Hydro-Québec
Annual Report
1977

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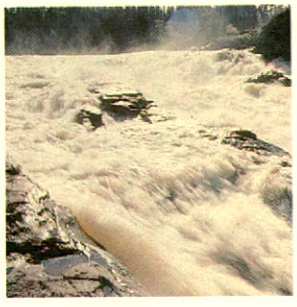
1977



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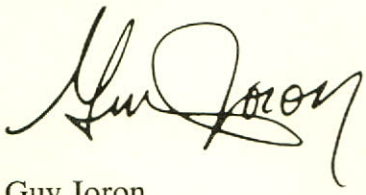
Gouvernement du Québec
Cabinet du Ministre délégué à l'Énergie

Monsieur Clément Richard
Président de l'Assemblée nationale
Québec

Monsieur le Président,

I have the honor of presenting to you the report of Hydro-Québec for the year ended December 31, 1977.

Yours truly,



Guy Joron
Le ministre délégué à l'Énergie
Québec, April 27, 1978.

The Commission

President
Robert A. Boyd, Eng.

Commissioners
Paul Dozois
Georges Gauvreau, N.P.
Edmond A. Lemieux, C.A.
Guy Monty, Eng.

Assistant to the President
Rita Dionne-Marsolais

Secretary
Michel-André Demers

General Auditor
Marcel Jean, C.A.

Director of special projects
Jan G. Charuk

Director of plant operation, James Bay
Robert Brunette, Eng.

Left to right, Messrs. Gauvreau, Boyd, Dozois, Monty and Lemieux.

Hydro-Québec was created on April 14, 1944, by an Act of the Provincial Legislature as a government-owned enterprise responsible for producing and distributing electricity in the province of Québec.

General managers

Construction
Paul Amyot, Eng.

Contrôle et Comptabilité
Control and accounting
Roger Girard, C.A.

Distribution et Ventes
Distribution and sales
Maurice Saint-Jacques, Eng.

Génie
Engineering
Lionel Cahill, Eng.

Finance
Georges Lafond, C.A.
Treasurer

Personnel
Alexandre Beauvais, Eng.

Production et Transport
Production and transmission
Jean J. Villeneuve, Eng.

Approvisionnement
Supply
Roger A. Labrie

Departmental directors

Planification générale
Corporate planning
Joseph Bourbeau, Eng.

Recherche économique
Economic research
Jean-Charles de Groote

Informatique
Electronic data processing
André Duval

Environnement
Environmental planning
Gaston Galibois, Eng.

Institut de recherche
Research institute
Lionel Boulet, Eng.

Contentieux
Law
Jean Boulanger, Q.C.

Organisation
Pierre Fiset

Programmation et Contrôle
Programming and control
Louis-Georges Boivin, Eng.

Projets
Projects
Gaston Turenne, Eng.

Relations publiques
Public relations
Marcel Couture

Regional directors

Abitibi
Maurice Huppé, Eng.

Laurentides
Marcel Lapierre, Eng.

Maisonneuve
Georges A. Lauzon, Eng.

Manicouagan
Gérard R. Labossière, Eng.

Matapédia
Gilles Béliveau, Eng.

Mauricie
Jacques Durocher

Montmorency
Pierre Godin, Eng.

Richelieu
Pierre Simard, Eng.

Saguenay
Jean-Claude Grégoire, Eng.

Saint-Laurent
Jean Lespérance

Mr. Robert A. Boyd, president of Hydro-Québec.

President's Foreword

During 1977, Hydro-Québec continued to satisfy the increased demand for electricity in Québec while playing a decisive role in the economy.

Capital expenditures, including those of the *Société d'énergie de la Baie James* (SEBJ), a Hydro-Québec subsidiary, totaled nearly $2 billion in 1977, thus greatly helping to mitigate the effects of a sluggish economy, already hampered by rising costs and high unemployment.

Strong evidence of the utility's economic role was provided by the activities of our supply department, which experienced unprecedented growth in 1977. Hydro-Québec, alone, placed orders totaling a record $875 million, more than double the maximum annual amount of preceding years. In addition to this, SEBJ placed orders worth $932 million, making a total of more than $1.8 billion put into circulation.

Hydro-Québec and SEBJ capital expenditures in 1977 thereby lessened somewhat the impact on Québec society of the world-wide economic slowdown.

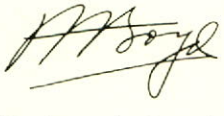
Financial results for the year 1977 enabled the utility to finance 21.3% of capital expenditures from internally generated funds. Increased revenues of $193,437,000 brought total revenues to $1,285,250,000, up 17.7% over 1976. Net income before allocations to reserves totaled $381,514,000, an increase of 22.8% over the preceding year. Hydro-Québec's net worth at year-end amounted to $2,358,872,000 and constituted 23.5% of invested capital.

Two outstanding events marked Hydro-Québec's progress during 1977. At the Québec government's request, the utility presented a report before the parliamentary commission created to gather material for the elaboration of Québec's future energy policy. The preparation of the report enabled the utility to state its opinion on the role of electricity in relation to other energy sources within the context of a Québec energy policy.

Work began in 1977 on the five 735-kV transmission lines that will carry the hydroelectric production of the James Bay generating stations to the population centres. These lines, totaling 5,370 kilometres of circuits, will all be in operation by October 1984, with the first line in operation by late 1979.

In closing, I should like to pay homage to my predecessor, Roland Giroux, who retired as president on August 9, 1977, and under whose guidance the utility's financial position was consolidated. This was confirmed recently by two leading American financial organizations: on March 14, 1977, Moody's described Hydro-Québec as one of the best managed electrical utilities in Canada, if not North America; and a few days later, a research report prepared by the investment firm of Kidder, Peabody & Company declared that Hydro-Québec deserved the highest credit rating on American financial markets.

Mr. Giroux, who was president of Hydro-Québec for nine years, is certainly closely linked to its successes and for this we honor him.



Robert A. Boyd
Montreal, April 21, 1978

Ten Years' Progress

Financial situation (in millions of dollars)	**1977**	**1976**	**1975**	**1974**	**1973**	**1972**	**1971**	**1970**	**1969**	**1968**
Property and plant in service	**$6,154**	5,880	5,307	4,973	4,834	4,599	4,251	3,899	3,404	2,992
Construction work in progress	**$4,283**	2,634	1,970	1,197	752	465	411	389	608	791
Long-term debt*	**$7,653**	6,647	5,001	4,062	3,513	3,229	2,928	2,676	2,554	2,347
Reserves or net worth	**$2,359**	1,977	1,667	1,437	1,260	1,140	1,041	913	796	712
Total sales revenue	**$1,263**	1,071	904	783	662	569	524	483	420	390
Total operating and interest charges	**$ 904**	781	692	621	554	481	408	378	346	320

*Including amounts payable within one year

Effects of growth

Installed capacity at December 31 (megawatts*)	**12,523**	12,409	11,356	11,123	11,148	11,107	11,107	10,617	9,809	8,365
Maximum firm-power demand in service area (megawatts*)	**15,171**	14,426	12,478	11,131	11,135	9,747	9,173	8,873	8,100	7,664
Billed sales of electricity in billions of kilowatthours	**87.3**	84.0	76.9	77.7	68.7	60.4	52.5	50.6	46.3	43.1
Total number of customer accounts (thousands)	**2,265**	2,188	2,136	2,081	2,017	1,943	1,895	1,852	1,773	1,720
Number of permanent employees of Hydro-Québec**	**15,763**	14,969	14,543	13,679	13,027	12,627	12,245	12,012	11,890	11,723

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

Financial Results*

A continuing rise in the price of energy, a small increase in personal income, and a large decrease in construction starts affected the growth of the Canadian and Québec economies in 1977, as in 1976.

Hydro-Québec felt the effects of the economic slowdown, with firm energy sales to Québec customers rising only 7.3% compared with 12.1% in 1976. However, this increase is in line with the average of 7.7% over the last five years.

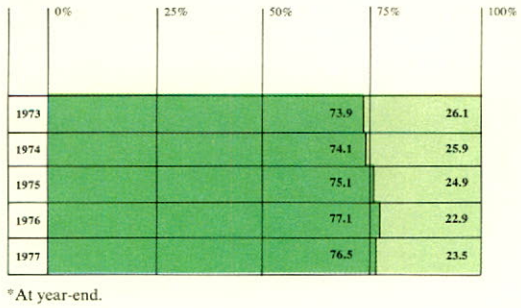
The appreciation of the world's stronger currencies and the decline in value of the Canadian dollar had the effect of increasing Hydro-Québec's expenses. Despite a reduction compared with 1976, the level of interest rates in Canada and the United States remained high and thus did not help to reduce substantially the cost of Hydro-Québec's borrowings in 1977. However, the average effective interest rate on the year's borrowings decreased owing to a greater use of European markets.

Despite these discouraging economic factors, 1977 was a good year for Hydro-Québec in many areas. Progress at the major construction sites was satisfactory, and *additions to fixed assets,* including those of the *Société d'énergie de la Baie James,* totaled $1,950,296,000 against $1,266,978,000 in 1976, an increase of 53.9%. The year's financial results enabled 21.3% of these additions to be financed from internal sources. The proportion financed through borrowings changed from 75.8% in 1976 to 78.7% in 1977.

Total operating income rose to $1,285,250,000, which was $193,437,000 or 17.7% more than in 1976. Total expenses *(expenditure* plus *interest* items in the *Consolidated Statement of Revenue and Expenditure)* amounted to $903,736,000, compared with $781,173,000 in 1976, an increase of 15.7%.

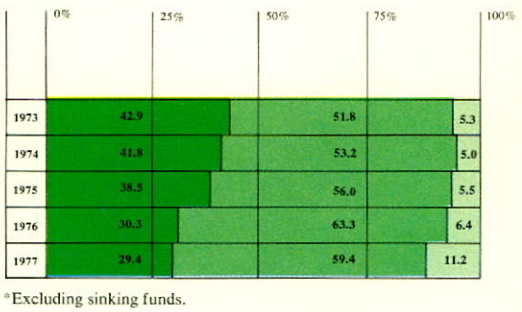
*Words in italics in this section are terms used in the *Financial Statements and Statistics.*

Composition of capital*



*At year-end.

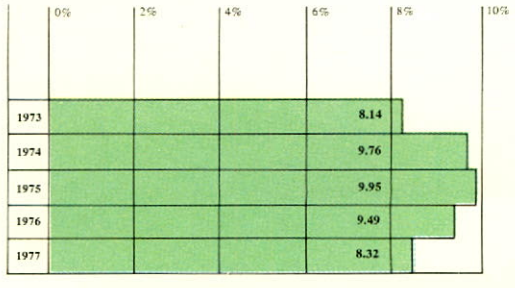
Composition of funded debt*



*Excluding sinking funds.

Interest rates

Average annual effective interest rate on long-term borrowings for each year since 1973



Net income before allocations to reserves amounted to $381,514,000, which was $70,874,000 or 22.8% more than in the preceding year.

Revenues

Sales of primary and *secondary electricity* produced $1,244,716,000 in 1977, compared with $1,046,235,000 in 1976, which represents an increase of $198,481,000 or 19.0%. Some $106,700,000 or 53.8% of this increase was attributable to recent rate increases on sales subject to rate bylaws.

Kilowatthour sales in the residential sector increased 13.3%, while in the commercial sector they rose 7.8%.

The expiry of large contracts for the supply of electricity at low rates to Ontario Hydro radically changed figures for sales of primary energy outside Québec, with these sales totaling only 3.6 billion kilowatthours in 1977, compared with 11.1 billion kilowatthours in 1976, a reduction of 67.8%.

