



REPORT

FLEET ELECTRIFICATION IN QUEBEC

Making the switch to medium and heavy electric vehicles in commercial and institutional fleets

With the financial participation of

Québec 

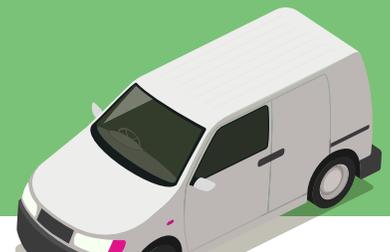


TABLE OF CONTENTS

About this report	4
Acknowledgements	4
Glossary	6
1. INTRODUCTION	7
1.1 Background	7
1.2 Methodological approach	7
2. PROFILE OF COMMERCIAL VEHICLE FLEETS IN QUEBEC	8
2.1. Vehicle types and associated GHG emissions	8
2.2. Fleet characterization	10
3. BARRIERS TO FLEET ELECTRIFICATION AND GENERAL INCENTIVES	13
4. INTERNATIONAL CASE STUDIES	18
4.1. Case descriptions	18
4.2. Key findings from the international case studies	20
5. COMPARATIVE ANALYSIS WITH QUEBEC	23
5.1. Barriers to electrification in Quebec	24
5.2. Incentives to electrification in Quebec and prioritization of the need to develop them	25
5.3. Development of incentives in Quebec	29
6. COURSES OF ACTION	31
6.1. Recommendations	31
6.2. Advice for operators	37
7. CONCLUSION	38
APPENDICES	39
Appendix I: Table of recommendations, honorable mentions, and barriers	40
Appendix II: References and documents cited	42

ABOUT THIS REPORT

Propulsion Québec hired Dunsky Energy Consulting to conduct an analysis on making the switch to medium and heavy electric vehicles to identify and prioritize strategies for accelerating the electrification of commercial and institutional fleets in Quebec. This report is based on the firm's conclusions and recommendations.

ACKNOWLEDGEMENTS

Propulsion Québec would like to thank the Dunsky Energy Consulting team, the project steering committee, and all the experts interviewed in preparation of this report for their valuable input.

This report was made possible thanks to the financial support of the government of Quebec, Hydro-Québec and Fonds de solidarité FTQ.

The shift to fleet electrification is most definitely an opportunity for Quebec and its companies. First, because it reduces greenhouse gas (GHG) emissions, and second, because it can improve the competitiveness of Quebec companies and stimulate the future economic sector of smart and electric transportation.

Propulsion Québec produced this report to explain and better understand the issues and barriers to the electrification of medium and heavy vehicle fleets in Quebec's commercial and institutional sectors. By identifying them and comparing them with those elsewhere in the world, we can more easily overcome them and find innovative solutions to deal with them, while focusing on and enhancing our incentives.

To achieve this ambitious goal, operators, governments, municipalities, private companies, and institutions must work together and pool their efforts. Our ecosystem is ready to cooperate with the various stakeholders to remove these barriers and make effective use of existing incentives. We believe that existing initiatives need to be improved to enable Quebec fleets and their managers to fully embark on the path of electrification. The barriers we're up against are similar to those elsewhere in the world. Faced with comparable challenges, Quebec must take even stronger action to stand out as a leader.

This report will serve as a starting point for the next steps leading to the electrification of Quebec fleets.

I especially encourage you to read the main recommendations arising from this in-depth analysis. Propulsion Québec will be actively working to implement them in the short and long term over the coming months and years.

This profound shift towards greener, more sustainable energy will be a key asset for our economy and will strengthen Quebec's position as a leader in transportation electrification. Through such actions, Quebec will set an example while diversifying its economy and reducing its GHG emissions.

Lastly, I would like to thank all the partners and contributors who made this report possible. Thanks to you, we have expanded our knowledge of fleet electrification—valuable expertise that will undoubtedly be of great benefit to our entire industry.



Sarah Houde
President and CEO
Propulsion Québec

GLOSSARY

The following acronyms and abbreviations are used in the document.

Abbreviation	Definition
AQMD	South Coast Air Quality Management District
CALeVIP	California Electric Vehicle Infrastructure Project
CARB	California Air Resources Board
CGER	Centre de gestion de l'équipement roulant
DCFC	DC fast charging stations
EV	Electric vehicle
GHG	Greenhouse gas
HVIP	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project
ICV	Internal combustion vehicle
MEI	Ministère de l'Économie et de l'Innovation
MTQ	Ministère des Transports du Québec
PGE	2030 Plan for a Green Economy
PG&E	Pacific Gas and Electric Company
RD&D	Research, development, and demonstration
SAAQ	Société de l'assurance automobile du Québec
SAQ	Société des alcools du Québec
SCE	Southern California Edison
SÉPAQ	Société des établissements de plein air du Québec
SPEDE	Quebec's carbon market or cap-and-trade system for greenhouse gas emission allowances
TEQ	Transition énergétique Québec
ZEV	Zero-emission vehicle

1.

INTRODUCTION

1.1. BACKGROUND

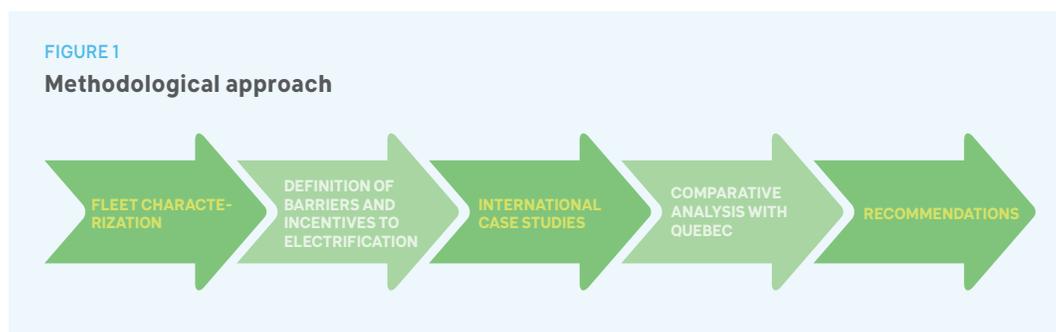
The transportation sector is currently the main emitter of greenhouse gases (GHGs) in Quebec, while emissions from fossil fuels used as fuel represented 43.3% of Quebec's emissions in 2017^[1], including nearly 80% from road transportation. The electrification of commercial and institutional fleets is of particular importance for Quebec because it can reduce GHG emissions while improving the competitiveness of Quebec companies and stimulating an economic sector of the future.

However, vehicle electrification in the commercial and institutional sectors faces significant barriers, which must continue to be removed to enable operators to go electric. Quebec has already put a number of incentives in place, but there are still gaps.

Throughout this report, Propulsion Québec presents the priority strategies for accelerating the switch to medium and heavy electric vehicles in commercial and institutional fleets.

1.2. METHODOLOGICAL APPROACH

For the purposes of this exercise, fleets of vehicles for institutional, professional, or commercial use will be referred to as "commercial fleets." In accordance with the priorities determined by the steering committee that was formed, the analysis also includes commercial pickup trucks, in addition to medium and heavy vehicles. However, vehicles used to transport people (e.g., buses, motorcoaches, and taxis) are excluded from our analysis. **FIGURE 1** shows the methodology used.



[1] Ministère de l'Environnement et de la Lutte contre les changements climatiques, 2018. Inventaire québécois des émissions de gaz à effet de serre en 2017 et leur évolution depuis 1990, 40 p. [Online: <http://www.environnement.gouv.qc.ca/changements/ges/2017/inventaire1990-2017.pdf>]

2.

PROFILE OF COMMERCIAL VEHICLE FLEETS IN QUEBEC

2.1. VEHICLE TYPES AND ASSOCIATED GHG EMISSIONS

According to SAAQ^[2] data, there were more than 730,000 institutional, professional, and commercial vehicles on the road in 2018, representing over 11% of all vehicles on the road in Quebec registered by SAAQ.

TABLE 1

Comparison of vehicle use types (2018)^[3]

Use type	Number of vehicles	Percentage
Institutional, professional, or commercial use	730,400	11%
Passenger	5,004,286	76%
Off-road and other use types	873,590	13%
TOTAL	6,608,276	100%

[2] Société de l'assurance automobile du Québec, 2019. *Données et statistiques 2018*, 34 p.
[Online : <https://saaq.gouv.qc.ca/fileadmin/documents/publications/donnees-statistiques-2018.pdf>]

[3] Definitions of use types are available in the document *Définitions*, 4 p., in the Databank of Official Statistics on Québec
[Online : <https://bdso.gouv.qc.ca/docs-ken/multimedia/3628.pdf>]

A large majority of vehicles in this category are light trucks or road vehicles over 3,000 kg designed specifically for the transportation of goods^[4] as shown in [TABLE 2](#).

