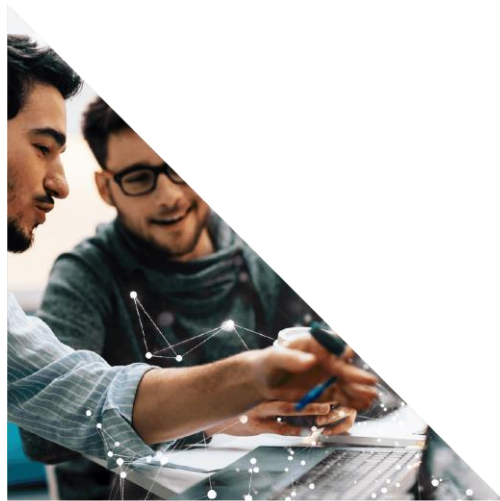


# Great Opportunities for Smart Transportation in Greater Montréal



# The world's best economic promotion agency at your service





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# 10+1 reasons to invest in Greater Montréal in electric and smart transportation

## 1 Specialized ecosystem

- Ground transportation expertise
- Vehicle electrification value chain
- A world-class hub in Artificial Intelligence

## 4 Proactive city

- Smart Cities Challenge 2019 Winner
- Smart and Digital City Office
- Intelligent Transportation Institute

## 7 Leading talent pool

- 64,000 engineers
- 34,000 engineering students
- Research chairs in transportation electrification
- Bilingual population

## 10 Intermodal platform

- International airports
- The second-largest container port in Canada
- A railway network that extends all the way to Mexico

## 2 Affordable and clean electricity

- One of the world's largest producers of hydro power
- 99%+ electricity from renewable sources
- The lowest electricity rates among major North American cities

## 5 World-class research centres

- IREQ, Hydro-Québec's research institute: 800 patents and 40 licences
- Leading artificial intelligence research
- World recognized researchers

## 8 Competitive costs and incentives

- Cost advantage over other North American cities
- Generous R&D tax credits
- Financial support

## 3 Québec's electrification strategy

- Ambitious targets to drive the industry forward
- A budget of \$420M
- 5,000 new jobs by 2020

## 6 Testing areas and conditions

- Favorable climate
- Presence of a test center for Canadian and U.S. standards
- Semi-controlled and real-world testing areas
- Temporary imports of non-certified vehicles

## 9 Market access

- Direct access to 1.5B consumers due to CUSMA, CETA, CPTPP and 12 other trade agreements in force



**Montréal International's  
strategic support**



# 01

## A Booming Smart Transportation Hub



Montréal  
International



# Québec's Smart transportation ecosystem at a glance



Source : Investissement Québec, 2019.

# A strong transportation manufacturing industry



**32,000**  
jobs



**620**  
companies

**A wide range of manufacturing, design and assembly activities for transportation equipment and vehicles**

Québec has been developing its expertise in **specialized vehicles**:

- Buses, motor coaches;
- Trucks; Garbage trucks;
- Armoured cars, ambulances, police cars;
- Motorcycles, snowmobiles, three-wheeled sports vehicles.

**A specialization strengthened customer base made up of industry giants**

**NOVA**BUS

**BOMBARDIER**  
l'évolution de la mobilité

**PACCAR**

**PREVOST**

**VOLVO**





## Greater Montréal, a smart and digital city

- **Smart Cities Challenge 2019 winner** for its proposal to improve mobility with a prize of \$50M
- **2019 Electromobile City Winner from Canada Electric Mobility**
- **First among the big smart cities**
  - Intelligent Community Forum (2018)
- Presence of the **Smart and Digital City Office** and **the Institute of Intelligent Transportation**
- **\$400 M** invested into Canada's **5G public-private ENCQOR project Network** to enable better-sustained connection and communication between technologies
- **Many ambitious Intelligent Transportation System** projects: Urban Mobility Management Center, Smart Parking Project, Geo-Traffic Dynamic Database



# World-class research centres

Recognized for its expertise in batteries and R&D on electric specialized vehicles.



