Hydro-Québec

Annual Report 1978

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Hydro-Québec

Annual Report
1978

Board of directors

Lucien Saulnier
Chairman

Robert A. Boyd
President and chief executive officer,
Hydro-Québec

Claude Laliberté
President and chief executive officer,
Société d'énergie de la Baie James

Guy Monty
President and chief executive officer,
Hydro-Québec International

Nicolle Forget,
director

Georges Gauvreau,
director

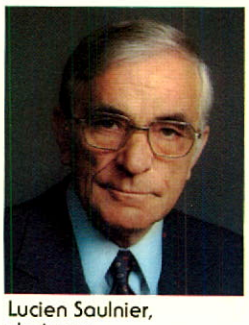
Roland Giroux,
director

Hervé Hébert,
director

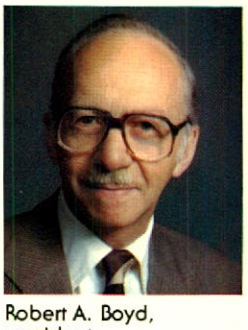
Pierre Laferrière,
director

Claude Roquet,
director

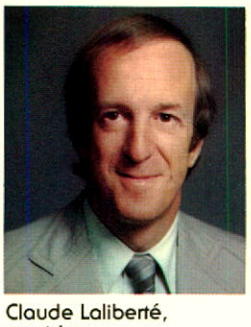
André Thibaudeau,
director



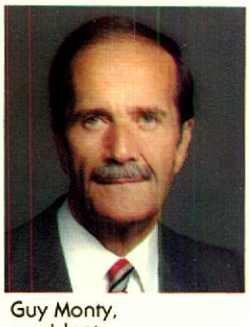
Lucien Saulnier,
chairman,
board of directors.



Robert A. Boyd,
president
and chief executive officer,
Hydro-Québec.



Claude Laliberté,
president
and chief executive officer,
Société d'énergie
de la Baie James.



Guy Monty,
president
and chief executive officer,
Hydro-Québec International.

Conseil d'administration d'Hydro-Québec,
de la Société d'énergie de la Baie James
et d'Hydro-Québec International

Cabinet du président

Monsieur Guy Joron
Ministre délégué à l'Énergie
Gouvernement du Québec

Monsieur le Ministre,

On behalf of the board of directors, I have the privilege of sending you Hydro-Québec's 1978 annual report.

Yours truly,

Lucien Saulnier
Chairman of the
board of directors

Montréal, May 28, 1979

Gouvernement du Québec
Cabinet du Ministre délégué à l'Énergie

Monsieur Clément Richard
Président de l'Assemblée nationale
Québec

Monsieur le Président,

I have the honor of presenting to you the annual report of Hydro-Québec for the year ended December 31, 1978.

Yours truly,

Guy Joron
Le ministre délégué à l'Énergie,

Québec City, May 31, 1979

Officers

Vice-presidents

Administration
Jean Boulanger

Clientèle et Régions (Customers and regions)
Pierre Godin

Finances
Edmond A. Lemieux

Information
Marcel Couture

Production et Transport (Production and transmission)
Jean-J. Villeneuve

Programme d'équipement (Construction program)
Paul Amyot

Ressources humaines (Human resources)
Jacques Durocher

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Michel-André Demers

Chief counsel
André E. Gadbois

General auditor
Marcel Jean

Director of corporate planning
Joseph Bourbeau

Director of l'Institut de recherche de l'Hydro-Québec
Lionel Boulet

Treasurer
Georges Lafond

Assistant to the president and chief executive officer
Rita Dionne-Marsolais

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André Lavoie

James Bay
Robert Brunette

Laurentides
Marcel Lapierre

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Georges A. Lauzon

Manicouagan
Joseph M. McNally

Matapédia
Pierre Fiset

Mauricie
Gérard R. LaBossière

Montmorency
Gilles Béliveau

Richelieu
Pierre Simard

Saguenay
Jean-Claude Grégoire

Saint-Laurent
Jean Lespérance

Hydro-Québec was created on April 14, 1944 by a statute of the provincial legislature as a government-owned corporation responsible for producing and distributing energy in the province of Québec.

President's foreword

Hydro-Québec's annual report for 1978 once again reflects the firm's financial health and its contribution to the economic life of Québec.

In a year when Québec experienced a slowdown in housing construction, increased concern for energy conservation and strong inflationary pressures, our financial report, I am proud to say, shows that Hydro-Québec continued to rank as one of Québec's soundly administered enterprises.

The word "administered" inevitably connotes the human element and it is on this level that I would like to address my comments.

The main events in the life of Hydro-Québec during 1978 stemmed from the sanctioning of Bill 41, which gave the utility a corporate structure with a board of directors composed mainly of prominent individuals from outside the company, representing different spheres of activity in the province.

Thus on October 1, 1978 the Québec Hydro-Electric Commission ceased to exist and the destiny of the firm was handed over to the new board of directors. The members of this board are also responsible for administering the affairs of the Société d'énergie de la Baie James.

Under the new law, this subsidiary of Hydro-Québec became a project management firm for its parent company.

In addition, Bill 41 permitted Hydro-Québec to export its know-how and to create a subsidiary for that purpose. Thus, towards the end of the year, Hydro-Québec International was created. This company, too, is administered by the members of Hydro-Québec's board of directors. And the presidents of Hydro-Québec, the Société d'énergie de la Baie James and Hydro-Québec International are members of this board.

My report would be incomplete, however, if I did not cite the competence, hard work and dedication of those who served as members of the Québec Hydro-Electric Commission over its thirty-four-year life, contributing a high degree of integrity that reflected on the entire firm.

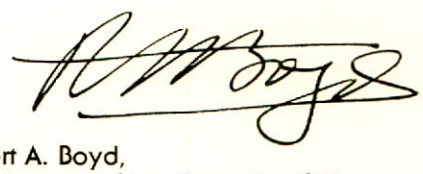
The successive teams of commissioners, although quite different from one another, shared a profound commitment to the progress and development of the firm, making it a symbol of Québec's success.

That vocation has necessarily linked Hydro-Québec to the destiny of its milieu. With the social and economic development of Québec paralleling that of Hydro-Québec, the firm has increasingly felt obliged to explain its decisions, consult the population and respect the interests of the community.

The new board of directors, under the chairmanship of Lucien Saulnier, is representative of the community's numerous interests which Hydro-Québec, like all business and industrial concerns, must take greater cognizance of.

During the year, moreover, the government published its White Paper on Québec's energy policy, which has a direct bearing on Hydro-Québec's mission. This document sets forth the government's orientations on energy matters, which we were all asked to share.

Hydro-Québec has committed itself to that and will continue to serve as a motive force in the economy of Québec within the framework of its mandate and for the greatest good of the population.



Robert A. Boyd,
President and Chief Executive Officer

Montréal, May 25, 1979

Ce rapport est également
publié en langue française.
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Montreal, Québec H2Z 1A4

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*The financial statements comprise the financial statements of Hydro-Québec and all its subsidiaries, including the Société d'énergie de la Baie James and Hydro-Québec International.

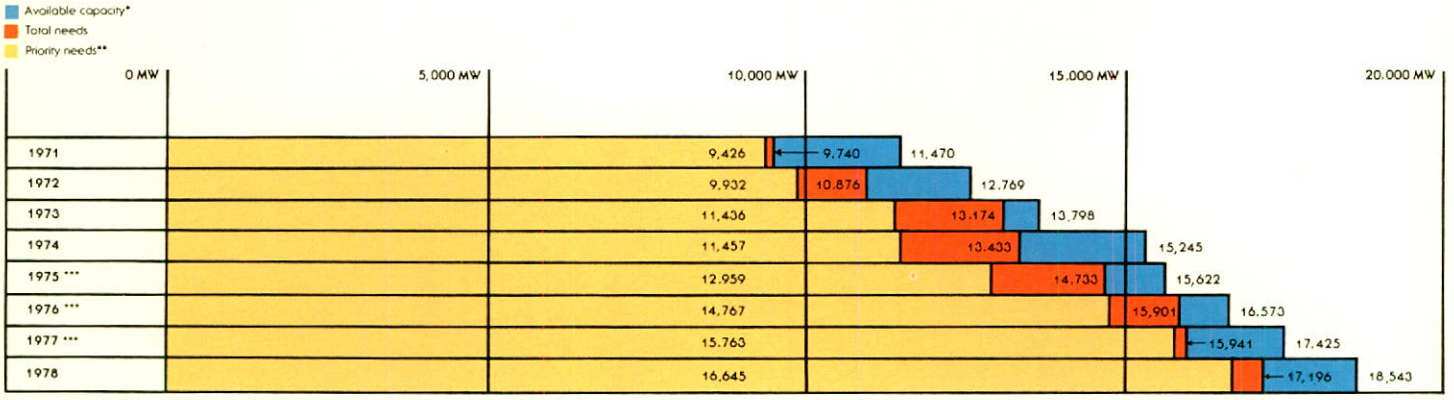
Facts in figures

	1978	1977	1976	1975	1974	1973	1972	1971	1970	1969
Financial situation (in millions of dollars)										
Property and plant in service	**$6,759**	6,154	5,880	5,307	4,973	4,834	4,599	4,251	3,899	3,404
Construction work in progress	**$6,221**	4,283	2,634	1,970	1,197	752	465	411	389	608
Long-term debt*	**$9,095**	7,653	6,647	5,001	4,062	3,513	3,229	2,928	2,676	2,554
Reserves or net worth	**$2,882**	2,359	1,977	1,667	1,437	1,260	1,140	1,041	913	796
Total sales revenue	**$1,600**	1,263	1,071	904	783	662	569	524	483	420
Total operating and interest charges	**$1,099**	904	781	692	621	554	481	408	378	346
Effects of growth										
Installed capacity at December 31 (megawatts)*	**12,979**	12,523	12,409	11,356	11,123	11,148	11,107	11,107	10,617	9,809
Billed sales of electricity in billions of kilowatthours	**91.2**	87.3	84.0	76.9	77.7	68.7	60.4	52.5	50.6	46.3
Total number of customer accounts (thousands)	**2,318**	2,265	2,188	2,136	2,081	2,017	1,943	1,895	1,852	1,773
Number of permanent employees of Hydro-Québec**	**16,930**	15,763	14,969	14,543	13,679	13,027	12,627	12,245	12,012	11,890

*Including amounts payable within one year.

*1 megawatt (or 1 MW) = 1,000 kilowatts = 1,000,000 watts
**Excluding employees on loan to the Société d'énergie de la Baie James.

Power needs and available capacity* at time of annual peak demand, 1971-1978



*Includes power received from other producers.
**Electricity which Hydro-Québec must produce under its mandate as defined in section 22 of the Hydro-Québec Act: "The object of the Corporation shall be to supply power... to the citizens of this Province at the lowest rates consistent with sound financial administration."
***The power needs of 1977, 1976 and 1975 include respectively 190 MW, 138 MW and 192 MW which were withheld through application of interruptible-power clauses in certain contracts.

Financial results*

Various features of the economic situation influenced developments in Hydro-Québec during 1978.

Québec's economic growth improved during the year, the gross domestic product increasing 3.5% in real terms, compared with 2.1% in 1977.

This strengthening of the economy is related primarily to exports from the manufacturing sector, which were stimulated by the decline in value of the Canadian dollar. In fact, the manufacturing sector experienced a marked revival of activity in 1978, with investments up by 18.3% over the preceding year. Fortunately, the upswing in the pulp-and-paper, chemical products and petroleum industries compensated for low investments in mining, financial services and institutions, and housing construction.

The manufacturing industries that recorded the best results in terms of shipments were transportation equipment, wood products, primary metal industries, and pulp and paper. Moreover the textile, clothing, knitted-goods, and leather industries, which had been in difficulty in 1977, showed encouraging results following a program of selective abolition of the provincial sales tax on their products.

This is the economic background to Hydro-Québec's financial results for 1978.

*Words in bold letters in this section are terms used in the **Financial Statements and Statistics.**

The utility's gross revenue totaled $1,621,614,000, compared with $1,285,250,000 in 1977. While a large part of this 26.2% growth in revenue was attributable to the 18.7% average increase in electricity rates that went into effect in January 1978, the higher **sales of primary electricity** to Québec customers was also a contributing factor. The 1978 growth in sales, however, was slightly lower than the average increase in sales over the last five years.

Total expenses were $1,098,671,000, against $903,736,000 in 1977. This increase of 21.6% was attributable to such factors as inflation, higher interest rates, increased interest costs resulting from the fall of the Canadian dollar and the appreciation of strong currencies, and higher operating costs caused by normal growth.

An indicator of Hydro-Québec's financial health is the **net income before allocations to reserves,** which amounted to $522,943,000. This was an increase of $141,429,000 or 37.1% over 1977.

Work proceeded on schedule at all the major construction sites, and **investments in fixed assets** totaled $2,588,411,000, which was $638,115,000 or 32.7% more than in the previous year. Hydro-Québec was able to finance 20.9% of these investments from financial resources derived from the year's operations.

Revenue

In 1978, billed **sales of primary electricity** to Québec customers rose 6.9% in kilowatthours, compared with a 7.3% increase the year before. Revenue from these sales nevertheless rose by $274,147,000, or 24.2%. In 1977, the corresponding increase had been $186,404,000 or 19.6% over the 1976 sales. The January 1978 increase in electricity rates produced additional revenue of about $200,000,000. The revenue from **sales of secondary electricity** in Québec was $11,602,000, or $4,066,000 more than in the preceding year.

Sales of primary and secondary electricity outside Québec brought in revenue of $129,003,000. This was $26,864,000 or 26.3% more than in the previous year, even though 10.6% fewer kilowatthours were sold in 1978.

Total billed sales increased 4.4% in 1978, against 3.9% in 1977, and produced revenue that was $305,076,000 or 24.5% more than in the preceding year. The **increase in unbilled revenue** was $49,709,000.

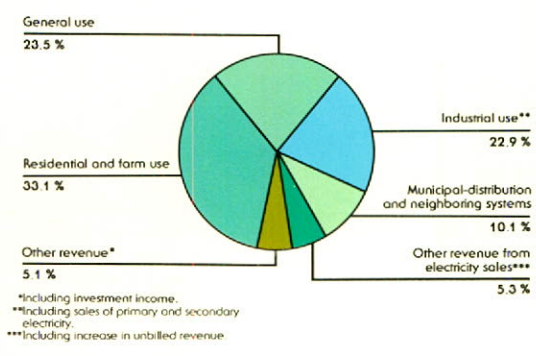
Expenditures

Operating, maintenance, administration and other expenses rose 18.2% in 1978, totaling $448,740,000 compared with $379,759,000 in 1977. This increase is attributable to higher wages and salaries paid to employees, to the hiring of additional staff for the normal expansion of the firm, and finally, to inflation, which was reflected in an 8.4% increase in the consumer price index for the Montréal area in 1978.

Gross **interest** costs for the year (see Note 5 to the Consolidated Financial Statements) were $861,058,000, against $642,176,000 in 1977. This increase of 34.1% reflects not only the impact of the year's borrowings to finance the construction program, but also the additional costs resulting from the decline of the Canadian dollar in relation to the American dollar (from $0.91 U.S. in January to $0.85 U.S. in December) and in relation to West German, Swiss and Japanese currencies.

