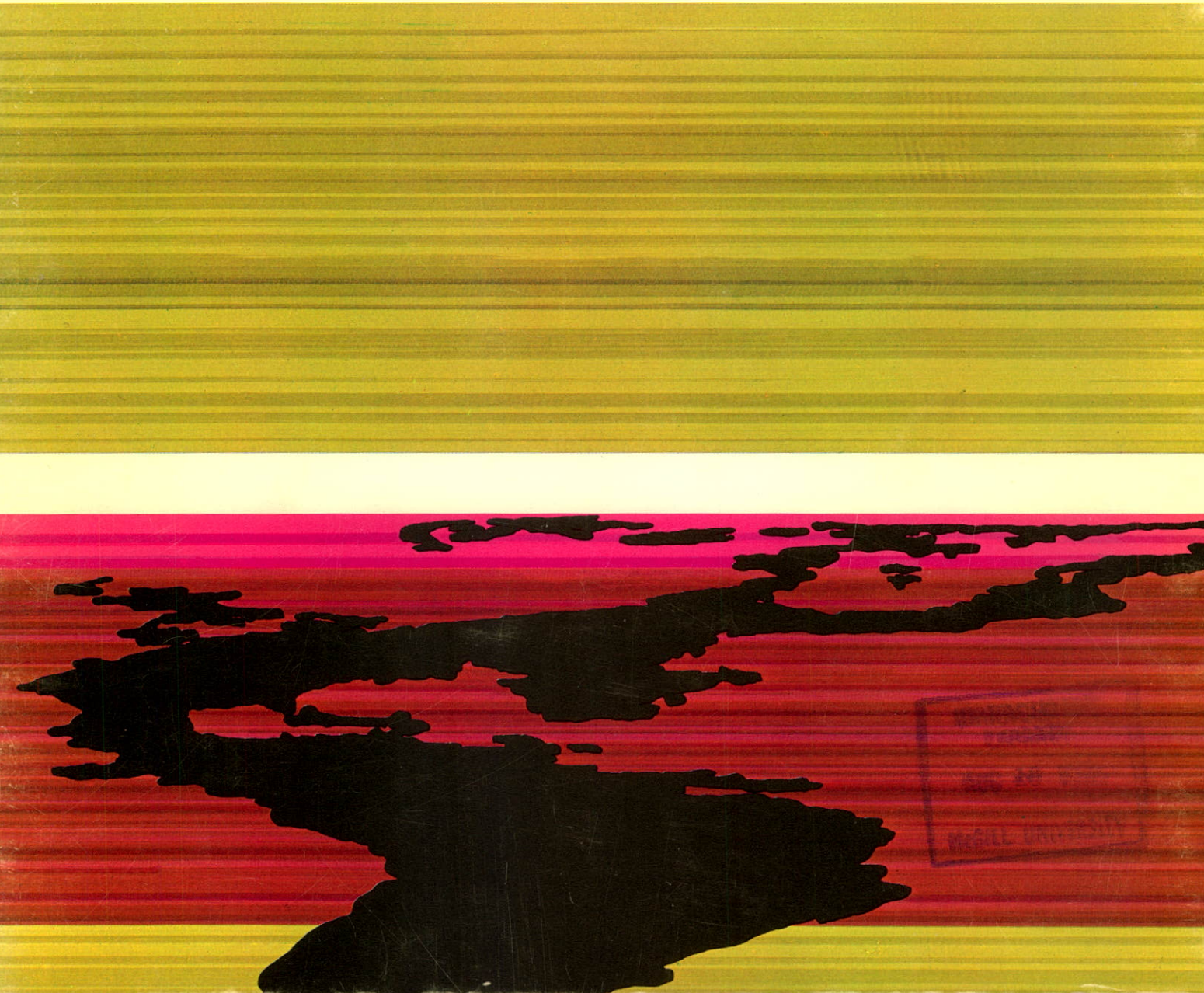
Hydro-Quebec Annual Report 1971



Hydro-Québec Annual Report 1971

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Department of Natural Resources
Province of Québec
Office of the Minister

The Honourable Lieutenant-Colonel
Hugues Lapointe, Q.C.
Lieutenant-Governor of
the Province of Québec

May it please Your Honour,

The undersigned has the honour
to present the report of the
Québec Hydro-Electric Commission
for the year ended
December 31, 1971

Respectfully submitted,

Minister of Natural Resources.

Québec, March 9, 1972

Head office:
75 Dorchester
Boulevard West
Montreal 128

The Commission

President
Roland Giroux

Commissioners
Georges Gauvreau, N.P.
Yvon DeGuise, Eng.
Robert A. Boyd, Eng.
Paul Dozois

Joint Secretaries
Bernard Lacasse, Q.C.
William E. Johnson

General Auditor
Marcel Jean, C.A.

Departments

Construction
General Manager:
Guy Monty, Eng.

Distribution and Sales
General Manager:
Maurice Saint-Jacques, Eng.

Engineering
General Manager:
Lionel Cahill, Eng.

Finance and Accounting
General Manager:
Edmond A. Lemieux, C.A.

Personnel
General Manager:
Alexandre Beauvais, Eng.

Production and Transmission
General Manager:
J. J. Villeneuve, Eng.

Supply
General Manager:
Roger A. Labrie

The Québec Hydro-Electric Commission (or 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.

Directorates

Economic Research
Director:
Jean-Charles de Groote

Electronic Data Processing
Director:
André Duval

Institute of Research
Director:
Lionel Boulet, Eng.

Law
Director:
Jean Boulanger, Q.C.

Organization
Director:
Jean Lespérance

Public Relations
Director:
Marcel Couture

Regions

Abitibi
Director:
Pierre Simard, Eng.

Laurentides
Director:
Marcel Lapierre, Eng.

Maisonneuve
Director:
Georges A. Lauzon, Eng.

Manicouagan
Director:
Gérard R. Labossière, Eng.

Matapédia
Director:
Gabriel Gagnon, Eng.

Mauricie
Director:
Robert Brunette, Eng.

Montmorency
Director:
Pierre Godin, Eng.

Richelieu
Director:
Gaston Galibois, Eng.

Saguenay
Director:
Jules Harvey, Eng.

Saint-Laurent
Director:
Louis G. Boivin, Eng.

Québec Hydro-Electric Commission

The Members of the Commission. L. to r., Messrs. Georges Gauvreau, Yvon DeGuise, Roland Giroux (president), Robert A. Boyd and Paul Dozois.

President's Report

Due to several factors, revenue from the sale of electricity was 8.4% higher in 1971 than in 1970, exceeding half a billion dollars for the first time. The renewal of a number of important contracts provided Hydro-Québec with the opportunity to negotiate selling prices more in line with actual costs and the real value of service provided. In addition, new agreements came into effect for the supply of power and energy to the electrical systems of two neighboring provinces. These agreements resulted in higher productivity at our generating stations in 1971.

Sales of firm energy to Québec customers increased in volume by only 3.6% in 1971, compared with the increase of 7.1% recorded in the previous year. Even though there was a drop of 2.4% in the electricity consumption of a small group of large industries such as pulp and paper, the consumption of all other Québec customers continued to grow vigorously, increasing by 9.2% in 1971.

For the first time in its history, Hydro-Québec's net worth has exceeded one billion dollars. By the year-end, it reached $1,040,000,000. This amount represented 25.6% of invested capital, a ratio that gives a favorable standing in the capital markets and one that the Commission will try to maintain in coming years.

A review of our long-term debt reveals that year after year new issues at high interest rates are replacing debentures with interest as low as 3%, causing the average rate of interest on debt to rise steadily. In this respect, Hydro-Québec's experience does not differ from that of almost every other utility.

In 1971, operating expenses increased at a slower rate than in preceding years, but there is no assurance that this improvement will continue in 1972.

Hydro-Québec's operations have now entered a new phase with the first deliveries of energy from Churchill Falls generating station, whose units are being installed ahead of schedule. This will make substantial quantities of additional energy available to Hydro-Québec.

With the completion of Manic 5 powerhouse, the generating stations on the Manicouagan and Outardes Rivers now have an installed capacity of 3,900,000 kilowatts and an annual production of 21 billion kilowatthours, which is more than one-third of the total system production at present.

In 1971, major additions to the transmission facilities increased Hydro-Québec's ability to supply new loads and ensure the development of the various regions of the province. The construction of new lines and substations connecting Churchill Falls generating station to our system has made an abundant supply of electrical energy available for the important port of Sept-Iles, and for both present and future mining developments in the interior. Similarly, the new 315-kV double-circuit line being built between Lévis and Matapédia to deliver power to New Brunswick also constitutes an additional source of supply for the Gaspé peninsula. Two sections of this line are now in service. The 315-kV and 230-kV circuits going into this part of the province will have a combined power-carrying capacity of more than 1,200,000 kilowatts. As a result, the entire grid in the Gaspé will be greatly strengthened.

Since the publication of our last annual report, a number of major steps have been taken to advance the project for developing the rivers in the eastern watershed of James Bay so as to meet the future growth of Québec's electrical energy requirements. Not only have technical and economic studies been pursued, but legal and administrative steps have been taken as well.

A law passed by the provincial government on July 14, 1971, established the legal framework for the development of all natural resources within the watershed on the Québec side of James Bay. Following passage of this law, the James Bay Development Corporation was formed, and shortly thereafter, the James Bay Energy Corporation.

In February 1972, the Commission's subscription for 70% (7,000,000 shares) of the authorized capital stock of the James Bay Energy Corporation was accepted. Payment of the requisite $700,000,000 will be spread over a period of 10 years; payments of $50,000,000 will be made in each of the years 1972 and 1973.

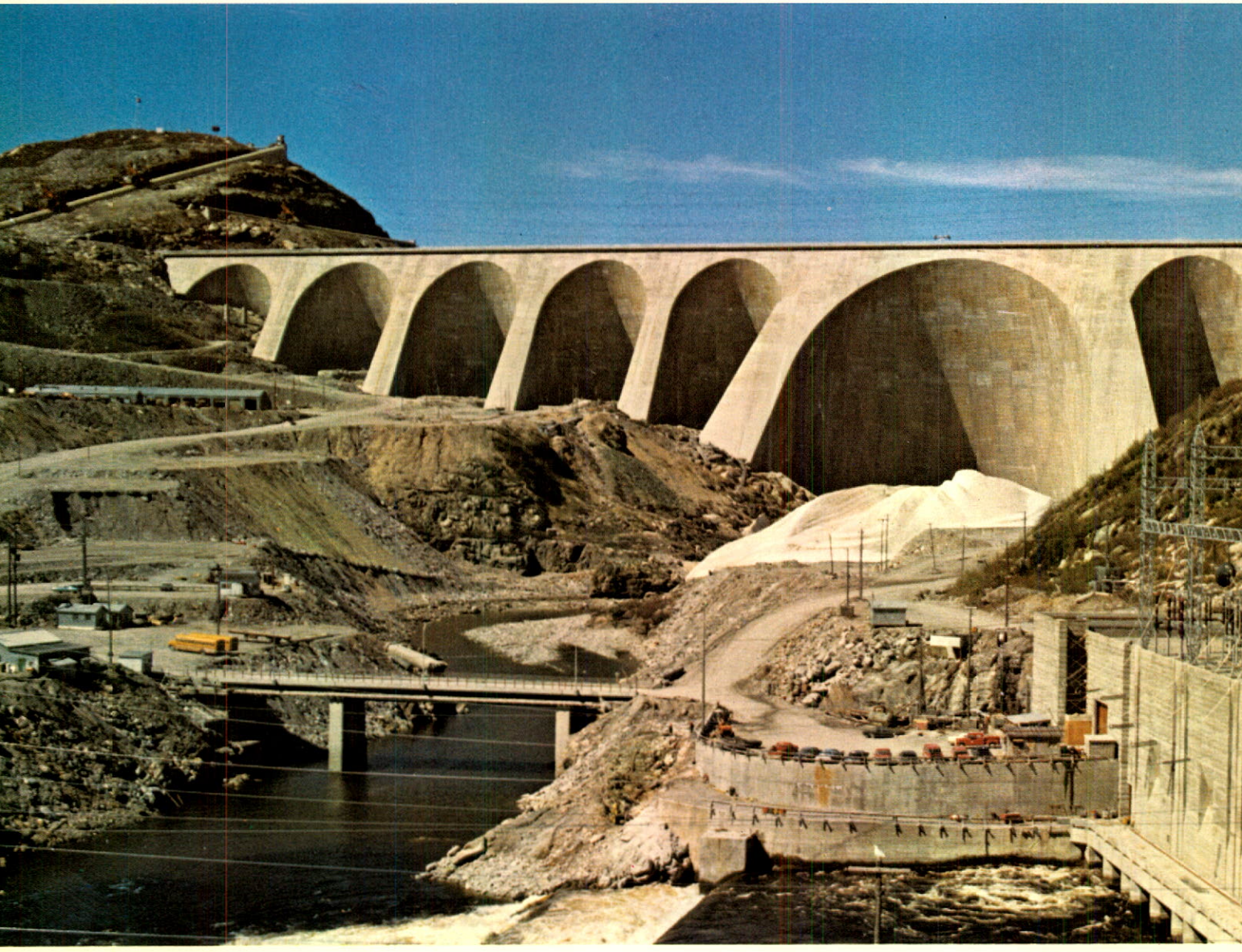
Technical and economic studies to determine the best way of developing the hydraulic resources of the James Bay rivers required a substantial effort both in the field and in the offices of Hydro-Québec and several consulting-engineering firms.