Institut de recherche

- **Hydro-Québec's research institute, IREQ** is recognized for its **expertise in batteries**
- Close to 30 research groups and research centres
- **800 patents and 40 licences** held by IREQ, Hydro-Québec's research institute
- Yearly average of \$100 M in its innovation projects
- 500 specialists pool their efforts and expertise to support Hydro-Québec in every facet of its operations, from electricity generation to consumption



**National Research  
Centre of Canada**



**Electrical energy  
innovation**



**Interuniversity Research  
Centre on Enterprise  
Networks, Logistics  
and Transportation**



Institut du véhicule innovant  
Innovative Vehicle Institute

**Innovative Vehicle  
Institute**

# Collaborative cluster organizations to support companies and investors



Electric and smart vehicles



Transport and logistics



Clean technologies



Information and communications technologies



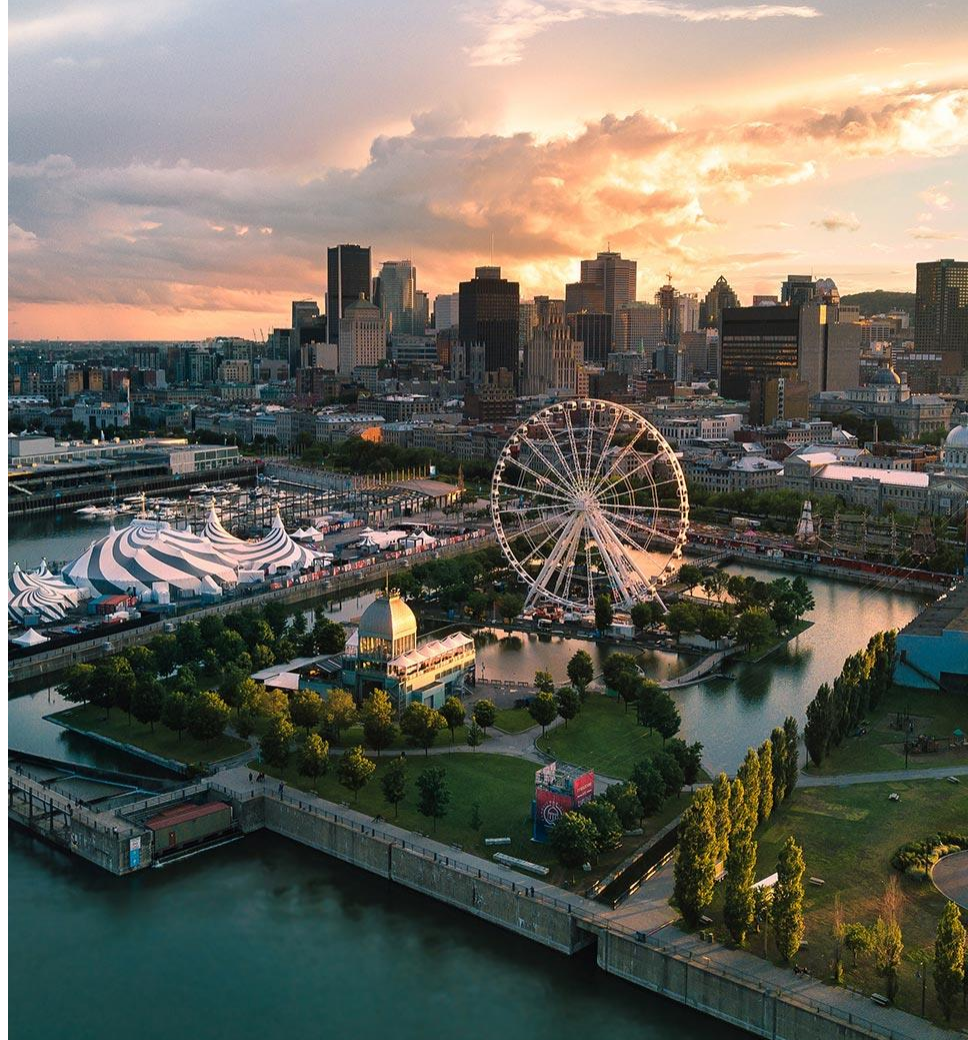
Ground transportation



Artificial Intelligence



AI-Powered Supply Chains



Old Port, Grande-Roue and downtown Montréal © Loïc Romer

# Established local and global players thriving in Greater Montréal



## Johnson Matthey

Production of lithium iron phosphate (LiFePO<sub>4</sub>) for Lithium-Ion batteries to meet North American demand