TABLE 2
Institutional, professional, or commercial use vehicles (2018)

Vehicle type	Number of vehicles
Car and light truck	471,868
<i>Car</i>	107,993
<i>Light truck</i>	363,792
<i>Unspecified</i>	83
Motorcycle	2,357
Moped	451
Motorhome	427
Taxi	8,296
Bus	8,897
School bus	10,650
Truck or road tractor	153,235
Tool vehicle	51,815
Other vehicle	22,404
TOTAL	730,400

Light trucks and heavy vehicles^[5] are responsible for a considerable share of GHG emissions in the road transportation sector in Quebec, and institutional, professional, and commercial fleets are made up mostly of these types of vehicles. We note that in 2017, they emitted more than two-thirds (66.5%) of GHGs in the road transportation sector in Quebec.

[4] Categorized under the Truck or road tractor vehicle type by SAAQ

[5] Defined by SAAQ, among others, as road vehicles with a gross vehicle weight rating of 4,500 kg or more. "Heavy vehicles" on <https://saaq.gouv.qc.ca/en>. Consulted on October 15, 2020. <https://saaq.gouv.qc.ca/en/transportation-goods/heavy-vehicles/>

Furthermore, as shown in [TABLE 3](#), the change in GHG emissions rose sharply between 1990 and 2017, unlike the change in emissions for cars, which declined.

TABLE 3
GHG emissions from road transportation in Quebec in 1990 and 2017^[6]

Road transportation	Emissions (Mt CO ₂ eq.)		Change in emissions from 1990 to 2017		Sector's share in 2017
	1990	2017	Mt CO ₂ eq.	%	%
Cars	10.86	9.01	-1.84	-17.0	33.3
Light trucks	3.64	8.26	4.62	127.1	30.5
Heavy vehicles	3.60	9.76	6.15	170.8	36.0
Other (motorcycles, propane and natural gas vehicles)	0.02	0.07	0.05	288.4	0.3
TOTAL	18.11	27.10	8.98	49.6	100.0

This data demonstrates the importance and environmental benefit of electrifying commercial and institutional fleets in Quebec, with a focus on medium and heavy vehicles.

2.2. FLEET CHARACTERIZATION

There is no formal characterization of commercial fleets. Twelve different types of commercial or public fleets representative of those found in Quebec were identified and defined to provide better insight into this sector.

Fleets in Quebec can be divided into two categories: freight fleets, which include vehicles used to transport materials and other cargo, and service fleets, which include vehicles with equipment (such as fire trucks) or conventional trucks used to provide services (e.g., vans used by electricians). [TABLE 4](#) presents the types of vehicles used by each fleet type.

^[6] Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec. *Inventaire québécois des émissions de gaz à effet de serre en 2017 et leur évolution depuis 1990*, 44 p. [Online : <http://www.environnement.gouv.qc.ca/changements/ges/2017/inventaire1990-2017.pdf>]

TABLE 4
Fleet types in Quebec

Category	Fleet types
FREIGHT FLEETS	Long distance distribution
	Regional/urban distribution
	Multimodal (ports, airports)
	Parcel delivery
	Food distribution
	Truck leasing companies
SERVICE FLEETS	Government fleets
	Telecoms and energy distributors
	Small businesses
	Waste collection
	Emergency services
	Construction companies

TABLE 5
Vehicle types used by fleet type

Fleet type	Vehicle types used	
FREIGHT TRANSPORTATION		
Long distance distribution	 	
Regional/urban distribution	    	
Multimodal (ports, airports)	 	
Parcel delivery	   	
Food distribution	   	
Truck leasing companies	   	
SERVICE FLEETS		
Government fleets	     	
Telecoms/utilities	   	
Small businesses	 	
Waste collection		
Emergency services	   	
Construction companies	   	
LEGEND		
 Pickup truck	 Medium truck	 Collection truck
 Van	 Heavy truck	 Other
 Delivery van	 Terminal tractor	BT: Bucket truck FT: Fire truck SV: Service vehicle DT: Dump truck MT: Mixer truck



3.

BARRIERS TO FLEET ELECTRIFICATION AND GENERAL INCENTIVES

The barriers and incentives commonly encountered during fleet electrification were identified in this analysis based on the numerous studies carried out by Dunsky on vehicle electrification. The data was subsequently refined using information gathered from industry experts under this mandate. [TABLE 6](#) reports these findings and presents the barriers that make electrification of medium and heavy vehicles more difficult for fleet operators.

TABLE 6
Barriers to electrification

Barrier	Description
VEHICLE ACQUISITION	1. Vehicle availability There is a lack of availability of medium and heavy electric vehicle models marketed internationally, as this technology is still under development. The number of electric truck models is limited, most are still in the demonstration stage, and few are marketed on a large scale.
	2. Initial vehicle purchase price The initial purchase price of electric trucks is still high : 150% or more of the cost of diesel trucks. The gap between medium and heavy electric vehicles and their internal combustion counterparts is much greater than for light vehicles, as this is still emerging technology. The cost of electric vehicles is a recurring barrier for operators.
	3. Financing difficulties It is hard to get a loan to finance the acquisition of medium and heavy electric vehicles because the technology is so young and financial players lack knowledge (e.g., poorly adapted existing financial tools, banks' perception of risk). For small operators, who often own only a few trucks on which they depend for their business, the risk associated with updating their fleet with electric trucks is significant.
CHARGING	4. Costs and challenges of on-site charging Electric vehicles cannot be separated from their charging infrastructure. The infrastructure itself and its installation at fleet sites are expensive. Charging can also be logistically complicated (e.g., lack of space to install chargers, costly infrastructure upgrades required because the building's electrical capacity limit has been reached, new habits for employees).
	5. Availability of public charging stations Range anxiety is a concern, because the public charging network is limited and there is a lack of accessible stations for medium and heavy electric vehicles.
OPERATIONAL AND INTERNAL ISSUES	6. Technological limitations and operational adjustments The technological limitations of electric vehicles call for operational adjustments (e.g., the weight of the battery reduces the payload of an electric truck, and a limited range requires adapted routes). These limitations make it necessary to adjust operations, which can be very complex or even impractical for some operators.

TABLE 6

Barriers to electrification (continuation)

Barrier	Description
OPERATIONAL AND INTERNAL ISSUES	7. Internal organizational barriers Friction or silos can inhibit electrification within a company, e.g., resistance to new technology or silos between transportation and building management departments (electrification shifts vehicle fuel costs from the transportation department to the department that manages property and installs charging stations, which can create friction).
	8. Lack of motivation There may be a lack of incentives for electrification due to internal factors (e.g., lack of vision and electrification targets within the organization) or external factors (e.g., low market and customer demand).
EXPERTISE AND SKILLS	9. Uncertainties about the financial analysis There is uncertainty about the total cost of ownership of medium or heavy electric vehicles because they are new and there is a lack of data for a number of financial analysis inputs. For example, operators still lack information on vehicle price, maintenance costs, downtime, and the residual value of vehicles and batteries, all of which are necessary to perform a credible total cost of ownership analysis.
	10. Lack of knowledge The electric vehicle market is rapidly changing, both in terms of the number of models available and their price. Operators may find it difficult to stay abreast of these developments.
	11. Lack of technical support There is a lack of technical support (internal or external) for assistance with electrical conversion, an underestimation of needs, and a lack of financial capacity to enlist external support.
	12. Maintenance challenges There are a number of uncertainties and challenges related to maintenance (e.g., uncertainty about the maintenance needs of electric vehicles and the need to train staff in new technology and hire new experts). Since the industry and electric vehicle manufacturers are less developed than the leading original equipment manufacturers (OEMs), maintenance networks for electric vehicles are more limited. Operators may have difficulty getting spare parts in the event of breakdowns because supply chains are not mature.

TABLE 7 presents the incentives that can help operators electrify their fleets and overcome the barriers presented in TABLE 6. These incentives can accelerate the electrification of medium and heavy vehicle fleets.

