Hydro Québec

Environmental Performance Report **1999**

all our energy to meet the challenge

table of contents

Andre Caillé

L. Jacques Ménard

all our energy for taking action

A Word from the President and Chief Executive Officer and from the Chairman of the Board

Hydro-Québec's fifth annual Environmental Performance Report *presents the company's achievements in fulfilling its environmental commitments. The activities and results described are in continuity with the operations outlined in previous reports. In addition, 1999 was devoted to consolidating the principles set forth in the policy titled* Our Environment.

Last December, for example, the company earned its first ISO 14001 registration, confirming that the environmental management system (EMS) being implemented complies with internationally recognized standards. Work continues to proceed smoothly in the five administrative units involved in this process. By the end of 2000, another two units will be similarly registered.

With 96% of its total output generated from water resources, Hydro-Québec is a world leader in the area of clean, renewable energy. The company is therefore continuing to develop profitable hydroelectric potential. This orientation, number three in Hydro-Québec's Strategic Plan 2000-2004, *reflects both the economic benefits of hydroelectric projects and the many environmental advantages of hydropower, including its contribution to reducing greenhouse gas emissions, acid rain, and other air pollutants.*

We are particularly proud of the low rate of atmospheric emissions produced by our facilities, thanks to which Hydro-Québec ranks as one of North America's most responsible companies in the fight against greenhouse gas emissions.

In concrete terms, Hydro-Québec maintains its involvement in a number of associations and organizations established to promote the advantages of hydropower. For example, in July 1999, the company officially became an active participant in the ÉcoGESte program set up by the Québec government as part of its action plan on climate change. Consequently, Hydro-Québec can claim emission credits worth 78.2 megatonnes of CO_2 equivalents as a result of the increase in its sources of hydroelectric power supply between 1991 and 1998.

With more than 25 years of experience in studying and understanding the environmental impacts of hydroelectric projects, Hydro-Québec has acquired world-renowned expertise. We will therefore continue to cooperate with various international agencies to develop hydropower design practices that will make projects as environmentally acceptable and community-friendly as possible.

For the Environment and Corporate Social Responsibility Committee, whose role is to make recommendations to Hydro-Québec's Board of Directors in its specific areas of activity, 1999 provided an opportunity to define guidelines for the allocation of donations and sponsorships, as well as university chairs in the environment sphere.

Our customers expect to receive a reliable, economical, clean and safe product. They know that Hydro-Québec is a leader in the field of energy; they also know that we can do even more. Therefore, in accordance with its Strategic Plan 2000-2004, *Hydro-Québec plans to implement a variety of strategies to serve customers better. This commitment will contribute to improving quality of life for all Quebecers, since electricity is a crucial part of so many aspects of modern life. However, its development must not be pursued to the detriment of the environment. That is why Hydro-Québec will carry on with the efforts it has already invested in environmental enhancement, in consultation with the various communities concerned.*

L. Jacques Ménard

L. Jacques Ménard
Chairman of the Board

André Caillé

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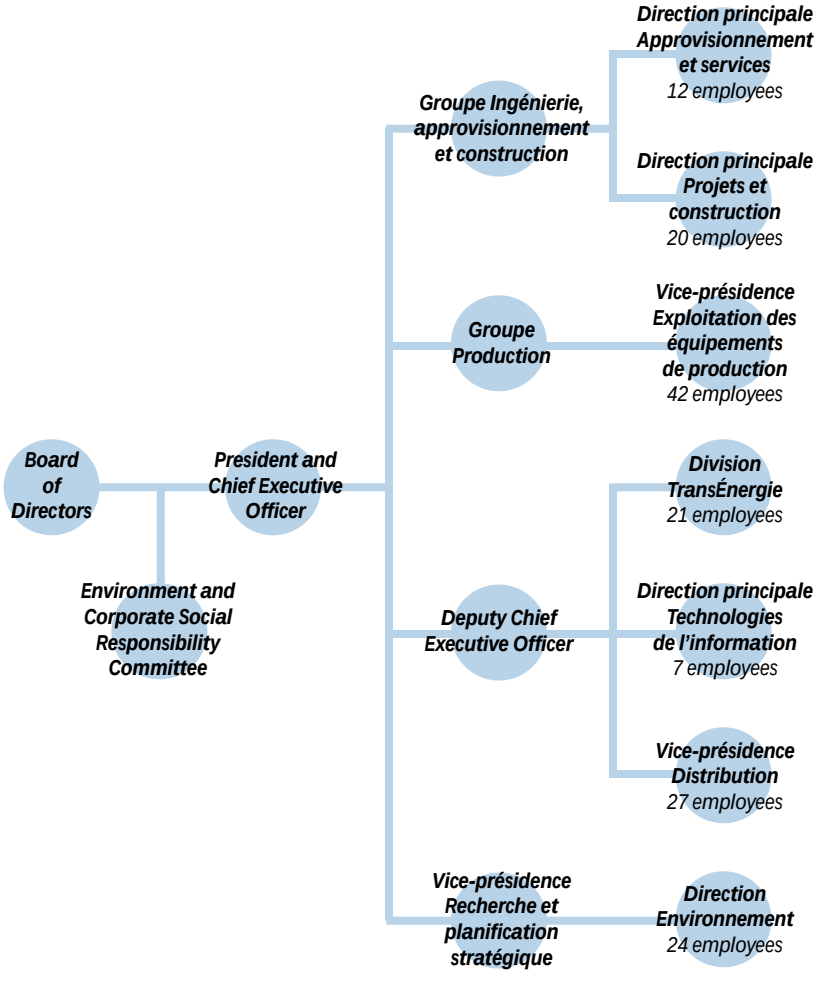
President and Chief Executive Officer

the environment at Hydro-Québec

This is Hydro-Québec's fifth* Environmental Performance Report. *It presents the company's achievements in fulfilling its environmental commitments.



Organizational Structure

Some 153 environment specialists work in the company's various administrative units. Their role is to provide the company's managers with support and expertise in their particular domain. Hydro-Québec's Environment unit is responsible for monitoring strategic environmental issues, proposing corporate orientations and ensuring senior management of control over environmental performance.

Instituting an environmental management system (EMS) in compliance with ISO 14001 specifications is a requirement of the company's environment policy. Each unit shown in this organization chart has undertaken to implement the ISO 14001 standard in order to obtain the means to fulfill its environmental responsibilities *(see page 18)*.

Environment and Corporate Social Responsibility Committee

The main role of Hydro-Québec's Environment and Corporate Social Responsibility Committee is to advise the Board on matters of environmental management. Made up of six members of the Board, including the Chairman, L. Jacques Ménard, and the President and Chief Executive Officer, André Caillé, the committee receives all reports and violation notices related to environmental incidents.

During 1999, the committee studied the establishment of guidelines for university chairs and reviewed the environmental performance assurance program, particularly with respect to the implementation of ISO 14001. Every six months, it also examines environmental issues and events affecting the company.

Advisory Committee on the Environment and Community Affairs

The Advisory Committee on the Environment and Community Affairs advises the company on its strategic orientations and provides recommendations on various environmental matters and community relations. In 1999, under a renewed mandate, the nine members of the committee offered the company a number of opinions. Particular attention was paid to the environmental aspects of Hydro-Québec's strategic orientations, especially the various options available to ensure long-term power supply for all Quebecers. The committee also examined the measures taken by Hydro-Québec to promote hydroelectricity, as well as the issue of greenhouse gas emissions. The principles, rules and criteria guiding the company in its efforts to foster environmental acceptability and a favorable reception of its projects and activities by the communities concerned were also studied. Lastly, the committee explored and expanded the principles and methods underlying Hydro-Québec's communications with respect to its environmental orientations and achievements.

Hydro-Québec at a glance

	1999	1998	1997	1996	1995
Total installed capacity (MW)*	31,505	31,472	31,397	31,413	31,125
Hydroelectric generating stations (MW)	29,235	29,203	29,203	29,220	28,932
Nuclear generating station (MW)	675	675	675	675	675
Thermal generating stations (MW)	1,595	1,594	1,518	1,518	1,518
Total sales (TWh)	172	161	163	163	166
Exports (TWh)	25	19	15	19	24
Transmission system (km)	32,227	32,144	32,036	30,557	30,831
Distribution system (km)	105,898	105,705	104,640	104,078	102,785
Number of customer accounts	3,505,400	3,481,030	3,456,768	3,427,260	3,398,944
Number of employees	19,135	20,847	20,416	23,320	24,852
Total revenue from electricity sales ($M)	8,496	8,004	7,927	7,655	7,576

* Hydro-Québec also has access to most of the generation from Churchill Falls power plant, which has a nominal capacity of 5,428 MW.

Hydroelectricity, Our Main Energy Source

Hydro-Québec is a world leader in the area of clean, renewable energy, with 96% of its total energy output generated from water resources. It has provided Québec with hydroelectric generating capacity that is among the most competitive in North America. Hydro-Québec has more than 25 years of experience in studying and understanding the environmental impacts of hydroelectric projects.

In its concern to demonstrate the comparative advantages of hydropower for sustainable development and renewable energy, Hydro-Québec is taking a number of steps to promote this energy source.

Beauharnois generating station

The company plays an active role in the operations of the International Energy Agency, set up within the framework of the Organization for Economic Cooperation and Development. In 1999, the company helped draft the preliminary version of a task force report entitled *Hydropower and the Environment,* including recommendations for optimum practices for building hydroelectric projects. The goal of these practices is to reduce projects' negative impacts to a minimum, while maximizing the positive spinoffs for the environment and the communities affected.

The World Commission on Dams was established by the World Bank and the World Conservation Union with a twofold mission. It assesses the effectiveness of large dams as development tools and makes recommendations for improving decision-making on future dam projects. Hydro-Québec is viewed by the commission as a benchmark organization because of its environmental practices and its partnerships with Aboriginal and non-Aboriginal communities. The company provides the commission with financial support and takes part in its studies, sharing the environmental and social experience it has acquired over the years. In 1999, the commission tabled its first two reports, which concern relations with Aboriginal peoples and the sharing of project spinoffs with local communities. As a member, Hydro-Québec comments on studies produced by the commission. For further information on the commission, readers may visit its Web site at: www.dams.org.

Hydro-Québec is also a member of the International Hydropower Association, whose role is to support the responsible development of hydroelectric resources. Hydro-Québec's Director – Environment has been elected to chair the association's standing committee on the environment.

highlights of 1999

First ISO 14001 Registration

In December 1999, the Centre-Sud territory of Hydro-Québec's Procurement and Services became the company's first unit to earn ISO 14001 registration. This registration recognizes that the environmental management system (EMS) meets international criteria and confirms the company's intention to meet the commitments outlined in its policy Our Environment.

Hydro-Québec's Participation in the ÉcoGESte Program

In July 1999, Hydro-Québec officially joined the ÉcoGESte program, set up in 1997 by the Québec government under its action plan on climate change. By establishing voluntary greenhouse gas (GHG) reduction measures, this program is intended to encourage companies, associations, organizations and municipalities to stabilize their GHG emissions. In so doing, these partners contribute to achieving the common goal and to implementing the United Nations Framework Convention on Climate Change.

The increase in sources of hydropower supply between 1991 and 1998 allows Hydro-Québec to claim emission credits worth 78.2 megatonnes of CO_2 equivalents for that period. Over the last 20 years, Québec's use of hydroelectricity and natural gas, combined with improved energy use, has led to a 25% reduction in CO_2 emissions for all energy-related activities in the province.

Events Concerning Transmission

Loop Projects

In February 1999, following an injunction by Québec Superior Court declaring that the government decrees previously obtained were illegal, Hydro-Québec suspended its loop projects in the Montérégie and Outaouais regions and in downtown Montréal. The Nicolet report on the events of the January 1998 ice storm, tabled on April 7, confirmed the need to strengthen the transmission system. On June 19, a law passed by the National Assembly allowed Hydro-Québec to resume work on the loop projects in compliance with the legal procedures in effect. On July 7, Hydro-Québec received government authorization to complete the draft design studies required for the Montérégie and Outaouais loop lines.

Pesamit

Agreement

In September 1999, Hydro-Québec and the Betsiamites Montagnais band council signed a partnership agreement for hydroelectric projects on the North Shore. This agreement concerns the partial diversion of the Manouane, Sault aux Cochons and Portneuf rivers at a cost of approximately $82 million. The Betsiamites Innu-Montagnais community will contribute 17.5% of this amount. The agreement also provides for the construction of a generating station on the Toulnustouc – an investment of over $600 million.

The flows diverted toward Bersimis-1 and Bersimis-2 generating stations will increase annual output by around 0.8 TWh. The new 440-MW Toulnustouc plant will supply approximately 2.0 TWh of energy a year.

Environment on the

Internet

Also in December 1999, Hydro-Québec launched its environment Web site. The primary objective of this site is to inform the public about the environmental advantages of hydropower and about the company's environmental management. The site also offers access to various publications dealing specifically with the environment. The documents available cover such topics as environmental management and ISO 14001, greenhouse effect, hydroelectricity, mercury and bio-diversity. The site will be improved over the year 2000 and will be updated periodically. It may be consulted at: www.hydroquebec.com/environment.