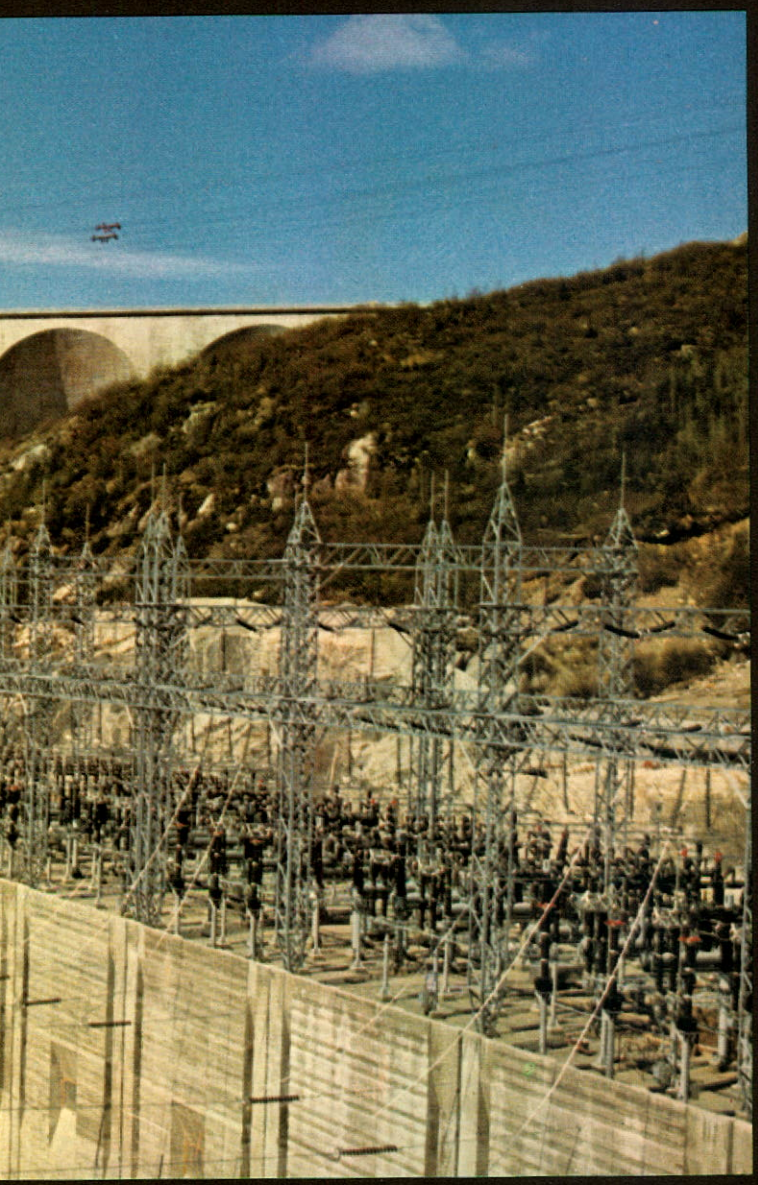
The results obtained during 1971 in the various spheres of our activity would not have been possible without the support and dedication of Hydro-Québec's staff and the assistance of numerous outside collaborators. On behalf of the Commission, I should like to express our gratitude to all of them.

President

Montreal, March 6, 1972

Manic 5 generating
station, below
Daniel Johnson Dam.





Highlights	1971	1970
Installed capacity (kilowatts) at December 31	11,106,710	10,617,253
Maximum firm demand in service area (kilowatts)	9,173,000	8,873,000
Total electricity sales (millions of kilowatthours)	52,499	50,612
Total revenue from electricity sales	$ 518,314,000	$ 478,246,000
Total number of customer accounts at December 31	1,895,082	1,852,292
Average consumption per domestic account (kilowatthours)	7,279	6,988
Number of permanent employees at December 31	12,245	12,012
Net long-term debt at December 31	$ 2,928,265,000	$ 2,675,814,000
Reserves (net worth) at December 31	$ 1,040,833,000	$ 913,081,000

Financial Results*

*Words in italics correspond to terms used in the Financial and Statistical Statements.

Gross *revenue* for the year amounted to $535,559,000, compared with $494,319,000 in 1970, an increase of $41,240,000 or 8.3%.

Expenditures totaled $277,865,000, an increase of only $13,103,000 or 4.9% over 1970, compared with the average annual increase of 7.1% recorded since 1967.

Provision for renewals (depreciation) rose by $5,298,000 or 9% to $64,103,000 because of the commissioning of the last generating units at Manic 5 and other new installations.

School and municipal taxes totaled $19,070,000, which was $888,000 or 4.9% more than in 1970. The *provincial levy on energy generated* was $29,057,000, an increase of $1,273,000 or 4.6% over 1970. These two items represented 17.3% of Hydro-Québec's 1971 *expenditures*.

Hydro-Québec bonds and debentures purchased at market prices to meet sinking fund requirements were acquired for $9,547,000 less than their par value. This figure compares with $8,796,000 for 1970 and is shown on the consolidated statement of revenue and expenditure as *net profit on repurchase of debentures*.

Reserves

After deducting the net amount of interest charged to operations the *net income before interest on reserves* was $127,752,000 or 9.5% more than in 1970.

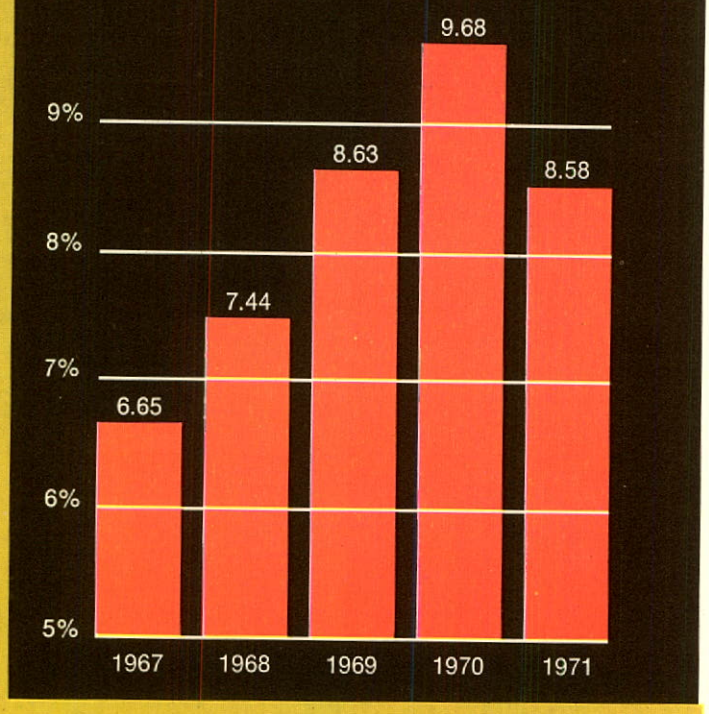
This net income brought the Commission's *reserves*, which represent its net worth, to $1,040,833,000. At December 31, *reserves* constituted 25.6% of the Commission's invested capital (comprised of total *assets* less *current liabilities* and *other liabilities*), compared with 24.6% one year before and 22.5% two years before.

Funds that were generated internally by the year's operations totaled $189,750,000, compared with $173,775,000 in 1970. This figure is made up of *net income before interest on reserves* less *profit on repurchase of debentures* (which is not a cash inflow) plus charges not requiring cash outlays, such as *provision for renewals (depreciation)*.

These funds permitted Hydro-Québec to redeem $46,424,000 worth of maturing long-term debt, disburse $34,889,000 for the purchase of sinking fund investments, reduce *notes payable* by $30,813,000, increase working capital by $26,942,000 and contribute $50,682,000 towards the financing of fixed asset additions, which cost $385,560,000 in 1971, as against $291,107,000 in 1970.

Interest rates

Average effective cost of yearly borrowings since 1967.



Borrowing

The Commission's long-term borrowings in 1971 provided a net amount of $334,640,000. The average effective interest rate on long-term borrowings, which was 9.68% in 1970, dropped to 8.58% in 1971.

The effective cost of debenture issues floated on the capital markets during the year varied from 8.85% at the beginning of the year to a low of 8.13% during the year and 8.63% at the year-end.

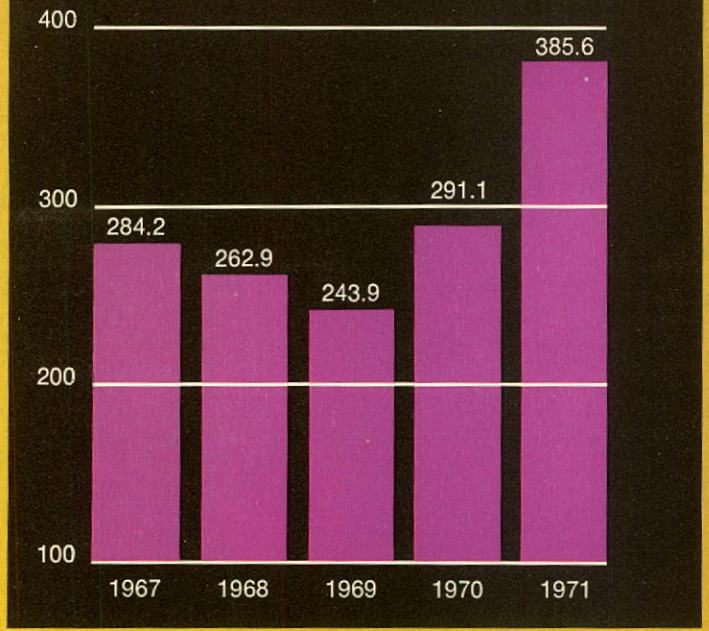
The Commission obtained $153,000,000 U.S. on the American market, including $3,000,000 as the balance of a loan that had been negotiated in 1970. On the European market it borrowed 45 million Eurodollars and 100 million Deutschemarks ($29,835,000). The Québec Deposit and Investment Fund subscribed for $65,000,000 of the $100,000,000 worth of debentures issued on the Canadian market. In addition, the Commission received $13,400,000 as the first instalments of a $17,500,000 loan which it negotiated with the government of Canada to help cover the cost of setting up the Hydro-Québec Institute of Research. At December 31, 1971, the net amount of long-term debt was $2,928,265,000 or $252,451,000 more than a year before.