However, sales of secondary energy to neighboring provinces and the U.S. increased 148.1% in volume and 141.1% in revenue from the previous year.

Total energy sales amounted to 87.3 billion kilowatthours in 1977, compared with 84.0 billion in 1976, a 3.9% increase.

Increase in unbilled revenue was $18,351,000, against $24,963,000 in 1976. *Other operating income* increased from $20,615,000 to $22,183,000.

Expenditures

Operating, maintenance, administration and other expenses increased 15.5% to $379,759,000 compared with $328,874,000 in 1976. A large part of this increase was attributable to the increase in wages and salaries provided for in collective agreements and to adjustments in the various wage classifications. Excluding salaries paid to employees on large construction sites, Hydro-Québec paid out $312,248,000 to its employees in 1977, against $278,472,000 in 1976, an increase of 12.1%. Most of this amount was charged to operating expenses.

Power purchased increased 7.5% to $122,171,000 from $113,660,000 in 1976. Neighboring systems and Québec's independent producers sold a total of 35.3 billion kilowatthours to Hydro-Québec, compared with 34.4 billion in 1976. Churchill Falls power station accounted for 33.3 billion kilowatthours of these deliveries, against 32.0 billion in 1976.

As few new installations were placed in service during the year, *provision for renewals (depreciation)* increased by only 5.4% or $5,011,000 to reach a total of $97,797,000. The *provincial levy* and *school and municipal taxes* together absorbed $40,217,000 compared with $39,209,000 in 1976.

Gross interest for 1977 (see Note 5) amounted to $642,176,000, which was $147,337,000 or 29.8% more than in 1976. This increase reflects the large borrowings contracted for during the year, as well as additional costs of about $50,000,000 attributable to foreign exchange. Capitalized interest, that is *interest charged to Construction work in progress,* totaled $282,047,000, against $186,178,000 in 1976, an increase of 51.5%, most of which resulted from the construction work in the James Bay area.

Investment income decreased from $93,475,000 in 1976 to $90,592,000 in 1977. The latter figure includes $8,086,000 in dividends from Churchill Falls (Labrador) Corporation Limited, in which Hydro-Québec holds a 34.2% interest (see Note 2).

Interest charged to operations, which is the net result of the table in Note 5 and appears in the *Consolidated Statement of Revenue and Expenditure,* totaled $263,792,000, an increase of $57,148,000 or 27.7% over 1976.

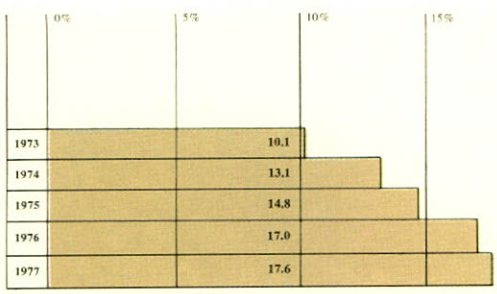
Financial Position

The *Consolidated Statement of Changes in Financial Position* shows that *total financial resources provided by operations* amounted to $503,716,000, compared with $412,393,000 in the preceding year. In 1977, these internally generated resources comprised *net income before allocations to reserves* ($381,514,000) plus a total of $122,202,000 made up of items not resulting in an outlay or inflow of funds.

Some $37,792,000 of the *total financial resources provided by operations* were used to redeem maturing long-term debt (with interest rates ranging from 4⅜% to 8%), and $50,949,000 went to meet sinking fund requirements. The balance of $414,975,000 served to cover 21.3% of the year's *additions to fixed assets.* In 1976, the corresponding amount had been $307,105,000, which covered 24.2% of these additions.

The *Consolidated Statement of Changes in Financial Position* reveals that *cash and short-term investments less bank indebtedness* decreased by $344,548,000 in 1977, compared with an increase of $798,510,000 the previous year. Year-end liquidity was nevertheless extremely high, with cash and temporary investments equal to $732,868,000, after deduction of bank advances.

Return on net worth*



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

Borrowings

The net proceeds from long-term borrowings amounted to $1,083,115,000 and the average effective interest rate was 8.32%, compared with 9.49% in 1976.

During 1977, Hydro-Québec negotiated two loans for a total of $350,000,000 in U.S. dollars, or 32.6% of the year's gross borrowings. Some $125,000,000 of this amount was floated in Europe.

Hydro-Québec also borrowed $296,000,000 in Canadian dollars, comprising $110,000,000 in debentures subscribed for by the *Caisse de dépôt et placement du Québec*, two loans worth $71,000,000 from Atomic Energy of Canada Limited for the construction of Gentilly-2 nuclear power station, and the remaining $115,000,000 subscribed for by the public.

In July, Hydro-Québec borrowed 20 billion Japanese yen ($80,500,000). In August and December, it borrowed 350 million Deutsche marks ($168,745,000). And in August and September, it borrowed 400 million Swiss francs ($176,800,000). Interest rates on these borrowings were appreciably lower than rates prevailing in Canada and the United States.

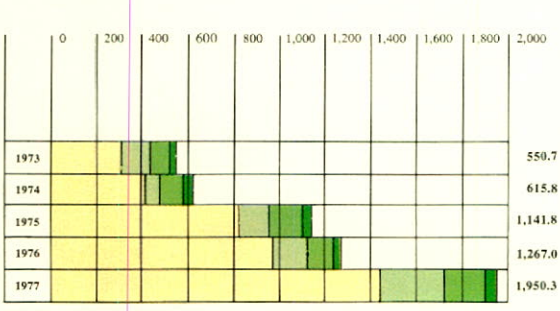
Invested capital

Long-term debt, not including the portion *payable within one year*, stood at $7,552,322,000 on December 31, 1977, compared with $6,566,317,000 one year before, an increase of $986,005,000.

At the same date, Hydro-Québec's net worth, which is made up of the reserves accumulated since Hydro-Québec's formation in 1944, reached a total of $2,358,872,000. This amount constituted 23.5% of invested capital, which consists of *reserves, notes payable*, and *long-term debt* before subtraction of the part *payable within one year*. The equivalent proportion for 1976 was 22.9%.

Breakdown of capital expenditures since 1973

(in millions of dollars)



	1973	1974	1975	1976	1977
Production:					
SEBJ*	229.2	263.2	583.0	676.7	1,188.6
Other power stations	86.8	148.4	234.1	281.5	247.9
Subtotal	316.0	411.6	817.1	958.2	1,436.5
Transmission	125.2	66.2	135.0	153.8	284.1
Distribution	86.0	105.2	150.8	126.5	187.5
Other	23.5	32.8	38.9	28.5	42.2
Total	550.7	615.8	1,141.8	1,267.0	1,950.3

**Société d'énergie de la Baie James.*

Electricity Sales*

Sales of primary energy to the system's Québec customers totaled 71.3 billion kilowatthours in 1977, representing a growth rate of 7.3%. This was less than the 12.1% increase of the previous year, which had resulted from a catching-up after the low year of 1975, but was close to the average growth rate of 7.7% for the last five years.

The increase in primary energy sales to Québec customers was maintained by increased consumption in the residential and commercial classes. Demand increase was less marked in the industrial class because the economic recovery continued at a slow pace.

The total volume of electricity sales, which includes not only primary energy sales in Québec but also primary energy sales outside Québec and sales of secondary energy, stood at 87.3 billion kilowatthours, an increase of 3.9% over the preceding year. This is less than the previous year's increase of 9.2% which followed a reduction of 1.0% in 1975.

Revenues resulting from these sales amounted to $1,135,041,000 for primary energy sales to Québec customers and $1,244,716,000 for total sales. This was an increase over 1976 of 19.6% in the first case and 19.0% in the second, with higher rates and a larger sales volume acting as growth factors. Average revenue per primary kilowatthour increased 7.9% in the residential and residential-farm classes, 11.2% in the commercial class and 14.0% in the industrial class. For total sales, average revenue per kilowatthour rose 14.5%.

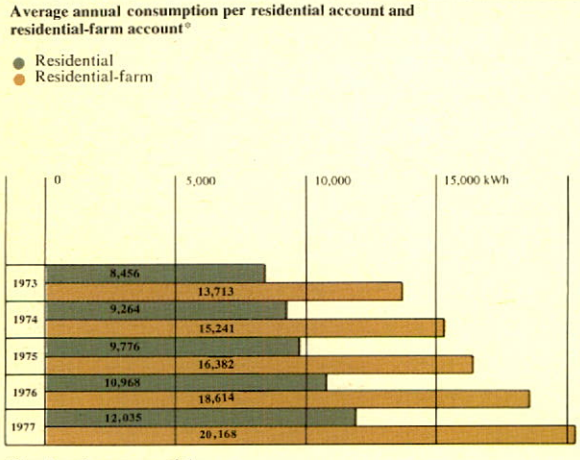
Residential customers

In 1977, residential customers used 22.9 billion kilowatthours, or 13.3% more than in 1976. The increase was slightly less than that of 1976, which at 15.4% was one of the largest ever recorded in this consumption category. The 1977 residential sales produced $432,708,000 in revenue, an increase of 22.1%. In 1976, the corresponding increase was 19.6%.

The number of new customer accounts totaled 71,136, representing an increase of 3.8%, compared with a 2.7% increase in 1976. The 1977 increase was the highest since the 4.2% increase recorded in 1973, and its size is explained partly by the large number of connections that were made at the beginning of the year because they had been delayed in 1976 by a strike. At the end of 1977, the number of residential customer accounts stood at 1,937,880.

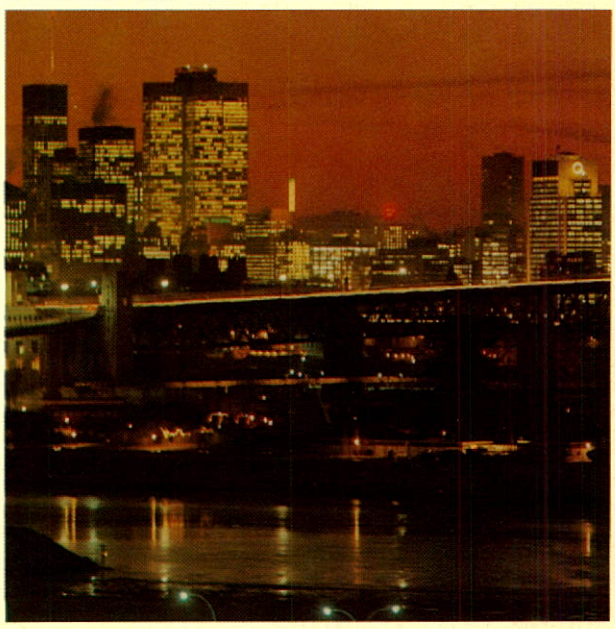
*In this chapter, annual consumptions per customer account are based on the average of the number of accounts at the beginning and end of the year.

Average annual consumption per residential account and residential-farm account*



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

Montreal by night.



The annual consumption per customer account was 12,035 kilowatthours, or 9.7% more than in 1976. This followed an increase of 12.2% in 1976 and resulted in an average growth rate of 9.2% since 1973.

Residential construction

Residential construction declined sharply. The number of housing starts fell from 68,748 in 1976 to 57,580 in 1977, a decrease of 16.2%. However the 1976 figure had been particularly high — 25.6% over that of the previous year. The 1977 figure is higher than those for 1974 and 1975.