Hydro-Québec's environmental commitment

In 1998, Hydro-Québec adopted the policy *Our Environment*, the text of which is reproduced at the end of this report. The general principles set forth in the policy state that:

Hydro-Québec is a leader in the field of environment. Thanks to hydropower, the company produces *clean, renewable and safe energy,* thus protecting our environmental heritage for future generations. It develops *profitable, environmentally acceptable projects that are well received by communities.* It practices *rigorous environmental management* that complies with ISO 14001, with a view to continuous improvement. In addition, to improve its performance in terms of the environment, sustainable development and public health, Hydro-Québec carries out or supports *research and development* on the environmental and health effects of its operations.

all our energy for

clean, renewable and safe energy

Some 96% of the output of Hydro-Québec's facilities is generated from water resources, and it is internationally recognized that this means of generating electricity emits many fewer pollutants than thermal power plants fired by coal, oil or natural gas.

Comparison of Electricity Generation Options

*Indicators of the environmental impacts of electricity generation options**

Generation options	Energy payback ratio**	Land area used (km^2/TWh/year)	Greenhouse gas emissions (kt CO_2 eq./TWh)	SO_2 emissions (t SO_2/TWh)	NO_x emissions (t NO_x/TWh)
Hydroelectric with reservoir	205	40 - 152	5 - 20	5	11
Coal	11	4	913	1,018	919
Natural gas (combined-cycle turbines)	26	10	511	413	416
Biomass (with tree planting)	5	533	118	26	1,396
Wind (without backup)	23	72	38	69	50

Source: International Energy Agency, *Hydropower and the Environment: Present Context and Guidelines for Future Action*, November 1999.

* The indicators in this table apply to new generating stations that would be built in North America and take into account the complete life cycle of the facilities, including their construction and operation, as well as the extraction and transportation of fuel.

** Energy payback is defined as the energy produced in relation to the energy consumed to build and operate the generation option.

These results enable us to draw the following conclusions:

- In terms of amount of energy supplied versus the amount of energy required to operate the facilities, hydroelectricity is the best-performing option.
- Facilities using a renewable energy source – i.e., hydroelectricity, wind and biomass – take up more space than other options. Local environmental and social impacts must therefore be considered at the design stage, and measures must be taken to ensure environmental and social acceptability.
- Hydroelectricity is the option that emits the least amount of greenhouse gases, SO_2 and NO_x.

Wind Power Test Facility

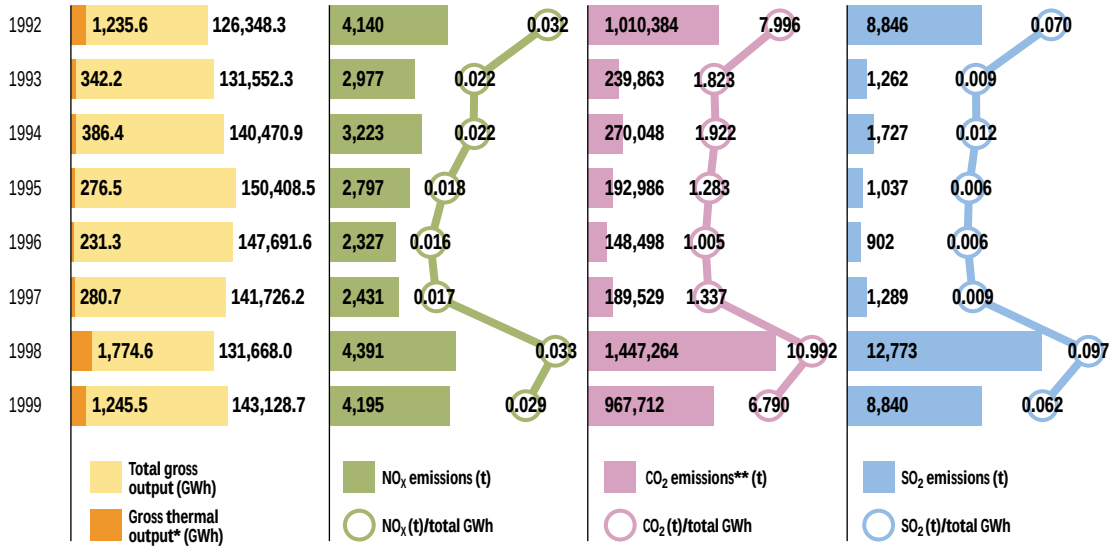
Hydro-Québec built its first test facility, consisting of three horizontal-axis wind turbines with a capacity of 750 kW each, in Saint-Ulric de Matane. The facility enables the company to develop expertise in this field and provides for both technology transfer and the development of experience in managing and operating a wind farm. It further allows the company to assess the impact of this form of energy on its power system. Manufacturers wishing to incorporate various wind power components into their operations can also test their products at the facility and then convey the results to their turbine designers. Results obtained from the test facility are of interest, as well, to educational institutions concerned with developing and improving training in this field.

In addition, Hydro-Québec purchases energy generated by private facilities comprising 133 wind turbines (76 in Cap-Chat and 57 in Matane). In 1999, approximately 115 GWh, or the equivalent of the average annual consumption of 8,000 households, was bought from these facilities. If this energy had been generated by thermal power plants, more than 100,000 tonnes of CO_2, 0.8 tonnes of SO_2 and 0.3 tonnes of NO_x would have been released into the atmosphere.

Atmospheric Emissions Related to Hydro-Québec's Generating Output

Atmospheric emissions are mainly associated with thermal generation. However, Hydro-Québec's thermal power plants are used almost exclusively in peak periods or to meet specific needs, a fact that explains the annual variations in thermal output and amount of pollutants emitted.

Estimated atmospheric emissions from Hydro-Québec's thermal power plants



Source: Hydro-Québec

* Not including nuclear generation.

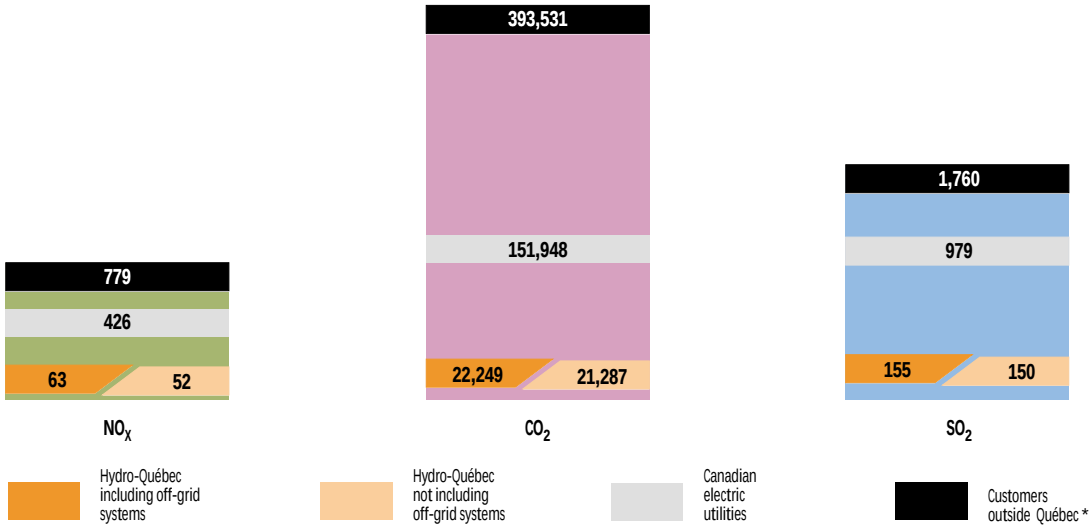
** The amounts shown do not include the extremely low CO_2 emissions from hydroelectric reservoirs, or the emission credits that may be granted under Québec's ÉcoGESte program. If these two estimated amounts were factored in, Hydro-Québec would show "negative" emission rates (-55.9 t/GWh for 1999).

Hydro-Québec emits seven times less CO_2, SO_2 and NO_x than Canadian utilities as a whole per TWh generated or purchased. The atmospheric emission rates shown in the following figure refer to generation (including off-grid power systems) and purchases by Hydro-Québec for the period from October 1, 1998 to September 30, 1999. They are based on calculations obtained from smokestack measurement tests and atmospheric emissions declared for comparable installations, as well as electricity generation and purchases by Hydro-Québec during this period.

Atmospheric emission rates for generation by Hydro-Québec's facilities (excluding off-grid power systems) and purchases by the company between October 1, 1998 and September 30, 1999 are approximately 15 times lower than atmospheric emission rates for customers outside Québec in 1997.

Comparison between Hydro-Québec's atmospheric emissions, those of electric utilities in Canada as a whole, and those of its customers outside Québec.

In metric tonnes/TWh



All the above figures have been certified by the firm of Samson Bélair Deloitte & Touche.

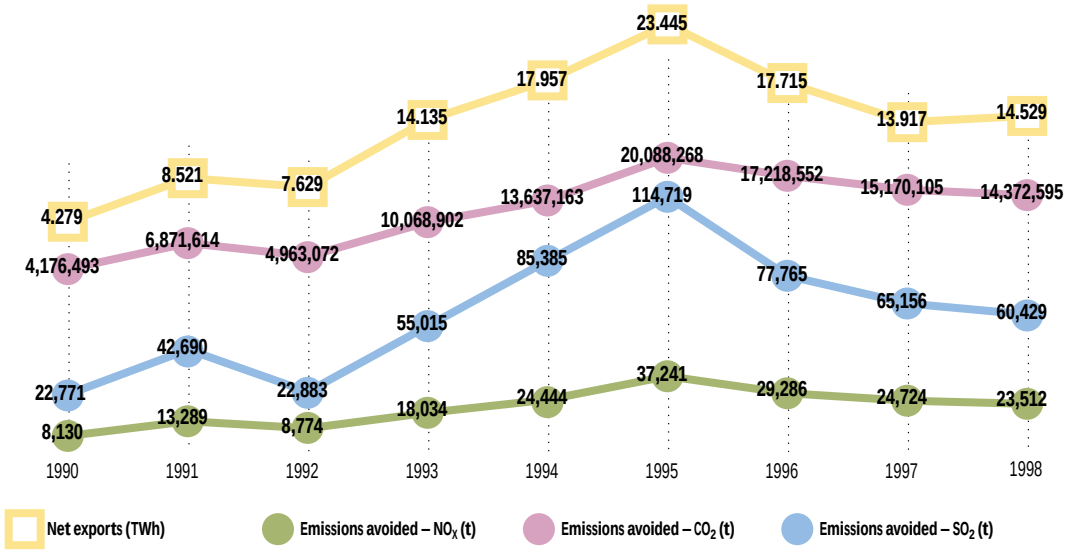
* *Customers outside Québec are located in six New England states, New York State, Ontario and New Brunswick.*

Atmospheric Emissions Avoided by Electricity Exports

For nearly 10 years, Hydro-Québec has exported more electricity every year than it imports from its Canadian and American neighbors. Each electric utility operates various types of generating stations that have specific impacts on the environment. Therefore, each company has its own emission factors which may differ widely from one utility to the next.

Every electricity purchase made by Hydro-Québec can be linked to corresponding atmospheric emissions produced by American or Canadian utilities. Conversely, each electricity sale made by Hydro-Québec can be linked to atmospheric emissions avoided by those same companies, since more than 96% of Hydro-Québec's electricity is generated from water resources, and 3% is of nuclear origin.

Atmospheric emissions of pollutants avoided



The figure shown above illustrates atmospheric emissions of pollutants avoided as a result of hydropower exports to other Canadian provinces (New Brunswick and Ontario) and to the United States (New England and New York State). These emissions avoided contribute to the abatement of phenomena such as acid rain and ground-level ozone. The beneficial effect of such reductions is observed mainly in the importing regions. Since a portion of the pollutants emitted in the United States and the rest of Canada is carried to Québec by the prevailing southwest winds, the emissions avoided may also contribute to the improvement of air quality and help protect ecosystems in Québec.

Canadian Commitments under the Kyoto Protocol and Participation by Hydro-Québec

Signed in 1997, the Kyoto Protocol set targets for reducing greenhouse gas (GHG) emissions by the signatory countries. Canada's target is a 6% reduction in emissions compared with 1990 levels. Achieving the target in Canada, where 64% of electricity is generated from water resources, is clearly predicated on the continued development of the country's remaining profitable hydroelectric potential. Hydro-Québec contributes to the work of several federal and provincial consultation committees, including the table on electricity, which allows the company to demonstrate the advantages of hydroelectricity in the fight against global warming.

The federal electricity table recognizes the vital role played by hydropower in achieving the goals of the Kyoto Protocol. Given its many advantages, hydroelectricity is an option that complies with the principles of sustainable development:

- It is a renewable source of energy.
- Its operations do not reduce the world's energy reserves.
- It creates very few air pollutants such as greenhouse gases.
- Hydroelectric facilities have a life span of over half a century, and are largely paid for by the generation that decides to build them.

all our energy for

profitable, acceptable and well received projects

Completing the development of Québec's hydroelectric potential is predicated on three conditions.
Hydroelectric generation projects must be:

- ***profitable on the basis of a generating station price of 3¢/kWh;***
- ***environmentally acceptable;***
- ***well received by local communities.***

New Projects and Projects Under Way

Grand-Mère Generating Station

The project for a new hydroelectric development at Grand-Mère is subject to the environmental impact assessment and review procedure specified under Québec's *Environment Quality Act.* Following the review by the Ministère de l'Environnement, three organizations filed applications for government hearings related to environmental issues. The chief concerns raised by the public during hearings held in fall 1999 were water flow management at the generating station in peak periods and the ensuing environmental impacts. Issues discussed at the hearings therefore included ice formation and the safety of the ice cover, erosion of banks, and impacts related to construction activities in urban surroundings. Environmental enhancement and assurance of the continued reliability of the existing hydropower plant were also raised by the environmental review panel. Throughout the hearing process, Hydro-Québec was able to count on the support of government departments and local community organizations. The report of the Bureau d'audiences publiques sur l'environnement is expected during the year 2000. If the final review of the project by the Ministère de l'Environnement is favorable, construction will commence in 2000.

