



PROPOSED HYDRO-QUEBEC DEVELOPMENT PLAN

1990-1992 - HORIZON 1999

**HYDRO-QUÉBEC
AND
ENERGY EFFICIENCY**



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Introduction

There is growing awareness that energy efficiency is both profitable and environmentally beneficial. The World Commission on Environment and Development has determined that energy efficiency must be viewed as the method of choice for attaining sustainable development. This conclusion was echoed by participants at the World Energy Conference, held in Montréal in September 1989. It is valid both for the developing countries, with their enormous energy needs, and for the industrialized world, which must adopt a lifestyle founded on respect for the imperatives of the environment.

In this year's Development Plan, Hydro-Québec is proposing an Energy Efficiency Project made up of marketing programs designed for all markets throughout the final decade of the 20th century. This Project will have two aspects: energy efficiency and consumption management.

The theoretical potential for energy savings is substantial. It has been estimated at 23 terawatt-hours per year, or 18% of 1989 Québec firm-electricity sales.

Bearing in mind the multiplicity of technological, commercial and social considerations, Hydro-Québec aims to reach an energy-efficiency level of 12.9 terawatt-hours per year by 1999, fully 55% of its 23-terawatt-hour potential. Over the next 10 years the utility intends to spend \$1.8 billion for this purpose. Cumulative anticipated energy savings should be in the vicinity of 70 terawatt-hours for the coming decade, and more than 130 terawatt-hours for the first decade of the next century.

Of the overall goal of 12.9 terawatt-hours for Horizon 1999, energy savings of 9.0 terawatt-hours should be the direct result of this year's proposed marketing programs, and will account for the bulk of anticipated investments. The remaining 3.9 terawatt-hours will be gained as customers acquire better electrical appliance and accessory (household appliances, home insulation) buying habits. These savings, which can be defined as natural, are the result of the past accomplishments of Hydro-Québec and other energy-market participants. However, marketing initiatives already underway must be extended in order to ensure that their effects will continue to be felt in the future.

General Orientation

Hydro-Québec's Energy Efficiency Project embodies two main aspects: energy-conservation programs, and consumption-management programs.

Examples of Commercial Energy-Efficiency Programs

| Energy Conservation | Consumption Management |
|--------------------------|------------------------|
| High-efficiency lighting | Interruptible power |
| Thermal insulation | Dual energy |
| High-performance motors | Surplus electricity |
| Programmable thermostats | Time-of-use rates |

Effective energy conservation means managing demand growth by using less energy to obtain comparable or superior results. Less energy is used to heat a well-insulated house, but with similar or even greater comfort levels. As we shall see, the same principle can be applied in a multitude of cases.

Consumption management is designed to improve temporal distribution of overall energy consumption. It can be defined as a temporary modification of demand level at a determined time, or a shift of demand from one period to another, allowing supply and demand equalization and optimal use of generating facilities. Both the dual-energy and interruptible-power programs make it possible to reduce peak demand.

Over the last three decades, these two components of energy efficiency have been an integral part of Hydro-Québec marketing, each of them relevant to a greater or lesser extent, depending on the steadily evolving energy context. During the 1980s, Hydro-Québec devoted very considerable efforts to consumption management. In the 1990s, the accent will be on energy conservation.

However, it must be emphasized that even though a particular aspect of energy efficiency has been given priority status, others will not be neglected. The following list illustrates some of the initiatives taken simultaneously to encourage better use of electricity — and of energy in general.

The 1960s

- Higher insulation standards: the MÉDAILLON house.
- More efficient water heaters: the CASCADE 40.
- Energy analysis tools intended for building designers and managers: CALMEC.
- Surplus-energy programs.
- Interruptible-power programs.

The 1970s

- Improved insulation standards: the NOVELEC house.
- Development of the CASCADE 60 water heater.
- A new generation of the CALMEC model.
- High-efficiency water heater rental program.

The 1980s

- Insulation program for existing houses: ÉNERGAIN QUÉBEC.
- More stringent insulation standards: EE and Super EE (Energy Efficiency) programs.
- Residential dual-energy programs.
- Commercial, institutional and industrial dual-energy programs.
- Electrotechnology programs.

These measures, along with the conversion of oil heating systems to electricity, have undoubtedly contributed to the drop in total Québec residential energy consumption from the electrical equivalent of 48,000 kilowatthours per household in 1971 to 28,000 kilowatthours today.

Energy Conservation

Québec has experienced steady economic growth over the last several years. Thanks to its many qualities, particularly its energy efficiency, electricity has become increasingly sought-after by business and industry as well as residential customers. It should come as no surprise that sales of electricity have risen some 53% since 1982. Market penetration has been uniformly high, as the following table indicates.

Table 1
Energy Consumption by Market, 1989 (%)

| | Electricity | Oil | Gas | Other | Total |
|---------------------------------|-------------|------|------|-------|-------|
| Residential market | 56.2 | 22.5 | 8.3 | 13.0 | 100 |
| Commercial-institutional market | 57.4 | 14.5 | 27.0 | 1.1 | 100 |
| Industrial market | 43.0 | 15.6 | 24.2 | 17.2 | 100 |

2.1

The Energy-Conservation Potential

Despite Québec's many successes in energy efficiency, there remains a sizeable additional energy-savings potential. According to current estimates, this potential now reaches 23 terawatt-hours, corresponding to 18% of 1989 Québec firm-electricity sales.

Table 2
Annual Energy-Saving Potential by Market

| Market | Potential (TWh) |
|-------------|-----------------|
| Residential | 12.5 |
| Commercial | 7.0 |
| Industrial | 3.8 |
| Total | 23.3 |

a) Obstacles to Success

This potential remains, of course, theoretical; its ultimate realization is subject to many uncertainties and obstacles.

It remains to be seen if consumer behavior can be modified as rapidly as desired. In like manner, the efforts which may be needed to surmount certain institutional barriers, and to overcome technical and financial problems while developing and maintaining the necessary expertise, cannot be foreseen with certainty.

Another factor which must be taken into account is the will — and the ability — to pay among all segments of society.

Hydro-Québec will ensure that the overall social cost of a kilowatt-hour saved must remain lower than that of a new kilowatt-hour generated. In other words, the total of its contributions — and those of its customers and other interested parties — must not exceed the marginal cost of supplying customers from a new generating facility.

Hydro-Québec is now prepared to allocate to energy conservation sums representing, at maximum, the difference between marginal construction project costs (generation, transmission and distribution) and revenue loss brought on by energy conservation. The contribution expected of customers will vary by market, by specific energy application, and by the length of the investment recovery period.

Bearing in mind all these factors, Hydro-Québec has set itself an optimal energy-savings objective of 12.9 terawatt-hours, which it intends to achieve by 1999. This objective takes into account the contribution Hydro-Québec is prepared to make, the probable contribution of the customer base addressed by each program, similar experiences undertaken elsewhere, anticipated level of technical difficulty, and anticipated success of marketing formulas to be employed.

The first programs to be put in place will be those which require the lowest investment by Hydro-Québec, as well as those which are expected to exert the strongest influence on subsequent developments. They will operate in two principal ways: encouragement will be offered to programs with a strong, visible impact, giving participants incentives to go beyond recommended measures and to discover new avenues for saving energy; at the same time, emphasis will be placed on programs which maximize economic benefit for Québec. Through its energy-conservation program, Hydro-Québec will ensure that the millions of dollars invested will stimulate Québec industry to the greatest possible extent, and spur on the emergence of new high-technology industries in the energy-efficiency field.

b) Hydro-Québec's Role

For Québec society to derive maximum benefit from energy conservation, all measures adopted must be coordinated. Hydro-Québec thus has a key role to play.