TABLE 7
Electrification incentives

Incentive		Description
VEHICLE PURCHASE	1. Vehicle cost subsidy	Have the government subsidize the cost of purchasing electric vehicles.
	2. Tailored financing	Offer financing solutions tailored to the purchase of electric vehicles by fleet managers/operators.
CHARGING	3. Subsidy for the cost of charging stations	Have the government subsidize the cost of charging stations (equipment and installation).
	4. Charging programs offered by energy distributors	Offer charging programs or initiatives from energy distributors (e.g., rates, subsidy programs for electrical infrastructure upgrades, demand management, etc.).
	5. Public charging	Provide a network of public charging stations adapted to medium and heavy commercial vehicles.
DEVELOPMENT AND DEMONSTRATION	6. Support for development projects and demonstrations	Support the development of medium and heavy electric vehicles (e.g., through co-financing of development and demonstration projects).
	7. Willingness of big operators to experiment	Increase the willingness of major operators to take risks and test new technologies to create demand and facilitate the development of new vehicles.
SUPPLY MANAGEMENT	8. ZEV policy	Improve the availability of zero-emission vehicles (ZEVs) by requiring manufacturers to sell a certain percentage of them.
	9. Development of industrial sectors	Develop new industrial sectors to diversify the electric vehicles produced.

TABLE 7

Electrification incentives (continuation)

Incentive		Description
OTHER AIDS AND INCENTIVES	10. Environmental goals	Accelerate electrification by adopting environmental goals (GHG reduction, air quality) in the territory or organization.
	11. Operational benefits and commitment by senior management	Recognize the operational benefits of electric vehicles (savings, employee comfort, etc.) and foster a commitment by senior management.
	12. Other incentives	Encourage electrification through certain non-financial benefits and privileges (e.g., reserved lanes, priority port entry) or indirect financial incentives (e.g., carbon pricing).
	13. Support (tailored analyses) for electrification	Offer or subsidize support for fleet electrification (e.g., fleet usage analyses and electrification options).
RISK MITIGATION	14. Possibility of outsourcing electric vehicle maintenance and ownership	Outsource electric vehicle maintenance and ownership to reduce the perceived or real risk associated with new technology.



4.

INTERNATIONAL CASE STUDIES

4.1. CASE DESCRIPTIONS

Five international case studies were carried out on the rollout of medium and heavy electric vehicle fleets. They are based on five priority fleet types identified by the steering committee and are listed in [TABLE 8](#). These fleet types were selected for the electrification potential they represent and their relevance for Quebec.

An analysis of the business model of their electrification projects was carried out beforehand to identify the barriers and incentives to electrification encountered by the selected organizations and to draw general conclusions. Information was gathered through public information gathering and interviews.

TABLE 8

Description of international case studies and examples of companies using similar fleets in Quebec

Urban distribution: **FEDEX**

FedEx has been testing electric and hybrid vehicles for more than 10 years. The company now owns 350 hybrid vehicles and 2,944 fully electric and plug-in hybrid vehicles. In 2018, it announced the addition of Chanje V8100 vehicles to its fleet in California. FedEx is also planning to add Tesla semi-electric tractors to its fleet.

Jurisdiction : United States

Examples of companies using similar fleets in Quebec: IKEA, Lowe's, SAQ

Multimodal (ports and airports): **PORT OF LONG BEACH AND PORT OF LOS ANGELES**

Both ports are collaborating with manufacturers, the local air district, terminals and fleet operators to demonstrate advanced technologies for yard tractors, on-road trucks, and other cargo handling equipment. In 2019, the Ports have moved forward with their partners on projects involving 37 zero-emission trucks, 87 pieces of zero-emission terminal equipment, 5 near-zero emission trucks, and 20 near-zero emission tractors using a number of technologies, which include electrification and hydrogen. n.

Jurisdiction : California, United States

Examples of companies using similar fleets in Quebec: Port of Québec, Aéroports de Montréal

Compagnie de location de camions : **RYDER**

To improve fuel economy and reduce emissions, Ryder utilizes cleaner-burning fuels and invests in alternative fuel technology. Ryder has nearly a thousand active advanced fuel vehicles (AFVs) and electric vehicles (EVs) in its fleet and has trained more than 6,000 maintenance and service employees across North America on the new technologies, extending the company's leadership position in the advanced vehicle technology industry. To vertically integrate its offerings, Ryder partnered with In-Charge to provide customers access to the industry's first single-source electric vehicle technology infrastructure solution, making it easier for customers to incorporate EVs into their fleets and enabling broader adoption of commercial EV technology throughout North America.

Jurisdiction : United States

Examples of companies using similar fleets in Quebec: Penske, Ryder, Brossard Leasing

Telecoms and energy distributors: **PACIFIC GAS & ELECTRIC (PG&E)**

In 2018, PG&E's fleet consisted of about 1,600 electrified vehicles. PG&E has owned and tested several electric vehicles throughout the years, including plug-in hybrid material-handling vehicles and fully electric vehicles. For example, it worked directly with automotive manufacturer EDI to develop plug-in hybrid bucket trucks. In 2015, PG&E announced that one third of its annual vehicle investment (US\$100 million) would be earmarked for the acquisition of fully electric and plug-in hybrid vehicles over the next five years. However PG&E was unable to meet this commitment due to the lack of commercially available products. Beyond internal fleet electrification, PG&E continues long-standing efforts to support its external EV customers and fleets through education, EV rate, and charging "make ready" electric infrastructure connection programs.

Jurisdiction : California, United States

Examples of companies using similar fleets in Quebec: Québecor, Telus, Hydro-Québec

Waste collection : **NEW YORK CITY**

NYC government operates 25,000 on-road vehicles, the largest municipal fleet in the United States, possibly the world. About half of these units are medium and heavy duty trucks and half light duty. The light duty fleet already includes nearly 2,000 electric units, supported by over 1,000 chargers. The City Department of Sanitation (DSNY) operates 5,000 of these on-road units focused on garbage trucks and street sweepers. DSNY recently received its first all-electric Mack garbage and will be assessing the effectiveness of the unit for the rigor of operations in America's largest City. NYC has committed to implement an all-electric fleet by 2040.

Jurisdiction : New York, United States

Examples of companies using similar fleets in Quebec: Derichebourg, Groupe Coderr, municipalities

4.2. KEY FINDINGS FROM THE INTERNATIONAL CASE STUDIES

We have listed the barriers to electrification and the incentives in each of the case studies from those previously established. Below we detail the main barriers encountered by the organizations studied as well as the most beneficial incentives for integrating medium and heavy electric vehicles into their fleets. A description of other key findings that emerged from the case study analysis also follows.

Main BARRIERS in the international case studies

The following barriers emerge from the case study analysis as the main factors hindering fleet electrification:

1. **Lack of availability of medium and heavy electric vehicles:** This factor emerges as the main barrier to switching to electric vehicles. The few available models available internationally still require some refinement or validation to reach commercial maturity.
2. **High price of electric vehicles (medium and heavy):** The gap between medium and heavy electric vehicles and their internal combustion counterparts is still much greater than for light vehicles.
3. **Cost of installing electrical infrastructure and power management:** This issue mainly affects big operators, as complexity and costs increase with the number of vehicles to be charged.
4. **Technological limitations and operational adjustments:** These limitations (e.g., limited range requiring route modifications or work methods) affect all operators differently depending on vehicle use.
5. **Lack of information to perform a total cost of ownership (TCO) analysis:** Operators lack the data to perform a credible TCO analysis.
6. **Lack of financing options (especially for small operators):** Owner-operators represent a substantial portion of the U.S. delivery market. They often do not have access to the necessary financing, such as bank loans, to purchase electric vehicles.
7. **Maintenance challenges:** A number of operators mentioned maintenance challenges. There are still uncertainties about the maintenance needs of electric vehicles, in addition to the need to train staff in new technology. Furthermore, since the industry and electric vehicle manufacturers are less developed than the leading original equipment manufacturers (OEMs), maintenance networks for these vehicles are more limited.