## Blue Solutions

A company specializing in energy and automation technologies and opening a North American centre of excellence for transportation infrastructure in Montréal



## TM4

A company designing **motors and power converters**



## AddÉnergie

1<sup>st</sup> in Canada and 2<sup>nd</sup> in North America in **charging solutions** for electric vehicles. It will provide New York City with charging stations for electric vehicles



## Varitron

One of the top five electronic manufacturing services companies in Canada



## Verbom

A leading **manufacturer of sheet metal parts** for the transportation industry



## ABB

A company specializing in **energy and automation technologies** and opening a North American centre of excellence for transportation infrastructure in Montréal



## Lion Bus

A Québec-based OEM that caters to the needs of the North American school bus industry

# A culture of partnerships and commitment



**Dana Incorporated and Hydro-Québec** announced a strategic joint-venture in which TM4 Inc., a subsidiary of Hydro-Québec, will become Dana's source for electric motors, power inverters, and control systems. (2018)



**Michelin acquires Camso** and strengthens its position in the manufacture of specialty tires and tracks for off-road vehicles (2018)



**Kéolis** launches the first **NAVYA** autonomous shuttle on the roads of Québec (2018)



**PSA (FreetoMove) invests in Communauto** to eventually provide car-sharing vehicles, thus preparing for its eventual return to the North American market (2016)



**Daimler and Blue Solutions** a subsidiary of Bolloré, enter into an agreement to equip Daimler's E-Citaro buses with Lithium Metal Polymer (LMP®) batteries from Blue Solutions, exclusive supplier of full solid batteries for electric buses (2018)



**Mobilizing project between Lion Bus, TM4, AddEnergie Technologies, Adetel Solution and Alcoa Canada** from electric heavy-duty vehicles prototypes (2016) to launching of All-Electric Class 8 Urban Truck (2019)



# A favorable political context for the industry

## Québec



### ■ 2030 Plan for a Green Economy

#### ■ Electrification of transport

- Support of + \$ 1.5 billion for the electrification of light vehicles
- Discount up to \$8,000 on the purchase of an electric vehicle
- Subsidy of \$12,000 per charging station for municipalities
- Financial assistance, training and support for organizations that want to electrify their transport
- Increased requirements for zero emission vehicles (ZEV)

#### ■ Electrical industry

- Development of the battery sector: development of critical minerals, production electric vehicles and development of recycling capabilities
- Financial assistance to encourage the development of technological innovations in the electrification of transport

## Montréal



### ■ Climate Plan 2020–2030

- Target of 50% the share of electric vehicles registered in Montréal by 2030
- Target of 30% of vehicle trips to be electrified
- Target of 25% of deliveries made without GHG emissions
- Institute of Electrification and Intelligent Transportation
- Carbon neutrality objective by 2050

## Québec government's 2030 Plan for a Green Economy

### *Targets for 2030*

- Objective of **1.5 million EVs in Quebec by 2030**, or around 30% of the vehicle fleet
- Achieve a **40% rate of electric taxis**
- Achieve a **65% rate of electric school buses**
- Achieve a rate of **100% electric vehicles and 25% vans for the government**
- Reach **2,500 fast charging stations and 4,500 standard stations**
- Reduction of **37.5% in GHG below their 1990 level**

# Transportation stands on a strong IT industry

- **179,000+ IT professionals** and **5,000+ companies** in Greater Montréal
- **A GDP of \$11.6B**
- **Lowest operating costs in North America** for software development
- **Broadly diversified industry:**



