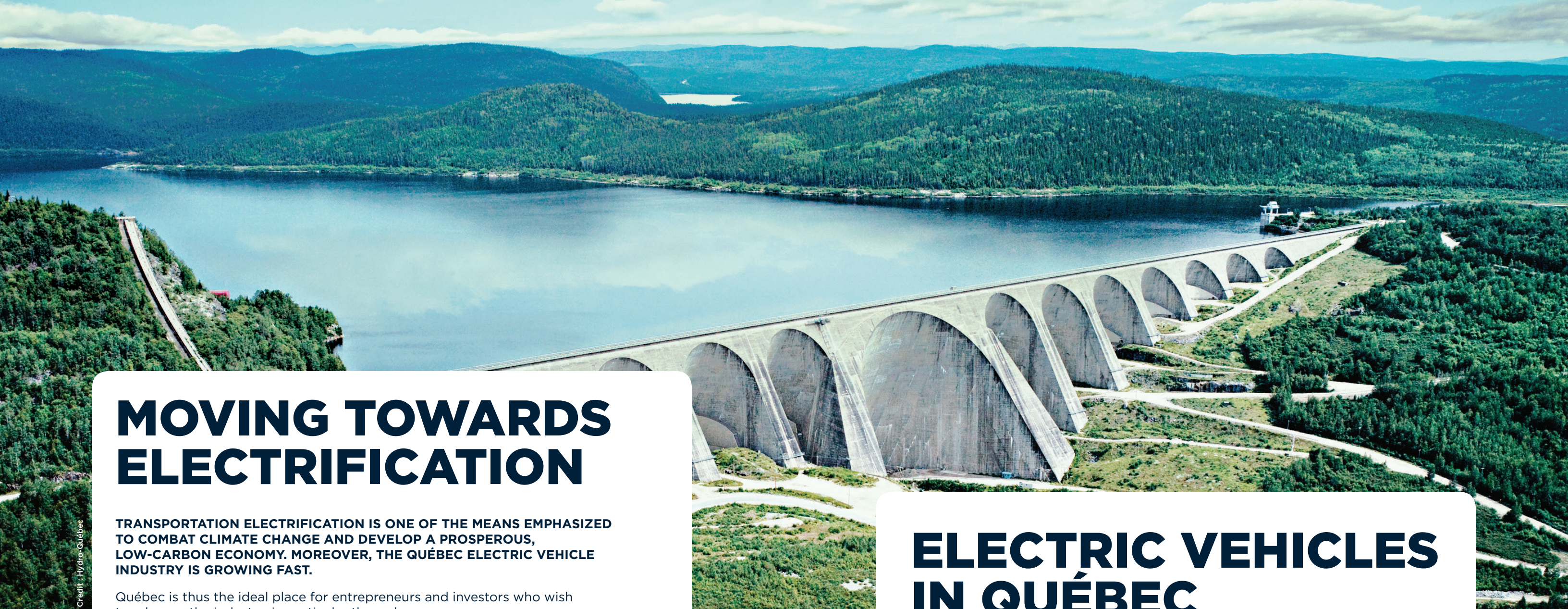


PROPELLING QUÉBEC
FORWARD WITH
ELECTRICITY



THE QUÉBEC ELECTRIC VEHICLE INDUSTRY





Credit: Hydre-Québec

MOVING TOWARDS ELECTRIFICATION

TRANSPORTATION ELECTRIFICATION IS ONE OF THE MEANS EMPHASIZED TO COMBAT CLIMATE CHANGE AND DEVELOP A PROSPEROUS, LOW-CARBON ECONOMY. MOREOVER, THE QUÉBEC ELECTRIC VEHICLE INDUSTRY IS GROWING FAST.

Québec is thus the ideal place for entrepreneurs and investors who wish to advance the industry, in particular through:



the recognized know-how of its businesses and research centres;



its abundant natural resources and hydroelectricity;



its numerous assets, such as competitive energy rates and operating costs.

