



 Institut du Québec

# LOW CARBON:

to fuel Quebec's economic growth

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The IDQ remains solely responsible for any omissions and errors found in this report.

# INTRODUCTION

In 2017, a group of business people approached the Institut du Québec (IDQ) to propose an interesting idea: With its near-100 per cent renewable electricity and avant-garde carbon pricing, Quebec could leverage this privileged position to encourage its companies to export and integrate global value chains in order to improve the emission profiles elsewhere on the planet and benefit Quebec's economy. The concept of Quebec companies undertaking "net positive" projects or operations emerged from this idea. When a low-emissions product or service replaces one with high carbon emissions in a value chain, the result is net positive.

This document summarizes the key findings from two reports published simultaneously by the IDQ: "*Quebec assets for a low-carbon economy*" (*Le Québec sobre en carbone, l'avantage économique*) and "*Key low-carbon markets for Quebec businesses*" (*Le Québec sobre en carbone, des débouchés pour les entreprises du Québec*). Both of these detailed documents are available in French for free on the IDQ website ([institutduquebec.ca](http://institutduquebec.ca)).

The economic and financial potential for goods and services industries that are sensitive about the carbon footprint of their production is significant. Quebec companies have every reason to invest in capturing their share of the low carbon economy.

## TWO MAJOR TRENDS

Currently, there are two major trends in energy and the environment: carbon pricing and a growing demand for energy.

**The first** involves putting a price on CO<sub>2</sub> emissions to reduce overall greenhouse gas emissions. Although we are still far from reaching the goal of limiting GHG emissions to keep Earth's global temperature at acceptable levels, the Paris Agreement signed in 2015 reflects a broad consensus on the urgent need to act. Carbon pricing is one of the key factors in effectively reducing CO<sub>2</sub> emissions.

A number of countries and regions understand this already: More and more are adopting measures to tax or put a price on CO<sub>2</sub> emissions, particularly countries with which Quebec companies have a privileged trade relationship. For example, almost all European Union member countries have a taxation or carbon credit-trading system, and some U.S. states have put a price on carbon, despite resistance from their federal government. As well, several regions in China have recently announced the introduction of carbon pricing: a major turning point in international production.

But progress is inconsistent: The United States, under the presidency of Donald Trump, withdrew from the Paris Agreement, and in June 2018, Ontario Premier Doug Ford announced that province's withdrawal from the cap-and-trade system for greenhouse gas emissions allowances, which it had shared with California and Quebec.

Currently, the price of carbon ranges from less than \$1 (Mexico) to more than \$150 (Sweden) per tonne. Most tax and credit-trading systems price carbon at \$10 to \$15 per tonne, or intend to do so. Within a few years, the carbon price in Canada will reach \$50 per tonne in provinces subject to federal carbon pricing. This is a major trend with which Quebec is aligned through the cap-and-trade system.

The experience of Quebec companies is an asset, since they have already incorporated the price of CO<sub>2</sub> emissions into their costs. In an international market that increasingly taxes emissions, they have a head start.

**The other, seemingly contradictory, trend** is the increase in global energy demand. Although demand is stable in developed countries, we are seeing exponential growth in demand in countries such as China and India. This additional energy is being used primarily for two things: producing goods and services, and transporting them.

## FIGURE 1

### TWO MAJOR TRENDS



Energy used in the transportation industry, both in Quebec and worldwide, remains a major source of greenhouse gas emissions, since cars, trucks, and boats rely mostly on non-renewable fossil fuels. The production of goods and services (excluding the heating of buildings and combustion-based industrial processes) often requires electricity, but what matters is how that electricity is produced. If it comes from renewable sources that emit little to no greenhouse gases (as with hydro, wind, or solar), the resulting products and services are considered low-carbon.

However, few places can boast very low CO<sub>2</sub> emissions. In most of the world, electricity is produced from energy sources that emit CO<sub>2</sub> (including oil, gas, and coal) or from a non-renewable source (nuclear). The increased demand for electricity will create additional pressures. Without a shift toward low-carbon production methods and a reduction in the emissions of certain industrial processes, the Paris targets will remain difficult to achieve.

