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Electrification as a societal opportunity: Québec's policies in transportation electrification

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Summary

Transforming Québec's transportation sector, which emits 44.8% of the province's greenhouse gas (GHG), has emerged as a priority for environmental and economic reasons. It's a strategic use of its clean hydroelectricity and contributes to improved air quality and public health, while creating quality jobs and bettering its trade balance. In order to reach its ambitious goals, including 1.6 million electric vehicles (EV) registered in 2030 and 100% new light vehicle sales being EV in 2035, Québec will, among other actions, strengthen its zero-emission vehicle (ZEV) mandate. Ultimately, all of Québec will benefit from the decarbonization of the transportation sector.

Keywords: EV (electric vehicle), government, mandate, market development, policy

1 Introduction

In Québec, the transport sector is the main greenhouse gas (GHG) emitting sector, being highly dependent on imported fossil fuels. According to the most recent inventory [1] (Fig.1), GHG emissions produced by transportation in Québec represent 43.3% of the province's total emissions. They have increased significantly since 1990 (+34.6% for total transportation, +60.0% for the road transport portion).

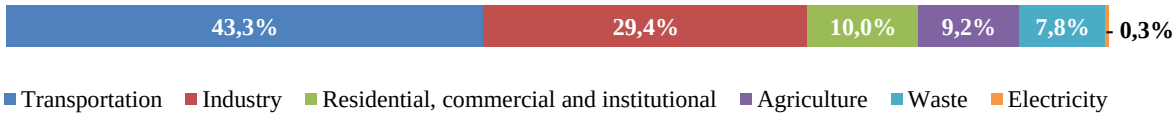

Figure 1: Percentage of GHG emissions by sector in Québec

Improving the energy efficiency of vehicles and fuels to reduce GHG emissions from the transportation sector is therefore paramount for Québec to reach its climate goals. One element of the solutions is transport electrification, a strategic move for Québec which has clean, abundant, and affordable energy:

hydroelectricity. Not only is 99.8% of the electricity from renewable sources, but it's also available through a nationalized utility provider. Hydro-Québec offers a residential rate among the lowest in North America, making fueling with electrons instead of gas beneficial for Québec's EV owners. Moreover, the utility made a $4.9B contribution to the Québec government's revenue in 2021 [2].

Besides being a promising solution for reducing GHG emissions, the electrification of transportation contributes to improved air quality and public health. It is also an economic niche of the future, creating quality jobs. Notably, reducing Québec's dependence on oil will have a direct and positive impact on its trade balance.

The Government of Québec therefore adopted several policies and programs including measures to support transport electrification in recent years. Among others, there was the 2013-2020 Climate Change Action Plan, the 2015-2020 Transportation Electrification Action Plan, the 2030 Energy Policy and its 2018-2023 Energy transition, Innovation and Efficiency Master Plan, the 2030 Sustainable Mobility Policy, Québec's strategy for developing the battery sector and Québec's Plan for the Development of Critical and Strategic Minerals.

The latest framework policy respecting electrification and the fight against climate change, the 2030 Plan for a Green Economy (2030 PGE) [3], was launched in November 2020, and has mapped out Québec's climate action roadmap until 2030. Québec's society will benefit from the plan, as it will bolster its resilience to climate change while contributing to economic development. An implementation plan that is revised annually supports the PGE. The 2022-2027 Implementation Plan of the 2030 PGE (2022-2027 IP) [4], published on April 28, 2022, presents concrete actions that will be deployed over the next five years, to achieve the Government of Québec's targets and objectives.

2 Shaping the Future with Strong Policies

2.1 The Plan for a Green Economy and its Implementation Plan

The PGE engages Québec in an ambitious project to lay the groundwork for a green economy by 2030 that is both resilient to climate change and more prosperous. The PGE will help achieve the 2030 greenhouse gas emissions reduction target Québec has set for itself, namely a 37.5% reduction compared with 1990 levels, and to reach carbon neutrality by 2050. It will also strengthen Québec's capacity to adapt to the consequences of climate change.

