4.3.

TRANSPORTATION ELECTRIFICATION STRATEGY

FEBRUARY 22, 2019

SUMMARY OF THE AUDIT

OBJECTIVE

Ensure that the implementation of the *Transportation Electrification Strategy's* goalsis supported by an action plan with specific objectives and timelines and appropriate coordination mechanisms

RESULTS

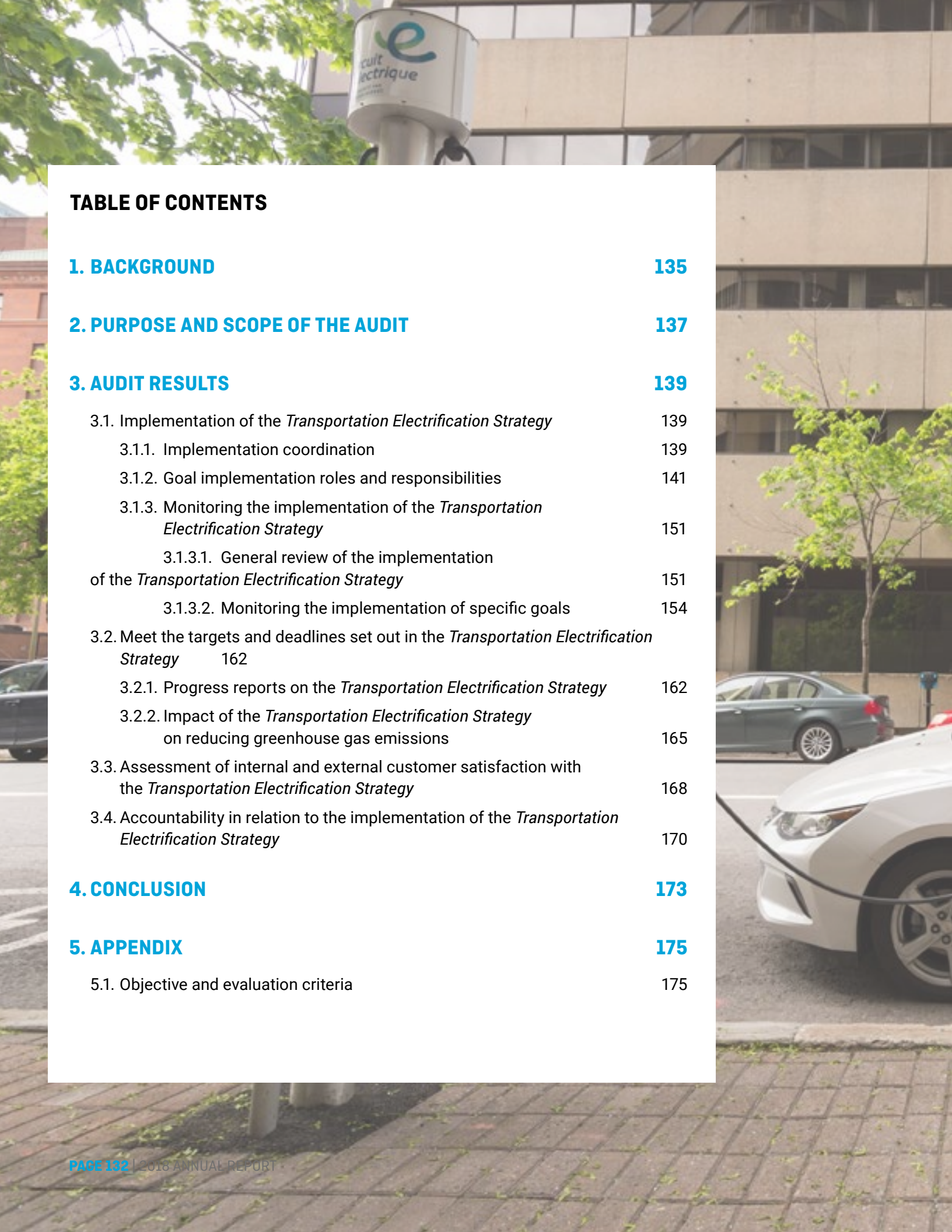
In addition to these outcomes, we have formulated various recommendations for business units.

The details of these recommendations and our conclusion are outlined in our audit report, presented in the following pages.

Note that the business units have had the opportunity to formulate their comments, which appear after the audit report recommendations.

In 2016 the Ville de Montréal (the City) adopted a *2016-2020 Transportation Electrification Strategy* (hereinafter "*the Strategy*") to help achieve the City's greenhouse gas emission reduction targets within the community and within its own municipal operations. This *Strategy*, which involves several business units and external partners includes converting subcompact combustion engine vehicles to all-electric vehicles, installing charging stations for City vehicles and employee vehicles, and installing 1,000 public charging stations throughout the City. Although the business units are on track to meet their own targets by 2020, we believe that improvements should be made in the following key areas:

- Although a business unit is responsible for coordinating the implementation of the *Strategy*, this department primarily collects information on monitoring the steps to be taken, but it does not have the necessary authority for the implementation and to ensure that specific results are achieved;
- The *Strategy* is being implemented without a real action plan to have been developed initially, and a formal reporting system has not been established to date;
- Maintenance planning for public charging stations has not been developed;
- The boroughs are becoming responsible for the energy costs for charging City vehicles as well as those charging at public locations while fees are paid to the Central City;
- There has been no in-depth analysis of the use of City charging stations. As a result charging station use cannot be optimized, particularly since there is no link between City vehicles and charging station access cards;
- The City is replacing obsolete vehicles with all-electric vehicles without first confirming whether charging infrastructure can be installed at the building where the vehicle is to be parked;
- Transportation electrification is a rapidly evolving field, yet there is no structured technology watch at the City;
- The arrival of fast-charging stations in Montréal may call into question the need for the City to install up to 1,000 public charging stations;
- The City does not plan to obtain all available financial support for municipal vehicle charging stations.



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LIST OF ACRONYMS

CSEM
Commission des services électriques de Montréal

GHG
Greenhouse gas

km
kilometre

kW
kilowatt

kWh
kilowatt-hour

REM
Réseau électrique métropolitain

SGPI
Service de la gestion et de la planification immobilière

SIVT
Service des infrastructures, de la voirie et des transports

SMRA
Service du matériel roulant et des ateliers

SMVT
Service de la mise en valeur du territoire

STM
Société de transport de Montréal

V
volt

1. BACKGROUND

In Quebec, in 2016, greenhouse gas (GHG) emissions associated with the road transport sector accounted for 34.4% of all greenhouse gas emissions in the province[1]. While the Government of Quebec is committed to reducing GHG emissions to 20% below 1990 levels by 2020, GHG emissions from road transport sector surged by 52.3% between 1990 and 2016. Overall, Quebec GHG emissions in 2016 were 9.1% lower than in 1990, just under half the 2020 target[2]. To reach the 20% target, emissions from the transport sector must be reduced.

In order to limit the rise in temperatures to less than 1.5°C and adapt to the unavoidable consequences of climate change, the Government of Quebec has adopted a (2013-2020) action plan on climate change[3] composed of 30 priorities, one of which involves greening the vehicle fleet with more fuel-efficient and better maintained vehicles.

Beyond the impact of transportation on GHG emissions and climate change, road transport, due to the emissions of fine particulate matter, ground-level ozone, nitrogen dioxide, carbon monoxide and volatile organic compounds, also has significant adverse effects on human health, mainly in urban areas. According to Health Canada, in 2015, emissions from gasoline-powered vehicles were responsible for the premature death of 700 people across Canada, in addition to being linked to respiratory symptoms associated with conditions such as asthma and bronchitis[4].

In 2015, the Government of Quebec adopted the *Plan d'action en électrification des transports* (2015-2020) to help achieve Quebec's GHG reduction target[5]. Through this plan, the government aims to reach the target of having 100,000 all-electric vehicles and plug-in hybrids registered in Quebec by 2020. To encourage this transition to electric transport, the government provides financial assistance to individuals, businesses, organizations and municipalities for the long-term purchase or lease of electric vehicles and plug-in hybrids and for installing charging stations at home or at the workplace (the Roulez vert - Volet roulez électrique and Branché au travail programs, administered by Transition énergétique Québec, a Crown corporation).

1 Ministère de l'Environnement et de la Lutte contre les changements climatiques, 2018. Inventaire québécois des émissions de GES en 2016 et leur évolution depuis 1990. Québec, ministère de l'Environnement et de la Lutte contre les changements climatiques, Direction générale de la règlementation carbone et des données d'émissions.

2 Reducing emissions to 20% below 1990 levels by 2020 is only an intermediate target, not an ultimate goal, because the Government of Quebec wants to reduce emissions to 37.5% below 1990 levels by 2030.

3 *Plan d'action 2013-2020* sur les changements climatiques- Le Québec en action vert 2020.

4 Health Canada, 2017. Human Health Risk Assessment for Gasoline Exhaust.

5 Government of Quebec, 2015. *Plan d'action en électrification des transports 2015-2020* – Propulser le Québec par l'électricité.

With respect to the Montréal agglomeration, in 2014, emissions associated with the community[6] accounted for 14% of Quebec's total GHG emissions. Compared to 1990, emissions from the Montréal agglomeration had decreased by 23% in 2014 (versus 8% over the same period province-wide). In 2014, the transport sector accounted for 40% of GHG emissions within the Montréal agglomeration.

The latest report on GHG emissions from municipal operations in the Montréal agglomeration shows a 23% drop in emissions in 2015 versus 2002 (however, there was an 8% increase in emissions between 2010 and 2015). One third of these GHG emissions were associated with the Montréal agglomeration's rolling stock.

In 2013, the Ville de Montréal (the City) committed to reducing its municipal GHG emissions to 30% below 2002 levels by 2020. To this end, the City has adopted a 2013-2020 GHG emissions reduction plan under which boroughs and reconstituted municipalities will acquire lower GHG-emitting vehicles and equipment to achieve this target. In terms of community emissions, the City has also adopted a *2013-2020 Reduction plan* to cut emissions to 30% below 1990 levels by 2020. This plan presents possible solutions for achieving this GHG reduction target, particularly in the road transport sector. However, it does not contain any final and concrete actions.

In 2016, following the City's participation in the 21st United Nations Conference on Climate Change[7] and the City's commitment to the *Déclaration du Sommet des élus locaux pour le climat*, the City adopted a *2016-2020 Transportation Electrification Strategy* (hereinafter "*the Strategy*") that is based on various existing City plans, strategies and policies, including the *2013-2020 Plan to reduce corporate GHG emissions* and the community's plan for the same period, the *Parking policy*, the *Rolling stock green policy* and the *City Transport plan*. As part of this *Strategy*, the City also committed to monitoring GHG reductions attributable to the implementation of policy measures. When the *Strategy* was adopted by the City's executive committee in June 2016, no implementation budget was submitted. The *Strategy*'s 10 goals are:

- Goal 1: Include transportation electrification needs in the planning and management of the City's building inventory (charging stations for the City's electric vehicle fleet);
- Goal 2: Convert the fleet of municipal combustion engine vehicles to electric vehicles;
- Goal 3: Implement an economic development action plan to develop a local transporta tion electrification and smart transportation sector;
- Goal 4: Establish an institute of electrification and smart transportation;

6 The Ville de Montréal periodically produces an inventory of GHG emissions for the entire agglomeration, which breaks down GHG emissions from the entire community, i.e., emissions associated with the activities of all residents and enterprises, businesses, industries, residual materials management and emissions specific to municipal activities.