These two trends are contradictory. On the one hand, we are seeing an increase in the demand for electricity (that is not necessarily low-carbon) and, on the other, an increase in the number of places that have imposed carbon pricing. This could lead to new business opportunities, particularly for Quebec.

# AN EXPANDING MARKET

These two trends are creating a growing market for low-carbon products and services. Companies may choose to lower their emissions in response to consumer pressure, to proactively meet environmental requirements, or to reduce the cost of their now-taxed CO2 emissions. At the same time, governments want to make the transition to low-carbon economies in order to achieve international commitments. Accordingly, they have a heightened interest in investing in low-carbon infrastructure and projects. The market that arises from these two drivers is an important one.

According to the *Global Commission on the Economy and Climate*<sup>1</sup>, global infrastructure investment between now and 2030 is expected to amount to US\$90 trillion. A considerable portion of that investment will be low-carbon. To achieve the energy goals that would stabilize CO2 emissions, the expected economic gains through to 2030 are worth around US\$26 trillion. The transition to a low-carbon Canadian economy therefore represents US\$520 billion, proportional to global GDP. Clearly, the market potential is huge, and Quebec companies are in a good position to take advantage of it.

## FIGURE 2

GLOBAL ECONOMIC GAIN: US\$26 TRILLION  
CANADIAN ECONOMIC GAIN: US\$520 BILLION



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1 Global Commission on the Economy and Climate: “Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times”, (Washington, D.C.: New Climate Economy, September 2018)

# NET POSITIVE PROJECTS

We know Quebec's comparative advantage. Thanks to the abundance, reliability, and affordability of its electricity, Quebec's energy balance is based on electricity consumption. This is attributable in particular to the prevalence of electric heating and an industrial structure that has favoured the development of energy-intensive industries. Since this electricity comes almost entirely from renewable sources (hydroelectric and wind), Quebec stands out from its neighbours and major partners with its much lower levels of CO<sub>2</sub> emissions.

This advantage also allows it to export its electricity to regions where it displaces CO<sub>2</sub>-generating energy production, especially from gas and coal. Quebec is thus reducing GHG emissions outside its own borders. It is this process that led to the concept of "net positive."

This concept was developed in 2013 by Forum for the Future, the World Wildlife Fund (WWF), and The Climate Group. A company is net positive when its low-emissions product or service replaces one with high carbon emissions in a value chain. For example, Hydro-Québec exports hydroelectricity to Massachusetts homes formerly air-conditioned using electricity produced with natural gas. Those exports are therefore net positive.

We can push this concept further. Within a global context focused on greenhouse gas reduction, it becomes advantageous to replace heavy carbon output with low carbon output. A company offering low-carbon projects, services, or products is net positive when those products or services replace carbon-heavy ones and reduce the amount of CO<sub>2</sub> emitted worldwide, even if that reduction isn't local.

A product or service produced with low-carbon electricity therefore has greater value than one generated by non-renewable, greenhouse gas-producing electricity. By exporting more products and services, integrating global value chains, and welcoming foreign investment to bring in new local production, businesses located in an area with low carbon output become net positive, reducing CO<sub>2</sub> emissions in the atmosphere through substitution.