As for goals pertaining specifically to the electrification of transportation in the 2030 PGE, that were strengthened in the 2022-2027 IP, it aims for:

- 1.6 million electric vehicles on the road in Québec by 2030
- No sales of new gasoline-powered vehicles as of 2035
- 40% of taxis, 55% of city buses and 65% of school buses electrified by 2030
- 100% of governmental cars, SUVs, vans, and minivans and 25% of pickup trucks electrified in 2030
- Up to 2,780 fast-charging stations by 2030 and 4,500 level 2 public chargers by 2028, complemented by a program in Montreal and Québec City for 900 more

The 2022-2027 Implementation Plan, financed at 70% by Québec's Cap and Trade system, adds $1B to the previous IP, for a total investment of $7.6B for the PGE until 2027. It is estimated that the actions and budgets put in place, including the effect of the carbon market on prices and on changes in the behavior of households and businesses in Québec, will allow GHG reductions of 15.9 Mt, representing 51% of the effort required to reach the 2030 target (-31.0 Mt).

The PGE and its evolving IP contains a comprehensive array of actions to sustain EV demand, such as subsidies up to $7,000 (US$5,470) for the purchase of new vehicles, which is in addition to the federal

government incentive of up to $5,000 (US$3,910). There are also incentives for used light-duty vehicles, for the purchase of medium and heavy-duty vehicles, allowances for the installation of charging stations in the home or the workplace, awareness campaigns, etc. The PGE also announced the intention to strengthen Québec's ZEV mandate, implemented in 2018 to ensure the EV supply, to help reach its objectives.

Table 1: Principal actions in transport electrification supported by the 2022-2027 Implementation Plan and associated budgets

Axis	Example of action	Budget (M CAD$)
Electrify passenger transport	Incentives for cars, taxis, and buses Charging stations (home, work, public network) Strengthen the light vehicle ZEV mandate	1,987.4
	Support the electrification of urban buses	524.6
Increase the use of renewable energies and efficiency in the transport of goods	Incentives for trucks and fleet conversion, including charging solutions Aid to increase the efficiency of maritime, air and train transportation Define a ZEV mandate for MHD vehicles	331.0
Stimulate the development of strategic sectors	Product development innovation in EV industry Battery recycling	45.2

Of note, even though the 2030 PEG and its IP include measures to build the charging station network, the future expansion of the grid's power is planned by Hydro-Québec. The utility expects a 20-TWh or 12% increase in Québec's electricity demand over the 2019–2029 period and is developing new business approaches and programs to encourage customers to become more involved in efforts to meet energy conservation targets. Hydro-Québec is also diversifying its mix of renewable energy through green hydrogen, solar panels, and wind turbines, and is currently developing and optimizing the hydroelectric network [2].

Several actions contributing to the fight against climate change through electrification were carried out during the first year of implementation (2021-2022) of the 2030 PEG, among others:

- Entry into force of a regulation requiring that all new school buses be powered by electricity. Financial support from a newly implemented School Transportation Electrification Program will help carriers replace their end-of-life school buses with electric models
- Improvements to the Écocamionnage program, to increase the financial assistance offered and to open eligibility for new categories of vehicles, such as pickup trucks and vans used for commercial purposes
- Adoption of the Act mainly to reinforce the enforcement of environmental and dam safety legislation, to ensure the responsible management of pesticides and to implement certain measures of the 2030 Plan for a Green Economy concerning zero emissions vehicles [5] to, among other things, provide for the enactment of a regulation prohibiting the sale of certain new gasoline-powered vehicles no later than 2035, and to add powers to the legislation supporting the ZEV mandate in order to manage the future use of credits accumulated by automobile manufacturers
- Pre-publication, followed by a consultation, of draft regulatory amendments aimed at

strengthening the ZEV mandate and thus accelerating the transition to electric vehicles (more details in the next section).

