



# Quebec's Pursuit of Decarbonization

A Difficult and Costly Challenge with Questionable Benefits

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# QUEBEC'S PURSUIT OF DECARBONIZATION

## EXECUTIVE SUMMARY

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Quebec's climate policy framework is set out in the [2030 Plan for a Green Economy](#). It targets a 37.5% reduction in greenhouse gas (GHG) emissions below 1990 levels by 2030 and carbon "neutrality" by 2050. Neutrality essentially means the almost complete elimination of GHG emissions by 2050, 24 years from now. How likely is it to succeed?

There are three main sources of energy supply. Electricity provides 707 petajoules (PJ), or 41%, of the province's needs. Over 99% of the electricity generated is from renewable energy sources, almost entirely from low-cost hydro. As impressive as this is, it is less than half the energy that Quebecers use. The other two major energy sources are refined petroleum products, which supply 599 PJ (35% of the total), and natural gas (235 PJ, or 14%). Hydrocarbons thus supply about half of Quebec's energy needs, more than electricity.

Quebec governments have implemented climate policies since the early 1990's, and especially since 2010. In 2010, provincial emissions were 79 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>eq). In 2024, Quebec's total GHG emissions were 78 MtCO<sub>2</sub>eq, barely changed from 2010.

According to Quebec government estimates, reducing emissions to meet the 2030 target will cost the province approximately \$38 billion, and potentially reduce GDP by \$20 billion by 2030. The government has published no estimates of the cost of reaching complete decarbonization by 2050.

Complete decarbonization means eliminating virtually all the consumption of hydrocarbons in the industrial, commercial, transportation, residential and agricultural sectors. Each of those sectors poses a unique set of challenges.

Road travel (cars and trucks) produces about 31% of Quebec's emissions, while air, rail, marine and off-road transport produce about 12%. Quebec has already invested billions of dollars in trying to replace gasoline and diesel fuel use in its transportation system and to get people out of cars and into electrified public transit. By the end of 2025, Quebec had approximately 441,000 registered zero-emission and plug-in hybrid light duty vehicles. This accounts for roughly 6 to 7 percent of the total vehicle fleet in the province. Less than 1% of Quebec's heavy-duty and medium-duty commercial trucks are electrified.

Industry and manufacturing account for about 28% of total GHG emissions in Quebec. A list of the largest industrial emitters reads like a profile of the most important economic firms in Quebec: Alcoa Canada, Aluminerie Alouette, Shawinigan Aluminerie and Aluminerie Becancour in aluminum; St. Mary's Cement and Ciment Quebec Inc. in cement; Rio Tinto Alcan; Bombardier; Glencore Canada; Domtar, Valero refinery; and so on. So far, in spite of its ambitious claims about achieving net-zero, Quebec has not embraced the challenge of forcing (or massively subsidizing) its largest industrial firms to comply.

Some 230,000 to 235,000 homes in Quebec rely on natural gas for heating and they will not welcome being required to change.

Agriculture accounts for around 7 to 8 MtCO<sub>2</sub>eq, or 10 percent of Quebec's GHG emissions. There are both economic and biological limits to how much emissions can be reduced. For example, eliminating livestock methane and fertilizer-based nitrous oxide entirely without drastically shrinking herd sizes or crop outputs requires unproven or only emerging technologies.

Hydro-Quebec estimates that it needs more than 100 terawatt-hours of additional electricity – more than half its annual generating capacity – to reach the government's goal of being "carbon neutral" by 2050. It seeks to add 8,000-9,000 MW of generating capacity by 2050, and to add 5,000 km of transmission lines. The investments needed to achieve this amount to \$110 billion by 2035.

Climate change policy must be viewed in an international context. Canada produces only 1.5% of the annual global GHG emissions, and Quebec produces less than 0.2%. Quebec's per capita GHG emissions are around 9.1 tonnes, roughly half the Canadian average.