Hydro-Québec also submitted the project to Environment Canada. In its preliminary examination, the federal department determined that the project did not pose any significant environmental impacts and consequently did not have to undergo the process laid down in the *Canadian Environmental Assessment Act.*

High-Voltage Loop in the Outaouais Region and Construction of an Interconnection with Ontario's Grid

Studies on looping the system in the Outaouais region and the interconnection with Ontario's grid resumed in the summer of 1999, following the usual procedure. The draft design report required for obtaining the necessary government authorization for Outaouais substation was submitted to Québec's Ministère de l'Environnement in September 1999. The draft design report for the Grand-Brûlé–Vignan line will be filed in March 2000. To complete the link with Ontario, Hydro-Québec plans to rebuild one of the crossings — on the eastern side — over the Ottawa River. The environmental assessment is scheduled to be filed in the spring of 2000.

Downtown Montréal High-Voltage Loop

In 1999, Hydro-Québec completed construction of a 3.6-km, 120-kV underground line between Hadley and Atwater substations. The downtown Montréal loop project should be finished in the year 2000, with a 315-kV connection from the existing Aqueduc–Atwater–Viger line and the dismantling of the old 120-kV transmission lines on steel towers.

Montérégie High-Voltage Loop

Work on the Montérégie loop is divided into three stages. The first stage, which involved connecting Des Cantons and Saint-Césaire substations, was concluded in February 1999. The second stage calls for the construction, in 2001, of a section to connect the Saint-Césaire region to Hertel substation in La Prairie. The third stage will include the commissioning of the new Montérégie substation toward the end of 2002 and the operation of the 735-kV Des Cantons-Hertel line.

Since obtaining government authorization to complete the draft design, Hydro-Québec has conducted new technical, economic and environmental studies, and resumed its community relations and communications activities with the local groups affected by the last two stages of this project. The draft design report was filed in December 1999 and is currently being reviewed by Québec's Ministère de l'Environnement.

Aqueduc - Atwater - Viger 315-kV line

Enhancement, Agreements and Partnerships

Acceptance of projects by local communities, including Aboriginal communities, is essential to complete the development of Québec's hydroelectric potential. Hydro-Québec offers local communities various types of business partnerships for all phases of new generating projects. The form such partnerships take may vary, as needed, from simple business transactions up to and including joint ownership of new facilities through limited partnerships. If no partnership is proposed, the integrated enhancement program applies, as for all new transmission line projects.

Environmental Enhancement

Hydro-Québec has applied its environmental enhancement program since 1985. The company's goal is to ensure that new generation and transmission facilities are integrated harmoniously into their host environments, and that their construction provides an opportunity to play an active part in regional development and the development of Aboriginal communities.

In 1999, Hydro-Québec spent more than $3 million on 20 initiatives. Over the last 15 years, Hydro-Québec has allocated more than $4.3 million annually, on average, to 275 municipalities, regional county municipalities and Aboriginal communities throughout Québec. About 90% of these amounts were invested in various outlying administrative regions of Québec.

Summary of environmental enhancement initiatives and funding

Type of initiative	Number of initiatives	Hydro-Québec funding (in thousands of $)	Counterpart funding (in thousands of $)	Total cost (in thousands of $)
Accessibility to natural sites	2	180.3	5.0	185.3
Park landscaping	3	401.9	1,004.0	1,405.9
Creation of green spaces	2	147.1	0	147.1
Environmental introduction and awareness	3	263.2	60.0	323.2
Landscaping of public buildings and infrastructures	3	232.3	5.7	238.0
Restoration and enhancement of historical heritage, built and natural	2	1,059.6	19.0	1,078.6
Community facilities	5	848.5	0	848.5
Total in 1999	20	3,132.9	1,093.7	4,226.6
Total since 1985	765	65,990.3	44,260.4	110,250.7

Birdhouse attached to a steel tower in a high-voltage transmission corridor

To increase awareness of its various environmental initiatives, Hydro-Québec is preparing to introduce a biodiversity support program, in cooperation with the Ministère de l'Environnement and the Société de la faune et des parcs du Québec (wildlife and parks association). This five-year program will promote biodiversity protection on all of the company's properties.

Administrative Agreement for Maintaining Biodiversity on Hydro-Québec Property

The cooperation agreement will enable the company to achieve the following objectives:

- **propose management rules and specific measures, for Hydro-Québec's facilities and properties, that are compatible with biodiversity protection while allowing the operation of facilities at competitive costs;**
- **foster the enhancement and multiple use of Hydro-Québec's facilities and properties, in a context of biodiversity;**
- **promote awareness by Hydro-Québec's employees and the general public regarding biodiversity protection, particularly in areas used by people;**
- **propose concrete means of applying the Québec government's biodiversity strategy and action plan.**

Agreements, Partnerships and Commitments

To facilitate the development of new projects and the operation of existing facilities, Hydro-Québec favors partnership agreements with the communities affected. Such agreements enable the company to minimize the adverse environmental impacts of its activities and to better define appropriate mitigative or compensation measures. In 1999, the company signed some 20 agreements with regional county municipalities, cities and towns, Aboriginal band councils, corporations, as well as government and other public agencies.

Type of organization	Partner	Commitments
Band councils	• Betsiamites	Pesamit Agreement (1999) • Financial partnership. • Targets for job creation and contracts. • Partnership for remedial work. • Participation by Montagnais in draft design and archaeological studies. • Provisions for identifying, protecting and relocating Innu archaeological sites and burial grounds. Agreement on salmon restoration in the Betsiamites • Shared commitment to promote the restoration of salmon in Rivière Betsiamites. • Management of flows at the outlet from Bersimis-2 generating station. • Montagnais fisheries management plan.
	• Essipit	Agreement on partial diversion of Rivière Portneuf • Montagnais participation in environmental draft design studies. • Provisions for identifying, protecting and relocating Innu archaeological sites and burial grounds. • Mitigative measures fund.
	• Chisasibi	• Modification, improvement and follow-up of pumping station and water treatment plant. • Training of Aboriginal community members, with a view to optimum plant operation. • Modification of chemical treatment system. • Systematic presentation of the results of environmental monitoring at the La Grande complex. • Discussion of environmental issues related to operation of the complex.
Regional county municipalities (RCMs)	• Manicouagan	Agreement on the Toulnustouc project • Creation of a development fund to finance cultural, social, environmental and economic projects. Participation in a study for testing a bank stabilization technique • Environmental monitoring of test facilities over a two-year period. • Technical support.
	• Fjord-du-Saguenay, Haute-Côte-Nord, Manicouagan and Maria-Chapdelaine RCMs	Agreement concerning the partial diversion of the Manouane, Sault aux Cochons, Portneuf and Boucher rivers • Formation of a partnership in which the RCMs are limited partners with Hydro-Québec.
	• Beauharnois-Salaberry and four municipalities in the Vaudreuil-Soulanges RCM	Memorandum of agreement on the Suroît region • Measures and improvements to promote the use and enhancement of certain Hydro-Québec properties and to foster accessibility and management of bodies of water. • Construction of a spur dike to reduce erosion at Baie Hungry. • Continued construction of bicycle paths, supplying of a pontoon to the town of Les Cèdres, and construction of a baffle at Pointe-des-Cascades. • Follow-up of contract for management of Hydro-Québec properties by the Beauharnois-Salaberry RCM. • Meeting with groups concerned by the projects.
	• Papineau-Labelle	• Restoration of the forest near distribution lines, for integrated management of risk associated with vegetation alongside power lines.

Type of organization	Partner	Commitments
Cities and towns	• Des Trois Rives	Management of Mékinac reservoir • Maintenance of flow and water levels during spring flood.
	• Montréal Urban Community—cities of LaSalle, Verdun and Sainte-Catherine	Management of area surrounding the Lachine rapids and La Prairie basin • Three-year management plan for protecting the great blue heron, rare plants and banks. • Possible establishment of a wildlife refuge in the area.
	• Mont-Laurier	• Partnership to integrate the distribution system into the downtown renewal program.
	• Towns of Lorraine and Brossard	• Participation on committees and in pilot projects for maintaining transformers on pedestals and removing graffiti.
Companies and associations	• Baskatong reservoir community wildlife area	• Conservation and enhancement of aquatic wildlife in this public lake.
	• Saint-Ferréol-des-Neiges development corporation (CODEF)	• Following the recommissioning of Sept-Chutes generating station, CODEF is operating the site's buildings and property for recreational and tourist use and managing visits to the plant, under an operating agreement with Hydro-Québec.
	• Gouin reservoir community wildlife area	• Inventory of biophysical resources. • Participation in public consultations. • Creation of a community wildlife area.
	• "On en sort du bois," Témiscamingue	• Recovery of floating debris that washes up near hydroelectric facilities on the upper Ottawa River. • Use of wood debris to make new products.
	• Centre de formation en entreprise et récupération	• Recovery and repair of ferrous metals and sale of metal accessories from power lines.
	• Les Bureaux d'Antoine	• Restoration and sale of surplus furniture from Hydro-Québec.
	• Bell Canada	• Continuation of internal environmental assessment (IEA) partnership and shared use of poles.
Government and other public agencies	• Québec's Ministère de l'Environnement	• Management of non-radiological liquid effluent from Gentilly-2 power plant. • Liquid effluent monitoring program.
	• RECYC-QUÉBEC	• Exchange of information. • Institution of 3RE projects (reduction and recovery, reuse, recycling, energy recovery). • Recycling technologies.
	• Québec wildlife foundation, St. Lawrence Valley natural history society, Saint-Laurent Vision 2000	• Protection of wetlands for the reproduction of rare and threatened species.
	• Québec wildlife and parks association for the restoration of lake trout in reservoirs in the Haute-Mauricie region	• Amendment of regulations on sport fishing. • Fish stocking and location of spawning grounds. • Modification of water resource management practices. • Study of walleye reproduction. • Monitoring of fishing.

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rigorous environmental management

Hydro-Québec's Environmental Management System

In 1997, Hydro-Québec began the process of instituting an environmental management system (EMS) in accordance with ISO 14001. Five units whose operations may produce environmental impacts are implementing an EMS. They are the *vice-présidence – Exploitation des équipements de production* (Operation of Generating Facilities), *TransÉnergie* (transmission division), *direction principale – Approvisionnement et services* (Procurement and Services), *direction principale – Projets et construction* (Projects and Construction) and the *vice-présidence – Distribution* (Distribution). Two other units — the *vice-présidence – Recherche et planification stratégique* (Research and Strategic Planning) and the *direction principale – Technologies de l'information* (Information Technologies) — joined the group in late 1999.

The units plan to complete the implementation process within the time frames indicated in the following table.

Business or support unit where an EMS must be established	Implementation starting date	Expected date of ISO 14001 registration 1999	2000	2001	2002
Operation of Generating Facilities	1997		X		
TransÉnergie	1997				X
Distribution	1997		X		
• Off-grid power systems					
- Îles-de-la-Madeleine	1997		X		
- Northern region	2000				X
Procurement and Services					
• Centre-Sud	1997	X			
• Montréal	1999		X		
• Other territories	1999			X	
• Specialized units	2000				X
Projects and Construction	1997			X	
Information Technologies	2000				X
Research and Strategic Planning	2000			X	

Employee Training and Awareness

Various initiatives have been taken to enable our employees to fulfill their environmental responsibilities as part of their daily activities.

Each unit that has undertaken the process of implementing an EMS has adopted a structured, formal approach to ensure that its employees have the necessary skills to manage the main environmental aspects of their work.

In 1999, some 6,621 employees received environmental training.

In addition to this specialized training, sessions related to activities entailing potential environmental impacts are offered to the employees concerned. The goal of this training is to ensure operational control of the activities.

Since ISO 14001 implementation began in 1997, some 3,705 employees have participated in EMS-related training or awareness sessions.

Environmental training – 1999

Topic	Number of participants
Emergency measures in the event of hydrocarbon spills	1,243
Emergency measures in the event of chemical spills	26
Training of instructors for the course on recovery of residual hazardous materials	6
Atmospheric emissions	22
Awareness of environmental management system as per ISO 14001	3,253
Recovery of residual hazardous materials	1,570
Internal environmental assessment of projects	471
Recovery of wood poles	30

In 1999, Environment Month focused on the EMS theme. The overall objective was to demystify and explain the system. This effort involved reminding employees that they are active participants in Hydro-Québec's orientations and commitments, and encouraging them to take personal initiatives to support the environment. Environment Month is an annual environmental awareness activity intended for all company employees.

RAP, an acronym for remembering the three basic commitments contained in the policy *Our Environment* and its general principles, was the Environment Month theme.