Electric heating continued making inroads. It was used in about 75% of new dwelling units in 1977, compared with 64.3% the preceding year and 62.7% for the 1973-77 period. Moreover, during the year conversions to electric heating in existing dwellings increased 46% over the 12,023 reported in 1976, but the size of this increase is explained partly by improved data collection. The administrative regions with the most conversions were Laurentides (4,901), Richelieu (3,602) and Montmorency (3,263), and they accounted for almost half the total conversions.

Residential-farm customers

The number of residential-farm accounts declined to 73,523 at the end of 1977, a decrease of 1,337 or 1.8% from the end of 1976. Despite this decrease, and one of 1.6% in 1976, sales to these customers increased 6.5% to 1.5 billion kilowatthours. They had increased 11.6% in 1976. After increases of 13.6% in 1976 and 8.3% in 1977, the annual consumption per customer account stood at 20,168 kilowatthours.

Revenue from sales in the residential-farm class was $26,222,000, an increase of 16.0% compared with 18.4% in 1976.

(These figures do not include farm operations that qualify for the commercial class.)

Commercial customers

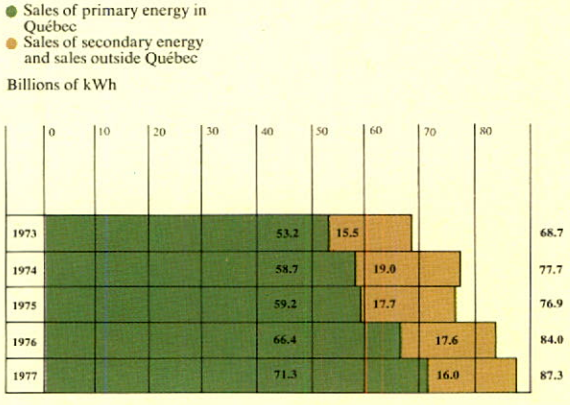
This class groups commercial customers and a wide variety of other customers, for example schools and hospitals. Rising to 230,331 at year-end, the number of accounts in this class increased 3.6%, which was higher than the 2.5% growth rate recorded in 1976. The sale of 15.8 billion kilowatthours in 1977 produced $312,761,000 in revenue. These figures represent increases of 7.8% in sales and 19.9% in revenue. The corresponding increases in 1976 had been 11.9% and 19.6% respectively.

Industrial customers

With the addition of 252 new contracts signed in 1977, the number of industrial customer accounts totaled 10,920. This was an increase of 2.4%, compared with increases of 1.2% in 1976 and 1.1% in 1975. The volume of primary energy sales was 2.4% higher than in 1976, surpassing the 2.2% increase of 1974 and reaching a figure of 27.7 billion kilowatthours. Industrial sales in 1975 and 1976 were lower than those of 1974.

In 1977, primary energy sales to industrial customers produced revenue totaling $304,332,000. This was 16.7% more than the 1976 revenue, which in turn had been 19.4% more than in 1975. The average annual increase over the past five years was 15.5%.

Breakdown of sales



Financial Statements and Statistics

Hydro-Québec Annual Report 1977

Financial Statements and Statistics

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Auditors' Report

We have examined the consolidated balance sheet of Hydro-Québec as at December 31, 1977, and the consolidated statements of revenue and expenditure, 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, 1977, 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 applied on a basis consistent with that of the preceding year.

Montreal, Canada,
March 28, 1978.

Samson, Bélair & Associés
Chartered Accountants

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

Consolidated Statement of Revenue and Expenditure

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

		1977	1976
Revenue	Sales of electricity: primary	$ 1,153,730	$ 1,002,634
	secondary	90,986	43,601
		1,244,716	1,046,235
	Increase in unbilled revenue	18,351	24,963
		1,263,067	1,071,198
	Other operating income (net)	22,183	20,615
		1,285,250	1,091,813
Expenditure	Operating, maintenance, administration and other expenses	379,759	328,874
	Power purchased	122,171	113,660
	Provision for renewals (depreciation)	97,797	92,786
	Provincial levy	20,000	20,000
	School and municipal taxes	20,217	19,209
		639,944	574,529
Net operating income		**645,306**	517,284
	Interest (Note 5)	263,792	206,644
Net income before allocations to reserves		**$ 381,514**	$ 310,640
Allocations to reserves	Interest	**$ 167,877**	$ 134,671
	Provisions:		
	Contingencies	153,899	121,602
	Rate stabilization	25,262	21,424
	Amortization of capital invested	34,476	32,943
		213,637	175,969
		$ 381,514	$ 310,640

See accompanying notes

Consolidated Balance Sheet

(in thousands of dollars)
as at December 31

	Assets	1977	1976
Fixed assets	Property and plant:		
	In service	$ 6,154,082	$ 5,880,406
	Less reserve for renewals (accumulated depreciation)	1,274,971	1,177,461
		4,879,111	4,702,945
	Construction work in progress	4,282,964	2,633,599
		9,162,075	7,336,544
	Construction, operating and research equipment, at cost less accumulated depreciation	81,953	70,799
		9,244,028	7,407,343
Current assets	Cash and short-term investments	761,298	1,085,853
	Accounts receivable and accrued interest	172,891	203,700
	Unbilled revenue	120,095	101,744
	Materials, fuel and supplies	80,167	73,083
	Prepaid expenses	6,214	6,340
		1,140,665	1,470,720
Other assets	Investments (Note 2)	131,697	131,819
	Unamortized debenture discount and expenses	92,263	80,910
	Accounts receivable	3,259	4,316
	Unamortized deferred cost on purchase of energy	36,651	37,615
		263,870	254,660
		$10,648,563	$ 9,132,723

	Liabilities and Reserves	1977	1976
Long-term debt	Bonds and debentures less sinking funds (Note 3)	$ 7,486,069	$ 6,554,806
	Other long-term debt (Note 4)	167,023	91,917
		7,653,092	6,646,723
	Less payable within one year (Note 1(g))	100,770	80,406
		7,552,322	6,566,317
Notes payable	Notes payable within one year	**18,678**	21,472
Current liabilities	Bank indebtedness	28,430	8,437
	Accounts payable and accrued liabilities	362,456	300,657
	Accrued interest	212,867	175,563
	Long-term debt payable within one year (Note 1(g))	114,938	82,919
		718,691	567,576
Reserves	Contingencies	1,087,503	860,544
	Rate stabilization	400,319	345,707
	Amortization of capital invested	871,050	771,107
		2,358,872	1,977,358
		$10,648,563	$ 9,132,723

See accompanying notes

On behalf of Hydro-Québec:
(signed) Robert A. Boyd
(signed) Guy Monty

(signed) Roger Girard
General Manager,
Control and Accounting.

Montreal, Canada,
March 29, 1978.

Consolidated Statement of Reserves

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

	1977				1976
	Contingencies	Rate stabilization	Amortization of capital invested	Total	Total
Balance, beginning of year	$ 860,544	$ 345,707	$ 771,107	$ 1,977,358	$ 1,666,718
Add:					
Interest	73,060	29,350	65,467	167,877	134,671
Provisions	153,899	25,262	34,476	213,637	175,969
Balance, end of year	**$1,087,503**	**$400,319**	**$871,050**	**$2,358,872**	$ 1,977,358

See accompanying notes

Consolidated Statement of Changes in Financial Position

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

		1977	1976
Source of financial resources	Operations		
	Net income before allocations to reserves	$ 381,514	$ 310,640
	Add (deduct) items not resulting in an outlay (a receipt) of financial resources:		
	Provision for renewals (depreciation)	97,797	92,786
	Depreciation of operating and research equipment	12,899	10,774
	Amortization of debenture discount and expenses	6,738	5,430
	Amortization of deferred cost on purchase of energy	964	964
	Net profit on repurchase of debentures	(5,745)	(8,542)
	Unrealized foreign exchange loss on translation of long-term debt payable within one year	11,655	2,513
	Net exchange premium at issuance of bonds and debentures purchased for sinking funds	(2,106)	(2,172)
	Total financial resources provided by operations	**503,716**	412,393
	Issue of debentures and other long-term debt, less discount and expenses	1,083,115	1,747,272
	Decrease (increase) in cash and short-term investments less bank indebtedness	344,548	(798,510)
	Decrease (increase) in accounts receivable and accrued interest and unbilled revenue	13,515	(103,693)
	Increase in accounts payable and accrued liabilities and accrued interest	99,103	117,646
	Sundry items	4,792	6,254
		$ 2,048,789	$ 1,381,362
Application of financial resources	Additions to fixed assets	$ 1,950,296	$ 1,266,978
	Maturities of bonds and debentures and other long-term debt	37,792	42,024
	Purchase of sinking fund investments (cost)	50,949	63,264
	Decrease in notes payable	2,794	3,665
	Increase in materials, fuel and supplies and prepaid expenses	6,958	5,431
		$ 2,048,789	$ 1,381,362

See accompanying notes

Notes to Consolidated Financial Statements
December 31, 1977

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 its outstanding long-term debt (8.49% in 1977 and 8.08% in 1976). 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 six 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 CFLCo 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 (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 revenue and expenditure. Debentures or bonds of an issue purchased for the sinking fund of that issue are cancelled.

g) Foreign exchange 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 to 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 consolidated statement of revenue and expenditure.

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

Property and plant are carried at cost which includes material, direct labor and overhead costs such as engineering and administration that are applicable to the capital 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 against income. When assets are sold or retired, their cost and accumulated depreciation are removed from the accounts and any gain or loss resulting from their disposal is amortized over a period of 10 years using a sinking fund method.

Preliminary engineering, investigation work and survey costs incurred on projects before their authorization for construction are included in Constuction 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 the sinking fund method is 3%.

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

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 9.50% in 1977 and 9.47% in 1976.

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 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

	1977 ($'000')	1976 ($'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	6,773	6,895
Sundry investments	91	91
	$131,697	$ 131,819

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, 1977 is as follows:

	Earnings (after deduction by CFLCo of income taxes to November 16, 1976) ($'000')	Dividends ($'000')	Retained earnings ($'000')
Cumulative to December 31, 1975	$ 22,956		$ 22,956
1976	7,280	$ 2,545	4,735
Adjustment for income taxes to November 16, 1976 (see below)			9,604
1977	10,676	8,086	2,590
Share of retained earnings at December 31, 1977			**$ 39,885**

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

On November 16, 1976, CFLCo qualified for exemption from income taxes, and accumulated deferred income taxes of $28,084,000, since the beginning of its operations to that date, of which $9,604,000 represents the share of Hydro-Québec, were added during that year to retained earnings. In order not to deprive the Province of Newfoundland of the income tax revenues that it would have been entitled to, had the CFLCo's tax status not been changed, the two shareholders have agreed that in future years special payments would be made by CFLCo to the Province of Newfoundland for amounts equivalent to the income taxes that it would have otherwise received.