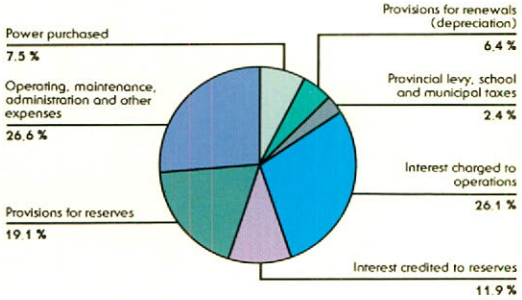
The **interest** expenditure listed in the **Consolidated Statement of Operations** is $375,980,000, compared with $263,792,000 for 1977. This increase is due principally to the commissioning of Outardes-2 generating station and certain transmission facilities near Montréal, as well as additional costs related to the fall of the Canadian dollar.

Source of revenue dollar in 1978*



*Including investment income.
**Including sales of primary and secondary electricity.
***Including increase in unbilled revenue

Application of revenue dollar in 1978

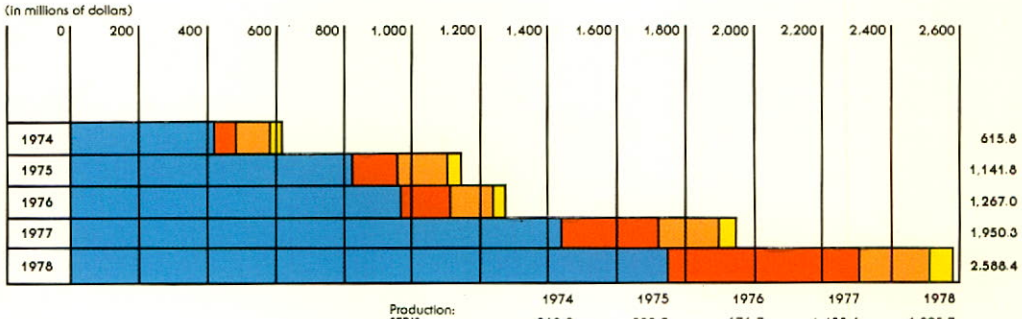


Capital expenditures

Plant investments for the year amounted to $2,588,411,000, most of which was devoted to development of hydroelectric resources in the James Bay region. The capital expenditures of Hydro-Québec, including those of the Société d'énergie de la Baie James, were 32.7% greater than in 1977, and they accounted for 38% of all such investments by firms in Québec.

The utility's total assets were $12,886,485,000 at December 31, 1978, compared with $10,648,563,000 one year before. Although the commissioning of Outardes-2 and other facilities resulted in a net addition of $604,897,000 to **property and plant in service**, the investments under the heading **construction work in progress** reached $6,220,866,000 at December 31, 1978. Most of this amount was invested in the La Grande project. For the first time in the history of Hydro-Québec, the value of **construction work in progress** was greater than the net value of **property and plant in service**.

Breakdown of capital expenditures since 1974



	1974	1975	1976	1977	1978
Production:					
SEBJ*	263.2	583.0	676.7	1,188.6	1,395.7
Other power stations	148.4	234.1	281.5	247.9	336.1
Subtotal	411.6	817.1	958.2	1,436.5	1,731.8
Transmission	66.2	135.0	153.8	284.1	545.0
Distribution	105.2	150.8	126.5	187.5	215.5
Other	32.8	38.9	28.5	42.2	76.1
Total	615.8	1,141.8	1,267.0	1,950.3	2,588.4

*Société d'énergie de la Baie James

Financing

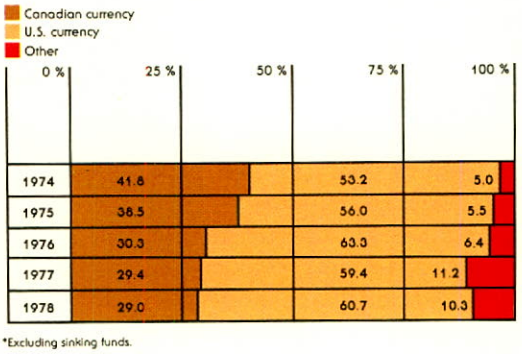
The year's long-term borrowings produced a net amount of $1,537,194,000. The average effective interest rate on these borrowings was 9.84%, compared with 8.32% in 1977, 9.49% in 1976, 9.95% in 1975 and 9.76% in 1974.

During the year Hydro-Québec completed seven borrowings by the issue of long-term debentures on various financial markets.

In addition, the utility made use of new methods of financing. In January it signed a credit agreement with floating rates. This agreement covers a medium-term loan of $750,000,000 and a standby line of credit of $500,000,000, both in U.S. dollars. In July Hydro-Québec entered into a $500,000,000 loan agreement that grants it a revolving line of credit until 1984. At December 31, only the $750,000,000 loan had been drawn down, thus leaving the firm with two $500,000,000 lines of credit to meet future needs.

During the year Hydro-Québec refinanced three borrowings in Swiss francs, originally made in 1974 and 1975 at interest rates of 7.75 to 9.0%. The new interest rates were 2.0 to 3.25%.

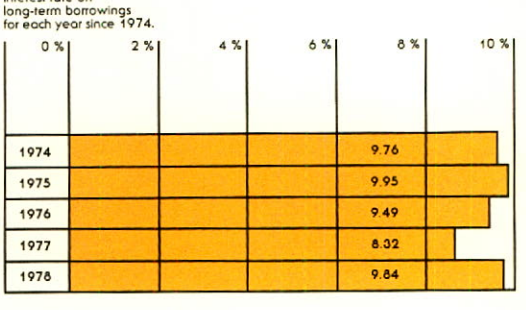
Composition of funded debt*



*Excluding sinking funds.

Interest rates

Average annual effective interest rate on long-term borrowings for each year since 1974.



Financial situation

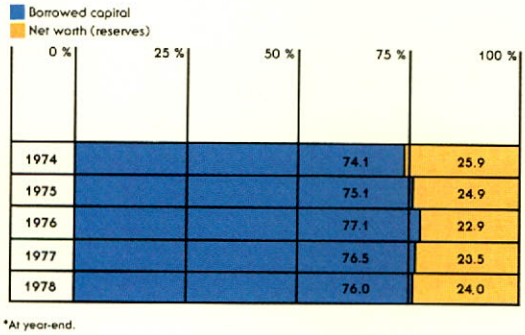
The cash position at December 31, that is **cash and short-term investments** less **bank indebtedness** amounted to $378,738,000, which was considered ample in view of the $1 billion available in lines of credit.

The **Consolidated Statement of Changes in Financial Position** shows that **total financial resources provided by operations** increased by 31.2% or $155,935,000 to reach $655,847,000. Some $115,480,000 of these resources was used to redeem long-term debt and make purchases for sinking funds, and the balance of $540,367,000 went to finance part of plant investments.

Net worth

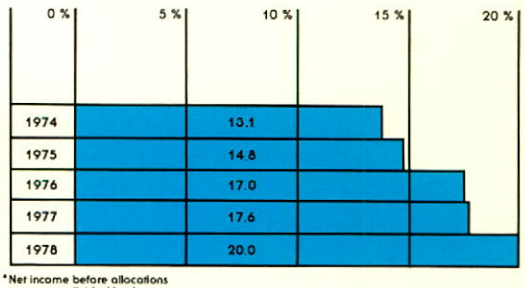
Net worth, which is made up of the earnings accumulated since Hydro-Québec was created in 1944, totaled $2,881,815,000 at year-end, compared with $2,358,872,000 one year earlier. At the end of 1978, net worth represented 24.0% of the firm's invested capital, which is the total of **reserves, notes payable** and **long-term debt** before subtraction of the **amount payable within one year.** The equivalent proportion at the end of 1977 was 23.5%.

Composition of capital*



*At year-end.

Return on net worth*



*Net income before allocations to reserves divided by the average of reserves at the beginning and end of each year.

audrey morris

Sales

In 1978, sales of primary electricity to Québec customers totaled 76.2 billion kilowatthours, or 6.9% more than in the previous year. This increase was slightly less than the 7.4% average growth rate over the last five years.

A slowdown in the growth of consumption in the residential category was partly counterbalanced by a resumption of growth in consumption by the industrial sector, mainly in the pulp-and-paper and primary metal processing industries where there was renewed activity.

The total volume of electricity sales, which besides primary sales in Québec includes primary sales to customers outside Québec and sales of secondary electricity, totaled 91.2 billion kilowatthours or 4.4% more than in the preceding year. This increase, although larger than the 3.9% increase of 1977, is smaller than the average growth rate of the past five years, which was 5.9%.

Revenue from sales of primary electricity to Québec customers amounted to $1,409,187,000, and revenue from total sales was $1,549,792,000. These increases of 24.2% and 24.5% respectively over the previous year were due to the combined effect of higher electricity rates and larger sales volumes.

Average revenue per kilowatthour for total electricity sales increased 19.3% to 1.7¢. The increase was 16.2% for primary sales to Québec customers and 36.8% for other types of electricity sales.

Residential use

There was another slowdown in residential construction in 1978, with the number of housing starts declining 24.2% from 57,580 to 43,671.

Of the 54,129 dwelling units completed during the year, 77.0% used electric heating. This is two percentage points more than in the previous year and 10.3 points above the 1974-1978 average. Some 17,000 existing dwellings were converted to electric heating, 600 fewer than in 1977.

The slowdown in residential construction reduced the growth in the number of residential customer accounts. There were 1,987,073 such customer accounts at the end of 1978, compared with 1,937,880 at the end of 1977. This 2.5% increase is less than the 3.1% average over the past five years.

Billed sales to residential customers totaled 24.5 billion kilowatthours in 1978, which was 7.2% more than in 1977. This is considerably lower than the 11.6% average annual increase for the period 1974 to 1978 and is explained mainly by the slowdown in housing construction. It is likely that energy conservation campaigns were also a factor in this easing of demand by residential customers.

Consumption per customer account increased only 3.9% in 1978, compared with 9.7% in 1977 and 12.2% in 1976. This brought average annual consumption per customer account to 12,503 kilowatthours.*

Revenue from sales of electricity to residential customers reached $527,403,000 in 1978, surpassing the 1977 revenue by 21.9%. This rate was slightly lower than that of 1977, when revenue from sales to residential customers rose 22.1%.

*The number of customer accounts used in this type of calculation, for all categories of customer accounts, is the average of the number of accounts at the beginning and end of each year.

Les Promenades Saint-Bruno shopping centre, one of this year's largest new customer accounts.

Farm use

Agricultural operations in Québec are consolidating. The number of farms is decreasing but their size is increasing. Thus in 1978 the number of farm accounts went from 73,523 to 72,508, a decrease of 1.4%.

Billed sales to customers in this category increased 3.4% to reach 1.5 billion kilowatthours.

Revenue from these sales amounted to $31,526,000, which was 20.2% more than in 1977.

General use

The general-use category includes commercial establishments and a wide variety of other customers such as schools, hospitals, hotels and some apartment buildings.

During the year, 6,735 new customer accounts brought the total number in this category to 237,066, or 2.9% more than in 1977. Consumption in this category amounted to 16.9 billion kilowatthours, which was 7.0% more than in the previous year.

Revenue from this category of customer increased 26.5% to reach $395,644,000.

Industrial use

The number of industrial customer accounts went from 10,920 at the end of 1977 to 10,897 in 1978. This slight decrease was attributable to the reclassification of certain industrial customers into the general-use category.

The resurgence of activity in certain manufacturing sectors contributed to the 6.2% increase in primary electricity sales to this category of customer. In 1978, industrial customers bought 29.4 billion kilowatthours, producing revenue of $376,211,000. Sales in this category increased only 2.4% in 1977, and in 1975 and 1976 they were less than in 1974.

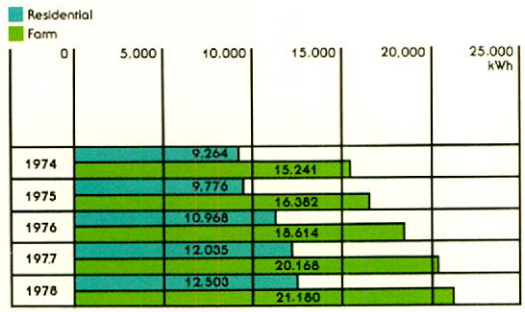
In 1978, the increase in sales to customers in this category using 5,000 kilowatts or more was attributable mainly to the pulp-and-paper and electrometallurgical industries, whose consumption increased 9.4% and 9.0% respectively after remaining almost stationary in 1977.

The other primary electricity sales to Québec customers, which include sales to municipal systems and neighboring systems as well as sales to the transportation and public-lighting sectors, amounted to 3.8 billion kilowatthours and brought in $78,403,000 in revenue.

Increase in average revenue per kilowatthour (1978/1977)

Residential	13.7 %
Farm	16.4 %
General	18.1 %
Industrial	16.5 %
Primary sales outside Québec	98.1 %
Other sales	19.7 %
Sales of primary electricity	17.5 %
Sales of secondary electricity	23.6 %
Total sales	19.3 %

Average annual consumption per residential account and farm account*



*Based on the average of the number of accounts at the beginning and end of each year.

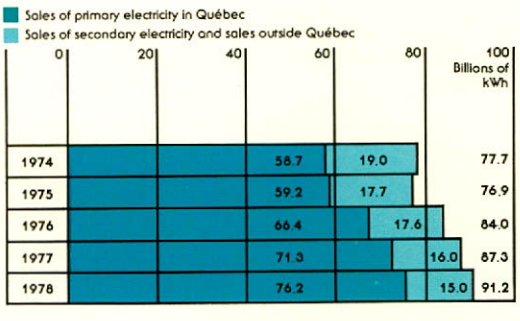
Sales outside Québec and secondary electricity

Sales of primary electricity outside Québec increased 9.6% to reach 3.9 billion kilowatthours. Revenue from these sales amounted to $40,562,000, an increase of 117.0%. The revenue per kilowatthour for these sales increased 98.1% to 1.034¢.

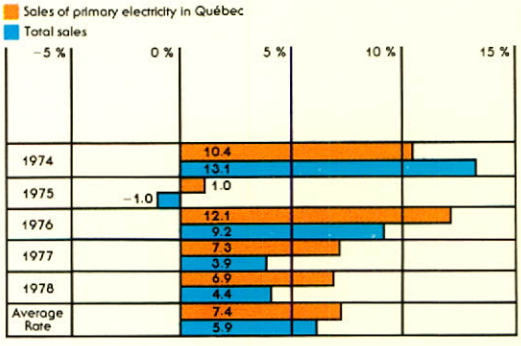
The resumption of growth in the industrial sector also led to an increase in secondary electricity sales in Québec. Fifteen firms bought 1.9 billion kilowatthours in 1978. This was 39.6% more than in the preceding year. Revenue from secondary electricity sales in Québec rose 54.0% to $11,602,000.