Some customers will carry out energy-conservation measures themselves, providing they are given all necessary information and are able to derive benefits commensurate with their expectations. This will certainly prove to be a vital contribution. But to maximize return on the entire profitable potential, leadership will be needed to orchestrate efforts.

Hydro-Québec is keenly aware of its role as coordinator. In electrical energy-related matters the utility will assume this role in close cooperation with all interested parties: the Québec *Ministère de l'Énergie et des Ressources*, the *Bureau de l'efficacité énergétique*, as well as businesses and social groups active in the field.

c) Strategic Considerations

Putting energy conservation into action requires broad-based participation, as well as highly articulated information and follow-up programs.

- Hydro-Québec will act in concert with the largest possible number of interested parties: the various levels of government; construction contractors; professional corporations; industrial organizations; and social groups such as consumer associations.
- Hydro-Québec will devote special attention to public and private organizations dedicated to environmental protection and to the efficient use of electricity and other forms of energy. The utility will establish close, permanent links with the *Bureau de l'efficacité énergétique*, which will be its main partner in carrying out the Energy Efficiency Project.
- Hydro-Québec will incorporate environmental protection in its marketing programs.
- With respect to information and customer and partner follow-up, Hydro-Québec will pursue several objectives:
 - pertinent information on all measures — and on their methods of application — will be made available; the utility will take all necessary steps to ease customer uncertainty;
 - access to accessories will be made easy, both in terms of availability and of purchase;
 - those who adopt energy-conservation measures will be given assurances as to the output, as well as to the quality, of equipment and service;
 - from the implementation of the very first energy-conservation programs, customers must remain satisfied with the experience; this is a prerequisite for the success of measures to follow.

Hydro-Québec itself will set the example in adopting measures for more efficient electricity use.

The utility will also work towards its objective of narrowing the gap between rates and cost of supply in each rate bracket. This will help customers become aware of the true value of the electrical service provided. These rate-adjustment measures will constitute a major energy-conservation incentive.

2.2

Energy-Conservation Programs

This chapter details Hydro-Québec's energy-efficiency programs for the years to come. These programs outline initiatives to be undertaken during the first three years of the plan, from 1990 to 1992. Those projected for a later date will be finalized after further study, and in the light of the results of the utility's initial efforts.

Energy-conservation programs are presented by market: residential, commercial and institutional, and industrial.

It should be noted that programs will be implemented progressively in each market based on a similar model. The first stage will be devoted to providing information and stimulating awareness among the target public. This will be followed by the adoption of concrete measures tailored to each market. Customer participation follow-up and detailed evaluation will conclude the cycle.

Needless to say, the time allotted to each of these three steps may vary according to the number of customers involved, the extent of existing energy-efficiency awareness among customer groups, the nature of the measures to be applied, as well as their degree of technological complexity.

Marketing and technological support programs, and consumption-management programs will complement these energy-conservation programs.

Energy-conservation programs have been drawn up in three versions, each corresponding to a Development Plan scenario.

Energy savings projected under the average electricity demand scenario will reach 12.9 terawatt-hours annually by Horizon 1999. Table 3 summarizes anticipated results by market, and the resulting cost to Hydro-Québec.

Table 3
Energy-Conservation Project Objectives, Average Scenario

| | Annual Impact 1999 (TWh) | Cumulative Impact 1990-99(TWh) | Total Cost 1990-1999 (\$M)* |
|--------------------|-----------------------------|-----------------------------------|-----------------------------------|
| Residential market | 4.7 | 25.7 | 432 |
| Commercial market | 2.9 | 14.8 | 650 |
| Industrial market | 1.5 | 7.2 | 239 |
| Natural savings | 3.9 | 22.4 | |
| Commercial support | | | 130 |
| Total | 12.9 | 70.1 | 1,451** |

*These amounts, and all others in this document, are expressed in constant 1989 dollars except for the figure of \$1.8 billion shown on page 1.

**Amount corresponding to \$1.8 billion figure shown on page 1.

The strong scenario forecasts higher energy savings than does the average scenario, 17.8 terawatt-hours annually, since rising supply costs would bring about higher rates. Furthermore, under a strong demand scenario, the energy-conservation potential would also be higher.

Under the weak scenario energy savings would decline slightly, to a yearly level of 12.2 terawatt-hours. Lower supply costs and weaker demand growth are the principal reasons.

a) Residential

The residential market numbers some 2.5 million customers, of whom 63% are owners, and 37% tenants. Electricity sales in this sector attained the 46.3 terawatt-hour mark in 1989, accounting for 36% of Québec firm-electricity sales. Revenue resulting from residential sales accounts for 42% of all revenue. The residential market is characterized by four usage categories: space heating, water heating, electrical appliances, and lighting. Annual consumption in each category is shown in Table 4.

Table 4
Residential Market Consumption, 1989

| Use | Consumption (TWh) |
|-----------------------|-------------------|
| Space heating | 20.8 |
| Electrical appliances | 14.0 |
| Water heating | 8.2 |
| Lighting | 3.3 |
| Total | 46.3 |

Studies have indicated that residential market customers are unfamiliar with the methods and equipment which could help them improve energy efficiency. Providing customers with information on techniques for reducing their electricity bill thus becomes an important concern. Such information will help them become accustomed to choosing products and equipment which are much more energy-efficient.

Hydro-Québec, in accordance with its basic strategy for this market, will be offering a wide range of energy-conservation options in order to reach a maximum number of customers.

The first initiatives selected meet the following criteria:

- beneficial to consumers;
- reduce electricity consumption;
- use low-complexity products;
- can generally be installed by customer;
- possible mass distribution.

Initiatives to follow will be more wide-ranging in scope, and will necessitate more frequent intervention by specialized employees.

Table 5 summarizes currently proposed initiatives for making energy conservation an integral part of the residential market. The data sheets published in Part Two of this document provide a detailed description of these initiatives. (See Data Sheets 1 — 7.)

Table 5
Residential Market Energy-Conservation Programs

| Initiative | Start | Duration (years) | Annual Impact (GWh) | Cumulative Impact 1990-1999 (GWh) | Total H.-Q. Cost (\$M) |
|-------------------------------------|-------|---------------------|---------------------------|--|---------------------------------|
| 1 - Six subsidized accessories | 1990 | 2 | 1,420 | 12,910 | 21.0 |
| 2 - Accessories: circular promotion | 1990 | 2 | 80 | 765 | 0.25 |
| 3 - Energy analysis (experimental) | 1990 | 1 | 2 | 19 | 0.8 |
| 4 - Energy analysis (mass program) | 1992 | 10 | 1,700 | 6,020 | 187.5 |
| 5 - Thermal insulation (dwellings) | 1991 | 4 | 100 | 728 | 25.2 |
| 6 - Energy analysis, pre-renovation | 1992 | perm. | 550 | 1,990 | 73.4 |
| 7 - Electric water heaters | 1993 | 10 | 850 | 3,215 | 124.0 |
| Total | | | 4,702 | 25,650 | 432.0 |

b) Commercial and Institutional

The commercial and institutional markets total 238,000 and 23,000 customers respectively. Electricity sales to these markets account for 26.8 terawatt-hours and 22% of Québec firm-electricity sales. Revenue produced accounts for 28% of the Québec total.

