ROLLING STOCK GREEN POLICY 2016-2020

Third generation
Service du matériel roulant et des ateliers
November 2016

Montréal

INTRODUCTION

The Coderre administration is proud to present its new Rolling Stock Green Policy, Third Generation (2016–2020). Since the first policy was adopted, in 2007, the city has made great progress in responsible consumption of fossil fuels.

Today, with the goal of reducing Montréal's greenhouse gas emissions by 30% from those of 1990, we are committed to the electrification of our fleet of municipal vehicles. By 2020 we will replace 500 subcompact automobiles at the end of their useful life with fully electric vehicles.

The Service du matériel roulant et des ateliers will also keep a constant eye out for eco-responsible technologies available on the market and the latest news on replacement fuels.

Our approach is making an active contribution to implementation of the Plan de développement durable de la collectivité montréalaise. It is yet another example of the City of Montréal's leadership on sustainable development.

Anie Samson
Vice-Chair of the Executive Committee
Responsible for Citizen Services

Elsie Lefebvre
Responsible for the Transportation Electrification Strategy

CONTENT

MISSION OF THE SERVICE DU MATÉRIEL ROULANT ET DES ATELIERS

Provision of maintenance and repair services, management of the vehicle fleet, and specialized services at competitive costs, of high quality, and adapted to client needs by skilled, motivated employees.

INTRODUCTION
AN OBJECTIVE TO ACHIEVE BY 2020

In 2005, Montréal made the commitment to reduce its greenhouse gas (GHG) emissions by 30% of 1990 levels by 2020.[1] The years have passed and it is still just as, if not more, important to achieve this objective.

In June 2016, the City published *Montréal durable 2016-2020, 3e exercice de planification en développement durable de la Ville.* This paper, which lists all of the City's sustainable-development commitments, conveys the need for cooperation between the City and the Montréal community. Although residents must participate in this effort, the City of Montreal has an essential role to play. For example, because the transportation sector is the main GHG emitter on the Island of Montreal,[2] all units – all boroughs and central services – must reconsider the use of their GHG-emitting vehicles and equipment.

As a leader in this portfolio, the Service du matériel roulant et des ateliers is guiding administrative units throughout this evolution.

A Priority: Electrification of Vehicles

The 2016–20 Rolling Stock Green Policy is the third policy that the department has adopted for this purpose. The first green policy (2007–11) conveyed the municipal administration's desire to significantly reduce its GHG emissions. The second policy (2012–15) took the next step by implementing a variety of eco-responsible initiatives such as acquisition of energy-efficient subcompact cars, the Green Vehicle Fund, technologies likely to improve the environmental balance sheet, and training drivers about energy-efficient driving.

The third green policy, based on the work done and progress made in the last decade, deploys a new strategy based mainly on electrification of municipal vehicles. In this regard, the Service du matériel roulant et des ateliers is responding to the City's October 2015 orientation, which reiterated its desire to position itself as an exemplary, forward-looking leader in the transportation electrification sector.

Therefore, this policy advances a massive and ambitious five-year program that aims to replace almost 250 conventional vehicles with 100% electric vehicles. It also provides for the maintenance and introduction of specific and proven measures such as stop-start systems, city-wide geolocation systems, and a centralized fuel-management system.

[1] This commitment was made during the 4th Municipal Leaders Summit on Climate Change, held in Montréal in December 2005.

[2] According to Le Plan de réduction des émissions de gaz à effet de serre de la collectivité montréalaise 2013-2020, transportation represented 39% of GGE emissions on the Ialdns of Montréal in 2009.

The Countdown Has Begun

All strategic actions included in the transportation electrification policy are based on orientations contained in the Master Plan, the Plan de transport, and the Plan de développement durable de la collectivité montréalaise 2016-2020. These actions therefore convey the importance that the city accords to the transformation of modes of transportation.