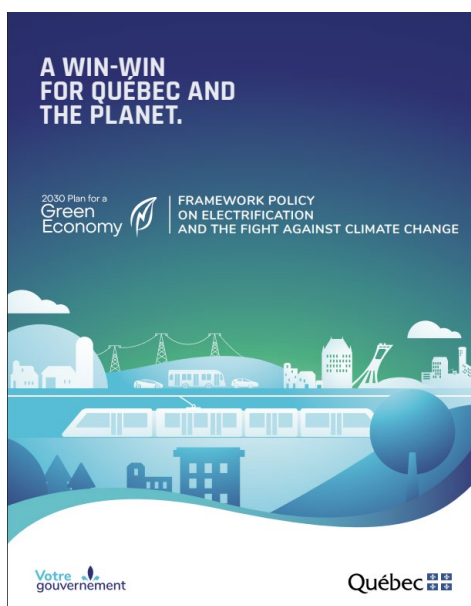
The political case for pursuing net-zero policies rests upon the thesis that the countries of the world are committed to sharply reducing and eventually eliminating greenhouse gas emissions. In 2025 the world emitted 35,806 million tonnes of carbon dioxide equivalent, continuing the increases that have occurred since 1990. Significantly, the non-OECD countries now produce 69% of the world's GHG emissions. Almost all the growth in emissions is occurring in the non-OECD countries and especially in Asia.

The obstacles in the way of Quebec attaining full decarbonization by 2050 are immense and overcoming them will be extremely costly as well as probably unfeasible regardless of the costs incurred.

# QUEBEC'S PURSUIT OF DECARBONIZATION

Quebec's climate policy framework is set out in the [2030 Plan for a Green Economy](https://cdn-contenu.quebec.ca/cdn-contenu/adm/min/environnement/publications-adm/plan-economie-verte/plan-economie-verte-2030-en.pdf). It targets a 37.5% reduction in greenhouse gas (GHG) emissions below 1990 levels by 2030 and carbon "neutrality" by 2050. Neutrality essentially means the almost complete elimination of GHG emissions by 2050, 24 years from now. Achieving that essentially requires the near-total elimination of the use of hydrocarbons – mainly oil, natural gas and propane – in all sectors of the economy. The plan centres on electrification using hydroelectricity, wind, and solar power sources backed by batteries, energy efficiency and "innovation" in industry.

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<https://cdn-contenu.quebec.ca/cdn-contenu/adm/min/environnement/publications-adm/plan-economie-verte/plan-economie-verte-2030-en.pdf>

The ambition evident in the plan is perhaps not surprising given Quebec's long-held position as Canada's largest producer of hydropower at relatively low cost, which has allowed domestic electricity rates to be among the lowest in North America and has enabled Hydro Quebec to be a large exporter of electrical energy to the eastern United States market. In addition, as described in a 2019 *Policy Options* [article](#), Quebec public opinion has long supported aggressive action to reduce GHG emissions and to support renewable energy development and use, including use of carbon taxes and regulations.

*"A combination of key factors set Quebec apart from most other provinces and collectively account for the province's sustained commitment to carbon pricing: the presence of an interparty consensus, the relative absence of voter polarization on this topic and the well-established perception that Quebec will benefit economically from the transition to a low-carbon economy."*

## HOW LIKELY IS QUEBEC TO SUCCEED?

The starting point for answering this question is consideration of the actual pattern of energy production, consumption and GHG emissions in the province. There are three main sources of energy supply. Electricity provides 707 petajoules (PJ), or 41%, of the province's needs. According to the think tank [EMBER](#), this is twice the average share held by electricity in OECD countries. In addition, over 99% of the electricity generated is from renewable energy sources, almost entirely from low-cost hydro. As impressive as this is, it is less than half the

energy that Quebecers use. The other two major energy sources are refined petroleum products, which supply 599 PJ (35% of the total), and natural gas (235 PJ, or 14%). Hydrocarbons thus supply about half of Quebec's energy needs, more than electricity.

According to Canada's Energy Regulator, Quebec's end-use primary energy demand in 2023 totaled 1,728 PJ. The breakdown of this by economic sector offers some insights into how large an effort would be required to achieve complete decarbonization and where the effects of such efforts will mostly be felt. Industry consumed the most energy (41%), followed by transportation (24%), residences (22%) and commerce (13%).

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## GREENHOUSE GAS EMISSIONS

Quebec governments have implemented climate policies since the early 1990's, and especially since 2010. During that time, the federal and provincial governments have used a broad range of economic policy instruments to reduce emissions – carbon taxes, regulations, subsidies, and others. There is no publicly-available accounting of either the costs of these measures or of the benefits achieved. In 2010, provincial emissions were 79 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>eq). In 2024, Quebec's total GHG emissions were 78 MtCO<sub>2</sub>eq, barely changed from 2010. The conclusion one should draw from this is not that the massive costs incurred have had no effect, but rather that the goal of decarbonization is made every year more difficult as a result of the province's increased population and economic activity. As long as Quebec's GDP and population grow, achieving large reductions in GHG emissions will prove elusive.

