

Quebec

RISKS AND OPPORTUNITIES IN THE GLOBAL LOW-CARBON TRANSITION

Quebec has been among the most successful provinces in decoupling its economic and job growth from its greenhouse gas emissions. With some of the cheapest, cleanest electricity in Canada and decades of increasingly ambitious climate policy—featuring a range of innovative public and private financing instruments—Quebec has produced some of the most successful transition-opportunity companies in the country.

The province faces notable challenges in reaching the next level of transition readiness. Quebec companies need to scale up quickly to succeed in increasingly competitive global markets, such as electric vehicles and batteries and storage. At the same time, building major new projects—whether mining transition minerals and metals or large-scale transmission lines—face both domestic and international hurdles, with important implications for workers, communities, and Indigenous Peoples.

Risks-and-opportunities profile

About this series of provincial profiles

The Canadian Climate Institute's 2021 *Sink or Swim* report assessed Canada's readiness for the wave of economic change being driven by the global net zero transition. The report stress-tested publicly traded companies under different global low-carbon scenarios to better understand the risks to Canada's economy and, more specifically, the risks to workers, communities, Indigenous Peoples, and the financial sector. The report also used new data from PitchBook Data Inc. to gain insights on the opportunities created by the transition, identifying significant potential sources of new growth for the country across several sectors.

Building on that research, the Climate Institute has now done a deeper analysis of the transition risks and opportunities facing specific provinces and regions. In addition to assessing risks, these province-by-province profiles provide in-depth analysis and insight on where provinces and regions can generate new sources of growth, the barriers that may be holding them back, and how to address those barriers. An overview report, *Net Zero Opportunities: A province-by-province comparison*, provides detailed analysis of how provinces and regions across Canada can navigate the net zero transition.

Workforce and communities

- Roughly 4% of workers in Quebec are employed in transition-vulnerable sectors.¹
- Several communities have high concentrations of workers in primary metal manufacturing and mining and quarrying, such as Val d'Or (14%), Rouyn-Noranda (11%), and Sorel-Tracy (9%).²
- Between 2015 and 2020, the Gaspésie-Îles-de-la-Madeleine region had the sixth-highest jobless rate in Canada, at 14% (Statistics Canada 2022f).
- Among workers in transition-vulnerable sectors, 10% are visible minorities; 2% are Indigenous.³

Economic and fiscal risks

- Relative to its economy, Quebec has one of the highest public debt levels in the country (45% debt-to-GDP in 2020–21) (RBC Economics Research 2021). High debt levels could increase fiscal vulnerability to market change and constrain public investment capacity and access to affordable credit for building transition readiness.
- Roughly half of Quebec's goods exports are from transition-vulnerable sectors, including transportation equipment manufacturing (19%) and primary metal manufacturing (16%) (Statistics Canada 2022h).

