

## Context

Like most major cities in the world, Montréal is faced with growing problems of air pollution caused by the extensive use of conventional gasoline vehicles. In 1990, greenhouse gas emissions in Québec were on the order of 9.3 tonnes per inhabitant<sup>1</sup>, which is lower than the Canadian average but still comparable to levels measured in Europe. Among the factors contributing to Québec's relatively low level of emissions: its reliance on hydro-electricity which in 1995 counted for 41 % Québec's energy needs<sup>2</sup>. Under the 1997 Kyoto Protocol, Canada is committed to reducing greenhouse gas emissions to 6 % below 1990 levels by 2008–2012.

## The project

The *Montréal 2000 – Electric Vehicle Project* brought together 10 organizations which acquired a total of 24 EVs.

The project was directed by a steering committee composed of the four partners as well as the heads of each of the support committees: scientific, user support and communications. CEVEQ acted as project manager and served as the agent of the Steering Committee.

The scientific program was the centrepiece of the project. It documented the experiment to evaluate the reliability, efficiency and cost-effectiveness of the EVs. The needs of fleet managers and users as well as their overall satisfaction was also evaluated in relation to the charging infrastructure. Environmental impacts were also analyzed.

To demonstrate that using battery-powered electric vehicles in an urban environment offers a sustainable solution for reducing greenhouse gas emissions, the partners, the governments of Canada<sup>3</sup> and Québec, Hydro-Québec and CEVEQ<sup>4</sup>, launched the *Montréal 2000 – Electric Vehicle Project* in January 1999. Its goal was to help integrate electric vehicles (EVs) into institutional and private vehicle fleets in the greater Montréal region. The first of its kind in Canada, the project ran for 27 months and had three major thrusts: a scientific evaluation of EVs under normal operating conditions, support for participating organizations, and promotion of this mode of transportation in an urban setting.

The user support aspect of the project allowed participating organizations to come together to share their experiences. To ensure visibility of the project, the partners established a communications strategy and program aimed at the general public as well as various members of the scientific, political and economic communities.

The budget for the *Montréal 2000 – Electric Vehicle Project* was C\$ 2,073,000. It was based on the purchase of 24 EVs. The costs of the project were divided as follows : participating organizations, \$ 953,000; Government of Canada, \$ 500,000; Hydro-Québec, \$ 301,000; Government of Québec, \$ 200,000; CEVEQ, \$ 105,000; and ISAAC Instruments Inc., \$ 14,000.



*Yves Filion, assistant general manager at Hydro-Québec; Kenneth Jackson, president of Norvik Traction Inc.; Jacques Baril, Québec Minister of Transportation; Christine Stewart, federal Minister of Environment; and Marc Gascon, chairman of the board of CEVEQ take turns speaking at the launch of the Montréal 2000 – Electric Vehicle Project on January 25, 1999.*

### Participating organizations

PARTICIPANTS	MODELS
Bell Canada	2 Ford Rangers
Department of National Defence	1 Solectria CitiVan
Environment Canada	1 Solectria Force
Hydro-Québec	8 Ford Rangers 1 Solectria Force 1 Ford THINK city
Les Services électriques Blanchette	1 Ford Ranger
Ministère des Transports du Québec	2 Ford Rangers
Canada Post	1 Solectria (conversion)
Transport Canada	1 Solectria Force 1 Ford Ranger
City of Montréal	2 Ford Rangers
Ville de Saint-Jérôme	2 Ford THINK city
<b>Total</b>	<b>24</b>

1. In Québec, the transport sector alone represents more than 40 percent of greenhouse gas emissions.

2. Source: Ministère des Ressources naturelles, Government of Québec, *L'Énergie au Québec*, 1999, p. 23.

3. The Canadian government was involved through the innovation, research and design program (Environment Canada and Economic Development Canada) and the Climate Change Action Fund (Technology Early Action Measures, TEAM).

4. The partners: The Government of Canada, the Government of Québec, Hydro-Québec and CEVEQ. Their overall mandate: to provide the financial support needed to carry out the project, to oversee the operations of the project, and to recruit organizations to participate.