7 Also known as the Paris Conference held in December 2015.

- Goal 5: Société de transport de Montréal (STM) will replace diesel buses with hybrid vehicles, purchase 52 Azur trains, electrify the bus fleet and participate in the Cité Mobilité demonstration;
- Goal 6: Implement the Réseau électrique métropolitain (REM);
- Goal 7: Implement electrification measures outlined in the *Parking policy*;
- Goal 8: Install a charging station network (public charging stations);
- Goal 9: Introduce a framework to enable private industry to install a self-service electric vehicle network;
- Goal 10: Continue to work on electrification initiatives with partners.

2. PURPOSE AND SCOPE OF THE AUDIT

Pursuant to the *Cities and Towns Act*, we completed a performance audit mission on the *Transportation Electrification Strategy* in Montréal. We performed this mission in accordance with the Canadian Standard on Assurance Engagement (CSAE) 3001 described in the CPA Canada Handbook – Assurance and other Canadian public sector certification standards issued by the CPA Canada Auditing and Assurance Standards Board.

The purpose of this audit was to ensure that the implementation of the *Transportation Electrification Strategy's* policies is supported by an action plan with specific objectives and timelines and appropriate coordination mechanisms.

The role of the Auditor General of the Ville de Montréal is to provide a conclusion regarding the objectives of the audit. To do so, we collected a sufficient amount of relevant evidence on which to base our conclusion and to obtain a reasonable level of assurance. Our assessment is based on criteria we have deemed valid for the purposes of this audit. They are presented in Appendix 5.1.

The Auditor General of the Ville de Montréal applies the *Canadian Standard on Quality Control* (CSQC) 1 of the CPA Canada Handbook – Assurance and, consequently, maintains a comprehensive quality control system that includes documented policies and procedures with respect to compliance with ethical guidelines, professional standards and applicable legal and regulatory requirements. The Auditor General also complies with regulations on independence and other ethical guidelines of the *Code of Ethics of Chartered Professional Accountants*, which is governed by fundamental principles of integrity, professional competence, diligence, confidentiality and professional conduct.

Our audit work focused on 2016 to 2018, the first years during which the *Strategy* was implemented. For some aspects, facts from before this period were taken into consideration in order to better understand a situation observed during the period covered by the audit. Our work was mainly performed from October 2018 to December 2018. However, we did consider information sent to us until the end of January 2019.

This work primarily involved the following business units:

- Service de la mise en valeur du territoire (SMVT) (Direction de l'urbanisme, division de la planification des transports et de la mobilité);
- Service du matériel roulant et des ateliers (SMRA) (division de la planification et du soutien aux opérations);
- Service de la gestion et de la planification immobilière (SGPI) (Direction du bureau de projet et des services administratifs, Division expertise-conseil);
- Service des infrastructures, de la voirie et des transports (SIVT) (Direction des transports, division du développement des transports);
- LaSalle borough;
- Ville-Marie borough;
- Villeray–Saint-Michel–Parc-Extension borough.

It is important to note that between completion of our audit work and publication of this report, the City reorganized some City departments. Given that our findings are limited to the period preceding this reorganization, the names of departments at that time are used in this report. However, our recommendations are intended for departments based on this reorganization. Table 1 shows the concordance between old and new departments involved in this audit. Other departments, directions or divisions targeted by this audit, but not mentioned in this Table, were not reorganized as of January 1, 2019.

TABLE 1 – EQUIVALENT DEPARTMENTS AUDITED IN THE 2018 ORGANIZATION AND THE 2019 ORGANIZATION

2018 ORGANIZATION	2019 ORGANIZATION
Service de la mise en valeur du territoire (SMVT) Direction de l'urbanisme Division de la planification des transports et de la mobilité	**Service de l'urbanisme et de la mobilité** Direction de la mobilité Division de la planification des transports et de la mobilité
Service des infrastructures, de la voirie et des transports (SIVT) Direction des transports Division du développement des transports	**Service de l'urbanisme et de la mobilité** Direction de la mobilité Division de la fonctionnalité des transports
Service des infrastructures, de la voirie et des transports (SIVT) Direction des infrastructures Division de la conception des travaux	**Service des infrastructures du réseau routier** Direction des infrastructures Division de la conception des travaux

Upon completing our audit work, we presented a draft audit report to the managers of each audited business unit for discussion purposes. The final report was then forwarded to the city manager and each business unit involved in the audit in order to obtain action plans and implementation timelines. A copy of the final report was also submitted to the city manager, the deputy director-general, Mobilité et attractivité, the deputy director general of Services institutionnels, the deputy director general of Service aux citoyens, the manager of Service de concertation des arrondissements, and the directors of the 16 other boroughs not targeted by our audit, so they could implement recommendations if appropriate.

3. AUDIT RESULTS

3.1. IMPLEMENTATION OF THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

3.1.1. IMPLEMENTATION COORDINATION

3.1.1.A. BACKGROUND AND FINDINGS

All departments audited indicated that SMVT is responsible for coordinating the *Strategy*, mainly because SMVT gathers information on progress towards implementing the goals and asks the other departments to provide information on this topic. SMVT also drafted the *Strategy* in 2016 and prepared the decision-making summary that was submitted to the executive committee for approval. This summary indicated that SIVT, SMRA, SGPI, the Service de l'environnement and the city manager are partners in the *Strategy*.

Another factor indicating that SMVT plays a coordinating role is that in a July 2018 follow-up meeting on implementing the *Strategy*, SMVT presented a review of the *Strategy*'s goals to the other departments and external partners for the last two years (2019-2020) because some goals had been implemented and others lacked the clarity required to be properly implemented.

However, this coordination is limited from SMVT's standpoint, because, initially, there was no real action plan for its implementation. SMVT's work is actually more focused on centralizing progress report data than overseeing the implementation of the *Strategy*.

Because of the type of stakeholders involved in the *Strategy*, it may be complicated for SMVT to play this role without having been formally assigned a coordinating role by the City Manager. The various goals to be implemented are the responsibility of departments in three separate associates city manager or external partners such as STM or CDPQ Infra[8]. For example, SMVT cannot make judgments or require changes regarding STM's choice

8 CDPQ Infra is a wholly owned subsidiary of Caisse de dépôts et de placements du Québec, which is responsible for implementing the Réseau électrique métropolitain (REM).

of buses or the rate at which it introduces new metro cars. Another example: during the presentation of the *Strategy* update, SMVT requested that each department concerned update the goal texts by mid-August 2018 so that an action plan can be produced by the end of September 2018. As of the end of November 2018, the action plan had not yet been produced because the departments had not completed the goal review that was due three months earlier.

This difficulty in coordinating the *Strategy* could become even more problematic in the near future. In September 2018, city council passed a resolution to create a paramunicipal corporation, the Agence de mobilité durable (hereinafter "the Agency"), which will aim to develop and manage parking and a network of charging stations for electric vehicles within the City. The decision-making summary supporting this resolution stated that the Agency will work in conjunction with SMVT and SIVT to install charging stations. In this context, questions may arise as to whether such an external entity can to be responsible and oversee the work performed by city departments pursuant to a municipal strategy. Because it is difficult for SMVT to coordinate the *Strategy* with other departments and external partners, there is reason to question whether a paramunicipal corporation can act as coordinator.

The difficulties in the coordination of the *Strategy* can also be observed by the delay of almost two years before the issue of whether City employees could access City charging stations for personal purposes was addressed pursuant to a request from a member of the City executive committee, and by the lack of answer from several departments to SMVT request for progress reports.

RECOMMENDATION

3.1.1.B. **We recommend that the Direction générale officially appoint a leader to coordinate the implementation of the *Transportation Electrification Strategy* and give him the powers needed to deal with the departments and paramunicipal and external partners to ensure that the objectives of this strategy are achieved.**

BUSINESS UNIT'S RESPONSE

3.1.1.B. ***Direction générale***

[TRANSLATION] The Direction générale will make the Directeur du Service de l'urbanisme et de la mobilité, Luc Gagnon, responsible for coordinating the implementation of the Transportation Electrification Strategy. At the last Transportation Electrification Strategy steering committee meeting, the representatives approved the document update exercise. The new version of the Strategy proposes an action plan, which identifies the budget, objectives, and indicators as well as the managers for each policy. ***(Planned completion: April 2019)***

3.1.2. GOAL IMPLEMENTATION ROLES AND RESPONSIBILITIES

3.1.2.A. BACKGROUND AND FINDINGS

PURCHASE ELECTRIC VEHICLES (GOAL 2)

One of the goals of the *Strategy* is that SMRA will implement a *2016-2020 Rolling stock green policy* action item, i.e., replace 250 subcompact vehicles with all-electric vehicles. Since January 1, 2017, pursuant to section 85.5[9] of the *Charter of Ville de Montréal*, SMRA was made responsible for purchasing, maintaining and managing vehicles and equipment and managing fuel until December 31, 2018, and then until December 31, 2023. As a result, this department identifies vehicles to be replaced as they become obsolete and, after consulting with the boroughs and the central departments, buys replacement vehicles. When the vehicle to be replaced is a class 134 vehicle (subcompact vehicle), if the business unit finds that it still needs a vehicle for the same purpose[10], SMRA replaces it with a class 140 vehicle (all-electric vehicle). In 2018, SMRA purchased 100 Nissan Leaf cars after issuing a call for tenders to replace obsolete subcompact vehicles. Once the vehicles are received, SMRA inspects them and delivers them to the requesting business unit.

INSTALL CHARGING STATIONS FOR THE CITY'S ELECTRIC VEHICLES (GOAL 1)

Charging stations are needed to charge the City's electric vehicles. In June 2017, SGPI had an order from the City to install about 50 charging stations, even before there was a structured, large-scale introduction of electric vehicles. In order to simplify installation and limit delays (all installations had to be completed within one month), it was decided that wall-mounted units would be installed[11] on City buildings. Several Service de sécurité incendie fire stations were identified.

The *Programme de développement durable dans les édifices municipaux*, outlined in the 2018-2020 three-year capital expenditures program (TCEP) administered by SGPI, aims to install charging stations for the City's electric cars. The TCEP project sheet states that SGPI is responsible for providing the necessary charging facilities in the buildings for vehicles acquired under the SMRA policy which provides for the replacement of 50 vehicles per year. The SGPI program for 2018-2020 aims to install 225 charging stations for City vehicles and 45 stations over 3 years for charging City employees' personal vehicles.

9 Section 85.5 of the *Charter of Ville de Montréal*, which allows city council to declare, in respect of all the boroughs and for a period it determines, that the exercise of a jurisdiction or power assigned by law to all the borough councils is within its jurisdiction.

10 A business unit may also chose, if its needs have evolved, to replace the obsolete vehicle by a most adapted one, or even chose not to replace the obsolete vehicle when it will be no longer in service.

11 Wall-mounted units are easier to install than pedestal-mounted charging stations, which require outdoor civil engineering work to supply them with electric power via underground conduits.