Growth in transition-opportunity companies headquartered in the province

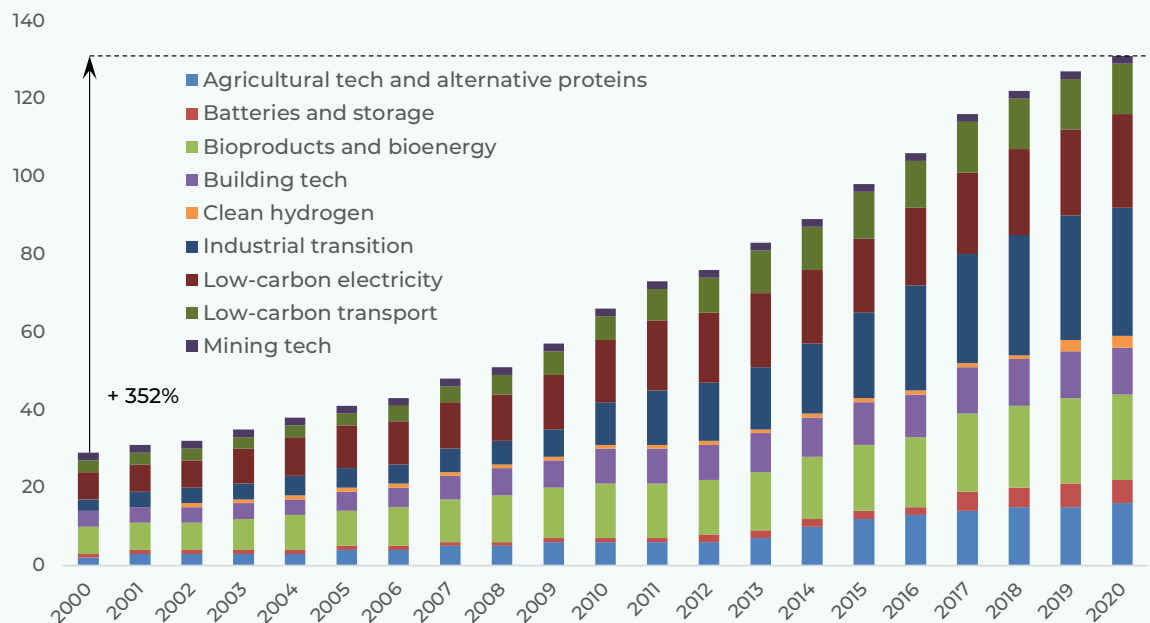
- Quebec had 133 transition-opportunity companies headquartered in the province and actively attracting investments in industrial transition (25%), low-carbon electricity (19%), and bioproducts and bioenergy (17%) (see Figure below) (PitchBook Data Inc. 2022).

- Areas of weaker representation include CCUS (0%), mining technology (2%), and clean hydrogen (2%).
- The Greater Montreal Area is home to the largest concentration of companies (56%), with the remaining companies spread across 31 other communities in the province (PitchBook Data Inc. 2022).

Competitive strengths

- Some of the most abundant and cheapest low-carbon electricity in the country, offering emissions- and electricity-intensive industries a pathway to decarbonize.⁴
- Consistent climate and economic policies, including a long-standing cap-and-trade program and large investments in climate change initiatives, create an attractive investment environment.
- An active venture capital ecosystem, along with innovative public investment, and private finance institutions with investment strategies for green financing (Samson et al. 2021, Finance Montréal 2022).⁵
- A mature mining sector supported by a provincial plan for the development of its critical and strategic minerals (e.g. lithium, graphite, cobalt, the platinum group elements, the rare earth elements,⁶ niobium, titanium, and vanadium) (Gouvernement du Québec 2020).
- Leading battery storage technologies and low-carbon transportation, supported by several prominent research centres working on innovation and clean technologies.⁷

Growth in transition-opportunity companies in Quebec



Source: PitchBook Data Inc. (2022). Notes: This figure shows the number of companies headquartered in Quebec operating in each of our 10 transition-opportunity markets in each year between 2000 and 2020. This analysis only counts “pureplay” companies whose primary business line involves a product, technology, or service that falls into one (or more) of our 10 transition-opportunity markets (see our [overview report](#) for a full description). Thus, large multinationals and conglomerates with only a portion of sales in these markets are excluded. The analysis also only counts companies that are currently active (i.e. excludes bankrupt companies) and still operate as a subsidiary in cases when the company has been acquired.

Trends in Quebec's transition readiness

Demand-creation markets in Quebec are attracting large investments across a wide range of companies and at various points of the innovation chain (early-to late-stage growth).⁸

- Quebec has some of Canada's leading low-carbon transportation companies that are attracting significant investment (see Figure on p. 4):
 - » **Lion Electric**, an electric bus and truck manufacturer, raised US\$490M in its 2021 initial public offering.
 - » **Taiga Motors**, an electric off-road vehicle manufacturer, raised US\$339M in its 2021 initial public offering.
 - » **AddÉnergie Technologies**, an operator of electric vehicle charging networks, raised US\$32M in 2021 in late-stage growth capital.
- Low-carbon electricity continues to generate the largest investments in absolute terms:
 - » **Hydro-Québec** invested US\$1.3B in **Innergex Renewable Energy** in 2020 through a private investment in a public equity (PIPE) deal.
 - » **Hydro-Québec** chose **Essen**, a subsidiary of Thyssenkrupp (Germany), to build one of the world's first and biggest green hydrogen production facilities (88MW) (amount undisclosed) (Green Car Congress 2020).
- Other notable investments include:
 - » **Lithion Recycling**, a lithium-ion battery recycler, raised US\$125M in Series A funding in 2021.
 - » **BrainBox AI**, provider of HVAC optimization, raised US\$24M in 2021 in Series A funding.
 - » A 2021 agreement between **Hydro-Québec**, several **Innu communities**, and **Boralex Inc.** solidified a C\$600M wind farm development.⁹

Companies in carbon-cost sectors (e.g. smelting, mining, steel manufacturing) are capturing the benefits of electrification and investing in low-carbon process innovations.