## Impacts

The *Montréal 2000 – Electric Vehicle Project* produced eight major results:

- The participation of 10 major public and private organizations in the Montréal region;
- A program of evaluation to document the use of EVs under normal operating conditions as well as the observations of users and vehicle fleet managers;
- The accreditation of a Ford dealership as the first official supplier of EVs in Canada;
- The establishment in Montréal of the first public and private charging infrastructure, which encourages the acquisition of new EVs;
- The creation of a core of users who, despite the end of the project, want to

continue their relationship and exchanges within the framework of a support committee such as was established during the project;

- A greater awareness of the general public of the beneficial effects of EVs on the environment and the promotion of this type of vehicle among policy makers

thanks to an effective communications program;

- Concrete demonstration of a solution aimed at reducing the negative impacts of ground transportation and conventional vehicles on air quality and greenhouse gas emissions;
- Opening of a new market for a clean renewable energy source : hydroelectricity.

## Results of the evaluation

### • Technical

The distance travelled by the EVs was calculated over the period between January 1999 and March 2001. Data collected from the odometers and driver log books showed the vehicles travelled a total 96,493 km.

Data gathered from the collection systems installed on each of the EVs allowed the calculation of an average daily distance travelled. The bar chart shows that 77 % of the time the vehicles were used to travel distances from between 0 and 40 km. Use of the vehicles for short distances can be explained by the fact that organizations generally use their internal combustion vehicles for a daily average of 40 km (Source: Données statistiques, City of Montréal).

The readiness and reliability of the EVs was also studied. It varied between 72 % and 100 % over the study period for an average of 88 %. The *Montréal 2000 – Electric Vehicle Project* took place in an experimental context, such that regular production and marketing of these vehicles had barely started. Adjustments and improvements

to parts and components of the EVs were therefore inevitable.

According to the data analyzed by the project, gasoline-powered vehicles have an average consumption rate per 100 km that is 5.5 times higher than EVs in the same category. As well, energy use of the battery-powered vehicles saw significant variations related to exterior temperature, road conditions (snow, etc.), air density and equipment installed by the EV makers, for example heaters in the passenger compartment.

### • Attitude

According to the various studies conducted within the framework of the scientific study, it appeared that some of the users were already familiar with how EVs performed, while most discovered this during the course of the

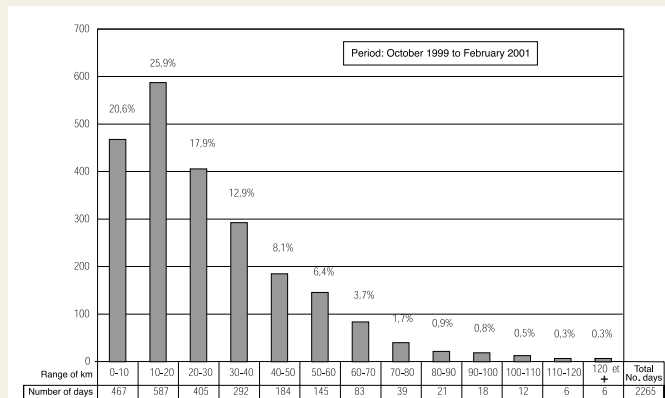
project. Among the advantages noted were good acceleration, ease of driving, comfort, quiet operation, and the ease of use of the battery charging stations.

The attitude study clearly underscored the importance of analyzing the use for which the vehicle will be used within an organization, whether for a specific purpose or for more general use. As well, for users and fleet managers to have confidence in this technology, the autonomy of the vehicle must correspond well to its use.

It also emerged that if the decision to introduce an EV was made by the fleet manager, the integration of the vehicle was easier. Conversely, if the decision came from another level of management, use of the vehicle faced a certain reticence. Integration was longer and more difficult.

The *Montréal 2000 – Electric Vehicle Project* allowed organizations, among other things, to evaluate how the EV technology met their needs and whether users were able to adjust.

Chart Showing Days of Use Related to Distance Travelled



\* Data collected from on-board systems of 18 vehicles that travelled a total of 61,430 km.

## Experience gained

In light of the experience gained, follow-up with projects similar to *Montréal 2000 – Electric Vehicle Project* is an option that deserves close consideration.