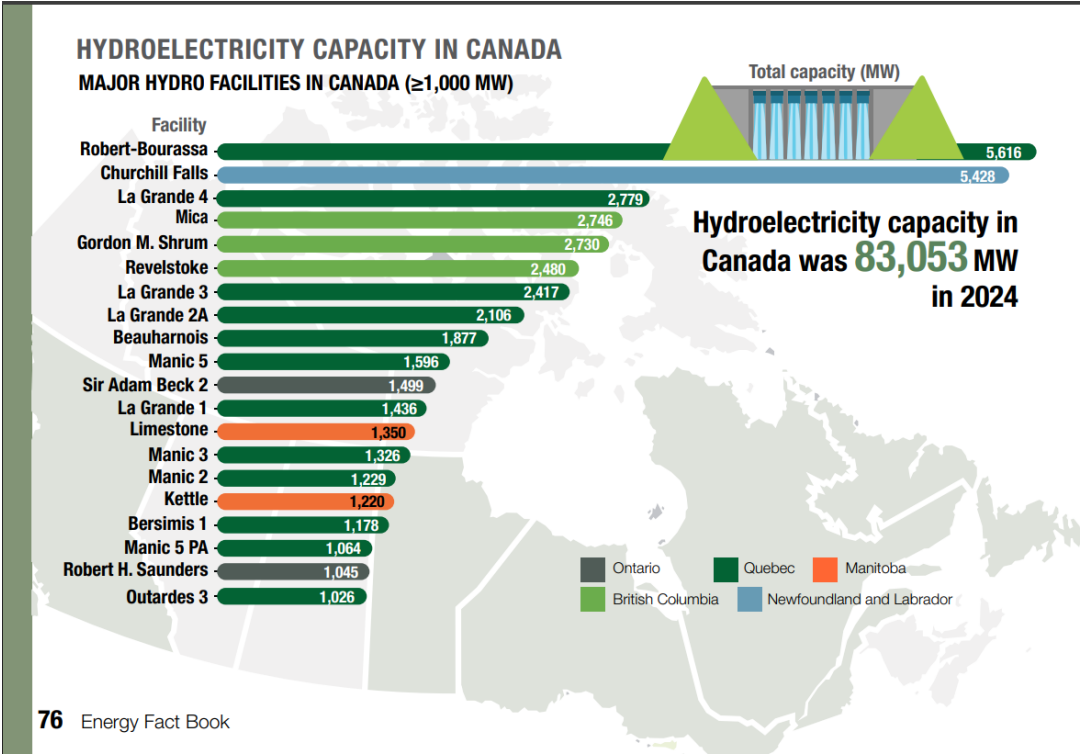
## THE QUEBEC PLAN

A central theme of the Quebec climate plan is an emphasis on electrifying the Quebec economy as much as possible. The measures to achieve this include promoting electric vehicles, providing large subsidies to urban public transport (especially light-rail projects), and other initiatives targeting school buses, cars and trucks. The government also seeks to make Quebec a leader in renewable energy through the construction of large hydropower plants (where that is possible), contracting for wind, solar and biomass energy, and promoting "green" hydrogen. It sees the climate measures as likely to maximize the economic benefits for the province.

As was the case with the Canadian federal government, the Quebec plan initially placed emphasis on carbon pricing as a policy tool to alter consumers' and investors' behavior. Quebec joined with California in a cap-and-trade regime that added roughly 7 to 25 cents per litre to gasoline prices and raised over \$1.3 billion annually for the province's electrification and climate fund (much of which went into subsidies for public transit). The cap-and-trade system covers roughly 80% of the province's greenhouse gas emissions and remains active as North America's premier subnational carbon market. The industrial portion of the system includes facilities emitting 25,000 tonnes or more of CO<sub>2</sub>e annually, electricity producers, and fossil fuel distributors. The absolute emissions

cap lowers progressively each year (targeting a decline toward 44.14 million tonnes by 2030) to meet provincial climate goals.

According to Quebec government estimates, reducing emissions to meet the 2030 target will cost the province approximately \$38 billion, and potentially reduce GDP by \$20 billion by 2030. The government has published no estimates of the cost of reaching complete decarbonization by 2050.