In 1978, less secondary electricity was available for customers outside Québec than in 1977 due to the increase in secondary sales in Québec and primary sales outside Québec. Sales of secondary electricity outside Québec declined to 9.2 billion kilowatthours, which was 17.1% less than in 1977. Despite the smaller volume, revenue increased 6.0% to reach $88,441,000. Sales of secondary electricity to the United States totaled 0.7 billion kilowatthours and brought in revenue of $11,200,000. This was 31.8% more in volume and 40.0% more in revenue than in 1977.

Breakdown of sales



Annual and average growth rates of electricity sales, 1974-1978



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Auditors' Report

We have examined the consolidated balance sheet of Hydro-Québec as at December 31, 1978 and the consolidated statements of operations, reserves, and changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these consolidated financial statements present fairly the financial position of Hydro-Québec as at December 31, 1978 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles which, except for the change in the basis of amortization of certain pension costs described in Note 6 to the consolidated financial statements, have been applied on a basis consistent with that of the preceding year.

Montréal, Canada,
March 27, 1979.

H. Marcel Caron & Associés
affiliated with Clarkson, Gordon & Co.
Chartered Accountants

Samson, Bélair & Associés
Chartered Accountants

Consolidated Statement of Operations

(in thousands of dollars)
for the year ended December 31

		1978	1977
Revenue	Sales of electricity: primary	$ 1,449,749	$ 1,153,730
	secondary	100,043	90,986
		1,549,792	1,244,716
	Increase in unbilled revenue	49,709	18,351
		1,599,501	1,263,067
	Other operating income (net)	22,113	22,183
		1,621,614	1,285,250
Expenditure	Operating, maintenance, administration and other	448,740	379,759
	Power purchased	125,593	122,171
	Provision for renewals (depreciation)	107,970	97,797
	Provincial levy	20,000	20,000
	School and municipal taxes	20,388	20,217
		722,691	639,944
Net operating income		**898,923**	645,306
	Interest (Note 5)	375,980	263,792
Net income before allocations to reserves		**$ 522,943**	$ 381,514
Allocations to reserves	Interest	**$ 200,504**	$ 167,877
	Provisions:		
	Contingencies	252,584	153,899
	Rate stabilization	31,990	25,262
	Amortization of capital invested	37,865	34,476
		322,439	213,637
		$ 522,943	$ 381,514

See accompanying notes

Consolidated Balance Sheet
(in thousands of dollars)
as at December 31

	Assets	1978	1977
Fixed assets	Property and plant:		
	In service	$ 6,758,979	$ 6,154,082
	Less reserve for renewals (accumulated depreciation)	1,363,095	1,274,971
		5,395,884	4,879,111
	Construction work in progress	6,220,866	4,282,964
		11,616,750	9,162,075
	Construction, operating and research equipment, at cost less accumulated depreciation	90,975	81,953
		11,707,725	9,244,028
Current assets	Cash and short-term investments	431,451	761,298
	Accounts receivable and accrued interest	216,979	182,364
	Unbilled revenue	169,804	120,095
	Materials, fuel and supplies	91,329	80,167
		909,563	1,143,924
Other assets	Investments (Note 2)	131,576	131,697
	Unamortized debenture discount and expenses	101,935	92,263
	Unamortized deferred cost on purchase of energy	35,686	36,651
		269,197	260,611
		$12,886,485	$ 10,648,563

	Liabilities and Reserves	1978	1977
Long-term debt	Bonds and debentures less sinking funds (Note 3)	$ 8,900,099	$ 7,486,069
	Other long-term debt (Note 4)	194,727	167,023
		9,094,826	7,653,092
	Less amount payable within one year	197,368	100,770
		8,897,458	7,552,322
Notes payable	Notes payable within one year	**55,119**	18,678
Current liabilities	Bank indebtedness	52,713	28,430
	Accounts payable and accrued liabilities	479,351	362,456
	Accrued interest	322,661	227,035
	Long-term debt payable within one year	197,368	100,770
		1,052,093	718,691
Reserves	Contingencies	1,432,525	1,087,503
	Rate stabilization	466,336	400,319
	Amortization of capital invested	982,954	871,050
		2,881,815	2,358,872
		$12,886,485	$ 10,648,563

See accompanying notes

On behalf of Hydro-Québec:
(signed) Lucien Saulnier
(signed) Robert A. Boyd

Montréal, Canada,
April 2, 1979.

(signed) Roger Girard
Directeur général
Contrôle et Comptabilité

Consolidated Statement of Reserves

(in thousands of dollars)
for the year ended December 31

	1978				1977
	Contingencies	Rate stabilization	Amortization of capital invested	Total	Total
Balance, beginning of year	$ 1,087,503	$ 400,319	$ 871,050	$ 2,358,872	$1,977,358
Add:					
Interest	92,438	34,027	74,039	200,504	167,877
Provisions	252,584	31,990	37,865	322,439	213,637
Balance, end of year	**$1,432,525**	**$466,336**	**$982,954**	**$2,881,815**	$2,358,872

See accompanying notes

Consolidated Statement of Changes in Financial Position

(in thousands of dollars)
for the year ended December 31

		1978	1977
Source of financial resources	Operations:		
	Net income before allocations to reserves	$ 522,943	$ 381,514
	Add items not resulting in an outlay of financial resources:		
	Provision for renewals (depreciation)	107,970	97,797
	Depreciation of operating and research equipment	14,932	12,899
	Amortization of debenture discount and expenses	9,037	6,738
	Amortization of deferred cost on purchase of energy	965	964
	Total financial resources provided by operations	**655,847**	499,912
	Issue of debentures and other long-term debt less discount and expenses	1,537,194	1,083,115
	Increase (decrease) in notes payable	36,441	(2,794)
	Decrease in cash and short-term investments less bank indebtedness	354,130	344,548
	Increase in accounts payable and accrued liabilities and accrued interest	212,521	110,758
	Sundry items	3,244	3,855
		$2,799,377	$ 2,039,394
Application of financial resources	Investments in fixed assets	$ 2,588,411	$ 1,950,296
	Redemptions of bonds and debentures and other long-term debt	115,480	95,655
	Increase (decrease) in accounts receivable and accrued interest and unbilled revenue	84,324	(13,641)
	Increase in materials, fuel and supplies	11,162	7,084
		$2,799,377	$ 2,039,394

See accompanying notes

Notes to Consolidated Financial Statements
December 31, 1978

Note 1

Summary of significant accounting policies

A summary of the major accounting policies of Hydro-Québec is presented below to assist the reader in analyzing the consolidated financial statements.

a) Consolidation

The consolidated financial statements include the financial statements of Hydro-Québec and of all its subsidiary companies including Société d'énergie de la Baie James.

b) Rates and Reserves

Under the provisions of its Act, the object of Hydro-Québec is to supply power in the Province de Québec at the lowest rates consistent with sound financial administration. More specifically, the Hydro-Quebec Act provides that the rates should be maintained at a level sufficient to defray all costs and to accumulate three reserves: Contingencies, Rate stabilization and Amortization of capital invested. Rates are fixed by Hydro-Québec and are subject to the approval of the Lieutenant-Governor in Council.

Each year, Hydro-Québec must credit to these three reserves, from its net income, interest calculated at a rate equivalent to the weighted average of the effective interest rates on all its outstanding long-term debt (8.50% in 1978 and 8.49% in 1977). The balance of net income is allocated to the reserves and contributes to an adequate coverage of interest charges and to the financing of part of the construction program.

The three reserves constitute the net worth of Hydro-Québec.

c) Investments

All of the short-term investments mature within three months and are shown at cost, which approximates market value. The long-term investments are carried at cost (see Note 2).

d) Materials, fuel and supplies

Hydro-Québec values its inventories of materials, fuel and supplies on the basis of average cost. The materials and supplies are primarily those required for the construction and maintenance of its distribution system.

e) Unamortized deferred cost on purchase of energy

In accordance with the terms of a contract with Churchill Falls (Labrador) Corporation Limited ("CFLCo") (see Note 7), Hydro-Québec absorbs the part of the interest charges attributable to the excess of the effective interest rate on the First Mortgage Bonds of CLFCo over 5½% and on the General Mortgage Bonds and other indebtedness over 6%. The portion of these payments that was deferred before the plant reached full production in 1975 is amortized over the life of the contract on a straight-line basis (40 years) by charges to the cost of power purchased. Annual payments which Hydro-Québec has to make under this agreement are also charged to the cost of power purchased.

f) Sinking funds

Hydro-Québec invests substantially all of its sinking funds in its own debentures and in bonds of its subsidiaries and follows the practice of carrying these investments at par, which may not be indicative of cost or current market value. The resulting profit, net of unamortized debenture or bond discount and other expenses, is included with interest expense in the consolidated statement of operations. Debentures or bonds of an issue purchased for the sinking fund of that issue are cancelled.

g) Foreign currency translation (see Note 3)

Consolidated long-term debt payable in foreign currencies is shown on the balance sheet at the Canadian dollar equivalent at the dates of borrowing. Current assets and liabilities, including long-term debt payable within one year, denominated in foreign currencies, are translated into Canadian currency at year-end rates of exchange and the resulting unrealized exchange gains or losses, together with exchange gains and losses at maturities of debentures and at purchases for sinking funds, are included with interest expense in the statement of operations.

h) Property and plant, and Reserve for renewals (accumulated depreciation)

Property and plant include generation, transmission, distribution and administration and service facilities. They are carried at cost which includes material, direct labor and overhead costs such as engineering and administration that are applicable to the construction program. The cost also includes interest charged to Construction work in progress as explained under (i) below. Expenditures for additions, improvements and renewals are capitalized and expenditures for maintenance and repairs are charged to operations. When assets are sold or retired, their cost and accumulated depreciation, net of salvage proceeds, are transferred to a separate account and the net amount is amortized over a period of 10 years using the sinking fund method.

Note 1 — Summary of significant accounting policies *(cont'd)*

Preliminary engineering, investigation work and survey costs incurred on projects before their authorization for construction are included in Construction work in progress and no interest is charged on these costs until such authorization. When a project is abandoned, its costs are charged to operations.

The costs of generating facilities are transferred to Property and plant in service by instalments proportionate to the number of generating units completed and in service in relation to the total number of units of the project. The costs of transmission, distribution and other facilities are transferred to Property and plant in service when completed and in commercial operation.

Hydro-Québec uses a sinking fund method of providing for depreciation of its property and plant, including intangible assets, based on their respective estimated service lives. The rate of interest used in applying the sinking fund method is 3%.

The expected service lives for the main categories of Property and plant in service are as follows:

Category	Life
Hydraulic powerhouses	50 years
Hydraulic turbines and generators	40 years
Dams and reservoirs	50 years
Transmission towers (steel) and conductors	50 years
Distribution poles (wood)	25 years
Distribution conductors	40 years
Intangible assets	25 years

i) Interest charged to Construction work in progress

Interest is charged to Construction work in progress at a rate equivalent to the weighted average of the effective interest rates on debentures of Hydro-Québec issued to finance such construction. This rate was 9.02% in 1978 and 9.50% in 1977.

j) Construction, operating and research equipment

This equipment is carried at cost. Hydro-Québec uses the straight-line method of providing for depreciation of these assets based on their respective estimated service lives. The cost of equipment used for the construction of major generating facilities is included in Construction work in progress.

k) Unbilled revenue

Revenues are recorded on the basis of cyclical billings and accrued in respect of energy delivered but not billed.

Note 2

Investments, at cost

	1978 ($'000)	1977 ($'000)
Churchill Falls (Labrador) Corporation Limited ("CFLCo") (see Note 7)		
General Mortgage Bonds, 7½%, due 2010 (par value $100 million)	$ 90,500	$ 90,500
Common shares	34,333	34,333
	124,833	124,833
Gelco Enterprises Ltd., 4% unsecured note, due 1991	6,652	6,773
Sundry investments	91	91
	$131,576	$ 131,697

The shares of CFLCo are held 65.8% by Newfoundland and Labrador Hydro-Electric Corporation (a crown corporation of the Province of Newfoundland), and 34.2% by Hydro-Québec. The share of Hydro-Québec in the earnings, dividends and retained earnings of CFLCo to December 31, 1978 is as follows:

	Earnings ($'000)	Dividends ($'000)	Retained earnings (see below) ($'000)
Share of retained earnings at December 31, 1976			$ 37,295
1977	$ 10,676	$ 8,086	2,590
1978	12,782	9,882	2,900
Share of retained earnings at December 31, 1978			**$ 42,785**

Dividends are included in Investment income (see Note 5).

During 1976, CLFCo qualified for exemption from income taxes and added to its retained earnings of that year deferred income taxes accumulated since the beginning of its operations. In order not to deprive the Province of Newfoundland of the income tax revenues that it would have been entitled to, had the CFLCo tax status not been changed, the two shareholders have agreed that dividends would be paid by CFLCo to the Province of Newfoundland for amounts equivalent to the income taxes that it would have otherwise received.

Note 3

Series	Interest rates	Years of issue	Years of maturity	Bonds and debentures ($'000)
Debentures of Hydro-Québec — Guaranteed by the Province de Québec				
*"N"	3½%	1956	1981	$ 17,155 U.S.
*"P"	4¼%	1956	1981	13,673 U.S.
*"S"	5%	1957	1982	13,241
*"T"	3¾%	1958	1983	24,441 U.S.
*"V"	5%	1958	1979	13,681
*"W"	5%	1959	1980	18,424
*"X"	5%	1959	1984	31,023 U.S.
*"Y"	6%	1959	1979	16,441
*"Z"	5½%	1960	1982	22,387
*"AA"	5½%	1960	1983	16,972
*"AB"	5½%	1961	1985	27,273
*"AC"	5½%	1961	1985	25,036
*"AD"	5½%	1962	1982	28,449
*"AF"	5¾%	1962	1984	36,967
*"AG"	5%	1963	1988	211,430 U.S.
*"AM"	5¼%	1963	1986	34,418
*"AN"	5½%	1964	1984, 1994	29,061
*"AO"	4½%	1964	1994	50,000 U.S.
*"AP"	4¾%	1964	1989	35,375 U.S.
*"AQ"	5½%	1964	1988	43,376
*"AR"	5½%, 5%	1965	1987, 1995	51,562
*"AS"	4⅝%	1965	1985	40,965 U.S.
*"AT"	5¼%	1966	1987	40,699 U.S.
*"AU"	6%	1966	1991	39,149
*"AV"	5⅜%	1966	1992	48,759 U.S.
*"AW"	6%	1966	1980, 1990	38,236
*"AX"	6¼%	1966	1991	29,619 U.S.
*"AY"	6¼%	1967	1993	46,621 U.S.
*"AZ"	6½%	1967	1990	30,262
*"BA"	6¼%	1967	1993	41,648 U.S.
*"BB"	6½%	1967	1992	40,523 U.S.
*"BC"	7%, 6%, 7%	1967	1980, 1994	44,393
*"BD"	6⅞%	1968	1989	50,708 U.S.
*"BE"	7½%, 7%	1968	1980, 1994	38,000
*"BF"	7¾%	1968	1986	22,679 U.S.
*"BG"	7¼%	1968	1991	41,647 U.S.
* —	6¾%	1969	1984 (90,000,000 Deutsche marks)	24,130
* —	7¼%	1969	1984 (60,000,000 Deutsche marks)	16,227
*"BH"	7¾%	1969	1990	206
*"BI"	8¾%	1969	1999	45,179 U.S.
"BJ"	8%	1969	1979	5,861 U.S.
*"BK"	8½%	1969	1992	24,178
*"BL"	9¾%	1969	1995	45,513 U.S.
*"BM"	9½%	1970	1990	5,622
*"BN"	9¼%	1970	1995	55,547 U.S.
*"BO"	9½%	1970	1990	27,050
*"BP"	9½%	1970	1997	69,173 U.S.
*"BQ"	9¼%	1970	1985	9,300 U.S.
*"BR"	8¾%	1971	1999	68,656 U.S.
*"BS"	8¼%	1971	1986	14,400 U.S.
*"BT"	7¾%	1971	1996	46,000
*"BU"	8¾%	1971	1996	46,569
* —	8%	1971	1986 (80,000,000 Deutsche marks)	23,868
*"BV"	8½%	1971	2001	71,887 U.S.
*"BW"	8½%	1971	1986	21,000 U.S.
*"BX"	7⅞%	1972	2002	97,391 U.S.
* —	6½%	1972	1987 (90,000,000 Deutsche marks)	28,252
*"BY"	8¼%	1972	1997	47,188
*"BZ"	8¼%	1972	1993	56,250
*"CA"	8%, 8⅜%	1972	1980, 1997	61,689
"CB"	8¼%	1972	1996	50,000
* —	6¼%	1972	1987 (80,000,000 Swiss francs)	21,021
*"CC"	7½%	1973	2003	122,239 U.S.
"CD"	8%	1973	1998	50,000
* —	6½%	1973	1988 (100,000,000 Deutsche marks)	35,234
"CE"	8¼%	1973	1998	55,000
*"CF"	8½%	1973	2003	99,963 U.S.