The 2020 deadline is now approaching rapidly. To accomplish the set objective of reducing GHG emissions by 30%, specific interventions will have to be undertaken based on user-need and vehicle-use analyses. Service du matériel roulant et des ateliers intends to contribute its support and expertise to the boroughs and the central services as these necessary steps are taken.

BALANCE SHEET FOR THE 2012–15 ROLLING STOCK GREEN POLICY

The second generation of the Rolling Stock Green Policy had five components: motorization, fuels, optimization of rolling stock, awareness raising, and the technical and technological component.

In a spirit of cooperation with the boroughs and the central services, the Service du matériel roulant et des ateliers has adopted the orientations of this policy and concentrated its efforts on the objectives set. To this end, its team of engineers is also constantly on the lookout for new technologies.

Here are the main gains made from 2012 to 2015 under the second-generation Rolling Stock Green Policy:

Motorization

- **Subcompact vehicles:**

  Acquisition of 208 energy-efficient vehicles – 69% of the objective of 300

- **8-cylinder minivans:**

  Acquisition of 98 4-cylinder or 6-cylinder European-style diesel-engine minivans – objective of 65 surpassed by 150%

- **Stop-start systems:**

  Integration of 117 stop-start systems – no precise objective

Fuels

- Renewal of biodiesel (B5) supply contract in 2012, for a fleet of 2,300 diesel vehicles

Optimization of rolling stock

- Conclusion of three new framework agreements for acquisition of small cars (Ford Fiesta, Nissan Versa Note, Toyota Prius C)

Awareness raising

- Creation of the Fonds véhicules verts, a bonus-malus financial system that targets exclusively light fossil-fuel vehicles whose consumption rate is established by the Environmental Protection Agency (EPA) – this system provides for payment of an environmental offset for gas-guzzling vehicles and, on the other hand, encourages the acquisition of hybrid or electric vehicles by offering purchase grants

A POLICY WITH FIVE COMPONENTS

Like the previous policy, the 2016–20 Green Policy for Rolling Stock is divided into five components. These cover all aspects on which the Service du matériel roulant et des ateliers, the boroughs, and the central services may take action to reduce their GHG emissions.

COMPONENT 1 – MOTORIZATION

An Evolving Sector

The vehicle market has been diversifying for some 20 years, in response to the environmental concerns of various carmakers' clienteles. Here is a brief overview of the most recent developments.

Cars that are 100% electric have been evolving constantly for several years as carmakers seek to increase their range per charge. For example, the battery capacity of the 2016 Nissan Leaf is 25% better than that of the previous model and 30% better than that of the 2016 Ford Focus. Currently, affordable vehicles may have a range of between 120 and 170 km. However, new affordable vehicles offering a range of more than 300 km, such as the Chevrolet Bolt, will soon be available on the market. It should be noted that the range of these vehicles declines significantly under winter conditions. Internal studies conducted using a Nissan Leaf showed that the percentage of charge used per kilometre rises from 2.2% to 4% when the temperature drops by 15 degrees Celsius.

Rechargeable hybrid vehicles offer a greater range in electric mode, as they are combined with a conventional thermal engine. A number of rechargeable hybrids are currently available on the market, including the Toyota Prius in various models, the Ford Fusion, the Hyundai Sonata, the Ford C-Max, and the Chevrolet Volt. The 2017 Mitsubishi Outlander will enter the sport utility vehicle niche.

There are now many hybrid vehicles on the market. Among the automobile models, the pioneering Toyota Prius is still the best known.

Diesel engines are more efficient than gas engines of the same displacement, even if the latter have improved in recent years.

> Subcompact cars

The City of Montréal is seeking to replace its subcompact cars with 100% electric automobiles. To assess the replacement potential, the Rolling Stock and Municipal Shops Department has analyzed the use and behaviour of more than 200 municipal vehicles in this category.