SGPI is responsible for administering the program and authorizing reimbursements for business units for charging station installation costs. Reimbursements are capped in accordance with established rules and maximum amounts authorized. This information is provided to the units by means of an implementation guideline. SGPI is also responsible for submitting subsidy applications to the Government of Quebec *Branché au travail* program. Installing charging stations requires the co-operation of several stakeholders including property managers. If it is a building owned by the City or leased by a central department, SGPI property managers oversee the installation. If it is a building owned or leased by a borough, the borough's property manager is responsible for the file. SGPI monitors central department projects, but does not monitor borough projects. However, it does collect final information on the costs it assumes and information on the project implementation milestone dates. One of the boroughs has already completed charging station installations under the SGPI program. It confirmed that the borough is responsible for making arrangements with contractors and electricians to have them install the charging stations and that SGPI is responsible for managing the program.

SGPI is also responsible for managing the three-year master agreement (2018-2020), which was negotiated with a charging station provider to have similar, compatible stations in all buildings and to get a volume discount. However, access to this master agreement for the purchase of charging stations is limited to projects authorized by SGPI. In the case of Villeray–Saint-Michel–Parc-Extension borough, SGPI authorized the installation of 7 charging stations in a borough building because the same number of vehicles are replaced by SMRA. However, the borough wants to install 8 more stations (total of 15 stations) because it expects its fleet of electric vehicles to expand. SGPI provided the borough with confirmation that it could not buy the additional stations under the agreement, but that it could deal with the same supplier to obtain them. The borough obtained a bid from the supplier that made the agreement with SGPI for the 8 charging stations not covered by the program. A comparison between this bid and the master agreement with SGPI reveals that the supplier is charging a higher cost per unit for all components than under the agreement, that the supplier is charging for transportation while it is included in the agreement and that it is proposing items deemed nonessential by SGPI, which are therefore excluded from the agreement. Therefore, the borough will pay 31% more for the 8 charging stations not covered under the SGPI program than if they had been acquired under the master agreement.

Because the boroughs or central departments that wanted to assume the costs of additional stations themselves were not given access to the master agreement, the business units had to pay significantly higher charging station purchase prices (the borough will have pay $9,400 more for the 8 charging stations).

RECOMMENDATION

3.1.2.B. **We recommend that the Service de la gestion et de la planification immobilière assist business units in purchasing charging stations for non-program projects and take steps to provide the City with a master agreement accessible to all business units to improve unit prices and ensure that charging stations are functional and compatible with one another.**

BUSINESS UNIT'S RESPONSE

3.1.2.B. ***Service de la gestion et de la planification immobilière***

[TRANSLATION] The supplier has been asked to offer the Ville de Montréal a preferential price for charging stations that are not covered under the Service de la gestion et de la planification immobilière's master agreement, i.e., charging stations installed at a business unit's initiative and not intended to charge electric vehicles from the Service du matériel roulant et des ateliers' fleet. This request is currently being studied by the supplier. For the time being, in the absence of a supply management framework, the supplier has agreed to grant a preferential price in response to all requests made within the framework of a Ville de Montréal project. Costs will be lower than those previously communicated to the boroughs, but higher than those in the framework agreement. ***(Planned completion: May 2019)***

An agreement will then be entered into with the Service de l'approvisionnement, which will cover all Ville de Montréal projects. Discussions will have to be held with the Service de l'approvisionnement to determine the best contractual framework to achieve this in accordance with existing statutes and regulations. ***(Planned completion: October 2019)***

INSTALL ON- OR OFF-STREET PUBLIC CHARGING STATIONS (GOAL 8)

The Central City has been responsible for installing on-street charging stations since 2016. This responsibility was renewed in 2018 for a period of five years under repatriation in accordance with section 85.5 of the *Charter of Ville de Montréal*.

In June 2017, following a work meeting between SIVT and SMVT, SIVT management sent an internal memo to all borough directors explaining the division of responsibilities between SMVT and SIVT in the public charging station installation program. SMVT is responsible for defining the overall charging station installation strategy and determining the number of charging stations to be installed per year in each borough according to its population and area. Once this annual strategy is developed, the Direction des transports within SIVT takes over. It manages the installation of charging stations, while the Direc-

tion des infrastructures du SIVT is responsible for installing the charging stations and coordinating the work with the Commission des services électriques de Montréal (CSEM), Hydro-Québec and an electrical contractor.

The Direction des transports du SIVT works with the Direction des infrastructures and the boroughs to identify the locations where the charging stations are to be installed, before instructing the Direction des infrastructures to perform the work. To this end, the Direction des transports first identified various locations where a charging station can be installed. This list is sent to the borough asking it to validate the sites or to propose others in accordance with criteria, including access to a nearby power source and a sidewalk at least 2.8 metres wide to allow pedestrians to walk behind the charging station. The Direction des infrastructures asks the boroughs to select 25% more locations than the number of charging stations to be installed because some locations could be ruled out after Hydro-Québec confirms whether the connection is technically feasible.

Overall, although two departments are involved, SIVT is considered responsible for the *Programme d'acquisition et d'installation des bornes de recharge publiques* according to the information presented in the 2017-2019 TCEP and the 2018-2020 TCEP.

However, it is not clear who is responsible for maintaining the charging stations. This internal memo sent to the boroughs in June 2017 specified that SMVT should operationalize the replacement and repair of charging stations while SIVT prepares a repair strategy. Two options were considered for this strategy at the meeting between the two departments to define their respective responsibilities. The options were to entrust maintenance to the boroughs as is the case with street lights and traffic lights or grant a maintenance contract to an outside company. However, this strategy has not actually been developed, and SIVT manages and monitors repairs with the charging station manufacturer. With the announcement of the creation of the Agency, the maintenance could be under its responsibility, but a final decision has not yet been made. According to SIVT, because these are high-voltage charging stations (240 volts), some maintenance or repair tasks must be performed by licensed electricians. Therefore, to ensure user and employee safety and to meet the terms and conditions of the warranty, it will be necessary to have a trained and certified workforce to maintain this type of equipment before maintenance is transferred to the boroughs or a paramunicipal corporation.

In addition, SIVT is not technically equipped to operationalize the maintenance of public charging stations. This is not a technical department like a public works department in a borough. It does not have a workshop or place to store equipment and spare parts. SIVT has initiated discussions with Rosemont-La Petite-Patrie borough's Division de l'entretien, de l'éclairage, de la signalisation et du marquage de la chaussée, which serves all former Ville de Montréal boroughs, to have it look after charging station maintenance. There was even possible to have the supplier of the charging stations certify one or more City electricians. However, the borough did not respond to this request. SIVT is therefore back to square one. It does not have a strategy for maintaining charging stations and has assumed this responsibility on its own. However, in the absence of such a strategy, there

may be a lack of planning in the maintenance of public charging stations, and the City may not be able to repair public charging stations quickly, which would adversely affect service quality.

Each business unit that uses the City vehicle charging stations that have been installed under the SGPI program is responsible for maintaining them. Although it is not the same model of charging stations as on-street public charging stations, these charging stations are from the same manufacturer. It may therefore be appropriate to examine the feasibility of managing the maintenance and repair of public charging stations and charging stations reserved for the City pursuant to a single strategy.

The charging stations supplier keeps 15%[12] of the residual value of each dollar paid by a public charging station user and the provincial and federal taxes. The supplier pays the City the remaining portion (just over 70% of the original dollar) as a quarterly fee. For 2018, SIVT has been authorized by city council to use this fee to cover repair costs. For subsequent years, city council decided to adjust SIVT's operating budget accordingly.

RECOMMENDATIONS

3.1.2.C.	**We recommend that the Service de l'urbanisme et de la mobilité develop a strategy for maintaining and repairing public charging stations that provides adequate preventive maintenance and quick maintenance response times in case of breakdowns, all the foregoing at the lowest cost.**
3.1.2.D.	**We recommend that the Service de l'urbanisme et de la mobilité and the Service de la gestion et de la planification immobilière jointly study the possibility of supervising the maintenance of public charging stations and stations reserved for City vehicles under a single strategy in order to centralize maintenance expertise for all electric vehicle charging infrastructure within the City.**

12 The 15% retained by the supplier is a transaction fee for providing and managing an automated payment service at the charging station.

BUSINESS UNITS' RESPONSES

3.1.2.C. ***Service de l'urbanisme et de la mobilité***

[TRANSLATION] The Centre de gestion de la mobilité urbaine, which reports to the Direction de la Mobilité, is now responsible for maintaining on-street charging stations. This operational centre is responsible for traffic lights and smart transportation system equipment and already has various field equipment maintenance procedures. Providing support for electric charging stations will enhance the Centre de gestion de la mobilité urbaine's service offering. ***(Planned completion: repatriation to the Centre de gestion de la mobilité urbaine: completed)***

Upon the termination of the current maintenance agreement with the supplier (warranty period), the Centre de gestion de la mobilité urbaine team will issue a call for tenders in early 2020 to provide constant corrective and preventive maintenance for electric charging stations. The Centre de gestion de la mobilité urbaine team will work with the supplier to develop maintenance plans for each type of equipment.

It should be noted that after the maintenance strategy has been implemented, resource needs will be assessed in order to respond to requests and to cope with the aging charging station inventory. ***(Planned completion: March 2020)***

3.1.2.D. ***Service de l'urbanisme et de la mobilité***

[TRANSLATION] As recommended, the Direction de la mobilité will work with the Service de la gestion et de la planification immobilière and the Service de matériel roulant et des ateliers to review existing processes and propose a solution that promotes best practices. ***(Planned completion: December 2019)***

Service de la gestion et de la planification immobilière

[TRANSLATION] The Service de la gestion et de la planification immobilière and the Service du matériel roulant et des ateliers will work together to implement a structure to oversee the maintenance and repair of charging stations in the City's private network (vehicle fleet). It should be mentioned that the Service du matériel roulant et des ateliers will be responsible for charging station maintenance and repair, while the Service de la gestion et de la planification immobilière provides support, because it will look after connecting and disconnecting charging stations that need to be replaced or repaired. The Service du matériel roulant et des ateliers will be responsible for work on charging stations.

Employees in charge of maintaining the charging station network will receive remote access to view the FLO portal, which displays the status of the private network's (vehicle fleet) charging stations. ***(Planned completion: July 2019)***

BOROUGHS' RESPONSIBILITY

As part of Goal 2 regarding the replacement of subcompact vehicles by electric vehicles, the boroughs are consulted by SMRA to identify replacement vehicles, as mentioned above. As part of Goal 1 on the installation of charging stations for municipal electric vehicles, boroughs are responsible for identifying buildings where charging stations are to be installed, obtaining bids from contractors, obtaining confirmation from property manager that the installation is feasible in the case of a lease, and finally to have the work done. Boroughs, like other business units, are also responsible for the maintenance of municipal vehicle charging stations. However, no framework has been put in place to define the required maintenance and the approach.

When boroughs use electric vehicles, they have a responsibility that they do not have when they use combustion engine vehicles. While SMRA is responsible for fuel costs until December 31, 2023 pursuant to the City's declaration of jurisdiction under section 85.5 of the *Charter of Ville de Montréal*, boroughs are responsible for electrical costs for municipal vehicle charging stations. Admittedly, the electricity costs significantly less than gasoline. SMRA estimates that annual gasoline costs are between 4.6 and 7.2 times higher than electrical costs depending on the type of combustion engine vehicle considered for identical use. With the eventual increase in the number of all-electric vehicles in central departments and borough, costs will increase for these business units. In addition, when technology will allow heavy-duty electric vehicles to be used, if the City chooses to convert its fleet of trucks to electricity, the business units' electrical consumption will increase considerably. We therefore believe that it would be wise to address the issue of energy cost sharing proactively, before the impact of transportation electrification significantly modifies the rules and procedures that prevailed before this transition to all-electric vehicles.