Source: Energy Fact Book Spring 2026 Edition <sup>1</sup>

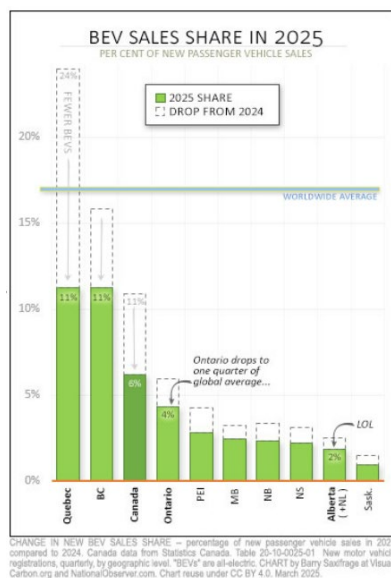
THE MAIN OBSTACLES TO DECARBONIZATION

Among other things, complete decarbonization means eliminating virtually all the consumption of hydrocarbons in the industrial, commercial, transportation, residential and agricultural sectors. Each of those sectors poses a unique set of challenges.

<sup>1</sup> <https://energy-information.canada.ca/sites/default/files/2026-05/energy-fact-book-spring-2026.pdf> Indicate that the reproduction is a copy of an official work that is published by Natural Resources Canada (NRCan) and that the reproduction has not been produced in affiliation with, or with the endorsement of, NRCan.

Transportation is a particularly difficult nut to crack. Road travel (cars and trucks) produces about 31% of Quebec's emissions, while air, rail, marine and off-road transport produce about 12%. Oil products have important natural advantages as transportation fuels. They have very high energy density, meaning that they hold a large amount of power in a small size and light weight. They are easy and affordable to store, meaning that they stay liquid at normal temperatures, making it easy to pump, tank, and handle them. They allow fast refueling. They benefit from an existing huge and well-built network of pipelines, refineries and gas stations to allow easy and fast refueling. For some transportation uses, such as in aviation, there simply are no technologically viable energy alternatives, nor are there likely to be in the foreseeable future.

Quebec has already invested billions of dollars in trying to replace gasoline and diesel fuel use in its transportation system and to get people out of cars and into electrified public transit. By the end of 2025, Quebec had approximately 441,000 registered zero-emission and plug-in hybrid light duty vehicles (according to data compiled by the Association of Electric Vehicle Owners of Quebec via the SAAQ). This accounts for roughly 6 to 7 percent of the total vehicle fleet in the province. Roughly one in five new vehicle registrations in 2025 were electric or plug-in hybrid vehicles. The average lifespan of a vehicle in Canada is about 12 years. So, even if the percentage of new vehicles that were electric doubled from today's rate to 40%, it would be next to impossible to achieve complete decarbonization of the vehicle fleet by 2050, only 24 years from now.



According to Gemini AI, Less than 1% of Quebec's heavy-duty and medium-duty commercial trucks are electrified. While Quebec features roughly 125,000 heavy trucks and over 107,000 medium-to-heavy commercial vehicles, data from industrial cluster groups like Propulsion Québec and technical analyses show only around 650 fully electric heavy trucks and road tractors registered in the province, making the adoption rate roughly 0.5% for heavy commercial transport. Add to this the fact that today 75 to 80 percent of Quebec commuters travel by car, SUV or pickup truck, and one can judge how feasible complete decarbonization of Quebec transport by 2050 is.

Image: <https://www.nationalobserver.com/2026/04/20/analysis/provincial-zero-emission-vehicle-sales-data>

Industry and manufacturing account for about 28% of total GHG emissions in Quebec. The main industrial contributors include smelting and refining (aluminum and minerals), chemical production, pulp and paper and cement manufacturing. In addition to carbon dioxide pricing, the Quebec effort to reduce emissions in this sector has been focused on subsidizing large business technology upgrades and so-called manufacturing "transitions".

A list of the largest industrial emitters reads like a profile of the most important economic firms in Quebec: Alcoa Canada, Aluminerie Alouette, Shawinigan Aluminerie and Aluminerie Becancour in aluminum; St. Mary's Cement and Ciment Quebec Inc. in cement; Rio Tinto Alcan; Bombardier; Glencore Canada; Domtar, Valero refinery; and so on.



Image licensed from Adobe Stock: Montréal Oil Refinery in Winter. Quebec Canada By [Overflightstock](#)

To take two examples, it may be technically feasible to “decarbonize” cement making and aluminum manufacturing, but it requires a combination of carbon capture, alternative materials, and new production methods. So far, decarbonized smelting of aluminum is barely past the pilot plant stage and is still undergoing verification at the commercial scale. The only commercial scale plant to produce cement in the world is in Norway and has the advantage of access to large nearby geological formations where the carbon dioxide can be stored. Imposing the immense costs of carbon dioxide capture, transportation and storage on Quebec’s firms would almost certainly drive them to other jurisdictions that are less concerned about their environmentalist credentials. So far, in spite of its ambitious claims about achieving net-zero, Quebec has not embraced the challenge of forcing (or massively subsidizing) its largest industrial firms to comply.