ISO 14001 and the environment: What is RAP?

***R**espect for legislation – **A** continuous environmental improvement – **P**revention of pollution*

Nearly 20,000 Hydro-Québec employees received a brochure explaining the main points of the company's EMS commitment. They were invited to answer the question "What does RAP mean?" as part of a company-wide contest. A number of them also had a chance to find out more about EMS and meet environment specialists, along with a most unusual character, a "RAPper," at the information booths. The RAPper also paid visits to employees in various buildings, and handed out pamphlets and memo pads.

As in previous years, Hydro-Québec conducted a program of university internships in 1999. A total of 19 students from five Québec universities worked as environmental interns. These internships, averaging 15 weeks in length, were assigned to various regions of Québec. More than half were related to EMS implementation in accordance with ISO 14001 specifications. Overall satisfaction with the program, as expressed by the students and internship supervisors, rated 4.6 on a scale of 1 to 5.

University Internship Program

This program offers working experience to undergraduate and Master's students, enabling them to improve their position on the environmental job market. The interns' contribution is also very beneficial for Hydro-Québec, as the students bring new energy and knowledge to the company.

Number of university internships in environmental management offered by Hydro-Québec 1999: 19 1998: 14

Compliance with Laws and Regulations

Violation Notices

In 1999, five violation notices were issued: three by Québec's Ministère de l'Environnement, one by Environment Canada, and one by the Montréal Urban Community.

Number of Violation Notices

	TransÉnergie	Generation	Distribution	Projects and Construction	Procurement and Services	TOTAL
1999	●	●		●	●●	5
1998		●	●		●●	4
1997			●	●	●	3
1996	●●	●		●●	●●	11

Unit concerned	Type of violation notice	Measures taken
Procurement and Services	Violation of the regulation relative to pentachlorophenol and creosote odors emanating from the storage yard at Bout-de-l'Île substation.	Hydro-Québec commissioned a firm of specialists to conduct a study of ambient air and an olfactory analysis.
	Violation notice from Environment Canada concerning irregularities with respect to application of the federal PCB-storage regulation at the Bout-de-l'île site.	Hydro-Québec sent the department a response specifying the corrective measures already in place, as well as future measures designed to remedy the situation.
TransÉnergie	Unauthorized work on a river bank near the village of Cabano.	Hydro-Québec seeded the work area. Protection zones will be marked off, and increased monitoring will be provided for future work in rights-of-way.
Projects and Construction	Unauthorized dredging when the Coteau-2 structure at the Beauharnois work site was permanently closed.	Hydro-Québec proposed remedial measures which were approved by the Ministère. The restoration work was completed by September 15, 1999.
Generation	Unauthorized remedial work carried out along the shoreline at the Île Bizard floating barrier at Rivière-des-Prairies generating station.	Hydro-Québec is drawing up an application for authorization to add gravel annually in order to correct shoreline erosion.

Following a violation notice filed before 1999 by the Ministère de l'Environnement, work was carried out at the tip of the Beauharnois canal to remedy an environmental problem related to the disposal of concrete slabs soiled with asphalt. This work, undertaken as part of the construction of a spur dike at Baie Hungry, received government approval.

Legal Proceedings

No legal proceedings under the provisions of environmental legislation were reported. However, Hydro-Québec was the subject of the following civil action.

Action by the Municipality of Saint-Timothée

An injunction was issued on June 17, 1999, in favor of the town of Saint-Timothée, requiring Hydro-Québec to fill in the town's basin and thus allow the beach to be used. Owing to a strike by some of its personnel, Hydro-Québec had been unable to proceed with this work at Saint-Timothée on the scheduled date. Filling began on June 18.

In the fall of 1999, the town filed a petition for a permanent injunction that would set specific dates for basin filling and emptying. This petition was filed in spite of the Suroît region memorandum of agreement, signed in 1998 by Hydro-Québec, the Beauharnois-Salaberry RCM and four municipalities in the Vaudreuil-Soulanges RCM. The town of Saint-Timothée is a party to this agreement.

An out-of-court agreement is currently being negotiated.

Optimum Resource Use

3RE Program

In 1999, Hydro-Québec continued to implement its 3RE program, which is aimed at the reduction and recovery, reuse, recycling and energy recovery of resources. This sustainable development initiative led to the recovery of numerous products that would otherwise have been treated as waste, generating gross income of approximately $9 million (including income from the sale of surplus material) and permitting substantial savings. Recovery and recycling apply to a wide range of activities.

The company increased the quantity of used poles recycled as lumber by 150% over 1998. Better control of recovery by contractors played a large part in these results. Hydro-Québec also endeavors to maximize the reuse of distribution poles that have been removed from service. As well, the company has undertaken an energy recovery program for wood chips resulting from pole recycling, an activity that produced 22.7 tonnes of chips.

The signing of contracts with recovery operations and the purchase of new equipment sped up the rate of paper recovery on the Island of Montréal, where 290 tonnes was recovered in 1999, compared with 97 tonnes in 1998.

Products covered by the 3RE program

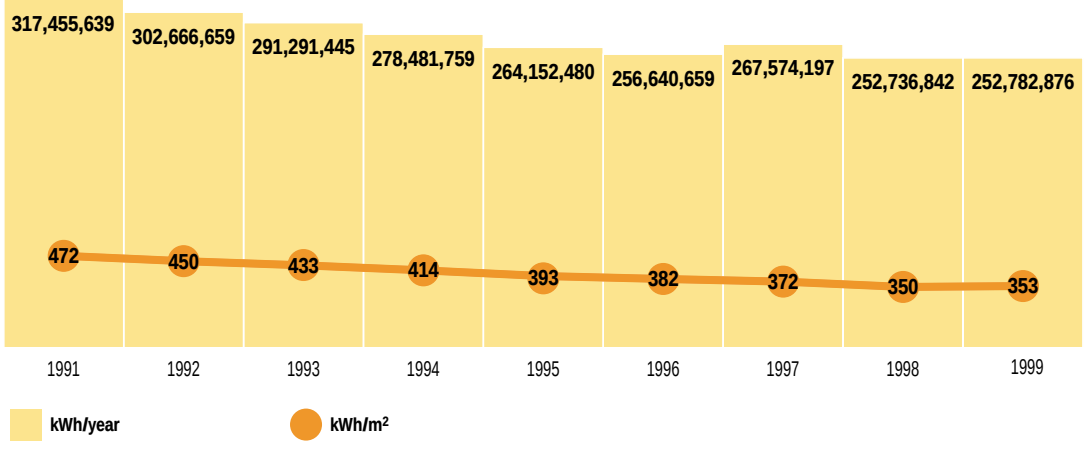
Product	Quantity reused	Quantity recycled	Quantity used for energy recovery
Lead batteries		68.8 t	
Antifreeze	2,340 L		
Electrical equipment		38.0 t	
Light fuel			11.2 t
Printer cartridges		2,771 units	
Assorted containers		3.5 t	
Contaminated (oily) water		681,100 t	
Vehicle filters		9.0 t	
Insulating mineral oil	2,416,312 L		186,707 L
Used oil			216,970 L
Mercury and sodium lamps		0.8 t	
Metal		6,502.7 t	
Office furniture	$18,671*		
Paper and cardboard		800 t	
Wood poles	584 units	13,785 units	22.7 t
Metal power-line accessories	50 t		
Contaminated containers (barrels)	3,529 units	759 units	
Binders	10,845 units		
Non-halogenated solvents			8.5 t
Distribution transformers	2,585 units	4,501 units	
Machine lubricant		2.1 t	
Fountain cleaning solution		0.5 t	
Grease			8.3 t
Paint and glue			0.8 t
Fluorescent tubes		9.8 t	

* Based on the market value of used furniture at the time of a transaction with the recovery operation Les Bureaux d'Antoine.

Energy Efficiency of Buildings

In 1999, Hydro-Québec continued its program for energy efficiency in administrative buildings. The company recorded a 21% reduction (nearly 65,000,000 kWh) in net annual energy consumption compared with the benchmark year of 1991. In all, 102 administrative buildings located throughout Québec and representing a total area of 718,000 m^2 were monitored to evaluate this performance.

Energy consumption in Hydro-Québec buildings



Source : Hydro-Québec

Management of Contaminants

Residual Hazardous Materials

In 1999, Hydro-Québec brought its hazardous material management practices in line with the new regulations of Québec's Ministère de l'Environnement. The company also submitted a brief to the Parliamentary Committee on Transportation and the Environment, concerning draft legislation to amend the *Environment Quality Act* as it applies to waste management.

Following the completion in 1998 of its plan for the elimination of high PCB-contaminated materials in storage, Hydro-Québec continued to apply its management practices for this contaminant as part of its ongoing management of residual hazardous materials.

PCB-contaminated materials in storage

(in metric tonnes)

	1999	1998	1997
Total inventory of high PCB-level materials in storage	0	2.7	3
Total inventory of low PCB-level materials in storage	5.5	9.7	190
TOTAL of PCB-contaminated materials in storage	5.5	12.4	193

In addition, Hydro-Québec reinforced its infrastructure for the recovery of residual hazardous materials by:

- establishing 234 hazardous material recovery areas;
- consolidating its four hazardous material recovery centres and its 55 transfer sites.

Residual hazardous materials are gathered in recovery areas on work sites and are then transported to one of the 55 transfer sites throughout the province before being finally collected in one of the company's four hazardous material recovery centres.

The recovery of hazardous materials at these centres has also made it possible to use many of the materials and to dispose of non-recoverable materials, in compliance with current regulations. In 1999, Hydro-Québec disposed of 433.7 tonnes – or only 6.3% – of its residual hazardous materials.

A first for Hydro-Québec

The Saint-Hyacinthe hazardous material recovery centre earned ISO 9002 registration in 1999. Furthermore, the centre is part of the Hydro-Québec unit which obtained ISO 14001 registration in December 1999.

Management of Insulating Mineral Oil

In 1999, Hydro-Québec decontaminated and reclaimed more than 1,100,000 litres of PCB-contaminated insulating mineral oil, in addition to the 1,300,000 litres of non-contaminated oil reclaimed for use in its equipment. This brought to 92.6% the rate of reuse of insulating mineral oil during the past year. In addition, the company obtained a permit allowing it to decontaminate oil from outside sources.

The energy recovery of used motor oil from Kuujjuarapik thermal power plant, located in Northern Québec, continued during 1999. This activity helps meet the heating needs of a warehouse adjacent to the plant. In 1999, some 4,737 litres of used oil, or 47.4% of the total volume, was reclaimed.

Herbicides

To ensure the reliability of its transmission system and generating facilities, the company must control vegetation that is incompatible with the operation of its power lines, transformer substations, dikes and dams. To do this, Hydro-Québec uses three approaches: mechanical intervention, selective application of herbicides, and vegetation management practices.

The choice of method is based on criteria related to environmental protection, effectiveness, safety, health protection and economics. Hydro-Québec always takes into account the overall surroundings and the use of the right-of-way or the area around substations or retaining structures.

An environmental assessment is made prior to all vegetation control operations in order to identify sensitive features of the local environment (streams, wells, wildlife habitats, etc.). The environmental assessment of vegetation control methods that involve the use of herbicides has shown that these products may be applied without jeopardizing public health and safety, while affording a reasonable amount of protection to the environment. In the long run, selective herbicide use leads to a reduction in the density of vegetation that is incompatible with facility operations, and a lower level of intervention.

Hydro-Québec's objective is not to totally eliminate herbicide use, but rather to apply the method that is safest and most effective, both environmentally and economically, given the local environment. The program varies from year to year. In 1999, for example, it included a larger proportion of mechanical cutting, and hence a proportionate reduction in the area treated with herbicides.

Herbicide use in transmission line rights-of-way

	1999		1998		1997	
	Mechanical cutting	Selective herbicide application	Mechanical cutting	Selective herbicide application	Mechanical cutting	Selective herbicide application
Total area per type of treatment (ha)	9,828	4,759	8,697	7,253	7,671	6,863
Proportion	67%	33%	55%	45%	53%	47%
Total area treated (ha)	14,587		15,950		14,534	

Source: Hydro-Québec

Soil Decontamination

In 1999, 68 sites belonging to the company underwent soil characterization, treatment or disposal activities, at an estimated total cost of $2.7 million. Soil restoration is now complete at the Îles-de-la-Madeleine and L'Île-d'Entrée power plant sites, and restoration continues at the former Port-Menier thermal power plant located on Île d'Anticosti.