Note 3 — Bonds and debentures *(cont'd)*

Series	Interest rates	Years of issue	Years of maturity	Bonds and debentures ($'000)	
"CG"	8¾%	1973	1998	$ 50,000	
"CH"	8½%	1973	1998	50,000	
*"CI"	8¼%	1974	2004	124,838	U.S.
*"CJ"	8½%	1974	1989	28,000	U.S.
"CK"	9%	1974	1999	60,000	
"CL"	9⅛%	1974	1996	80,000	
*"CM"	10⅞%	1974	1999	150,000	U.S.
—	2%	1974	1979 (40,000,000 Swiss francs)	13,200	
"CN"	10%	1974	1980	50,000	
"CO"	10%	1974	1982	100,000	
"CP"	10%	1974	1982	100,000	U.S.
*"CQ"	10¼%	1975	2005	200,000	U.S.
"CR"	9%, 9¾%	1975, 1977	1985, 2000	245,000	
"CS"	10%	1975	2000	80,000	
*"CT"	9¾%	1975	2005	198,750	U.S.
"CU"	10¼%	1975	1997	65,000	
—	3¼%	1975	1980 (100,000,000 Swiss francs)	38,400	
"CV"	9½%	1975	1981	50,000	
*"CW"	10%	1975	2005	250,000	U.S.
—	3%	1975	1980 (100,000,000 Swiss francs)	38,500	
*"CX"	10¼%	1976	1996	1,000,000	U.S.
*"CY"	10¾%	1976	1996	35,000	
* —	6%	1976	1991 (80,000,000 Swiss francs)	31,900	
*"CZ"	8⅝%	1976	2006	250,000	U.S.
"DA"	10%	1976	2001	120,000	
"DB"	8½%	1976	1986	125,000	U.S.
*"DC"	8¾%	1976	1996	50,000	U.S.
—	5⅜%	1976	1981 (300,000,000 Swiss francs)	124,200	
"DD"	10%	1977	1997	100,000	
—	8½%	1977	1992 (20,000,000,000 Japanese Yen)	80,500	
*"DE"	9%	1977	1992	118,750	U.S.
* —	6½%	1977	1987 (199,250,000 Deutsche marks)	92,452	
—	5¼%	1977	1982 (300,000,000 Swiss francs)	131,800	
*"DF"	9¼%	1977	1997	225,000	U.S.
* —	5%	1977	1992 (100,000,000 Swiss francs)	45,000	
* —	6¼%	1977	1987 (145,000,000 Deutsche marks)	73,413	
* —	3¾%	1978	1993 (130,000,000 Swiss francs)	75,140	
"DG"	10¼%	1978	2003	120,000	
"DH"	10%	1978	2003	250,000	
*"DI"	9½%	1978	1993	48,750	U.S.
*"DJ"	10%	1978	2008	100,000	U.S.
"DK"	9¾%	1978	1993	50,000	U.S.
—	11%, 12¾%, 12½%	1978	1986	750,000	U.S.
Total debentures of Hydro-Québec				**$8,667,479**	

*Sinking fund debentures

Bonds of subsidiaries

The Shawinigan Water and Power Company					
"S"	5¾%	1961	1981	$ 12,278	
Southern Canada Power Company Limited					
"D"	3⅜%	1951	1981	2,425	
Quebec Power Company					
"G"	6¼%	1962	1982	10,469	
Lower St. Lawrence Power Company					
"F"	5⅞%	1959	1984	790	U.S.

Note 3 — Bonds and debentures *(cont'd)*

Series	Interest rates	Years of issue	Years of maturity	Bonds and debentures ($'000)
Saguenay Electric Company				
"A"	5½%	1962	1982	$ 3,340
Total bonds of subsidiaries				**$ 29,302**
Total bonds and debentures				**$8,696,781**
Total bonds and debentures				$ 8,696,781
Add net exchange premium at dates of borrowing on debt payable in U.S. currency				211,223
				8,908,004
Less sinking fund investments				7,905
				$8,900,099

Bonds of subsidiaries are guaranteed by Hydro-Québec, which guarantee is in turn guaranteed by the Province de Québec.

On January 26, 1978, Hydro-Québec entered into a credit agreement consisting of a U.S. $750,000,000 medium-term loan and a U.S. $500,000,000 standby line of credit, both maturing not later than 8½ years from the date of execution of the credit agreement and bearing interest at ¾% over the London Interbank Offered Rate (LIBOR) for 1 to 6-month deposits. Also, in July 1978, Hydro-Québec entered into a $500,000,000 loan agreement consisting of a revolving line of credit until 1984 when amounts outstanding are to be converted into a six-year term loan at variable interest rates based upon fluctuations in the Canadian chartered banks' prime lending rate. As at December 31, 1978, only the U.S. $750,000,000 medium-term loan had been drawn.

In February 1979, Hydro-Québec issued U.S. $193,435,000 ($231,245,000 Canadian equivalent) and agreed to issue U.S. $6,565,000 of 10% debentures maturing in 2009.

In March and April 1979, Hydro-Québec issued $15,000,000 of 10.40% debentures maturing in 1989, and $135,000,000 of 10.75% debentures maturing in 2004.

Consolidated long-term debt maturities and sinking fund requirements in each of the next five years are approximately as follows (in Canadian dollar equivalent at the date of borrowing):

	Canadian dollars ($'000)	United States dollars ($1,095,422,000 U.S.) ($'000)	Deutsche marks (340,141,000 DM) ($'000)	Swiss francs (903,000,000 SFr) ($'000)	Total ($'000)
1979	$ 50,079	$ 109,335	$ 24,754	$ 13,200	$ 197,368
1980	124,135	113,057	22,151	78,894	338,237
1981	84,037	155,811	22,151	128,444	390,443
1982	195,350	423,281	22,152	139,801	780,584
1983	38,075	350,707	22,152	11,942	422,876
	$ 491,676	**$1,152,191**	**$ 113,360**	**$ 372,281**	**$2,129,508**

Consolidated long-term debt at December 31, 1978 includes $5,172,310,000 U.S., 691,000,000 Deutsche marks, 1,190,000,000 Swiss francs, and 20,000,000,000 Japanese Yen. If the long-term debt payable in various currencies in the principal amount of $8,897,458,000 at December 31, 1978 were translated into Canadian dollars at the rates of exchange prevailing on that date, this principal amount would be increased by approximately $1,341,142,000 to $10,238,600,000.

Note 4

Other long-term debt

	1978 ($'000)	1977 ($'000)
Rural Electrification Bureau, 1979 — 1994*	$ 4,285	$ 4,938
Government of Canada, 1979 — 1999**	19,235	19,618
Atomic Energy of Canada Limited**	151,000	137,000
Present value of lease obligations for regional office and service facilities, for a 25-year period ending in 2003, capitalized at interest rate charged to Construction work in progress (see Note 1 (i))	20,090	5,304
Other long-term debt maturing from 1979 to 1984	117	163
	$194,727	$167,023

*Does not bear interest as long as there is no default under the provisions of the governing agreements.
**Notes guaranteed by the Province de Québec at various rates from 7 3/16% to 10% payable in 25 equal annual instalments following completion of the project involved.

Note 5

Interest

	1978 ($'000)	1977 ($'000)
Interest on long-term debt	$ 785,411	$ 620,860
Interest on bank indebtedness and notes payable	5,299	4,397
Amortization of debenture discount and expenses	9,037	6,738
Foreign exchange loss on repurchase of debentures and translation of current assets and liabilities	61,311	10,181
	861,058	642,176
Less:		
Interest charged to Construction work in progress	414,841	282,047
Investment income	64,096	90,592
Net profit on repurchase of debentures	6,141	5,745
	485,078	378,384
	$375,980	$ 263,792

Note 6

Pensions

The Hydro-Québec employees' retirement plan is a contributory, benefit-based plan, under which the benefits payable are guaranteed by Hydro-Québec. The most recent actuarial valuation of the plan, at December 31, 1977, reported an estimated deficit, on a present value basis, of approximately $163,000,000 at that date. Of this amount, $21,000,000 arose from an initial actuarial deficit in respect of services prior to 1966 which is being amortized and funded over a period ending December 31, 1995.

Of the balance, $41,000,000 arose from a deficit resulting from changes in actuarial assumptions imposed by amendments in provincial legislation, and $101,000,000 arose from an experience deficiency. These amounts are being amortized and funded over a fifteen-year period beginning in 1978; prior to 1978, such deficit and deficiency were amortized and funded over a period of five years. This change in the basis of amortization has reduced the amortization of pension costs for 1978 by approximately $18,000,000 compared with the amount of amortization had Hydro-Québec continued to use a five-year amortization period.

The total pension cost of $48,609,000 for 1978 ($27,816,000 for 1977) provides fully for Hydro-Québec's contribution to the Québec Pension Plan and to the Hydro-Québec Retirement Fund in respect of current services and amounts required to amortize any unfunded obligations.

Additional past service obligations of $54,500,000 at December 31, 1977, on a present value basis, as determined by an actuarial survey at that date, have resulted from supplementary amounts that Hydro-Québec had decided to pay to improve the pension benefits of certain of its employees and pensioners. This amount is being substantially amortized over a period of thirty years by annual charges to operations. Hydro-Québec paid $3,561,000 in 1978 ($3,423,000 in 1977) in respect of these benefits.

Note 7

Commitments, contingencies and projected capital expenditures

Churchill Falls

In May 1969, Hydro-Québec executed a contract with Churchill Falls (Labrador) Corporation Limited ("CFLCo") for the purchase, starting in 1972, of energy from a generating station at Churchill Falls in Labrador with a rated capacity of 5,225,000 kilowatts.

The power contract provides for the purchase by Hydro-Québec for a period of 40 years from the Effective Date as defined in the power contract (September 1, 1976) of virtually all the power generated at Churchill Falls, except for an amount not to exceed 300,000 kilowatts of such power which may be recaptured by CFLCo. This contract will be automatically renewed for a further period of 25 years upon already agreed terms. The price to be paid by Hydro-Québec for the energy, which should be finalized in 1979, will vary until the year 2016 and will depend upon the final cost of construction of the plant. It is estimated that the maximum total annual payments by Hydro-Québec for energy will range from $93,000,000 to $80,000,000 until the year 2016 and will be approximately $63,000,000 during the subsequent 25 years.

In addition, Hydro-Québec is obligated to pay CFLCo an amount equal to a part of the interest charges on the First Mortgage Bonds, General Mortgage Bonds and other indebtedness of CFLCo. Hydro-Québec estimates that these payments will not exceed $15,000,000 per annum, declining as the bonds and other indebtedness are retired. Subject to certain limitations and compensations, the contract requires Hydro-Québec to make payments for energy whether or not taken; Hydro-Québec can also be required to make additional advances, against the issue of units of Subordinate Debentures and shares of Common Stock, to service the debt of CFLCo and to cover its expenses if funds are not otherwise available.

On September 14, 1976, CFLCo and Hydro-Québec were served with concurrent Writs of Summons and a Statement of Claim in an action brought by the Attorney General of Newfoundland before the Supreme Court of Newfoundland, seeking a judgment declaring that Newfoundland is entitled under the CFLCo lease to make a request to CFLCo for

Note 7 — Commitments, contingencies and projected capital expenditures *(cont'd)*

800,000 kilowatts of power generated from the waters of the Upper Churchill River watershed commencing October 1, 1983, that CFLCo is obliged to comply with such request, and that such compliance would not constitute a default under the power contract or the financing agreements of CFLCo. Hydro-Québec is defending the action in the Newfoundland Supreme Court and has been advised by its counsel that the validity of such contract and the enforceability thereof according to its terms cannot be successfully challenged before the courts, and in particular that the above action, insofar as it claims a declaration which would affect the existing rights of Hydro-Québec under the power contract, is unfounded. In addition, Hydro-Québec has commenced proceedings before the Superior Court of the District of Montréal to obtain a judgment confirming, in substance, that it is entitled, under the power contract, to virtually all of the power generated by the Churchill Falls plant and that if CFLCo does not sell and deliver such power it will be in breach of the power contract. This litigation is presently before the courts.

James Bay

In 1971, the Gouvernement du Québec created Société de développement de la Baie James to undertake the development of the natural resources in northwestern Québec and Société d'énergie de la Baie James to develop the hydro-electric resources of the same area. On October 1, 1978, an Act came into force to amend the objects of Société d'énergie de la Baie James and rendering Hydro-Québec responsible for hydro-electric resource development and electricity production in the James Bay Region, while empowering Société d'énergie de la Baie James to continue for the account of Hydro-Québec the development of the La Grande Complex and to assume the engineering, construction and management of such large-scale projects as requested by Hydro-Québec.

At December 31, 1978, all the shares of the authorized capital stock of Société d'énergie de la Baie James were either owned or subscribed for by Hydro-Québec.

The James Bay project as revised in August 1976 consisted of the construction of four generating plants on the La Grande River with a projected capacity of 10,420,000 kilowatts at an estimated cost of $16,200,000,000 with completion expected in 1985.

In September 1978, a decision was made to revise the configuration of the project and to add two generating units at LG-3 and at LG-4, for an additional peak power capacity of 970,000 kilowatts. LG-1 has been deferred to the second phase of the La Grande River construction program. Phase I of the James Bay project now consists of three generating plants with an installed capacity of 10,269,000 kilowatts at an estimated cost of $15,100,000,000. At December 31, 1978, $5,000,000,000 had been invested in the project.