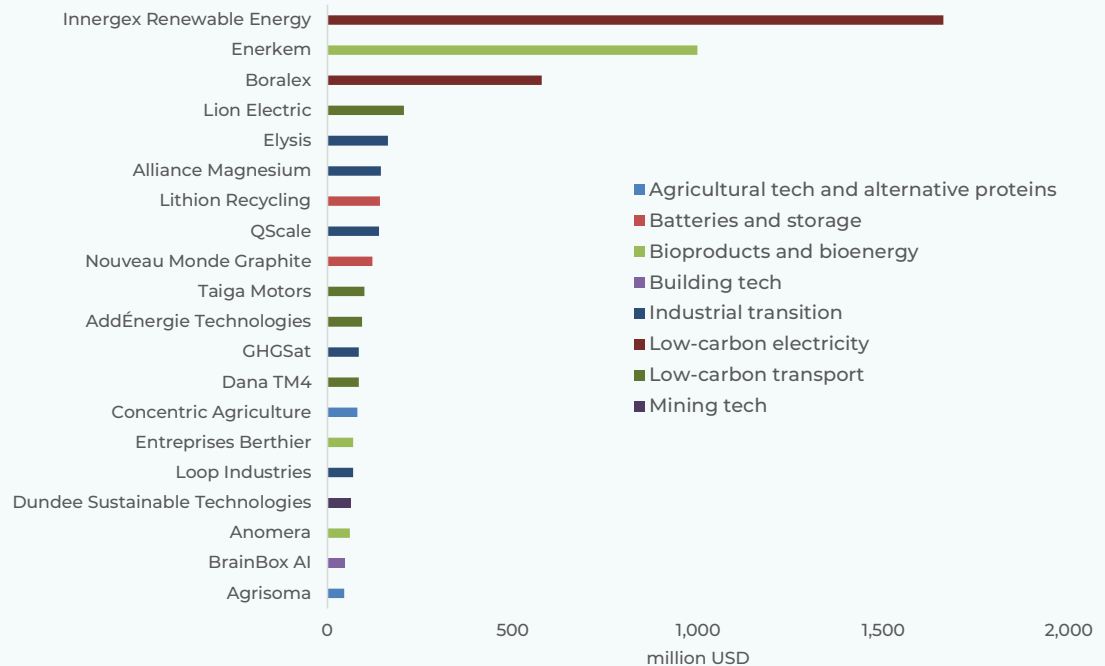
- **Rio Tinto** (United Kingdom) and **Alcoa** (United States) operations in Quebec have among the lowest emissions intensities for aluminum production in the world through ongoing low-carbon investments and access to low-emission electricity.
- In 2021, **ArcelorMittal** (Luxembourg), the world's second-largest steel producer, announced a US\$164M investment to reduce its Port-Cartier pellet plant's CO₂ emissions by 20% (ArcelorMittal 2021).
- In 2018, as part of a US\$108M project, **Agnico Eagle** (Ontario), a large gold mining operator, installed an energy-efficient, electric-powered ore transporting technology at its Goldex Mine in Val-d'Or (Railveyor 2018).
- In 2021, **Air Liquide** (France), a global leader in industrial gases, technologies, and services, opened the world's largest green hydrogen membrane-based production unit in Bécancour (Air Liquide 2021).

Several companies in demand-decline sectors are diversifying to new products and income streams.

- **Shell** and **Suncor** are major investors in **Enerkem's** \$875M biofuels facility in Varennes, which hopes to turn waste and wood waste into low-carbon fuels (Enerkem 2022, Shell Canada 2021).
- **General Motors Canada** is partnering with **POSCO Chemicals** to build a \$500M cathode active material facility at the Bécancour Industrial Park to improve the auto manufacturer's electric vehicle battery supply chain (Banks and Jarratt 2022).