This study revealed that on average, a four-cylinder, four-door subcompact vehicle travels about 5,700 km per year, or 22.8 km per day. On this basis, by 2020 the department plans to replace all of the 242 subcompact cars at the end of their useful life with the same number of 100% electric vehicles.

This large-scale operation must take account of the following factors:

- The installation of infrastructure necessary to the project – a network of charging stations to support the desired gradual conversion of the Montréal car fleet
- Planning of the necessary budgets – a 100% electric car involves a total extra cost of $4,000 to $5,000, after grants, for a lifecycle of 10 years and average annual kilometrage of 5,700 km.

According to the analyses conducted, the replacement of the targeted 250 cars will reduce GHG emissions by 1,750 tonnes over five years (five-year plan).

OBJECTIVE: replace 250 subcompact cars, at the end of their useful life, by the same number of 100% electric vehicles.

OBJECTIVE (ACHIEVED IN MARCH 2016): conclude a two-year framework agreement, with a one-year renewal option, for the acquisition of 42 Nissan Leaf vehicles, model SV, with a theoretical advertised range of 172 km.

> Minivans and pickup trucks

The City of Montréal has already replaced 98 eight-cylinder minivans – high-fuel-consumption vehicles – with four- or six-cylinder European-style minivans. By the end of 2020, the Service du matériel roulant et des ateliers plans to have replaced 100 of the 198 remaining minivans at the rate of 20 per year.

According to the analyses conducted, replacement of these 100 minivans with more energy-efficient vehicles will reduce GHG emissions by the fleet of municipal minivans by 12%.

In addition, stop-start systems will be installed on about 145 minivans; these will join the 117 that have already been equipped with stop-start systems in recent years. Installation should be completed at the rate of 29 minivans per year.

OBJECTIVE: Replace 100 eight-cylinder minivans with the same number of four- or six-cylinder European-style minivans.

OBJECTIVE: Install stop-start systems on about 145 minivans.

> Electric motorcycles

High-performance motorcycles are a new option to envisage. In cooperation with the Service de police de la Ville de Montréal (SPVM), the Service du matériel roulant et des ateliers is studying a plan to acquire 100% electric motorcycles, the first step of which would be the purchase and real-world testing of an electric motorcycle.

OBJECTIVE: Analyse/Evaluate the relevance of equipping the SPVM with electric motorcycles.

> Other vehicles and equipment

The City of Montréal has undertaken to replace motorized vehicles and various equipment with electrically powered vehicles, such as ice resurfacers, certain quadricycles, lift trucks, and aerial platforms. By prioritizing electricity, the City is seeking to replace both road vehicles and various types of equipment,

on condition that electric versions of these pieces of equipment are already on the market and meet the needs of users. As of the end of 2015, the City owned 225 electricity/hybrids-powered vehicles and various pieces of equipment.

OBJECTIVE: Evaluate the possibility and relevance of acquiring various electric or hybrid vehicles and pieces of equipment.

COMPONENT 2 – FUELS

> Biodiesel

Since 2008, the City of Montréal has been using B5 biodiesel – that is, a diesel fuel with a biodiesel content of 5%.

In 2011, Environment Canada published the Renewable Fuels Regulations, which impose an annual national average of 2% biodiesel on refiners and importers of diesel fuel. To avoid any problem that could arise during cold weather, the City of Montréal has chosen to use B5 biodiesel during the five warmest months of the year.

To use biodiesel properly, its metering in the regular diesel must not be changed significantly. For example, if B2 biodiesel is used in winter it creates diesel or biodiesel deposits; then, the use of B20 bio diesel in summer favours the dissolution of these deposits, given the dissolving effect of pure biodiesel. Certain problems often result, including clogging of filters, which considerably reduces the flow of distributor pumps and contaminates the filters.

Another significant element is the frequency of filling tanks, combined with the effective duration during which the biodiesel concentration is above 2% during the cold season.

OBJECTIVE: Pursue supply of second-generation B5 biodiesel to the City of Montreal's fuel-distribution stations.