Sales Revenue

Total energy sales for the year were 52.5 billion kWh which generated revenue of $518,314,000, representing increases over 1970 sales of 3.7% in volume and 8.4% in revenue.

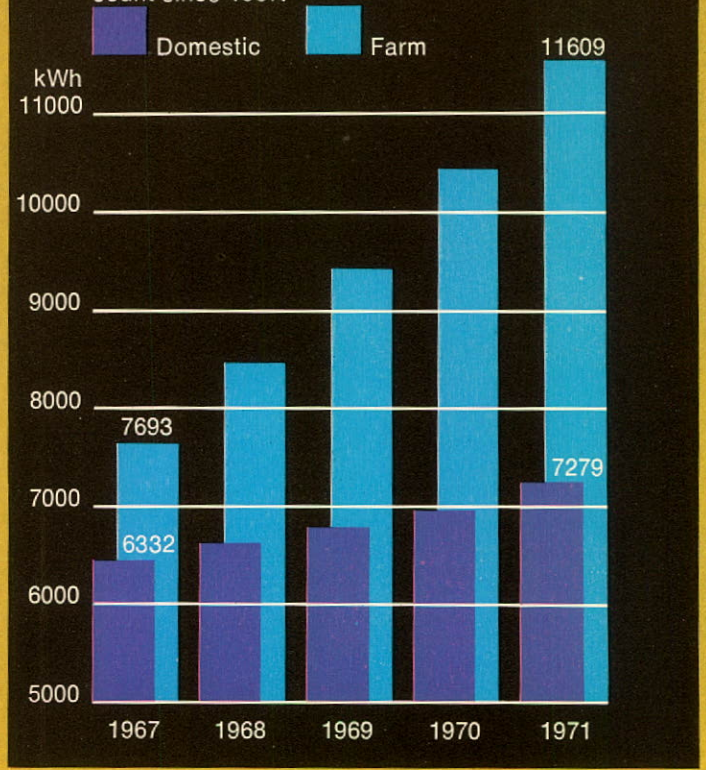
Sales of firm energy to Québec customers within the service area increased in volume by only 3.6% in 1971, compared with an average annual increase of 7.2%

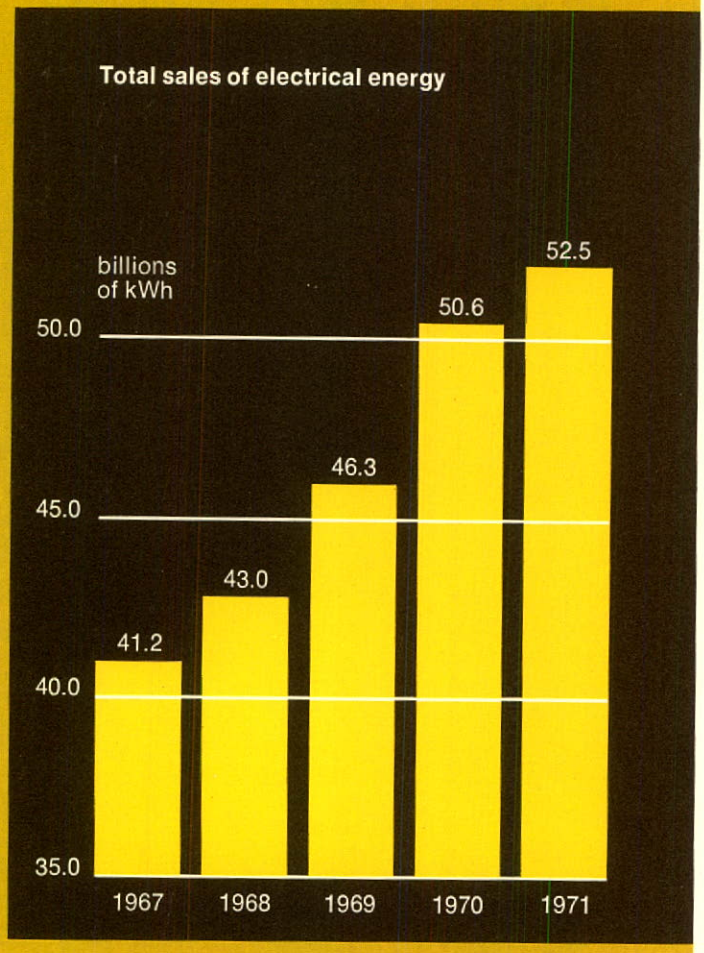
Capital Expenditures 1967-1971



Average annual consumption

Growth of average annual consumption per domestic customer account and per farm account since 1967.





during the preceding five years. These sales amounted to 46.5 billion kWh (as against 44.9 billion kWh in 1970) and produced revenue of $493,877,000, for an increase of $34,125,000 or 7.4%.

The electricity consumption of several major industries, which absorb a large proportion of Hydro-Québec's production, was 383 million kWh or 2.4% less than in 1970. These industries are pulp and paper manufacturers, electrometallurgical and metallurgical plants, electrochemical and chemical plants, and mines. Moreover, Hydro-Québec's own construction sites used 611 million kWh less owing to the completion of work at Manic 5 and the Outardes River sites.

Leaving aside the industries whose consumption dropped and Hydro-Québec's own construction sites, the firm-energy consumption of all other Québec customers was 30.8 billion kWh compared with 28.2 billion kWh in 1970, an increase of 2.6 billion kWh or 9.2%. The increase in revenue from these customers was $34,858,000 or 9.1%.

During 1971, we sold a total of 5.5 billion kWh to neighboring systems, compared with 5.1 billion in 1970.

Domestic and farm customers

Sales to domestic customers reached $176,271,000 for 11.6 billion kWh, an increase of 8.7% in revenue and 6.7% in volume.

At the year-end, the number of domestic customer accounts was 1,588,587 or 38,606 more than the preceding year. The average annual consumption per domestic account increased markedly in 1971, when it was 7,279 kWh or 4.2% more than in 1970, compared with the average yearly increase of 3.5% recorded since 1967.

Farm customers consumed 940 million kWh, which was 75 million kWh or 8.7% more than in 1970. Revenue from this sector was $13,022,000, an increase of $994,000 or 8.3%. The number of farm customer accounts continued to decrease and was 80,936 at December 31, 1971, compared with 82,412 one year before. However, the average annual consumption continued to rise, reaching 11,609 kWh, as against 10,490 kWh in 1970.

Marketing

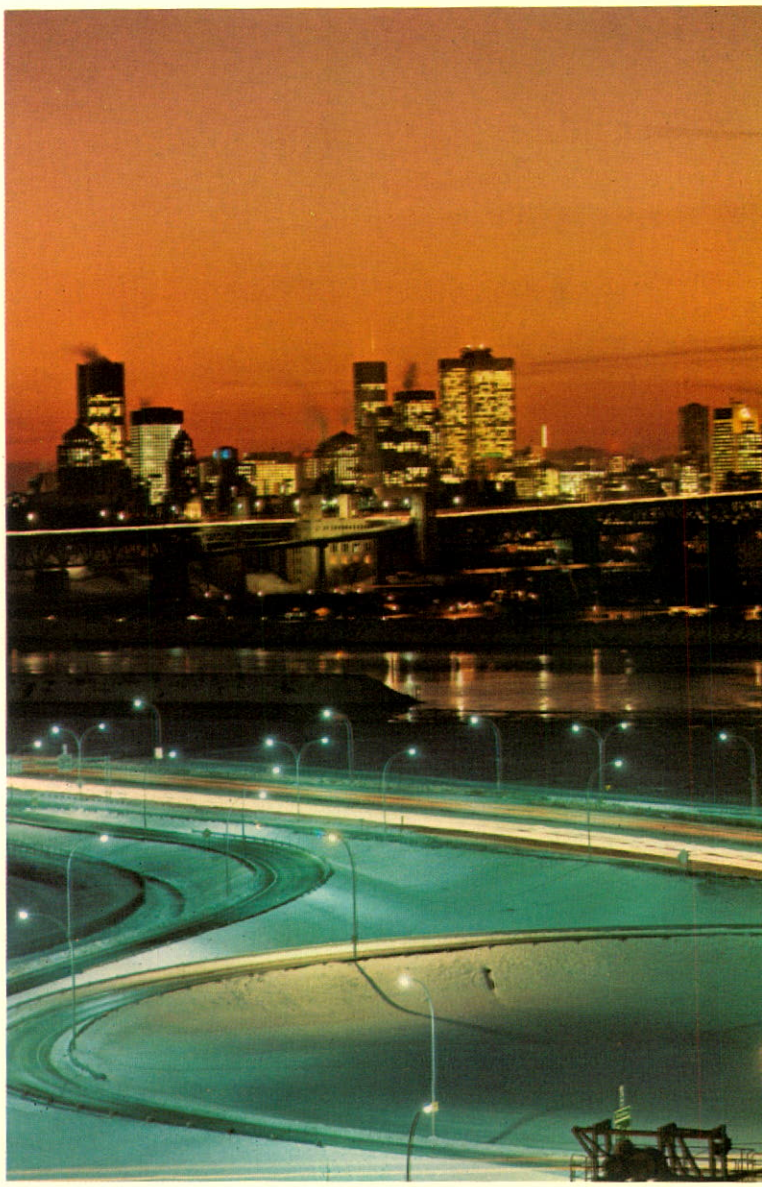
Close to 10,000 new housing units completed during the year were built in accordance with all-electric (NOVELEC) standards. This was an increase of about 60% over 1970 when 6,260 such units were completed.

Moreover, of Québec's 51,800 housing starts in 1971 (according to federal government statistics), more than 40% incorporated electric heating.

At December 31, there were 137,106 electric water heaters installed on a rental basis in customers' premises, 7.7% more than a year earlier. Moreover, 4,842 customers took advantage of easy terms offered for the purchase of water heaters or the modernization of their electric installations.

The number of "well-electrified" farms increased from 906 to 1,058. Average annual consumption by such farms is about 30,000 kWh.

The Marketing Directorate and the Institute of Research continued their close interest and participation in studies and research aimed at developing a practical and economically viable electric vehicle. During the year, four models of electric tractors appeared on the market, accompanied by claims that they are competitive with similar tractors powered by internal combustion engines. The batteries of these electric tractors can be recharged at any ordinary 120-volt outlet.



Night view of downtown Montreal.

Supplies

The value of material, equipment and services ordered during the year was 22% greater than during 1970, due mainly to further construction of 735-kV lines and the work in progress at the Manic 3 site.

The Supply Department issued a total of 73,488 purchase orders worth $333,542,000, compared with 69,415 purchase orders worth $272,493,000 in 1970.

The acquisition of real rights and properties needed for projects throughout the province cost $1,850,000 as against $1,754,000 in 1970, while payments to landowners for clearing rights-of-way for new transmission lines crossing their land amounted to $483,000.

Administrative buildings

At Baie-Comeau, construction of a new administrative centre for the Manicouagan Region, which was started in 1970, was completed and the building is now occupied. The new administrative and service centre at Drummondville was also completed and occupied during the year. In addition, three sectors of the Saint-Laurent Region were provided with administrative and service centres in rented premises.

Two standard designs for administrative and service buildings were completed during the year: one for districts and the other for sub-districts. Construction of the first standard district building will be completed early in 1972 at Maniwaki.

Production

During the year, installed capacity of the system rose from 10,617,253 kW to 11,106,710 kW, an increase of 489,457 kW or 4.6%. This new capacity consisted principally of 484,500 kW furnished by the last three generating units placed in service at Manic 5. It also included a 3,072-kW diesel unit installed at Cap-aux-Meules generating station in the Magdalen Islands.