2.2 A Key Measure: Québec's ZEV Mandate

The ZEV mandate is one of a group of tools and measures that the Government of Québec put in place in 2018 to accelerate the use of electric vehicles in Québec [6]. Automakers selling or leasing on average above 4,500 vehicles per year are required to earn credits through the sale or lease of ZEV (all-electric vehicles) and low emission vehicles (LEV, consisting mainly of plug-in hybrids) in the Québec market, may they be new or reconditioned with set criteria, or to buy such credits from other manufacturers. The yearly credit requirement is calculated by applying a percentage to the total number of light-duty vehicles that each automaker sells in Québec. The credit requirement thus varies from one automaker to the next and is not a yearly percentage of total sales.

Each sale or lease of a ZEV or LEV recognized by the Minister earns credits, the number of which currently varies according to the vehicle's electric range. The greater the range, the higher the number of credits that the automaker earns, with a maximum of 4 credits for a ZEV and 1.3 credit for a LEV. Required credits are asked of the industry at the end of compliances periods that generally comprise three model years. Excess credits can be banked, or traded, and used in subsequent compliance periods.

The adoption of the ZEV mandate — very similar to the one in place in California, ten other American states, and in the province of British-Columbia — played a key role in improving supply of ZEV and LEV in recent years. All motor vehicle manufacturers met their 2018 model year requirements and are currently banking the credits required for the 2019-2021 compliance period. The credits earned by the industry as a whole (including first compliance period leftover credits) were sufficient on September 1, 2020, to meet requirements for the 2019–2021 compliance period even if the automakers sold no more electric vehicles between then and September 1, 2022, on the condition that credits are exchanged or sold among them [7]. The number of available credits continued to increase since [8]. This shows that motor vehicle manufacturers can comply with the mandate in advance.

This observation, as well as current indications that demand still outpaces supply for certain vehicle models and leads to waiting lists that can sometimes be very long, led to a proposal to tighten the mandate. A draft regulatory amendment for the two regulations supporting the ZEV mandate was published on January 26, 2020, in the *Gazette officielle du Québec*:

- The draft Regulation to amend the Regulation respecting the application of the Act to increase the number of zero-emission motor vehicles in Québec in order to reduce greenhouse gas and other pollutant emissions [9] progressively increases the number of credits that must be accumulated by an automobile manufacturer to meet its requirements in order to reach 100% of ZEV sales in 2035. To that end, it amends the calculation used to determine the number of credits that the motor vehicles concerned provide, giving them a set value of 1 credit for a ZEV and 0.5 credit for a LEV. It also progressively reduces the ceiling for the use of credits from reconditioned motor vehicles to 0% in 2035. In addition, to reflect the amendment to the calculation of credits, the Regulation amends the calculation of the charge owed where the credits accumulated by an automaker are insufficient to meet its credit requirements, which would increase if adopted from $5,000 to $20,000 for each missing credit. Lastly, the draft Regulation makes other amendments, such as adjustments to the classification of motor vehicles eligible for credits and of automobile manufacturers, time limits for processing reports and methods for calculating certain environmental and electric range requirements.
- The draft Regulation to amend the Regulation respecting the limit on the number of credits that may be used by a motor vehicle manufacturer and the confidentiality of some information [10] progressively reduces the ceiling for the use of credits by an automobile manufacturer, accumulated during a preceding compliance period, during a subsequent period to 0% in 2035. It also amends the time when motor vehicle manufacturers must indicate to the Minister the

number of credits they wish to use in order to be able to make a decision based on an update of their accumulated credits. Lastly, the draft Regulation makes minor adjustments to the information entered in the name of a motor vehicle manufacturer in the register that is not public.

Their publication was followed by a 45 days consultation period that ended on March 12, 2022. As a result of comments received and analyzed, it appears that Québec has the capacity to accelerate the pace of electrification so that electric vehicles represent faster a substantial part of the vehicle fleet.