- Quebec's natural gas utility, **Énergir**, has partnered with **Hydro-Québec** to reduce natural gas sales through increasing heat pump adoption.
- A 2011 joint venture between **Enbridge** (Alberta) and **EDF Energy** (United Kingdom) invested US\$687M to build a 300MW wind farm in Lac-Alfred.
- **Nova Bus** (Saint-Eustache), historically a manufacturer of fossil-fuel powered transit buses, is diversifying its product lines into low- and zero-emissions bus models (The Canadian Press 2021b).

Top 20 Quebec transition-opportunity companies by total investment raised



Source: PitchBook Data Inc. (2022). Notes: This figure shows the top transition-opportunity companies headquartered in Quebec by total capital raised, which is the net of all capital injected into a company to date. It excludes certain deal types, such as buyouts, corporate asset purchases, debt repayments, and merger/acquisitions. Note that not all identified transition-opportunity companies in our analysis have capital raised data in PitchBook, as not all company deals are disclosed and available.

Potential barriers to scaling up growth opportunities

A lack of skilled workers could limit Quebec's ability to capture transition opportunities.

- With historically low unemployment levels, Quebec has among the highest job vacancy rates in the country.¹⁰ Quebec's Ministry of Employment projects workforce supply shortages in the medium term (2023) for several transition-related professions (Propulsion Québec 2020).
- Small- and medium-sized enterprises (SMEs) that represent the bulk of the clean technology sector are struggling to find qualified employees (Vincent 2022).
 - » Clean technology SMEs report challenges recruiting technical and specialized professional trades, as well as senior executives with both scientific knowledge and management skills (Chamber of Commerce of Metropolitan Montreal 2020, Propulsion Québec 2020).
- Indigenous Peoples and visible minorities experience higher levels of unemployment in the province, highlighting the structural and systemic barriers to creating inclusive employment opportunities (Statistics Canada 2020a, Samson et al. 2021).

Mobilizing private capital to maintain Quebec's position in increasingly competitive and growing international markets (e.g. electric vehicles, batteries and storage) poses notable challenges.

- Despite Quebec's significant progress in low-carbon transportation and batteries and storage, other large economies such as the United States, the European Union, and China are aggressively competing for market share.¹¹
- Protectionist measures by trading partners could hinder company-level growth in Canada (Jin et al. 2021).
- On average, Quebec companies in the electric and smart transportation sector raised less capital at each investment stage compared to the United States and Canadian companies (excluding QC).¹²
- The remote location of potential greenfield sites for mines, with limited supporting infrastructure, could add costs and complexity to developing transition mineral deposits (Bertrand-Daoust 2021).

Building new large-scale projects (e.g. electricity generation and transmission, mining transition-critical minerals) requires overcoming past experiences that have eroded trust, particularly for Indigenous Peoples and nations.

- Developing Quebec's transition minerals will need to respect the duty to consult and the United Nations Declaration on the Rights of Indigenous Peoples Act, along with ensuring economic and social benefits for Indigenous communities and mitigating the potential for local environmental impacts.¹³
- The provincial utility's historical legacy, which includes ongoing harm to Indigenous lands through large-scale developments, continues to slow the development of large projects, including proposed hydro projects and transmission lines (North American Megadam Resistance Alliance 2020).
- The Memorandum of Understanding on the Cree-Quebec Sustainable Infrastructure Development Program in Eeyou Istchee James Bay, signed in 2020, marks an important milestone, as it lays out a 30-year plan for economic and social development in the region (La Grande Alliance 2021).
- The agreement between Hydro-Quebec and the Innu community of Natashquan for the La Romaine hydroelectric project may provide a framework for inclusive economic development (Thibodeau 2015).



Conclusion

Looking across the full set of provincial profiles, we see strong signs of progress in transition readiness, although provinces are at different stages in terms of developing and capturing these opportunities.