Maximum demand

From 1970 to 1971, the maximum firm-power demand in the service area increased by only 300,000 kW or 3.4%, reaching 9,173,000 kW at 5 p.m. on December 20, 1971, when the temperature was 20°F. The previous year's peak had been 8,873,000 kW at 5 p.m. on December 22, 1970, when the temperature was −2°F. This small increase in system demand is attributable mainly to the large difference in temperature on the two dates.

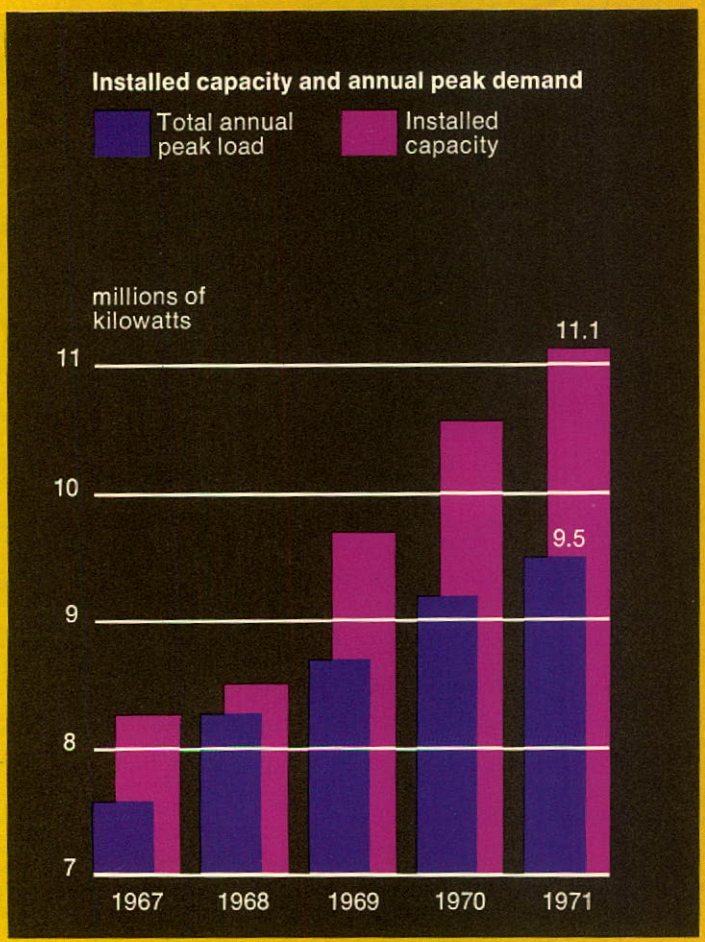
At the time of peak system demand, total demand, which includes secondary power and power delivered outside the system, was 9,537,000 kW, an increase of 3.5% over the previous year. Since 1966, the average annual increase in total demand has been 5.3%. When the peak occurred on December 20, demand was met by available generating capacity, without any difficulty.

Hydraulic conditions

Although run-off was 6% less than the average for previous years, production was not hampered since the lower run-off coincided with a general slowdown in economic activities.

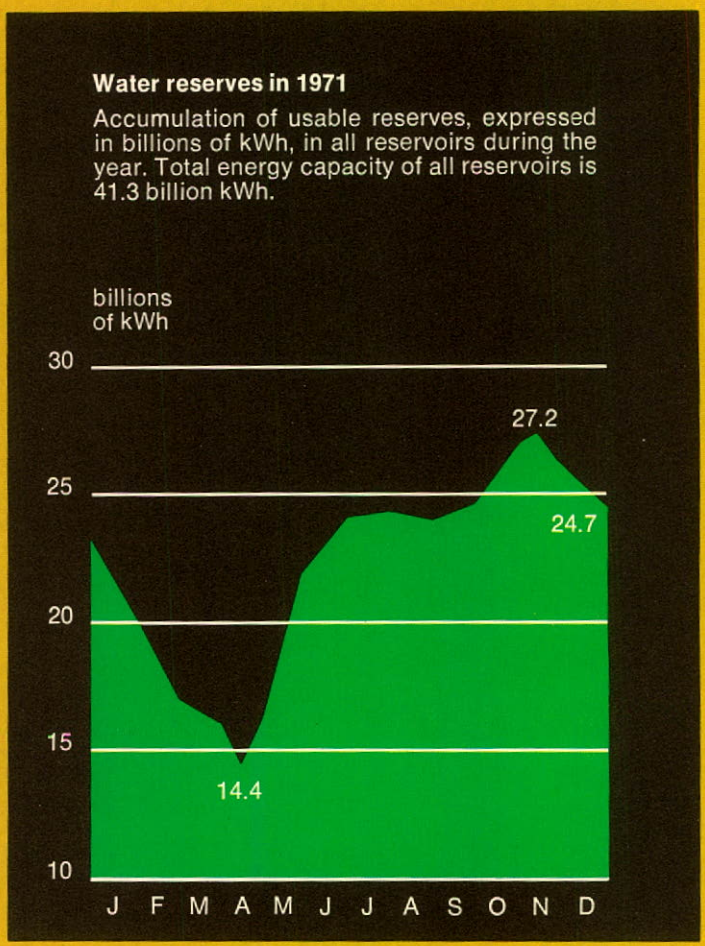
In fact, production was reduced at Tracy thermal generating station and Hydro-Québec's usable hydraulic reserves increased from an equivalent energy value of 23.1 billion kWh on January 1 to 24.7 billion kWh on December 31.

Installed capacity and annual peak demand



Water reserves in 1971

Accumulation of usable reserves, expressed in billions of kWh, in all reservoirs during the year. Total energy capacity of all reservoirs is 41.3 billion kWh.



Generating Stations under Construction

Manic 5 powerhouse, located on the east bank of the Manicouagan River just downstream from the Daniel Johnson dam, was completed on November 11, when the eighth and last generating unit was put in service. With an installed capacity of 1,292,000 kW, Manic 5 is now Hydro-Québec's second largest generating station, Beauharnois being the largest.

Since Hydro-Québec began construction on the Manicouagan and Outardes rivers in 1959, five of the seven generating stations planned for this complex have been completed. These five stations have a combined capacity of 3,879,810 kW and an annual production of 21 billion kWh. When completed, the complex will have a capacity of 5,500,000 kW producing about 30 billion kWh annually.

Manic 3

At the Manic 3 construction site, located 77 miles downstream from Manic 5, river diversion was completed on December 2. The diversion tunnel, driven 2,300 feet through the east bank of the river, has a diameter of 55 feet and can discharge up to 85,000 cubic feet of water per second in time of flood.

Manic 3 underground powerhouse will have a total capacity of 1,183,200 kW provided by six generating units, which will be commissioned in the period from December 1975 to October 1976.

The main dam will contain 11 million cubic yards of earth and rockfill. A side valley to the east of the main dam will be closed off by a concrete auxiliary dam containing the intake, spillway and log-chute.

The main dam's impervious core will be extended down to the bedrock by means of a double wall of concrete passing through the alluvium-filled gorge that extends more than 400 feet below the riverbed at this location. Construction of this cut-off wall, intended to prevent seepage under the dam, began in the spring and will continue during 1972. The placing of material for the dam itself will last until 1975, when the reservoir will be impounded. Excavation of the powerhouse cavern will begin in 1972.

The Construction Department carried out work at many other locations during 1971, and the construction workforce reached a peak of 3,200 during the year, including 2,020 at Manic 3 and 770 at Manic 5.

Gentilly nuclear station

The 266,000-kW Gentilly nuclear generating station, built on the south shore of the St. Lawrence River near Trois-Rivières, could supply up to 117,000 kW to the provincial grid by the year-end. The reactor at Gentilly went critical for the first time on November 12, 1970.

This generating station belongs to Atomic Energy of Canada Limited, but Hydro-Québec can acquire the station when it achieves continuous, dependable operation.

The Manic 3 construction site during 1971.

James Bay:
preliminary camp
sites take form.
In 1971 the only
access was by air.

In December, Hydro-Québec and the James Bay Development Corporation received three reports outlining various possibilities for development of the rivers on the Québec side of James Bay.

These reports will enable choices to be made regarding the most economic means and most rational program for developing the potential of these rivers. Preparation of the reports necessitated intensive on-site investigations.

The report on a complex comprising the three southernmost rivers — the Nottaway, Broadback and Rupert — was prepared by Hydro-Québec's Engineering Department and included an alternative proposal involving diversion of part of the Eastmain River. Two consulting engineering firms prepared reports on the Eastmain and La Grande Rivers, with the possibility of diverting into the latter the upper reaches of two more northerly rivers, the Grande Baleine and Caniapiscau.

The three groups worked in cooperation during the investigation, which had started the previous winter with construction of a winter road on the snow and ice between Matagami and the Rupert River, a distance of 170 miles. This road enabled advance land transportation of a large part of the material and fuel required.

Crews charged with gathering the multitude of hydrological, topographical, geological and other data fanned out from 27 base camps established in a 100,000 square mile area and were transported and supplied by about 20 helicopters and 15 hydroplanes. Of the 1,300 men who took part in the operation, 650 were Hydro-Québec employees and the remainder were employees of consulting engineering firms and contractors.

While these field investigations were under way, other engineering firms established routes and completed plans and specifications for a 150-mile permanent road between Matagami and the Rupert River and a 110-mile permanent road between Chibougamau and Lake Mistassini. Tenders were called before the year-end and the first road will be passable by the end of 1972. Studies were also carried out to determine the best sites for three airports.

Other studies

During the year, the Engineering Department effected various other studies on smaller projects, notably on the 620,000-kW potential of the Chamouchouane River, which empties into Lac Saint-Jean at Saint-Félicien, and on the Moisie River, which discharges into the St. Lawrence at Sept-Iles; the potential of the Moisie could be raised to 1,800,000 kW by diverting a small section of the Caniapiscau River.

An experimental station has been installed on the St. Lawrence River at Saint-Joachim to study the problems of corrosion posed by the salt content of the river water at this location, where it may be possible to build a pumped storage station to operate under a head of 1,160 feet. This station, which could be built in three stages, would have an eventual capacity of 3,600,000 kW available for use at peak hours in accordance with system operating requirements.

Transmission and Distribution System

The first of three 735-kV lines to link the Churchill Falls powerhouse to the Manicouagan and Micoua substations, along with the first of the powerhouse's 11 generating units, went into service on November 19, 1971, more than five months ahead of schedule.

Hydro-Québec takes delivery of Churchill Falls energy at a point 152 miles north of Sept-Iles and 125 miles west of the powerhouse, where Hydro-Québec's lines are connected to those built by Churchill Falls (Labrador) Corporation Limited.

The first of the Hydro-Québec lines runs 257 miles from the delivery point to Manicouagan substation, near Baie-Comeau. The second Hydro-Québec line, which runs 265 miles from the delivery point to Micoua substation, was completed by December 31 and is expected to go into service by May 1972. Completion of the third line between the delivery point and the Manicouagan substation is scheduled for 1973.

The third 735-kV line between the Manic-Outardes complex and the Montreal area was completed on December 3 when a 158-mile section of the line went into service between the Laurentides substation, near Québec City, and the new Duvernay substation, near Montreal.

Deliveries of power from Churchill Falls required construction of a fourth 735-kV line between the Manic-Outardes complex and the Québec City area, and by year-end it was half completed.

315-kV and 230-kV lines

A 260-mile 315-kV double-circuit line is under construction between Lévis substation and Matapédia substation, near the New Brunswick border. It will deliver energy to New Brunswick under the terms of a contract running until October 31, 1976. In October 1971, two sections of the line were placed in service: from Lévis to Rivière-du-Loup (114 miles) and from Rimouski to Matapédia (80 miles). These sections will operate at 230 kV until the 66-mile section between Rivière-du-Loup and Rimouski is completed in October 1972.