**5<sup>th</sup>**

**highest tech jobs concentration**  
among the largest metropolitan areas in Canada & U.S.



**1<sup>st</sup>**

**city in Canada**  
and a world leader in digital creativity



**5<sup>th</sup>**

**video game development hub**  
in the world

## Sample of major IT and transports companies located in Greater Montréal



# Building transportation with AI

- **\$3+ billion in AI investments** in Greater Montréal since 2016
- The Canadian government chose Montréal as headquarters for **Scale AI**, Canada's AI supply chain supercluster
- A community of more than 600 researchers and graduate students at Mila - the world's largest academic research lab in deep learning and reinforcement learning.
- Sample of major players located in Greater Montréal:



# Made-in-Québec electric vehicles



## **BOMBARDIER RECREATIONAL PRODUCTS (BRP)**

A fully electric Spyder with a 170-km range. 70% of BRP recreational products are exported to the U.S.

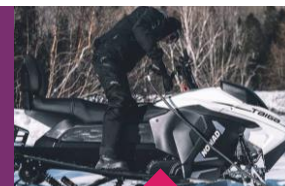


## **POSI**



## **MOVERA**

An iconic shuttle vehicle developed by a consortium for Calgary International Airport.



## **TAIGA MOTORS**

## **LION BUS**

The first OEM to sell a fully electric school bus. Its vehicles are also available in California, Massachusetts and New York.



## **ALSTOM**



## **KARGO**

A vehicle that is 90% aluminium. 30% of all vehicles produced go to mines outside North America.



## **DOPPELMAYR**



## **NOVABUS**

Volvo is making the most of Greater Montréal's position as the only centre of expertise in transportation electrification in North America.



## **PACCAR**



## **MOTREC**



## **LITO GREEN MOTION**



# A culture of innovative, sustainable urban mobility



**Société de transport de Montréal (STM) planning to go fully electric**  
Ranked 9<sup>th</sup> in the 2018 **Best 50 Corporate Citizens in Canada**  
Goals: **acquire only electric vehicles as of 2025** and **achieve zero emissions for vehicles by 2040**



**Réseau Express Métropolitain (REM) is a light rail network under construction in Greater Montréal**

**67 km, with 26 stations**

Initiated by Caisse de dépôt et placement du Québec (CDPQ Infra) for an estimated **investment of \$6.3B**



**Communauto, one of the largest companies of its kind in the world, and North America's car-sharing pioneer**  
**3,000 vehicles**

A fleet including **hybrid and electric cars**  
Serves 13 Canadian cities and Paris in France



**BIXI, the bike sharing system that has taken over the world**

**7,250 bikes and 600 stations** in Montréal

Urban mobility and environmental responsibility

A system used in **33 cities around the world**: NYC, London, Chicago, Toronto, Barcelona, Sao Paulo, etc.



# 02

## All the Building Blocks for the Future of Mobility



# Clean, renewable, reliable and affordable electricity



## 1<sup>st</sup> place

in North America for the lowest electricity prices for large-power customers

Total installed capacity  
of **47 222 MW**



With its rich renewable, green and stable supply of **low-cost hydropower**, Greater Montréal boasts one of the lowest electricity rates in North America: **CA¢4.04/kwh\***

\* Rate LG: large power with minimum billing demand of 5,000 kW, transmission and distribution included, for 120-kV supply with 95% load factor, and including the Economic Development Rate reduction (if eligible).



Carillon generating station © Hydro-Québec

- **Stable electricity rates:** Thanks to the collective wealth represented by our water resource, the rates are not subject to the volatility of oil and gas prices
- Hydro-Québec generates more than **99% of clean, renewable energy**
- The **quality** and **reliability** of the power grid are also two major advantages

# Favorable conditions for vehicle testing



## Québec's weather is perfect for testing

- Harsh winter conditions
- Heavy precipitation and wide temperature variations

**Dedicated organisms  
for the experimentation  
of new technologies in  
the field of smart and  
sustainable transport**