Note 3

Bonds and debentures

Series	Interest rate	Years of issue	Years of maturity	Bonds and debentures ($'000')	Sinking fund investments ($'000')
Debentures of Hydro-Québec — Guaranteed by the Province de Québec					
*"K"	3½%	1953	1978	$ 32,253 U.S.	$ 20,395
*"N"	3½%	1956	1981	17,600 U.S.	
*"P"	4¼%	1956	1981	14,332 U.S.	
*"S"	5%	1957	1982	13,435	

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

Series	Interest rate	Years of issue	Years of maturity	Bonds and debentures ($'000')	Sinking fund investments ($'000')
*"T"	3¾%	1958	1983	$ 25,328 U.S.	
*"V"	5%	1958	1979	13,970	
*"W"	5%	1959	1980	19,076	
*"X"	5%	1959	1984	31,882 U.S.	
*"Y"	6%	1959	1979	16,975	
*"Z"	5½%	1960	1982	23,172	
*"AA"	5½%	1960	1983	17,568	
*"AB"	5½%	1961	1985	27,679	
*"AC"	5½%	1961	1985	25,439	
*"AD"	5½%	1962	1982	29,346	
*"AF"	5¾%	1962	1984	38,266	
*"AG"	5%	1963	1988	220,410 U.S.	
*"AM"	5¼%	1963	1986	35,480	
*"AN"	5½%	1964	1984, 1994	30,086	$ 20
*"AO"	4½%	1964	1994	50,000 U.S.	
*"AP"	4¾%	1964	1989	36,475 U.S.	45
*"AQ"	5½%	1964	1988	44,948	250
*"AR"	5½%, 5%	1965	1987, 1995	54,400	626
*"AS"	4⅝%	1965	1985	41,774 U.S.	
*"AT"	5¼%	1966	1987	41,516 U.S.	25
*"AU"	6%	1966	1991	40,487	
*"AV"	5⅜%	1966	1992	50,655 U.S.	
*"AW"	6%	1966	1980, 1990	40,235	550
*"AX"	6¼%	1966	1991	31,767 U.S.	
*"AY"	6¼%	1967	1993	48,978 U.S.	
*"AZ"	6½%	1967	1978, 1990	41,283	
*"BA"	6¼%	1967	1993	42,780 U.S.	
*"BB"	6½%	1967	1992	41,571 U.S.	
*"BC"	7%, 6%, 7%	1967	1980, 1994	44,937	
*"BD"	6⅞%	1968	1989	53,117 U.S.	
*"BE"	7½%, 7½%, 7%	1968	1978, 1980, 1994	39,200	
*"BF"	7¾%	1968	1986	22,708 U.S.	257
*"BG"	7¼%	1968	1991	42,719 U.S.	
* —	6¾%	1969	1984 (105,000,000 Deutsche marks)	28,152	382
* —	7¼%	1969	1984 (70,000,000 Deutsche marks)	18,931	
*"BH"	7¾%	1969	1990	206	10
*"BI"	8¾%	1969	1999	46,512 U.S.	
"BJ"	8%	1969	1979	5,861 U.S.	
*"BK"	8½%	1969	1992	24,478	
*"BL"	9¾%	1969	1995	46,513 U.S.	
*"BM"	9½%	1970	1990	5,635	
*"BN"	9¼%	1970	1995	56,815 U.S.	
*"BO"	9½%	1970	1990	27,535	
*"BP"	9½%	1970	1997	70,847 U.S.	
*"BQ"	9¼%	1970	1985	10,200 U.S.	
*"BR"	8¾%	1971	1999	70,596 U.S.	
*"BS"	8¼%	1971	1986	15,200 U.S.	
*"BT"	7¾%	1971	1996	46,250	
*"BU"	8¾%	1971	1996	47,094	
* —	8%	1971	1986 (90,000,000 Deutsche marks)	26,851	
*"BV"	8½%	1971	2001	73,367 U.S.	
*"BW"	8½%	1971	1986	21,869 U.S.	
*"BX"	7⅞%	1972	2002	99,073 U.S.	
* —	6½%	1972	1987 (100,000,000 Deutsche marks)	31,391	
*"BY"	8¼%	1972	1997	47,369	
*"BZ"	8¼%	1972	1993	56,875	
*"CA"	8%, 8⅜%	1972	1980, 1997	62,112	
"CB"	8¼%	1972	1996	50,000	
* —	6¼%	1972	1987 (80,000,000 Swiss francs)	21,021	
*"CC"	7½%	1973	2003	124,750 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	100,000 U.S.	
"CG"	8¾%	1973	1998	50,000	
"CH"	8½%	1973	1998	50,000	
*"CI"	8¼%	1974	2004	124,838 U.S.	
*"CJ"	8½%	1974	1989	29,000 U.S.	300
"CK"	9%	1974	1999	60,000	
"CL"	9⅞%	1974	1996	80,000	
*"CM"	10⁷/₁₀%	1974	1999	150,000 U.S.	

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

Series	Interest rate	Years of issue	Years of maturity	Bonds and debentures ($'000')	Sinking fund investments ($'000')
—	9%	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	
—	8%	1975	1980 (100,000,000 Swiss francs)	38,400	
"CV"	9½%	1975	1981	50,000	
*"CW"	10%	1975	2005	250,000 U.S.	
—	7¾%	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"	8⁶/₁₀%	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	122,500 U.S.	
* —	6½%	1977	1987 (199,500,000 Deutsche marks)	92,568	
—	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 (149,500,000 Deutsche marks)	75,692	
Total debentures of Hydro-Québec				**$7,399,432**	**$ 22,860**

*Sinking fund debentures

Bonds of subsidiaries

The Shawinigan Water and Power Company					
"S"	5¾%	1961	1981	$ 12,454	
Southern Canada Power Company, Limited					
"D"	3⅜%	1951	1981	2,450	
Quebec Power Company					
"G"	6¼%	1962	1982	10,733	
Lower St. Lawrence Power Company					
"F"	5⅞%	1959	1984	805 U.S.	
Saguenay Electric Company					
"A"	5½%	1962	1982	3,400	
Total bonds of subsidiaries				**$ 29,842**	
Total bonds and debentures				**$7,429,274**	**$ 22,860**

Total bonds and debentures	$ 7,429,274
Less sinking fund investments	22,860
	7,406,414
Add net exchange premium at dates of borrowing on debt payable in U.S. currency	79,655
	$7,486,069

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

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

On January 26, 1978, Hydro-Québec entered into a credit agreement consisting of a U.S. $750,000,000 Medium Term Loan and of 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.

Hydro-Québec has also issued, in March 1978, 130,000,000 of debentures, 3¾%, payable in Swiss francs ($75,140,000 in Canadian dollars) maturing in 1993.

Consolidated long-term debt maturities and sinking fund requirements in each of the next five years are approximately as follows:

	Canadian dollars ($'000')	United States dollars[1] ($661,235,000 U.S.) ($'000')	Deutsche marks[1] (322,574,000 DM) ($'000')	Swiss francs[1] (865,000,000 SFr) ($'000')	Total ($'000')
1978	$ 29,604	$ 56,885	$ 28,449		$ 114,938
1979	51,020	112,335	22,152	$ 13,200	198,707
1980	129,463	110,389	22,152	78,894	340,898
1981	89,277	153,584	22,152	128,444	393,457
1982	194,679	240,074	22,152	136,043	592,948
	$ 494,043	**$ 673,267**	**$ 117,057**	**$ 356,581**	**$1,640,948**

[1]As explained in Note 1(g), the 1978 amounts shown above have been translated to Canadian currency at the rates of exchange prevailing at December 31, 1977 and the amounts for 1979 to 1982 are shown at the Canadian dollar equivalent at the dates of borrowing.

Consolidated long-term debt at December 31, 1977 includes $4,346,412,000 U.S., 758,000,000 Deutsche marks, 1,100,000,000 Swiss francs, and 20,000,000,000 Japanese yen. If the long-term debt payable in various currencies in the principal amount of $7,552,322,000 at December 31, 1977 were translated into Canadian dollars at the rates of exchange prevailing on that date, this principal amount would be increased by approximately $605,243,000 to $8,157,565,000.

Note 4

Other long-term debt

	1977 ($'000')	1976 ($'000')
Rural Electrification Bureau, 1978-1994*	$ 4,938	$ 5,628
Government of Canada, 1978-1999**	19,618	19,975
Atomic Energy of Canada, Limited**	137,000	66,000
Present value of lease obligations for regional office and service facilities, for 25-year period ending in 2002, capitalized at interest rate charged to Construction work in progress (see Note 1(i))	5,304	
Other long-term debt maturing from 1978 to 1984	163	314
	$167,023	$ 91,917

*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

	1977 ($'000')	1976 ($'000')
Interest on long-term debt	$ 620,860	$ 485,567
Interest on bank indebtedness and notes payable	4,397	4,143
Amortization of debenture discount and expenses	6,738	5,430
Foreign exchange loss (gain) on repurchase of debentures and translation of foreign current assets and liabilities	10,181	(301)
	642,176	494,839
Less:		
Interest charged to Construction work in progress	282,047	186,178
Investment income	90,592	93,475
Net profit on repurchase of debentures	5,745	8,542
	378,384	288,195
	$263,792	$ 206,644

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 initial actuarial deficit in respect of services prior to 1966 and the experience deficiency for current services amounted to approximately $28,000,000 and $5,000,000, respectively, at December 31, 1974 as determined by an actuarial survey at that date.

The total pension cost of $27,816,000 for 1977 ($23,833,000 for 1976) provides fully for Hydro-Québec's contribution to the Québec Pension Plan and to the Retirement Fund in respect of current services, amortization of the experience deficiency over a five-year period and amortization of the initial actuarial deficit over a period ending December 31, 1995.

Additional past service obligations of $34,000,000 at December 31, 1974 and of $10,800,000 at December 31, 1975, as determined by actuarial studies at those dates, have resulted from supplementary amounts that Hydro-Québec had decided to pay to its pensioners. These amounts are substantially amortized over a period of thirty years by annual charges to operations. Hydro-Québec paid $3,423,000 in 1977 ($3,279,000 in 1976) in respect of these benefits.

An actuarial survey of the plan and of Hydro-Québec's commitments relative to the above-mentioned past service obligations, as at December 31, 1977, will be completed in 1978.

Note 7

Commitments 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 1978, 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 remaining 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 Subordinated 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 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 contesting the jurisdiction of the Newfoundland Supreme Court over the power contract 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 Montreal 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 Québec Government 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.

At December 31, 1977, 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 currently consists 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. At December 31, 1977, $3,385,000,000 has been invested in the project.

During 1977, legislation has been implemented by the Québec National Assembly and the Government of Canada, approving, giving effect to and declaring valid the final agreement, signed in 1975 and subsequently confirmed by the James Bay Crees and Inuit of Québec, providing, among other things, for the extinguishment of all claims of the Crees and Inuit in and to the territory on which the project is located.

The final agreement also provides for a final basic monetary compensation of $225,000,000 of which $75,000,000 is to be paid by Société d'énergie de la Baie James or Hydro-Québec, in instalments to be determined with reference to the installed capacity of future hydro-electric generating facilities within the territory. Such instalments, which have not been provided for in the accounts, will commence one year after each turbine-generator has been in commercial operation and will extend to 1996. Another $75,000,000 is to be paid over a period of ten years to 1985 to the extent of 57% by the Province (and/or a corporation designated by the Province) and to the extent of 43% by the Government of Canada. The balance of $75,000,000 is to be paid by the Province.

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

In early 1978, an agreement has been signed with the Naskapis of Québec, under which the Naskapis have undertaken not to institute any future legal proceedings affecting the project. This agreement is subject to the future confirmation of the Naskapis, to enactment within two years of implementing legislation by the Québec National Assembly and the adoption of an order-in-council by the Government of Canada, approving, giving effect to and declaring valid the said agreement, and to the coming into force of the supplementary agreement number 1 of the James Bay and Northern Québec Agreement signed on the same date. The final agreement also provides for a final monetary compensation of $9,000,000 of which $3,000,000 is to be paid by Société d'énergie de la Baie James or Hydro-Québec. The balance is to be paid by the Province and the Government of Canada.

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 by AECL's plant plus a profit margin. The current market price for heavy water is approximately $211,000 per metric ton. The agreements also provide for the undertaking by Hydro-Québec to build another CANDU nuclear station of at least 600,000 kilowatts capacity at the Gentilly site before the end of the 1980s.