A 3.5-mile 230-kV double-circuit line was built from Matapédia substation to the Restigouche River at the New Brunswick border. From there, the New Brunswick Electric Power Commission has extended this line 20 miles to a convertor substation at Eel River near Dalhousie.

The Eel River convertor station, the first in America to use solid-state convertors, will act as a buffer between the Hydro-Québec system and that of the Maritime provinces.

New substations

Three new 735-kV substations were put in service during the year. They are Duvernay substation near Montreal, and Arnaud and Montagnais located along the route of the lines from Churchill Falls.

Duvernay is destined to become one of the largest substations on the continent, and it is the second major substation built in the Montreal area to receive energy transmitted by the 735-kV system, the other one being Boucherville. Arnaud substation is located at Pointe-Noire near Sept-Iles, some 325 miles northeast of Quebec City, and is equipped to supply the local distribution system. Montagnais substation is situated 137 miles north of Sept-Iles. In 1973, it will supply a 315-kV line, about 100 miles long, which will feed power to the Mount Wright mining complex and the mining town of Fermont.

Six other new substations were put in service during the year. They are Maisonneuve, Sidbec and Delson substations in the Maisonneuve region, Rimouski and Matapédia substations in the Matapédia region, and Boulevard Labelle substation in the Laurentides region.

During the year, a total of about 5,000,000 kVA of transformer capacity was added to the system. This figure comprises the capacity of new substations, plus additions to existing substations, less transformers withdrawn from service.

Distribution system

Capital expenditures for extension of the distribution network amounted to $55,063,000, which was $1,158,000 or 2% more than in 1970. This amount included $22,900,000 as the cost of extensions and additions to supply new customers. It also included $8,900,000 for small transformers installed during the year, either to serve new customers or to meet increased load.

Some 692 miles of new distribution circuits were placed in service, compared with 750 miles the previous year. According to the results of a new survey, at December 31 the distribution network comprised 43,124 miles of circuits at voltages between 4 and 25 kV.

With the placing in service of 46 miles of new underground circuits, the total length of underground distribution lines now stands at 1,346 miles. More than half of the new lines were installed for new customers who either directly or indirectly paid for the difference between the cost of underground and overhead distribution.

Erection of a 735-kV transmission tower.

Parabolic reflectors
on the microwave
link to Churchill Falls.

System Automation

During 1971, the Hydro-Québec system firmly oriented itself to the advanced means of operation and supervision that are becoming increasingly indispensable as transmission and distribution lines grow in number, length and capacity.

At the beginning of the year, a report was presented by a task force which during the previous year had studied system operations and automation. Implementation of the report's conclusions will result in a new provincial control centre being set up at Montreal in 1975, and seven new regional control centres being set up between 1975 and 1977: Manicouagan, Greater Montreal, Québec City, Shawinigan, Hull, Rouyn and Rimouski. By progressively adaptating to the evolution of the system, these new control centres will be able to meet system-operating needs until 1985 or 1990.

Remote control

Remote-control equipment being installed in the new Outardes 4, Outardes 3 and Manic 5 generating stations, as well as in Manicouagan substation, was at various stages of completion by the year-end. The four generating stations on the upper St. Maurice River will eventually be controlled remotely from the Shawinigan control centre, but as an interim measure two of these stations, La Trenche and Rapide-Blanc, will be brought under remote control from La Tuque powerhouse in 1972. By then, 12 generating stations with a combined capacity of 3,800,000 kilowatts will be under remote control.

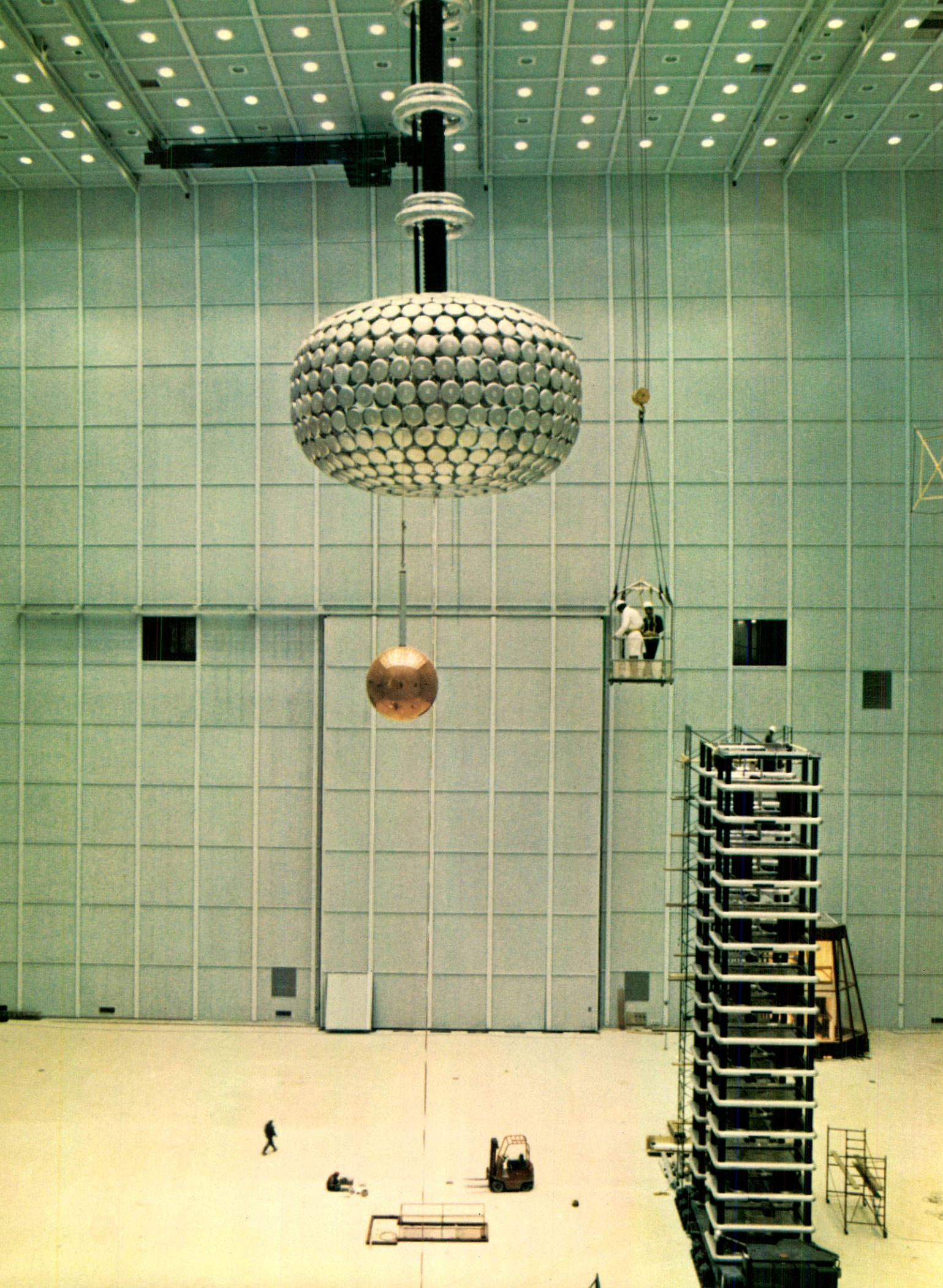
During the year, five more substations were placed under remote control: Maisonneuve, Bélanger, Montréal-Nord and Mont-Royal substations on Montreal Island, and Renaud substation in Laval. By the year-end, the system contained 139 remotely controlled substations of all types.

Telecommunications

In 1971, the main addition to the telecommunications system was the microwave link established between the Hydro-Québec system and Churchill Falls generating station. This link covers a distance of 374 miles and contains two transhorizon hops using transmission by the tropospheric-scatter technique.

Other microwave links were put in service, notably one between Shawinigan and the upper St. Maurice generating stations. Several new carrier-current links on transmission lines were also established, notably on the lines linking Beauharnois generating station and the Ontario Hydro system.

At the year-end, the telecommunications system comprised a total of approximately 125,000 circuit miles, 80,000 of which utilize microwave transmission. The Hydro-Québec telecommunications system is therefore one of the largest operated by an electric utility in North America.



Institute of Research

Construction of the laboratory buildings of Hydro-Québec's Institute of Research, located on the south shore of the St. Lawrence River 20 miles from the centre of Montreal, entered the third and final stage during the summer when construction began on the High Power Laboratory.

The High Voltage Laboratory, with its test hall measuring 60,000 square feet in area and 168 feet in height, was placed in service in October. The General Laboratories building, which contains 80 research offices and 60 laboratories, has been occupied since 1970.

The various sections of the High Power Laboratory will become operational in 1972 and 1973. The Institute will then be the most comprehensive electrical research centre in North America and some of its facilities will be superior to any others in the world.

At year-end, some 60 research and contract projects were being carried out by the staff of the Institute, which includes many world-renowned scientists and engineers recruited both in Canada and abroad. Some of these projects are being executed under contract for various Canadian, American and European clients, and others bear on problems of special concern to Hydro-Québec.

Oil Exploration

Synthesis and analysis of data from seismic soundings and exploratory drilling carried out the previous year on the Magdalen Islands continued in 1971, and the resultant reports could be used as the basis for negotiation of agreements designed to follow up this initial phase of investigation.

The first well was drilled on Ile Brion and reached a depth of 10,500 feet. Through an agreement with Hydro-Québec, drilling was done by the Société acadienne de Recherches pétrolières (SAREP), a subsidiary of Texaco Exploration Canada Ltd. By the spring of 1971 all remaining equipment had been removed and the surface of the island restored to its natural condition.

The exploratory work on Ile Brion cost $1,612,000, including acquisition of the island, seismic soundings and drilling of the first well. This exploration was carried out under the terms of an agreement concluded in 1967 between SAREP and Hydro-Québec, which holds oil-exploration permits from the Québec Department of Natural Resources. These permits originally covered an area of 33 million acres in the Gulf of St. Lawrence, but the permits for 30 million acres of this area were transferred to the Société québécoise d'Initiatives pétrolières (SOQUIP) in 1970 after this government-owned corporation was created. The agreement between Hydro-Québec and SAREP covers the remaining area, whose transfer to SOQUIP was under study at year-end.

The test hall of the High Voltage Laboratory.

Personnel

During the year, new collective agreements were concluded with the Syndicat professionnel des Ingénieurs de l'Hydro-Québec (which represents 460 out of a total of about 790 staff engineers), and with five union locals representing a total of 760 employees, most of whom work at the Manic-Outardes complex. The agreement signed on November 5, 1971, with the engineers' union ends on December 31, 1972.

Major negotiations were under way at year-end for the renewal of three contracts that expired on December 31, 1971. These contracts, which cover more than 8,000 employees, had been concluded in 1969 with locals 957 (technicians and technologists), 2000 (office workers) and 1500 (trades employees) of the Canadian Union of Public Employees (CUPE).

In addition, two special agreements concerning job evaluation were concluded with local 1500 of CUPE in 1971.

Staff and salaries

At December 31, there were 12,245 permanent employees on the payroll, 233 more than the previous year; and in early October personnel on construction projects totaled 2,477, which was 407 more than a year before.

Not counting the cost of fringe benefits, wages and salaries paid to operations employees totaled $129,673,000, and personnel on construction projects received $24,840,000.