Main INCENTIVES in the international case studies

The case studies revealed that the following incentives were the most useful in helping organizations overcome barriers and facilitate the electrification of their fleets:

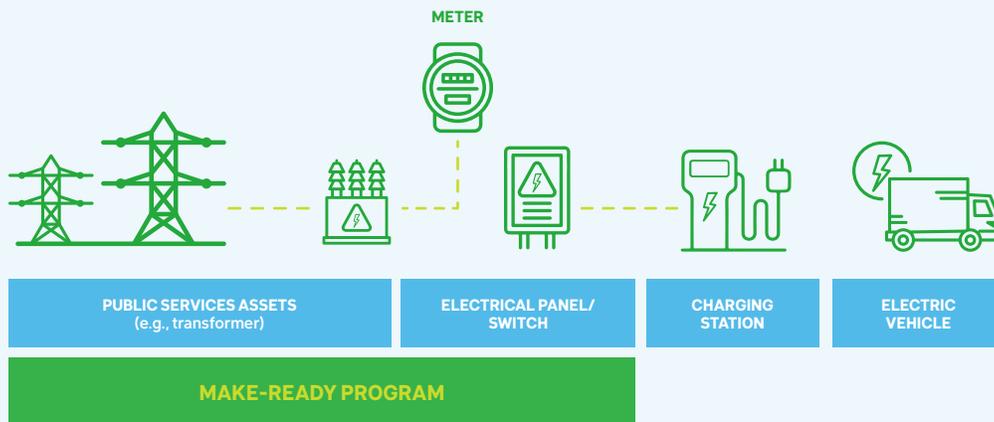
1. **Access to subsidies for the purchase of electric vehicles:** This is often cited as one of the most important incentives.
2. **Operational and economic benefits noted by operators:** Operators are aware of the promising savings with electric vehicles, but these have not yet materialized. Operators are also observing many additional operational benefits from electric vehicles in service, including improved air quality (e.g., around the Port of Los Angeles and Port of Long Beach), improved employee comfort, and lower noise levels allowing night-time operation for some service providers.
3. **Operators' willingness to experiment:** All the operators studied are testing new models of electric vehicles, including pre-market vehicles, and are sharing what they learn with manufacturers. Big operators, who can afford to take this kind of risk, are thus contributing to the development of the technology.

4. **Ecosystem of programs focused on charging, development, and supply management:** The ecosystem of programs and subsidies to facilitate the switch to electric vehicles, particularly in California, appears to be an important incentive. These programs include vehicle and charging subsidies, grants for pre-market technology development and demonstration projects, make-ready programs (see [FIGURE 2](#))^[7] offered by energy distributors, and a medium and heavy ZEV policy (see [FIGURE 3](#)).
5. **Environmental objectives set by operators, their customers, or their jurisdictions:** In most cases, environmental objectives related to GHG reduction or air quality encourage or promote fleet electrification.

FIGURE 2

Make-ready programs for electrical infrastructure

A number of energy distributors in the U.S. offer an electrification incentive program to support upgrades to electrical infrastructure when charging stations are installed. These so-called “make-ready” programs go beyond a simple financial incentive for charging stations. Under these programs, the utility company performs the necessary upgrades at its own expense, from the transformer to the customer’s charging station.



[7] For more information on the PG&E program, go to https://www.pge.com/en_US/large-business/solar-and-vehicles/clean-vehicles/ev-fleet-program/ev-fleet-program.page.

FIGURE 3

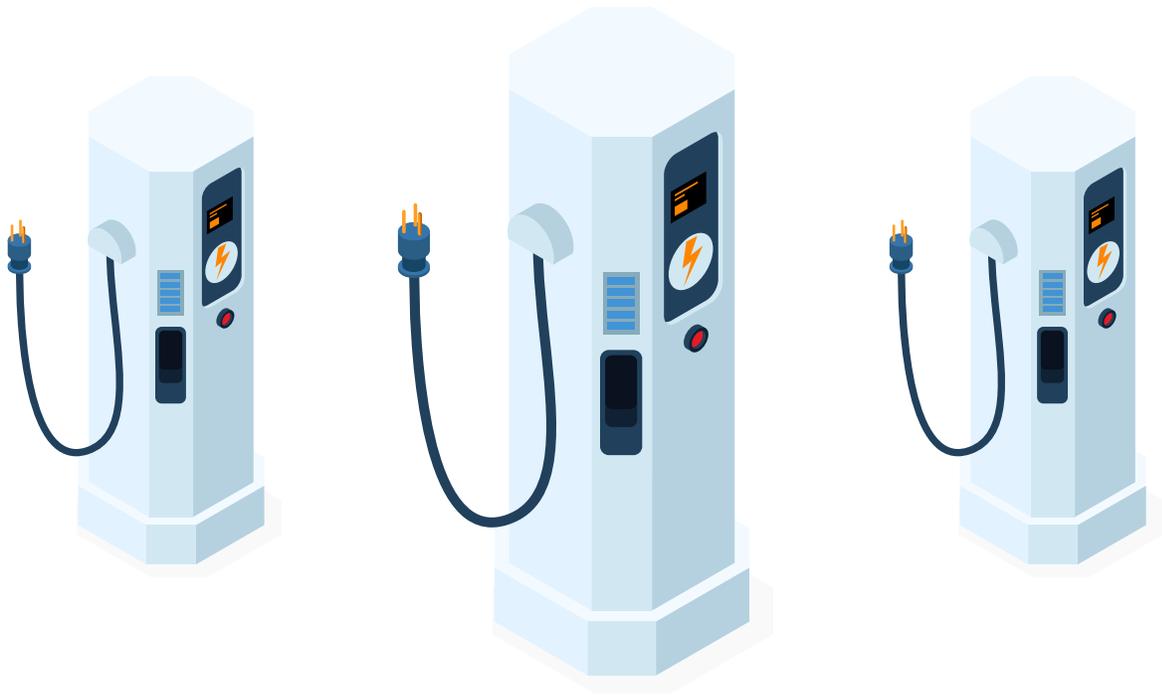
Focus on California, an ecosystem of programs and subsidies to facilitate the switch to electric vehicles

The state of California offers a number of grants for electric vehicle purchases, charging infrastructure, and demonstration projects:

- **Purchase:** California offers generous incentives for the purchase of commercially available electric vehicles through the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP). The buyer of a Class 8 truck can get a US\$150,000 grant, for example (California HVIP).
- **Charging stations:** Fleet operators with publicly accessible charging sites can get a rebate of up to US\$7,500 for a Level 2 charging station and up to US\$80,000 for a DC fast charging station (DCFC) through the California Electric Vehicle Infrastructure Project (CALeVIP) funded by the California Energy Commission.
- **Demonstration and development (D&D):** The California Air Resources Board (CARB) and the South Coast Air Quality Management District (AQMD) have a number of grant programs for the demonstration of pre-market technology, such as the Zero- and Near Zero-Emission Freight Facilities Project (California Air Resources Board, 2018). Some of these projects receive significant funding from California Climate Investments, the California cap-and-trade program. In 2017, AQMD disbursed a total of US\$18 billion for clean transportation-related D&D projects, nearly 20% of which was related to electrification (South Coast AQMD).
- **Supply management:** In June 2020, California passed a zero-emission vehicle (ZEV) law for medium and heavy trucks called the Advanced Clean Trucks Regulation, which will take effect as of 2024. It requires manufacturers to sell increasing percentages of electric vehicles in three truck classes: 5% for Class 7-8, 5% for Class 2b-3, and 9% for Class 4-8 trucks by 2024, increasing annually to 40%, 55%, and 75% by 2035 respectively (Sharpe, 2020) (California takes bold step to reduce truck pollution, 2020).

A number of energy distributors also offer programs to support fleet electrification. For example, PG&E and Southern California Edison (SCE) offer similar programs, which include:

- A special PG&E rate for charging commercial and industrial electric vehicles that eliminates power demand charges (*California Public Utilities Commission*).
- An EV fleet program that offers subsidies for the purchase of medium and heavy electric vehicles and their charging infrastructure. In some cases, PG&E also offers a program to support the upgrade of a customer's infrastructure from a meter to a charging station (make-ready program) (PG&E).
- Both companies also support electric vehicle demonstration projects (e.g., with transit agencies or the Port of Long Beach) (*Southern California Edison, 2020*) (*Work Truck Online, 2018*).



5.

COMPARATIVE ANALYSIS WITH QUEBEC

A comparative analysis was conducted by comparing the barriers and incentives to electrification in the international case studies and applying them to Quebec to determine their applicability for operators in the province. A panel composed of eight Quebec fleet operators from the private and public sectors was also consulted to add to this information and draw a more accurate picture of this phenomenon in Quebec.

5.1. BARRIERS TO ELECTRIFICATION IN QUEBEC

Following the consultation with Quebec operators, we noted that they generally face the same barriers to electrification as the organizations in the case studies. These consultations also revealed that fleet size, rather than fleet type, is the most important differentiator in determining the impact of barriers on operators.