Soil decontamination projects (costing $100,000 or more)

Site	Volume to be treated (m^3)	Volume removed and treated in 1999 (m^3)	Volume removed and treated to date (m^3)	Total volume treated (%)	Cost to date ($ million)	Scheduled completion
Cap-aux-Meules Former diesel power plant	56,988	R: 488 T: 8,988	R: 56,988 T: 56,988	100	11.7	Complete
Cap-aux-Meules Former diesel power plant	oil on groundwater	R: 30 L	R: 10,830 L	N/A	4.9	Ongoing
L'Île-d'Entrée Diesel power plant	9,900	R: 0 T: 1,300	R: 9,900 T: 9,900	100	3.8	Complete
Port-Menier Former diesel power plant	9,225	R: 1,180 T: 1,150	R: 7,480 T: 5,250	57	1.6	2001
Sainte-Marguerite-3 Work-site activities	3,800	R: 0 T: 3,800	R: 0 T: 3,800	N/A	0.2	2001
Maniwaki Former pole yard	480	R: 480 T: 480	R: 480 T: 480	100	0.1	Complete
Nemiscau Former firefighter training centre	2,435	R: 0 T: 0	R: 975 T: 675	28	0.2	> 2000
La Grande-3 Airport	1,700	R: 0 T: 0	R: 1,700 T: 0	0	0.1	> 2000
Carignan substation	900	R: 900 T: 900	R: 900 T: 900	100	0.1	Complete
TOTAL	85,428	R: 3,048 T: 16,618	R: 78,423 T: 77,993	91	22.7	

Source: Hydro-Québec

R: Removed

T: Treated

Sainte-Marguerite-3 construction site

Noise

Electrical substations are the company's main source of noise-related disturbances, owing to their number and their location in inhabited areas. Hydro-Québec applies noise standards to its facilities in order to limit their adverse effects on the quality of the environment. For example, the levels of noise produced by new substations must not exceed 40 dBA at night, and 45 dBA during the day, at the edge of neighboring residential properties.

Furthermore, Hydro-Québec develops, evaluates and applies noise measurement and forecasting tools. In 1999, the company introduced a new sound-simulation software program incorporating the latest ISO standards. Hydro-Québec also takes appropriate noise-reduction measures to control acoustic impacts. The company favors noise reduction at source through the purchase of suitable equipment, construction of sound barriers, and installation of sound-absorbing walls. These types of mitigative measures are applied in many substations.

Hydro-Québec is proactive in its approach to noise management. For all substation projects in inhabited areas, it conducts an acoustic impact study and monitors projects to ensure that corporate noise regulations are followed. No fewer than 15 facilities underwent acoustic studies in 1999.

Spills of Contaminants

In 1999, some 407 spills occurred in connection with the company's operations. Most of these were minor spills of insulating oil which were not the subject of either a violation notice or an investigation. Under the criteria of the Environmental Commitment and Responsibility program of the Canadian Electricity Association, 23 of the spills recorded were considered major. In most cases, the measures taken allowed nearly all of the spilled products to be recovered.

Number of spills of contaminants

Environment contaminated	1999	1998	1997
Atmosphere	1	2	1
Water	7	15	5
Soil	399	245	185
TOTAL	407	262*	191

* Not including 3,028 spills during the ice storm of January 1998, caused by damage to many devices on the distribution system.

The large majority of spills occur on the distribution system during major weather-related events. In 1999, the violent winds that struck the Montréal area caused extensive damage to the system, resulting in a large number of minor spills due to breaks in transformers.

CEA Criteria Defining a Major Spill

The substance spilled must be a petroleum product or PCB-contaminated substance *and*:

1) spill volume is greater than 500 L *or*
2) spilled substance enters a water body *or*
3) spill attracts media attention.

Optimization of Generating Facilities

Every year, Hydro-Québec devotes considerable efforts to incorporating environmental concerns into the maintenance and operation of its facilities. Some examples are listed below.

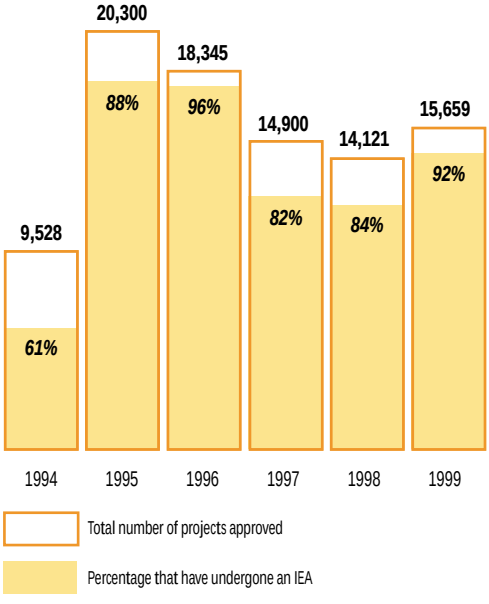
Site	Activity	Environmental result or benefit
Sept-Chutes generating station	• Recovery of equipment of historical interest during recommissioning of Sept-Chutes generating station.	• Preservation and enhancement of built and technological heritage.
Manic-2 generating station	• Reduction in frequency of generating-unit lubrication.	• Reduction from 28 grease injections a day to just one.
Bersimis-2 generating station	• Modification of the station's water-oil separator. • Modification of water flow management.	• Removal of accumulations of oil and grease to prevent their release into the water. • Improvement of salmon breeding capacity.
Robert-Bourassa generating station	• Complete refurbishing of the two oil recovery units.	• Significant improvement in the quality of permanent effluents.
Tracy power plant	• Replacement of system for treating domestic sewage and addition of a system for neutralizing wastewater from the demineralization plant. • Siting of parking area to reduce the amount of salt in runoff into the St. Lawrence River. • Addition of mufflers to induced draft fans.	• Improvement in the quality of water treatment effluent. • Improvement in the quality of runoff water. • Reduction in noise emitted by the plant.
Gentilly-2 power plant	• Construction of a separation centre for waste from power plant operation, and a radiological oil decontamination plant.	• Introduction of 3RE program; reduction of storage area for waste with low contamination levels.
Rivière-des-Prairies generating station	• Reconstruction of fishway.	• Improved fishway efficiency.
Chambly dam	• Optimization of eel fishway.	• 3,685 eels passed through the Chambly dam heading toward Lake Champlain.
Îles-de-la-Madeleine thermal power plant	• Construction of a natural sound barrier. • Addition of a membrane and protective barrier to the basement floor. • Enlargement of concrete slab in fuel yard loading dock. • Replacement of underground oil pipeline with an aboveground pipeline in the fuel yard.	• Reduction in the plant's acoustic impact. • Containment of liquids from spills. • Reduced risk of corrosion and spills.
Lac-Robertson generating station	• Lowering of spillway channel sill to the level of the outlet of three fish ponds, in order to drain them.	• Free circulation of fish and easier regrouping in adjacent lakes when water is removed.
Distribution system	• Three pilot projects for undergrounding distribution lines in cooperation with the municipalities of Lafontaine, Saint-Laurent and Candiac. • Reconstruction of the line supplying the telecommunications towers on top of Mt. Orford.	• Landscape improvement and reduced risk of outages caused by major weather-related events. • Landscape improvement in a protected site.

Mt. Orford distribution line

Internal Environmental Assessments

Hydro-Québec carries out internal environmental assessments (IEA) to systematically incorporate environmental concerns into its distribution system planning, construction, modernization and maintenance activities. In 1999, some 92% of the company's distribution projects underwent such assessments.

Distribution projects that have undergone an IEA



Listening to Our Customers

Requests for Information from the Public

Hydro-Québec takes into account the public's requests and comments concerning its environmental performance. It has instituted a variety of means of gathering and documenting requests. Members of the public can pass on their questions or comments by speaking to our staff at the head office reception desk, calling 1 800 363-7443 or the Customer Service number on their electricity bill, visiting the company's Web site or communicating directly with personnel in the field. Questions and comments are directed to senior Environment personnel either in the regions or at headquarters, who ensure that they are processed.

Environment-Related Complaints and Claims

Hydro-Québec also has a system for handling complaints and claims. Most environment-related complaints concern distribution operations. In 1999, some 39% of these complaints were related to property damage, 23% to pruning, and 21% to contamination resulting from a spill or fire.

Number of environment-related complaints and claims

Nature of complaint or claim	1999	1998	1997	1996
Property damage	193	236	467	421
Pruning	127	115	127	121
Contamination caused by a spill or fire	107	116	116	59
Maintenance of site	34	27	28	26
Visual impact	22	16	17	20
Noise and lighting	18	26	32	–
Interference and EMF	12	6	16	–
Erosion, wildlife and vegetation	1	2	5	–
Other	–	–	–	47
Total environment-related complaints and claims	514	544	808	694
Total number of written complaints and claims	7,779	6,637	6,578	8,140
Percentage of environment-related complaints and claims in relation to total	6.6%	8.2%	12.3%	8.5%

Trees cause over 30% of system outages and a large part of the damage due to major weather-related phenomena (electrical storms, violent winds, ice storms). In choosing an intervention method, the value of these trees and the concerns of customers must be taken into account. Consequently, control of vegetation near distribution lines requires considerable effort every year. As part of its integrated vegetation management program, Hydro-Québec implemented various measures in 1999. These include:

- drafting of a guide for planning municipal buffer zones;
- production of a brochure for the general public, titled *Le bon arbre au bon endroit (The Right Tree in the Right Place)*;
- identifying methods of handling vegetation during emergency repairs on the distribution system;
- distribution, within and outside the company, of a guide to protecting vegetation;
- setting up an environmental management program for the disposal of pruning chips.

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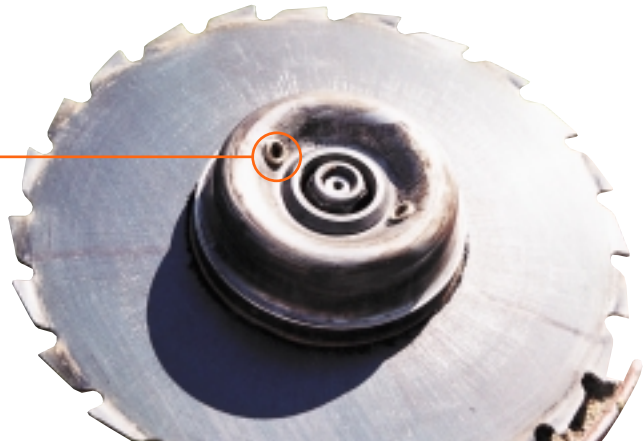
Research and Environmental Monitoring Projects

In 1999, Hydro-Québec carried out numerous environment-related applied research and project monitoring activities. Some examples are listed below.

Research or monitoring	Context	Activities carried out during the year	Environmental result or benefit
Greenhouse gas (GHG)	In cooperation with Université Laval, development of a method using an infrared laser to measure GHGs.	• Continuous measurement of CO_2 and methane (CH_4) for 24 hours over distances of one to two kilometres.	• The results allow GHG emissions to be compared with those from thermal power plants.
	With the Freshwater Institute/Manitoba Hydro, joint studies of GHG emissions from hydroelectric facilities.	• Active monitoring of GHG emissions from three small artificial reservoirs.	• The results allow GHG emissions to be compared with those from Hydro-Québec reservoirs.
Integrated watershed management	Needs of other watershed users (municipalities, industries, farmers and recreational and tourist users) to optimize watershed utilization.	• General overview of watershed characteristics and uses. • Identification of areas of competition and conflicts between different uses of water and shoreline. • List of major community expectations and options to explore.	• Development of analytic tools. • Better characterization of reservoirs, rivers and their watersheds. • Greater knowledge of watershed uses and of any conflicts between them.
Walleye	During spring filling of Kempt, Manouane and Châteauvert reservoirs (Haute-Mauricie), drying-out of sections of river, preventing walleye from spawning.	• Monitoring of walleye spawning in spring 1999. • Evaluation of minimum flows to be maintained during this species' breeding season, from May 1 to June 15.	• Development of procedures for spring management of flows below these reservoirs, starting in spring 2000, to ensure optimum conditions for walleye reproduction.
American eel	Decline in eel stocks in the St. Lawrence River.	• Monitoring of eel migration between the Beauharnois and Moses-Saunders structures.	• The Beauharnois structures form a major obstacle to eel migration.
Floating peat bogs	In 1998, peat bogs were removed from the La Grande Rivière and transferred to a granular deposit near La Grande-1 generating station.	• Characterization of water and peat matter in order to monitor groundwater contamination.	• The monitoring does not reveal any water contamination or acidification. • The removal of the peat bogs contributed to a decrease in generation losses at La Grande-1 generating station.