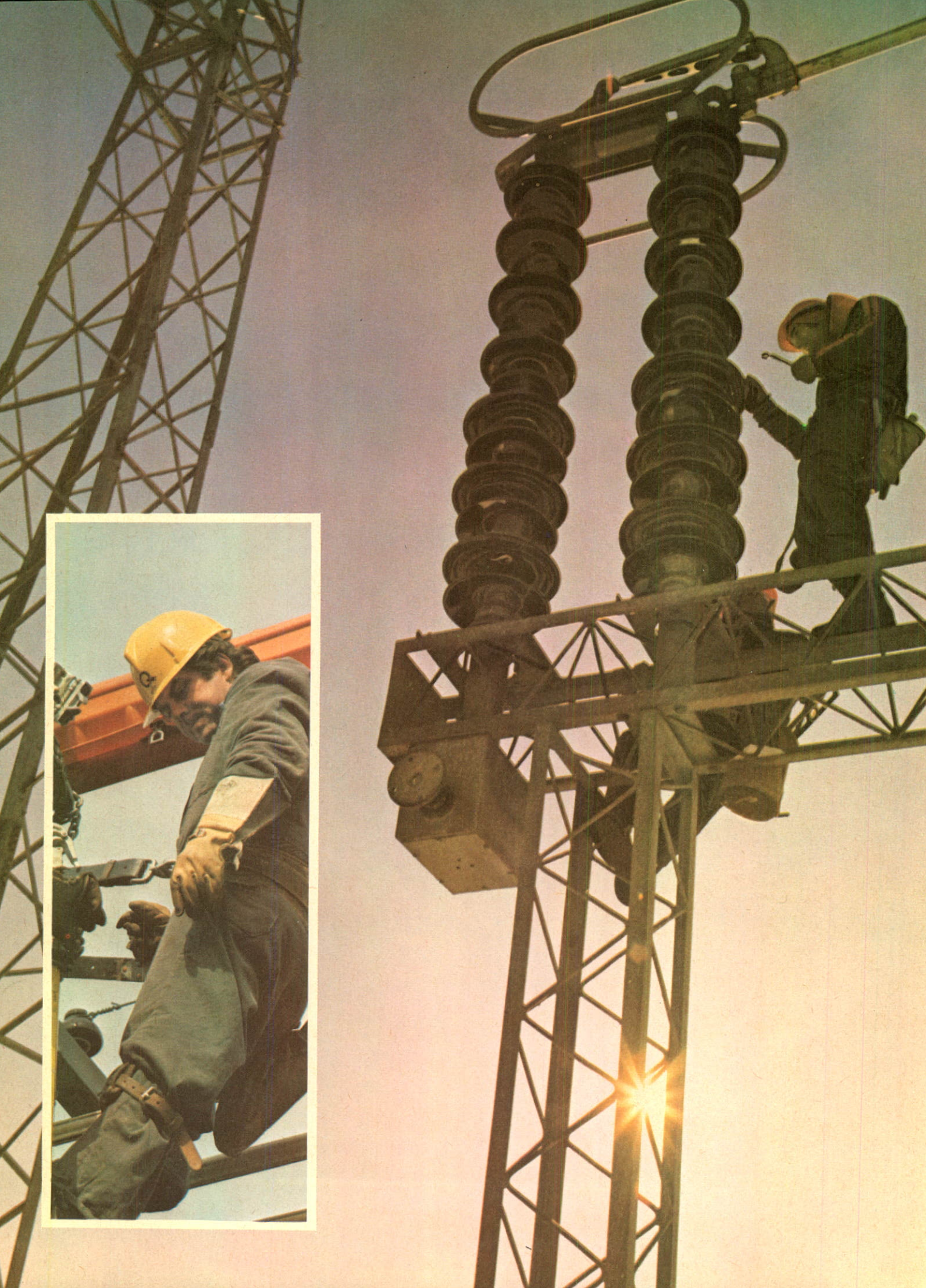
New Administrative Structures

Ten new administrative divisions, called regions, have now replaced the eight distribution regions and four production zones created in the service area following nationalization of the last remaining electric utility companies in 1963.

The *distribution and sales* functions and the *production and transmission* functions, which were formerly carried out by separate administrative units, will henceforth be handled by a single administrative unit in each of the new territorial divisions, with two exceptions: the Saint-Laurent region, which encompasses the Greater Montreal area, remains exclusively a *distribution and sales* unit, and the Maisonneuve region (formerly the South zone) remains exclusively a *production and transmission* unit.

The new administrative structures were designed to reduce operating costs, eliminate duplication and improve customer service. The last stages of the reorganization consisted in combining the former Laurentides region and West zone, with head office in Saint-Jérôme, and in establishing the boundaries of the new Maisonneuve region, whose *production and transmission* jurisdiction extends over the entire Saint-Laurent region and parts of the Laurentides and Richelieu regions, as indicated on the accompanying map.

The list of new territorial divisions, with the name of the director in each case, appears on page 4 of this report.



Hydro-Quebec Annual Report 1971

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Auditors' Report

We have examined the consolidated balance sheet of the Quebec Hydro-Electric Commission and its subsidiaries as at December 31, 1971, and the consolidated statements of revenue and expenditure, reserves, and source and application of funds for the year then ended. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

In our opinion, the operations of the Commission during the year have been carried on in conformity with the Hydro-Quebec Act and these consolidated financial statements, forming the report of the Commission, present fairly the financial position of the Commission and its subsidiaries as at December 31, 1971, and the results of their operations and the source and application of their funds 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 3, 1972

Samson, Bélair, Côté, Lacroix
et Associés
Chartered Accountants

H. Marcel Caron, C.A.
of: Clarkson, Gordon & Co.
Chartered Accountants

Consolidated Statement of Revenue and Expenditure

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

		1971	1970
Revenue	Sales of electricity	$518,314	$478,246
	Increase in unbilled revenue	5,963	4,820
		524,277	483,066
	Other operating income (net)	11,282	11,253
		535,559	494,319
Expenditure	Operating, maintenance, administration and other expenses (including fuel $1,669 and $3,827)	149,897	144,344
	Provision for renewals (depreciation)	64,103	58,805
	Provincial levy on energy generated	29,057	27,784
	School and municipal taxes	19,070	18,182
	Power purchased	15,738	15,647
		277,865	264,762
Net operating income		**257,694**	229,557
Other income	Investment income (net)	10,094	10,564
	Net profit on repurchase of debentures (note 4)	9,547	8,796
Income before interest charges		**277,335**	248,917
Interest charges	Interest on long-term debt	167,800	148,443
	Interest on bank indebtedness and notes payable	8,007	12,721
	Amortization of debenture discount and expenses	3,311	3,190
	Interest charged to construction work in progress	(29,535)	(32,079)
		149,583	132,275
Net income before interest on reserves		**127,752**	116,642
	Interest on reserves (note 7)	57,250	46,910
Available for reserves		**$ 70,502**	$ 69,732
Provisions for reserves (note 7)	Contingencies	$ 36,203	$ 38,227
	Stabilization of rates	10,485	9,661
	Amortization of capital invested	23,814	21,844
		$ 70,502	$ 69,732

(See accompanying notes)

QUEBEC HYDRO-ELECTRIC COMMISSION AND ITS SUBSIDIARIES

Consolidated Balance Sheet

(in thousands of dollars)
As at December 31

	Assets	1971	1970
Fixed assets	Property and plant, at cost:		
	In service	$4,250,783	$3,899,146
	Less reserve for renewals (accumulated depreciation)	815,420	756,845
		3,435,363	3,142,301
	Construction work in progress	411,304	388,530
		3,846,667	3,530,831
	Construction, operating and sundry equipment, at cost less accumulated depreciation	23,542	27,338
		3,870,209	3,558,169
Current assets	Cash and short-term investments, at cost	34,543	4,868
	Accounts receivable	59,361	57,895
	Unbilled revenue	42,427	36,464
	Materials and supplies, at cost	27,714	27,201
	Prepaid expenses	5,454	6,031
		169,499	132,459
Other assets	Investments, at cost (note 1)	132,190	132,219
	Unamortized debenture discount and expenses	50,442	47,053
	Accounts receivable	10,040	12,546
	Deferred cost on purchase of energy (note 2)	16,658	7,368
		209,330	199,186
		$4,249,038	$3,889,814

	Liabilities and Reserves	1971	1970
Long-term debt	Bonds and debentures — guaranteed by the Province of Quebec (notes 3 and 5)	$2,875,894	$2,637,766
	Less sinking funds (notes 3 and 4)	53,825	55,680
		2,822,069	2,582,086
	Net exchange premium (note 5)	81,364	82,133
		2,903,433	2,664,219
	Other long-term debt (note 6)	24,832	11,595
		2,928,265	2,675,814
Notes payable	Notes payable within three years of which $98,045 and $123,700 are due within one year	**98,045**	128,858
Current liabilities	Bank indebtedness	21,959	40,408
	Accounts payable and accrued liabilities	94,851	73,594
	Accrued interest	54,110	46,820
		170,920	160,822
Other liabilities	Workmen's compensation awards	2,431	2,471
	Customers' deposits and advances	8,544	8,768
		10,975	11,239
Reserves (note 7)	Contingencies	426,252	367,036
	Stabilization of rates	186,495	165,625
	Amortization of capital invested	428,086	380,420
		1,040,833	913,081
		$4,249,038	$3,889,814

On behalf of the Commission:
(signed) Roland Giroux
(signed) Robert A. Boyd
Montreal, March 3, 1972

(signed) E.-A. Lemieux,
General Manager
Finance and Accounting

(See accompanying notes)

Consolidated Statement of Reserves

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

	1971				1970
	Contingencies	Stabilization of rates	Amortization of capital invested	Total	Total
Balance, January 1	$367,036	$165,625	$380,420	$ 913,081	$796,439
Add:					
Interest on reserves (note 7)	23,013	10,385	23,852	57,250	46,910
Provisions from consolidated revenue	36,203	10,485	23,814	70,502	69,732
Balance, December 31	**$426,252**	**$186,495**	**$428,086**	**$1,040,833**	$913,081

(See accompanying notes)

QUEBEC HYDRO-ELECTRIC COMMISSION AND ITS SUBSIDIARIES

Consolidated Statement of Source and Application of Funds

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

	1971	1970
Source of funds		
Operations		
Net income before interest on reserves	$127,752	$116,642
Less net profit on repurchase of debentures	9,547	8,796
	118,205	107,846
Plus:		
Provision for renewals (depreciation)	64,103	58,805
Depreciation of operating equipment	4,131	3,934
Amortization of debenture discount and expenses	3,311	3,190
	189,750	173,775
Issue of debentures (less discount and expenses)	334,640	229,492
Net exchange premium	(769)	2,407
Sundry items (net)	1,007	1,350
	$524,628	$407,024
Application of funds		
Additions to fixed assets (cost)	$388,592	$292,905
Less depreciation of construction equipment	3,032	1,798
	385,560	291,107
Maturities of long-term debt	46,424	77,252
Purchase of sinking fund investments (cost)	34,889	31,365
Decrease in notes payable	30,813	55,034
Increase (decrease) in working capital	26,942	(47,734)
	$524,628	$407,024

(See accompanying notes)

Notes to Consolidated Financial Statements

December 31, 1971

Note 1

Investments, at cost

	1971 ($'000')	1970 ($'000')
Churchill Falls (Labrador) Corporation Limited (see note 9)		
General Mortgage Bonds, 7½%, due 2010 (par value $100 million)	$ 90,500	$ 90,500
Common shares:		
Fully paid	34,333	34,333
	124,833	124,833
Gelco Enterprises Ltd., 4% unsecured note, due 1991	7,250	7,250
Sundry investments	107	136
	$132,190	$132,219

Note 2

Deferred cost on purchase of energy

In accordance with the terms of a contract with Churchill Falls (Labrador) Corporation Limited (see note 9), the Commission is obligated to pay to the Corporation an amount equal to a part of the interest charges on the First Mortgage Bonds, General Mortgage Bonds and other indebtedness of the Corporation. These payments will be amortized over the life of the contract, starting in 1972.