ELECTRIC VEHICLES IN QUÉBEC

- > Ranks 1st in Canada for electric vehicle sales
- > 16 200 light-duty electric and rechargeable hybrid vehicles on the roads
- > 1 830 public charging stations
- > 6 vehicle charging networks, including the Electric Circuit, Canada's biggest public recharging station network
- > 58 manufacturing companies
- > 30 university, college and private research centres and groups
- > 4 700 direct and indirect jobs



THE INDUSTRY POWERHOUSE

THE EXPERTISE OF BUSINESSES AND RESEARCH CENTRES FORMS THE CORE OF THE QUÉBEC ELECTRIC VEHICLE INDUSTRY.

QUÉBEC HAS AN ARRAY OF TALENTED ORGANIZATIONS THAT ARE TRAINING THE NEW GENERATION OF WORKERS AND ADVANCING TRANSPORTATION ELECTRIFICATION

ORGANIZATIONS DEDICATED TO THE DEVELOPMENT OF THE ELECTRIC VEHICLE INDUSTRY

The electric and smart vehicle industrial cluster mobilizes Québec stakeholders, i.e. the industry, users and the research and innovation sector, as well as the education sector, to focus on common objectives and concerted initiatives to optimize the industry's growth and influence.

The Québec Ground Transportation Cluster has solid expertise in international market development and collaborative innovation. It supports the product marketing initiatives of the member transportation equipment manufacturers.

EDUCATIONAL INSTITUTIONS AND RESEARCH CENTRES

The Université du Québec à Trois-Rivières is conducting research on fuel cells for electric vehicles at its Institut de recherche sur l'hydrogène.

The Centre de technologies avancées BRP-UdeS, affiliated with the Université de Sherbrooke and Bombardier Recreational Products, offers the transportation industry industrial and university expertise and the requisite testing and simulation equipment to develop complete electric and hybrid propulsion systems.

The Groupe Performance Innovation Transport de FPInnovations proposes tailor-made technological solutions and assistance to vehicle fleet managers wishing to reduce costs and the environmental impact of their activities and to enhance their security.

InnovÉÉ is a sectoral industrial research cluster specializing in collaborative industry-university research. It supports industrial projects related to transportation electrification such as the development of materials and advanced manufacturing processes for the production of electric motors and lighter automobile bodies.

The Institut de recherche d'Hydro-Québec (IREQ) conducts research in the realm of battery materials for transportation and designs energy storage systems. It holds more than 800 patents and 40 licences the world over.

The Innovative Vehicle Institute possesses advanced expertise in engineering and the design of technological solutions for projects centred on hybrid and autonomous electric vehicles, vehicular intelligence and energy efficiency.

PMG Technologies conducts compliance testing on electric and innovative vehicles for governments and manufacturers. The test centre, the biggest in Canada, possesses state-of-the-art facilities among the most modern in North America.

THE MAIN SUPPLIERS OF PARTS AND SYSTEMS

AddÉnergie Technologies proposes solutions and charging stations for the public, private and multi-residential sectors.

Johnson Matthey Battery Materials produces lithium iron phosphate (LiFePO₄), a much sought-after component worldwide used to produce lithium-ion batteries. The company's expertise enables its clients to comply with stringent battery purity requirements.

LTS Marine is developing electric drive trains for the boating industry and the railway sector.

Nemaska Lithium produces hydroxide and lithium carbonate for the manufacture of batteries.

Blue Solutions Canada specializes in the design of lithium metal polymer batteries, a superior technology tested in real situations in France, especially in the vehicles of the manufacturer Bolloré.

TM4, a Hydro-Québec subsidiary, designs and manufactures high-efficiency electric motors for light-duty and heavy-duty vehicles, such as the motorization system for the Nova Bus electric bus.

Varitron specializes in the manufacture of electronic systems for electric vehicles.

ASSEMBLERS

Autobus Lion designs and manufactures electric school buses and their propulsion and control systems.

Bombardier Recreational Products has designed two all-electric recreational vehicles, the Spyder and the E Commander, a two-seater autoquad.

Nova Bus is a subsidiary of Volvo Group, which designs and manufactures electric and rechargeable hybrid urban buses.

Kargo manufactures modular aluminum electric vehicles for the industrial sector.

Motrec designs and manufactures tailor-made industrial electric vehicles.

Trains & Trams Wattman has developed an all-electric small railless train and a transport shuttle.