EXPÉRIMENTATION D'INNOVATIONS



- **One of the most modern motor vehicle test centres (MUTC)**
- Transport Canada's only motor vehicle test and research centre; run by PMG Technologies
- The only Canadian motor vehicle test centre and one of the few in North America that conducts testing to Canadian and U.S. standards (CMVSS and FMVSS)
- Test vehicle preparation lab and crash lab
- 25 km (15.5 mi.) of test tracks and proving grounds
- Environmental chambers for tests at temperatures ranging between  $-55^{\circ}\text{C}$  and  $+85^{\circ}\text{C}$



PMG Technologies' test tracks



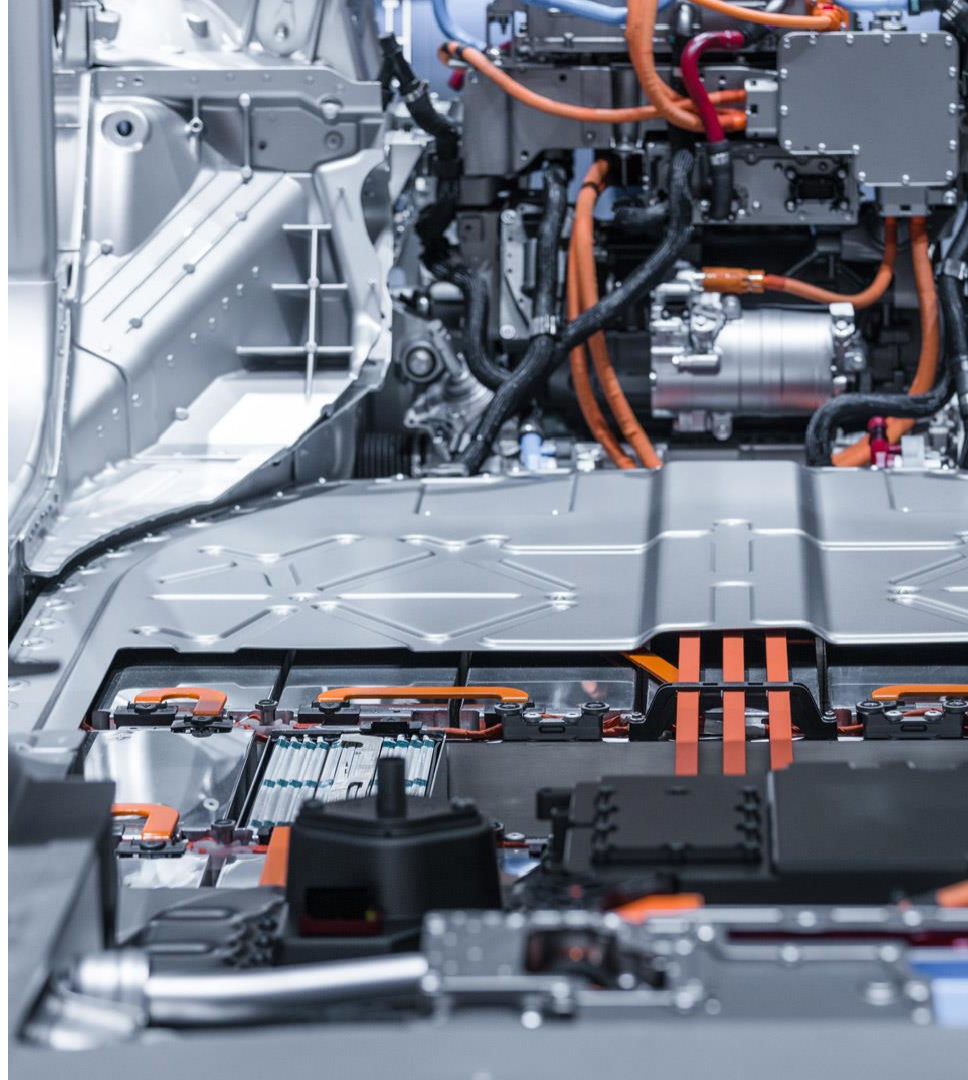
# Abundant natural resources needed for battery production

## Geological diversity

- Availability of **metals needed** to manufacture batteries and special alloys for lighter vehicles
- **Lithium, graphite, titanium, phosphate, cobalt, niobium and vanadium reserves**
- **3<sup>rd</sup> world lithium deposit** is in Québec