Note 3

Bonds and Debentures

Series	Interest Rate	Year of Issue	Year of Maturity	Bonds and Debentures ($'000')	Sinking Fund Investments ($'000') (Note 4)
Quebec Hydro-Electric Commission					
"D"	3%	1947	1972-1973	$ 18,300	
*"K"	3½%	1953	1978	39,217 U.S.	$14,285
*"L"	3¼%	1954	1974	20,594	479
*"M"	3½%	1955	1975	27,213	
*"N"	3½%	1956	1981	39,150 U.S.	12,384
*"O"	4¼%	1956	1976	18,230	
*"P"	4¼%	1956	1981	27,243 U.S.	7,125
*"Q"	4⅜%	1957	1977	38,566 U.S.	5,150
*"S"	5%	1957	1975, 1982	21,852	70
*"T"	3¾%	1958	1983	38,992 U.S.	6,754
*"V"	5%	1958	1979	16,040	18
*"W"	5%	1959	1980	23,819	410
*"X"	5%	1959	1984	37,186 U.S.	
*"Y"	6%	1959	1979	20,207	
*"Z"	5½%	1960	1982	28,137	189
*"AA"	5½%	1960	1983	20,961	
*"AB"	5½%	1961	1985	33,762	
*"AC"	5½%	1961	1985	31,202	
*"AD"	5½%	1962	1982	35,410	220
*"AF"	5¾%	1962	1984	45,177	
*"AG"	5%	1963	1988	265,989 U.S.	
"AH"	4%	1963	1973	20,000	
"AI"	4½%	1963	1973	7,118	
"AJ"	5%	1963	1973	12,196	
"AK"	5½%	1963	1973	5,775	
"AL"	6%	1963	1973	8,089	
*"AM"	5¼%	1963	1986	43,483	
*"AN"	5½%, 5½%	1964	1984, 1994	35,938	
*"AO"	4½%	1964	1994	50,000 U.S.	5,549
*"AP"	4¾%	1964	1989	44,080 U.S.	497
*"AQ"	5½%	1964	1988	54,197	
*"AR"	5½%, 5%	1965	1987, 1995	67,958	185
*"AS"	4⅝%	1965	1985	48,857 U.S.	
*"AT"	5¼%	1966	1987	48,650 U.S.	
*"AU"	6%	1966	1991	47,407	
*"AV"	5⅜%	1966	1992	60,000 U.S.	
*"AW"	6%	1966	1980, 1990	46,908	20
*"AX"	6¼%	1966	1991	40,000 U.S.	
*"AY"	6¼%	1967	1993	60,000 U.S.	
*"AZ"	6½%	1967	1978, 1990	47,883	90
*"BA"	6¼%	1967	1993	50,000 U.S.	
*"BB"	6½%	1967	1992	50,000 U.S.	
*"BC"	6¾%, 7%, 6% and 7%	1967	1972-1977, 1980, 1994	54,000	
*"BD"	6⅞%	1968	1989	60,000 U.S.	
*"BE"	7½%, 7½%, 7%	1968	1972-1978, 1980, 1994	46,400	
*"BF"	7¾%	1968	1986	25,000 U.S.	
*"BG"	7¼%	1968	1991	50,000 U.S.	
"VA"	7¼%	1968	1974	10,000 U.S.	
* —	6¾%	1969	1984 (150 million Deutsche Marks)	40,216	
* —	7¼%	1969	1984 (100 miilion Deutsche Marks)	27,045	
*"BH"	7¾%	1969	1974 (1990 at the option of the holders)	50,000	
*"BI"	8¾%	1969	1999	50,000 U.S.	
"BJ"	8%	1969	1979 (1974 at the option of the holders)	20,000 U.S.	
*"BK"	8½%	1969	1972 (1992 at the option of the holders)	25,000	
*"BL"	9¾%	1969	1995	50,000 U.S.	
*"BM"	9½%	1970	1975 (1990 at the option of the holders)	50,000	
*"BN"	9¼%	1970	1995	60,000 U.S.	
*"BO"	9½%	1970	1990	30,000	400
*"BP"	9½%	1970	1997	75,000 U.S.	
*"BQ"	9¼%	1970	1985	14,400 U.S.	
*"BR"	8¾%	1971	1999	75,000 U.S.	
*"BS"	8¼%	1971	1986	20,000 U.S.	
*"BT"	7¾%	1971	1996	50,000	
*"BU"	8¾%	1971	1996	50,000	
* —	8%	1971	1986 (100 million Deutsche Marks)	29,835	
*"BV"	8½%	1971	2001	75,000 U.S.	
*"BW"	8½%	1971	1986	25,000 U.S.	
				$2,757,682	**$53,825**

*Sinking fund debentures

Notes to Consolidated Financial Statements
December 31, 1971

Note 3 — Bonds and Debentures (continued)

Series	Interest Rate	Year of Issue	Year of Maturity	Bonds and Debentures ($'000')	Sinking Fund Investments ($'000') (Note 4)
The Shawinigan Water and Power Company					
First Mortgage Sinking Fund Bonds					
"O"	3¼ %	1947	1972	$ 11,833	
"P"	3½ %	1948	1973	19,827	
"Q"	3%	1950	1975	14,650 U.S.	
"R"	4¾ %	1956	1976	10,251	
"S"	5¾ %	1961	1981	14,332	
				70,893	
Sinking Fund Debentures					
—	5½ %	1957	1972	13,347	
				$ 84,240	
Southern Canada Power Company, Limited					
First Mortgage Bonds					
"B"	3½ %	1946	1976	$ 5,340	
"C"	3½ %	1948	1976	2,500	
"D"	3⅜ %	1951	1981	2,500	
				$ 10,340	
Quebec Power Company					
First Mortgage Sinking Fund Bonds					
"F"	3%	1947	1972	$ 2,623	
"G"	6¼ %	1962	1982	12,272	
				$ 14,895	
Gatineau Power Company					
First Mortgage Bonds					
"E"	3¾ %	1948	1973	**$ 2,122**	

Note 3 — Bonds and Debentures (continued)

Series	Interest Rate	Year of Issue	Year of Maturity	Bonds and Debentures ($'000')	Sinking Fund Investments ($'000') (Note 4)
Lower St. Lawrence Power Company					
First Mortgage Sinking Fund Bonds					
"E"	4½ %	1953	1973	$ 720 U.S.	
"F"	5⅞ %	1959	1984	895 U.S.	
				$ 1,615	
Northern Quebec Power Company, Limited					
First Mortgage Sinking Fund Bonds					
"B"	5⅛ %	1954	1974	**$ 280**	
Saguenay Electric Company					
First Mortgage Sinking Fund Bonds					
"C"	4⅞ %	1953	1973	$ 960	
General Mortgage Sinking Fund Bonds					
"A"	5½ %	1962	1982	3,760	
				$ 4,720	
Total Bonds and Debentures				**$2,875,894**	**$53,825**

A contract was signed by the Commission on February 1, 1972 for the issue on February 10, 1972 and on May 16, 1972 of $98,500,000 (U.S.) and $1,500,000 (U.S.) respectively of Series "BX" 7⅞ % Debentures dated February 1, 1972, maturing February 1, 2002.

Bonds and debentures of subsidiary companies are guaranteed by the Commission, guarantee which is in turn guaranteed by the Province of Quebec.

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

	Maximum maturities and requirements ($'000')	Maturities at the option of the holders ($'000')	Minimum maturities and requirements ($'000')
1972	$ 98,957	$ 25,000	$ 73,957
1973	141,877	—	141,877
1974	149,071	70,000	79,071
1975	152,274	50,000	102,274
1976	94,072	—	94,072

Notes to Consolidated Financial Statements
December 31, 1971

Note 4

Sinking Funds

The Commission invests substantially all of its Sinking Funds in its own debentures and in those 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 discount and other expenses, is credited to revenue and expenditure. Debentures of an issue purchased for the sinking fund of that issue have been cancelled.

Note 5

Net Exchange Premium

Consolidated long-term debt includes $1,563,595,000 payable in U.S. currency which is carried in the accounts at the rate of U.S. $1 equals Canadian $1 and 350 million Deutsche Marks carried in the accounts at the Canadian dollar equivalent at the dates of borrowing. The net exchange premium shown on the consolidated balance sheet represents the adjustment arising from the conversion of debt payable in U.S. funds into Canadian funds at the rates of exchange in effect at the time the debt was incurred or included in consolidation, less the premium on debentures purchased for sinking funds.

If the net debt payable in foreign currencies was converted into Canadian dollars at the rates of exchange prevailing at December 31, 1971, the premium required would be approximately $67,200,000 less than the net exchange premium shown on the consolidated balance sheet.

Note 6

Other Long-Term Debt

	1971 ($'000')	1970 ($'000')
Rural Electrification Bureau, 1972 - 1993*	$ 9,127	$ 9,827
Government of Canada**	14,111	—
Other long-term debt maturing from 1972 to 1992	1,594	1,768
	$24,832	$11,595

*Does not bear interest as long as there is no default under the provisions of the governing agreements.

**Guaranteed by the Province of Quebec, 7 3/16%-7 1/2% Notes payable in 25 equal annual instalments of principal and interest starting not later than March 31, 1975.

Note 7

Reserves

The Hydro-Quebec Act requires the Commission to create reserves for contingencies, stabilization of rates and amortization of the capital invested. In addition to the amounts provided for the respective reserves at the end of each year, the Commission, as required by the Act, charged to revenue and expenditure and credited to reserves interest on the amounts of the reserves at the average cost of money to the Commission in the year as follows: 1971 — 6.27%; 1970 — 5.89%.

Note 8

Pensions

The Hydro-Quebec Employee's Retirement plan is a contributory, benefit-based plan, under which the benefits payable are guaranteed by the Commission, and applies to all Hydro-Quebec employees including those who were employees of the subsidiaries prior to January 1, 1966 and who are therefore covered by the pension funds of the subsidiaries for service prior to that date. The past service liability not provided for in the consolidated financial statements amounted to approximately $33 million on the basis of an actuarial survey of the plans at December 31, 1968.

The total pension cost of $11,849,000 for 1971 ($10,997,000 for 1970) provides fully for contributions to the Plan and to the Quebec Pension Plan in respect of current service, interest on the above past service liability and amortization of the unfunded past service liability over a period ending December 31, 1995.

Furthermore, effective January 1, 1972 the Commission decided to pay supplementary amounts in order to assure a minimum pension of $1,200 per year and to adjust the pensions paid or to be paid to the pensioners of the subsidiaries acquired in 1963. On the basis of preliminary estimates the actuarial deficit relating to these benefits amounts to approximately $30,000,000, entirely in respect of past services. This amount will be substantially amortized over a period of thirty years by annual charges to operations as the benefits are disbursed.

An actuarial survey of the plans and of the commitments of the Commission resulting from its above policy adopted on January 1, 1972, at December 31, 1971, will be done in 1972.

Commitments

Note 9

Churchill Falls

In May 1969, the Commission executed a contract for the purchase, starting in 1972, of a very large amount of energy from a generating station at Churchill Falls in Labrador with a rated capacity of 5,225,000 kilowatts, in process of construction by Churchill Falls (Labrador) Corporation Limited ("CFLCo").

CFLCo has entered into long-term and interim financing contracts which, with internally generated funds, will, in its opinion, permit it to cover the cost of the project estimated originally at $950 million and now at $937 million. The Commission holds 34.2% of the Common Stock of CFLCo and $100 million of its General Mortgage Bonds at a total cost of approximately $124.8 million. If CFLCo is not able to obtain otherwise any further funds which may be necessary to complete the project, it can call upon the Commission to purchase units of Subordinated Debentures and shares of Common Stock.