For Goal 8 on public charging stations, the boroughs have responsibilities in both charging station installation and use phases. In installation, in addition to assisting SIVT in identifying charging station locations, the boroughs are responsible for providing charging station signage (a NO PARKING sign except for electric vehicles or plug-in hybrids that are recharging) and removing parking meters if the space required by the charging vehicle replaces a metered parking space[13].

In the operation phase, boroughs are responsible for paying for the electricity used by the vehicles. The impact of this responsibility is discussed in the section of the *Strategy* related to the sharing of responsibilities.

13 Only parking spaces in the Ville-Marie borough that are part of the zone defined as downtown Montréal within the meaning of the *Act to amend various legislative provisions concerning Montréal* retain parking meters even if they become locations for charging electric or plug-in hybrid vehicles.

OTHER RESPONSIBILITIES

The other goals of the *Strategy* are under the responsibilities of departments that were not within the scope of this audit or external organizations such as STM and CDPQ Infra. Their responsibilities are therefore not discussed in this audit. This applies to the Service de l'environnement, which is responsible for assessing the environmental benefits of implementing the *Strategy*. This action item is discussed later in this report, not from the standpoint of this department, but from the standpoint of departments audited as generators of information required for the Service de l'environnement's work.

ISSUES RELATED TO THE CURRENT MODE OF SHARING RESPONSIBILITIES IN IMPLEMENTING THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

Based on the sharing of responsibilities between SGPI, SIVT, SMRA and SMVT, as well as the boroughs, we consider it important to highlight some issues that may justify reviewing this mode of sharing responsibilities.

As previously mentioned, boroughs are now responsible for electric vehicle energy costs, and SMRA is responsible for combustion engine vehicle fuel costs. In the course of our work, we did not identify any budget allocations for this transfer of responsibility to the boroughs.

Boroughs are also responsible for the cost of the electricity used by public charging stations. According to the agreement between Hydro-Québec and the City[14], the income from charging vehicles on the Circuit électrique Québec inc. (hereinafter Circuit électrique)[15] for charging stations purchased by the City[16] are the exclusive property of the City after taxes have been paid and transaction fees[17] have been paid to the charging station supplier selected by Hydro-Québec (AddÉnergie).

Table 2 shows the income that the City receives per charge (depending on whether it is an on-street station at a rate of $1.00 per hour or an off-street station[18] at a flat rate of $2.50 per session) as well as the amount it pays for the electricity used during charging. It should be noted that Hydro-Québec sets prices for the use of public charging stations. It sets the maximum rate that can be charged for charging stations on the Circuit électrique and, under the agreement, this rate must cover the price of the electricity used. Based on one month of charges in November 2018, SIVT estimated an average $30 electricity cost per charging

14 There was an initial 2013-2016 agreement between Hydro-Québec and the City, which was renewed for 2017-2020.

15 Circuit électrique, which is owned by Hydro-Québec, is the largest network of public charging stations in Quebec and Eastern Ontario.

16 Companies and organizations located in the Ville de Montréal, such as Rona, Rôtisseries St-Hubert and educational institutions, also have charging stations in their parking lots that are part of Circuit électrique. The City does not receive any income from the use of these off-street charging stations.

17 The transaction costs retained by AddÉnergie are equivalent to 15% of the net income, or charging revenues minus taxes. Taxes are also applicable on transaction fees.

18 Off-street charging stations are installed for example in borough library or sports complex parking lots.

station. Based on this average monthly cost per station, the 1,000 on-street charging stations that the City aims to have under the *Strategy*, the boroughs could have to pay $360,000 in annual electricity costs. This amount may rise as charging station use increases.

On a City-wide basis, the hourly rate for use of on-street charging stations is high enough for the City to collect a fee covering the cost of electricity, even at the full power of the charging station (a fee of $0.72 / h versus an energy cost of $0.706 / h). However, central departments collect the fee (in 2018, SIVT used the fee to pay for charging station maintenance), whereas the boroughs pay for electricity costs. It is therefore a net expense for the boroughs. For off-street charging stations that use a per session fee, cost-effectiveness will depend on how long it takes to charge the vehicle. For charges that take from up to 2.5 to 3 hours, the fee received by the City ($1.799 regardless of the duration of the session) is higher than the cost of the electricity. However, beyond this charge time, the cost of the electricity paid by the borough exceeds the amount of the fee. In addition to being also borne by the boroughs, overall, such charges are unprofitable for the City.

According to the report on charging stations installed in the City as of December 5, 2018, there are more on-street (556 installed including 480 in operation) than off-street charging stations (82 installed including 78 in operation). Off-street charging stations in operation represent only 14% of City charging stations.

TABLE 2 – INCOME AND EXPENSES RELATED TO PUBLIC CHARGING STATION USE

	ON-STREET CHARGING STATION	OFF-STREET CHARGING STATION
INCOME		
Charge fees paid by users (gross income)	$1.00/h	$2.50/session
Taxes to be paid on charging income	$0.13/h	$0.326/session
Transaction fee (15% of income minus taxes) for AddÉnergie (taxes apply to these fees)	$0.15/h	$0.375/session
Fee paid to the City	**$0.72/h**	**$1.799/session**
Borough expense ($0.0981/kilowatt hour) for charging based on the capacity of the electric vehicle's charger	**7.2 kilowatts (maximum power of an on-street charging station)**	**6.2 kilowatts (maximum power of an off-street charging station)[19]**
1 hour charge	$0.706	$0.608
2.5 hour charge	$1.767	$1.521
3 hour charge	$2.119	$1.825

19 All-electric vehicles like the Chevrolet Bolt or Tesla S have built-in 7.2-kilowatt (kW) and 11.5-kW chargers respectively. They therefore use the full power of on-street and off-street charging stations. However, vehicles like the Nissan Leaf are equipped with 6.2-kWh chargers. They therefore do not use the full power of on-street charging stations, but they do use the full power of off-street charging stations. Some vehicles are equipped with 3.3-KW chargers.

If a user has to charge his electric vehicle for longer than 2.5 hours, it is cheaper for him to use a flat rate off-street charging station than an hourly rate on-street charging station. We reviewed charges for the third quarter of 2018. We found that 91% of on-street charges took less than 2.5 hours, whereas this percentage decreased to 75% at off-street stations. When long-term charging is required, users seem to prefer off-street charging stations.

From the City's standpoint, with a $1.799 flat fee for an off-street charging session and an electricity cost of $0.0981/kilowatt-hour (kWh), a charge needs to use more than 18.33 kWh for the fee to be less than the electrical cost (an unprofitable charge for the City). In the third quarter of 2018, only 5.5% of on-street charges were over 18.33 kWh versus 15.4% for off-street charging stations, three times more. We concluded that, in 15% of cases, off-street charging stations are not cost-effective for the City in terms of electrical consumption.

Because only a small percentage of charging stations are off-street charging stations (82 off-street charging stations installed versus 556 on-street charging stations installed), we would not have considered it appropriate to raise this finding of increased use of off-street charging stations for lengthy charges that are not profitable for the City. However, SIVT considers it is increasingly difficult to find street locations to install charging stations that meet the established criteria, such as sidewalk width, or potentially high-demand location. SIVT also indicates that boroughs are sometimes opposed when the location that has been identified is in front of a park or residence. That is why the decision was made to allow the installation of off-street charging stations for 2019 and 2020 to reach the target of 1,000 charging stations. SIVT provided us with confirmation that the rate for these new off-street charging stations to be installed in 2019 and 2020 will be $2.50 per session, as is currently the case. This decision by the City will exacerbate a situation that may be unfavourable for it and for the boroughs.

It should be noted that boroughs have no control over the cost of electricity to be paid for charging vehicles at public charging stations. On the one hand, the Central City sets the number of charging stations to be installed within boroughs. On the other hand, users decide how much energy will be used at charging stations. We believe that the City and the boroughs should reach an income and expense sharing agreement (infrastructure and operating costs) related to public charging stations before the cost of energy used by charging stations becomes too high due to the increasing popularity of all-electric vehicles.

RECOMMENDATION

3.1.2.E. **We recommend that the Service de l'urbanisme et de la mobilité develop an income and cost-sharing model between the Central City and the boroughs for all aspects of transportation electrification, which includes both infrastructure acquisition costs and energy costs for charging City vehicles (the City's charging stations), costs for charging public vehicles (public charging stations) and maintenance costs for all these charging stations to ensure the various business units are treated fairly.**

BUSINESS UNIT'S RESPONSE

3.1.2.E. ***Service de l'urbanisme et de la mobilité***

[TRANSLATION] Charging station fees are used to maintain charging stations. It should be understood that the Central city invests $3 million per year to purchase and install charging stations. Finally, it is our understanding that the boroughs are responsible for paying electricity bills, whereas the Central city is responsible for installing and maintaining charging stations. A revised revenue and cost sharing model must involve jurisdictional arbitrage.

It is recommended that the Service des finances be put in charge of this matter, in conjunction with the Service de l'urbanisme et de la mobilité, to review the revenue sharing model, because all the foregoing will have an impact on the fees that the Central city pays to the boroughs.
(Planned completion: June 2020)

3.1.3. MONITORING THE IMPLEMENTATION OF THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

In this section of our audit, we looked at whether audited departments were monitoring the steps to be taken to ensure that the expected outcomes of the *Strategy* were being achieved.

3.1.3.1. GENERAL REVIEW OF THE IMPLEMENTATION OF THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

3.1.3.1.A. BACKGROUND AND FINDINGS

The entire *Strategy* is reviewed twice a year by the *Strategy* directors committee, which consists of the department heads of SMVT, Service de l'environnement and SMRA, branch directors or division heads of SIVT, SGPI, SMVT and the Service du développement

économique, a representative of the Service des ressources humaines (new since the July 2018 meeting), a representative of STM, a member of the City executive committee responsible for transportation and the Directeur général adjoint des Services institutionnels. All leaders of the 10 goals of the *Strategy* except for Goal 6 (Implementation of REM) are represented in the composition of the directors committee. February 2018 meeting minutes indicate that "*because of the many recent amendments to the* [REM] *project, it was deemed appropriate to wait before including it in our discussion*". At the July 2018 meeting, SMVT made a proposal to update the last two years of the *Strategy* (2019-2020), including removal of the REM goal in order to include it in a new goal entitled "*Sustained co-operation with partners to promote transportation electrification*".

Directors committee meetings provide a forum where each department responsible for a goal provides a progress report on the work for which it is responsible. They also provide a forum for initiating discussions on City positions related to transportation electrification and to mandate one or more departments to explore these topics in greater depth. This is the case for charging stations for City employees' personal vehicles. Given that it is in the SGPI program, but that the City does not yet have a clear position on this subject, the transportation leader of the City executive committee asked SMVT, at the July 2018 meeting, to submit "*proposals to frame City employees' use of charging stations*" for their personal vehicles.

The directors committee uses a table to monitor the steps to be taken in each goal. SMVT, the *Strategy* coordinator, asks the departments concerned to update this table before each committee meeting. This table is considered the *Strategy* action plan. However, SMVT does not consider that there is a real action plan for implementing the *Strategy* although its own monitoring document is called an action plan.