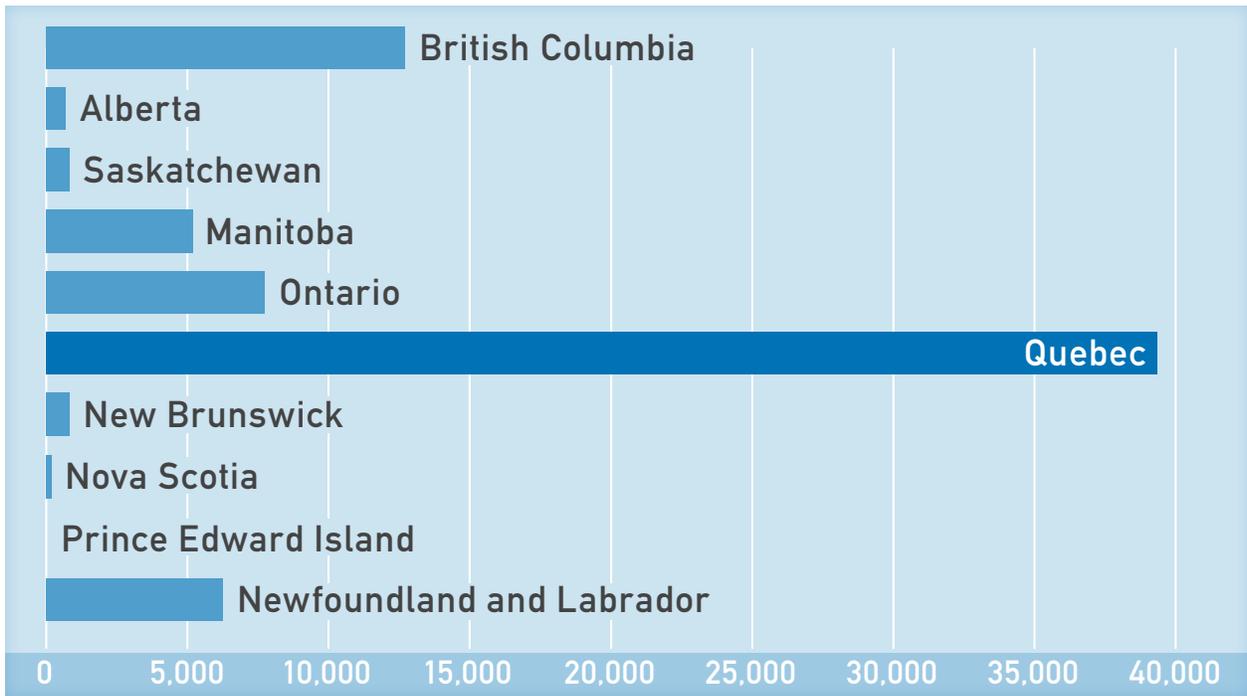
## QUEBEC: UNDENIABLE BENEFITS

As mentioned above, Quebec's main advantage is its electricity production, which is **reliable, low-carbon, and almost 100 per cent renewable**. This is not the case for its main trading partners.

The following two graphs show the advantage Quebec has in this area compared to the rest of Canada and the northeastern United States. Its hydroelectric production capacity far exceeds that of other Canadian provinces, while electrical production in the other regions emits a significant amount of greenhouse gases.