## Global aluminum producer

- **Nine aluminum smelters** in Québec, with a production capacity of 2.9 million tonnes
- Canada, the **world's third-largest producer** of primary aluminum, 90% of which is produced in Québec
- The major producers are **Rio Tinto** and **Alcoa**
- **Aluminum processors serving the transportation industry:** Bombardier (metro) ▪ Fabrication Powercast (mold cast parts)
  - Fourgons Transit (truck bodies) ▪ Cambli Group (armoured trucks) ▪ Tremcar (tank trailers) ▪ Remtec (special vehicles/tanks) ▪ Raufoss (formed aluminum products)
  - Equipements Labrie Manac (waste collection equipment)



# 03

## A Strategic Market Access







Montréal's Old Port

# A gateway to 60% of the world's GDP

Thanks to **CUSMA, CETA, CPTPP**  
and 12 other free trade agreements in force\*

Direct access to **1.5 billion consumers**  
and a **combined GDP** of **US\$50 trillion**  
(60% of the world's output of goods and services)

**Only Canada has free trade agreements  
with all other G7 countries**

\*Canada-United States-Mexico Agreement (CUSMA), Comprehensive Economic and Trade Agreement (CETA) and Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)  
Source: World Trade Organization, 2020; World Bank, 2019; Census Bureau, 2020..

# A true logistics and intermodal hub



- **Two international airports:** Montréal–Trudeau and Montréal–Mirabel
- **19.4M passengers** in 2018 (+6,9%)
- Direct flights from Montréal–Trudeau airport to **more than 150 destinations**, including 119 international destinations



- The **2<sup>nd</sup> largest port** in Canada and **1<sup>st</sup> container port** in Eastern Canada
- Dubbed the port for Québec and Ontario shippers
- More than 2,000 ships/year, 2,500 trucks/day and 60–80 trains/week
- Access to 40M consumers in **one day by truck** and 70M consumers in **less than two days by train**



A rail network that extends across Canada and the U.S. all the way to Mexico: over **42,557 km** of track in Canada



## Canadian National Railway Company (CN)

Headquarters located in Montréal. Tracks stretching across Canada from the Atlantic to the Pacific coast and following the Mississippi River all the way to the Gulf of Mexico



## Canadian Pacific Railway (CP)

22,500 km of track in 6 Canadian provinces and 13 U.S. states



## CSX

More than 34,000 km of track in 23 U.S. states, the District of Columbia, Ontario and Québec



# 04

## A Deep and Growing Pool of Highly Qualified Talent



# The best student city in the Americas and Canada's university capital

- **Canada's university capital:** 11 university institutions and 60 colleges
- **320,000 post-secondary students**, including more than **200,000 university students** and **35,500 international university students**
- **1<sup>st</sup> in Canada for university research funding** with \$1.34+ billion yearly



**Best student city in the Americas**  
tied with Boston

QS Best Student Cities Rankings  
2022

1	<b>Montréal</b> tied with Boston
2	Toronto
3	New York
4	Vancouver
5	San Francisco







## Canada's most bilingual and trilingual population



**2.5 million residents speak English,** that's 9% more than in Vancouver



**55% of the population is bilingual** (French and English), compared to 8% in Toronto and 7% in Vancouver



**Almost 20% of the population is fluent in three or more languages,** compared to 4% in Toronto and 3% in Vancouver

# The engineering advantage

## Top-ranked mobility engineering programs



- 1<sup>st</sup> in Québec for the number of students and the scope of research activities
- 120 programs, 20 Industrial Chairs (including 13 NSERC), 25 Canada Research Chairs and 1 Canada Excellence Research Chair



Le génie pour l'industrie

- 10,700 students, including 2,800 graduate students
- \$27,2M in R&D research funds
- 60% of research activities carried out in partnership with the industry



- Highly ranked electrical engineering and software engineering departments
- A Canada Research Chair in Efficient Electric Vehicles with Hybridized Energy Storage Systems
- World recognized laboratory on Intelligent Vehicles