To facilitate the achievement of the new target of 1.6M electric vehicles set in the 2022-2027 IP published on April 28, 2022 and decarbonize the light-duty road transport sector by 2050, the Ministry of the Environment and the Fight against Climate Change will file new regulatory proposals pertaining to the ZEV mandate in the spring of 2022 to improve the supply of electric vehicles in Québec.

3 An Opportunity for Richness

Electric mobility is a key economic sector in Québec with a bright future. It is home to a diverse and growing economic sector focusing on five key areas:

- Commercial and specialty vehicle companies
- Raw materials
- Enabling digital technologies
- Research laboratories
- Storage and charging

Examples of successes are the development of electric buses, delivery trucks, and automated agricultural equipment. Many result from a "mobilizing projects" approach, in which the government invites companies and research organizations to collaborate to develop a specific technology to the pre-commercialization stage. The Government of Québec also aims to establish and grow the battery production, battery recycling, and zero-emission aerospace sector. In 2019, the gross domestic product (GDP) of the sector was of $1,3B through 147 companies, and represented 6,240 direct jobs.

The sector is effervescent, as illustrated by only a few of the announcements made in March and April 2022:

- Agreement between the Société du parc industriel et portuaire de Bécancour and BASF concerning the acquisition of land to establish a manufacturing plant for cathode active material (CAM) and battery recycling [11].
- Decision by the joint venture formed by General Motors Canada and POSCO Chemical to set up a CAM production plant in Bécancour. The project is estimated at over $500M and would generate approximately 200 jobs in the region [12].
- A financial assistance of $350K to Meglab Electronics, for a $849K project dedicated to the demonstration and marketing of an electric charging station designed to supply energy to several electric vehicles at the same time, mainly in underground mines [13].
- A sum of $5.4M to Innovation in Electrical Energy (InnovÉÉ) from the Québec government to support collaborations between industry and the research community aimed at transportation electrification [14].
- $22.5M to Recyclage Lithion to support the construction of an electric vehicle battery shredding plant, a project up of $80M, the establishment of a technological development center, as well as the detailed engineering design to build a future hydrometallurgy plant. The company's activities should eventually generate nearly 160 jobs [15].
- $22.66M to support the development of a 100% electric bus and a system capable of converting diesel-powered buses to electric. Completed at a cost of $84.3M by 2026, this project will create

115 jobs in Québec and consolidate over 650 others [16].

- A sum of $38.97M to the Université du Québec à Trois-Rivières to support the construction of a research and development pavilion on green and sustainable technologies fostering industrial partnerships and international collaboration, at a total cost of $46.03M [17].

4 Conclusion: Tangible Results and Looking Forward

With a clean electricity grid, the biggest challenge to tackle in Québec in order to reduce its GHG — and therefore reach its climate goals — resides in the transportation sector. It is no wonder that the electrification of transportation is a priority, among others in Québec's framework policy respecting electrification and the fight against climate change, the 2030 PGE. A minimum of $2,888.2M is dedicated to various actions to that effect in the 2022-2027 IP.

In addition to incentives and other measures to support the demand of electric vehicles, regulations were put in place, notably for school buses and a ZEV mandate — currently under review — that is paving the way to 100% of light-duty vehicles sold in Québec being EVs by 2035. The measures implemented are a success: the electrification of 136,983 light-duty electric vehicles on March 31, 2022, makes Québec a leader in Canada. The share of electric models in new vehicle sales, which was 0.7% in 2015, increased to 6.6% in 2020 [7], and is 71% higher than the Canadian national average (8.9% to 5.2%) for 2021 [18].

Even more than a way to meet its climate goals, electrification is a societal opportunity for Québec. The imports of hydrocarbon crude oil and natural gas reached $5.6B in 2019 and represent the equivalent of 48% of its trade balance deficit [19]. On the other hand, the profits made by its electricity provider are reinvested in Québec's budget. Also, the electric mobility sector is booming and creating quality jobs. Its government is therefore resolute in continuing to put together the tools and policies necessary to succeed in the transition to a greener future.

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