## GRAPH 1

### HYDROELECTRIC CAPACITY BY PROVINCE

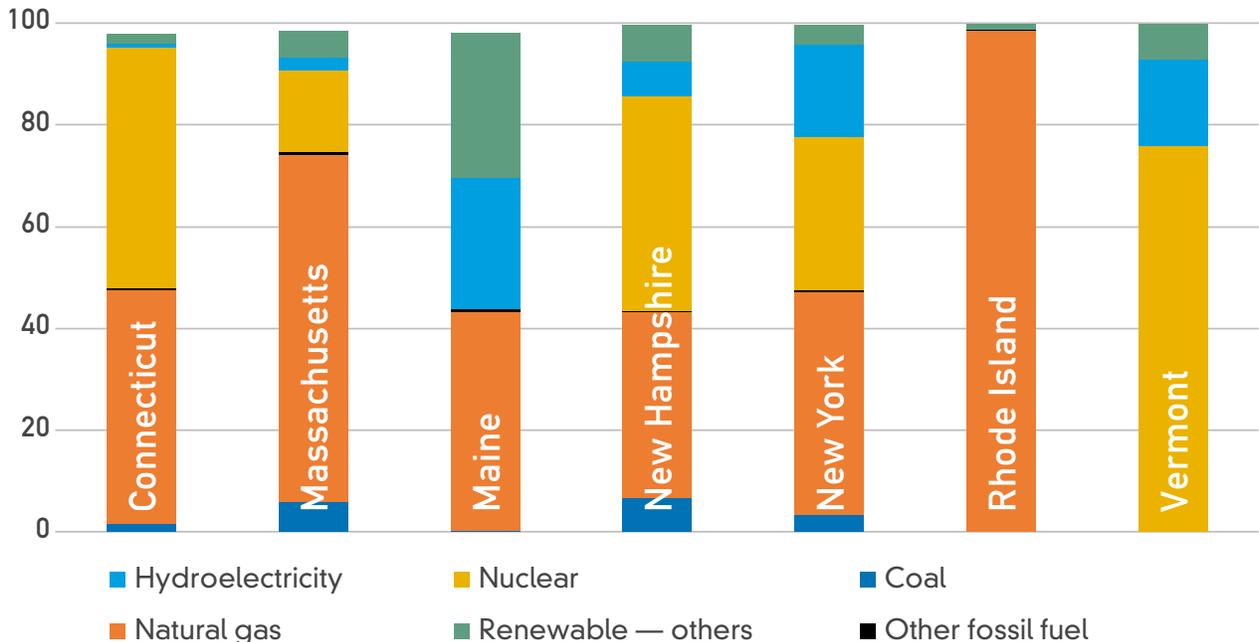


Source: Canada's Renewable Power Landscape, 2016.

## GRAPH 2

### ELECTRICITY PRODUCTION BY STATE IN THE NORTHEAST U.S. IN 2012

NOTE: the totals do not add up to 100 per cent since there are other means of production.



Source: CIRAIG, 2014.

Quebec also benefits from electricity rates that are generally two times lower and sometimes three times lower than in other North American jurisdictions. In addition, the province offers preferential rates to certain industries. This encourages the use of electricity, provides a comparative advantage in exports, and may attract companies to establish activities in Quebec when energy represents a significant cost component, all the more so since the province has a clean-energy surplus for most of the year. With a potential decline in demand thanks to increased energy efficiency, this surplus could increase if efficiency targets are met.

Another advantage is the recent experience of Quebec companies with carbon pricing. Where necessary, companies have already integrated the cost of the greenhouse gas emissions cap-and-trade system. In the context of a rise in demand for low-carbon products and services, large Quebec companies can already demonstrate that they are offsetting their CO<sub>2</sub> emissions.

Quebec's workforce is also better-trained, compared with many countries and regions in the world, to face new demand for greener production. In Quebec, the presence of industrial clusters for green technology and green transportation is the beginning of an interesting structure to support net positive projects. As mentioned above, Quebec also enjoys successful trade integration with the United States and Europe, where several regions impose carbon pricing.

## QUEBEC: CHALLENGES

While per capita CO<sub>2</sub> emissions in Quebec are relatively low, significant challenges remain. Although Quebec supports the objectives of the Paris Agreement and is committed to transitioning to a low-carbon economy through its energy policy, there is still some uncertainty about the province's ability to achieve its ambitious objectives, even with the Transition énergétique Québec action plan and the financial support provided through the Clean Technology Action Plan for Growth. Some industries are still using high-carbon processes; the energy efficiency of buildings needs to be optimized; and transport, despite the emergence of smart and electric modes of ground transportation, still depends heavily on fossil fuels.

A successful energy transition would further reduce Quebec's carbon footprint and strengthen its leading position. In addition, improved energy efficiency would generate additional renewable-electricity surpluses that could be strategically used to reduce overall emissions in a net positive context. Currently, these surpluses are distributed according to demand. An optimal investment strategy for these surpluses that promotes the greatest economic and environmental benefits could be considered if the regulatory framework is adjusted to adopt a net positive perspective.

# LOW CARBON FOOTPRINT: ECONOMIC POTENTIAL

Although all goods- and services-producing industries can sell the idea of net positive projects now, some industries are better positioned than others.

The primary aluminum industry could easily benefit from a net positive strategy because the essential input to its production is electricity. The world aluminum market is dominated by China, which relies mainly on electricity produced from coal. Middle Eastern countries are growing their share of the market using their natural-gas reserves. Quebec, the world's third-largest producer, stands out by producing aluminum that has a much lower carbon footprint.

Already, the industry is beginning to explore ways to share the benefits of this "green ingot." It could be attractive to companies subject to carbon pricing, saving them significant amounts of money. This could lead to substitution of Chinese aluminum with Quebec aluminum, or affect prices (because Quebec's aluminum could potentially be sold at a higher price). In addition, companies that are committed to reducing their carbon footprint, either through personal conviction or as a marketing strategy, will benefit from integrating Quebec aluminum into their production processes. Industries that use aluminum, such as automotive, high technology, or consumer commodities, come to mind.