This monitoring table, which is used as an action plan, presents for each goal: action items, a calendar, a responsible unit, the financial implications, and monitoring on whether the action item was completed. Our main findings regarding this tool are:

- Some action items are not clear and specific enough for them to be considered a real action plan or they are just too similar to the goal they are responding to. For example, the table mentions "*setting up an eco-friendly vehicle and equipment integration program" or "installing charging stations for the City's fleet of vehicles*";
- Financial information, when available in the table, provides an overview of the budget allocated for the action item, but there are no progress reports on the use of this budget;
- Between the February 2018 and July 2018 versions, there are no progress reports on some action items (in particular goal 8 on public charging stations);
- Action items are added from one version to another of the table, which is not typical of an action plan. Between the February 2018 and July 2018 versions, SMRA added an action item to increase the number of plug-in hybrid vehicles by 25%, and increase the number of all-electric vehicles and equipment by 10%;
- Some deadlines presented in the action plan are not actual deadlines, but rather starting points quantifying the situation at a moment in time. So rather than saying which

target should be achieved and when, the table states the indicator's starting point at an earlier date. SMRA indicates in the July 2018 version of the document that the timeline for the action item for replacing 50 combustion engine vehicles per year from 2016 to 2020 with all-electric vehicles, *"As of January 1, 2018 is 129 compact and subcompact all-electric vehicles"*[20].

As mentioned earlier, SMVT started updating the *Strategy* for 2019 and 2020 and, with the co-operation of the departments concerned, had to produce a new action plan to complete the implementation. However, at the time of our audit, in November 2018, work on this update was several months behind schedule.

RECOMMENDATION

3.1.3.1.B. **We recommend that the Service de l'urbanisme et de la mobilité adopt a real action plan for implementing the *Transportation Electrification Strategy*, including each concrete action item, targets, progress indicators, a timetable and a budget, in order to monitor progress on implementing the *Transportation Electrification Strategy*.**

BUSINESS UNIT'S RESPONSE

3.1.3.1.B. ***Service de l'urbanisme et de la mobilité***

[TRANSLATION] At the last Transportation Electrification Strategy steering committee meeting, the representatives approved the document update exercise. In addition to reviewing the policies, the new version of the Strategy proposes an action plan, which identifies the budget, objectives, and indicators for each policy.

The updated version of the Strategy will be submitted to the steering committee in the spring of 2019. It will subsequently be validated, if necessary. ***(Planned completion: December 2019)***

20 Textual excerpt from what is written in the action plan for implementation of the *Strategy* for an action item deadline.

3.1.3.2. MONITORING THE IMPLEMENTATION OF SPECIFIC GOALS

3.1.3.2.A. BACKGROUND AND FINDINGS

MONITORING TOOLS

We focused on the mechanisms that SGPI, SMRA, and SIVT used to monitor 1, 2 and 8 of the *Strategy*, respectively. We find that each department uses tools (mainly Excel files) to monitor action items required to implement the policy for which they are responsible. We noted various discrepancies in the information contained in these files, which in our opinion shows a need for better control and better use of these monitoring tools. For example, we noted that:

- the SGPI file for monitoring the implementation of the City's vehicle charging stations contains several tabs for overall project monitoring, calendar monitoring, and monitoring each project's budget. None of these tabs have the same total number of charging stations (164 charging stations under the financial monitoring tab, 165 charging stations under the calendar monitoring tab, and 161 charging stations under the overall project monitoring tab);
- the file for monitoring electric vehicles ordered by SMRA contains only 95 vehicles, while 100 Nissan Leafs were purchased in 2018 according to quote 14017E11;
- the file used by SIVT to monitor public charging stations monitors the total cost of installing charging stations, but it does not provide all the information on charging station purchase costs and installation costs;
- technical information regarding public charging stations in the SIVT monitoring file (fleet number, physical address, charging station serial number) differs in several cases from the information available from Circuit électrique. Among the differences noted, one charging station is in Rosemont-La Petite-Patrie borough according to SIVT, but a serial number for a similar charging station is recorded in Ville-Marie borough according to Circuit électrique. Also, the correspondence between fleet numbers and charging station serial numbers is incorrect in about 20 cases. As a result, we doubt that a problematic charging station can be properly identify and that the situation can be corrected promptly.

CHARGING STATION USAGE DATA ANALYSIS

SGPI has installed charging stations for City vehicles and SIVT has installed charging stations for public vehicles. As a result, the City can now access a large amount of data from the supplier on charging station use. Data are available on each charge, including the charge date, amount of energy used, length of the charge, the price the user paid for charging at a public charging station and the access card number used to charge a vehicle at a City charging stations.

Every month, SIVT produces a table showing the total number of charges per double station (one double station has two charging station) and by the borough. This file is sent to all boroughs for information purposes. SIVT also indicated that it could also use this information to examine the locations where charging stations could be installed based on use of existing charging stations. However, the analyses do not go any further regarding this matter.

SIVT provided us with confirmation that it does not analyze quarterly use of public charging stations to ensure that the fee from the charging station supplier is consistent with the gross income generated by charging stations minus deductions (taxes and service charges) included in the agreement between the City and the supplier.

Because public network charging data have not been analyzed, SIVT cannot determine whether some charges at charging stations have not been invoiced to users, most of which involved off-street charging stations. For the third quarter of 2018 only, we noted that 178 charges at this type of charging station had not been invoiced out of a total of 2,751 charges, which represents 6.5% of charges. With the exception of two charges, these free sessions occurred at three locations, including one site that alone accounts for 70% of free charges at an off-street charging station. Unable to account for this situation, SIVT questioned the charging station manufacturer. The manufacture indicated that the charge was apparently performed using a private access card that was provided with each charging station to test the charging station after it was installed. This could occur at off-street charging stations directly installed by the boroughs before 2016 because they had taken direct possession of the charging stations (and the access cards). The three cases we identified occurred during this period. SIVT indicated that in these cases, City vehicles, possibly from the concerned boroughs, would have been charged at Circuit électrique public charging stations rather than at City charging stations. In fact, these are major energy charges, with averages 15.5 kWh, 16.4 kWh and 23.0 kWh respectively, including one 40.9-kWh charge. A 40.9-kWh charge is the maximum charging capacity of a completely discharged Nissan Leaf battery (40 kWh for the 2018 and 2019 models). In the City's all-electric vehicle fleet, only the Chevrolet Bolt has a greater charging capacity (60 kWh). As of October 2018, the City had 10 Chevrolet Bolts, but none of them were associated with the borough where this charge occurred. As a result, if test cards were used to obtain these free charges, there is no guarantee that they were used to charge City vehicles rather than City employees' personal vehicles.

SGPI also provided us with confirmation that it does not analyze the data available on City vehicle charges. We raised the case of a City charging station in a municipal workshop where we observed two charging sessions (42.97 kWh and 49.02 kWh). SGPI was unable to account for these two major charges exceeding the charging capacity of the new Nissan Leaf (40 kWh), despite the fact that the number of the access card used is known. The technical reason why SGPI cannot answer this question is that the City does not have a register that associates an access card to a City charging station and a specific City

vehicle[21]. This is another case where there is no guarantee that City employees did not use City charging stations (at no cost) to charge their personal vehicles with cards that should be used only to charge City vehicles. At a City building equipped with several charging stations, we observed vehicles that were charging with no visual identification to confirm that they belonged to the City. In one case, the vehicle being charged was a type of high-end electric car that the City does not have in its fleet.

USE OF CITY CHARGING STATIONS TO CHARGE EMPLOYEES' PERSONAL VEHICLES

With respect to charging employees' electric vehicles at City charging stations, the SGPI program provides for the installation of 45 charging stations over 3 years. However, none of these charging stations have been installed yet. SMVT has been mandated to make proposals to regulate employee access to charging stations under the SGPI program (an exercise we believe should have been completed before including this action item in the SGPI charging station program). SMVT requested the Service des ressources humaines' support to deal with this matter because the directors committee felt that there were many issues related to the benefits this could provide for employees. We consider that the City should deal with this matter quickly, because there is evidence that employees are using the charging stations. In addition to the vehicles we observed, we noted two City charging station charge profiles that were similar to personal vehicle charges. These findings are based on an analysis of charge data from the same access card from June 2018 to September 2018 at charging stations located in a City workshop:

- The card was used at a charging station from Monday to Friday approximately 9:00 p.m. to 5:30 a.m. the next morning (meaning that the vehicle was not in use, but parked). The card was then used again immediately afterward at a neighbouring charging station for charges starting between 5:30 a.m. and 6 a.m. until 3:30 p.m. or 4 p.m. After charging a vehicle for so long, there is no technical reason for routinely reconnecting an electric vehicle to another charging station without having actually used the vehicle. This case may involve two employees working on different shifts who use the same City card to charge their respective personal vehicles;
- The same card was also used a few times for simultaneous charges on two neighbouring charging stations.

TECHNOLOGY WATCH

Although we are collectively only starting to electrify transportation, this field is quickly changing, in terms of vehicle battery capacity (range) and charging methods. As such, we believe it is important to ensure that we make the most judicious and appropriate choices

21 However, it should be noted that the cards only provide access to charging stations that belong to a specific group of charging stations, i.e., charging stations at a City building or all charging stations belonging to a business unit.

today, based on available knowledge, to meet current and, at least, medium-term needs. We therefore tried to find out whether, as part of the implementation of the *Strategy*, the various departments concerned were performing a formal, routine and structured technology watch, and whether the findings were shared.

According to SMVT, each department involved performs a technological watch on its own topics, and if necessary, findings are shared at directors committee meetings. However, everything is done on ad hoc and informal basis. For example, an SMVT employee represents the City as a member of the *Global EV Pilot City Programme*, which is administered by the International Energy Agency in Paris. This gives him access to information on what is being done elsewhere. At SMRA, transportation electrification managers are in contact with cities outside the country to discuss available technologies. At SGPI and SIVT, there is no formal technology watch, but employees do this on a voluntary basis and out of personal interest. The three sets of minutes of directors committee meetings that we obtained did not indicate that any information was provided on any technological watch performed by a department.

In this field, we believe it is necessary to be able to assess trends and developments in order to properly plan for the technology and infrastructure to be implemented. Large investments have been made in this field[22]. The City is developing an agreement with Hydro-Québec to ensure that the Crown corporation is technically and economically responsible for the installation of fast-charging stations (400 V)[23] in the Ville de Montréal. It is therefore appropriate to ask whether, with the arrival of fast-charging stations, and since 638 on- and off-street charging stations (240 V) have already been installed, the City needs to continue to install new charging stations to reach the 1,000-charging station target.

CITY'S ELIGIBILITY FOR GOVERNMENT SUBSIDIES

The City's *Strategy* is eligible for two provincial government subsidies under the *Plan d'action contre les changements climatiques 2013-2020* and the *Plan d'action 2015-2020 en électrification des transports*.

A first subsidy for the purchase of electric vehicles is available under the Roulez vert - volet Roulez électrique program, which provides $8,000 for the purchase of an all-electric vehicle. The decision-making summary for the purchase of 100 Nissan Leafs in 2018 did not assume that the subsidy would still be available at the time of purchase (a conservative and cautious City approach). However, our audit confirmed that the City obtained this discount for the purchase of all these vehicles.

22 The introductory document for the 2019-2021 TCEP indicates a cost of $7.26 million for 2019 to 2021 plus $6.54 million for 2017 and 2018, for a grand total of $13.79 million for 848 public charging stations.