TABLE 9

Barriers to electrification in Quebec



Barrier		Presence in the international case studies	Extent of impact in Quebec	
			Big operators (QC)	Small operators (QC)
VEHICLE ACQUISITION	1. Vehicle availability			
	2. Initial vehicle purchase price			
	3. Financing difficulties			
CHARGING	4. Costs and challenges of on-site charging			
	5. Availability of public charging stations			
OPERATIONAL AND INTERNAL ISSUES	6. Technological limitations and operational adjustments*			
	7. Internal organizational barriers			
	8. Lack of motivation			
EXPERTISE AND SKILLS	9. Uncertainties about the financial analysis			
	10. Lack of knowledge			
	11. Lack of technical support			
	12. Maintenance challenges			

* High barrier for operators dealing with long distances, heavy cargo, or intensive use (many kilometers traveled almost continuously).

5.2. INCENTIVES TO ELECTRIFICATION IN QUEBEC AND PRIORITIZATION OF THE NEED TO DEVELOP THEM

Quebec and Canada already offer a number of incentives to support fleet electrification. However, most present opportunities for improvement when compared to international best practices.

TABLE 10 compares the incentives in the international case studies to programs and other forms of support available in Quebec. The “Programs/support in Quebec” column provides an overview of the programs or initiatives currently in place in Quebec.

TABLE 10

Comparison in between levers identified in the international case studies and support programs in Quebec.

 = Low  = Moderate  = High

Incentive	Programs/support in Quebec	Presence in the international case studies	
VEHICLE PURCHASE	1. Vehicle purchase cost subsidy	- Transportez vert program (TEQ) - Écocamionnage program (MTQ)	
	2. Tailored financing	- Tax deduction on EV purchases (federal)	
CHARGING	3. Subsidy for the cost of charging stations	- Zero Emission Vehicle Infrastructure Program (federal) - Roulez vert program (TEQ) - Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative (federal) - Transportez vert program (TEQ) — DCFC	
	4. Charging programs offered by energy distributors	- Experimental Rate BR (Hydro-Québec)	
	5. Public charging infrastructure	- Electric Circuit (Hydro-Québec)	
DEVELOPMENT AND DEMONSTRATION	6. Support for development projects and demonstrations	- Écocamionnage program (MTQ) - STM pilot projects (Hydro-Québec)	
	7. Willingness of big operators to experiment	- Some fleets (e.g., SAQ, Hydro-Québec, IKEA, cities)	
SUPPLY MANAGEMENT	8. Zero-emission vehicle supply standards	- Zero-emission vehicle standard — Light vehicles (QC)	
	9. Development of industrial sectors	- InnoV-R (MEI) - Demonstration and technology showcase projects (MEI) - Pivotal projects in ground transportation (MEI) - MEI-IQ Innovation Program	

TABLE 10

Comparison in between levers identified in the international case studies and support programs in Quebec. (continuation)

 = Low  = Moderate  = High

Incentive	Programs/support in Quebec	Presence in the international case studies	
OTHER AIDS AND INCENTIVES	10. Environmental objectives (GHG reduction, air quality)	- Quebec’s GHG emission reduction targets – 2030 target and 2050 ^[8] objective (QC)	
	11. Operational benefits and commitment of senior management	- Écocamionnage program (MTQ) ^[9] - Transportez vert program (TEQ) - Plug-in Fleet (IV)	
	12. Other incentives	- Green license plate advantages (reserved lanes, zero-emission zones, etc.) - Registration and acquisition fees based on cylinder capacity (SAAQ) - SPEDE (QC) - Clean Fuel Standard (federal)	
	13. Support (tailored analyses) for electrification	- Transportez vert program (TEQ) - Écoleader Fund (QC)	
RISK MITIGATION	14. Possibility of outsourcing electric vehicle maintenance and ownership	- Private options (e.g., Ryder, CGER)	

^[8] Quebec has set a target to reduce its GHG emissions by 37.5% below 1990 levels by 2030. The province has also set a target to reduce its GHG emissions by 80% to 95% below 1990 levels by 2050. See <http://www.environnement.gouv.qc.ca/changementsclimatiques/engagement-quebec.asp>.

^[9] Quebec has set a target to reduce its GHG emissions by 37.5% below 1990 levels by 2030. The province has also set a target to reduce its GHG emissions by 80% to 95% below 1990 levels by 2050. See <http://www.environnement.gouv.qc.ca/changementsclimatiques/engagement-quebec.asp>.

TABLE 11 summarizes the analysis of the presence and need to develop incentives to facilitate and accelerate the electrification of medium and heavy vehicle fleets in Quebec. It also summarizes the importance of the incentive categories, as prioritized by the operators who were consulted.

The need to develop each incentive is classified as either high where the incentive doesn't exist, moderate if the incentive is available but needs to be improved, or low if the incentive is well in place.

TABLE 11

Incentives to electrification in Quebec



Incentive		Need to develop incentive in Quebec	Importance of incentive for the Quebec operators consulted
VEHICLE PURCHASE	1. Vehicle purchase cost subsidy		
	2. Tailored financing		
CHARGING	3. Subsidy for the cost of charging stations		
	4. Charging programs offered by energy distributors		
	5. Public charging infrastructure		
DEVELOPMENT AND DEMONSTRATION	6. Support for development projects and demonstrations		
	7. Willingness of big operators to experiment		
SUPPLY MANAGEMENT	8. Standards for offering zero-emission vehicles		
	9. Development of industrial sectors		

TABLE 11

Incentives to electrification in Quebec (continuation)

 = Low  = Moderate  = High

Incentive		Need to develop incentive in Quebec	Importance of incentive for the Quebec operators consulted
OTHER AIDS AND INCENTIVES	10. Environmental objectives (GHG reduction, air quality)		
	11. Operational benefits and commitment of senior management		
	12. Other incentives		
	13. Support (tailored analyses) for electrification		
RISK MITIGATION	14. Possibility of outsourcing electric vehicle maintenance and ownership		

[10] Quebec has set a target to reduce its GHG emissions by 37.5% below 1990 levels by 2030. The province has also set a target to reduce its GHG emissions by 80% to 95% below 1990 levels by 2050. See <http://www.environnement.gouv.qc.ca/changementsclimatiques/engagement-quebec.asp>.

[11] Quebec has set a target to reduce its GHG emissions by 37.5% below 1990 levels by 2030. The province has also set a target to reduce its GHG emissions by 80% to 95% below 1990 levels by 2050. See <http://www.environnement.gouv.qc.ca/changementsclimatiques/engagement-quebec.asp>.

5.3. DEVELOPMENT OF INCENTIVES IN QUEBEC

The need to develop certain incentives is based on a number of observations that must be taken into account to accelerate and encourage the electrification of commercial and institutional fleets in Quebec. Examples of gaps that must be addressed or potential improvements were identified.

1. Vehicle purchase – High need

Programs to support the purchase of electric vehicles are in place, but operators find these programs incomplete and complex. A one-time subsidy program for electric vehicles, ranging from cargo bikes to heavy trucks, would be one solution. The amounts of aid offered could also be higher (as in California, where the purchase of a Lion 8 truck may qualify for a US\$150,000 grant under the California HVIP).

2. Charging – High need

The subsidy programs available in Quebec for the purchase and installation of charging stations are quite comprehensive. However, the “utility charging programs” incentive is deemed to be absent in Quebec. Hydro-Québec currently offers only an experimental rate for charging stations, which is limited compared to the range of programs offered by California electricity distributors for fleets. The public charging incentive should also be improved, because even though the Electric Circuit network is highly developed, few sites are suitable for medium or heavy commercial vehicles.

3. Development and demonstration – High need

Development and demonstration incentives need to be enhanced. The operators consulted find the support programs for electric vehicle demonstration projects are not well known or hard to access. However, a number of big operators are already showing a willingness to experiment and test electric vehicles. If development and demonstration incentives were improved, the number of big Quebec operators interested in carrying out such projects could increase significantly.