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 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 electricity, water and 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 period of option 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.

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 1978 amount to $2,707,000,000, including $1,933,000,000 for the James Bay project.

Note 8

Reclassification of comparative figures

At December 31, 1977, Hydro-Québec has regrouped certain items in the consolidated balance sheet and the comparative figures for 1976 have been reclassified accordingly.

Five-Year Summary of Consolidated Revenue and Expenditure

(in thousands of dollars)

		1977	1976	1975	1974	1973
Revenue	Sales of electricity: primary	$ 1,153,730	$1,002,634	$ 850,082	$ 738,866	$ 638,628
	secondary	90,986	43,601	42,529	36,542	15,475
		1,244,716	1,046,235	892,611	775,408	654,103
	Increase in unbilled revenue	18,351	24,963	11,599	7,764	7,542
		1,263,067	1,071,198	904,210	783,172	661,645
	Other operating income (net)	22,183	20,615	17,879	14,709	12,785
		1,285,250	1,091,813	922,089	797,881	674,430
Expenditure	Operating, maintenance, administration and other expenses	379,759	328,874	266,392	236,853	201,641
	Power purchased	122,171	113,660	106,633	86,930	62,753
	Provision for renewals (depreciation)	97,797	92,786	84,394	78,447	75,439
	Provincial levy on energy generated	—	—	—	—	8,222
	Provincial levy	20,000	20,000	20,000	20,000	15,000
	School and municipal taxes	20,217	19,209	18,806	18,379	18,783
		639,944	574,529	496,225	440,609	381,838
Net operating income		**645,306**	517,284	425,864	357,272	292,592
Interest	Interest on long-term debt	620,860	485,567	344,330	259,472	224,062
	Interest on bank indebtedness and notes payable	4,397	4,143	3,732	4,085	3,652
	Amortization of debenture discount and expenses	6,738	5,430	4,602	3,990	3,820
	Foreign exchange loss (or gain) on repurchase of debentures and translation of foreign current assets and liabilities	10,181	(301)	192	(2,251)	(1,058)
	Interest charged to Construction work in progress	(282,047)	(186,178)	(118,826)	(62,757)	(40,412)
	Investment income	(90,592)	(93,475)	(27,222)	(15,150)	(10,449)
	Net profit on repurchase of debentures	(5,745)	(8,542)	(10,694)	(6,740)	(7,632)
		263,792	206,644	196,114	180,649	171,983
Net income before allocations to reserves		**$ 381,514**	$ 310,640	$ 229,750	$ 176,623	$ 120,609
Allocations to reserves	Interest	**$ 167,877**	$ 134,671	$ 107,773	$ 88,476	$ 77,274
	Provisions:					
	Contingencies	153,899	121,602	74,163	44,625	3,019
	Rate stabilization	25,262	21,424	18,084	15,663	13,233
	Amortization of capital invested	34,476	32,943	29,730	27,859	27,083
		213,637	175,969	121,977	88,147	43,335
		$ 381,514	$ 310,640	$ 229,750	$ 176,623	$ 120,609

Five-Year Consolidated Sales and Revenue

		1977	1976	1975	1974	1973
Electrical Energy Generated and Purchased (in millions of kWh)	Generated (net)	60,796	60,882	54,392	59,893	57,514
	Purchased	35,255	34,381	31,687	25,938	18,390
	Received as per agreement	2,616	1,972	2,629	133	61
		98,667	97,235	88,708	85,964	75,965
	Less:					
	Losses and internal use	7,766	9,218	7,974	6,956	5,715
	Delivered as per agreement	3,420	2,794	3,212	1,130	1,099
	Increase in unbilled sales	159	1,206	585	183	471
	Total electrical energy sold	**87,322**	84,017	76,937	77,695	68,680
Electricity Sales (in millions of kWh)	Residential and farm	24,391	21,611	18,768	17,260	15,215
	Commercial (including Municipal)	15,812	14,673	13,113	12,033	11,149
	Industrial: Primary	27,695	27,055	24,506	27,100	24,566
	Secondary	1,020	1,816	1,778	2,710	2,171
	Street lighting and luminaires	622	599	576	539	512
	Transportation	189	157	151	142	160
	Wholesale: Primary	6,075	13,325	14,324	13,123	10,965
	Secondary	11,444	4,677	3,598	4,654	3,863
	Interdepartmental	74	104	123	134	79
	Total electricity sales	**87,322**	84,017	76,937	77,695	68,680
Sales Revenue (in thousands of dollars)	Residential and farm	$ 458,930	$ 376,990	$ 315,358	$ 269,075	$ 235,615
	Commercial (including Municipal)	312,761	260,939	218,218	182,761	164,842
	Industrial: Primary	304,332	260,736	218,308	201,068	171,760
	Secondary	5,747	8,171	8,188	9,042	5,228
	Street lighting and luminaires	26,959	23,618	20,188	17,083	15,196
	Transportation	2,665	2,094	1,700	1,420	1,482
	Wholesale: Primary	47,847	77,912	75,940	67,053	49,472
	Secondary	85,239	35,430	34,341	27,500	10,247
	Interdepartmental	236	345	370	406	261
	Total sales revenue	**$1,244,716**	$1,046,235	$ 892,611	$ 775,408	$ 654,103
Average Revenue (cents per kWh)	Residential and farm	1.882¢	1.744¢	1.680¢	1.559¢	1.549¢
	Commercial (including Municipal)	1.978¢	1.778¢	1.664¢	1.519¢	1.479¢
	Industrial: Primary	1.099¢	0.964¢	0.891¢	0.742¢	0.699¢
	Secondary	0.563¢	0.450¢	0.460¢	0.334¢	0.241¢
	Wholesale: Primary	0.788¢	0.585¢	0.530¢	0.511¢	0.451¢
	Secondary	0.745¢	0.757¢	0.954¢	0.591¢	0.265¢
	Other	3.374¢	3.029¢	2.619¢	2.320¢	2.256¢
Total Customer Accounts	(year-end)	**2,265,221**	2,188,222	2,135,724	2,080,650	2,017,079
Residential and Farm Accounts	(year-end)	**2,011,403**	1,941,604	1,893,969	1,841,671	1,783,871

Statistics of Electricity Generated and Purchased and its Disposal in 1977

Gross Generation		The consolidated system (in millions of kWh)
Hydro-Electric Stations		
Upper Ottawa	(5 plants)	2,541
Gatineau	Paugan	931
	Others (3 plants)	1,112
		2,043
Lower Ottawa	Carillon	2,262
	Others (7 plants)	982
		3,244
Upper Saint Lawrence	Beauharnois	11,445
	Other (1 plant)	671
		12,116
Saint-Maurice	La Trenche	1,373
	Beaumont	1,243
	La Tuque	1,122
	Shawinigan 3	1,009
	Others (4 plants)	3,297
		8,044
Bersimis	Bersimis 1	5,393
	Bersimis 2	2,806
		8,199
Outardes	Outardes 3	3,792
	Outardes 4	2,706
		6,498
Manicouagan	Manic 5	6,831
	Manic 2	5,137
	Manic 1	557
	Manic 3	5,111
		17,636
Other rivers	(14 plants)	527
Total	(49 hydro-electric plants)	60,848
Thermal-Electric Stations	(15 plants)	214
Total gross generation	(64 plants)	61,062
Less: station use		266
Total generation (net)		60,796
	Alcan	825
	Maclaren-Quebec Power Co.	560
	Churchill Falls (Labrador) Corporation Limited	33,275
	Sundry purchases	595
Total purchases		35,255
Plus: received as per agreement		2,616
Energy available		98,667
Less: delivered as per agreement		3,420
Energy available (net)		95,247
Total sales		87,322
Increase in unbilled sales		159
Losses and internal use		7,766
System peaks (MW)	Primary	15,674
	Secondary	—

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, 1977 and the statement of revenue and expenditure 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, 1977, and its revenue and expenditure for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Montreal, Canada,
March 28, 1978.

Samson, Bélair & Associés
Chartered Accountants

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

Hydro-Québec Employees' Retirement Fund

Statement of Revenue and Expenditure

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

		1977	1976
Revenue	Current contributions:		
	Employees	$ 11,312	$ 9,328
	Hydro-Québec	22,182	18,920
		33,494	28,248
	Contribution by Hydro-Québec for initial actuarial deficit (Note)	2,108	2,108
		35,602	30,356
	Additional past service contributions less cancellations	36	63
		35,638	30,419
	Less refunded to employees leaving service	514	529
		35,124	29,890
	Revenue from investments	25,630	19,319
		60,754	49,209
Expenditure	Pensions paid	4,974	4,417
Net revenue transferred to reserve		**$ 55,780**	$ 44,792

See accompanying note

Hydro-Québec Employees' Retirement Fund

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

		1977	1976
Assets			
(Note)	Investments, at cost		
	Debentures of Hydro-Québec and bonds of its subsidiaries, guaranteed by the Province de Québec	$ 154,942	$ 117,624
	Bonds of, or guaranteed by the Province de Québec	99,600	92,550
	Municipal, School Commission, Cegep, Hospital and University Bonds	33,677	30,602
	Government of Canada bonds	—	3,280
	(Par value $296,009, market value $279,666)	**288,219**	244,056
	Common stocks (market value $1,480)	1,212	1,180
	Short-term investments	13,462	4,000
		302,893	249,236
	Accrued interest on investments	6,661	5,474
	Past service contributions receivable from employees	46	61
	Amount receivable from Hydro-Québec	2,336	1,385
		$311,936	$ 256,156
Reserve	Balance, beginning of year	$ 256,156	$ 211,364
	Net revenue for the year	55,780	44,792
	Balance, end of year	**$311,936**	$ 256,156

See accompanying note

On behalf of Hydro-Québec:
(signed) Robert A. Boyd
(signed) Guy Monty

(signed) Roger Girard
General Manager,
Control and Accounting.

Montreal, Canada,
March 29, 1978.

Note to Financial Statements

December 31, 1977

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 as of December 31, 1974 shows an actuarial deficit in respect of services prior to 1966 of approximately $28,000,000, and an experience deficiency at December 31, 1974 in respect of current services of approximately $5,000,000.

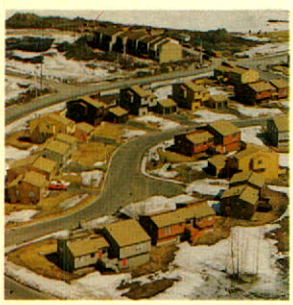
Hydro-Québec assumes the annual amortization ($2,108,000) of the initial actuarial deficit over a period ending December 31, 1995. The experience deficiency at December 31, 1974 for current services is being amortized over a period of 5 years, from 1975 to 1979 inclusive. As a result, contributions to the Fund are sufficient to cover obligations in respect of current services and the amortization of the above actuarial deficit in respect of past services over a period ending December 31, 1995.

An actuarial survey of the plan at December 31, 1977 will be completed in 1978.

The variations in electrical energy sales to the pulp and paper industry, the largest customer in the industrial sector, were respectively −0.5%, +12.1% and −10.8% for the years 1977, 1976 and 1975. For the electrometallurgical industry, the variations were +1.2%, +13.9% and −24.5%. For the chemical and electrochemical industry, they were +4.9%, +32.7% and −1.4%, and for the metal and nonmetal mining industry, +3.6%, +33.2% and −17.9%. These figures apply to companies using more than 5,000 kW. During 1977, poor economic conditions forced most of the large paper producers to reduce production temporarily.

