



Marc Gilbert, Manitoba

Climate Action 2025

A year for rewiring



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Harmony Le Reste, Quebec

Overview

2025: A year for rewiring

Welcome to 2025, the midpoint of climate’s decisive decade—and a year that already feels an age apart from its predecessor.

Over the next 12 months, a plethora of new governments in much of the world will try to rebalance climate policy with economic, energy and national security needs, while business will come to terms with a new and uncertain investing cycle, and a frustrated public will again weigh the cost of living with the cost of climate action.

As the world approaches the 10th anniversary of the Paris Agreement, this year could indeed be a hinge moment. Will 2025 bring a reckoning for climate action or a realization that more can be done, perhaps just in different ways? And will Canada—an energy, trade and climate leader—be among those developing a new path forward or bringing about a strategic retreat in a rapidly changing and divided world? In this, our second annual assessment of Canadian climate action, we find plenty of cause for concern, and some reason for hope. The RBC Climate Action Institute, which was created in 2023, has developed climate action models to analyze where the country and economy is at, and our team has interviewed scores of climate leaders to assess the opportunities ahead.

As we detail in Climate Action 2025, Canada is still making progress, in cutting emissions, mobilizing investment, advancing public policy and driving innovation across the economy. But that progress—along with public support—is slowing, adding to pressure for new ideas to get to net-zero in the quarter century ahead.

In this year’s report, you will find:

- our proprietary Climate Action Barometer, which assesses policy ambitions, investment flows, business and consumer views, and emissions progress. The index shows that we may have reached a peak of policy interventions from the federal government, and in the years ahead will need more private capital and innovation.
- sector indices that measure the commitments and investments in the six heaviest emitting sectors: oil and gas, electricity, transportation, buildings, heavy industry and agriculture.

- case studies of Canadian innovators making climate progress, and what they’re learning. These entrepreneurs and businesses are engaged in industries as diverse as animal genetics and carbon capture, each making very different contributions to Canada’s climate goals that every enterprise, private or public, can draw insights from.
- a spotlight on what we call the Idea of the Year—electricity—and how it can help rewire our collective climate strategy. If Canada had to pick one priority for the next half-decade, we make the case that the best return, for emissions reduction and economic growth, could come from building out a low-carbon electricity grid. Our feature essay looks additionally at the special role of Indigenous equity, and what that could do for reconciliation.

None of this is evolving outside the context of political change, economic frustration and the many climate disasters, which continue to reshape the 2020s. In 2024, we endured the warmest year on record, coinciding with droughts in southern Africa, devastating floods in southern Europe and a wildfire that destroyed much of Jasper, Alberta. One estimate concluded the 10 worst climate events of the year killed 2,000 people and caused US\$229 billion in damages¹.

All the while, many of the governing parties that championed Paris, and then the 2021 Glasgow climate conference that increased the ambition for emissions reductions, are either out of power or on the political ropes.

Moving forward, in the United States, the incoming Trump administration and Republican Congress will almost certainly reorient American energy and climate policies, and alter the trading norms that underpin much of the world’s climate action and investments. One of the early signals from a new Washington may be its commitment to the Inflation Reduction Act, which not only underwrote an unprecedented investment wave in new energy systems in 2023 and 2024; it forced governments across Europe, Canada and Asia to respond with their own supersized cleantech subsidy programs.

Europe, long a climate leader, is undergoing its own political convulsions, and a new European parliament will need to signal if it’s truly committed to tariffs based on the carbon intensity of imports. And the world’s other cleantech leader, China, will need to determine if it can sustain its heavy support for the removal of coal-fired power and expansion of EVs, among other climate policies, in the face of a struggling economy.

Here in Canada, a new federal government will need to consider the fate of an unpopular retail carbon tax, and also the future of industrial policies—electricity regulations, emissions restrictions and fuel standards, among them—in the new reality of a Donald Trump-led America. Provinces, too, will be confronted with the budgetary pressures, and public demands, for more (and more affordable) electricity.

Our annual business survey

We surveyed more than 100 Canadian private sector executives, working with Kantar Canada Inc., to understand how the business sector is navigating Canadas policies to lower emissions.

Here’s what they told us:

- A majority see government subsidies (55%), dedicated internal funding (53%), and C-suite buy-in (50%) as the three top factors that will drive emissions reduction in their organizations.
- Two-thirds of executives see themselves as drivers of climate strategy for their organization, but those in electricity, heavy industry and transport believe government regulations are primary drivers of change.

- Oil and gas, heavy industry and electricity executives see regulatory uncertainty as their biggest obstacle.
- 42% see governments as primarily responsible for climate change mitigation, but also see themselves (40%) as equally responsible. Customers are a distant third at 16%.
- 36% of businesses have a senior executive advocating for environmental issues.