4. Supply management – Moderate need

Quebec has had a zero-emission vehicle supply standard for light motor vehicles since 2018, but none for medium and heavy vehicles. By way of comparison, such a standard was adopted in June 2020 in California, which will impose minimum sales thresholds for medium and heavy electric vehicles as early as 2024 (see box in the “International case studies” section). California’s leadership should certainly serve as a source of inspiration.^[12] In terms of the development of industrial sectors, a number of programs, initiatives, and organizations are active in this field in Quebec and could be further supported and developed. Furthermore, a number of electric vehicle manufacturers in Quebec, such as Lion and Nordresa, could be supported. There is also a need to develop not only trucks, but also a range of complementary electric vehicles to promote smart electrification.

5. Other aids and incentives – Moderate need

A range of other electrification initiatives and incentives have begun to be deployed in Quebec and can be enhanced or complemented by new and emerging initiatives and incentives. Quebec companies and organizations could be encouraged to set GHG reduction targets as well as electrification targets for their fleets, thus sending a clear signal and helping to create a local market for electric vehicles. Furthermore, commitment initiatives,^[13] which are more focused on light electric vehicles, could be extended to the medium and heavy vehicle segment.

Policies that increase the cost of internal combustion vehicles compared to electric vehicles could also be further developed, e.g., via a *malus*^[14] on the purchase of internal combustion vehicles or by increasing the price of carbon in Quebec’s cap-and-trade system. Non-financial incentives for electric vehicles in Quebec could be expanded and introduced as urban zero-emission zones (ZEZs), which are increasingly present in Europe.

[12] For more information, refer to Propulsion Québec’s brief on the zero-emission vehicle (ZEV) policy (French only). Go to https://propulsionquebec.com/wp-content/uploads/2020/09/Propulsion_Qc-Consultation_norme_VZE_aout_2020.pdf?download=1&mc_cid=43488d7b30&mc_eid=b8c2aec995

[13] Such as the Innovative Vehicle Institute’s “Plug-in Fleet” project.

[14] A “malus” is an increase in an auto insurance premium based on the number of at-fault accidents the insured has annually.

Lastly, support programs for electrification, such as the Écoleader Fund or the “Support for Energy Management” component of the Transportez vert program, which provides assistance of up to \$100,000 per applicant per year, could be improved by being better communicated to operators.

6. Risk mitigation – Low need

The last incentive is to offer operators the possibility of outsourcing the maintenance or ownership of electric vehicles. Long-term leasing options are available for institutional fleets through MTQ’s Centre de gestion de l’équipement roulant (CGER), which manages the MTQ fleet and serves more than 120 government, paragovernment, and municipal clients. This offer could be increased and simplified so that operators can take greater advantage of it.

The assessment by Quebec operators of the impact that missing incentives or ones needing improvement have on the Quebec market has led to a consensus. Given the lack of electric trucks and their current prohibitive cost, the first incentives to prioritize are those that would enable the industry to mature and operators to acquire and test their first electric vehicles. Charging is also important because it’s necessary for the operation of electric vehicles, but also expensive. In a second phase, once the number and quality of models are better established, it will be important to activate incentives to promote the sale and adoption of electric vehicles on a larger scale (e.g., via the ZEV policy) and differentiate electric vehicles from internal combustion vehicles.

6. COURSES OF ACTION

6.1. RECOMMENDATIONS

Right now there are many barriers to the electrification of medium and heavy vehicle fleets, and efforts are needed in all areas to promote and accelerate the switch to electric fleets. Quebec already has a number of incentives, but there are still gaps. To respond to the priority needs raised, 15 recommendations applicable over a 10-year period from 2020 to 2030 were formulated.

The impact of each recommendation on the electrification of fleets in Quebec was evaluated in consultation with Quebec operators and refined by the experts consulted. The overall and relative ease of implementing each recommendation, also referred to as feasibility, was assessed based on a number of criteria. It's important to note that the feasibility analysis does not take into account the political will that would be required to implement these recommendations. The recommendations were prioritized according to their impact and feasibility, shown in [FIGURE 4](#).

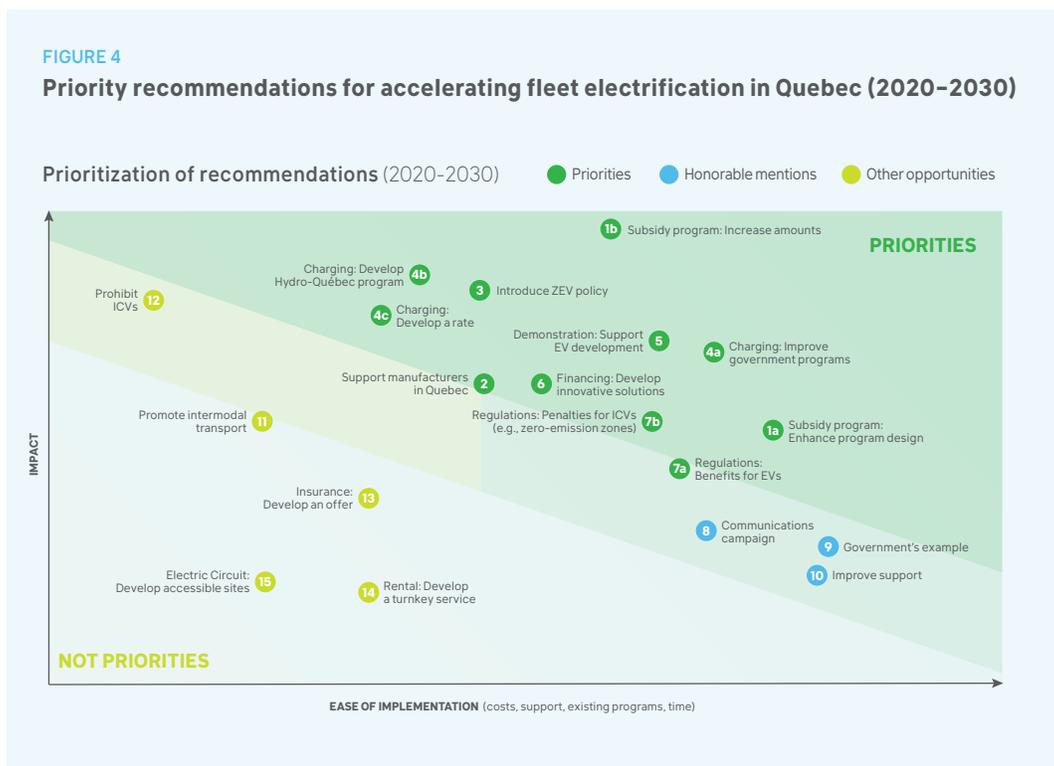


TABLE 12
List of recommendations

Category	Recommendations
Priority recommendations	1. Enhance subsidy programs <ul style="list-style-type: none"> a) Improve program design b) Increase the amount of financial assistance available
	2. Support the development and marketing of EVs made by Quebec manufacturers
	3. Introduce a zero-emission vehicle (ZEV) policy
	4. Enhance support for charging infrastructure <ul style="list-style-type: none"> a) Improve government infrastructure grant programs b) Develop a Hydro-Québec program to upgrade electrical infrastructure c) Develop a Hydro-Québec rate for vehicle fleets
	5. Enhance the availability of demonstration programs to support the development of pre-market vehicles
	6. Develop an innovative financing solution
	7. Introduce regulations that highlight the advantages of EVs: <ul style="list-style-type: none"> a) Develop the advantages granted to EVs b) Develop regulations that penalize internal combustion vehicles (ICVs) in comparison to EVs
Honorable mentions	8. Roll out a communications campaign for operators
	9. Build on the example set by government
	10. Improve and raise awareness of the "Support for Energy Management" component of the Transportez vert program
Other opportunities	11. Develop solutions to promote intermodal transportation and smart electrification
	12. Prohibit the operation of ICV trucks
	13. Develop an insurance offer for medium and heavy EVs
	14. Develop a turnkey leasing service
	15. Develop sites accessible to medium and heavy EVs in the Electric Circuit

Seven recommendations are considered priorities, given their high level of impact and feasibility.