VISIONARIES

Québec also stands out because of businesses in fields related to electric transport and future modes of intelligent and autonomous transport.

ImmerVision offers 360-degree vision solutions used in cameras to aid driving.

LeddarTech is developing optical detection and telemetry technologies. Moreover, the company won the award for the best technology destined for the automobile sector at the Électrons d'Or 2016 in France.

Nuance is developing voice recognition software to make driving safer.

THE QUÉBEC GROUND TRANSPORTATION INDUSTRY

Québec has a solid ground transportation industry that encompasses:

- ▶ 625 firms;
- ▶ 31 900 direct and indirect jobs; and
- ▶ generates \$10.1 billion in annual sales.

The industry supplies clients the world over but especially in North America.

Several companies in the sector are world class and specialize in the production of an array of vehicles:

- ▶ automobiles: Bridgestone, Raufoss, Spectra Premium, Verbom;
- ▶ buses: Autobus Lion, Nova Bus, Prévost Car;
- ▶ trains: Bombardier Transportation;
- ▶ recreational vehicles: Bombardier Recreational Products, Campagna Motors, Groupe Soucy;
- ▶ service or special vehicles: Équipement Labrie, Manac, Paccar.

The Québec Ground Transportation Cluster is the main group of industrial stakeholders in the sector in Québec. It oversees the mobilization and raises the profile of the industry, which includes transportation electrification.

FUEL FOR INNOVATION

FROM MINE PRODUCTION TO THE MANUFACTURE OF COMPONENTS AND ASSEMBLY OF ELECTRIC VEHICLES, INCLUDING RESEARCH, QUÉBEC IS ESTABLISHING A COMPLETE INDUSTRY THAT IS PROMOTING THE RAPID DEVELOPMENT OF TRANSPORTATION ELECTRIFICATION.

NATURAL RESOURCES

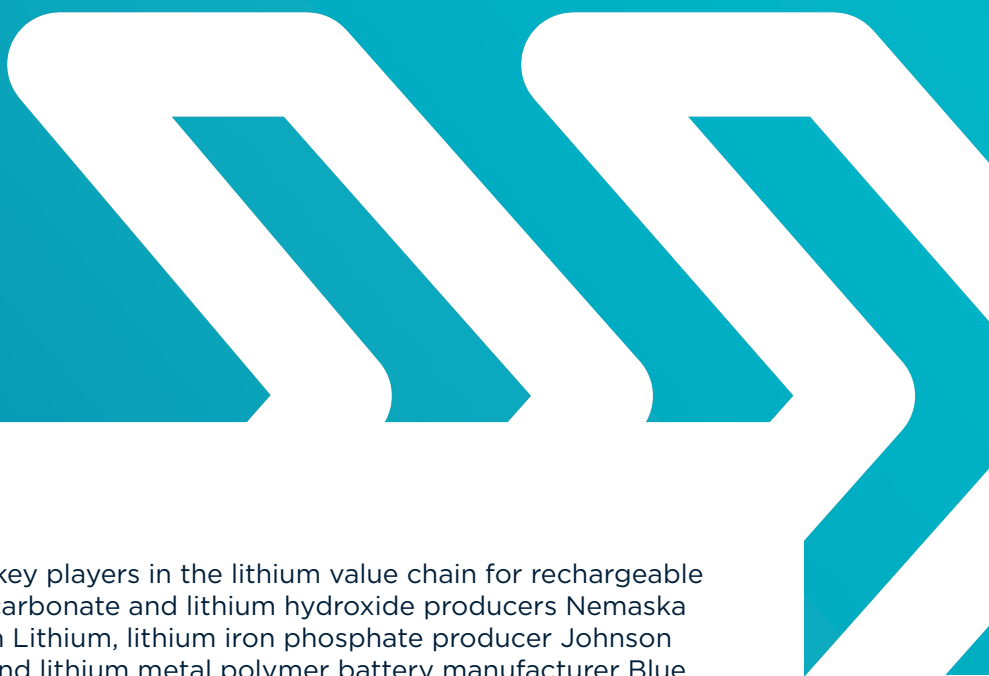
Québec abounds in resources that are used to manufacture batteries, including:

- ▶ lithium;
- ▶ graphite;
- ▶ titanium;
- ▶ phosphates;
- ▶ cobalt.