Among other reasons, it is worth noting the interest of fleet managers and the satisfaction of users who testified to their enthusiasm for the EVs. Despite the overall positive response, however, difficulties faced by some fleet managers in integrating EVs into their fleets must also be noted. This situation was different for organizations who from the beginning had outlined their specific needs and who already understood the uses and the users. This greatly simplified matters.

In targeting large companies and public and quasi-public institutions who had a vehicle fleet, the partners chose a market

that represented a major stake. These organizations participated for a variety of reasons: to position themselves as responsible corporate citizens, for economic reasons, to increase their visibility, or to meet certain commitments related to the environment. The autonomy of EVs worked within a wide range of applications within the vehicle fleets: for deliveries, specialized transportation, and more generally for repetitive tasks within a limited range. The EVs were therefore particularly useful for trips in an urban setting—areas where there are large greenhouse gas emissions.

Beyond the limited circle of participants, the partners extended their efforts to raise awareness and to promote the idea among political and economic policy makers.

## Conclusion

The *Montréal 2000 – Electric Vehicle Project* was a wealth of information and allowed the formulation of several propositions. These did not necessarily emerge within the framework of the mandate, which was to judge the usefulness of EVs. They can, however, be used in the future to establish the best conditions for developing EV technology and introduction it in Canada and Québec.

In participating in *Montréal 2000 – Electric Vehicle Project* the governments of Canada and Québec testified to their respective commitments to

work to reduce greenhouse gas emissions in the country. This was a first step, and one that must be accompanied by many other measures. In Québec, the eventual conversion of fleets of internal combustion vehicles to electric vehicles will have a direct impact on greenhouse gas emissions and air quality (smog, particulates, etc.) within the urban environment. The province's vast hydroelectric resources—a renewable and non-polluting energy—will play a decisive role in limiting the combustion of fossil fuels.



*A driver fills out the logbook after using his EV. Each EV used in the project was equipped with a log and drivers were obliged to fill it out after using the vehicle.*

Future projects must also follow this direction in targeting a large segment of the general population as

well as opinion leaders to encourage the adoption of EVs on a larger scale.



*The City of Montréal parks service used two EVs. Here, the driver of one of the two discusses the vehicle with a citizen interested in EVs. Behind can be seen the tower of Olympic Stadium.*

## Main courses of action

To create a positive image of EV technology, it is essential to set up a program of information and promotion. This must necessarily discuss—with complete transparency—the advantages and performances of EVs as well as their existing limitations. In the same way, the technical and environmental stakes must also be discussed so that organizations can better develop a positive attitude towards integrating EVs in their fleets.

In addition, to increase demand for EVs and to encourage manufacturers to make their products available on a commercial basis throughout the country, new projects should extend to other regions of Québec and Canada. To encourage successive projects similar to the *Montréal 2000 – Electric Vehicle Project* and the participation of a larger number of organizations, measures similar to those put forward during the project should be used, such as financial incentives, the establishment of a public and private charging infrastructure, etc.

To avoid delays in supplying those who could carry out a project within a fixed deadline, it would be better to obtain the participation of a larger number of manufacturers (GM, Toyota, Honda, etc.). At the time of the project, most makers did not appear to be ready to distribute their products on the Canadian market and the partners had to redouble their efforts to get their participation.



*One of the features of the Montréal 2000 – Electric Vehicle Project was the trials in a northern climate. Here is a typical winter day in Québec.*

## After Montréal 2000

Despite the end of the *Montréal 2000 – Electric Vehicle Project*, the 24 EVs are still in operation on the road network of greater Montréal. To this end, it was recommended that a regular service of expert advice and user support be maintained. This mandate, previously in the hands of the User Support Committee, will be undertaken by a

group that brings together the organizations that possess one or more electric vehicles and CEVEQ.

It is reasonable to believe that within a year or two, the EV fleet that criss-crossed the greater Montréal region could grow within specialized uses. The trail is blazed; it remains for other organizations to follow.



*The organizers of the Montréal 2000 – Electric Vehicle Project participated in many events. Here, during Clean Air Day in Montréal in June 1999, the EVs used in the project are introduced to the public.*

**The final report is available in its entirety at the project Web site, at : <http://www.ve-montreal2000.com>.**

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