New industrial loads

There were three additions to the list of large industrial accounts: Papier Cascades (Cabano) for a minimum contract power of 6,000 kilowatts, Sidbec-Normines at Fire Lake for a minimum contract power of 2,000 kilowatts, and Sidbec-Normines at Port Cartier for a minimum contract power of 50,000 kilowatts.



New loads in the three main customer classes — residential, commercial and industrial.

The term of the first two contracts is one year, while the third contract will remain in effect until June 30, 1987.

Sixty-one large contracts were renewed or revised in 1977, adding 56,800 kilowatts to firm load. In addition, negotiations were conducted during the year on a number of projects which could result in a total of more than 400,000 kilowatts of firm demand.

Sales outside Québec and secondary energy

Sales of primary energy outside Québec totaled 3.6 billion kilowatthours, a decrease of 67.8% which reduced revenue in this category from $53,997,000 in 1976 to $18,689,000 in 1977, a decrease of 65.4%. Expiration of a contract guaranteeing 1,000 megawatts to Ontario Hydro left eight such contracts still in effect.

Seventeen Québec customers, the same number as in 1976, paid $7,536,000 for 1.3 billion kilowatthours of secondary energy. These figures represent a reduction of 16.2% in revenue and 33.0% in energy. The decrease is explained by the low level of activity in the pulp and paper industry, which is Hydro-Québec's main customer for this kind of electrical energy.

The reduction in primary energy sales outside Québec and in secondary energy sales inside Québec resulted in larger quantities of secondary energy being available for export. These sales consequently rose 148.1% to reach 11.1 billion kilowatthours, producing revenue of $83,450,000, which was 141.1% more than in 1976. Sales of secondary energy to the United States accounted for 0.5 billion kilowatthours and $7,995,000, or 10.2% more in volume and 18.0% more in revenue than in the preceding year.

Maximum demand

In 1977, customers' peak demand for power, which Hydro-Québec has the mandate to satisfy, exceeded 15,000 MW, reaching 15,171 MW on December 12, when the temperature dropped to −19°C. In anticipation of the peak, 190 MW of load had been interrupted, as provided for in certain contracts. The 1977 peak was 5.2% higher than the 1976 peak. But this increase was considerably less than those of 1975 (12.1%) and 1976 (15.6%). The size of the 1975 and 1976 increases partly accounts for the modest increase of 1977 which re-establishes the long-term equilibrium of demand growth. This annual growth rate, calculated over the last ten years, is now 8.15%.

To meet the December 12 peak, Hydro-Québec power stations supplied a net of 9,570 MW. And 6,104 MW of additional power was purchased. Nevertheless, Hydro-Québec was able to deliver 503 MW outside the system, which left an import balance of 5,601 MW at the time of the peak.

Runoff and reserves

In nearly all the river basins exploited by Hydro-Québec, runoff was about 6.5% less than the average of the last five years, and much less than that of 1976. The Saint-Maurice and Gatineau river basins, for example, respectively received 20.1% and 17.9% less water than in 1976.

However, as 1977 production did not exceed that of 1976, water reserves increased from 40.4 billion kWh at the beginning of the year to 44.1 billion kWh at year-end; reserves being at their lowest (30.1 billion kWh) in April and at their highest (47.2 billion kWh) in November. At the start of 1978, Hydro-Québec reservoirs were therefore at 89.9% of their total capacity of 49.0 billion kWh.

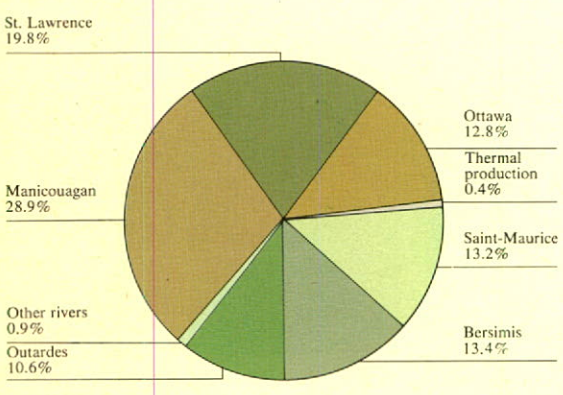
Production

During 1977, the gross production of Hydro-Québec's power stations was 60.8 billion kWh — no significant increase over 1976. Of this energy, 66.1% was generated from power stations with storage reservoirs, 33.5% from run-of-river plant, and only 0.4% from thermal installations.

Installed capacity

At December 31, 1977, the installed capacity of Hydro-Québec's power stations totaled 12,523,400 kW, an increase of 113,911 kW over 1976. This small amount of additional capacity resulted primarily from the commissioning of the last two gas-turbine units (108,000 kW) of the Cadillac thermal station in Abitibi, and two diesel units (combined capacity 11,936 kW) at Cap-aux-Meules on the Magdalen Islands. However, the eight units of the Havre-Saint-Pierre thermal station were dismantled as this region is now linked to the main grid. No hydroelectric capacity was added to the system during 1977.

Production by river-system



Construction of Generating Stations

In 1977, Hydro-Québec continued construction of the Outardes-2 hydroelectric station and the Gentilly-2 nuclear power station. Outardes 2 is scheduled for service in a few months. The Cadillac gas-turbine power station in Abitibi has been completed, and the Cap-aux-Meules diesel generating station in the Magdalen Islands is being enlarged. However, most of the power-station construction work is being carried out in the James Bay region where SEBJ is building the La Grande hydroelectric complex.

While this work is proceeding, Hydro-Québec is conducting intensive surveys and studies to find other sites suitable for the construction of power stations.

James Bay

Construction of the La Grande complex began in 1973. This complex will include four power stations on the La Grande River, which flows from east to west about 1,000 km north of Montreal. Two neighboring rivers, the Caniapiscau and the Eastmain, will be diverted into the La Grande to increase the flow.

A total of 44 generating units will successively be placed in service between 1979 and 1985. As now planned, the complex's four generating stations will have an installed capacity of 10,420 MW and a production capability of 67.8 billion kWh a year.

SEBJ's expenditures amounted to $1,189 million in 1977, compared with $677 million in 1976.

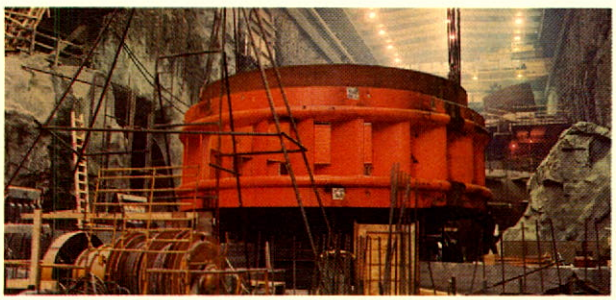
LG-1

The site of this power station had to be moved from kilometre 37 to kilometre 71 after an agreement was signed with the native people of the region. If it is built at kilometre 71, LG-1 power station will have an installed capacity of 910 MW. However, negotiations were conducted in 1977 with a view to building this power station on the original site at kilometre 37, which will allow for an installed capacity of 1,140 MW.

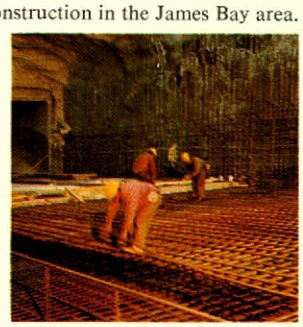
LG-2

The LG-2 construction site, located 117 kilometres from the mouth of the La Grande River, experienced an exceptional year in 1977. As a result of the accelerated program implemented at the beginning of the year, time lost during the construction-industry strike in August 1976 was made up, and in fact the work was brought ahead of schedule.

The progress was most marked at the main dam, an earth and rockfill structure whose crest will measure 2,835 metres in length. The dam and the 29 auxiliary dikes are now



Construction in the James Bay area.



Excavation work, James Bay site.

more than 75% complete. It will therefore be possible to begin impounding the reservoir several months ahead of schedule and to commission the first four generating units in the fall of 1979, several months before the date initially planned.

At the powerhouse site, excavation of the machine hall is completed. This huge cavern, 483 metres long, was dug 137 metres underground. It will house the station's sixteen 333-MW generating units. With a utilization factor of 80% and an installed capacity of 5,328 MW, LG-2 power station will produce 35.8 billion kWh a year. In 1982, it will be the largest hydroelectric power station in North America.

LG-3

Hydro-Québec is acting as prime contractor at LG-3 construction site, which is located 238 kilometres from the mouth of the La Grande River. Work began in 1976, and the first of the station's 10 generating units will be commissioned in July 1982. The powerhouse will have a total installed capacity of 1,920 MW and produce 12.3 billion kWh annually.

At this location, an island divides the river into two branches. In 1977, material was placed on the south dam to a height of 41 metres. The northern branch of the river was closed and the river flow diverted into two tunnels driven through the island. In addition, excavation work was done for the powerhouse, the intake and the spillway. And a 55-kilometre access road is now being built to the area where the northern dikes are located.

LG-4

At the LG-4 site, exploratory work has been completed and a landing strip is now being prepared, as well as a camp-site and family village. This construction site is now linked to the complex's road network. Construction of the permanent structures is scheduled to begin in 1978.

The powerhouse will be built above ground at a site 463 kilometres from the mouth of the La Grande River. Its eight generating units will have a total installed capacity of 2,032 MW and an annual production of 14.1 billion kWh.

Gentilly

The Gentilly nuclear complex is situated on the south shore of the St. Lawrence River, halfway between Montreal and Québec City. It now contains two power stations — Gentilly 1 (266 MW), which belongs to Atomic Energy of Canada Limited, and Gentilly 2 (685 MW) which is under construction. A third station, Gentilly 3, is to be built soon. In addition, Atomic Energy of Canada Limited is building a heavy water plant on a nearby site.

At Gentilly 1, the reactor was in operation for about one month at the beginning of the year, but then production had to be stopped because of difficulties with the moderator heat-exchangers. A new start-up may be possible in May 1978.

At Gentilly 2, construction work proceeded in the power station's four buildings. This project is about two years behind schedule, mainly because of delays in deliveries and in detailed engineering of the powerhouse. It is now expected that the reactor will be ready to operate in 1981. During 1977, some $114,781,000 was invested in the construction of this project.

Outardes 2

Outardes 2, the last power development to be built in the Manic-Outardes complex, is now in the final stages of construction. The work at this site, which was suspended in 1968 and resumed in 1974, will be completed on December 1, 1978, with the starting of the third and final 151.3-MW unit. This power station, to have a total installed capacity of 454 MW, is located on the Outardes River about 400 kilometres from Québec City, on a site next to a small power station owned by the Quebec North Shore Paper Company.

Some major work was accomplished at this site during 1977. At the powerhouse, concreting of the roof has been completed, erection of the generating units has begun, and the switching station has been installed. Concreting of the intake tunnel and intake structure has been completed. The steel surge tank has been erected, and the tailrace canal has been excavated except for the plug. The spillway is now being used as a bypass, allowing an old spillway to be taken out of service and material

to be placed on the dam located downstream from it. And finally, construction of two auxiliary dikes is under way.

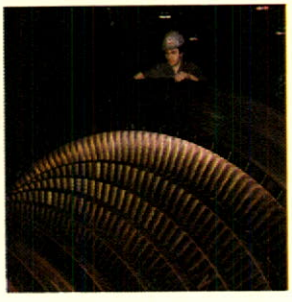
Work at this site cost $104,220,000 in 1977, with the total cost of this power development now estimated at $314,000,000.

Gas-turbine powerhouses

The 162-MW Cadillac power station in the Abitibi region is now finished and will be placed in operation in 1978. Each of the three generating units in this station will be driven by two turbines activated by gas from the combustion of light oil. In addition, a small back-up power station containing gas turbines has been installed at head office.