There are four commercial and institutional market usage categories: space heating, water heating, air conditioning and ventilation, and lighting. Annual consumption for each category is shown below.

Table 6
Electricity Consumption, Commercial and Institutional Markets

| Use | Consumption (TWh) |
|----------------------------------|-------------------|
| Lighting | 10.5 |
| Space heating | 8.5 |
| Air conditioning and ventilation | 5.3 |
| Water heating | 2.5 |
| Total | 26.8 |

The principal characteristics of these markets are:

- Diversity, whether by building size and function, location or management method.
- A large institutional installations volume, a significant portion of which belongs to the Québec public sector (31 million square metres), to the federal government, and to municipal administrations.
- Customers sensitive to energy conservation, but not necessarily prepared to adopt measures they are aware of unless induced to do so.

Given the diversified nature of the commercial and institutional markets, Hydro-Québec will structure its initiatives according to the various strata of each. Since each market has its own special characteristics, each constitutes a distinct target.

Since the number of institutional installations is substantial, it will occupy a key position. Here, Hydro-Québec intends to set an example by applying energy-conservation measures to its own buildings, thus hoping to encourage emulation.

For small-business-oriented initiatives to succeed, Hydro-Québec will have to provide incentives, such as subsidies or financing, as well as technical assistance (training, consulting services, etc.)

These measures could concentrate on one or more applications — heating, ventilation, lighting, and water heating — depending on specific customer needs and technical possibilities.

Table 7 summarizes currently proposed initiatives for making energy conservation an integral part of the commercial and institutional markets. The data sheets published in Part Two of this document provide a detailed description of these initiatives. (See Data Sheets 8 — 13.)

Table 7
Energy-Conservation Programs, Commercial and Institutional Markets

| Initiative | Start | Duration (years) | Annual Impact (GWh) | Cumulative Impact 1990-1999 (GWh) | Total H.-Q. Cost (\$M) |
|--|-------|---------------------|---------------------------|--|---------------------------------|
| 8 - Analysis, H.-Q. buildings | 1990 | 3 | 68 | 480 | 29 |
| 9 - Analysis, institutional buildings | 1991 | 5 | 672 | 4,608 | 171 |
| 10 - Analysis, large commercial complexes | 1992 | 6 | 233 | 1,281 | 66 |
| 11 - Public lighting | 1990 | 4 | 163 | 1,350 | 14 |
| 12 - Energy initiatives, small/medium businesses | 1993 | 7 | 258 | 1,064 | 55 |
| 13 - Small/medium business applications | 1993 | 7 | 1,462 | 6,017 | 315 |
| Total | | | 2,855 | 14,795 | 650 |

c) Industrial

The industrial market consists of some 13,000 enterprises operating in various sectors. In terms of electricity consumption, the three major ones are the pulp and paper industry, smelting and refining, and chemicals.

Total 1989 industrial market consumption reached 46.3 terawatt-hours; this was distributed among several uses, as indicated below. Some 175 large enterprises, whose firm demand exceeds 5,000 kilowatt-hours, consume 85% of all firm electricity sold on the industrial market, a fact that will guide Hydro-Québec's strategy in this area.

Table 8
Average Industrial Profile, 1989 (estimated)

| Use | Consumption (TWh) |
|--------------|-------------------|
| Motive power | 28.7 |
| Lighting | 2.1 |
| Electrolysis | 10.5 |
| Smelting | 3.2 |
| Other | 1.8 |
| Total | 46.3 |

These three principal industrial sectors will experience vigorous growth in consumption over the next 10 years, and will contribute substantially to the overall growth of firm-electricity sales in Québec. Construction of new aluminum smelters and expansion of smelters already in production will modify the relative share of each use, with electricity demand for electrolysis showing the most rapid increase. However, since these new installations will be employing an extremely sophisticated technology, no further action is needed to enhance their efficiency.

Hydro-Québec will thus be concentrating its efforts on other uses, particularly on motive power, which will account for more than half of all industrial consumption.

Industrial customers are sensitive to variations in electricity costs, which often represent a significant portion of an enterprise's expenditures. Energy-efficiency measures will thus be well received, providing return on customer investment is high. In this perspective, and to enhance the success rate of its marketing activity, Hydro-Québec will seek first and foremost to influence the choices made by industries replacing obsolescent facilities.

In the industrial market, energy conservation helps make Québec enterprises more competitive. It is Hydro-Québec's intention to promote industrial profitability and productivity through promotion of suitable energy-conservation methods. The diversity of processes and industrial uses, the size of the enterprises involved, the significance of electricity costs in relation to total production costs, and an enterprise's relative performance in terms of energy efficiency are the main factors which will determine the utility's basic strategy in taking on this market.

For uses which are widespread and common to many sectors, such as motive power or lighting, specific programs will be formulated, while more general programs will seek to promote energy conservation specific to a particular process or sector. The aim: seize every opportunity for conserving energy. These programs will be backed by a wide range of communication, educational and informational tools, as well as by technical assistance methods designed to evaluate a given customer's energy-conservation potential.

To ensure sharing of efforts needed to implement these programs, large enterprises will constitute the initial target group, followed closely by small- and medium-sized businesses. Eventually, these same programs may be extended to commercial customers where uses are shared with industrial customers.

Table 9 summarizes currently proposed initiatives for making energy conservation an integral part of the industrial market. The data sheets published in Part Two of this document provide a detailed description of these initiatives. (See Data Sheets 14 — 18.)

Table 9
Energy-Conservation Programs, Industrial Market

| Initiative | Start | Duration (years) | Annual Impact (GWh) | Cumulative Rate 1990-1999 (GWh) | Total Cost: H.-Q. (\$M) |
|---|-------|---------------------|---------------------------|--|----------------------------------|
| 14 - Energy analysis | 1992 | 8 | 170 | 765 | 18.5 |
| 15 - Energy initiatives, processes | 1991 | 9 | 380 | 2,055 | 26.0 |
| 16 - High-performance motors | 1991 | 9 | 685 | 3,190 | 84.6 |
| 17 - Energy management | 1992 | 8 | 265 | 1,145 | 35.2 |
| 18 - High-performance electrotechnologies | 1990 | 10 | --- | --- | 75.0 |
| Total | | | 1,500 | 7,155 | 239.3 |

In addition to these programs, another program is already making a major contribution to the overall efficiency of industrial enterprises: the Electrotechnology Implementation Assistance Program. This program is designed to encourage conversion from fossil fuel to processes based on electricity.

This program's primary objective is to make known and implement certain technologies specifically conceived to upgrade the overall efficiency — and thus competitiveness — of Québec industries. Over and above energy gains, implementation of an electrotechnology brings with it significant advances (such as flexibility, productivity, improved working conditions, environmental spinoffs) which cannot always be quantified.

After several years of existence, the program will be modified so that financial support is given to those electrotechnologies promising significant energy gains compared with the fuel replaced.

d) Marketing and Technological Support

The success of the Energy Efficiency Project does not depend on initiatives directed toward the customer base alone. It will also be shaped by broader considerations which will be neither market-bound nor directly customer-oriented. This approach involves, either separately or jointly, two principal areas: R & D, and marketing initiatives, such as training of Hydro-Québec employees and collaborators, public information, advertising, standardization, etc.