TABLE 13

Details of priority recommendations

	Recommendation	Explanation	Targeted barriers
1	Enhance subsidy programs	<p>Improve the design of subsidy programs for vehicle purchases (including MTQ's Ecocamionnage program and TEQ's Transportez vert program) (1a) in order to simplify them, notably by combining the two programs, simplifying the application process, reducing uncertainty over access to financial assistance, and broadening the type of technologies and the number of eligible electric truck models.</p> <p>Increase the amounts of financial assistance available for the purchase of medium and heavy electric vehicles (1b) to match the amounts offered in other jurisdictions and stimulate demand to enable more operators to overcome the cost barrier to purchasing electric vehicles.</p>	<p>N° 1 : Vehicle availability</p> <p>N° 2 : Initial purchase price</p>
2	Support the development and marketing of electric vehicles made by Quebec manufacturers	Support Quebec-based electric vehicle manufacturers working on the development and marketing of medium and heavy vehicles through government R&D funding, technology showcases, and marketing support.	<p>N° 1 : Vehicle availability</p> <p>N° 6 : Technological limitations and operational adjustments</p>
3	Introduce a policy for medium and heavy zero-emission vehicles (ZEVs)	Such a standard would ensure the availability of electric vehicles and spur the development and sale of electric vehicles by requiring manufacturers to sell a certain percentage of ZEVs.	N° 1 : Vehicle availability
4	Enhance support for charging infrastructure	<p>Improve government subsidy programs for fleet charging infrastructure (3a) by increasing the amount of financial assistance available, simplifying the application process, or introducing incremental subsidies that would increase with the number of electric vehicles in the fleet (given the increase in costs per station based on the number of stations).</p> <p>Develop a program administered by Hydro-Québec (3b) to take charge of upgrading the electrical infrastructure (make-ready program)</p> <p>Develop a specific electricity rate for charging fleets of electric vehicles (3c) to enable demand charges to be reduced.</p>	<p>N° 4 : Costs and challenges of on-site charging</p> <p>N° 5 : Availability of public charging stations</p> <p>N° 11 : Lack of technical support</p>

TABLE 13
Details of priority recommendations (continuation)

	Recommendation	Explanation	Targeted barriers
5	Enhance the availability of demonstration programs to support the development of pre-market vehicles	Enhance programs, particularly the "Technology Demonstration" component of the Écocamionnage program, by allowing financial assistance to be granted at the beginning of a project and by improving communication to raise awareness of the program.	<p>N° 1 : Vehicle availability</p> <p>N° 6 : Technological limitations and operational adjustments</p> <p>N° 7 : Internal organizational barriers</p> <p>N° 8 : Lack of motivation</p> <p>N° 10 : Lack of knowledge</p>
6	Develop an innovative financing solution	Build a solution that would specifically address small fleets and allow operators to acquire medium and heavy electric vehicles more easily with a tailored financing solution. Different models can be explored, including a specialized loan model, a turnkey vehicle acquisition model, and an infrastructure model that is self-financed from operating profits (akin to the energy service company [ESCO] model used in construction ^[15]). This would reduce the risks for operators.	<p>N° 3 : Financing difficulties</p> <p>N° 10 : Lack of knowledge</p>
7	Introduce regulations that stress the advantages of electric vehicles	<p>Introduce or enhance regulations that highlight the advantages of electric vehicles ("bonus") (6a) to boost their appeal.</p> <p>Introduce regulations that penalize internal combustion vehicles ("malus") to discourage the purchase of higher-polluting vehicles (6b).</p>	<p>N° 8 : Lack of motivation</p>

[15] An ESCO designs, finances, and implements energy efficiency projects for clients. These projects are reimbursed through savings over a period of time agreed upon between the company and the client.

The recommendations in [TABLE 14](#) require moderate effort to implement and are feasible in the short term. However, they have a potentially lower impact but are significant enough to merit special mention.

TABLE 14

Details of honorable mentions

	Recommendation	Explanation	Targeted barriers
8	Roll out a communications campaign for operators	Deploy communication tools to promote the benefits of electric vehicles (total cost of ownership, air quality, etc.) and thus encourage operators to electrify their fleets and set public electrification targets.	<p>N° 8 : Lack of motivation</p> <p>N° 9 : Uncertainties about the financial analysis</p> <p>N° 10 : Lack of knowledge</p>
9	Build on the example set by government	Raise the electrification target for the Quebec government fleet, establish sub-targets by vehicle category (including medium and heavy trucks), establish electrification targets for other public organizations with a large number of vehicles that are not managed by CGER (e.g., SAQ, SÉPAQ, certain municipalities), and stimulate the demand for electric trucks through government calls for tenders.	<p>N° 8 : Lack of motivation</p> <p>N° 9 : Uncertainties about the financial analysis</p> <p>N° 10 : Lack of knowledge</p>
10	Improve and raise awareness of the "Support for Energy Management" component of the Transportez vert program	Increase the promotion of this program among operators, positioning it as the first step in their electrification. Some operators are not aware of this component or its benefits.	<p>N° 10 : Lack of knowledge</p> <p>N° 11 : Lack of technical support</p> <p>N° 12 : Maintenance challenges</p>

The measures in TABLE 15 can support the electrification of Quebec fleets but have not been identified as priorities, either because they are deemed too difficult to implement (dark grey zone) or because their ratio of impact and ease of implementation is too low to be prioritized (light grey zone).

TABLE 15
Details of other opportunities

	Recommendation	Explanation	Targeted barriers
11	Develop solutions to promote intermodal transportation and smart electrification	Increase the number of microhub pilot projects using electric vehicles for "last mile" delivery.	<p>N° 6 : Technological limitations and operational adjustments</p> <p>N° 8 : Lack of motivation</p> <p>N° 10 : Lack of knowledge</p>
12	Eventually prohibit the operation of internal combustion trucks by setting provincial targets	Prohibit the operation of internal combustion trucks provincially or federally. This policy would have a very strong impact on the market, especially towards the end of the target period (2020-2030).	<p>N° 1 : Vehicle availability</p> <p>N° 8 : Lack of motivation</p>
13	Develop an in-surance offer for medium and heavy electric vehicles	Approach insurers to help them better understand electric vehicles and facilitate the development of tailored insurance products, as insurers are sometimes reluctant to cover technology they know little about.	<p>N° 3 : Financing difficulties</p> <p>N° 9 : Uncertainties about the financial analysis</p>
14	Develop a turnkey electric vehicle leasing service for operators	Develop a turnkey leasing service offer through a paragovernment organization, such as CGER, or private truck leasing companies. Leasing options exist for light electric vehicles, but the leasing of medium and heavy electric vehicles has not yet been developed in Quebec.	<p>N° 1 : Vehicle availability</p> <p>N° 3 : Financing difficulties</p> <p>N° 6 : Technological limitations and operational adjustments</p> <p>N° 11 : Lack of technical support</p> <p>N° 12 : Maintenance challenges</p>
15	Develop sites accessible to medium and heavy electric vehicles in the Electric Circuit charging station network	Adjust the sites in the charging station network to accommodate medium or heavy commercial vehicles, as few of these currently do.	<p>N° 5 : Availability of public charging stations</p>

6.2. ADVICE FOR OPERATORS

In addition to the recommendations, eight selected actions would enable fleet operators to help accelerate vehicle electrification in Quebec.

- 1. Monitor technology:** Operators should stay abreast of changes in the supply of electric vehicles to be able to adopt the models that fit their needs as soon as they arrive on the market. A number of tools, including the Zero-Emission Technology Inventory of the Drive to Zero initiative, can help operators in this regard (CALSTART, 2020). Smaller operators can get support or share this monitoring service.
- 2. Set electrification targets and make them public:** Electric vehicle adoption targets send a clear message to manufacturers about demand in the market. They also help promote electric vehicles to peers and spur internal efforts to go electric.
- 3. Test pre-market vehicles:** The willingness of big operators to test new models of electric vehicles and share what they learn with manufacturers helps refine the technology.
- 4. Anticipate organizational barriers:** It's best to develop a centralized electrification strategy in different departments. Potential sources of friction (such as shifting fuel costs from the transportation department to the department responsible for buildings) should also be anticipated.
- 5. Get ready by conducting a fleet analysis:** An analysis can identify vehicle performance and appropriate routes or segments for electrification.
- 6. Do not just replace existing vehicles one by one:** Vehicle routes should be restructured to make them more suitable for electrification (consider combining some of them, using microhubs,^[16] etc.), to benefit from operational savings.
- 7. Use available support offers:** A number of programs are available to support operators in their electrification (e.g., the "Support" component of the Transport Vert program, the Écoleader Fund). To facilitate their electrification efforts, operators should seek this external expertise that is intended for them.
- 8. Work with customers and subcontractors:** Operators can play an important role as a driving force for electrification, either by offering this new service to their customers or by supporting their subcontractors' switch to electric vehicles.