23 A fast-charging station runs on direct current at 480 V and can transfer a charging power of 50 kW compared to a standard on-street charging station that generates 7.2 kW of power. Charging time is therefore divided by 7. However, some electric vehicles are not compatible with this charging method.

A second subsidy is available for the purchase and installation of charging stations for vehicles owned by a company, organization or municipality (Branché au travail program). The subsidy is for 50% of eligible expenses up to a maximum of $5,000 per charging station, and up to $25,000 per year per site. Here again, the City was cautious in its decision-making summary. It did not assume that it would obtain the subsidy. Although the City has already installed several charging stations in its buildings, including 50 charging stations installed in 2017, no subsidies had been obtained at the time of our audit. On two occasions, Transition énergétique Québec rejected the City's applications because they were incomplete (lack of proof, such as a photo, of reserved parking space signs for vehicles being charged, no proof of payment to the contractor for all work performed, no breakdown of electrical installation costs, no confirmation that the electrical contractor had performed its work).

SGPI revised its charging station implementation guideline to require business units to use the elements described in the normative framework of the Branché au travail program to ensure that complete applications can be submitted. To ensure that these business unit documents are obtained, SGPI withholds 10% of the amount to be reimbursed for charging station purchase and installation costs. However, according to SGPI itself, although it withholds this amount, it is difficult to obtain all documents to receive all available subsidies. This is an important issue because, according to SGPI, the total subsidies it could obtain by 2020 range between $535,000 and $988,500 under various scenarios prepared by this department.

LACK OF INTERDEPARTMENTAL PLANNING FOR IMPLEMENTATION OF THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

SMRA is responsible for converting combustion engine vehicles to electric vehicles. SGPI is responsible for installing charging stations for these vehicles because the equipment must be installed on a building or in connection with a building. As a result, SMRA orders electric vehicles without first confirming whether the appropriate a charging station can be installed in the building where the vehicle will be parked. A vehicle must be slated for replacement before the business unit can contact SGPI to prepare plans, order the charging station, perform the work and commission the charging station. We consider that the work performed by SMRA and SGPI should be better aligned to speed up the start of work on installing charging stations and to ensure that a charging station can be installed before an electric vehicle is ordered. Rather than looking at these two goals reviewing separately, they should be considered together, because an electric vehicle cannot operate without a charging station, and vice versa.

RECOMMENDATIONS	
3.1.3.2.B.	**We recommend that the Service du matériel roulant et des ateliers, the Service de la gestion et de la planification immobilière and the Service de l'urbanisme et de la mobilité review the tools they use to monitor implementation of the *Transportation Electrification Strategy*'s policies for which they are responsible to ensure that the information they have to adequately monitor the progress of actions is accurate and complete.**
3.1.3.2.C.	**We recommend that the City Manager come to a decision on employee use of City charging stations to charge their personal electric vehicles, taking into consideration both charging stations used to charge City vehicles and future charging stations for employees, in order to regulate this practice and ensure that it is fair to all employees.**
3.1.3.2.D.	**We recommend that the Service du matériel roulant et des ateliers make an inventory of charging station access cards and link them to a City vehicle to better control the use of access cards at City charging stations.**
3.1.3.2.E.	**We recommend that the City Manager make the *Transportation Electrification Strategy* coordinator responsible for a structured and planned technology watch including periodic reporting to the various departments involved in implementing the *Transportation Electrification Strategy* in order to ensure that implementation takes into account technological changes and trends in transportation electrification.**
3.1.3.2.F.	**We recommend that the Service de la gestion et de la planification immobilière take all the steps needed to obtain the financial assistance available from the Branché au travail provincial program.**
3.1.3.2.G.	**We recommend that the Service de la gestion et de la planification immobilière and the Service du matériel roulant et des ateliers work together to commission a new electric vehicle and install a charging station within the same timeframe.**

BUSINESS UNITS' RESPONSES	
3.1.3.2.B.	***Service de la gestion et de la planification immobilière et Service du matériel roulant et des ateliers*** *[TRANSLATION] The Service de la gestion et de la planification immobilière and the Service du matériel roulant et des ateliers will review the monitoring files in order to incorporate 2019 project planning and update project data going back to 2017 and in the planning stage in 2018 as part of the replacement of traditional vehicles by electric vehicles in the City's fleet.* ***(Planned completion: April 2019)*** ***Service de l'urbanisme et de la mobilité*** *[TRANSLATION] The Service de l'urbanisme et de la mobilité component: the new one-stop shop that will handle all requests regarding electric charging stations will require files with correct data. Because there are some many files in circulation and in the City's network, it is impossible to tell whether charging station installation and performance data are accurate.* *To resolve this problem, network architecture will be reviewed and cloud storage will be introduced to allow stakeholders to view or edit shared files, in accordance with their access rights. The upcoming implementation of Office Suite and Google Cloud will allow all City employees to collaborate on files.* ***(Planned completion: September 2019)***
3.1.3.2.C.	***Direction générale*** *[TRANSLATION] The Direction générale has already mandated the Bureau du contrôleur général, in conjunction with the Service des ressources humaines, to draft a guideline on using the Ville de Montréal's charging stations to charge employees' personal electric vehicles. This guideline will subsequently be distributed to all employees.* ***(Planned completion: December 2019)***
3.1.3.2.D.	***Service du matériel roulant et des ateliers*** *[TRANSLATION] The Service du matériel roulant et des ateliers will ask the supplier to develop a filing system (FLO portal) that groups all access cards in order to associate them with a vehicle or employee. The Service du matériel roulant et des ateliers will also ask the supplier to no longer provide access cards without the authorization of the Service du matériel roulant et des ateliers. An access card distribution guideline must be developed.* ***(Planned completion: September 2019)***
3.1.3.2.E.	***Direction générale*** *TRANSLATION] The Direction générale will mandate the person responsible for coordinating the Transportation Electrification Strategy to implement a technology watch and make it available to the various Departments involved in implementing this strategy. There will have to be a discussion on how to perform this watch.* ***(Planned completion: September 2019)***

3.1.3.2.F. ***Service de la gestion et de la planification immobilière***

[TRANSLATION] A 10% deduction is already withheld when credits are transferred pursuant to a favourable response in a decision-making file in order to encourage business units to submit relevant documents as soon as possible to prepare the subsidy file.

Business units will receive regular reminders indicating which documents are missing. Support will also be available at the business unit's request.

Guidelines listing the documents to be submitted will be revised as needed following discussions with those responsible for the Branché au travail subsidy.

A project-specific monitoring table will be developed to monitor pending documents. To date, nearly $350,000 in subsidies have been deposited under the program (a total of 9 files). ***(Planned completion: April 2019)***

3.1.3.2.G. ***Service de la gestion et de la planification immobilière et Service du matériel roulant et des ateliers***

[TRANSLATION] An action plan has been implemented between the Service de la gestion et de la planification immobilière and the Service du matériel roulant et des ateliers to coordinate activities specific to each Department. Two forms have been developed to better define an upstream project.

The first form, sent by the Service du matériel roulant et des ateliers, asks the business unit to confirm the address where the electric vehicle will be parked ("home port"). The second form is a prefeasibility study that will be conducted by the Service de la gestion et de la planification immobilière to identify the project's characteristics (preliminary budget, summary schedule) and determine whether there are any critical issues. This preliminary exercise will enable the Service de la gestion et de la planification immobilière, the Service du matériel roulant et des ateliers and the business unit to make an informed decision on installing the required charging infrastructure, and to propose alternative solutions in cases where there are major charging station installation issues.

A table has been constructed to disseminate status updates on each project and the scheduled charging infrastructure installation date. Information on the progress of each project will be exchanged between the Departments on a monthly basis.

Meetings between the 2 Departments are also scheduled to exchange information on the progress of a charging infrastructure installation project and, if necessary, adjust the timing of electric vehicle deliveries accordingly. ***(Planned completion: April 2019)***

3.2. MEET THE TARGETS AND DEADLINES SET OUT IN THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

3.2.1. PROGRESS REPORTS ON THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

3.2.1.A. BACKGROUND AND FINDINGS

In this section, we seek to establish whether the various departments audited are on track to achieve the targets set out in the *Strategy*. Table 3 summarizes these targets and the progress we observed during our work in the fall of 2018. We then provide details on our main findings regarding the achievement of these targets.

TABLE 3 – TARGETS TO REACH BY 2020 FOR THE GOALS EXAMINED IN THE AUDIT

AREA	2020 TARGET	DECEMBER 2018 RESULTS
GOAL WITH AN EXPLICIT TARGET DESCRIBED IN THE *TRANSPORTATION ELECTRIFICATION STRATEGY*		
Number of subcompact combustion engine vehicles replaced by all-electric vehicles (Goal 2)	230 according to the *Transportation Electrification Strategy* 250 according to the *Green Policy*	168 in service 210 in total
Number of (on-street) public charging stations (Goal 8)	1,000	480 on-street charging stations in operation 556 on-street charging stations installed 638 total including off-street charging stations
GOAL WITHOUT AN EXPLICIT TARGET DESCRIBED IN THE *TRANSPORTATION ELECTRIFICATION STRATEGY*		
Number of charging stations installed to charge City vehicles (Goal 1)	225 (2018-2020) + 84 maximum retroactively for 2017 according to the SGPI program	32 charging stations in service 127 charging stations in preparation
Number of charging stations for charging City employees' electric vehicles (Goal 1)	45 according to the SGPI program	None

Of the three goals that we examined in detail in the *Strategy*, only two outlined explicit targets: the number of combustion engine vehicles to be replaced by electric vehicles and the number of public charging stations to be installed in the City.

On December 17, 2018, we extracted the list of electric vehicles from the SMRA database. The list included 227 vehicles. However, the City had acquired some of these vehicles before it had started implementing the *Strategy*. They must therefore be excluded from the list to accurately assess the extent to which the *Strategy*'s target was achieved. The City therefore acquired 210 all-electric vehicles under the *Strategy*. By the end of 2018, depending on whether we consider the 230 electric vehicle target set out in the *Strategy* or the 250 electric vehicle target set out in the *Rolling stock green policy*, SMRA achieved 91.3% or 84% of the target. It would still have two years to add a maximum of 20 electric vehicles per year to its fleet. Given that SMRA added 100 electric vehicles in 2018, it is in a very good position to achieve its target.

Within the narrow meaning of the *Strategy*, any combustion engine vehicle replaced by an all-electric vehicle helps achieve the target. Within the meaning of the *Rolling stock green policy*, only subcompact combustion engine vehicles (classes 134 and 135) replaced by all-electric vehicles help achieve the target. In this context, we examined the combustion engine vehicles replaced by the 100 Nissan Leafs in 2018. We identified 95 of the 100 vehicles that were replaced. We identified 72 class 134 and 135 vehicles replaced by all-electric vehicles, i.e., 75.8% of the 95 vehicles. The other vehicles were larger models such as pickup trucks and vans. From a GHG reduction standpoint, this is a positive approach because these vehicles use significantly more gasoline than subcompacts. With respect to the *Rolling stock green policy*, of the 210 electric vehicles acquired since 2016, 23 would have to be removed because they are not class 134 or 135 technical vehicles that have been replaced by electric vehicles. The result would therefore be 187 of the 250 vehicle target to be achieved by 2020 (74.8%). Here again, with two years to go and the City's history in recent years, it seem quite plausible that 63 electric vehicles will be acquired.