The power contract provides for the purchase by the Commission for a period of 40 years from the completion of the project, scheduled for 1976, of all of the power generated at Churchill Falls in excess of the requirements (not exceeding 12% of the energy generated) of Newfoundland. This contract will be automatically renewed for a further period of 25 years, upon already agreed terms. The price to be paid by the Commission for the energy 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 the Commission for energy will range from $93 million to $80 million until the year 2016 and will be approximately $63 million during the remaining 25 years. In addition, the Commission is obligated to pay to CFLCo an amount equal to a part of the interest charges on the First Mortgage Bonds, General Mortgage Bonds and other indebtedness of CFLCo. The Commission estimates that these payments will not exceed $15 million per annum, declining as the Bonds and other indebtedness are retired. Subject to certain limitations and compensations, the contract requires the Commission to make payments for energy whether or not taken; the Commission 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. Commercial delivery of power from the first two generating units, of a total of eleven units, began early in December 1971 and the Commission expects to take delivery of 5,500,000,000 kilowatt-hours during 1972, representing a cost of approximately $13 million.

In anticipation of the purchase of energy from CFLCo, the Commission has signed contracts with the Hydro-Electric Power Commission of Ontario and the New Brunswick Electric Power Commission for the sale to them of substantial amounts of power until 1977.

James Bay

In July 1971 the Quebec Government created the James Bay Development Corporation to undertake the development of the natural resources in northwestern Quebec and in December 1971 the James Bay Energy Corporation was incorporated to develop the hydro-electric resources of the same area. At December 31, 1971, five shares had been issued for $500, to directors, three of them to nominees of the Commission. On February 3, 1972 the directors of James Bay Energy Corporation accepted from the Commission a subscription for 7,000,000 shares of capital stock, out of a total authorized capital of 10,000,000 shares, for a price of $700,000,000 payable over a period of 10 years. This subscription calls for payments of $50,000,000 in each of the years 1972 and 1973.

No important transactions took place in 1971 on the part of James Bay Energy Corporation whose accounts are not consolidated with those of the Commission. However, at December 31, 1971 the financial statements of the Commission include costs of $39 million and commitments of $72 million in connection with the James Bay project. It has not yet been determined if all of the above costs will be transferred to James Bay Energy Corporation.

The total capital expenditures to be incurred for the James Bay Project cannot be estimated until the ultimate scope of the programme and its sequence of development is established. Therefore, with the exception of the subscription for shares mentioned above, the extent of the financial involvement of the Commission in connection with the project cannot yet be determined.

Other commitments

Commitments in respect of construction contracts and for the purchase of equipment amounted to approximately $260 million at December 31, 1971, including $72 million for James Bay Energy Corporation.

Summary of Consolidated Revenue and Expenditure
(in thousands of dollars)

		1971	1970	1969	1968	1967
Revenue	Sales of electricity	$518,314	$478,246	$416,012	$386,942	$353,508
	Increase in unbilled revenue	5,963	4,820	4,315	3,049	5,054
		524,277	483,066	420,327	389,991	358,562
	Other operating income (net)	11,282	11,253	10,781	7,837	7,141
		535,559	494,319	431,108	397,828	365,703
Expenditure	Operating, maintenance, administration and other expenses (1)	149,897	144,344	143,704	130,050	112,947
	Provision for renewals (depreciation)	64,103	58,805	51,488	45,751	42,622
	Provincial levy on energy generated	29,057	27,784	23,744	22,088	22,179
	School and municipal taxes	19,070	18,182	18,091	17,999	14,476
	Power purchased	15,738	15,647	17,536	18,750	18,230
		277,865	264,762	254,563	234,638	210,454
Net operating income		**257,694**	229,557	176,545	163,190	155,249
Other income	Investment income (net)	10,094	10,564	9,114	3,470	4,156
	Net profit on repurchase of debentures	9,547	8,796	6,736	3,738	2,922
	Profit on disposal of common shares of British Newfoundland Corporation Ltd.				1,092	
Income before interest charges		**277,335**	248,917	192,395	171,490	162,327
Interest charges	Interest on long-term debt	167,800	148,443	130,654	117,023	105,095
	Interest on bank indebtedness and notes payable	8,007	12,721	17,962	12,761	13,069
	Amortization of debenture discount and expenses	3,311	3,190	2,899	2,526	2,375
	Interest charged to construction work in progress	(29,535)	(32,079)	(43,885)	(38,559)	(33,763)
		149,583	132,275	107,630	93,751	86,776
Net income before interest on reserves		**127,752**	116,642	84,765	77,739	75,551
	Interest on reserves	57,250	46,910	39,284	33,852	28,589
Available for reserves		**$ 70,502**	$ 69,732	$ 45,481	$ 43,887	$ 46,962
Provisions for reserves	Contingencies	$ 36,203	$ 38,227	$ 18,002	$ 19,328	$ 23,872
	Stabilization of rates	10,485	9,661	8,407	7,800	7,171
	Amortization of capital invested	23,814	21,844	19,072	16,759	15,919
		$ 70,502	$ 69,732	$ 45,481	$ 43,887	$ 46,962

(1) Including fuel $1,669 — 1971; $3,827 — 1970; $12,641 — 1969; $11,399 — 1968; $5,132 — 1967.

Five-Year Consolidated Sales and Revenue

		1971	1970	1969	1968	1967
Electric Energy Generated & Purchased (in millions kWh)	Generated (net)	54,134	52,165	46,760	43,068	41,201
	Purchased	4,200	4,001	4,298	4,660	4,576
		58,334	56,166	51,058	47,728	45,777
	Losses and internal use	4,640	4,422	3,829	3,830	3,723
	Delivered as per agreement (net)	625	858	458	582	411
	Increase in unbilled sales	570	274	458	246	411
	Total electric energy sold	**52,499**	50,612	46,313	43,070	41,232
Electric Sales (in millions kWh)	Domestic and farm	12,503	11,696	10,883	10,125	9,432
	Commercial (including Municipal)	9,096	6,684	5,505	4,367	3,609
	Industrial: Primary	22,369	24,032	23,334	22,174	21,342
	Secondary	439	574	819	640	687
	Street lighting and luminaires	453	429	413	402	336
	Transportation	164	161	164	176	218
	Wholesale: Primary	5,008	3,784	3,710	3,802	3,674
	Secondary	2,395	2,569	826	642	951
	Interdepartmental	72	683	659	742	983
	Total electric sales	**52,499**	50,612	46,313	43,070	41,232
Sales Revenue (in thousands of dollars)	Domestic and farm	$189,293	$174,231	$148,661	$139,670	$124,090
	Commercial (including Municipal)	134,539	103,303	83,912	70,816	60,806
	Industrial: Primary	144,903	159,122	150,602	144,999	138,090
	Secondary	1,665	2,115	2,957	2,228	2,137
	Street lighting and luminaires	12,720	11,586	10,346	9,629	7,593
	Transportation	1,402	1,306	1,318	1,363	1.684
	Wholesale: Primary	20,046	14,921	14,383	14,714	14,340
	Secondary	13,510	9,588	1,844	1,285	1,804
	Interdepartmental	236	2,074	1,989	2,238	2,964
	Total sales revenue	**$518,314**	$478,246	$416,012	$386,942	$353,508
Total Customer Accounts	(year-end)	**1,895,082**	1,852,292	1,772,878	1,719,799	1,655,584
Domestic and Farm Accounts	(year-end)	**1,669,523**	1,632,393	1,568,689	1,525,380	1,470,685

Statistics of Electricity Generated and Purchased and its Disposal in 1971

Gross Generation		The consolidated system (in millions kWh)	
Hydro-Electric Stations			
Upper Ottawa	(5 plants)		1,957
Gatineau	Paugan	915	
	Others (3 plants)	1,112	2,027
Lower Ottawa	Carillon	2,099	
	Others (9 plants)	895	2,994
Upper Saint Lawrence	Beauharnois	11,923	
	Other (1 plant)	488	12,411
Saint Maurice	Trenche	1,610	
	Beaumont	1,403	
	La Tuque	1,260	
	Shawinigan 3	1,103	
	Others (4 plants)	3,615	8,991
Bersimis	Bersimis 1	5,737	
	Bersimis 2	3,034	8,771
Outardes	Outardes 3	3,706	
	Outardes 4	2,872	6,578
Manicouagan	Manic 5	4,632	
	Manic 2	4,035	
	Others (A) (2 plants)	874	9,541
Other rivers	(14 plants)		593
Total	.(51 hydro-electric stations)		53,863
Thermal-Electric Stations	Tracy	427	
	Others (16 plants)	49	476
Total generation	(B) .(68 plants)		54,339
Less: station use			205
Total generation (Net)			54,134
Purchased from	Alcan		2,953
	Maclaren-Quebec Power Co.		809
	Atomic Energy of Canada (Gentilly)		68
	Churchill Falls (Labrador) Corporation		184
	Sundry Purchases		186
Total			4,200
Less: delivered as per agreement (net)			625
Energy supplied			3,575
Net system total output			57,709
Total Sales			52,499
Increase in unbilled sales			570
Losses			4,640
System Peaks (MW)	Primary		9,536
	Secondary		1
	Foreign network support		0

(A) Units 6 and 7 of McCormick under rental are considered as one plant.
(B) Hydro-Quebec owns 67.

Hydro-Quebec Employees' Retirement Fund
Auditors' Report

We have examined the statement of assets and reserve of the Hydro-Quebec Employees' Retirement Fund as at December 31, 1971 and the statement of revenue and expenditure for the year ended on that date. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the assets of the Fund as at December 31, 1971 and its revenue and expenditure for the year ended on that date, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Montreal, Canada,
March 3, 1972

Samson, Bélair, Côté, Lacroix
et Associés
Chartered Accountants

H. Marcel Caron, C.A.
of: Clarkson, Gordon & Co.
Chartered Accountants

Hydro-Quebec Employees' Retirement Fund

Statement of Revenue and Expenditure

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

		1971	1970
Revenue	Contributions: Employees	$ 4,505	$ 4,163
	Hydro-Quebec	8,917	8,249
		13,422	12,412
	Additional past service contributions less cancellations	58	131
		13,480	12,543
	Less refunded to employees leaving service	277	442
		13,203	12,101
	Revenue from investments	5,920	4,782
		19,123	16,883
Expenditure	Pensions paid	2,992	2,705
Net revenue	transferred to reserve	**$16,131**	$14,178

(See accompanying note)

Hydro-Quebec Employees' Retirement Fund

Statement of Assets and Reserve

(in thousands of dollars)
as at December 31

Assets (note)	1971	1970
Investments, at cost:		
Bonds of, or guaranteed by the Province of Quebec	$65,763	$50,891
Municipal and School Commission bonds	15,518	14,995
Government of Canada bonds	336	—
Other bonds	150	150
(Par value $88,916, market value $79,284)	**81,767**	66,036
Common stocks (market value $1,196)	1,497	1,479
Short-term investment, guaranteed by the Province of Quebec	10,500	10,000
	93,764	77,515
Accrued interest on investments	1,818	1,335
Past service contributions receivable from employees	52	68
Amount receivable from (payable to) Hydro-Quebec	(112)	473
	$95,522	$79,391

Reserve		
Balance as at January 1	$79,391	$65,213
Net revenue for the year	16,131	14,178
Balance as at December 31	**$95,522**	$79,391

(See accompanying note)

On behalf of the Commission:
(signed) Roland Giroux
(signed) Robert A. Boyd
Montreal, March 3, 1972

(signed) E.-A. Lemieux,
General Manager
Finance and Accounting

Hydro-Quebec Employees' Retirement Fund

Note to Financial Statements

December 31, 1971

These statements show only the position of the assets of the Hydro-Quebec Employees' Retirement Fund, but do not purport to show the adequacy of the Fund to meet the obligations of the Hydro-Quebec Retirement Plan, which are guaranteed by the Commission. An actuarial survey of the obligations of the Plan as of December 31, 1968 shows an unfunded past service liability of approximately $33 million. It is calculated that current contributions are sufficient to cover obligations in respect of current service, interest on the above unfunded past service liability, and the amortization of this unfunded past service liability over a period ending December 31, 1995.

An actuarial survey of the Plan at December 31, 1971 will be done in 1972.