These initiatives play a supporting role for energy-conservation programs in the various markets, and help generate or strengthen natural energy-efficiency savings which, as noted, will reach 3.9 terawatt-hours in 1999 according to the average demand scenario.

For this natural conservation to materialize, a certain degree of marketing support is required. When incentives either are terminated or cut back, customers tend to lose interest. Hence Hydro-Québec's resolve to devote special efforts to research, development and demonstration of energy-efficient equipment. The utility may even perform a portion of this work itself. In a majority of cases, however, it will rely on its collaborators — manufacturers, professional associations, government and private agencies — offering them its assistance and cooperation.

Potential users must be made aware of the availability of more efficient technologies, and this availability must be accompanied by a shift in attitude. In short, more and more customers must be persuaded to make energy efficiency a daily concern. Since it is unlikely that such a shift will happen spontaneously, it must be brought about. Proposed information, training and advertising activities all fit into this overall approach.

These initiatives are consistent with those undertaken by Hydro-Québec in past years; for example, the Cascade, Novelec and Energain programs.

Table 10 summarizes initiatives currently proposed for providing the marketing and technological support necessary to ensure the success of energy-conservation programs. The data sheets published in Part Two of this document provide a detailed description of these initiatives. (See Data Sheets 19 — 29.)

Table 10
Marketing and Technological Support Initiatives

| Initiative | Start | Total Cost 1990-99 (\$M) |
|---|-------|--------------------------|
| 19 - H.-Q. employee participation | 1990 | 3 |
| 20 - Advertising campaigns | 1990 | 20 |
| 21 - School energy-efficiency programs | 1990 | 5 |
| 22 - Energy efficiency, general public | 1990 | 23 |
| 23 - Energy efficiency in industry | 1990 | 4 |
| 24 - Construction quality label | 1991 | 9 |
| 25 - Appliance performance standards | 1992 | 6 |
| 26 - Demonstration houses and units | 1992 | 4 |
| 27 - New residential construction standards | 1991 | 1 |
| 28 - R & D — energy efficiency | 1990 | 50 |
| 29 - Public events — energy efficiency | 1991 | 5 |
| Total | | 130 |

Consumption Management

Hydro-Québec has been employing consumption-management techniques for many years and will continue to do so through the Energy Efficiency Project. Two other programs which, though not directly related to consumption management still contribute significantly to energy efficiency, should also be mentioned. They are the combined generation (cogeneration) program in the industrial market, and the program relating to energy sources for non-connected systems.

Taken as a whole, the initiatives planned should allow for creation of a margin of manoeuvre equivalent to 4,270 megawatts of peak power by 1999.

3.1

Interruptible Power

Under the terms of the interruptible-power program, certain industrial customers agree to reduce peak-period consumption at the request of Hydro-Québec. This program offers a range of options which respect both customer needs and those of the Hydro-Québec system. Premiums paid out to customers joining the plan account for a substantial part of the utility's conserved energy. In fact, this program makes it possible to avoid construction or operation of peak-period generating facilities which would otherwise have been necessary. Contracts in force at the beginning of winter 1989-1990 have accounted for a 760-megawatthour reduction in peak demand.

The target figure is 1,200 megawatthours for Horizon 1995-1996, approximately 3.5% of projected peak demand. To achieve this goal, market penetration efforts will be continued during the coming years, particularly in the pulp and paper industry. (See Appendix, Data Sheet 33.)

3.2

Electric Boilers

The electric boiler units installed during the surplus energy program provides a flexible consumption-management tool. By the end of the program, there was a 3,000-megawatt stock of electric boilers. It will prove beneficial to both Hydro-Québec and its customers to maintain a portion of this stock for the sale of eventual surpluses on the Québec market. To this end, Hydro-Québec has instituted two industrial rates: the emergency repairs and maintenance rate, and the intermittent surplus energy rate.

The emergency repairs and maintenance rate permits customers to utilize electric boilers to replace fuel-fired installations in order to sustain power generation in the event of breakdown or maintenance. Up to the present, 37 customers have subscribed to the emergency repairs and maintenance rate for a total of 870 megawatts.

With regard to the intermittent surplus energy rate, the provisions of the 1989 electricity rate bylaw will facilitate sale of temporary surplus energy, if available. (See Appendix, Data Sheet 34.)

Energy surpluses are unlikely in the short term. Maintaining boiler units, supported by the emergency repairs and maintenance rate, will allow customers to profit from surpluses, when available, for brief periods, at attractive prices.

3.3

Residential Dual Energy

In terms of consumption management, dual energy is an excellent replacement for all-electric heating. For customers it is an option well worth considering thanks to the attractive rates established by Hydro-Québec, plus a service and maintenance program subsidized by the utility.

This program, instituted in 1983, now extends to 90,000 units. Hydro-Québec's objective is 150,000 units in 1992. Leading edge technologies, such as the integrated dual-energy furnace, will make it easier to attain this goal. Dual energy expansion will take place in both existing and new markets. (See Appendix, Data Sheet 30.)

3.4

Commercial, Institutional and Industrial Dual Energy

Commercial, institutional and industrial dual energy is a tool of choice for short-term readjustment of demand-side energy availability. In the current context of low runoff, the program has helped free up a reserve of 5 terawatt-hours. This reserve will be reconstituted as soon as energy balance can be re-established: existing customers will once again be offered attractive rates and an increase in the number of units through new conversions is contemplated. The annual management potential at term should thus reach 4,600 gigawatt-hours. (See Appendix, Data Sheets 31--32.)

Hydro-Québec looks upon dual energy as a firm customer base to which it intends to supply energy at competitive prices and in a dependable manner during the coming years. Because of its flexibility and its ability to transfer from one service to another, this base forms an energy reserve to which the utility could turn on occasion, in the event of such unlikely phenomena as long-term low runoff, to modify delivery conditions.

3.5

Related Programs: Combined Generation (Cogeneration)

Combined generation (cogeneration) is defined as a method of generating both electricity and useful heat from the same energy source.

Though combined generation is primarily a supply management device, the program also contributes to energy efficiency. For instance, the efficiency of a combined-generation process utilizing a combined-cycle gas turbine may run as high as 80%, while that of a conventional thermal installation is less than 40%.

Combined generation represents an attractive generating method both for Québec society and for Hydro-Québec, over both the short and long term, due to the relatively short implementation period, proximity of markets, and the diversification of generation sources it provides.

In the short term, combined generation can help compensate the supply-demand imbalance brought about by low runoff and strong growth in demand. In the long term, it will help Hydro-Québec reduce its investment in basic facilities.

Hydro-Québec wishes to enter into long-term (15-20 year) contracts with industrial partners interested in combined generation. However, short-term (five-year) contracts may also be accepted for such systems scheduled to go on stream before the 1992-1993 peak period. The greatest potential is to be found in the forest, petrochemical and chemical industries. Among the most promising technologies are gas turbines and steam turbines powered by forest industry biomass.

To promote development of this potential, initiatives under study include financial assistance for feasibility studies and for investment. (See Appendix, Data Sheet 35.)