The City's goal in the *Strategy* is to have 1,000 public charging stations installed by 2020. As of December 5, 2018, SIVT had 556 on-street charging stations installed in the City, 480 of which were in operation. The City is behind schedule. It had planned to have 604 charging stations installed and in service by the end of 2018 by installing 202 charging stations in 2018. SIVT attributes this delay to average 65.5 days it takes to connect charging stations after they are installed. According to the minutes that we obtained of the follow-up meetings between SIVT and its partners, the charging station connection rate in 2018 was 3 to 4 times lower than required to install all charging stations in 2018. SIVT does not believe this delay is an issue and is considering completing the 2018 installations in 2019.

The *Strategy* for this goal on public charging stations is aimed at "*installing an on- and off-street charging network for private electric vehicles, with a target of nearly 1,000 charging stations*". However, the *Strategy*'s directors committee is only monitoring the on-street charging stations described in the goal. Yet 82 off-street charging stations have also already been installed, including 78 in operation as of December 5, 2018.

Considering that each on-street charging station costs the City about $15,000 (purchase and installation), trying to achieve the 1,000 charging station target without considering these 82 off-street charging stations amounts to increasing the cost of this goal by more than $1,230,000. Also, given that SIVT does not perform in-depth analyses of the use of existing charging stations within the City and that Hydro-Québec will begin installing fast charging stations in Montréal, we question whether it is appropriate for the City to maintain the 1,000 public charging station target. In other words, could it be that the supply of public charging infrastructure within the City is already greater than the demand and that the arrival of fast-charging stations means that City no longer has a rationale for achieving the 1,000 charging station target?

Goal 1 on installing charging stations for City vehicles and for City employees' vehicles does not contain any targets in the *Strategy*. The approach adopted by SGPI is to associate a charging station with each City electric vehicle ordered by SMRA from 2018 to 2020. However, given that SGPI does not monitor the use of City charging stations, that City subcompact vehicles travel an average of 5,700 kilometres (km) annually, which equals 22 km per working day, and that the range of electric vehicles continues to grow[24], we question whether a new charging station should automatically be installed for each new electric vehicle. In terms of economics, it is important to understand that installing a charging station for each electric vehicle acquired by the City increases the purchase cost of the electric vehicle by approximately $10,000 (the average cost for purchasing and installing a charging station under the SGPI program). Given the vehicles' annual kilometrage, the fuel savings cannot offset this additional cost over the 10-year life of an electric vehicle[25] [26].

RECOMMENDATIONS

3.2.1.B. We recommend that the Service de l'urbanisme et de la mobilité review whether it is appropriate to maintain the 1,000 on-street public charging station target whereas the *Transportation Electrification Strategy* also considers the contribution of off-street charging stations and that the City is entering into an agreement with Hydro-Québec to have the Crown corporation install fast charging stations in the City.

24 The 2016 Nissan Leaf equipped with a 24-kWh battery had a 133 km range, whereas the 2019 Nissan Leaf now features a 40-kWh battery with a 242 km range. In 2017, the city acquired 10 Chevrolet Bolt EVs that have a 383 km range.

25 SMRA estimates the fuel to operate a subcompact vehicle in the City for 10 years costs $6,201.

26 SMRA estimated that it costs the City $650 more per year to operate an electric vehicle than a gasoline vehicle. However, this assessment significantly underestimated the cost of purchasing and installing a charging station (SMRA considered a total of $3,516, while SGPI's average was $10,000) and that the City routinely obtained the Government of Quebec rebates for charging stations. As of the date of our audit in December 2018, SGPI had not obtained any subsidy from Quebec for charging stations. If the total cost of charging stations is adjusted without considering the Quebec subsidy, it would cost the City an estimated $1,440 more per year per electric vehicle than it would to operate a gasoline vehicle.

3.2.1.C. **We recommend that the Service de la gestion et de la planification immobilière examine the possibility of associating more than one electric vehicle per charging station by introducing charging procedures to optimize City charging station use.**

BUSINESS UNITS' RESPONSES

3.2.1.B. ***Service de l'urbanisme et de la mobilité***

[TRANSLATION] In connection with the review of the Electrification Strategy, the 1,000 charging station target will be reviewed to take into account evolving charging station use patterns.

Thus, the primary target in implementing a charging station network will be set in terms of the number of charges, not the number of installed charging stations. This target makes it possible to maximize the charging stations already installed, without necessarily adding any to the network if this proves necessary.

All the foregoing will be submitted to the Strategy steering committee in the spring of 2019, and any necessary changes will be made afterward. ***(Planned completion: December 2019)***

3.2.1.C. ***Service de la gestion et de la planification immobilière***

[TRANSLATION] If no data were available, a ratio of one charging station per electric vehicle was preferred. In future installations, business units will be required to thoroughly review the number of charging stations needed charge its electric vehicles.

Service de la gestion et de la planification immobilière and the business unit will have discussions on establishing an appropriate ratio, particularly if new electric vehicles are joining an existing charging station network. With the manufacturer's technology for retrieving charge data and statistics, it will become easier to make these decisions based on evidence. ***(Planned completion: September 2019)***

3.2.2. IMPACT OF THE *TRANSPORTATION ELECTRIFICATION STRATEGY* ON REDUCING GREENHOUSE GAS EMISSIONS

3.2.2.A. BACKGROUND AND FINDINGS

The *Strategy* is in line with the City's commitment to reduce GHG emissions from its operations and community operations. The *Strategy* states that GHG reductions must be assessed annually during its implementation. The Service de l'environnement is responsible for performing this task and has developed a methodology to standardize this assessment. The first assessment of GHG reductions was performed for 2017 and sent

to SMVT in July 2018. At the time of our audit in mid-November 2018, these results had not been sent to other departments and partners involved in implementing the *Strategy*.

Table 4 presents GHG reductions for 2017 calculated by the Service de l'environnement. The actual activities outlined in the *Strategy* by the City accounted for only 4.6% of GHG reductions. The goal for which STM is responsible generated the greatest reduction (68.5%). Overall, GHG reductions from implementing the 2017 *Strategy* account for only 0.05% of the 1990 GHG emissions for the entire community. Given that the City has set a goal of reducing community emissions to 30% below 1990 levels by 2020, we find that the environmental benefits of the *Strategy* have had little impact on reducing GHG emissions and achieving the City's target and that they are almost exclusively based on the actions of STM. Given that the City's heavy vehicles are responsible for the main impacts in the area of transportation[27], and that electrification technology is not yet available for this type of vehicle, it is difficult to exceed the contribution achieved under the current *Stratégie à la réduction des émissions de GES de la Ville*.

To assess reductions associated with Goal 2 on converting the fleet of combustion engine vehicles to electric vehicles, the Service de l'environnement needs the total annual kilometrage of electric vehicles. The data are used to estimate the amount of GHG that would have been emitted by combustion engine vehicles if there were no electric vehicles. SMRA provided the Service de l'environnement with a list of all electric vehicles in service in 2017 containing this information. There were only 122 electric vehicles on the list. However, only 30 of these vehicles (24.6%) had kilometrage data for the year. Some of these vehicles had been in service since 2013 or 2015 but the list only indicated the vehicle kilometrage at the end of 2017. The total odometer reading was then attributed to 2017 (in three cases, these odometer readings were 12,604 km, 18,688 km and 26 248 km). However, according to SMRA, these vehicles travel 5,700 km annually on average. In some cases, there may not be an odometer reading, which is normal for electric vehicles commissioned at the end of the year, for example. However, the list of vehicles contained vehicles commissioned in 2013 for which there were no odometer readings in the document that the Service de l'environnement obtained from SMRA. We also considered that vehicles commissioned in the middle of the year were used, although the file did not have odometer readings for these vehicles. The Service de l'environnement did not make assumptions to complete the missing data. Using a zero value for the annual kilometrages of several electric vehicles in 2017, is equivalent to not considering the avoided GHG emissions for the City. Given that these initiatives must contribute to the 2013-2020 action plan to reduce GHG emissions from municipal operations and that this is also mentioned in the City's annual report on sustainable development, it is important to ensure that accurate GHG reduction values are reported. Accurate data on these GHG reductions is all the more important since city council decided to adopt a carbon budget in January 2019.

27 For example, according to the data obtained by SMRA, a subcompact vehicle in Villeray-Saint-Michel-Parc-Extension borough uses 250 to 1,000 litres of gasoline annually depending on how it is used. A garbage truck's annual diesel consumption can range from 6,000 to 12,000 litres, and a bulldozer can consume between 2,300 to 11,000 litres.

We contacted SMRA to find out how City vehicle odometer readings were taken. The department indicated that before May 2018, some vehicles were equipped with an electronic module that reads vehicle data, including odometer data. SMRA also indicated that the data transmitted were not reliable. Since May 2018, employees must enter the vehicle identification number and the odometer reading when refuelling at a pump. This is the standard method for all combustion engine vehicles, but not for all-electric vehicles. In this case, SMRA says it routinely takes an odometer reading during the annual vehicle maintenance check. However, on December 17, 2018, we randomly picked an all-electric vehicle (Nissan Leaf) commissioned more than a year ago and asked SMRA to give us the last odometer reading and date. The vehicle was put into service on June 17, 2016 and the SMRA database provided a zero odometer reading (zero). Based on this test and observations on the data that the Service de l'environnement receives from SMRA, we therefore find that SMRA does not routinely take electric vehicle odometer readings. When the City extends transportation electrification to its heavy machinery, there will be greater environmental benefits. It will then be even more important to take correct heavy electric vehicle odometer readings.

TABLE 4 – GHG REDUCTIONS GENERATED BY IMPLEMENTING THE *TRANSPORTATION ELECTRIFICATION STRATEGY* IN 2017

GOAL	GREENHOUSE GAS REDUCTIONS ACHIEVED IN 2017 (TONNES OF CARBON DIOXIDE EQUIVALENT)	CONTRIBUTION TO REDUCTIONS	RESULTS VERSUS COMMUNITY EMISSIONS IN 1990
Goal 2 - Convert the fleet of City vehicles	-23	0.3%	-0.0002%
Goal 5 - Action items completed by STM	-5,002	68.5%	-0.0334%
Goal 8 - Install public charging stations	-317	4.3%	-0.0021%
Goal 9 - Install the self-service electric vehicle network	-1,964	26.9%	-0.0131%
TOTAL	**-7,307**	**100.0%**	**-0.0488%**

Source: Service de l'environnement, 2018

RECOMMENDATION

3.2.2.B. We recommend that the Service du matériel roulant et des ateliers implement a procedure for taking routine odometer readings from electric vehicles belonging to business units in order to generate reliable kilometrage data for all these vehicles and enable accurate monitoring of greenhouse gas reductions that help achieve the 2013-2020 municipal operations action plan target and provide an accurate representation of actual results in the City's sustainable development report.

BUSINESS UNIT'S RESPONSE

3.2.2.B. ***Service du matériel roulant et des ateliers***
[TRANSLATION] Odometer readings will be taken twice a year during preventive inspections as recommended by the manufacturer
(Planned completion: July 2019)

3.3. ASSESSMENT OF INTERNAL AND EXTERNAL CUSTOMER SATISFACTION WITH THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

3.3.A. BACKGROUND AND FINDINGS

In general, none of the central departments we interviewed for our audit evaluates the satisfaction of customers directly affected by the City's actions.