Research or monitoring	Context	Activities carried out during the year	Environmental result or benefit
La Grande complex	Environmental monitoring below La Grande-2-A generating station.	• Monitoring of wildlife habitat improvements in Upichiwuun Bay. • Monitoring of eelgrass production along the coast of James Bay in cooperation with coastal hunters who were met at Chisasibi.	• Plant and animal productivity in the improved bay is comparable to that observed in a control bay. • Joint observation of a widespread decline in this sea grass all along the east coast of James Bay and Hudson Bay. The decline follows a dieback that may be related to an abnormal elevation in water temperature. This situation is not due to Hydro-Québec facilities.
		• Monitoring of changes in banks.	• 30% reduction in bank erosion below La Grande-1 generating station compared with 1997 measurements. • Slight reduction (5.6%) in bank erosion in La Grande-1 reservoir for the same period.
	Monitoring of James Bay territory following construction of a road network.	• Survey of road-related use of territory.	• Better understanding of the road network's organizing effect on use of the James Bay territory. • Development of tools for planning future infrastructure and service needs.
	Commitments resulting from various agreements associated with the La Grande complex, Phases I and II.	• Monitoring of water quality and fish in the eastern sector of the La Grande complex, including the Caniapiscau reservoir and river. • Monitoring of remedial work for facilities in the La Grande complex, Phases I and II, which was designed to promote use of the territory, biological productivity and visual quality.	• Return to natural conditions. • Observation of a decline in the survival of lake trout eggs, caused by winter drawdown. • The results of the 1999 monitoring will assist managers in developing a maintenance plan.
	Opimiscow Agreement.	• Monitoring of remedial work agreed upon with the Crees for the Vincelotte river and part of the Laforge-1 reservoir.	• Summer wildlife density is greater in the improved areas. However, better planning of remedial work would have increased their use by wildlife. • The remedial work allowed the Crees to pursue their traditional activities.
Noise	Reduction in noise produced by power transformers.	• Development and optimization of algorithms and control units. • Evaluation of vibrating approach.	• Reduction of 10 to 15 dB in noise at the 120-Hz frequency, and of approximately 5 dB in 240-Hz noise.
Lac Robertson	Monitoring of fish communities: - rainbow smelt - brook trout - Arctic char - landlocked salmon.	• Fishing yield. • Study of reproduction.	• Better understanding of the dynamics of species in the reservoir. Rainbow smelt has become the dominant species in the reservoir, four years after impoundment. • Species reproduction is a major success since impoundment in 1995. • The reservoir's tributaries remain accessible during summer, to permit reproduction.
Reservoir management	Research on wildlife populations, in cooperation with Québec's Ministère de l'Environnement—Abitibi-Témiscamingue regional office.	• Review of the literature, including: - inventory of aquatic and semi-aquatic species; - identification of population variation factors.	• Identification of reservoir management effects on wildlife populations. • Proposal concerning areas of research.
Lake sturgeon	Three years of monitoring by Hydro-Québec of lake sturgeon spawning at Rivière-des-Prairies generating station, following work to increase the safety of shallows at the spillway outlet.	• Third year of monitoring of sturgeon reproduction and counting of larvae.	• Brood stock estimated at 4,163 specimens, which produced 83 million eggs in spring 1999. • Production in 1999 is below that of 1998, owing to low runoff in 1999 and early warming in spring 1999.

Research or monitoring	Context	Activities carried out during the year	Environmental result or benefit
Environmental monitoring	Environmental monitoring of the 735-kV Des Cantons-Lévis-Appalaches power transmission line and Appalaches substation.	• Nine separate studies were conducted during the line operation phase.	• The actual impact is lower than forecast. • The mitigative measures recommended and applied proved effective.
Herbicides	Environmental assessment of herbicides used under lines, at substations and on dikes and dams.	• Study of herbicide displacement and path.	• Choice of best products for vegetation control operations. • Environmental acceptability of herbicides.
Vegetation	Studies to understand the dynamics of vegetation in rights-of-way.	• Monitoring of treatment performance, eight years after intervention.	• Development of intervention strategies based on the characteristics of local environments.
	Environmental review of more environment-friendly intervention methods.	• Monitoring of tests with "sprout less" method. • Study of type of plant growth. • Waste management.	• Formulation of specific environmental provisions for each intervention method. • Silver maple helps reduce regrowth. • Development of new waste disposal methods to reduce management requirements and negative impacts of the standard disposal method.
Buffer strips	Assessment of environmental value of buffer strips for streams and rivers.	• Assessment of scope of work carried out near streams and rivers.	• Establishment of vegetation control strategies near streams and rivers.
Pentachlorophenol (PCP)	Behavior of PCP in the environment.	• Development and standardization of a model of PCP behavior.	• Validation of pole siting criteria.
	Construction of storage yards for PCP-treated wood poles.	• Evaluation of existing facilities and design of environmentally efficient storage.	• Optimization of construction concept through the use of absorbents.
Contaminated soil	Hydro-Québec owns approximately 1,800 sites where spills of contaminants may occur.	• Evaluation of characterization and treatment technologies. • Implementation of the Québec government's policy for soil protection and the rehabilitation of contaminated land. • Evaluation and prioritization of sites.	• Development of a method for identifying priority sites that require specific intervention.
Mercury	Environmental and health-related risk management.	• Monitoring of mercury concentrations in fish in the La Grande-4, Laforge-1, Laforge-2, Caniapiscau and Robertson reservoirs, as well as in the Laforge diversion and control lakes.	• Mercury concentrations in non-predatory fish are equivalent to those in control lakes; in predators, the return to natural conditions is well under way (see page 33). • After four years of flooding, mercury concentrations in fish in the Robertson reservoir are as forecast.
	Development of a forecasting model for mercury concentrations in fish.	• Forecasting of reservoir fish mercury concentrations for a period of 30 years after flooding.	• The model accurately reproduces the conditions observed in the Robert-Bourassa reservoir (see page 33).
		• Evaluation of consumption of fish from the La Grande complex in terms of health benefits related to omega-3 fatty acids and health risks associated with mercury.	• The recommended consumption rate to obtain health benefits does not represent a health risk in terms of mercury exposure.



Opening for the application of herbicide

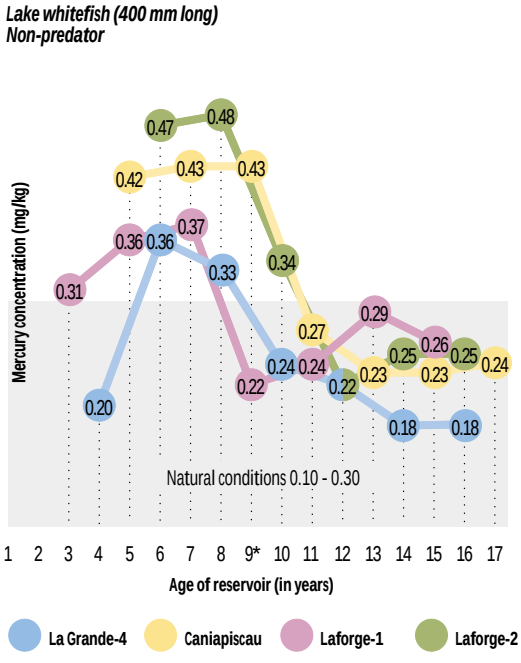
"Sprout less" method

Blade which makes it possible to simultaneously cut and treat vegetation by applying herbicide. This method has the advantage of reducing the amount of herbicides used in power line rights-of-way.

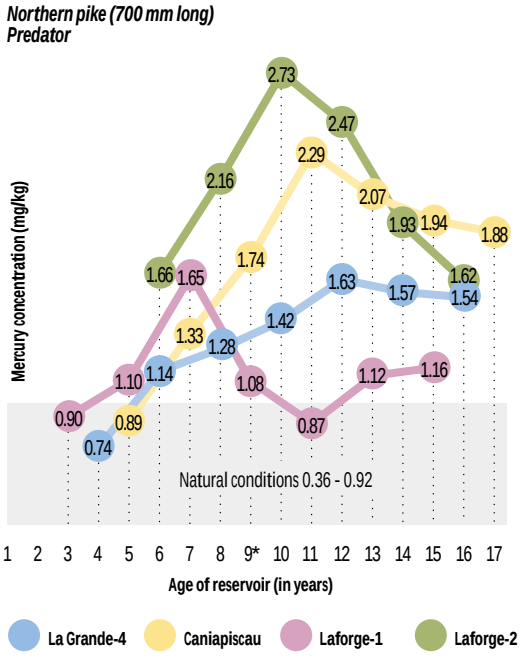
Changes in Mercury Concentrations in Fish

In the reservoirs of the La Grande complex, all species studied showed an increase in mercury concentrations. Mercury levels in non-predators reach a maximum five years after impoundment; in predators, this process takes approximately 10 to 15 years. Depending on the species studied, mercury concentrations increased up to sixfold in reservoirs, compared with natural lakes.

According to findings in reservoirs in Québec, Labrador and Manitoba that are older than those in the La Grande complex, mercury concentrations in white-fish and pike return to levels comparable to mean concentrations observed in fish in natural lakes approximately 30 years after impoundment.

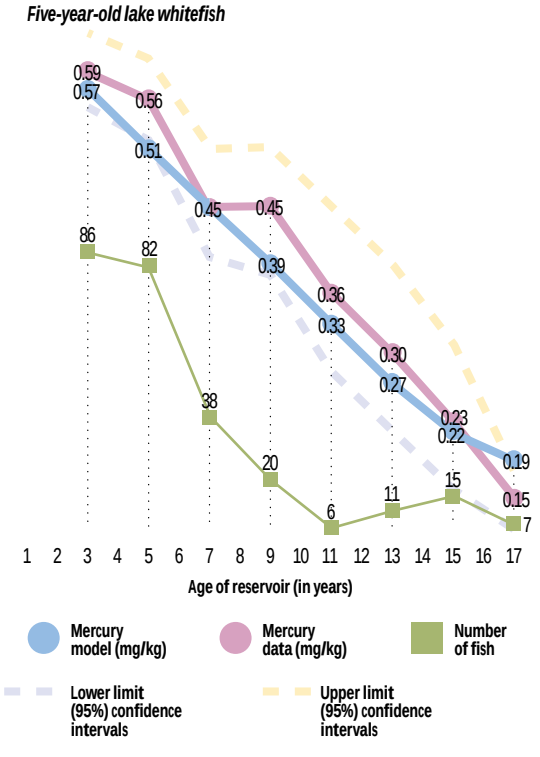


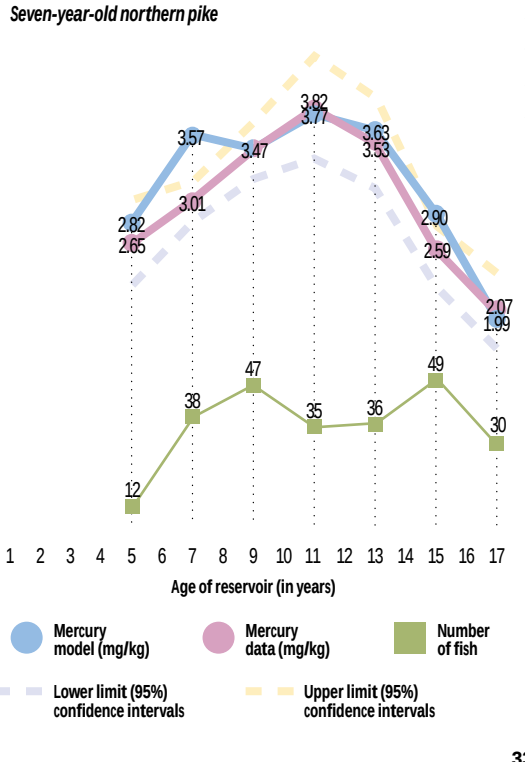
* Second impoundment of Laforge-1 reservoir



* Second impoundment of Laforge-1 reservoir

Mercury concentrations in the flesh of fish in reservoirs located in the eastern sector of the La Grande complex





Simulation of mercury concentrations in fish in the Robert-Bourassa reservoir

Exposure to electric and magnetic fields (EMFs) is an environmental issue linked to the construction of new power lines, the refurbishing of existing lines and system operation for energy transfers. The adoption of Hydro-Québec's action plan in June 1986 gave rise to research intended to better characterize EMF impacts on the environment and on the health of local communities and Hydro-Québec employees. A multidisciplinary team made up of engineering, medical and environmental experts is responsible for continually monitoring developments in this area.

State of Research on Electric and Magnetic Fields

In the United States, the National Institute of Environmental Health Sciences (NIEHS) ruled, in June 1999, on the human health risk resulting from EMF exposure. It determined that the probability of such exposure representing a real health risk is low, and that current scientific data do not justify recommending the application of stringent regulations for electrical equipment and power lines. The NIEHS also concluded that further research is necessary to measure the effects of EMF exposure more accurately.[1]

Since the 1998 publication of the new recommendations of the International Commission for Non-Ionizing Radiation Protection (ICNIRP) concerning EMF exposure limits, certain scientific organizations and political bodies have ruled on the validity of applying these recommendations. In July 1999, the European Union ratified ICNIRP's recommendations, with the addition of an amendment specifying that it "applies in particular to relevant areas where members of the public stand a significant time in relation to the effects."[2] The National Radiological Protection Board (NRPB), a scientific body of the British government, does not back ICNIRP's recommendations on limits of public exposure, but instead observes the lack of scientific evidence supporting the recommendations' safety factors.[3]

It should be noted that there is no international scientific consensus on EMF exposure limits. Hydro-Québec is currently making federal and provincial government agencies aware of the nature and impacts of these recommendations. As part of prudent management practices, the company has also ratified a corporate directive[4] aimed at incorporating the issue into its system operation activities.

In the area of international research, in 1999, two new epidemiological studies – by Dr. M. McBride, of Canada,[5] and Dr. N. Day, of the United Kingdom[6] – contributed significantly to knowledge of this issue. These two major, rigorous studies reach the same conclusions, namely the lack of evidence of any etiological link between magnetic-field exposure and cancer in children. The authors of another British study,[7] conducted at the University of Bristol, observed a higher concentration of radon derivatives in the vicinity of high-voltage lines. The researchers hypothesize that these derivatives may be at the root of cancers potentially linked to EMF exposure. The NRPB[8] has clearly indicated that this hypothesis is purely speculative, because of the lack of biological plausibility. In 1999, activities carried out under Hydro-Québec's action plan led to the publication of the results of a study on cows' milk, conducted by researchers at McGill University, in a specialized environmental journal. The researchers note a physiological change in biological variables, without there necessarily being any consequences for the animal's health.[9] Hydro-Québec has also published a brochure summarizing studies of EMF effects on livestock health and productivity.[10]

Bibliographical references:

1. NIEHS, *Health Effects from Exposure to Powerline Frequency Electric and Magnetic Fields,* 1999, 64 p.
2. *Official Journal, Council of the European Union*, Council Recommendations, July 1999.
3. NRPB, *NRPB Statement 10(2)*, June 1999.
4. HYDRO-QUÉBEC, Corporate Directive No. 22, *Exigences de prévention et de contrôle des pollutions et nuisances*, 1999.
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6. DAY, N., et al., *The Lancet*, 1999, 354, p. 1925-1931.
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8. NRPB, *NRPB Information Services,* February 1996.
9. BURCHARD, J. F., et al., *Bioelectromagnetics,* 1999, 20, p. 358-364.
10. HYDRO-QUÉBEC, *Les effets des champs électriques et magnétiques sur la santé et la productivité du bétail*, 2nd quarter 1999.