It also has metals used to make lighter vehicles:

- ▶ niobium;
- ▶ vanadium.

THE PLAN NORD AND THE STRATEGIC VISION FOR MINING DEVELOPMENT IN QUÉBEC will facilitate the exploitation and transformation of such minerals while limiting their impact on the environment and communities.



LITHIUM

Québec can rely on several key players in the lithium value chain for rechargeable batteries, including lithium carbonate and lithium hydroxide producers Nemaska Lithium and North American Lithium, lithium iron phosphate producer Johnson Matthey Battery Materials, and lithium metal polymer battery manufacturer Blue Solutions Canada.

What is more, through the activities of IREQ's energy storage and conversion branch, Hydro-Québec is recognized the world over for its technological expertise and its intellectual property portfolio, especially with regard to lithium-ion, lithium-sulphur and lithium-air batteries.

RARE EARTHS

A host of applications call for the rare-earth elements, which are used, in particular, in rechargeable batteries, since they are satisfying growing demand for new generations of electric and hybrid vehicles.

Several rare earths mining projects are under study in Québec because of their unique properties and promising future.

Successful exploration projects in Northern Québec reveal high potential for the extraction of the resources.

WATER

Québec is recognized for its vast expanses of water, which make it one of the world's leading hydroelectricity producers. In Québec, 99% of the electricity generated comes from hydropower.

Water is a source of clean, renewable, reliable energy offered at highly competitive rates in relation to other energy sources. Hydro-Québec's network can supply demand to charge more than 1 million electric vehicles.



FOCUSING ON THE FUTURE

QUÉBEC HAS IMPLEMENTED SEVERAL STRATEGIES AND ACTION PLANS TO REMAIN A WORLD LEADER AND A STRATEGIC CHOICE FOR BUSINESSES WISHING TO LAUNCH OR PURSUE THEIR OPERATIONS THERE.

THE PROMISING PROJECTS AND MASSIVE INVESTMENTS ARE ALL OPPORTUNITIES, ESPECIALLY IN THE ELECTRIC TRANSPORTATION SECTOR.

THE 2015-2020 TRANSPORTATION ELECTRIFICATION ACTION PLAN'S OBJECTIVE is to bolster the electric vehicle industry.

It is targeting by 2020:

- ▶ the registration in Québec of 100 000 electric and rechargeable hybrid vehicles;
- ▶ a 150 000-tonne reduction in transportation-related GHG emissions;
- ▶ a 66-million litre annual reduction in fuel consumption;
- ▶ \$500 million in investments;
- ▶ the creation of 5 000 jobs.

QUÉBEC'S ALUMINUM DEVELOPMENT STRATEGY 2015-2025 is intended to double within 10 years aluminum processing in Québec and promote lighter vehicles.



Credit : Société de transport de Montréal



Credit : Hydro-Québec

IDEAL MATERIALS TO MAKE LIGHTER VEHICLES

New North American regulations are compelling automakers to reduce vehicle weights in order to curb fuel consumption and GHG emissions.

Aluminum offers particularly interesting prospects for companies seeking to reduce vehicle weights, all the more so as it is a durable metal that resists corrosion. Tesla, the American automaker, offers a range of electric vehicles whose autonomy is enhanced, in particular, by the use of aluminum parts, some of which are manufactured in Québec.

Plastic and composite materials are also used to manufacture vehicles and Québec has an ecosystem of solidly established businesses that specialize in this field.

The **DIGITAL ECONOMY ACTION PLAN** was implemented to accelerate the digital transformation of businesses to keep them in the vanguard of new technologies.

Through the **GREEN FUND**, more than \$250 million will be invested by 2020 to support measures geared to broadening electric mass transit offerings, develop innovative solutions for freight transportation, step up technological innovation, and foster the marketing and export of innovative products.

THE GREEN FUND AND THE CARBON MARKET

The Green Fund derives its revenue principally from the sale of GHG emissions units under the GHG emission cap-and-trade system, the so-called carbon market.

The revenue helps to fund the electric vehicle rebates and investments in support infrastructure.