The manufacturing sector in general increasingly relies on process automation to produce goods. This automation will require a greater share of electrical input. In the context of increasing demand for low-carbon products, Quebec and its industries are well-positioned to provide fertile ground for green automation in the manufacturing sector.

## Examples of market opportunities abound:

- Cutting-edge, low-carbon, high-tech materials: a US\$682 billion market by 2023;
- Electric cars: a US\$130 billion market by 2021;
- The construction and building industry: a US\$62.2 billion market by 2018.

Finally, data centres and industries that use server farms are large consumers of electricity. As part of efforts to remain green and in the context of the carbon trade with California (where many of the giants in this industry are located), they represent a golden opportunity. In addition to its very low GHG emissions, the low price and reliability of Quebec's electricity make it a preferred jurisdiction for doing business.

At the same time, Quebec industries now have access to an increasingly dynamic sustainable-finance sector. Several major investors have announced their intention to prioritize low-carbon projects in order to reduce climate-change risk. Quebec companies also have public funds at their disposal to facilitate the transition to low-carbon energy sources. Finally, the Clean Technology Action Plan for Growth calls for investments of several million dollars in the marketing and export of Quebec's green products.

Figure 3 provides an overview of the strengths, weaknesses, opportunities, and threats faced by Quebec companies from a net positive perspective.

**FIGURE 3**

STRENGTHS	WEAKNESSES
Close to 100 per cent of electricity produced is renewable and low-carbon	Labour shortage in some sectors
Integrated economy	Energy efficiency still low
Presence of industrial clusters in the sector	Reduction strategy focused only on local impact
Active carbon market	Lack of recognition for GHG reductions incurred by Quebec companies abroad
Skilled workforce	
OPPORTUNITIES	THREATS
A growing global market	Other jurisdictions are rapidly beginning their energy transitions
Major investments in green infrastructure	Some consider economic development and environment to be opposed
Appetite for low-carbon products	Some jurisdictions have a negative perception of hydroelectric power
Rapid development of sustainable and green financing	