Diesel power station

In March and October, two new 6-MW units were placed in service at the Cap-aux-Meules diesel generating station in the Magdalen Islands. This station will be enlarged to accommodate four other units fueled by heavy oil. At present only three of these units will be installed. This construction work cost $8,229,000 in 1977.



Construction of Gentilly 2.

Surveys and studies

In the southern part of the James Bay territory, preliminary studies for the NBR complex continued during the year. This complex, to be built on the Nottaway, Broadback and Rupert rivers, would have an installed capacity of about 5,515 MW. Also under study is the possibility of installing secondary power stations on the Eastmain, Laforge and Brisay rivers. These stations could add nearly 1,600 MW to the installed capacity of the La Grande complex.

Surveying, studies and investigations are being carried out in the territory of the Grande and Petite Baleine rivers, whose power potential is estimated at 2,110 MW divided among three power stations.

Preliminary studies are also being conducted on the George and Baleine rivers in the Ungava Bay region, and the Koksoak-Caniapiscau-Mélèzes complex is being re-evaluated in order to carry through overall planning for the region.

On the Lower North Shore of the St. Lawrence, a number of studies and surveys were carried out on the Romaine, Natashquan, Petit Mécatina, Moisie and Magpie rivers.

Elsewhere in the province, eight possible sites for pumped-storage power stations are being investigated.

Transmission system

The undoubted highlight of 1977, as far as the transmission system was concerned, was the official start of construction work on one of the five transmission lines that will link the James Bay power stations to consumption centres. By 1984, 5,370 km of 735-kV circuits and 17 substations will have been commissioned. Much of the infrastructure – access roads, construction camps, telecommunications facilities and supply depots – is already in place. Land clearing for work on the first two transmission lines has been in progress for two years. With the official start on the Abitibi substation in July, and on the line section between the Abitibi and Chibougamau substations in October, construction is now well under way. The LG-2, Nemiskau, Abitibi, La Vérendrye and Chénier substations will be ready in the fall of 1979.

Engineering work on the microwave link between the LG-2 power station and Montreal continued throughout the year and the construction contract was awarded in October.

Two of the James Bay transmission lines will feed directly into a system that will encircle the island of Montreal and link these lines to the existing grid which is fed primarily by energy from the Manic-Outardes complex and Churchill Falls power station. All the sections of the metropolitan Montreal loop that remain to be built are now under construction. In addition to Chénier, which is the terminal station for the first James Bay line, two new substations are required for the loop: Châteauguay and Hertel. They, along with the two new feeder lines from Duvernay and Boucherville substations, will be completed in 1978.

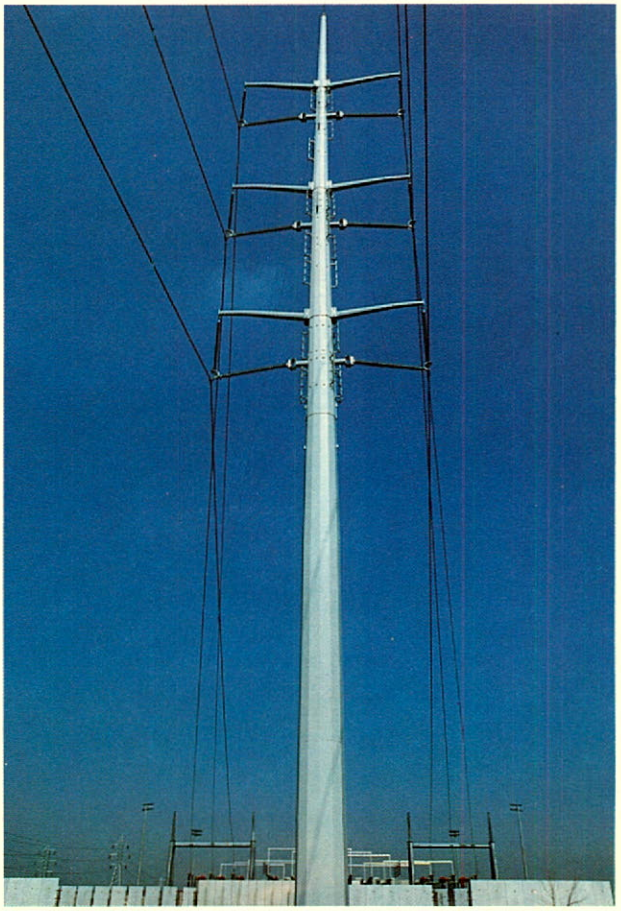
Also in 1978 Hydro-Québec will be ready to begin its deliveries to the Power Authority of the State of New York. During the year, construction work continued on the 56-km, 765-kV interconnection between Châteauguay substation and the State of New York's grid.

Guyed-V transmission towers will be used on the first two James Bay lines, the Montreal loop and the line from Châteauguay to the State of New York.

In 1977, improved-appearance transmission towers were used for the first time on the Hydro-Québec system for a 315-kV line supplying Brossard substation. Although only about 3 km long, the line incorporates several special features, including the first use of synthetic insulators to support 315-kV conductors.

During the year, about 6,000 megavolt-amperes (MVA) was added to the system's transformer capacity as a result of the construction of Lanaudière substation in the Joliette region, the installation of eight new transformers at various substations and the replacement of the two Duvernay substation transformers by two more powerful ones.

The new improved-appearance transmission tower.



The installation of the first 100-MVA static condenser on the transmission system at Rimouski substation will be followed by the installation of more powerful static condensers at Laurentides substation, in 1978, and at Nemiskau substation, in 1981. In addition, two 250-MVA synchronous condensers were installed at Manicouagan substation. Special transportation measures were needed to move this enormous equipment.

In February, Control Data Canada was awarded a contract for the automation of certain system-operation activities. The computerized system should be ready for the fall of 1979 and preparation of the premises for the computers, in Hydro-Québec's quarters in *Complexe Desjardins*, adjacent to the Montreal head office, will be completed by April 1978. The new system required installation of an emergency power station comprising three 800-kW, gas-turbine units. When the power station is ready to operate at the beginning of 1978 it will supply, if need be, the operations control centre, the EDP department's data processing centre and head office.

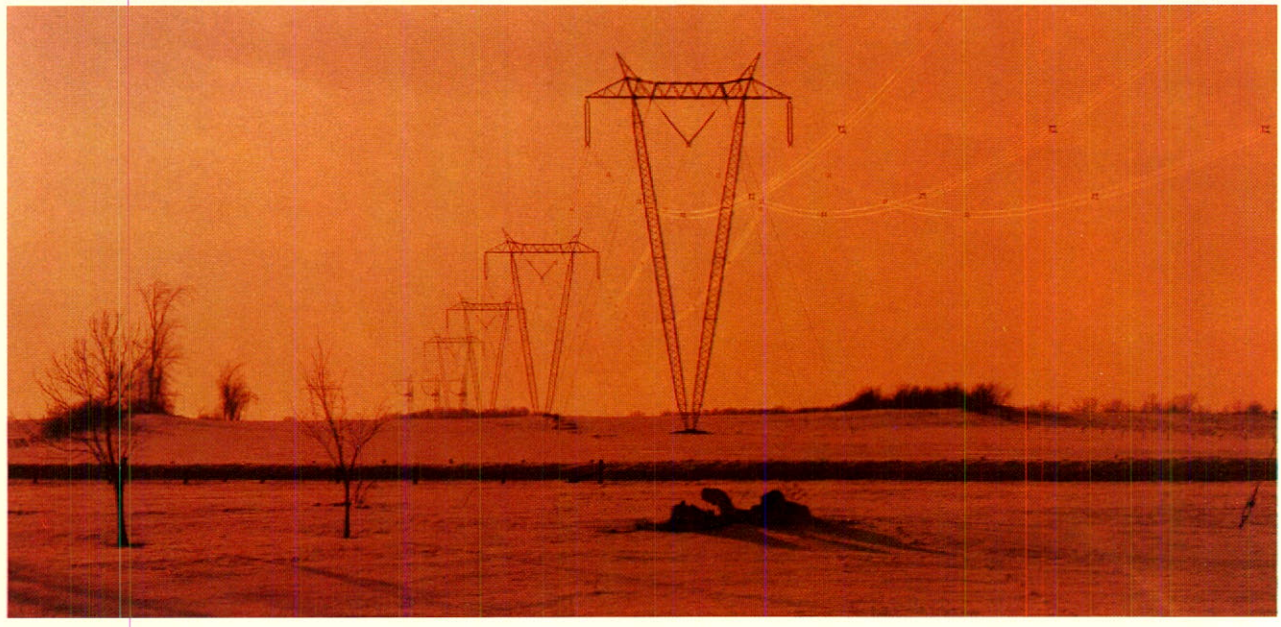
At the end of 1977, the transmission system comprised 23,610 km of circuits rated between 69 kV and 735 kV; 270 km of circuits were added during the year.

Distribution system

During 1977, 1,527 MVA of transformer capacity was added to the distribution system, partly through the construction of 12 new substations. Also during the year, 2,020 km of circuits rated from 2.4 to 34.5 kV were added, including 250 km of underground circuits. At year-end, circuits totaled 78,900 km including 2,920 km underground.

Capital expenditures increased considerably as expected, due mainly to the backlog of work carried out to catch up on time lost during the 1976 strikes. Expenditures for the distribution system reached $187,487,000, up $61,022,000 or 48.3% from 1976. Operating and maintenance expenditures rose to $99,014,000 as against $75,082,000 in 1976.

Guyed-V towers of the new line to New York State.



The Hydro-Québec system is interconnected with several other systems, facilitating a certain amount of mutual aid through exchanges of surplus power and energy. Such surpluses are available over periods of a few years or at times of the year when demand is low.

Canadian interconnections

Hydro-Québec is participating in the Interprovincial Advisory Committee on Energy which has undertaken a study on the feasibility and advantages of a trans-Canada electrical grid. The work was consigned to a team of specialists who must submit a preliminary report for June 1978.

Another initial report due in 1978 concerns a joint study by Hydro-Québec and Ontario Hydro to determine the technical and economic advantages of increasing the capacity of the interconnections between the Québec and Ontario systems. During 1977 a contract between the two utilities for 1,000 megawatts of primary power expired and another for secondary energy became effective.

Exchanges with New Brunswick proceeded normally.

The province of Newfoundland took legal action aimed at forcing the Churchill Falls (Labrador) Corporation Limited to supply it with 800 megawatts starting on October 1, 1983.

In reaction to this, Hydro-Québec initiated legal proceedings before the Superior Court of the District of Montreal with a view to obtaining a ruling on the rights it is assured in the contract signed with this company on May 12, 1969. In addition, Messrs. René Lévesque and Frank Moores, prime ministers of Québec and Newfoundland, announced on July 12, 1977 the creation of an intergovernmental committee charged with studying the possibility of joint exploitation of the hydroelectric potential of Labrador and the St. Lawrence North Shore.

Interconnections with the U.S.