3.6

Related Programs: Non-Connected Systems

There are a number of small, independent systems that are not linked to Hydro-Québec's main grid where the bulk of electricity is produced by thermal-generating stations. To boost energy efficiency, Hydro-Québec plans to promote use of fuel oil by customers as an energy source for heating, and to encourage installation of high-efficiency systems. (See Appendix, Data Sheet 36.)

Table 11 summarizes currently proposed consumption-management initiatives. The data sheets published in Part Two of this document provide a detailed description of these initiatives. (See Appendix, Data Sheets 30 -- 34.)

Table 11
Consumption Management Programs

| Initiative | Start | Maximal Annual Impact (GWh) | Maximal Impact, Power (MW) | Total H.-Q. Cost (\$M) |
|---------------------------------------|-------|-----------------------------|----------------------------|------------------------|
| 30 - Residential dual energy | 1991 | | 1,570 | 147.5 |
| 31 - Dual energy, resumption CII* | 1991 | 4,000 | 1,300 | |
| 32 - Dual energy, expansion CII* 1991 | 600 | 200 | 10.0 | |
| 33 - Interruptible power | 1990 | | 1,200 | 475.5 |
| 34 - Maintaining boilers | 1990 | 4,000 | | |
| Total | | 10,800 | 4,270 | 633.0 |

* Commercial, institutional and industrial dual energy

Proposed Marketing Programs and Initiatives

Energy-Conservation Project: Average Scenario

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A) Residential Programs

Data Sheet 1

Six High-Efficiency Accessories -- Promotion by Subsidy

Objective

Raise public awareness of the concept of energy efficiency, and help publicize the most efficient accessories on the market.

Description

Promote, through subsidies, a range of accessories for everyday use designed to encourage lower energy consumption: reduced-flow shower heads, more efficient interior and exterior lighting fixtures, flow-filters for faucets, block-heater timers, programmable thermostats.

Draft Strategy

Launch six accessories, one after the other; collaborate with distributors and manufacturers to create optimum conditions for supplying customers at lowest possible prices.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1990 (2 years) |
| Maximal annual impact | 1,420 GWh |
| Cumulative impact, 1990-1999 | 12,910 GWh |
| Total H.-Q. program cost | \$21 million |

Data Sheet 2

High-Efficiency Accessories — Promotion by Circular

Objective

Raise public awareness of the concept of energy efficiency, and help publicize the most efficient accessories on the market.

Description

Promote, through circulars, 20 or 30 accessories or small appliances for everyday use designed to encourage lower energy consumption.

Draft Strategy

Distribute two circulars, for products used in winter and in summer. Accessories and appliances to be chosen for ease of installation and distribution.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1990 (2 years) |
| Maximal annual impact | 80 GWh |
| Cumulative impact, 1990-1999 | 765 GWh |
| Total H.-Q. program cost | \$0.25 million |

Data Sheet 3 Residential Energy Analysis — Experimental Project

Objective

Rapidly acquire expertise in residential energy analysis while helping low-income customers lower their energy bills.

Description

Make house calls featuring free installation of energy consumption-reducing accessories; help residents identify uses leading to meaningful energy savings (heating, air conditioning, lighting, hot water, refrigeration, washer, dryer, etc.).

Draft Strategy

Give top priority to low-income customers or those experiencing difficulties in paying their electricity bill (all-electric heating); evaluate energy-conservation potential, cost of call, reception by tenants or owners.

Anticipated Results (preliminary)

| | |
|------------------------------|---------------|
| Launch date (duration) | 1990 (1 year) |
| Maximal annual impact | 2 GWh |
| Cumulative impact, 1990-1999 | 19 GWh |
| Total H.-Q. program cost | \$0.8 million |

Data Sheet 4
Residential Energy Analysis -- Mass Program

Objective

Reduce residential customer energy consumption by improving the energy performance of various uses and applications of electricity.

Description

Residential energy analysis to cover the following points:

- basic energy analysis, including upgrading insulation;
- distribution of literature on ways to reduce energy consumption;
- free installation of energy-conservation devices;
- presentation of kit containing energy-conservation devices to be installed by customer;
- invitation to purchase energy-conservation devices;
- list of qualified contractors for upgrading insulation;
- information on other energy-efficiency programs for which customers are eligible.

Draft Strategy

Six-point program, to be launched in succession.

Anticipated Results (preliminary)

| | |
|------------------------------|-----------------|
| Launch date (duration) | 1992 (10 years) |
| Maximal annual impact | 1,700 GWh |
| Cumulative impact, 1990-1999 | 6,020 GWh |
| Total H.-Q. program cost | \$187.5 million |

Data Sheet 5
Thermal Insulation, Residences

Objective

Reduce electric heating demand and energy consumption for air conditioning and electric heating.

Description

Provide financial assistance to further upgrade insulation.

Draft Strategy

Begin with dwellings which have not benefitted in the past from similar programs.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1991 (4 years) |
| Maximal annual impact | 100 GWh |
| Cumulative impact, 1990-1999 | 728 GWh |
| Total H.-Q. program cost | \$25.2 million |

Data Sheet 6

Pre-Renovation Energy Analysis

Objective

Optimize overall energy efficiency in houses to be renovated and ensure that owners select best available energy sources and heating systems for such major uses as space and water heating.

Description

Provide free expert assistance to owners wishing to undertake large-scale renovations or modify building function; assistance to be extended to all energy-efficiency-related aspects of buildings (structure, energy systems, appliances, consumption habits).

Draft Strategy

Publicize program among the general public and in specialized media to establish contact with owners at the renovation planning stage.

Anticipated Results (preliminary)

| | |
|------------------------------|------------------|
| Launch date (duration) | 1992 (permanent) |
| Maximal annual impact | 550 GWh |
| Cumulative impact, 1990-1999 | 1,990 GWh |
| Total H.-Q. program cost | \$73.4 million |

Data Sheet 7
Electric Water Heaters

Objective

Reduce residential water heater energy consumption.

Description

Develop a more energy-efficient water heater which will facilitate demand management.

Draft Strategy

Make the new water heater and its advantages known to all via a long-term advertising campaign. Establish a permanent quality-control mechanism for new water heaters. Ensure purchase prices remain comparable to other electric water heaters now on the market, notwithstanding lower utilization costs to customers (involve manufacturers, distributors and customers).

Anticipated Results (preliminary)

| | |
|------------------------------|-----------------|
| Launch date (duration) | 1993 (10 years) |
| Maximal annual impact | 850 GWh |
| Cumulative impact, 1990-1999 | 3,215 GWh |
| Total H.-Q. program cost | \$124 million |

B) Commercial and Institutional Programs

Data Sheet 8

Energy Analysis, Hydro-Québec Buildings

Objective

Enhance the energy efficiency of Hydro-Québec buildings to provide an example while reinforcing the credibility of the utility's marketing programs.

Description

Conduct a thorough and rigorous energy analysis (covering space and water heating, lighting, air conditioning and ventilation) of all Hydro-Québec administrative buildings; prepare and recommend, in cooperation with persons responsible for each building, a plan to implement energy-efficiency-enhancement measures; apply these measures; devise control mechanisms.

