse de dépôt et placement du Québec. He also sits on the boards of the Institut de recherches cliniques de Montréal and of the Canadian Life and Health Insurance OmbudService.

Montreal
Economic
Institute

Ideas for a More Prosperous Nation

ISBN 2-922687-25-2