Several agreements have been entered into with the James Bay Crees, the Inuit of Québec, the Naskapis of Québec, Hydro-Québec, Société d'énergie de la Baie James, the Gouvernement du Québec and the Government of Canada. These agreements provide for, among other things, the extinguishment of all respective claims of the Crees, Inuit and Naskapis in and to certain territories in the Province de Québec, including the territory on which the project is located.

Under these agreements Hydro-Québec or Société d'énergie de la Baie James are committed to pay, in various instalments and without interest, $37,000,000 from January 1979 to November 1980 and $78,000,000 from 1980 to 1996. These amounts will be provided for in the accounts when paid.

Agreements with Atomic Energy of Canada Limited

In January 1978, Hydro-Québec signed agreements with Atomic Energy of Canada Limited (AECL) providing for the continuation by AECL of construction of the La Prade heavy water plant and the purchase by Hydro-Québec on or before December 31, 1989, of 1,440 metric tons of heavy water produced by AECL at a price based on the average cost of production of AECL's plants plus a profit margin. The current market price for heavy water is approximately $259,000 per metric ton. The agreements also provide for the undertaking by Hydro-Québec to build another CANDU nuclear power station of at least 600,000 kilowatts capacity at the Gentilly site before the end of the 1980's.

The La Prade plant, owned by AECL, is under construction at Bécancour, on a site 1.5 kilometres from Hydro-Québec's nuclear complex. The plant has a nominal capacity of 800 metric tons of heavy water annually and, under the agreements, is scheduled for completion in 1982.

The cost of the heavy water plant is estimated at $846,000,000 (before including interest during construction), including $50,000,000 to be financed by Hydro-Québec for the necessary modifications to its Gentilly 2 station to enable it to supply steam to the La Prade plant.

The agreements give Hydro-Québec the option of acquiring the La Prade plant up to 1990 and the right of first refusal should AECL contemplate sale of the plant during the option period and thereafter. The purchase price to 1990 shall be the capital cost of the plant less the aggregate repayments on account of principal borrowed to finance the plant.

The agreements also stipulate that AECL will buy back at the end of 1995, or earlier should AECL require it, any amount of heavy water in excess of that required for the commissioning of Gentilly 3 and which Hydro-Québec wishes to sell.

Discussions are presently being held between the Government of Canada and the Gouvernement du Québec concerning these agreements.

Projected capital expenditures

Hydro-Québec carries on a continuous construction program in anticipation of future demand for electrical power in the Province. The capital expenditures projected for the calendar year 1979, including the James Bay project, amount to $2,871,000,000.

Note 8

Reclassification of comparative figures

Certain of the figures for 1977 have been reclassified to conform with the presentation adopted in the current year.

Summary of Consolidated Operations: 1974 to 1978

(in thousands of dollars)

		1978	1977	1976	1975	1974
Revenue	Sales of electricity: primary	$ 1,449,749	$1,153,730	$1,002,634	$ 850,082	$ 738,866
	secondary	100,043	90,986	43,601	42,529	36,542
		1,549,792	1,244,716	1,046,235	892,611	775,408
	Increase in unbilled revenue	49,709	18,351	24,963	11,599	7,764
		1,599,501	1,263,067	1,071,198	904,210	783,172
	Other operating income (net)	22,113	22,183	20,615	17,879	14,709
		1,621,614	1,285,250	1,091,813	922,089	797,881
Expenditure	Operating, maintenance, administration and other	448,740	379,759	328,874	266,392	236,853
	Power purchased	125,593	122,171	113,660	106,633	86,930
	Provision for renewals (depreciation)	107,970	97,797	92,786	84,394	78,447
	Provincial levy	20,000	20,000	20,000	20,000	20,000
	School and municipal taxes	20,388	20,217	19,209	18,806	18,379
		722,691	639,944	574,529	496,225	440,609
Net operating income		**898,923**	645,306	517,284	425,864	357,272
Interest	Interest on long-term debt	785,411	620,860	485,567	344,330	259,472
	Interest on bank indebtedness and notes payable	5,299	4,397	4,143	3,732	4,085
	Amortization of debenture discount and expenses	9,037	6,738	5,430	4,602	3,990
	Foreign exchange loss (or gain) on repurchase of debentures and translation of current assets and liabilities	61,311	10,181	(301)	192	(2,251)
	Interest charged to Construction work in progress	(414,841)	(282,047)	(186,178)	(118,826)	(62,757)
	Investment income	(64,096)	(90,592)	(93,475)	(27,222)	(15,150)
	Net profit on repurchase of debentures	(6,141)	(5,745)	(8,542)	(10,694)	(6,740)
		375,980	263,792	206,644	196,114	180,649
Net income before allocations to reserves		**$ 522,943**	$ 381,514	$ 310,640	$ 229,750	$ 176,623
Allocations to reserves	Interest	**$ 200,504**	$ 167,877	$ 134,671	$ 107,773	$ 88,476
	Provisions:					
	Contingencies	252,584	153,899	121,602	74,163	44,625
	Rate stabilization	31,990	25,262	21,424	18,084	15,663
	Amortization of capital invested	37,865	34,476	32,943	29,730	27,859
		322,439	213,637	175,969	121,977	88,147
		$ 522,943	$ 381,514	$ 310,640	$ 229,750	$ 176,623

Consolidated Sales and Revenue: 1974 to 1978

	Categories of use	1978	1977	1976	1975	1974	Average annual increase (%) 1978/1973
Electricity sales (in millions of kWh)	Primary						
	residential and farm	26,083	24,391	21,611	18,768	17,260	11.4
	general	16,926	15,812	14,673	13,113	12,033	8.7
	industrial	29,401	27,695	27,055	24,506	27,100	3.6
	municipal distribution systems	2,613	2,402	2,178	1,968	1,451	15.0
	neighboring systems	4,134	3,673	11,147	12,356	11,672	(15.6)
	other	928	885	860	850	815	4.3
		80,085	74,858	77,524	71,561	70,331	5.0
	Secondary						
	industrial	1,433	1,020	1,816	1,778	2,710	(8.0)
	neighboring systems	9,663	11,444	4,677	3,598	4,654	20.1
		11,096	12,464	6,493	5,376	7,364	13.0
	Total sales	**91,181**	87,322	84,017	76,937	77,695	5.9
Revenue from electricity sales (in thousands of dollars)	Primary						
	residential and farm	$ 558,929	$ 458,930	$ 376,990	$ 315,358	$ 269,075	18.8
	general	395,644	312,761	260,939	218,218	182,761	19.1
	industrial	376,211	304,332	260,736	218,308	201,068	17.0
	municipal distribution systems	37,510	28,470	23,729	17,265	12,619	28.5
	neighboring systems	42,638	19,377	54,183	58,675	54,434	1.9
	other	38,817	29,860	26,057	22,258	18,909	18.0
		1,449,749	1,153,730	1,002,634	850,082	738,866	17.8
	Secondary						
	industrial	9,042	5,747	8,171	8,188	9,042	11.6
	neighboring systems	91,001	85,239	35,430	34,341	27,500	54.8
		100,043	90,986	43,601	42,529	36,542	45.2
	Total revenue	**$1,549,792**	$1,244,716	$1,046,235	$ 892,611	$ 775,408	18.8
Average revenue per kWh	Primary sales						
	residential and farm	2.143¢	1.882¢	1.744¢	1.680¢	1.559¢	6.7
	general	2.337¢	1.978¢	1.778¢	1.664¢	1.519¢	9.6
	industrial	1.280¢	1.099¢	0.964¢	0.891¢	0.742¢	12.8
	municipal distribution systems	1.436¢	1.185¢	1.089¢	0.877¢	0.870¢	11.8
	neighboring systems	1.031¢	0.528¢	0.486¢	0.475¢	0.466¢	20.8
	other	4.183¢	3.374¢	3.029¢	2.619¢	2.320¢	13.1
		1.810¢	1.541¢	1.293¢	1.188¢	1.051¢	12.2
	Secondary sales						
	industrial	0.631¢	0.563¢	0.450¢	0.460¢	0.334¢	21.2
	neighboring systems	0.942¢	0.745¢	0.757¢	0.954¢	0.591¢	28.8
		0.902¢	0.730¢	0.672¢	0.791¢	0.496¢	28.6
	Total	**1.700¢**	1.425¢	1.245¢	1.160¢	0.998¢	12.1
Number of customer accounts (year-end)	residential and farm	2,059,581	2,011,403	1,941,604	1,893,969	1,841,671	2.9
	general	237,066	230,331	222,305	216,988	213,510	2.6
	industrial: primary sales	10,897(1)	10,920	10,668	10,543	10,425	1.4
	other	10,436	12,567	13,645	14,224	15,044	(7.0)
	Total	**2,317,980**	2,265,221	2,188,222	2,135,724	2,080,650	2.8

(1) Industrial customer accounts were reclassified in 1978.

Energy Needs of the Hydro-Québec System: 1974 to 1978

(in millions of kilowatthours)

		1978	1977	1976	1975	1974	Average annual increase (%) 1978/1973
Total Needs	Generated (gross)	63,329	61,268	61,206	54,623	60,189	1.8
	Received						
	purchased	38,650	35,255	34,381	31,687	25,938	16.0
	received as per agreement	2,982	2,616	1,972	2,629	1,802	17.8
		41,632	37,871	36,353	34,316	27,740	16.1
	Total Needs	**104,961**	99,139	97,559	88,939	87,929	6.2
Québec Needs	Primary sales in Québec	76,162	71,279	66,404	59,260	58,685	7.4
	Deliveries in Québec as per agreement	3,561	3,099	2,501	2,977	2,598	9.6
	Increase in unbilled sales	1,425	159	1,206	585	183	24.8
	Total — Priority consumption	**81,148**	74,537	70,111	62,822	61,466	7.7
	Consumption by generating stations	302	266	324	231	296	5.0
	Losses and other	8,037	7,972	9,218	7,974	7,027	6.9
	Total — Priority needs	**89,487**	82,775	79,653	71,027	68,789	7.6
	Secondary sales in Québec	1,882	1,348	2,013	1,870	4,119	(11.7)
	Total Québec Needs	**91,369**	84,123	81,666	72,897	72,908	6.9
Deliveries outside Québec	Primary sales	3,923	3,579	11,120	12,302	11,646	(16.2)
	Secondary sales	9,214	11,116	4,480	3,505	3,245	29.5
	Deliveries as per agreement	455	321	293	235	130	54.3
	Total Deliveries outside Québec	**13,592**	15,016	15,893	16,042	15,021	2.4
	Total Needs	**104,961**	99,139	97,559	88,939	87,929	6.2

Power Needs of the Hydro-Québec System: 1974 to 1978

(in thousands of kilowatts)

	1978	1977	1976	1975	1974	Average annual increase (%) 1978/1973
Total Needs	**17,196**	15,941	15,901	14,733	13,433	5.5
Priority Needs	**16,645**	15,763 (1)	14,767 (1)	12,959 (1)	11,457	7.8

(1) The power needs of 1977, 1976 and 1975 include respectively 190 MW, 138 MW and 192 MW which were withheld through application of interruptible-power clauses in certain contracts.

Hydro-Québec Employees' Retirement Fund

Auditors' Report

We have examined the statement of assets and reserve of the Hydro-Québec Employees' Retirement Fund as at December 31, 1978 and the statement of operations for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the assets of the Fund as at December 31, 1978 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Montréal, Canada,
March 27, 1979.

H. Marcel Caron & Associés
affiliated with Clarkson, Gordon & Co.
Chartered Accountants

Samson, Bélair & Associés
Chartered Accountants

Hydro-Québec Employees' Retirement Fund

Statement of Operations
(in thousands of dollars)
for the year ended December 31

		1978	1977
Revenue	Current contributions:		
	Employees	$ 13,375	$ 11,312
	Hydro-Québec	26,235	22,182
		39,610	33,494
	Contribution by Hydro-Québec (Note)	17,809	2,108
		57,419	35,602
	Additional past service contributions less cancellations	86	36
		57,505	35,638
	Less refunded to employees leaving service	485	514
		57,020	35,124
	Revenue from investments	31,386	25,630
		88,406	60,754
Expenditure	Pensions paid	5,678	4,974
Net revenue transferred to reserve		**$82,728**	$ 55,780

See accompanying note

Hydro-Québec Employees' Retirement Fund

Statement of Assets and Reserve
(in thousands of dollars)
as at December 31

		1978	1977
Assets (Note)	Investments, at cost:		
	Debentures of Hydro-Québec and bonds of its subsidiaries, guaranteed by the Province de Québec	$ 187,882	$ 154,942
	Bonds of, or guaranteed by the Province de Québec	110,660	99,600
	Municipal, School Commission, Cegep, Hospital and University bonds	36,483	33,677
	Government of Canada bonds	5,033	—
	(Par value $347,521, market value $318,186)	**340,058**	288,219
	Common stocks (market value $2,118)	1,350	1,212
	Short-term investments	40,000	13,462
		381,408	302,893
	Accrued interest on investments	8,194	6,661
	Past service contributions receivable from employees	65	46
	Amount receivable from Hydro-Québec	4,997	2,336
		$394,664	$ 311,936
Reserve	Balance, beginning of year	$ 311,936	$ 256,156
	Net revenue for the year	82,728	55,780
	Balance, end of year	**$394,664**	$ 311,936

See accompanying note

On behalf of Hydro-Québec:
(signed) Lucien Saulnier
(signed) Robert A. Boyd

Montréal, Canada,
April 2, 1979.

(signed) Roger Girard
Directeur général
Contrôle et Comptabilité

Note to Financial Statements
December 31, 1978

These statements show only the position of the assets of the Hydro-Québec Employees' Retirement Fund, but do not purport to show the adequacy of the Fund to meet the obligations of the Hydro-Québec retirement plan which are guaranteed by Hydro-Québec. An actuarial survey of the obligations of the plan, at December 31, 1977, reported an estimated deficit, on a present value basis, of approximately $163,000,000.

Of this amount, $21,000,000 arose from an initial actuarial deficit in respect of services prior to 1966. Hydro-Québec assumes the annual amortization ($2,108,000) of this obligation over a period ending December 31, 1995.

Of the balance, $41,000,000 arose from a deficit resulting from changes in actuarial assumptions imposed by amendments in provincial legislation, and $101,000,000 arose from an experience deficiency. Beginning in 1978, Hydro-Québec will assume the annual amortization ($15,701,000) of these obligations over a fifteen-year period; prior to 1978, such obligations were amortized over a period of five years.

Production

Increase in installed capacity

The commissioning of Outardes-2 power station (453,900 kilowatts) and the installation of new diesel generating units for a net addition of 1,950 kilowatts, raised the total capacity of Hydro-Québec's generating stations to 12,979,250 kilowatts.

Energy production

The gross production of Hydro-Québec's power stations was 63.3 billion kilowatthours, an increase of 2.1 billion or 3.4% over 1977.

Runoff and reserves

Runoff in the Gatineau, St. Maurice and Ottawa river basins was less than the average over the last 10 years. However, for the Manicouagan, Outardes and St. Lawrence rivers it was higher than either the 10-year average or the 1977 figures. Because of the size of these basins, and in particular the flow of the St. Lawrence, actual runoff was more overall than in 1977.