Draft Strategy

Widely publicize results obtained in Hydro-Québec buildings; use as demonstrators for outside experts such as architects, engineers, real-estate developers, building managers, etc.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1990 (3 years) |
| Maximal annual impact | 68 GWh |
| Cumulative impact, 1990-1999 | 480 GWh |
| Total H.-Q. program cost | \$29 million |

Data Sheet 9
Energy Analysis, Institutional Buildings

Objective

Upgrade the energy efficiency of institutional buildings

Description

Conduct or commission a thorough and rigorous energy analysis (covering space and water heating, lighting, air conditioning and ventilation) of all Québec government institutional buildings; prepare, in cooperation with persons responsible for each building, a plan to implement energy efficiency enhancement measures; devise control mechanisms and incentives for building managers.

Draft Strategy

Group buildings into categories (schools, hospitals, offices, group residences, etc.); coordinate actions with government departments concerned; help implement recommended measures.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1991 (5 years) |
| Maximal annual impact | 672 GWh |
| Cumulative impact, 1990-1999 | 4,608 GWh |
| Total H.-Q. program cost | \$171 million |

Data Sheet 10 Energy Analysis, Large Commercial Complexes

Objective

Upgrade energy efficiency (reduce energy consumption, reduce or level demand) in Québec's large commercial complexes (office buildings, shopping centres, recreation facilities, etc .)

Description

Perform thorough and rigorous energy analysis (covering space and water heating, lighting, air conditioning and ventilation) of all large Québec commercial centres; prepare, in cooperation with persons responsible for each building, a plan to implement energy efficiency enhancement measures.

Draft Strategy

Contribute financially to energy analysis performed by firms specializing in energy efficiency.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1992 (6 years) |
| Maximal annual impact | 233 GWh |
| Cumulative impact, 1990-1999 | 1,281 GWh |
| Total H.-Q. program cost | \$66 million |

Data Sheet 11
Public Lighting

Objective

Reduce electricity consumption for lighting Québec public roadways.

Description

Replace lights in current use with highly energy-efficient lamps.

Draft Strategy

Modify Hydro-Québec's 133,000 lighting units as a demonstration pilot project; then, through various support actions (consultation, financing or subsidies), induce municipalities to modernize lighting units.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1990 (4 years) |
| Maximal annual impact | 163 GWh |
| Cumulative impact, 1990-1999 | 1,350 GWh |
| Total H.-Q. program cost | \$14 million |

Data Sheet 12

Customer Energy Initiatives -- Small and Medium Enterprises (Commercial and Industrial)

Objective

Encourage initiatives by small- and medium-sized enterprises designed to reduce energy consumption by identifying energy-conservation measures specific to small buildings (where complete energy analysis would not be profitable), and by suggesting solutions better adapted to their needs (excluding industrial processes).

Description

Enhance efficiency of main energy-use applications: space and water heating, lighting, air conditioning and ventilation (excluding industrial processes, dealt with as a separate subject) of all Québec small and medium enterprises (businesses and industries).

Draft Strategy

Invite small and medium enterprises to submit to Hydro-Québec energy-efficiency-enhancement projects designed for their installations; evaluate these projects and provide financial assistance (subsidies or financing) according to project energy-saving potential, and profitability for Hydro-Québec and customers.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1993 (7 years) |
| Maximal annual impact | 258 GWh |
| Cumulative impact, 1990-1999 | 1,064 GWh |
| Total H.-Q. program cost | \$55 million |

Data Sheet 13
**Specific Applications in Small and Medium Enterprises
(Commercial and Industrial)**

Objective

Reduce energy consumption among Québec small and medium enterprises (businesses and industries).

Description

Offer energy-efficiency-enhancement plans focused on specific applications: lighting, space and water heating, air conditioning and ventilation (excluding industrial processes). Main feature of program to be its specialized approach: only one application to be dealt with at a time, contrary to energy analyses dealing with all aspects of building energy management.

Draft Strategy

Set up, either in-house or outside Hydro-Québec, teams specializing in particular energy applications (lighting, for example); such teams would, on request, offer their services to small and medium businesses, suggesting or carrying out improvements in their field of expertise. Hydro-Québec to train employees or accredit outside collaborators, and will provide financial assistance.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1993 (7 years) |
| Maximal annual impact | 1,462 GWh |
| Cumulative impact, 1990-1999 | 6,017 GWh |
| Total H.-Q. program cost | \$315 million |

C) *Industrial Programs*

Data Sheet 14

Energy Analysis, Industrial Customers

Objective

Enhance energy efficiency (through reduction of energy consumption, reduction or demand levelling) of Québec industrial enterprises by ascertaining the energy-conservation potential of each enterprise's industrial process, bearing its specifics in mind.

Description

Perform a thorough, rigorous energy analysis adapted to each enterprise's needs; prepare, in cooperation with company officials, an energy-efficiency-enhancement implementation plan.

Draft Strategy

Provide technical and financial assistance for energy analysis:

- Step One: summary analysis to itemize facilities, determine consumption for each use, evaluate energy-conservation potential and estimate cost.
- Step Two: where more complex processes require, additional analysis by specialists to obtain a higher degree of precision.

Work closely with engineering firms.

Anticipated Results (preliminary)

Launch date (duration)

| | |
|------------------------------|----------------|
| - Pilots | 1991 (1 year) |
| - Program | 1992 (8 years) |
| Maximal annual impact | 170 GWh |
| Cumulative impact, 1990-1999 | 765 GWh |
| Total H.-Q. program cost | \$18.5 million |

Data Sheet 15

Customer Energy Initiatives -- Industrial Processes

Objective

Encourage energy saving techniques specific to particular industrial processes and capable of guaranteeing gains in energy efficiency.

Description

Enhance efficiency of industrial processes other than those applications covered by the high-performance motor installation program.

Draft Strategy

Invite industrialists to submit to Hydro-Québec all energy-efficiency-enhancement projects to be applied to their processes; evaluate projects and provide financial assistance commensurate with projects' energy-saving potential.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1991 (9 years) |
| Maximal annual impact | 380 GWh |
| Cumulative impact, 1990-1999 | 2,055 GWh |
| Total H.-Q. program cost | \$26 million |

Data Sheet 16

Financial Assistance, High-Performance Motor Installation

Objective

Encourage gains in energy efficiency derived from conversion of standard to high-performance motors.

Description

Allocate financial assistance for installation of high-performance motors in all industrial, commercial and institutional sectors.

Draft Strategy

Define the concept of high performance and draw up minimum efficiency standards, by class of motor, in cooperation with other public corporations offering similar programs.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1991 (9 years) |
| Maximal annual impact | 685 GWh |
| Cumulative impact, 1990-1999 | 3,190 GWh |
| Total H.-Q. program cost | \$84.6 million |

Data Sheet 17
Energy Management, Industrial Customers

Objective

Increase energy efficiency in the industrial sector through improved energy management.

Description

Promote materials or techniques to improve energy management in industry.

Draft Strategy

Identify possible areas of improvement and promote installation of measurement or management facilities, or any other technology or device for better understanding and better managing energy consumption whether by use, by production unit, or by process.

Anticipated Results (preliminary)

Launch date (duration)

| | |
|------------------------------|----------------|
| - Pilot | 1991 (1 year) |
| - Program | 1992 (8 years) |
| Maximal annual impact | 265 GWh |
| Cumulative impact, 1990-1999 | 1,145 GWh |
| Total H.-Q. program cost | \$35.2 million |

Data Sheet 18

Industrial Electrotechnologies, Installation Assistance

Objective

Introduce and apply high-efficiency electrotechnologies to industrial processes to enhance competitiveness of Québec industry.