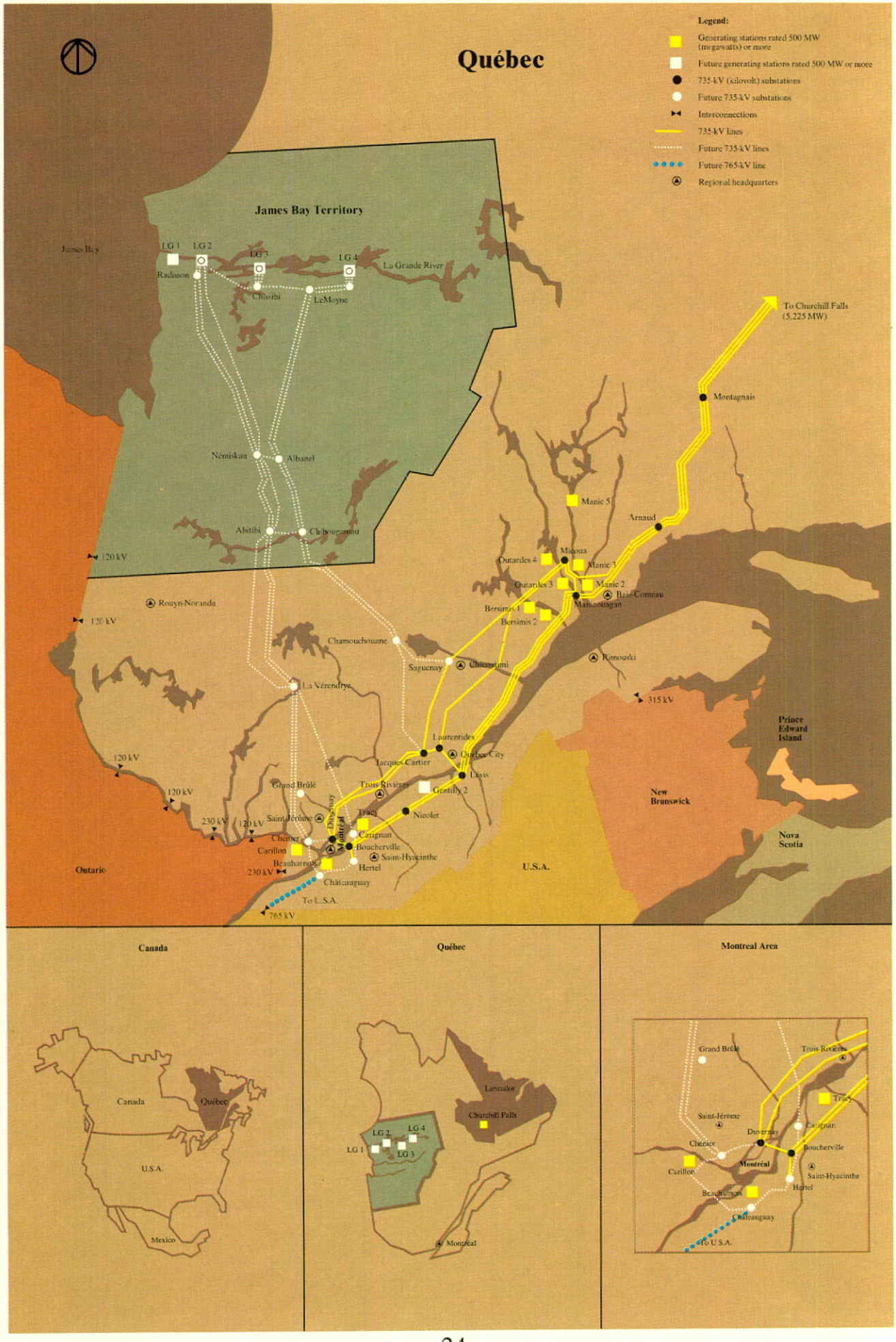
Last year's annual report noted that Hydro-Québec had obtained approval from the National Energy Board to build a 765-kV transmission line to the State of New York. This line will connect Hydro-Québec's Châteauguay substation to the system of the Power Authority of the State of New York (PASNY). A contract approved in 1976 provides for Hydro-Québec making a capacity of 800 megawatts available to PASNY during Québec's period of low demand, in summer. Withholding rights assure priority supply to Québec customers. This arrangement will make it possible to deliver 12 billion kilowatthours during the first four years of the contract, and thus bring in about $105,000,000 in revenue. Starting in 1982, upon request from Hydro-Québec, PASNY will have to return each winter all or part of the energy it received from Hydro-Québec the previous summer.

The 56-kilometre Québec section of the line was almost entirely built in 1977. It will be completed early in 1978 and the contract can become effective as soon as the American section is ready.

A new request was made to the National Energy Board on October 17, 1977, to obtain approval of an interconnection agreement that would permit the delivery of additional quantities of secondary energy to PASNY. The hearing will be held in 1978.

A National Energy Board hearing on a request for authorization for contracts with three Vermont companies was held in October 1977. The three companies, to which Hydro-Québec was already delivering electricity by virtue of the extension of expired contracts, are Citizens Utilities Company, the Vermont Electric Cooperative and the Union/Butterfield Division. A total of 35 megawatts is involved. The authorization was given in December 1977. Hydro-Québec also obtained authorization to build a 120-kV transmission line from Stanstead substation to the Québec - U.S. border, a distance of about 2 kilometres. This line, which will be built in early 1978, will replace the 49-kV transmission line with which Hydro-Québec serves the Citizens Utilities Company. The line is expected to produce revenue of at least $5.5 million in three years.

Hydro-Québec's Main Generating Stations and 735-kV Transmission System



Hydro-Québec
Generating Stations

In service
or under construction
at December 31, 1977

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
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-Iles	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	3,950
Natashquan	3,000
Fort George	2,700
La Baleine	2,100
La Tabatière	1,900
Parent	1,500
Harrington-Harbour	1,400
Saint-Augustin	1,400
La Romaine	1,200
Johan-Beetz	605
Ile-d'Entrée	465
Ile-aux-Grues	425
Gas turbine	
Cadillac	162,000
Nuclear	
Gentilly 1**	266,400

Summary

	(kilowatts)
Total installed capacity of hydroelectric generating stations (49)	11,701,816
Total installed capacity of thermal-electric generating stations (15)**	821,584
Total capacity in service at December 31, 1977	12,523,400

Generating stations under construction

	In service	(kilowatts)
Hydroelectric		
Outardes 2	1978	453,900
La Grande 2***	1979-82	5,328,000
La Grande 3***	1982-83	1,920,000
Thermal		
Nuclear		
Gentilly 2	1981	685,000

*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.

***_La Société d'énergie de la Baie James_, a subsidiary of Hydro-Québec, is responsible for the development of the La Grande River.

Hydro-Québec's Research Institute

The year 1977 marked the tenth anniversary of the founding of *l'Institut de recherche de l'Hydro-Québec* (IREQ). The occasion was used to evaluate the results obtained to date in comparison with the objectives originally set, and to propose changes and new directions where necessary. From this stock-taking, IREQ formulated its first five-year plan for research and development.

Under this plan, the institute intends to maintain its present pace of research on energy transmission, intensify research on new forms of energy production, storage and utilization and create a nuclear-fission research unit that will work mainly on the improvement of operating conditions in the nuclear powerhouses.

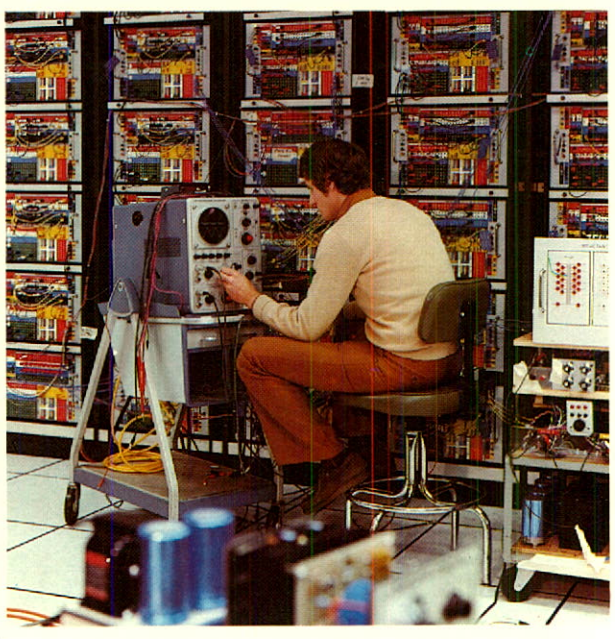
Most of the research activity in 1977 was concentrated on high-voltage transmission problems such as corona effect, air insulation, contamination of HVDC line insulators for voltage from ± 600 kV to ± 1200 kV, and the behavior of contaminated UHV insulator strings during switching surges. In addition, research to improve substations and system equipment yielded significant results.

There was intense activity in IREQ's testing laboratories during the year.

The high-voltage laboratory registered 1,182 test days, during which time 127 contracts were completed. The high-power laboratory, though inactive for more than seven months while new equipment was being installed, obtained 45 test contracts and registered 152 test days.

During the year, in addition to the many research projects carried out at the request of Hydro-Québec's departments and regions, the institute obtained contracts from a number of outside organizations including the Canadian Electrical Association, American Electric Power, British Columbia Hydro, Canada Wire and Cable, the (U.S.) Electric Power Research Institute, and Environment Canada.

At December 31, the institute's staff comprised 397 permanent employees including 110 scientists, 123 technicians and 164 support employees.



Personnel*

At year-end, Hydro-Québec's permanent staff, excluding 148 permanent employees seconded to SEBJ, numbered 15,763, which was a net increase of 794 employees or 5.3% in one year. The average age was 37.4 years and the average length of service was 12.5 years. The number of temporary employees at construction sites averaged 3,691 per two-week period.

Wages and salaries paid to operating personnel during the year amounted to $312,248,000, compared with $278,472,000 in 1976. Wages and salaries paid to construction workers totaled $93,626,000, against $68,825,000 the previous year. Fringe benefits, including those paid to employees seconded to SEBJ and Hydro-Québec's contributions to the pension fund, amounted to $51,173,000 for operating and construction employees.

A policy for the internal recruitment of management staff was developed after consultation. And a career-orientation service is now available to employees. Information meetings on the Charter of Human Rights and Freedoms and its repercussions on hiring activities were organized for those responsible for such matters.

An official equal-opportunity policy was adopted during the year. As part of this policy, the utility recognizes that all positions must be accessible to all qualified applicants without discrimination, both when they apply for employment and during their careers, and moreover it recognizes that salaries and working conditions must also be free from discrimination.

During the year, Hydro-Québec renewed six collective agreements covering 800 employees, and it entered into negotiations with the *Syndicat professionnel des ingénieurs de l'Hydro-Québec* which represents 805 engineers. It also submitted to the Québec government two briefs on labor legislation, the first of which was prepared jointly with SEBJ and dealt with Bill 45 to amend the Labor Code. The subject of the second brief was the revision of the collective bargaining system in the public and parapublic sectors.

In the area of employee health, emphasis was placed on the planning of a computerized system for the detection of the most serious and widespread health problems among employees.

Some 1,535 management employees and 115 instructors were involved in training activities during 1977. Most of the effort for supervisory staff was concentrated on the development of management programs. In addition, a program was set up to initiate line managers into the training process, as the training of employees is mainly their responsibility. About 700 permanent employees enrolled in outside courses. Five new scholarships were awarded to employees and six existing scholarships were renewed.

In 1977, Hydro-Québec faced many problems caused by inconsistencies arising after collective agreements were signed in November 1976 with unions representing office workers, trades employees and technicians. Not only were the relationships between salary groups upset, but the management remuneration system also became seriously unbalanced. Remuneration guidelines were issued to assist in the uniform application of the agreements' salary clauses and to establish corrective measures for management salaries.

A task force was created at the beginning of the year to study remuneration problems. As a result of its recommendations, a plan of action was drawn up for the next five years.

*The figures in this section exclude SEBJ employees and Hydro-Québec employees seconded to SEBJ, unless otherwise stated in the text.