Production by Hydro-Québec's generating stations increased in1978, with 67.8% coming from regulated rivers, but water reserves were nevertheless well maintained. At year-end the energy equivalent of these reserves stood at 41.9 billion kilowatthours, compared with 44.1 billion at the beginning of the year.

Peak exceeds 16,600 megawatts

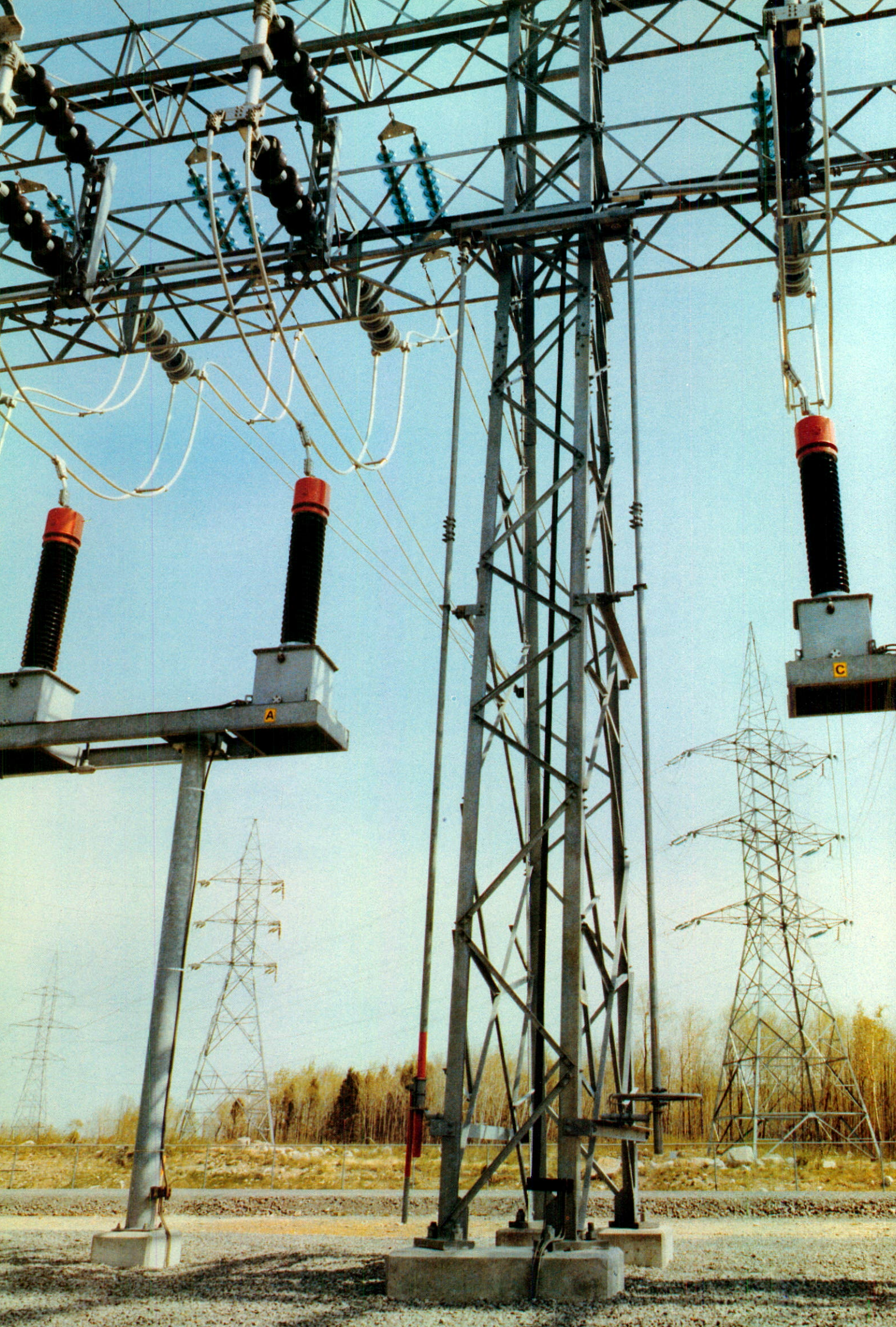
The priority needs of the Hydro-Québec system attained a maximum in December, on the 18th to be exact, when the temperature in Montréal was −13°C. At 5 p.m., the system's priority needs reached 16,645 megawatts, an increase of 5.6% over the 1977 peak. The average increase over the last 10 years was 7.6%.

More than 18,500 megawatts of generating capacity was available to Hydro-Québec in December, so the system operators did not have to shed any interruptible load when the peak occurred.

When priority needs attained their maximum, Hydro-Québec's power stations were providing a gross output of 11,082 megawatts, which was 1,435 megawatts more than in the previous year. In addition, 6,114 megawatts were received from neighboring systems.

Outardes-2 powerhouse.

Outardes-2: retaining works and surge tank.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Interconnections

Sales to the United States

Two agreements exist between Hydro-Québec and the Power Authority of the State of New York (PASNY).

The first agreement is based on a contract signed in 1974 by both parties and approved in 1976 by the National Energy Board. This agreement provides for delivery of up to 800 megawatts of **diversity power,** made available by the diversity in seasonal demand patterns: the PASNY system experiences its peak load in summer, while the Hydro-Québec system has its peak demand during the winter. The agreement also stipulates that as of 1982 PASNY must, when Hydro-Québec so requests, deliver to the Québec system during the winter months all or part of the energy it received during the previous summer.

In 1978 deliveries did not reach the maximum power stipulated in the contract because the final section of the 765-kV line, between the Massena and Marcy substations in the U.S., was not commissioned until October 31. For this reason, Hydro-Québec requested and received from the National Energy Board permission to use the two 120-kV circuits between Les Cèdres generating station and the American border near Massena, New York, for deliveries of 120 megawatts. First deliveries took place on June 23, 1978. Hydro-Québec was able to increase deliveries to PASNY to 320 megawatts as of August 29, 1978, when the first 765-kV line section went into service between Châteauguay and Massena substations. As the 765-kV line is now completed, power deliveries stipulated in the contract will start in the spring of 1979.

765-kV transmission line to the United States starts at Châteauguay substation.

The second agreement between Hydro-Québec and PASNY was approved by the National Energy Board on September 8, 1978. It is valid until December 31, 1983, and it authorizes the sale, over any period of twelve consecutive months, of a maximum of 10.2 billion kilowatthours, less net exports under the contract for sales of diversity power.

This agreement, which was exercised for the first time on November 1, enables Hydro-Québec to sell fuel replacement energy* at terms more favorable than those previously obtained in agreements of this nature.

In regard to other agreements, Hydro-Québec commissioned a new 120-kV interconnecting line between Stanstead and Border substations, which is used for the sale of modest quantities of primary electricity to the Citizens Utilities Company of Vermont. The old 49-kV circuit between Québec and Vermont was then dismantled. Moreover, export contracts are still in effect with two other Vermont companies: Union/Butterfield Division and the Vermont Electric Cooperative.

Several companies or government agencies in the northeastern United States have shown an interest in electrical energy exchanges with Hydro-Québec, and in some cases have entered into negotiations in order to increase their electrical-energy exchanges with the utility.

In 1978 sales of primary and secondary electricity to American customers totaled 1.4 billion kilowatthours. This represents 1.5% of all Hydro-Québec sales.

*Fuel replacement energy is energy derived from renewable resources and delivered to replace energy derived from non-renewable resources in order to economize the latter and effect savings.

Sales in Canada

Hydro-Québec negotiated a new interconnection agreement with Ontario Hydro, and modifications to the contract between Hydro-Québec and the New Brunswick Electric Power Commission are at the discussion stage.

Under existing agreements with Ontario Hydro, sales of 2.75 billion kilowatthours, within the framework of a contract for 15 billion kilowatthours, brought Hydro-Québec revenue of approximately $34 million in 1978.

Total sales to Canadian systems outside Québec were 11.7 billion kilowatthours.

Electricity purchases

Hydro-Québec signed two contracts for purchases of power during periods of heavy load. The first contract, with the New Brunswick Electric Power Commission, provides for the purchase of 200 megawatts between December 1, 1979 and March 31, 1980. The second, with ALCAN, is for the purchase of 300 megawatts between November 1, 1979 and February 29, 1980, and for 50 megawatts between November 1, 1980 and February 28, 1981.

In 1978 Hydro-Québec purchased 38.7 billion kilowatthours, which was 3.4 billion more than in 1977. As sales to neighboring systems (in Québec, the rest of Canada and the United States) totaled 13.8 billion kilowatthours, Hydro-Québec made net purchases of 24.9 billion kilowatthours.

Hydro-Québec's increased purchases were primarily the result of its contract with the Churchill Falls (Labrador) Corporation Limited. Following an agreement modifying the maintenance program at the Churchill Falls generating station, Hydro-Québec was able to take delivery during the winter period of power from all the plant's generating units.

Human resources

At the end of 1978, Hydro-Québec had 16,930 permanent employees, 1,167 or 7.4% more than the previous year. Their average age was 37.2 years, almost the same as in the previous year, and the average length of service was 12.3 years, also virtually unchanged.

At year-end, 33% of permanent employees had up to four years' service, 16% had from 5 to 9 years; 35% from 10 to 24 years; 14% from 25 to 34 years and 2% of employees had been with the firm for 35 years or more. Some 14% of the permanent employees were classified as management staff, 10% as management equivalent, 6% engineers, 9% technicians, 30% trades employees, and 31% office employees.

The number of temporary employees at Hydro-Québec construction sites averaged 3,942, including 1,260 at LG-3.

The firm paid $499,444,000 in salaries to its employees, including $122,050,000 to construction workers.

Fringe benefits not included in salaries, and contributions to the retirement fund cost Hydro-Québec $78,090,000.

The collective agreement between Hydro-Québec and the Syndicat professionnel des ingénieurs de l'Hydro-Québec was renewed. Collective agreements with the unions representing 11,000 Hydro-Québec office workers, trades employees and technicians expired on December 31. During the year the unions presented their demands and Hydro-Québec submitted its proposals for approval by the Québec government as required by the recently enacted Bill 55. This bill governs the organization of management and labor for purposes of collective bargaining in the education and social affairs sectors, and in government organizations.

At the height of activity, the Société d'énergie de la Baie James employed 2,155 people, including 829 at head office. A total of $90 million was paid out in salaries and fringe benefits.

Nearly 18,000 people were employed at the James Bay sites at the peak of construction. The Association des employeurs de la Baie James hired more than 23,000 workers during 1978.

In the field of labor relations, the collective agreement governing the employees of Crawley & McCracken Ltd. and J.A. Hubert Limitée, caterers, was renewed in September.

The Municipalité de la Baie James and its 150 security staff were also able to sign a new collective agreement in December, after lengthy negotiations marked by a strike.

Construction

Production equipment

Construction work was largely concentrated on the sites of the La Grande complex in the James Bay region. According to the plans announced in 1976, the complex was to have four generating stations — LG-1, LG-2, LG-3 and LG-4 — all situated on the La Grande River which flows from east to west approximately 1,000 kilometres north of Montréal. The total installed capacity of these generating stations was to be 10,190 megawatts.

In 1978 important changes were made to the configuration of the complex, construction of which will now be in two stages. The La Grande complex, phase I, will consist of LG-2, LG-3 and LG-4 power stations. Two additional generating units will be installed at both LG-3 and LG-4, thus putting the total installed capacity of phase I at 10,269 megawatts.

Construction of LG-1 is postponed to phase II of the project, which will also include development of the remaining potential of the river basins included in the La Grande complex.

Market trends, indicating that power needs are increasing more rapidly than energy needs, were responsible for these changes which will reduce capital costs by about $665 million. An additional saving of $359 million, entirely due to a reduction in the forecast cost of the James Bay transmission system, will bring the overall estimate for phase I of the La Grande complex to $15.1 billion.

Since the project got under way, $5 billion has been invested in the development of the La Grande complex, phase I. Some $1,775,263,000 of this amount was spent in 1978.

The dams and dikes are completed at LG-2, which is located 117 kilometres from the mouth of the La Grande River. The two diversion tunnels have been closed and water is being impounded in the reservoir. Excavation for the powerhouse is now completed and work was concentrated on installation of the first four turbine-generators which will be commissioned, ahead of schedule, in the fall of 1979.

Some 121 kilometres upstream from LG-2, the main dam at LG-3 will straddle an island in the La Grande River. In 1978 its southern part was raised to elevation 258 metres, as required by the construction program, and at year-end the dam was 37% complete. The powerhouse excavation was enlarged to accommodate two turbine-generator units added to the ten originally planned.

At LG-4, situated 463 kilometres from the mouth of the La Grande River, work concentrated on completing the infrastructure needed for construction work. The old exploration campsite was replaced by a new campsite that can house 2,400, and the family village of Keyano has been open since August. The access road is completed and construction has started on the road linking LG-4 to Caniapiscau. At the dam site, excavation of the diversion tunnel is completed.

Work at the Eastmain-Opinaca-La Grande (EOL) site is aimed at creating a 1,036-square-kilometre reservoir within the drainage basin of the Eastmain, Opinaca and Petite Opinaca rivers, and at directing the waters of this reservoir into the forebay at LG-2. Construction of the required structures is proceeding well.

Diversion of the waters of Caniapiscau River into LG-4 reservoir has been slightly delayed due to additional work needed because of the poor quality of the foundation rock for one of the dams. But other construction is proceeding normally, and the campsite and village were completed during the year.

Under the James Bay and Northern Québec Agreement, LG-1 generating station was to have been built 71 kilometres from the mouth of the La Grande River. However, in April 1978, the parties to this agreement decided that the generating station would be built at kilometre 37. This site provides a greater head of water and other technical advantages. Although construction of LG-1 has been postponed, SEBJ is going ahead immediately with diversion of the river at kilometre 37, so as to take advantage of the fact that most of the flow is now being impounded by the retaining works at LG-2.

At Hydro-Québec's other construction sites 1978 was notable for the commissioning of Outardes-2, at the mouth of the Outardes River. This brings the installed capacity of the seven generating stations in the Manicouagan-Outardes complex to 5,516,910 kilowatts.

Work continues at Gentilly-2 nuclear power station. Situated on the south bank of the St. Lawrence River, half way between Montréal and Québec City, this construction site is Hydro-Québec's second largest, after the La Grande complex. Most of the piping is now installed in the buildings, while civil engineering work was concentrated on finishing the buildings. Electrical and instrumentation work will be stepped up in 1979.

However the construction schedule at Gentilly-2 will have to be modified. A manufacturing fault, detected in the steam generators at Pickering nuclear power station in Ontario, has also been discovered at Gentilly-2. The problem is currently under investigation and it will certainly affect the construction schedule, although the exact duration of delays is still uncertain.

Spillway canal and pillars for spillway gates, EOL diversion project, James Bay region. The Eastmain River is diverted through this canal during construction of dam OA-11.