Description

Make technical and financial assistance programs available for introduction and application of industrial electrotechnologies to production processes.

Draft Strategy

Extend technical and financial support to enterprises wishing to introduce electrotechnologies. Participate in feasibility studies and develop pilot projects to demonstrate feasibility and profitability, and illustrate the multiple advantages of electrotechnologies. Carry out R & D activities.

Anticipated Results (preliminary)

| | |
|--|-------------------|
| Launch date (duration) | 1990 (10 years) |
| Maximal annual impact (GWh equivalent)* | 500 GWh (125 MW)* |
| Cumulative impact, 1990-1999 (GWh equivalent)* | 2,250 GWh* |

* Estimated energy gain (not a sales objective)

D) *Marketing and Technological Support Initiatives*

Data Sheet 19

Participation, Hydro-Québec Employees

Objective

Invite Hydro-Québec employees to participate in energy-efficiency programs by acquainting them with these programs; encourage them to become effective spokespersons.

Description

Make Hydro-Québec employees aware of how important they are to the success of energy-efficiency programs; provide them with information on programs and with program participation incentives to encourage their active collaboration.

Draft Strategy

- Offer programs to employees on a priority basis.

- Send employees personal letters containing program information and soliciting their active participation; hold unit meetings; lunch-hour meetings with door prizes; *Hydro-Presse* and *Courants*.

Anticipated Results (preliminary)

| | |
|---------------------------|------------------|
| Launch date (duration) | 1990 (permanent) |
| Marketing cost, 1990-1999 | \$3 million |

Data Sheet 20
Advertising Campaigns

Objective

Mobilize the general public around the concept of energy efficiency.

Description

Conduct a large-scale advertising campaign aimed at the general public and designed to create a favorable climate for launching marketing programs now in preparation; make energy efficiency a regular advertising campaign theme.

Draft Strategy

Stimulate public awareness through a well-designed advertising campaign.

Anticipated Results (preliminary)

| | |
|---------------------------|--------------|
| Launch date | 1990 |
| Marketing cost, 1990-1999 | \$20 million |

Data Sheet 21 Introducing Energy Efficiency in Schools

Objective

Prepare the future generation of customers to adopt more energy-efficient behavior; invite them to encourage their parents to start changing energy consumption habits today.

Description

Ensure that energy efficiency is well integrated into curricula at all levels.

Draft Strategy

Contribute to the efforts of the *Bureau de l'efficacité énergétique*, which is already very active in this area.

Anticipated Results (preliminary)

| | |
|---------------------------|-------------|
| Launch date | 1990 |
| Marketing cost, 1990-1999 | \$5 million |

Data Sheet 22

Introducing Energy Efficiency to the Public

Objective

Diversify ways of reaching customers and of increasing their receptivity to changes in life-style, behavior and purchase criteria suggested by energy-efficiency programs.

Description

Produce a series of pamphlets on energy-efficiency-related topics and ensure maximum public distribution. Topics to include:

- how to get the most out of hot water;
- how to bring heating costs down;
- how to choose a heating system;
- how to reduce lighting costs;
- how to cut air-conditioning costs;
- how to build a super-efficient house;
- how to recognize energy-efficient appliances;
- using energy efficiently: fact and fiction.

Coordinate this project with action already undertaken by the *Bureau de l'efficacité énergétique*.

Draft Strategy

Publish pamphlets at regular intervals in a practical, easy-to-save format; each pamphlet to feature a contest dealing with previous issues, encouraging customers to read and save pamphlets.

Anticipated Results (preliminary)

Launch date

1990

Marketing cost, 1990-1999

\$22.9 million

Data Sheet 23 Introducing Energy Efficiency in Industry

Objective

Heighten awareness of energy efficiency and high-performance technology among industrial customers to stimulate interest in energy efficiency.

Description

Distribute high-performance technology information: reference guides, data sheets, test and pilot project results (oriented primarily toward optimal use of motive power with high-performance motors and variable-speed drives).

Draft Strategy

In close cooperation with the *Bureau de l'efficacité énergétique*:

- distribute documents at Hydro-Québec displays during exhibitions and congresses;
- organize energy-efficiency seminars for industrialists;
- work closely with engineering firms;
- meet manufacturers of high-performance equipment;
- conduct pilot projects to demonstrate profitability of energy-efficiency measures in various industrial sectors (motive power optimization projects in the pulp and paper and mining industries);
- develop software and other energy management tools.

Anticipated Results (preliminary)

| | |
|---------------------------|-------------|
| Launch date | 1990 |
| Marketing cost, 1990-1999 | \$4 million |

Data Sheet 24 Construction Quality Label

Objective

Allow Hydro-Québec to upgrade, to guarantee and to monitor the quality of construction work being carried out by customers within the purview of energy-efficiency marketing programs.

Description

Develop a quality label — a battery of regulations, trademarks, work standards, accreditation, employee training, work guarantees, inspections, etc. — governing the work of outside collaborators (master electricians, pipe-fitters, dual-energy specialists, construction and renovation contractors) performing work designed to enhance customer energy efficiency.

Draft Strategy

- Work closely with corporations and agencies that govern collaborators;
- coordinate all necessary steps leading to creation of an umbrella energy-efficiency-quality label;
- develop sub-labels for each construction or professional category related to energy efficiency.

Anticipated Results (preliminary)

| | |
|---------------------------|-------------|
| Launch date | 1991 |
| Marketing cost, 1990-1999 | \$9 million |

Data Sheet 25

Household Appliances, Performance Standards

Objective

Contribute to the constant improvement of household appliance energy performance.

Description

Contribute to the establishment of high performance standards for household appliances; urge manufacturers to adopt such standards; inform customers of the benefits of purchasing high-performance appliances.

Draft Strategy

Work with other Canadian electric utilities, the Canadian Electrical Association (CEA) and Québec's *Bureau de l'efficacité énergétique*, with a view to evaluating the possibility and the advantage to Québec, under the free trade agreement, of adopting North-American standards or joining North-American associations working toward the goal of energy efficiency; urge governments to adopt strict regulations for the manufacture and distribution of high-performance household electrical appliances.

Anticipated Results (preliminary)

Launch date

1992

Marketing cost, 1990-1999

\$6 million

Data Sheet 26

Demonstration Houses and Units

Objective

Support energy-efficiency efforts in the residential market; foster the emergence of energy-conservation consciousness; closely link the concept of energy efficiency with comfort and quality of life; boost Hydro-Québec's visibility on energy-conservation issues.

Description

Build, in all large Québec urban centres, a model home to act as showcase and clearing-house for information on the efficient use of electricity and on energy conservation in general; staff with qualified full-time personnel able to provide information to the public and respond to queries on energy efficiency; develop mobile units to be used in sparsely populated urban areas for specific events.

Draft Strategy

Develop and put in place throughout Québec the concept of permanent or semi-permanent display of products designed to enhance energy efficiency.

Anticipated Results (preliminary)

Launch date

1992

Marketing cost, 1990-1999

\$4.2 million

Data Sheet 27

Standards and Regulations, New Residential Construction

Objectives

Upgrade residential market energy efficiency by campaigning for improved quality in new house construction and energy systems; ensure optimal interior air quality in the light of strict energy-efficiency criteria for insulation, air replacement, etc.