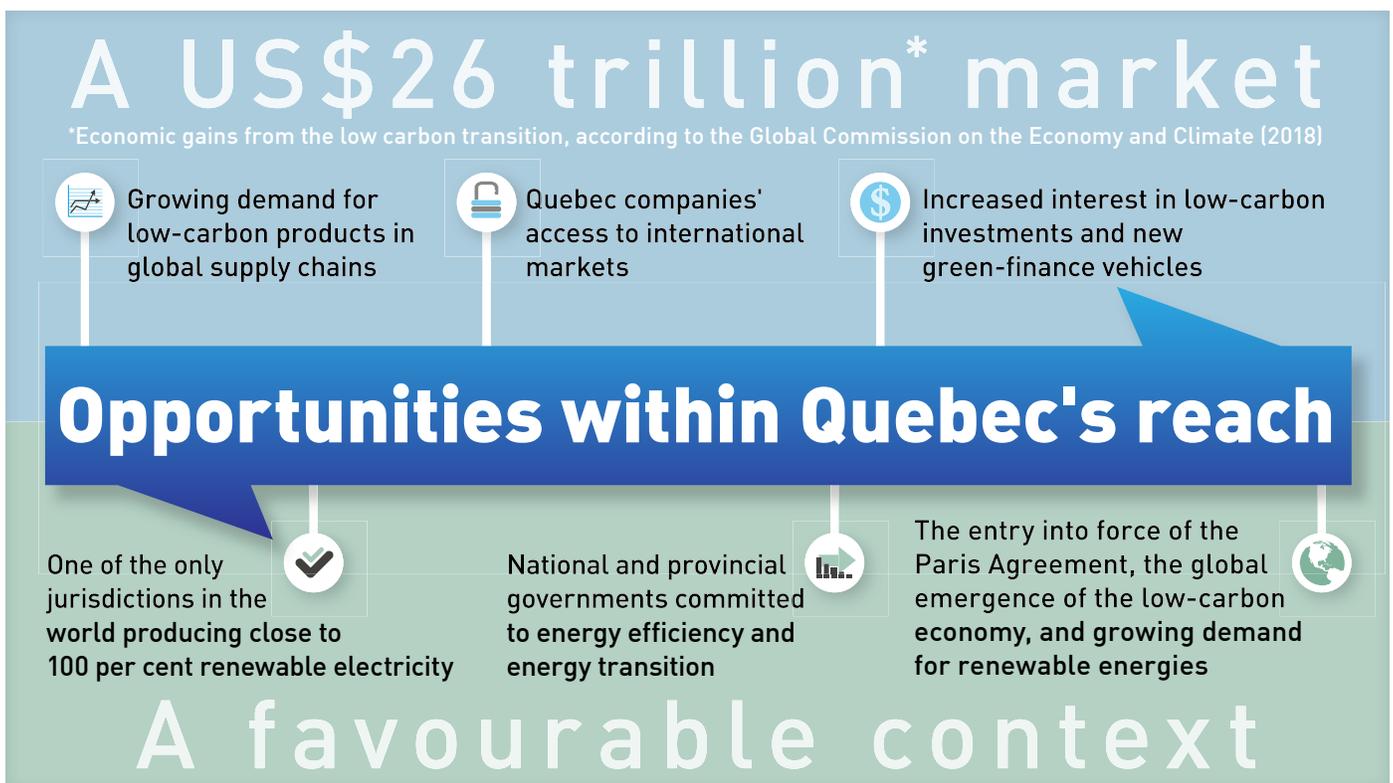
Source: Institut du Québec

# QUEBEC MUST SEIZE THE LOW CARBON OPPORTUNITY. HERE'S HOW.

Several countries and regions around the world have already begun the process of reducing CO2 emissions from their electricity production. For example, California is accelerating its adoption of solar and wind energy. There is an opportunity for Quebec to position itself as a privileged jurisdiction for the low-carbon economy, but its comparative advantage will decrease over time.

Concurrently, there is growth in demand for low-carbon products and an increase in funding available for green companies. The following figure illustrates Quebec's window of opportunity in the coming years.

**FIGURE 4**



Source: Institut du Québec

# To make the most of the available opportunities, IDQ offers the following recommendations:

## For companies:

- Undertake an inventory of the comparative advantage of your products and services from a low-carbon perspective.
- Understand the impact of your activities on greenhouse gas reductions in Quebec and their net positive impact beyond the province's borders.
- Prioritize the electrification of operations and a shift to low carbon as a strategic focus for the growth, sustainability, and competitiveness of your company, recognizing that some processes will be difficult to change and will require major financial and capital investments.
- Actively target international companies in your market that would benefit from reducing the carbon footprint of their production.

## For the government:

- Adopt an economic strategy to position Quebec as a hub of low-carbon expertise in North America and promote Quebec companies and their products and services to value chains and investors in the global low-carbon economy.
- Adopt or accelerate a strategy to attract low-carbon foreign investment.
- Integrate this strategy into existing energy-transition and green-economy policies and measures to create a cohesive low-carbon economic strategy.
  - ▶ Modify the regulatory framework to allow the Régie de l'Énergie to take GHG reduction into account in their decision-making processes.
  - ▶ Target optimal use of energy surpluses that takes GHG reductions into account.
  - ▶ Promote and accelerate the creation of technological showcases for low-carbon products and services that demonstrate net positive export potential.
  - ▶ Prioritize investment and procurement decisions accordingly.
  - ▶ Recognize and promote the net positive effect of greenhouse gas reductions obtained abroad through exports of Quebec's energy, products, and services.
  - ▶ Support the integration of low-carbon Quebec-made products into global value chains and the attraction of new investments related to the low-carbon economy.
  - ▶ Support additional research to quantify Quebec's comparative advantage.
  - ▶ Establish conditions to strengthen the low-carbon ecosystem, sustainable venture capital, and green finance in Quebec.
  - ▶ Provide support to companies for the electrification of certain industrial processes commensurate with their efforts.

Adopting a net positive strategy, beyond its direct impact on both economic development and the reduction of greenhouse gas emissions, could also contribute positively to the debate surrounding Quebec's energy transition. The main resistance of governments to reducing their carbon footprint is the fear of negative economic impact. A net positive strategy provides a convincing example of how efforts to reduce CO<sub>2</sub> emissions can be reconciled with economic development.