- A Canada Research Chair in Energy Sources for the Vehicles of the Future



- A new electric vehicle technology program
- A new mechanical program for buses and electric vehicles in collaboration with the Saint-Jérôme Road Transport Training Center



Close to **24,000 students** in engineering programs

**9,500+** graduates

Close to **14,000 students** enrolled in post-secondary IT programs

Over **64,000+** members Of the Ordre des Ingénieurs du Québec



# University research expertise in electric and smart transportation



**JOAO PEDRO FERNANDEZ**  
**Université de Sherbrooke**



*Canada Research Chair in Efficient Electric Vehicles with Hybridized Energy Storage Systems*  
Efficiency and driving range of electric vehicles by **improving their energy storage capacity**



**RENÉ JR. LANDRY**  
**École de Technologie Supérieure**



*LASSEN* (Laboratory of Space Technologies, Embedded Systems, Navigation and Avionic)  
Applications in electronics and transportation such as **autonomous vehicles** (UAVs), software defined radio, robust systems and high-precision navigational and reliable, **secure wireless communication**



**LOIC BOULON**  
**Université du Québec à Trois Rivières**



*Canada Research Chair in Energy Sources for the Vehicles of the Future*  
Designing **clean, efficient energy sources** for vehicles



**YOU MIN ZHANG**  
**Concordia University**



*Networked Autonomous Vehicles (NAV) Lab*  
**Advanced technologies for autonomous vehicles** (FDD System, System FTC, Sense & Avoid)



**MIGUEL ANJOS**  
**Polytechnique Montréal**



*Canada Research Chair in Discrete Nonlinear Optimization in Engineering*  
Optimization methods that make the best use of **renewable sources of energy** and **smoothly run** the electricity smart grid



**BENOÎT BOULET**  
**McGill University**



*Industrial Automation Lab, Centre for Intelligent Machines*  
Design and control of **electric vehicle drivetrains** and green energy systems

# University research expertise in electric and smart transportation



**MAAROUF SAAD**  
**École de Technologie Supérieure**



*Groupe de recherche en électronique de puissance et commande industrielle (GRÉPCI)*  
Applications in **mobile robotics** (hardware infrastructure, trajectory generation algorithms, electrical circuits)



**CATHERINE MORENCY**  
**Polytechnique Montréal**



*Canada Research Chair on personal mobility*  
*Chaire de recherche (industrielle) MOBILITÉ*  
**Transportation engineering:** Interactions between urban travel behaviour and spatial dynamics, Spatial data analysis methods applied to urban microdata



**KE WU**  
**Polytechnique Montréal**



*Advanced Research Centre In Microwaves And Space Electronics (Poly-grames)*  
Electronic materials and components, **Energy conversion and distribution**, Wireless communication systems



**ANDRÉA LODDI**  
**Polytechnique Montréal**



*Canada Excellence Research Chair in Data Science for Real-time Decision making*  
Models and algorithms for quickly and efficiently processing large amounts of data from multiple sources eg. electricity market, **rail transportation logistics** and health care planning



**JÉRÔME LE NY**  
**Polytechnique Montréal**



*Mobile Robotics And Autonomous Systems Laboratory*  
**Autonomous systems and mobile robotics**, Navigation systems, Design and verification of networked, distributed and embedded control systems

# 05

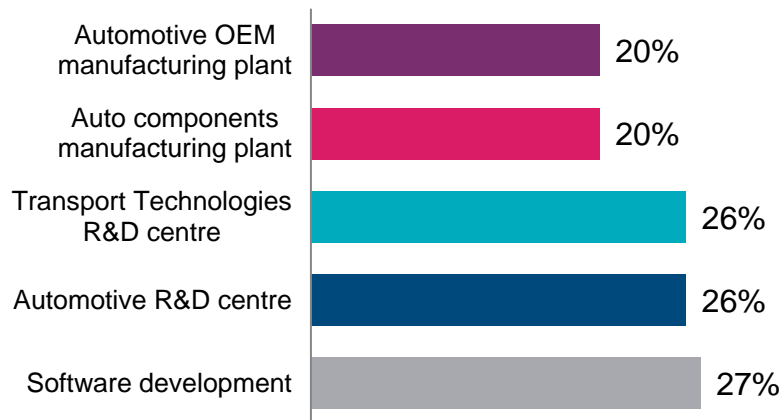
## Competitive Operating Costs and Incentives