Description

- Define new residential construction needs and orientations for Hydro-Québec, its customers and collaborators.
- Identify key figures in the new residential construction field.
- Establish policies for participation in various bodies; develop ways of dealing with the different levels of authority.
- Appoint representatives to deal with agencies and other interested parties.

Draft Strategy

In cooperation with the *Bureau de l'efficacité énergétique*, attempt to have laws, regulations and standards governing new residential construction and energy systems modified (the Québec Act respecting the conservation of energy in buildings; Canadian Standards Association, CSA Preliminary Standard -- Residential Mechanical Ventilation Requirements (*Energy Conservation in Housing*); ASHRAE90.1P Standard for the design of energy-efficient buildings and electromechanical systems).

Anticipated Results (preliminary)

| | |
|---------------------------|---------------|
| Launch date | 1991 |
| Marketing cost, 1990-1999 | \$1.5 million |

Data Sheet 28

Energy-Efficiency R & D

Objectives

Enhance efficiency of energy-consuming accessories, appliances, systems and processes.

Description

Conduct or commission research, development and demonstration of energy-consuming accessories, appliances, systems and processes.

Recent examples: residential water heating (better insulated, higher performance water heater); residential and commercial space heating (high-capacity oil furnaces; heat pumps with non electric backup), use of infra-red and plasma in industrial processes.

Draft Strategy

Work closely with outside interested groups: *Bureau de l'efficacité énergétique*, research institutes, universities, manufacturers, associations, etc.

Anticipated Results (preliminary)

Launch date

1991

Marketing cost, 1990-1999

\$50.0 million

Data Sheet 29

Energy-Efficiency Public Events

Objective

Promote energy efficiency expertise and heighten customer awareness in various economic sectors.

Description

Create a platform limited first to Québec and Canada, then international in scope, to facilitate encounters among interested parties and stimulate commercial transactions. In addition to an annual trade show, organize a program of technical and scientific lectures and site visits (pilot events).

Draft Strategy

Make energy efficiency the principal theme of a major public event, such as a large-scale exhibition or show.

Anticipated Results (preliminary)

| | |
|---------------------------|---------------|
| Launch date | 1991 |
| Marketing cost, 1990-1999 | \$2.0 million |

E) Consumption-Management Programs

Data Sheet 30

Expansion of Residential Dual Energy

Objective

Reduce electricity consumption and space heating demand in existing and future dwellings; use dual energy to enhance consumption management potential.

Description

Offer residential customers two dual-energy options:

- install super-efficient dual-energy furnaces or boilers equipped with wall chimneys;
- install high-efficiency furnaces or boilers matched with air-to-air heat pumps.

Program might also include an all-fuel option in addition to dual energy or all-electric: replace existing furnaces with new high-efficiency furnaces equipped with wall chimneys.

Draft Strategy

Focus on customers considering electricity as their principal energy source.

Anticipated Results (preliminary)

| | |
|------------------------------|-----------------|
| Launch date (duration) | 1991 (8 years) |
| Maximal annual energy impact | 2,025 GWh |
| Impact in terms of power | 1,570 MW |
| Total H.-Q. program cost | \$147.5 million |

Data Sheet 31
**Resumption of Commercial, Institutional and Industrial
Dual-Energy Deliveries (CII)**

Objective

Establish a Hydro-Québec energy reserve for extreme runoff scenarios, with a view to optimal electricity demand management.

Description

Resume electricity deliveries to CII dual-energy customers at the end of 1990.

Draft Strategy

Offer CII customers advantageous commercial terms reflecting average supply costs, thus ensuring customer loyalty to the concept of dual energy while preserving the energy flexibility Hydro-Québec derives from these units.

Anticipated Results (preliminary)

| | |
|------------------------------|------------------|
| Launch date (duration) | 1991 (permanent) |
| Maximal annual energy impact | 4,000 GWh |
| Impact in terms of power | 1,300 MW |

Data Sheet 32
Expansion of CII Dual Energy

Objective

Expand demand management potential through dual energy, particularly for small buildings.

Description

Offer financial assistance programs for conversion to and installation of dual-energy systems via high-performance technology.

Draft Strategy

Focus on customers who would, without Hydro-Québec's intervention, opt for all-electricity.

Anticipated Results (preliminary)

| | |
|------------------------------|----------------|
| Launch date (duration) | 1991 (7 years) |
| Maximal annual energy impact | 600 GWh |
| Impact in terms of power | 200 MW |
| Total H.-Q. program cost | \$10 million |

Data Sheet 33
Interruptible Power

Objective

Strengthen peak demand management on the Hydro-Québec system and enhance the competitiveness of Québec industries.

Description

Offer a marketing program under which large industrial customers undertake, in return for rebates representing a significant portion of the energy savings achieved by Hydro-Québec, to reduce demand to a pre-determined level during critical peak periods.

Draft Strategy

Offer Québec industrial customers a variety of interruption options, depending on production constraints, to maximize program participation and loyalty.

Anticipated Results (preliminary)

| | |
|--------------------------|------------------|
| Launch date (duration) | 1990 (permanent) |
| Impact in terms of power | 1,200 MW |
| Total H.-Q. program cost | \$475.5 million |

Data Sheet 34 Maintaining Electric Boilers

Objective

Maintain a pool of electric boilers to absorb eventual surpluses.

Description

Establish a market which Hydro-Québec can tap in the event of very heavy runoff or commissioning of new installations, to ensure optimal demand management.

Draft Strategy

Encourage customers to keep industrial boilers by offering an emergency repair or maintenance service for fuel-fired boilers in case of breakdown or need for repairs; establish an intermittent surplus energy rate for sale of electricity at advantageous terms in the event of temporary surpluses.

Anticipated Results (preliminary)

| | |
|------------------------------|------------------|
| Launch date (duration) | 1990 (permanent) |
| Maximal annual energy impact | 4,000 GWh |
| Impact in terms of power | 1,000 MW |

Data Sheet 35
Combined Generation (Cogeneration)

Objective

Increase and diversify electricity generating capacity in Québec in the short term, and reduce the risk of supply/demand imbalance.

Description

Purchase preferentially, on a long-term contract basis, electricity produced by Hydro-Québec industrial customers equipped with combined steam-electricity generating facilities.

Draft Strategy

- utilize the most promising potentials: forestry, chemical and petrochemical industries (single or combined cycle gas turbines; steam turbines driven by biomass);
- provide financial assistance for feasibility studies and for investment;
- purchase all electricity generated at a price reflecting avoided costs.

Anticipated Results (preliminary)

| | |
|------------------------------|------------------|
| Launch date (duration) | 1990 (permanent) |
| Maximal annual energy impact | 2,100 GWh |
| Impact in terms of power | 300 MW |

Data Sheet 36
Non-Connected Systems

Objective

Ensure energy needs of non-connected systems are satisfied at lowest cost, considering availability and operating costs of thermal generating facilities.

Description

Promote use of fuel oil as a heating source by customers, and encourage installation of high-efficiency heating systems.

Draft Strategy

Hydro-Québec to underwrite a portion of fuel-oil system installation costs for residential customers.

Anticipated Results (preliminary)

| | |
|------------------------------|------------------|
| Launch date (duration) | 1990 (permanent) |
| Maximal annual energy impact | 100 GWh |
| Impact in terms of power | 30 MW |

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