OBJECTIVE: Keep a lookout for the development and availability of cleaner diesel and gasoline fuels.

> Ethanol

The City of Montréal began to use E10 ethanol in 2008 as a pilot project, with two of its stations distributing a total of 500,000 litres of this fuel per year.

Since adoption of the Renewable Fuels Regulations, Canadian oil companies have been obliged to incorporate a minimum of 5% renewable fuel into their gasoline. Therefore since October, the City of Montréal's fuel stations have distributed gasoline composed of 10% ethanol, the oil companies having opted for this percentage for technical and operational reasons.

Currently, few vehicles can consume E85 ethanol, and few service stations offer this mixture to consumers. The costs generally associated with implementation of distribution infrastructure for this fuel, in combination with a relatively small number of compatible vehicles, has convinced the city to opt for a different fuel.

> Compressed natural gas

A first truck using compressed natural gas (CNG) has been in service since March 2016, as a pilot project. This garbage truck is used to collect residual materials in the Rivière-des-Prairies–Pointe-aux-Trembles borough. On the island of Montréal, there is currently only one public service station offering CNG, but the network is supposed to develop in coming years. CNG may prove to be an alternative solution to diesel fuel, particularly for heavy trucks.

OBJECTIVE: Depending on the results of the pilot project and the development of the public GNC distribution network on the island of Montréal, envisage extending the use of this fuel to a larger number of heavy trucks owned by the City of Montréal.

> Other replacement fuels

A number of replacement fuels exist: propane, biogas, hydrogen, and methanol. Because the City's priority is to use fuels that all of its vehicles and motorized equipment can consume without having to be modified or adapted, consideration of these fuels has been set aside for the moment.

COMPONENT 3 – OPTIMIZATION OF ROLLING STOCK

> Vehicle fleet

Following the municipal mergers of 2002, the City of Montréal reviewed the management procedures for its vehicle fleet. A few years later, in 2005, it transferred the activities linked to ownership and the associated budgets to the boroughs and the central services.

Over the last 10 years, advantages and disadvantages of this mode of functioning have been observed. For instance, a certain number of vehicles are not used much, and others are used more. In 2017, all of the vehicles in the 19 boroughs and the central services will be grouped under a single department, the Service du matériel roulant et des ateliers. It will now be easier to find new ways of streamlining the use of the City's vehicles and other rolling equipment, which will benefit all units concerned.

OBJECTIVE: Rationalize and optimize the use of vehicles by sharing assets and rolling stock among the boroughs and the central services.

> Geolocation systems

Although they are necessary, many of the City's activities may have an impact on the environment, because they emit GHG or contribute to smog. For example, winter smog is exacerbated by snow-removal operations.

To harmonize practices, generate savings, and enhance adherence to sustainable development principles,

the city has mandated the Service du matériel roulant et des ateliers to pilot an implementation project for a geolocation system designed for all municipal vehicles and equipment.

The boroughs and the central services will benefit from this unified system. It will make it possible, among other things, to follow the location of vehicles, to better coordinate activities – in short, to rationalize the use of vehicles and equipment. A committee was formed in late 2015, and the Service du matériel roulant et des ateliers will coordinate the implementation of this large-scale project, in cooperation with the boroughs and the central services.

OBJECTIVE: install a unified geolocation system for the fleet of municipal vehicles and for the equipment associated on a city-wide scale.

> Acquisition of vehicles and equipment

To facilitate the acquisition of eco-responsible vehicles and equipment and to reduce the City's carbon footprint, the Service du matériel roulant et des ateliers engineering team is establishing new framework agreements (19 are currently in force at the city) with the suppliers available on the market. Three framework agreements have been concluded in recent years for the following light vehicles:

- Ford Fiesta – sedan
- Nissan Versa Note – five-door
- Toyota Prius C

In March 2016, a new framework agreement was approved for the acquisition of Nissan Leaf vehicles. The choice of this 100% electric model was based on analyses conducted by the Service du matériel roulant et des ateliers.