In January 1978, Hydro-Québec, together with the Québec government, signed two agreements with Atomic Energy of Canada Limited (AECL). The first provided for the purchase of 1,440 metric tons of heavy water from AECL which, for this purpose, agreed to build the La Prade plant according to a set schedule. The second agreement concerned the conditions under which AECL gave Hydro-Québec the mandate to design, build and operate the installations required to supply electricity, water and steam to this plant. In addition, this second agreement laid out the conditions for financing the plant and gave Hydro-Québec the right to acquire the La Prade plant before 1990, as well as the right of first refusal if AECL were to consider selling it during the years of the option or subsequently.

Discussions are presently being held between the Canadian and Québec governments concerning these agreements.

Final engineering work and construction of the La Citière gas-turbine generating station began during the year. The four 71-MW generating units will be installed in 1979.

Work on enlarging Cap-aux-Meules diesel generating station on the Magdalen Islands, to accommodate four new 6-MW generating units, was 60% complete at year-end. Three of the four units have been delivered and will be installed in 1979, bringing the total number of units to 16 and the total capacity to 57 megawatts.

Transmission system

During the year about 100 transmission-line projects were under way, involving 1,300 kilometres of line construction and 1,400 kilometres of right-of-way clearing, for line sections of various lengths and voltages.

Most of the work was concentrated along the 1,015-kilometre route of the first two lines of the James Bay transmission system, between LG-2 power station and the new Chénier substation being built near Montréal international airport (Mirabel).

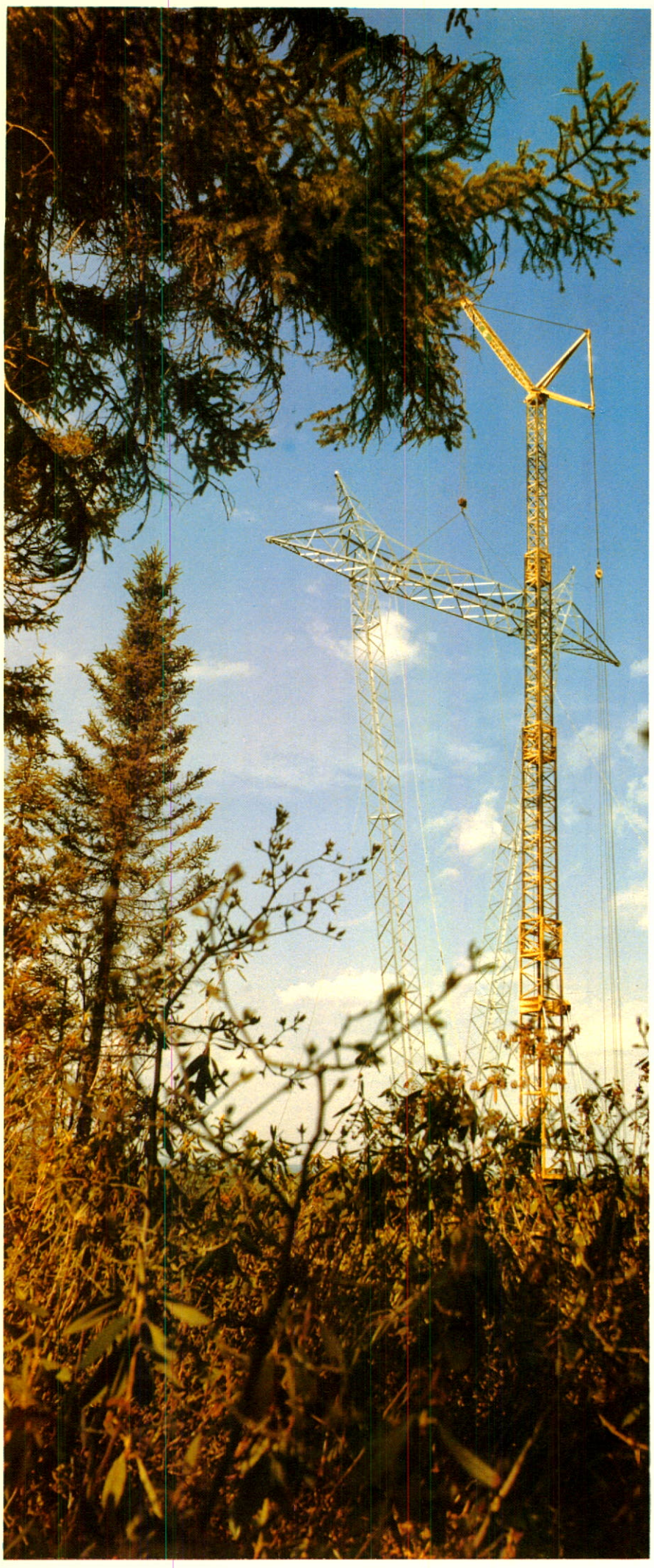
At year-end, about 32% of the first line's 2,230 towers had been erected and 22% of its conductors installed. These two lines are scheduled for commercial operation on October 1, 1979 and July 1, 1980 respectively.

Work on the other James Bay power lines also progressed during the year. The 61-kilometre section between Abitibi and Chibougamau substations was finished. Right-of-way clearing for the lines that will link LG-2, LG-3 and LG-4 was almost completed. Clearing for the third line is continuing, and studies were carried out on the infrastructure required for building the fourth and fifth lines.

Construction work also proceeded on schedule at La Vérendrye, Némiscau, LG-2 and Abitibi substations.

In 1978, Hydro-Québec invested $446,371,000 in the construction of the James Bay transmission system.

Concreting the plug in one of the two by-pass tunnels at LG-2.



A considerable amount of work was also carried out on the 735-kV loop around the Montréal metropolitan area.

Early in the summer of 1978, construction of Hertel and Châteauguay substations was completed and construction of Chénier substation began.

Châteauguay and Hertel substations were connected, and construction of the line between Chénier and Duvernay substations was completed. In 1979, the sections between Châteauguay and Chénier substations and Hertel and Boucherville substations will be completed, closing the loop.

Completion of the 315/25-kV Langelier substation in Montréal marked a first for Hydro-Québec, inasmuch as the high-voltage equipment in this substation is insulated with sulfur hexafluoride (SF_6), which permits more compact equipment design and thus allows a substation to occupy as little as one-tenth the area of a conventionally insulated substation or one-twentieth the volume.

In all, 725 circuit-kilometres operating at voltages from 69 kV to 765 kV were added to Hydro-Québec's transmission system during the year, bringing the total length of the system to 24,605 kilometres. Sixteen new substations added 12,000 megavolt-amperes to total transformer capacity, bringing it to slightly more than 100,000 megavolt-amperes at the end of 1978.

Distribution system

Hydro-Québec invested $215,500,000 to improve and extend its distribution system in 1978, which was 14.9% more than the amount invested in 1977. Operating and maintenance expenses amounted to $115,556,000, or 16.7% more than the $99,014,000 spent in 1977.

The system was extended 1,465 kilometres, compared with the 2,020 kilometres added in 1977. At year-end, distribution circuits totaled 80,365 kilometres, 3,115 kilometres of which were underground.

To meet increased electricity demand, 13 new distribution substations were completed during the year and 26 transformers installed in them increasing total distribution-system capacity by nearly 1,700 megavolt-amperes. At year-end the total capacity of this system was 19,325 megavolt-amperes.

System automation and telecommunications

Work continued on the automation of certain sectors of system operation.

The supplier carried out operational tests on the computer equipment. Development of the software proceeded and delivery of the system is scheduled for mid-1980.

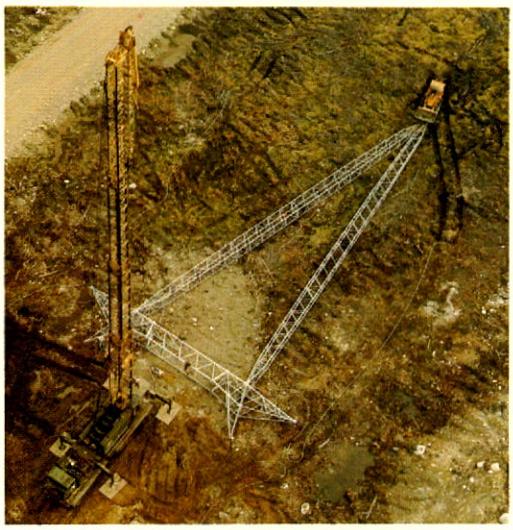
A total of 78 remote terminal units were delivered and 27 of them were installed. These units will be used for the acquisition of data from substations and power stations. The required metering and indication equipment has been installed in the substations and generating stations.

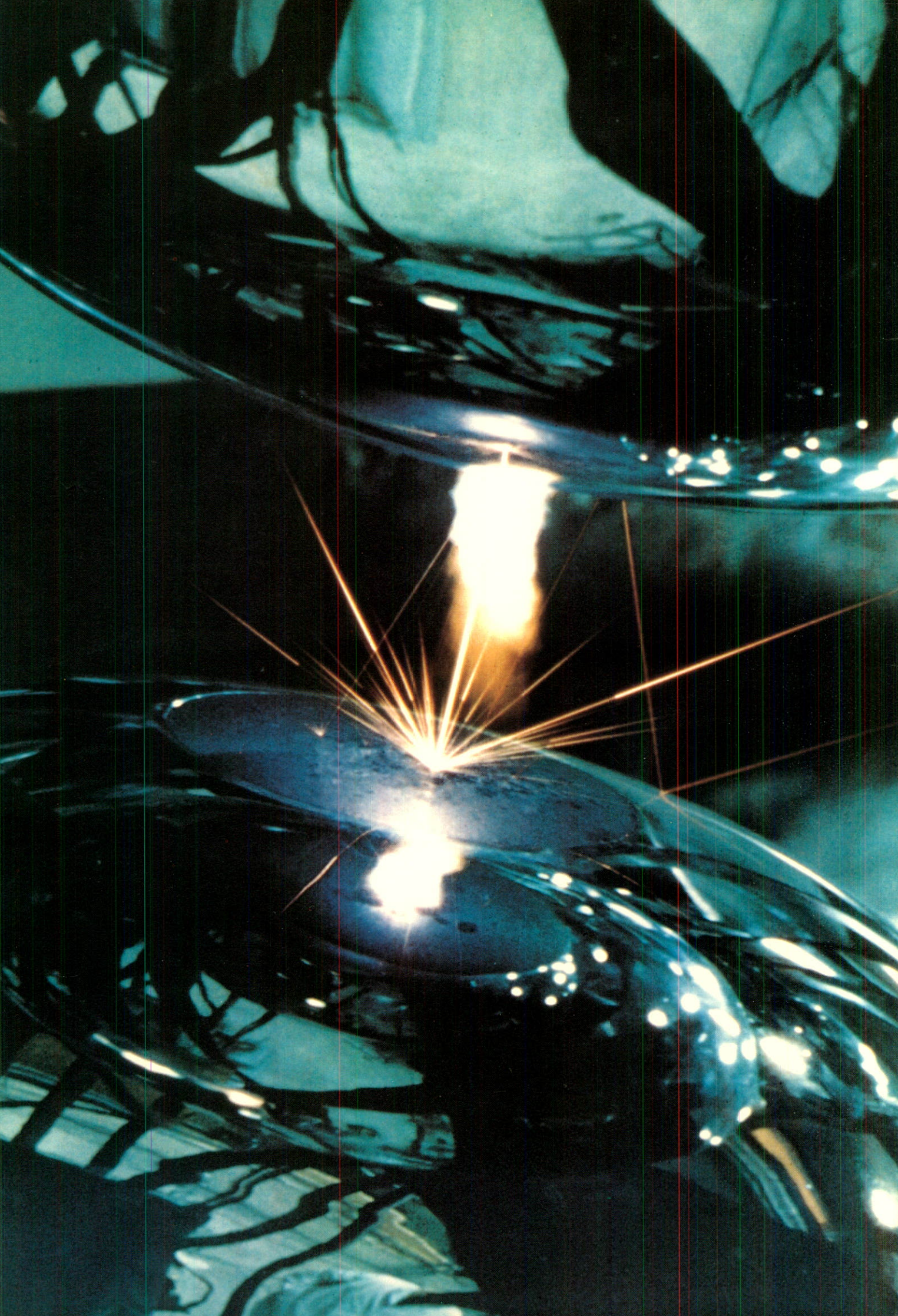
In addition, negotiations were completed with neighboring systems to integrate their data and the required work was begun.

An emergency power supply system comprising three 800-kW turbine-generators was placed in service in June. In case of power failure, this emergency system could supply the system control centre as well as the electronic data-processing centre and the head-office building.

Construction proceeded on the microwave network linking the James Bay generating stations to urban centres. When completed, this network will transmit protection signals for the power system and provide a communications link for system operators.

Guyed-V transmission tower about to be hoisted into final position. One of 2,230 towers on the first line of the James Bay 735-kV transmission system.





Preparing for the future

During the year, Hydro-Québec continued its efforts on many fronts to ensure that it will be able to meet the future needs of its customers.

It implemented a program to encourage electricity savings and applied measures to save energy in its own installations; it studied the feasibility of improving existing equipment, continued its search for new powerhouse sites, and investigated alternative methods of producing electricity, backed by the work carried out at Hydro-Québec's research institute. The utility also founded a subsidiary called Hydro-Québec International which will export Québec engineering expertise.

Energy conservation

Through its programs to promote energy economies, Hydro-Québec was able to reach all categories of customers.

Residential customers were urged by an extensive information campaign to reduce their hot-water consumption and improve the thermal insulation of their homes.

Efforts directed at commercial customers were tailored to suit the nature of the different establishments. For example an experiment carried out in cooperation with a shopping centre enabled the customer to reduce maximum demand by 200 kilowatts and annual consumption by 500,000 kilowatthours.

Encouraging results were also obtained with some industrial customers. One such customer was even able to halve electricity consumption per square metre.

In addition, Hydro-Québec equipped itself with tools enabling it to gauge more accurately the repercussions of its customer-oriented activities.

The utility has taken the following steps to reduce its own energy consumption:

- Measures first adopted in 1977 at head office in Montréal have resulted in savings of about 5 million kilowatthours a year. This is nearly 15% of the building's total consumption.
- Other measures implemented in 1978 on the construction sites reduced fuel consumption by nearly 1.9 million litres and electricity consumption by more than 3,400,000 kilowatthours.
- Stricter construction standards for new Hydro-Québec buildings will result in energy savings of up to 35% annually, judging from experience with the Montmorency region's administrative centre.
- An analysis of the energy output of several power stations showed that the replacement of 74 old turbines would enable some 450 megawatts of generating capacity to be recovered. This capacity could supply 360 million kilowatthours a year.
- Plans have been prepared for excavating the bed of the Ottawa River downstream from Carillon power station. This excavation will increase the station's operating head, enabling the turbine-generators to produce an additional 42 megawatts under full-load conditions and 42.6 more megawatthours a year.

These successes have motivated Hydro-Québec to intensify its efforts in close collaboration with the Québec government's bureau of energy savings.

New hydroelectric sites

Detailed study of the technical characteristics of the La Grande complex, phase II, generating stations indicate that the Eastmain, Laforge and Brisay rivers, in conjunction with LG-1 power station, could add nearly 2,900 megawatts to the complex's installed capacity. Total annual energy output from these generating stations would be about 17.3 billion kilowatthours.