Environment Chairs

Hydro-Québec funds three university chairs for environmental research.

Université de Montréal Environmental Design Chair

Hydro-Québec, together with its partners Transports Québec and Société d'affichage Omni, has supported the Université de Montréal Environmental Design Chair since 1996. In 1999, the company provided the Chair with approximately $108,000. The Chair's objective is to promote university research in the field of landscape design, in order to better understand current issues associated with the Québec landscape and to establish common points of reference among the various partners, who have adopted their own practices for land use planning, environmental planning and landscape design.

In 1999, the Chair's research conducted at Hydro-Québec's request focused on subjects including:

- the posting of technical information on transformers mounted on pedestals;
- a study of highway crossings by distribution lines;
- identification of the main landscape issues related to three energy options: wind power, the construction of small hydroelectric stations, and river diversion to another, previously developed river.

In addition, Hydro-Québec, along with Québec's Ministère de la Culture et des Communications, contributed to funding wide-ranging research on landscape in concept and in practice, begun in 1999 and scheduled to continue in 2000.

Hydro-Québec also asked the Chair for supplementary expertise in landscape and industrial design, in order to develop guidelines for a study of smaller, more visually pleasing towers for 735-kV power lines.

École Polytechnique de Montréal – NSERC Industrial Chair in Site Bioremediation

This Chair's first term began in June 1994 and concluded in May 1999. Several of the studies carried out helped increase knowledge of the biodegradation of recalcitrant contaminants and develop technologies for solving various issues for the company. Hydro-Québec has renewed its participation for a second term (1999-2004). The other industrial partners will be Alcan, Bell Canada, Cambior, Canadian Pacific, the Québec centre for expertise in environmental analysis (CEAEQ), Elf Aquitaine, Petro-Canada, Solvay and the City of Montréal. Each partner will contribute $75,000 annually. The research efforts will focus chiefly on the development and automation of confinement and site bioremediation biotechnologies, the study of physicochemical and biological phenomena inherent in the evolution of contaminants, the economic analysis of technological options, and the development of decision-making tools.

Hydro-Québec – NSERC – UQÀM Environmental Research Chair

In partnership with the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Université du Québec à Montréal (UQÀM), Hydro-Québec continued its commitment to this Chair for the final year of a second five-year term. In 1999, Hydro-Québec allocated $370,000 to the Chair, which comprises two separate sections: mercury and greenhouse gases (GHGs).

Mercury

The findings of more than 10 years of studies by UQÀM's research teams in connection with the Chair, along with the results of Hydro-Québec's environmental monitoring at the La Grande complex for the last 20 years and studies by the Université de Sherbrooke, the Université de Montréal's Faculty of Veterinary Medicine and the Canadian Wildlife Service, were the subject of a monograph on mercury in Northern Québec. This monograph presents mercury research conducted in Québec over the last two decades.

Greenhouse Gases

The results obtained here led to improved quantification of GHG emissions from reservoirs of variable age, as well as from natural lakes used as reference environments. This added to our knowledge of the biological signature (through analyses of stable carbon isotopes) of GHGs from the Robert-Bourassa reservoir; the findings will be used to quantify atmospheric CO_2 more accurately. Preliminary results show that the contribution of the La Grande Rivière watershed is insufficient to explain previously measured GHG emission levels. The Chair's research also demonstrated that gross GHG emissions stemming from hydroelectric generation are 34 times lower than those associated with coal and 18 times less than those produced by gas turbines.

Robert-Bourassa reservoir

presence on the international scene

In 1999, Hydro-Québec maintained its international involvement through a number of environment-related contracts.

The company drew up several offers of services for environmental assessments, environmental training activities and support for establishing environment units for potential projects, mainly in Asia and Africa. It also produced environmental opinions on generation and transmission projects, with a view to acquiring foreign electric utilities or facilities, particularly in the Philippines and Ecuador.

In addition, Hydro-Québec was put in charge of a major performance appraisal project: evaluating the operations of the E7 Network of Environmental Expertise, of which it is a member. The goal of this network, which is made up of the eight largest electric utilities in the G7, is to pool the members' experience and expertise so that it can play a leading role in global environmental protection and promote energy efficiency and the appropriate use of electricity. The appraisal project entrusted to Hydro-Québec will focus on a selection of training activities and opinion reports on various environmental topics carried out since 1996 in Mexico, South Africa and Thailand. It will also lead to the revision and creation of project planning and construction tools used by the E7 Network. This project will conclude in October 2000.

Activities undertaken in recent years to provide the company's specialized environment personnel with environmental databases on developing countries came to fruition in 1999. These databases also contain directories and compendiums of information on prospective international partners and regulatory aspects. In the same spirit, to better prepare employees for a growing number of activities abroad, Hydro-Québec developed a training program on the environment and international projects. The program is scheduled to be implemented starting in 2000.

Hydro-Québec presented a training seminar on integrated vegetation management in Colombia, for managers of transmission line operations at the Interconexion Electrica SA (ISA) electric utility. General environment training sessions were also given to operations personnel at SENELEC, Senegal's national electric utility.

In Venezuela, Hydro-Québec was awarded a contract by CVG-Electrification del Caroni (EDELCA) for the operation of a transmission line of particular strategic importance to that country, connecting Macagua 2 generating station and the border with Brazil. The project mainly involved developing guidelines for integrated vegetation control and assessing the effectiveness of various herbicides that may be used in transmission line rights-of-way.

Hydro-Québec also took part in the first mission to Benin, Niger and Burkina Faso to evaluate potential projects for developing the *Parc du W* in the Sahel. Following UNESCO's approach, the group identified rural electrification projects that fit in with the worldwide solar energy program and are aimed at wildlife preservation and enhancement as well as improving living conditions for riverside communities.

In a related area, Hydro-Québec continued to participate in Indonesia's rural electrification program. Depending on the islands where the projects are located, a number of renewable energy sources have been examined: photovoltaics, micro hydro stations, wind power and hybrid systems. Hydro-Québec's role consists of supplying the expertise needed for the socioeconomic integration of these facilities into the rural communities concerned, along with the training required for their use by those communities.

Hydro-Québec's participation in the ECR program of the CEA

A Word from Marie-José Nadeau, Chair, Program Steering Committee

Marie-José Nadeau, Executive Vice President – Corporate Affairs and Secretary General of Hydro-Québec, was the 1999 Chair of the Steering Committee of the Canadian Electricity Association's (CEA) Environmental Commitment and Responsibility (ECR) Program.

When they launched the ECR program in 1997, electric utilities that belong to the CEA undertook to improve their environmental performance.

The program is based on five elements:

- a Declaration of Principles, supported by measurable indicators;
- a commitment to implement an environmental management system (EMS) consistent with ISO 14001;
- performance monitoring and reporting by each member utility, including independent verification of the data reported;
- a Public Advisory Panel that provides an annual independent review;
- a communications program.

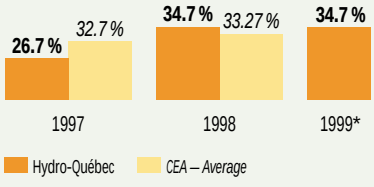
Hydro-Québec is proud to take part in this program, designed to revitalize the entire power industry. Our company is active in developing the program and putting it into effect. For example, in terms of implementing of an ISO 14001-consistent EMS, Hydro-Québec's efforts, achievements and difficulties in this area have been presented throughout this performance report.

The ECR program allows us to draw certain comparisons between our company's environmental performance and that of other electric utilities. It will be noted that Hydro-Québec maintains a very high standard of environmental performance, particularly with respect to air quality and management of contaminants.

In this age of deregulation and restructuring of markets in North America and around the world, it is encouraging to see that the Canadian electricity industry as a whole attaches the necessary importance to environmental issues and to ensuring optimum environmental protection amid all these changes.

our environmental performance compared with the Canadian electricity industry

Hydro-Québec is an active participant in the Canadian Electricity Association's ECR program. It provides the CEA with an annual report of its environmental performance based on a series of indicators used by all CEA member utilities. In most areas, Hydro-Québec compares favorably with other Canadian utilities.

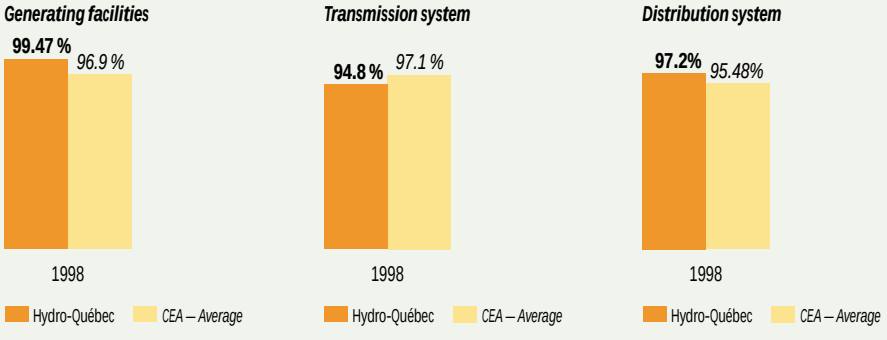


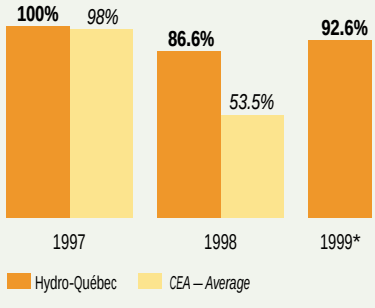
Energy Conversion Efficiency of Thermal Generating Facilities

Energy conversion efficiency is the total net energy output of thermal power plants divided by the total energy input needed to generate the electricity (net energy output/ energy input).

Internal Energy Efficiency

Internal energy efficiency for a utility's generating facilities is the total quantity of electricity sold divided by the total electricity generated and purchased (imports). This indicator illustrates internal energy use and line losses on transmission and distribution systems.





Reuse of Insulating Oil

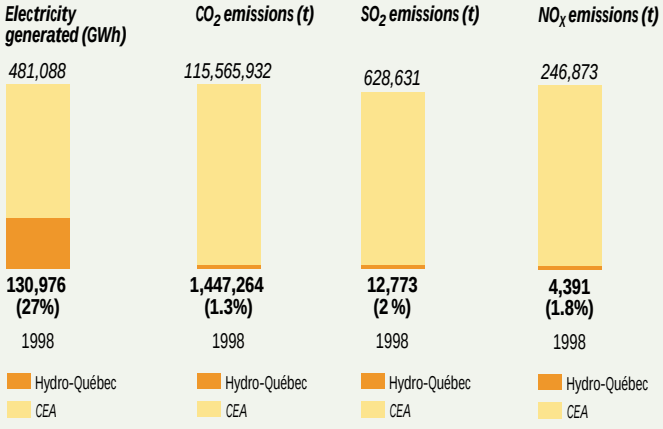
This indicator measures the savings achieved with respect to the volume of new insulating oil consumed and purchased, thanks to the reuse of existing quantities that would otherwise have been disposed of, or recycled for other purposes. Hydro-Québec reuses most of its insulating oils.

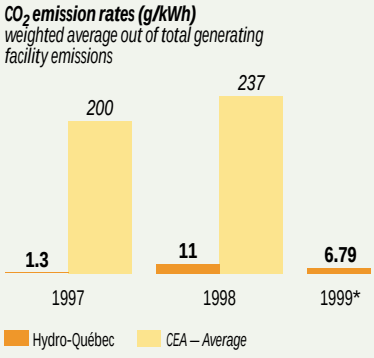
Note: The highest values represent best performance.
* Data for this indicator are not available for the CEA in 1999.

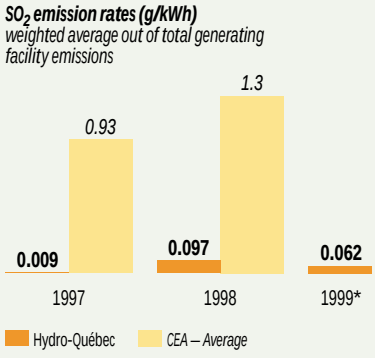
Atmospheric Emissions

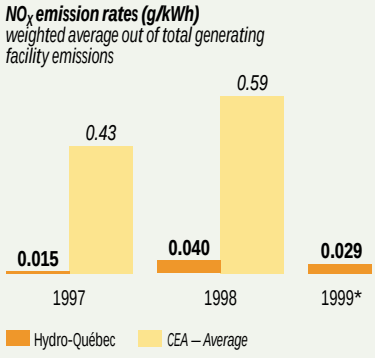
It should be noted that in 1998, HQ accounted for only 1.3% of the total amount of CO_2 emitted by Canadian electric utilities, 2% of the amount of SO_2 and 1.8% of the amount of NO_X, even though it generated more than 27% of all of Canada's electricity.