# Lowest operating costs for the smart transportation industry

## Greater Montréal's cost advantage In six sectors related to the smart transportation industry (%)

Compared to four other  
North American metropolitan areas,\* 2019



## Business operating costs are lower in Greater Montréal:

- Montréal has a **24% cost advantage** over the following four North American metropolitan areas: **Austin (TX), Columbus (OH), Detroit (MI) and San Francisco (CA)**
- A **cost model developed by fDi Benchmark** to compare operating costs for different locations and types of businesses (labour, property and utility costs)



# Advantageous salaries for employers

## Median base annual salaries\* (US\$) for six typical professions

Five major North American cities, 2021

	Montréal	Columbus (OH)	Austin (TX)	Detroit (MI)	San Francisco (CA)
<b>Electrical Engineering Technician</b>	<b>\$53,681</b>	\$63,168	\$66,766	\$67,929	\$79,648
<b>Automotive Engineer</b>	<b>\$68,804</b>	\$83,570	\$92,381	\$92,215	\$106,826
<b>Electrical Engineer</b>	<b>\$78,767</b>	\$98,147	\$109,427	\$108,031	\$125,610
<b>Software Developer</b>	<b>\$80,857</b>	\$96,284	\$104,411	\$97,363	\$135,428
<b>Manager Manufacturing</b>	<b>\$81,854</b>	\$98,287	\$104,375	\$104,794	\$138,715
<b>R&amp;D Manager (Technical)</b>	<b>\$102,928</b>	\$126,681	\$134,829	\$134,791	\$177,458

\*Salaries based on 5 years of experience; all industries combined.

Exchange rate based on the average for June 2021: 1.00 US\$= 1.2219 \$CA .

Source: Economic Research Institute Inc., July 2021.

# Funding for the smart transportation industry



## Partnership-building transportation electrification projects

- Intended to encourage universities, public research centres and SMEs to work together by providing funding for the development of innovative products and processes



## Strategic Innovation Fund (SIF)

- Repayable or non-repayable contributions up to **50% of eligible costs for projects up to \$500M**
- All industrial and technological sectors to support innovation



## ESSOR (innovative manufacturer)

- Refundable (interest-free & low interest loans) and non-refundable contributions
- Up to 15% of the capitalizable expenses

Source: Ministère de l'Économie et de l'Innovation du Québec, 2019;  
Innovation, Science and Economic Development Canada, 2019;  
Investissement Québec, 2019.



Downtown Montréal © Montréal International

# Programs that foster innovation

## Scientific research and experimental development (SR&ED) tax credit program

- A **15% tax credit from the Government of Canada** and a **14% refundable tax credit from the Government of Québec**

## InnoVÉÉ/PROMPT

- Calls for projects and grants for R&D **collaborative projects** involving at least one academic partner and one industry partner
- Subsidies that could cover up to **40% of eligible expenses and combinable with federal programs**
- Examples of funded projects:
  - Development of a range extender for industrial electric vehicles
  - Development of a navigation system for electric vehicles (off-road)

## INNOV-R

- Dedicated to projects reducing GHG emissions in Québec
- Funds up to 50% of eligible expenses for partnerships that include at least:
  - a company established in Québec, a university, a CCTT or a public research center
- By combining programs with other funding programs (such as NSERC, etc.), up to 90% of eligible expenditures can be covered by public funding

## Other organizations that support research and innovation



# 06

## Montréal International's Personalized, Free and Confidential Services





# Montréal International, a single contact point for a series of personalized, free and confidential services



**Long-term  
strategic support**



**Economic data  
and communications  
services**



**Government  
relations facilitation**



**Incentive programs  
assistance**



**Foreign workers  
immigration  
assistance**



**International  
recruiting solutions**



## Contact us



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