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From five to eight percent of Quebec's total GHG emissions come from the residential sector. When grouped together, the entire building sector (residential, commercial, and institutional heating) is responsible for about eight to eleven percent of the province's direct emissions, largely because most homes rely on hydroelectricity rather than fossil fuels. Some 230,000 to 235,000 homes in Quebec rely on natural gas for heating and they will not welcome being required to change. Natural gas is one of the most popular choices for home heating because it is highly cost-effective, warms homes quickly, and provides a highly reliable energy source through underground pipelines. Modern high-efficiency natural gas furnaces can convert up to 98% of their fuel into usable heat, making it a preferred option for cold climates. It also is less vulnerable to the service interruptions that increasingly plague homes reliant on electricity for heating.

Agriculture accounts for around 7 to 8 MtCO<sub>2</sub>eq, or 10 percent of Quebec’s GHG emissions. The federal-provincial Agro-Environmental Financial Support program has directed over \$130 million in recent assistance to help Quebec farms lower emissions and there are other assistance programs to subsidize reducing emissions from this sector.

However, there are both economic and biological limits to how much emissions can be reduced. For example, eliminating livestock methane and fertilizer-based nitrous oxide entirely without drastically shrinking herd sizes or crop outputs requires unproven or only emerging technologies. As is the case with other economic sectors, there has been no economic study of the cost of completely eliminating GHG emissions from Quebec agriculture. Quebec's farmers have a record of exercising significant political influence where their interests are at stake.

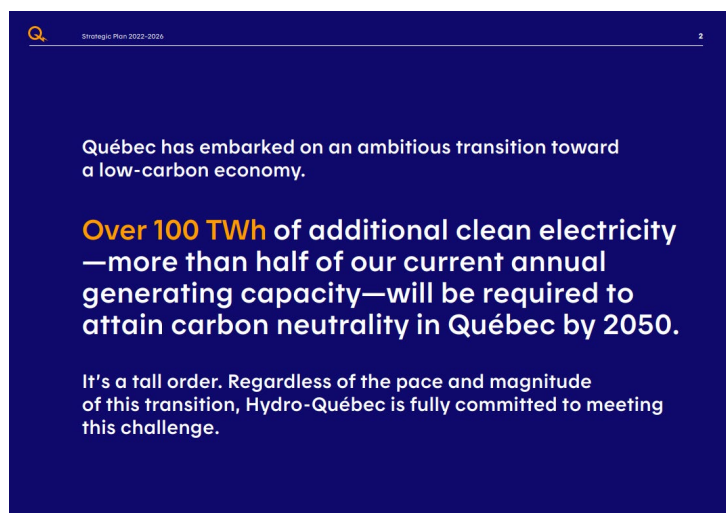
## THE SPECIAL CHALLENGES OF ELECTRICITY

Quebec has a total installed electricity generation capacity of approximately 46,300 to 47,000 megawatts (MW), over 97% of which comes from renewable sources. The vast majority of this power is managed and produced by the provincial utility, Hydro-Québec.

Hydro-Quebec estimates that it needs more than 100 terawatt-hours of additional electricity – more than half its annual generating capacity – to reach the government's goal of being "carbon neutral" by 2050. Assuming that it can meet its very ambitious goal of reducing consumers' demand via subsidies, it seeks to add 8,000-9,000 MW of generating capacity by 2050, and to add 5,000 km of transmission lines. The investments needed to achieve this amount to \$110 billion by 2035.

<https://www.hydroquebec.com/data/documents-donnees/pdf/strategic-plan.pdf?v=2022-03-24>

The utility's commitments include tripling its wind power production capacity by 1,500 to 1,700 MW, at a cost of more than \$30 billion, adding significant but not quantified solar power capacity and adding battery bulk storage to cope with the inherent intermittency of wind and solar. Hydro-Quebec implemented a three per cent general rate increase for residential and farm customers on April 1, 2026. In future, general consumer bills are projected to rise steadily by about two per cent to five per cent annually starting around 2029 to fund the major infrastructure investments, along with a new "third tier" billing structure for "extreme power users".