With respect to the City's electric vehicles, the borough staff we interviewed indicated that they do not conduct a vehicle user satisfaction survey. Although there was some initial concern regarding vehicle range, informal comments that the people we interviewed heard in the boroughs did reflect satisfaction in several respects: the vehicle's green credentials, quiet ride, comfort and the technology available in the vehicle.

SGPI does not evaluate customer satisfaction with City vehicle charging stations. It should be noted that SGPI does not identify charging station locations, business units do that on their own. As mentioned earlier, SGPI does not analyze the use of charging stations to determine whether they meet the need.

SIVT has access to all public charging station usage data in the City. It prepares a monthly summary of the information and produces a table summarizing the number of charges per month. This table is sent to the boroughs. However, there are no charging station user

satisfaction surveys or surveys to determine whether new charging stations should be installed. Given that public charging stations in service are currently used no more than three times a day in 77% of cases (this count is per double station, not per charging station, so if a double station is used, only one of the two charging station is used)[28], that the City is in talks with Hydro-Québec to have the Crown Corporation install fast charging stations in the City, and that in the first three quarters of 2018, 52.1% of vehicles that received Government of Québec subsidies for the purchase of electric vehicles or plug-in hybrids had fast-charging capacity (400 V), it would be appropriate for the City to determine whether the need for charging electric vehicles in public areas has not changed enough for the City's *Strategy* to be reviewed.

RECOMMENDATIONS

3.3.B. **We recommend that the Service de la gestion et de la planification immobilière and the Service de l'urbanisme et de la mobilité implement a data analysis process for use of City charging stations and the public network to ensure optimal use of this infrastructure.**

3.3.C. **We recommend that the Service de l'urbanisme et de la mobilité examine the possibility of working with its partners to perform a study on the satisfaction of customers and all Montrealers with respect to charging services available in public areas.**

BUSINESS UNITS' RESPONSES

3.3.B. ***Service de la gestion et de la planification immobilière***

[TRANSLATION] The prefeasibility analysis will provide information on the specificities of an upstream project and ensure that if the charging infrastructure is installed at the address confirmed by the business unit, it will respond to the business unit's needs. It will be easier to initiate a dialogue with the business unit to target the best locations to install charging stations. By being involved in the project analysis and decision-making, the business unit will be better informed at the start of the project, knowing the budget and the schedule.

The Service de la gestion et de la planification immobilière will continue to provide options and ideas to enable the various business units to effectively manage and administer their charging stations.
(Planned completion: May 2019)

28 The double station that is used most often charged 10 vehicles a day on average in August 2018, i.e., it was used 5 times a day charging station.

	Service de l'urbanisme et de la mobilité *[TRANSLATION] When a one-stop shop is created, new tools will be needed to plan the installation of new charging stations. Charging stations have been installed taking space limitations and population density into account. With large numbers of stations already installed, available spaces are more difficult to find and charging station performance is not uniform.* *The one-stop shop wants to introduce visualization tools (dashboards and thematic maps) and report creation tools to automatically extract and integrate the data most likely to help plan new spaces where charging stations can be installed. Usage data will be incorporated into various information layers to maximize use of future charging stations.* *The Direction de la Mobilité has requested the Service des communications' support to create two Internet pages for citizens and internal partners. Once the pages are in place, the City will disseminate and promote information useful to citizens and provide a space for citizen input to measure their level of satisfaction and to receive their complaints and requests. The second Internet page will be for external partners, which will list all the resources needed to plan new sites for efficient charging stations.* *It should be noted that the Ville de Montréal already has access to real-time data on charging station use, via a web platform provided by the charging station manufacturer.* ***(Planned completion: to be determined)***
3.3.C.	***Service de l'urbanisme et de la mobilité*** *[TRANSLATION] In conjunction with Hydro-Québec, the City will be able to assess the implementation of a telephone survey of Electric Circuit users and Montreal citizens regarding the on-street electric vehicle charging stations.* ***(Planned completion: March 2020)***

3.4. ACCOUNTABILITY IN RELATION TO THE IMPLEMENTATION OF THE *TRANSPORTATION ELECTRIFICATION STRATEGY*

3.4.A. BACKGROUND AND FINDINGS

SMVT does the reporting regarding the *Strategy*. However, its role is limited to collecting and compiling progress data provided by the other departments involved. This information is entered in the table used to monitor implementation of *Strategy* action items. The information in this table does not routinely reflect progress in action items as of the date of each directors committee meeting. SIVT did not provide any changes between the February 2018 and July 2018 versions of the table used to monitor installation of public charging stations. However, more than a dozen of double charging stations (and therefore twice as many charging stations) were put into service between February 2018 and

July 2018. The same holds true for the Service de l'environnement, which did not respond to SMVT's June 2018 request for a table update. However, the week after the directors committee meeting in early July 2018, it sent SMVT the methodology to quantify GHG reductions, dated June 2018, and the results for 2017.

This information, which is reported through the table used to monitor *Strategy* action items, is not sent to anyone except the members of the directors committee. It is also surprising that since 2016, no reports or official documents have been produced to report on the implementation of the *Strategy*. However, it should be noted that an elected member of the executive committee sits at all directors committee meetings and that since the last two meetings, a Directeur général adjoint of the City has also attended.

In addition, the table used to monitor implementation of *Strategy* action items cannot be considered as a reporting tool in itself because it does not cover the use of available budgets allocated to implement the various action items. The table mentions financial considerations for some action items, i.e., available budget, but there are no status updates on the use of this budget. There is therefore no link between performance and budget monitoring. To make such a link, it would have been necessary to develop a global budget for implementing the *Strategy*, which was not done.

These findings on the lack of formal and comprehensive reporting on the *Strategy* are partially attributable to the lack of formal leadership in implementing this *Strategy*. In the current context, SMVT may request information from other departments, but it does not have the authority to make them respond.

RECOMMENDATION

3.4.B. **We recommend that the City Manager obtain from the person responsible for coordinating the implementation of the *Transportation Electrification Strategy* a periodic report that provides a progress update on each activity, and that he perform a mid-term review of the implementation of the *Transportation Electrification Strategy* to inform decision-makers of the results achieved and the strategy items that require follow-up.**

BUSINESS UNIT'S RESPONSE

3.4.B. ***Direction générale***

[TRANSLATION] At the last Transportation Electrification Strategy steering committee meeting, the representatives approved the document update exercise. The new version proposes an action plan, which identifies the budget, objectives, and indicators as well as the managers for each policy.

The Direction générale will mandate the person responsible for coordinating the Strategy to provide an action plan status update as of December 31, 2019, the halfway point of the revised Strategy. Also, to facilitate reporting on each activity, a shared monitoring file will be put in place as soon as the upcoming implementation of Office Suite and Google Cloud provides the required functionality.
(Planned completion: March 2020)

4. CONCLUSION

The Ville de Montréal (the City) aims to reduce its greenhouse gas (GHG) emissions to 30% below 1990 levels by 2020 for community-related emissions, and 30% below 2002 levels for emissions related to its municipal operations. Road transportation accounts for a significant share of the City's and the province's GHG emissions. These reduction targets can only be achieved by actively working to change behaviours and approaches in this area.

In 2016, the City adopted the *Transportation Electrification Strategy* (hereinafter "*the Strategy*"), which is based on several policies and action plans, including the *Rolling stock green policy*. The *Strategy* outlines 10 goals to be implemented by the City or external partners such as the Société de transport de Montréal or CDPQ Infra. Three of these goals caught our attention: converting the City's combustion engine vehicles to all-electric vehicles, installing charging stations for these electric vehicles as well as for City employees' personal vehicles, and installing a network of public charging stations throughout the 19 boroughs of the City.

Based on the achievement of the targets set out in this *Strategy*, and more specifically targets for these three goals, we find that with two more years of implementation to go, the departments concerned are in a good position to achieve these targets.

Nevertheless, our audit highlights findings that adversely affect implementation of the current *Strategy* and that shed light on issues between the Central City, its boroughs and its partners, which will become more serious as the City starts to electrify transportation.

Based on our audit work, we conclude that the implementation of the *Strategy*'s goals was not initially supported by an action plan, and that the documents currently used as a plan are not a real action plan, because they do not include a target, schedule and budget for each action item.

We believe that the City should provide better oversight on implementing the *Strategy*, review the roles and responsibilities of its business units based on the changes required by transportation electrification, and work with transportation electrification partners to ensure that services meet the needs of internal and external users. This is why we have recommended a variety of corrective measures to this end:

- The *Strategy* should be officially coordinated by a leader who, based on a structured and budgeted action plan, would work to ensure that collaborating units achieve targets, and in return, the leader should report periodically to decision-makers;
- Electrification of transportation calls for a change in the way roles and responsibilities are shared between the various business units of the City and its partners, particularly with regard to energy costs, including for the City's all-electric vehicles, public charging stations or station maintenance;

- Given that electrification of transportation is an area that is changing very quickly, the City should have a structured technology watch with periodic reporting to the business units concerned, perform regular in-depth analyses of the use of charging stations for its vehicles and in public areas, and conduct surveys to assess internal and external satisfaction with its services to ensure that they meet the needs of business units and the general public;
- Although the City has started to shift to electric vehicles, it still needs to establish guidelines for many aspects of this field, including City employees' use of charging stations, which must be regulated to be fair to all employees, maintenance of City charging stations and the public charging station network, and use of the public charging station network, which must be regulated to be fair to business units.

The impact of many of the economic observations made in this audit is still minor, on a City-wide scale. For example, a borough's cost for charging its own electric vehicles or the electricity used to operate public charging stations is currently a very small fraction of its operating budget. However, the City is still in the early stages of transportation electrification. Demand for electric vehicles, including all-electric vehicles or plug-in hybrids, has been surging for a year. This trend is likely to continue or even increase, with repeated calls for a drastic change in our travel patterns and our relationship with motor vehicles. Inevitably, these expenses will take an increasingly larger share of borough budgets as electric cars become more popular. The arrival of electric vehicles with greater charging capacity will affect the energy profitability of off-street charging stations, which are not priced according to the amount of electricity used. Technological development will bring the possibility of electrifying not only subcompact vehicles, but increasingly large vehicles, even heavy machinery, which means greater electricity consumption. In the long term, today's minor economic costs for the various business units could well become significant if changes are not made to deal with the way responsibilities are shared between central departments and boroughs and the increased number of off-street charging stations whose pricing is not based on energy consumption. Now that it is aware of these issues, we consider that the City must now review its *Transportation Electrification Strategy*, including its procedures and its internal and external service offering, so that the electrification of transportation—when it becomes the standard for urban travel—is thoroughly planned and economically viable for the City.

5. APPENDIX

5.1. OBJECTIVE AND EVALUATION CRITERIA

OBJECTIVE

The objective of this audit was to ensure that the implementation of the *Transportation Electrification Strategy*'s goals is supported by an action plan with specific objectives and timelines and appropriate coordination mechanisms.

EVALUATION CRITERIA

- The roles and responsibilities regarding the implementation of the *Transportation Electrification Strategy* are clearly defined;
- Specific targets and timelines are planned to facilitate implementation of the *Transportation Electrification Strategy*;
- Mechanisms for monitoring the achievement of expected outcomes (deliverables, costs, subsidies and timelines) are in place to ensure the implementation of the *Transportation Electrification Strategy*;
- Periodic reporting mechanisms are in place to assess the implementation of the *Transportation Electrification Strategy* and its progress;
- Mechanisms are put in place to evaluate the level of customer satisfaction with the charging station network.