[16] A microhub is a form of consolidation center in an urban area. Located between the largest suburban warehouses and the final delivery point, it allows for more agile "last-mile" delivery, which facilitates electrification (see Recommendation 11). For more information, go to <https://www.pembina.org/reports/microhubs-factsheet-v4-online.pdf>.

7.

CONCLUSION

The findings of this report show that there are still significant barriers to vehicle electrification in the commercial and institutional sectors both in Quebec and elsewhere in North America, and these barriers will have to gradually be removed before operators can fully embrace going electric. Quebec has already put in place and/or announced the deployment of several incentives, among others the recent 2030 Plan for a Green Economy (PGE) and the important transportation targets it includes, but following an in-depth analysis, this new report proposes enhancing several strategies.

To kick off a wave of electrification of commercial and institutional fleets, the recommendations we have made must be carefully implemented, starting with priority recommendations relating to regulatory and financial initiatives. The case studies presented clearly show that such initiatives yield extremely positive results, as for example in California, and Quebec can follow the same path.

Quebec will derive not only environmental but also economic benefits from reducing its dependence on oil in favor of broader use of hydroelectricity. Urgent action is needed.

Propulsion Québec has already taken important steps to implement these incentives and is actively involved in the electrification of commercial vehicle fleets at various levels through the following measures, among others:

- Documentation of the status of fleet electrification through this report
- Submissions to government authorities to advocate the example set by government by electrifying public and parapublic fleets
- Support for submissions to implement a standard for medium and heavy zero-emission vehicles in Quebec
- Networking activities between operators, fleet managers, and manufacturers to improve knowledge on practices, existing or future models, steps to be taken, etc.
- Organization of events and conferences, such as the IMPULSION MTL International Fleet Forum, to share best practices and lessons learned in the field
- Production and dissemination of studies on barriers, incentives, and other aspects of the conversion of commercial fleets in North America

As mentioned above, the recent PGE includes important transportation targets, including the fact that 100% of automobiles, sport utility vehicles, vans and minivans, as well as 25% of vans from the government fleet will be electrified in 2030. Furthermore, starting 2025, all new vehicles acquired by public transport companies, and receiving government assistance, will be electric vehicles. With the PGE, the government will be providing assistance to reduce the cost of purchasing electric vehicles for private fleets, while supporting Quebec's industrial sector and supporting innovation and demonstration of Quebec's electrification solutions adapted to this type of transportation. Even though these new measures have been welcomed by the Quebec electric and intelligent transportation ecosystem, they will also require close coordination between its members and the government, in order to operationalize the PGE and to align it properly with the needs of fleet managers. In this context, the present report should serve as a tool for raising awareness among the various stakeholders, so that the identified initiatives are quickly implemented to accelerate the electrification of vehicle fleets.

APPENDICES

APPENDIX I: TABLE OF RECOMMENDATIONS, HONORABLE MENTIONS, AND BARRIERS

	Priority recommendations	Targeted barriers
1	Enhance subsidy programs	N° 1 : Vehicle availability N° 2 : Initial purchase price
2	Support the development and marketing of electric vehicles made by Quebec manufacturers	N° 1 : Vehicle availability N° 6 : Technological limitations and operational adjustments
3	Introduce a policy for medium and heavy zero-emission vehicles (ZEVs)	N° 1 : Vehicle availability
4	Enhance support for charging infrastructure	N° 4 : Costs and challenges of on-site charging N° 5 : Availability of public charging stations N° 11 : Lack of technical support
5	Enhance the availability of demonstration programs to support the development of pre-market vehicles	N° 1 : Vehicle availability N° 6 : Technological limitations and operational adjustments N° 7 : Internal organizational barriers N° 8 : Lack of motivation N° 10 : Lack of knowledge
6	Develop an innovative financing solution	N° 3 : Financing difficulties N° 10 : Lack of knowledge
7	Introduce regulations that enhance the advantages of electric vehicles	N° 8 : Lack of motivation

	Honorable mentions	Targeted barriers
8	Roll out a communications campaign for operators	N° 8 : Lack of motivation N° 9 : Uncertainties about the financial analysis N° 10 : Lack of knowledge
9	Build on the example set by government	N° 8 : Lack of motivation N° 9 : Uncertainties about the financial analysis N° 10 : Lack of knowledge
10	Improve and raise awareness of the "Support for Energy Management" component of the Transportez vert program	N° 10 : Lack of knowledge N° 11 : Lack of technical support N° 12 : Maintenance challenges

	Other opportunities	Targeted barriers
11	Develop solutions to promote intermodal transportation and smart electrification	N° 6 : Technological limitations and operational adjustments N° 8 : Lack of motivation N° 10 : Lack of knowledge
12	Eventually prohibit the operation of internal combustion trucks (ICVs) by setting provincial targets	N° 1 : Vehicle availability N° 8 : Lack of motivation
13	Develop an insurance offer for medium and heavy electric vehicles	N° 3 : Financing difficulties N° 9 : Uncertainties about the financial analysis
14	Develop a turnkey electric vehicle leasing service for operators	N° 1 : Vehicle availability N° 3 : Financing difficulties N° 6 : Technological limitations and operational adjustments N° 11 : Lack of technical support N° 12 : Maintenance challenges
15	Develop sites accessible to medium and heavy electric vehicles in the Electric Circuit charging station network	N° 5 : Availability of public charging stations

APPENDIX II: REFERENCES AND DOCUMENTS CITED

California HVIP. HVIP Eligible Vehicle Catalog. (Date not available).

Retrieved from <https://www.californiahvip.org/how-to-participate/#Eligible-Vehicle-Catalog>

CALSTART. Global Drive to Zero: Zero-Emission Technology Inventory. 2020.

Retrieved in July 2020 from <https://globaldrivetozero.org/tools/zero-emission-technology-inventory/>

Carolyn Kim and Nitish Bhatt. Modernizing urban freight deliveries with microhubs. Pembina Institute, January 2019.

Retrieved from <https://www.pembina.org/reports/microhubs-factsheet-v4-online.pdf>

Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques. Nos cibles de réduction d'émissions de GES. (Date not available).

Retrieved from <http://www.environnement.gouv.qc.ca/changementsclimatiques/engagement-quebec.asp>

Ministère de l'Environnement et de la Lutte contre les changements climatiques. Inventaire québécois des émissions de gaz à effet de serre en 2017 et leur évolution depuis 1990. 2018, 40 p.

Retrieved from <http://www.environnement.gouv.qc.ca/changements/ges/2017/inventaire1990-2017.pdf>

Sharpe, B. Five reasons to thank California for doing you a real (heavy-duty) solid. The International Council on Clean Transportation, June 26, 2020.

Retrieved from <https://theicct.org/blog/staff/five-reasons-thank-california-clean-trucks>

Société de l'assurance automobile du Québec. Définitions. 4 p.

Retrieved from the Databank of Official Statistics on Québec at <https://bdso.gouv.qc.ca/docs-ken/multimedia/3628.pdf>

Société de l'assurance automobile du Québec. Données et statistiques 2018. 2019, 34 p.

Retrieved from <https://saaq.gouv.qc.ca/fileadmin/documents/publications/donnees-statistiques-2018.pdf>

Société de l'assurance automobile du Québec. Nombre de véhicules en circulation selon le type d'utilisation, le type de véhicule et l'âge du véhicule, Québec et régions administratives. 2019. Retrieved from the Databank of Official Statistics on Québec at https://bdso.gouv.qc.ca/pls/ken/ken213_afich_tabl.page_tabl?p_iden_tran=&p_lang=&p_m_o=SAAQ&p_id_ss_domn=718&p_id_raprt=3372#tri_age=1&tri_tertr=0

Société de l'assurance automobile du Québec. Heavy Vehicles. October 5, 2020.

Retrieved from <https://saaq.gouv.qc.ca/en/transportation-goods/heavy-vehicles/>

South Coast AQMD. Research, Development, Demonstration and Deployment. (Date not available).

Retrieved on May 29, 2020, from <https://www.aqmd.gov/home/technology/research-development-and-demonstration>

Work Truck Online. PG&E's Fleet Electrification Efforts. April 2, 2018.

Retrieved on May 28, 2020, from <https://www.worktruckonline.com/306348/pges-fleet-electrification-efforts>

The logo for "propulsion Québec" is centered at the bottom of the page. It features the word "propulsion" in a bold, lowercase, sans-serif font. The letter "p" is stylized with a blue and green gradient. Below "propulsion" is the word "Québec" in a smaller, lowercase, sans-serif font.