Government policy can—and must—play a major role in accelerating this momentum. In addition to the broad recommendations laid out in the *Sink or Swim* report, we recommend five specific policy actions in *Net Zero Opportunities: A province-by-province comparison* that can help each province position its economy for success in the net zero transition.

ENDNOTES

- ¹Workers in transition-vulnerable sectors are heavily concentrated in emissions-intensive manufacturing and transport equipment manufacturing (Samson et al. 2021).
- ²Other communities with high workforce concentrations in primary metal manufacturing and mining and quarrying include: Sept-Îles (10%), Baie-Comeau (6%), Saguenay (4%), and Alma (4%). In addition, Cowansville has high worker concentration in plastics and rubber manufacturing (4%).
- ³The share of visible minorities and Indigenous Peoples employed in Quebec's transition-vulnerable sectors in 2016 was below the total share of visible minorities and Indigenous Peoples in the total population (Statistics Canada 2020a, Samson et al. 2021).
- ⁴Nearly all of Quebec's electricity is generated by hydroelectric dams (95.2%), providing some of the lowest electricity rates in North America. Quebec (alongside British Columbia) leads other provinces in electric vehicle adoption (Statistics Canada 2020b, Canada Energy Regulator 2022a). Quebec also has the most extensive transmission system in North America, connecting it with neighbouring regions.
- ⁵A high proportion of Canadian clean tech venture capital is invested in Quebec. Quebec accounted for 27% of the total transaction volume and 37% of dollars invested between 2015 and 2019, whereas its economy represented 20% of national GDP in 2020 (Chamber of Commerce of Metropolitan Montreal 2020, Statistics Canada 2022c).
- ⁶Much of Quebec's expertise in batteries and storage has been led by Hydro-Quebec. It was the first company in the world to use lithium iron phosphate for grid-scale energy storage, supported by the Centre of Excellence in Transportation Electrification and Energy Storage (Chamber of Commerce of Metropolitan Montreal 2020, Ross 2019).
- ⁷Prominent research institutions include: Hydro-Quebec's Institut de recherche en électricité du Québec (IREQ), CRÉDEAU, CÉPROCQ, the Natural Gas Technologies Centre, the Natural Resources Canada's CanmetENERGY laboratory, Strategic Metals Excellence Centre, COREM, Metal Transformation Research and Innovation Consortium (Chamber of Commerce of Metropolitan Montreal 2020).
- ⁸All statistics within the demand-creation section are from PitchBook Data Inc. (2022) unless otherwise stated.
- ⁹The Innu communities and Boralex Inc. partnered to create a new company, called Parc éolien Apuiat S.E.C. With a cost of about 6¢/kWh, Apuiat will become the most cost-competitive wind farm under contract in Quebec (Apuiat 2016).
- ¹⁰In 2021 the job vacancy rate in Quebec hit a peak of 6.1%. Prior to the COVID-19 pandemic, job vacancies in Quebec had more than doubled in four years, from 52,205 in Q4 2015 to 126,730 in Q4 2019. As of Q3 2021, there were 18,810 job vacancies in the manufacturing and utilities sector alone (Statistics Canada 2022d).
- ¹¹In 2020, China already produced around 77% of lithium-ion batteries, followed by the United States with 9% of global production (Yu and Sumangil 2021). China has spent nearly US\$60B from 2009 to 2017 on its electric vehicle manufacturing industry, and in 2015 alone it invested \$8.4B in electric vehicle incentives and subsidies for consumers. The United States government has also indicated it will make a US\$174B investment in domestic electric vehicle manufacturing and battery capability, and has identified the establishment of an independent supply chain from China as a security imperative (United Auto Workers 2020, Wayland 2021).
- ¹²A comparison of electric and smart transportation companies that received seed funding in the United States and Quebec revealed that 75% of United States companies reached the Series A round, as compared to only 33% of Quebec companies. The study also found that Quebec electric and smart transportation companies receive far smaller investments than their counterparts in the rest of Canada and the United States across all investment stages, from seed funding to Series C (Propulsion Québec 2021).
- ¹³Quebec's Critical and Strategic Minerals Strategy acknowledges that the legacy of the past contributes to the apprehension regarding future mining developments that are key to battery supply chain development (Government of Quebec 2020).

Disclaimer

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