Accordingly, the adoption rate of low-emission motor vehicles in Québec is now one of the highest in North America. Furthermore, the international City Mobility program, which the Québec government supports, has selected Montréal as its first North American partner city. The initiative of Volvo Group and its Nova Bus North American division seeks to accelerate the adoption of clean, efficient, connected urban transportation systems that satisfy the needs of the 21st century.



THE QUÉBEC ELECTRIC VEHICLE INDUSTRY

Credit : Nova Bus

**QUÉBEC:
THE GATEWAY TO
NORTH AMERICA**

MONTRÉAL'S RÉSEAU ÉLECTRIQUE MÉTROPOLITAIN

Upon completion, the project will be the biggest integrated public transportation project since the Montréal Métro, inaugurated in 1966. The network comprises 24 stations spanning 67 km and will be the third biggest automated transportation network in the world, after those in Dubai and Vancouver.

The Caisse de dépôt et placement du Québec is responsible for the new, fully electric network, that will link five strategic sectors in the Montréal region:

- **downtown Montréal;**
- **the South Shore;**
- **the North Shore;**
- **the West Island;**
- **Montréal-Pierre Elliott Trudeau International Airport.**

The Réseau électrique métropolitain (REM) will be accessible seven days a week and provide an efficient transportation solution centred on sustainable mobility. It will be connected to the Métro, commuter trains and buses to promote the use of mass transit.

Each year, the network could thus contribute to a reduction:

- **of nearly 16 800 tonnes of GHG;**
- **in economic losses stemming from traffic congestion, estimated at \$1.4 billion in the metropolitan area.**

For users, this new transportation dynamic means faster, smoother travel during which they can connect to the Wi-Fi network.

YOUR BUSINESS DESTINATION

QUÉBEC:

- is located at the heart of several major North American trade corridors;
- has a vast navigable waterway linked to a strategic commercial port system;
- has three Class 1 rail networks;
- has a freeway system connected to North American roads;
- is strategically located to access the world automotive and aerospace markets.

QUÉBEC'S 2015-2020 MARITIME STRATEGY pursues the establishment and modernization of such infrastructure to make Québec a transatlantic trade hub.

In particular, the government is supporting the development of industrial zones near port, road and rail infrastructure. The strategy represents a considerable comparative advantage for businesses that establish themselves in the zones, through:

- easier access to inputs;
- the accelerated transit of their goods to North American and international markets.

STAYING AHEAD OF ITS COMPETITORS

Québec has numerous competitive advantages that enable businesses to successfully set up and expand their operations.

Skilled, educated WORKERS

- ▶ More than 60% of the labour force has a post-secondary or university diploma.
- ▶ Nearly 47% of Quebecers master two languages.

Abundant NATURAL RESOURCES

- ▶ Nearly 99% of the electricity generated in Québec comes from hydroelectricity, an abundant, clean, renewable energy source.
- ▶ Québec has enviable energy and mineral potential.

Some of the world's lowest ENERGY RATES

- ▶ Costs are more affordable than in the average of the G7 countries:
 - 43% lower with respect to electricity;
 - 49% lower as regards natural gas.

TAX INCENTIVES

- ▶ The 26.9% corporate tax rate is one of the lowest in North America.
- ▶ The government grants a 10-year tax holiday for major investment projects (\$100 million or more).
- ▶ Advantageous tax credits are also granted for investment and research and development spending.

Advantageous OPERATING COSTS

- ▶ Operating costs are 7.4% lower, on average, than in the United States, in particular thanks to labour costs, which are 34% lower, on average.

INNOVATIVE MANUFACTURERS

\$700 million to support projects

The Québec government supports investment projects that encourage manufacturing companies to shift to advanced manufacturing and Industry 4.0 by relying on the integration of state-of-the-art technologies.

Such projects fall into four categories: product innovation, process innovation, organizational projects, and commercial and marketing projects.

Forward-thinking companies in the electric vehicle industry can rely on extensive support to carry out their robotization, automation and technological innovation projects.



ENTER THE RACE

Do you want to invest in Québec? Several organizations offer personalized guidance in:

- financing;
- support to establish new businesses and for expansion;
- strategic alliances.

Ministère de l'Économie, de la Science et de l'Innovation

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