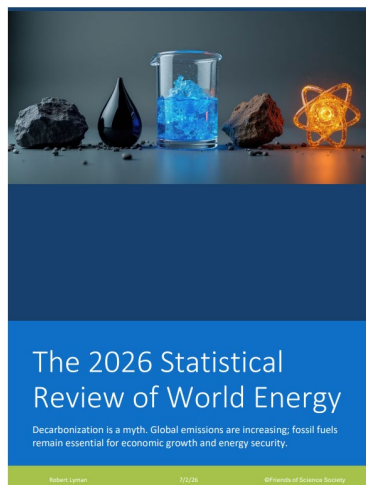
Adding to the existing hydro-power capacity may prove to be a challenge. Hydro power projects in Quebec face major hurdles, including strenuous opposition from environmentalists and indigenous groups, and the need to navigate federal and provincial permitting, overlapping jurisdictional requirements and Indigenous partnership and consultation — processes that are often unpredictable in scope and duration. Timelines can stretch well beyond a

decade. The federal government has promised to accelerate projects that it deems to be in the national interest, but none of the candidates for such designation has yet received regulatory approvals, and it remains unclear how the ultimate Cabinet reviews will address the *Building Canada Act* requirement that to be approved projects must “contribute to clean growth and climate policy objectives”.

## THE INTERNATIONAL CONTEXT

Climate change policy must be viewed in an international context, as the alleged effects of GHG emissions growth and atmospheric concentrations occur at the global level. Canada produces only 1.5% of the annual global GHG emissions, and Quebec produces less than 0.2%. Quebec’s per capita GHG emissions are around 9.1 tonnes, roughly half the Canadian average.

The political case for pursuing net-zero policies rests upon the thesis that the countries of the world are committed to sharply reducing and eventually eliminating greenhouse gas emissions, largely by reducing consumption of hydrocarbon fuels and replacing them by zero-emission fuels.



The Energy Institute [Statistical Review of World Energy](https://www.ei-energy-institute.org/statistical-review-of-world-energy) is the most authoritative source of data on global energy supply, demand and emissions. In its 2026 edition, the review noted that fossil fuels (oil, natural gas and coal) provide 86% of the world's energy needs. That percentage has been growing in recent years, not declining.

<https://blog.friendsofscience.org/wp-content/uploads/2026/08/THE-2026-STATISTICAL-REVIEW-OF-WORLD-ENERGY-Rev.pdf>

The review reported that consumption of oil was 100.6 million barrels of oil per day in 2025, the highest level in history. The rate of growth in global oil consumption has been over one million barrels per day per year, ever since 2012, with the exception of the pandemic years. This is the fastest rate of growth in history. Global natural gas consumption is at an all-time high (4,186 billion cubic metres in 2025). Global coal consumption is increasing and is now higher than in 2015.

With respect to GHG emissions, the review reported that in 2025 the world emitted 35,806 million tonnes of carbon dioxide equivalent. In an allegedly decarbonizing world, this means that once again (as in almost every year since 1990) global GHG emissions have increased, this past year by 1.1%. Significantly, the non-OECD countries now produce 69% of the world's GHG emissions. Almost all the growth in emissions is occurring in the non-OECD countries and especially in Asia. In short, most of the world's countries continue increasing their use of oil, natural gas and coal because these are the energy sources that offer the best combination of economic benefits and security of supply for their growing populations.

Nothing that Canada or Quebec does can hope to influence the energy choices made by other countries in their own interests.

## CONCLUSION

The obstacles in the way of Quebec attaining full decarbonization by 2050 are immense and overcoming them extremely costly as well as probably unfeasible regardless of the costs incurred.

The international context has important implications for what can be achieved by Quebec climate policy. The Quebec public needs to grasp the reality that reducing GHG emissions there will have effects on global temperatures, weather and the panic-du-jour of wildfires ranging from negligible to nil.



## ABOUT THE AUTHOR

Robert Lyman is an economist with 27 years of experience as an analyst, policy advisor and manager in the Canadian federal government, primarily in the areas of energy, transportation, and environmental policy. He was also a diplomat for 10 years. Subsequently he has worked as a private consultant conducting policy research and analysis on energy and transportation issues as a principal for Entrans Policy Research Group. He is a frequent contributor of articles and reports for Friends of Science, a Calgary-based independent organization concerned about climate change-related issues. He resides in Ottawa, Canada. [Full bio.](#)

## ABOUT FRIENDS OF SCIENCE SOCIETY

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens that is celebrating its 24th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO<sub>2</sub>).

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