Studies continued on possible development of the NBR (Nottaway, Broadback, Rupert) complex, in the southern part of the James Bay region. Capacity of this complex is estimated at 6,235 megawatts.

Drilling, geological sampling and surveying on the Great Whale and Little Whale rivers, which empty into Hudson Bay, have revealed a basic potential of 2,270 megawatts.

Preliminary studies continued on the George, à la Baleine and Koksoak rivers, including the two major Koksoak tributaries, the Mélèzes and Caniapiscau rivers — the latter separated from its upper reaches. These studies will lead to an evaluation of the hydroelectric resources of the Ungava Bay region and an overall plan for their development.

On the Lower St. Lawrence North Shore preliminary studies on the feasibility of development of the Natashquan, Petit Mécatina, Moisie, Magpie and Romaine rivers continued, with studies on the Romaine being more advanced.

Eight sites are still being studied and surveyed for pumped-storage generating stations, but to meet more pressing needs for peak energy Hydro-Québec plans to build an underground powerhouse at Manic 5, slightly downstream from the Daniel Johnson dam. Commissioning of the four 250-MW unit powerhouse is scheduled for 1985.

Alternative production methods

A preliminary study was begun in 1978 on the possibility of building a coal-fired generating station with a capacity of about 3,000 MW.

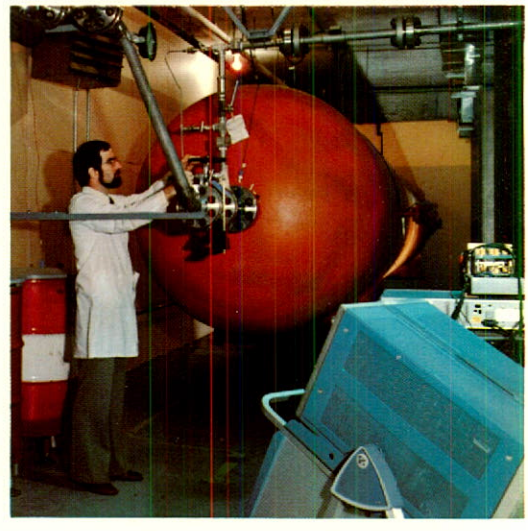
The utility also undertook a study of a proposed 260-MW peat-fired plant, and the evaluation of the energy potential of Québec's peat deposits.

In addition it is investigating the use of urban waste in the production of electricity. Two processes are being studied: incineration of garbage to feed a thermal power station and pyrolysis to feed gas turbines.

Hydro-Québec is also looking into the possibilities of wind energy.

Moreover, it has decided to modify Tracy thermal generating station to bring it into line with environmental-protection requirements.

Compressed-air storage system of a wind-powered generator.



Hydro-Québec's research institute (IREQ)

Since its first laboratories were built in 1970 IREQ, in accordance with its mandate, has continued its research activities on behalf of Hydro-Québec and other Canadian and foreign organizations.

Work on electricity transmission and new energy sources as well as conservation, storage and utilization of electrical energy was carried out for Hydro-Québec. This research centred on current transformers for high-voltage systems, spacer-dampers, nuclear fusion and the energy possibilities of the wind, the sun and biomass.

In addition to its numerous research activities for Hydro-Québec, IREQ also undertook various projects for outside organizations, including the Canadian Electrical Association, the Canadian International Development Agency, the Electric Power Research Institute, the Centro de Pesquisas de Energia Electrica (Brazil), American Electric Power and Japan's Central Research Institute of the Electric Power Industry.

The high-voltage laboratory registered 1,100 test-days for the execution of 125 contracts, and the high-power laboratory obtained 63 contracts requiring 273 test-days.

IREQ also continued its coordination work in conversion to the International System of Units (SI).

At year-end the research institute's staff comprised 406 permanent employees, including 238 researchers and technicians.

Hydro-Québec International

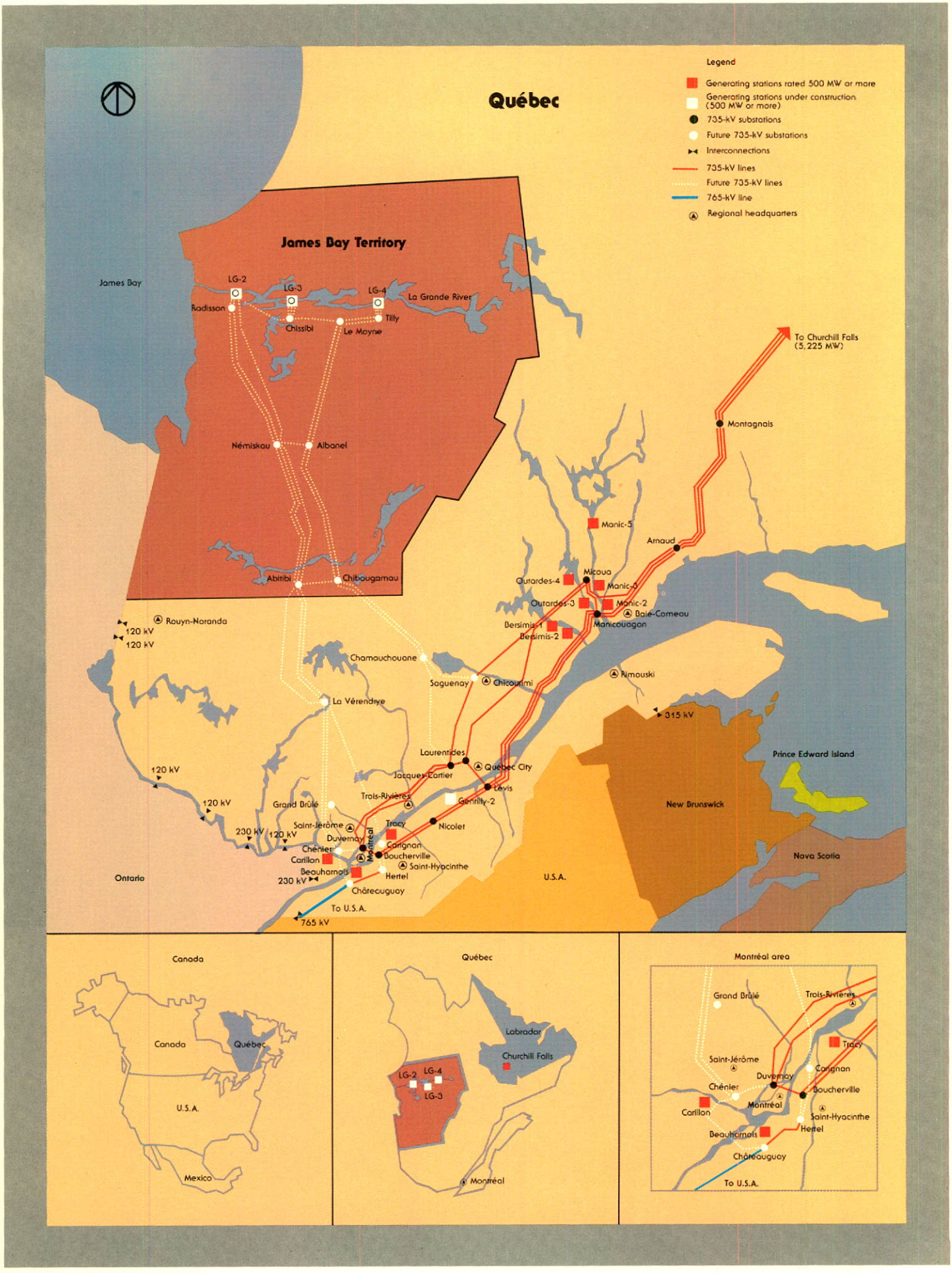
As part of its preparation for the future, Hydro-Québec has created another subsidiary, Hydro-Québec International. The new subsidiary is an engineering company specializing in the design and construction of electrical systems, and in power-system management. It offers producers and distributors of electrical energy, the services of its personnel and the expertise acquired in building the large-scale projects of one of the most extensive production, transmission and distribution systems in North America.

Not only can Hydro-Québec International draw directly on the resources of its parent company, but it can also call upon the potential of another, wholly-owned Hydro-Québec subsidiary, the Société d'énergie de la Baie James.

The new company collaborates with other Québec engineering firms in their initiatives to obtain contracts or build major projects.

Experimental line of IREQ's high-voltage laboratory.

Hydro-Québec's Main Generating Stations and Extra-High-Voltage Transmission System



Hydro-Québec Generating Stations

In service
or under construction
at December 31, 1978.

Generating stations in service*

Hydroelectric

	(kilowatts)
Beauharnois	1,574,260
Manic-5	1,292,000
Manic-3	1,183,200
Manic-2	1,015,200
Bersimis-1	912,000
Outardes-3	756,200
Bersimis-2	655,000
Carillon	654,500
Outardes-4	632,000
Outardes-2	453,900
La Trenche	286,200
Beaumont	243,000
La Tuque	216,000
Paugan	201,975
Manic-1	184,410
Rapide-Blanc	183,600
Shawinigan-2	163,000
Les Cèdres	162,000
Shawinigan-3	150,000
Grand'Mère	148,075
Rapide-des-Îles	146,520
Chelsea	144,000
La Gabelle	136,580
Première-Chute	124,200
Rapides-Farmers	98,250
Rapides-des-Quinze	89,600
Rapide-7	57,000
Bryson	56,000
Rapide-2	48,000
Rivière-des-Prairies	45,000
Chute-Hemmings	28,800
Hull-2	27,280
Sept-Chutes	18,720
Saint-Narcisse	15,000
Drummondville	14,600
Métis-1	6,400
Pont-Arnault	5,450
Chute-Bell	4,800
Métis-2	4,250
Saint-Alban	3,000
Saint-Raphaël	2,550
Sherbrooke	2,256
Chute-Garneau	2,240
Corbeau	2,000
Magpie	1,800
Rawdon	1,720
Chute-Burroughs	1,600
Chute-Wilson	840
Anse-Saint-Jean	400
High-Falls	340

Thermal

	(kilowatts)
Conventional thermal	
Tracy	600,000
Diesel	
Cap-aux-Meules	38,939
Blanc-Sablon	3,800
Natashquan	3,000
La Baleine	2,900
La Tabatière	2,800
Fort George	2,700
Saint-Augustin	1,750
Parent	1,550
Harrington-Harbour	1,400
La Romaine	1,200
Johan-Beetz	605
Île-d'Entrée	465
Île-aux-Grues	425
Gas turbine	
Cadillac	162,000
Nuclear	
Gentilly-1**	266,400

Summary

	(kilowatts)
Total installed capacity of hydroelectric generating stations (50)	12,155,716
Total installed capacity of thermal-electric generating stations (15)**	823,534
Total capacity in service at December 31, 1978	12,979,250

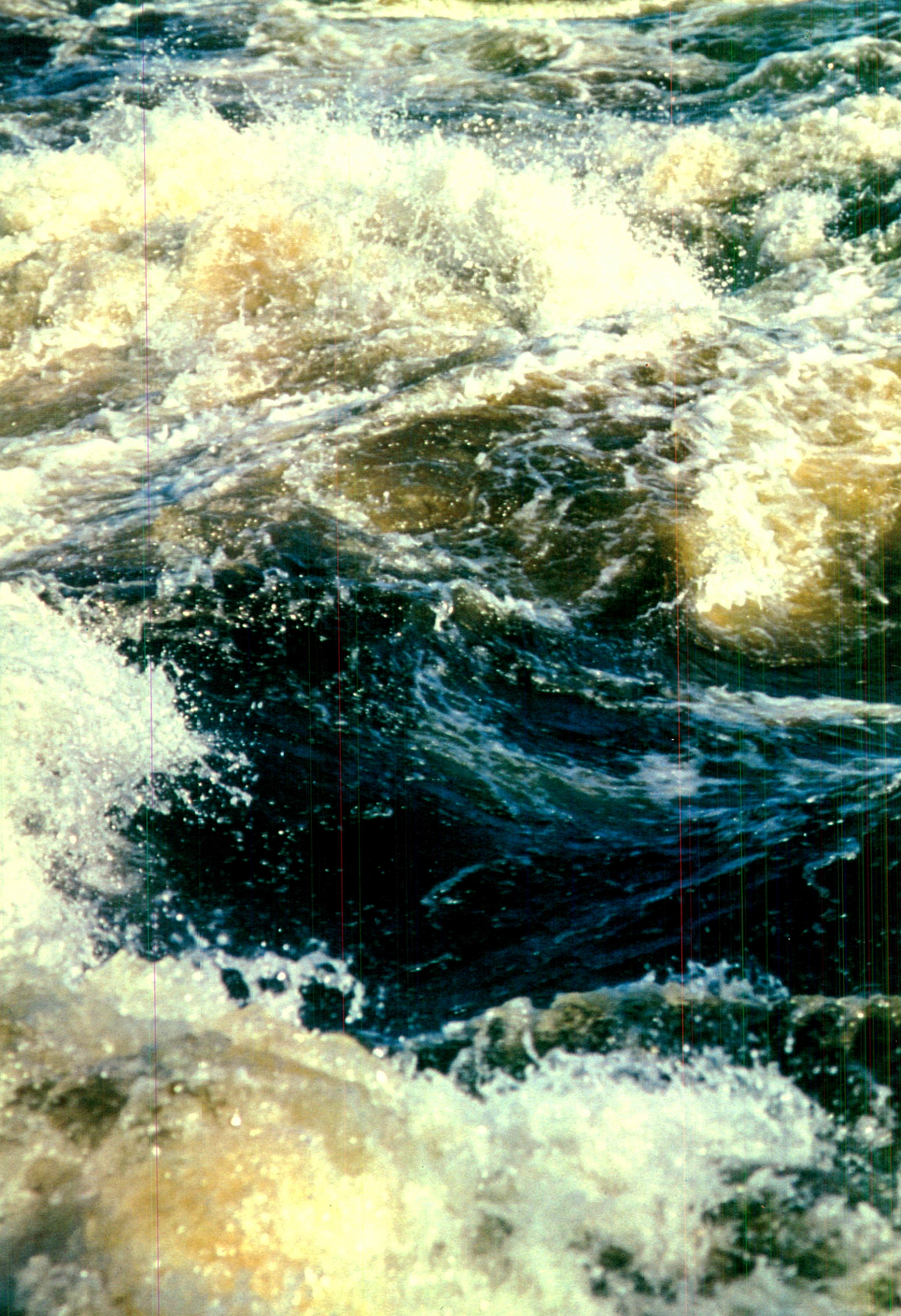
Generating stations under construction

	In service	(kilowatts)
Hydroelectric		
La Grande-2***	1979-81	5,328,000
La Grande-3***	1982-84	2,304,000
La Grande-4***	1984-85	2,637,000
Thermal		
Nuclear		
Gentilly-2	1981	685,000
Gas turbine		
La Citière	1979	284,000

*A 230-kW experimental wind-powered generator is connected to the Magdalen Islands system. Its availability depends on experiments being conducted, therefore it is excluded from the capacity figures.

**Gentilly-1 does not at present belong to Hydro-Québec and therefore is excluded from the total.

***The Société d'énergie de la Baie James, a subsidiary of Hydro-Québec, is reponsible for the development of the La Grande River.



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