OBJECTIVE: increase the number of framework agreements with different suppliers of vehicles and equipment.

COMPONENT 4 – TECHNIQUES AND TECHNOLOGIES

> Technology Watch Committee

Techniques and technologies are constantly evolving, and environmental performance is increasingly important. For example:

- Idling limiters, present as an option in all heavy and medium trucks since the early 2000s, are systematically activated when these vehicles are acquired. In the case of light vehicles such as pickup trucks, idling limiters are added; these systems also manage accessories such as turn signals by restarting the engine as needed, in order to maintain a minimum voltage in the vehicle's battery.
- Street sweepers must meet the American PM10 standard (South Coast Air Quality Management District Rule 1186) or equivalent European standards, which govern releases of fine dust in suspension into the air. This requirement reduces urban smog and lowers health risks associated with the presence of fine particles in the ambient air.

To provide residents with ecologically friendly, efficient, and low-cost services, the Service du matériel roulant et des ateliers and the Service de l'approvisionnement have jointly instituted a committee of expert users who deal with, among other things, issues associated with new technologies.

OBJECTIVE: Hold three meetings per year of the rolling stock expert user committee in order to discuss new products and good practices in force.

OBJECTIVE: Stay updated on all new technologies, test and integrate them when new vehicles are acquired.

> Technical specifications

The standardization of acquisition of vehicles and equipment is advantageous in a number of ways. Notably, it reduces technical and administrative delays regarding acquisitions (fewer technical specifications and bids), the number of parts in stock, and the number of training courses to follow for operators and mechanics (fewer different models). For these reasons, the city will centralize production of all technical specifications at the Service du matériel roulant et des ateliers.

In addition, the department's team of engineers will integrate the environmental dimension into technical specifications, when technologies permit.

OBJECTIVE: Centralize production of all technical specifications at the Service du matériel roulant et des ateliers.

OBJECTIVE: Write technical specifications that, on the whole, take account of sustainable-development principles.

COMPONENT 5 – AWARENESS RAISING

The 2016–20 Rolling Stock Green Policy is intended to be more concrete then the previous policies, and there is a reason for this. The many new products that the city is choosing to reduce GHG emissions require it to review its ways of doing things and of working, which may prove challenging.

All of these changes require conviction – real commitment by the managers and employees concerned. The Service du matériel roulant et des ateliers intends to use different tools and activities to make employees aware of the importance of their cooperation. For example, the Service des communications has developed a visual signature for 100% electric vehicles.

OBJECTIVE: Place the new visual signature on all of the City's 100% electric vehicles.

OBJECTIVE: Assess and validate the criteria and needs for the most eco-responsible new vehicles on the market, including the Service de police de la Ville de Montréal and the Service de sécurité incendie de Montréal.

OBJECTIVE: In the context of the plan to open the city's data, publish once a year the tables of all the data linked to the present policy.

CONCLUSION

Since the first Rolling Stock Green Policy was adopted, in 2007, the City of Montréal has made undeniable progress in responsible consumption of fossil fuels. This progress makes a real contribution to implementation of the Plan de développement durable de la collectivité montréalaise and demonstrates the importance of this approach.

By being more concrete and specific than previous policies, the 2016–20 Rolling Stock Green Policy – Third Generation, with its 20 targeted initiatives, offers the means necessary to enhance the City's contribution to this societal project.

Because it emphasizes the acquisition of 100% electric subcompact cars, this policy concretely conveys the city's desire to encourage massive electrification of its vehicle fleet. In the end, this replacement process will have made it possible to electrify at least 95% of the eligible cars.

Of course, the work will continue beyond 2020, and it is to be hoped that this third-generation green policy be followed by a fourth generation. Until then, the Service du matériel roulant et des ateliers, along with the boroughs and the other central services, will work together to make the municipal fleet ecologically exemplary.

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