The data for Hydro-Québec do not include the extremely low emissions of CO_2 from hydroelectric reservoirs or the emission credits which it could be granted under Québec's ÉcoGESte program. If these two estimates were factored in, Hydro-Québec would show "negative" emission rates (-55.9 g/kWh for 1999).



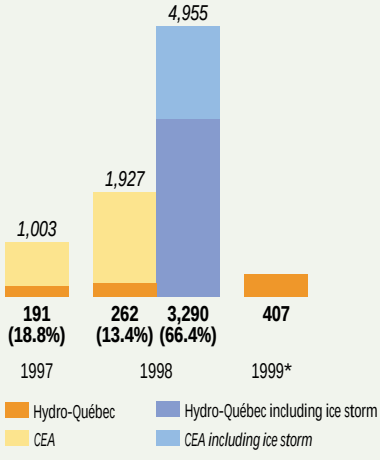






Number of Spills

Of the 3,290 spills experienced by Hydro-Québec in 1998, 3,028 occurred during the exceptional ice storm of January 1998, which destroyed more than 3,400 km of distribution lines.



PCB in Storage and Use

Type of PCB	CEA		Hydro-Québec		
	1997	1998	1997	1998	1999
High level in storage	4,392 t	719 t	3 t	2.7 t	0 t
Annual variation		- 84%		- 10%	- 100%
Low level in storage	1,933 t	1,989 t	190 t	9.7 t	5.5 t
Annual variation		+ 3%		- 95%	- 43%

*Data for this indicator are not available for the CEA in 1999.

conclusion

In 1999, the first ISO 14001 registration of a Hydro-Québec unit confirmed the commitment, given in 1997, to take all necessary measures for rigorous environmental management and to acquire the tools to meet the highest international criteria in this field. Efforts will continue throughout 2000, when other units will undergo the registration process.

Hydro-Québec is also working to gain recognition for hydropower as a renewable, relatively non-polluting means of energy generation that contributes to achieving Canadian targets for GHG reduction, in accordance with the Kyoto Protocol. Our active participation in the operations of international organizations such as the International Energy Agency and the World Commission on Dams is intended to identify optimum hydroelectric construction practices. These practices are designed to reduce projects' negative impacts while maximizing their positive spinoffs for the environment and the communities concerned. The new business partnerships offered by Hydro-Québec, along with the environmental enhancement program it has pursued since 1985, attest to this commitment. Local communities affected by hydropower projects may now obtain either funding for initiatives that offer environmental benefits or economic development, or financial participation that enables them to share in the annual income generated by these projects. Communities may also take part in defining the most appropriate mitigative or compensation measures, as applicable.

Jean-Étienne Klimpt
Director – Environment

Hydro-Québec also plans to hold discussions with Québec environmental groups in order to make them aware of the company's achievements and to take their expectations into consideration in planning and carrying out its activities.

During the coming year, the five-year review of the *Canadian Environmental Assessment Act* and the review of Québec's environmental protection system will afford Hydro-Québec the opportunity to highlight the experience it has acquired from 25 years of impact monitoring and through the hundreds of environmental assessments it has conducted. The gradual implementation, starting January 1, 2000, of the new Canadian environmental protection legislation will add to existing regulatory requirements. Hydro-Québec is confident that the establishment of its ISO 14001-consistent environmental management system and the pursuit of its goal of excellence in the environment field will make it possible to meet these new requirements.

In light of its accomplishments and the commitments it has made and fulfilled in recent years, Hydro-Québec will continue to develop strategies and means for carrying out projects that are favorably received by host communities and are also environmentally acceptable. On the international scene, Hydro-Québec plans to maintain its involvement in the major debates on the greenhouse effect and pollution emissions. It will also continue to play a part in developing international standards for the construction of hydroelectric projects based on the best environmental practices, and will continue to forge relationships with local communities that are beneficial to all parties.

acronyms, abbreviations and symbols

3RE program
reduction and recovery, reuse, recycling and energy recovery

BAPE
Bureau d'audiences publiques sur l'environnement

CEA
Canadian Electricity Association

CH_4
methane

CO_2
carbon dioxide

ECR
CEA's Environmental Commitment and Responsibility Program

EMF
electric and magnetic fields

EMS
environmental management system

GHG
greenhouse gas

ICNIRP
International Commission for Non-Ionizing Radiation Protection

IEA
internal environmental assessment

IHA
International Hydropower Association

ISO 14001
environmental management standard of the International Organization for Standardization

NIEHS
National Institute of Environmental Health Sciences

NO_X
nitric oxide

NRPB
National Radiological Protection Board

NSERC
Natural Sciences and Engineering Research Council of Canada

OECD
Organization for Economic Cooperation and Development

PCB
polychlorinated biphenyl

PCP
pentachlorophenol

RCM
regional county municipality

SO_2
sulphur dioxide

UQÀM
Université du Québec à Montréal

Units of Measure

$M: millions of dollars

kV: kilovolt

kt CO_2 eq.: kilotonne CO_2 equivalent

kW: kilowatt

MW: megawatt (one million watts)

GW: gigawatt (one million kilowatts)

GWh: gigawatthour (one million kilowatthours)

TWh: terawatthour (one billion kilowatthours)

glossary

Bureau d'audiences publiques sur l'environnement
Public review panel responsible for analyzing various projects that may have an impact on the environment, established under article 6 of Québec's *Environment Quality Act*.

Canadian Electricity Association (CEA)
Organization made up of 29 electric utilities (representing 95% of installed capacity in Canada), 25 major manufacturers of electrical equipment, and several hundred other companies and stakeholders involved directly or indirectly in the field of electricity.

contaminant*
A solid, liquid or gaseous matter, a microorganism, a sound, a vibration, rays, heat, an odor, a radiation or a combination of any of them likely to alter the quality of the environment in any way *(see pollutant)*.

energy conversion efficiency
Energy efficiency of the different means of electricity generation, calculated on the basis of the energy source used as input (e.g., gas, coal, biomass, nuclear energy) and expressed as a percentage.

environmental management system (EMS)
A component of a company's overall management system which includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, setting up, carrying out, reviewing and maintaining the environmental policy.

hazardous material
Any residual material that is solid, semi-liquid at 20°C, liquid or gaseous, held in a transportable container, and that is combustible, corrosive, leachable, radioactive, reactive or toxic, as well as the categories of waste listed in Schedule 1 of Québec's *Regulation respecting hazardous materials*.

herbicide
A chemical agent that destroys plants. A selective herbicide is designed to destroy certain plants in order to encourage others to grow.

internal environmental assessment (IEA)
Assessment designed to determine whether a project is likely to alter the quality of the environment and, consequently, to prescribe mitigative measures in connection with certain projects, even if those projects do not require authorization under the *Environment Quality Act*.

life cycle
Life span of a product, taking into account the characteristics of its inputs, its manufacturing process, its outputs and its final disposal.

mercury
A heavy metal occurring naturally in the environment which, in soils and oceans, is found mainly in inorganic form, invisible to the naked eye and not readily assimilable by organisms.

Following the flooding of land caused by reservoir construction, a portion of the mercury already present in organic soils and vegetation becomes subject to methylation. This is not a new source of mercury added by the reservoir itself, but rather a transformation of inorganic mercury already present in the land environment that is flooded.

off-grid power system
Regional electricity generation, transmission and distribution system in northeastern Québec which is not connected to Hydro-Québec's province-wide system.

omega-3 fatty acids
High-quality fat found in the flesh of fish that fosters lower blood cholesterol and has a beneficial effect on health, notably in preventing certain cancers and inflammatory diseases.

pentachlorophenol
Chemical compound, insoluble in water, used as a wood preservative.

polychlorinated biphenyl (PCB)
Askarel in the family of chlorinated hydrocarbons, used in certain electric insulators and comprising more than 200 compounds. A property of askarels is that they do not release any combustible or explosive gases when an electric arc passes through them.

pollutant*
A contaminant or a mixture of several contaminants present in the environment in a concentration or quantity greater than the permissible level determined by regulation of the Government, or whose presence in the environment is prohibited by regulation of the Government *(see contaminant)*.

spur dike
A dike made of rock, which is placed in a river at right angles to the shore. Its purpose is to reduce erosion by retaining a portion of the material carried along by the river's current.

stable isotope
One of two or more stable forms of a chemical element with the same atomic number, but with different atomic masses.

sustainable development
A planning, intervention and management concept that calls for the rational use of environmental resources in order to achieve a viable economy, so as to meet the needs of the present and future generations worldwide while ensuring active participation by local communities.

violation notice
Notice issued by a government department (federal or provincial) following observation of non-compliance with a law or regulation.

* Definitions drawn from Québec's *Environment Quality Act*.

units' declarations of principles

Each Hydro-Québec unit that is in the process of implementing an EMS has adopted a declaration of environmental principles which incorporates into its specific activities the general principles stated in the corporate policy *Our Environment*.

Generation

Our goal is a better utilization of our resources in a spirit of sustainable development.

As a power producer, we undertake to:

- manage our facilities rigorously, with due respect for the environment;
- prevent pollution at source;
- act in consultation with local communities;
- encourage our employees, suppliers and partners to adopt sound environmental practices;
- continuously improve our environmental performance.

Procurement and Services

The Procurement and Services unit has adopted the following commitments:

- regulatory compliance;
- continuous improvement of environmental performance;
- pollution prevention.

To fulfill these commitments, Procurement and Services:

- acquires goods and services that meet the company's environmental requirements;
- recovers residual materials and unused assets, and encourages their reuse, recycling and energy recovery (3RE), in that order, in preference to their elimination;
- adheres to and promotes energy efficiency in the management of administrative buildings and transportation equipment;
- prevents the emission of contaminants in the operation of administrative buildings and transportation equipment.

Distribution

The Distribution unit undertakes to implement the policy *Our Environment* by conducting its operations with a concern for pollution prevention and sustainable development, and with a view to continuous improvement.

To meet its commitments, the Distribution unit applies the following principles:

- build distribution systems that are properly integrated into their environment;
- recover, reuse and promote the recycling and energy recovery of the resources, materials and equipment used;
- support research on using products in ways that help prevent pollution;
- give preference, at the best possible cost, to renewable energy sources for off-grid power systems;
- evaluate the satisfaction of customers affected by its projects;
- reach agreements with its partners for better environmental integration of public utility systems.

Projects and Construction

Projects and Construction undertakes to:

- ensure the environmental management of its projects;
- take local values and concerns into consideration;
- manage impacts at source;
- provide effective resource management;
- improve its environmental practices.

TransÉnergie

- TransÉnergie undertakes to provide power transmission in compliance with applicable laws and regulations. To achieve this, it integrates environmental concerns into its daily operations, in order to prevent pollution, while applying a continuous improvement approach to its management and environmental performance.
- It favors the harmonious integration of its facilities into the local environment, following the principles of sustainable development, while ensuring the continued reliability and optimum growth of its assets and maintaining its competitive position.
- TransÉnergie relies on its employees' expertise to plan and design facilities with due consideration for the environment, to operate and maintain facilities while protecting the environment, to reduce, recover and promote the recycling and energy recovery of resources, materials and equipment, and to plan for environmental emergencies and take effective action.
- It also encourages its partners and suppliers to adopt sound environmental practices, and supports the development and improvement of environmental knowledge and practices, especially in the areas of environmental assessment, electric and magnetic fields, wildlife, and vegetation control.

Our Environment policy

General Principles

Hydro-Québec is a leader in the field of environment. Thanks to hydropower, the company produces clean, renewable and safe energy, thus protecting our environmental heritage for future generations. It develops profitable, environmentally acceptable projects that are well received by communities. It practices rigorous environmental management that complies with ISO 14001, with a view to continuous improvement. Thus:

Sustainable Development

To contribute to sustainable development and to the protection of the global environment, Hydro-Québec undertakes to:

- give preference to hydropower, other sources of renewable energy and energy efficiency to meet the needs of its customers;
- use resources as efficiently as possible and practice reduction at source, reuse and recycling.

Continuous Improvement of Environmental Performance

To improve its environmental performance, Hydro-Québec undertakes to:

- include environmental concerns in its decision-making processes and at all stages in the life cycle of its products, services and facilities, in such a way as to meet recognized environmental standards, prevent pollution, manage impacts at source, mitigate negative impacts and maximize positive impacts;
- adopt a transparent approach by encouraging the participation of local communities in the environmental assessment of its proposed projects and activities;
- make its business partners and suppliers aware of the need for responsible environmental management of their activities, products and services.

Public Health and Safety

To ensure public health and safety, Hydro-Québec undertakes to:

- design, manage and maintain its facilities and conduct operations in such a way as to control the risk of bodily injury;
- inform the public on how to use its products and services safely;
- put in place and maintain emergency measures and plans that are coordinated with those of local responders and the relevant authorities, and make them public.

Research

To improve its performance in terms of the environment, sustainable development and public health, Hydro-Québec undertakes to:

- carry out or support research and development on the environmental and health effects of its operations, as well as on environmental or energy-efficient technologies.

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