A new role for climate capitalism

There may be no greater opportunity for climate action than the private sector, especially in terms of mobilizing venture capital for some of the most daring technology projects we’re seeing anywhere. This report maps out some of the investment needs, as well as many of the successes to date, that can get us there. We tracked close to 350 climate-related emerging technology projects that are already underway, including ground-breaking work in small modular nuclear reactors in Ontario, methane capping of gas wells in British Columbia and Alberta, and industrial-scale decarbonization efforts in Quebec and the Atlantic provinces.

Much of this is the result of sizeable government funding announcements—\$177 billion worth over the past decade, according to our tracking². Without the massive subsidies offered through the U.S. Inflation Reduction Act and the European Green Deal, major industries are at risk of pulling back. More public-private investments may be needed, along with more strategic procurement from public sector entities.

Business adoption is also powerful. Many of the cleantech headlines of 2024 focused on the stumbles of startups like Montreal’s Taiga Motors and Kingston, Ontario’s Li-Cycle. That can be a natural part of the innovation cycle, and its inherent nature of creative destruction. More concerning would be any extended pause or change in strategy among large corporates—and so-called ecosystem leaders—such as Ford Motors, which delayed the start of EV production at its plant in Oakville, Ontario, by two years, to 2027, and paused work on a \$1.2-billion cathode material plant in Becancour, Quebec.

Our annual survey of Canadian business leaders shows a majority still see themselves as drivers of climate action in their organizations, with necessary support from governments (through regulations and subsidies) as well as institutional investors focused on the long term. By the same token, most business leaders do not seem to feel pressure, or encouragement for that matter, from their customers. That view was reinforced by our annual consumer survey that showed only one in seven Canadians now place climate among their top three concerns.

As this report outlines, the efforts of the past decade won’t likely be the flagships of the decade ahead. We’ve probably seen peak policy, with the federal government going as far as it can, and perhaps being overextended. Provinces need to step up more, in our view, as do municipalities. As you will see in our Climate Action Barometer and public sentiment analysis, we’re also seeing consumers recoil from any climate action that costs them more, while businesses are showing more caution and government spending priorities are shifting. The brightest spot may be Indigenous equity, which continues to grow across the economy and is critical to climate, as well as economic and social progress.

Security as the new watchword

As government and business consider the next half decade, they may do well to consider different models, perhaps even paradigms. Technology may be a centrepiece of a Trump economic agenda, especially to help reshore manufacturing, whether it’s low emitting or otherwise. Convenience and cost will also become more pressing for businesses and governments, if they’re to convince the public to adopt lower-emitting products and services.

More broadly, “security” could be the new watchword. A range of governments, and notably the incoming Trump administration, have entered the year with an enhanced focus on national security—and a view that economic security and energy security are twin pillars of that new paradigm. Climate security may soon be part of that model if climate policy and practice can be viewed as essential to our collective economic and energy needs.

In some ways, that has always been the imperative of climate action—to ensure emissions reduction can be achieved without damaging the prosperity of nations and of people. The year ahead may just demonstrate how that can be done.

Our annual consumer survey

We worked with Ipsos Canada to survey 2,000 Canadians on their views of climate action.

Here’s what they told us:

- 14% of Canadians cited climate change as one of their top 3 concerns, down from 26% in 2019.
- 58% believe climate action is important but other things need more attention and action right now.
- Two-thirds of residents in B.C., Alberta and Ontario were more bullish than the national average about the economic opportunity stemming from green jobs.

- Baby boomers (59%) felt a greater sense of responsibility than Gen Z (45%) to take climate action. Half of Gen X and Millennials had the same view.
- 65% of Quebecers believe it’s consumers’ responsibility to tackle climate action, compared to the national average of 53%.
- Baby Boomers felt they had a greater sense of duty to act, but were two or three times less then Gen X likely to act on making their homes energy efficient, installing a heat pump, or buying an EV.

Key Findings

- 1. Policy, capital and consumers have driven a near doubling of climate action in Canada** over the past five years, according to the RBC Climate Action Institute's Climate Action Barometer.
- 2. Emissions fell by 0.8% in 2023, led by progress in the electricity sector.** Government projections suggest Canada is not on course to meet its 2030 climate targets¹.
- 3. Alberta's removal of more than six megatonnes of coal-based emissions drove national electricity emissions lower by about 12%².** The province is now coal free—six years ahead of schedule. Only Saskatchewan, Nova Scotia and New Brunswick remain coal-dependent for electricity.
- 4. There was an estimated 50% improvement in managing methane emissions from oil and gas projects relative to 2019³.** While the sector's overall GHG emissions remain high due to rising production, emissions intensity is estimated to have dropped to a six-year low⁴.
- 5. The oil and gas index's capital score rose 36% in 2024 compared to 2019, suggesting considerable investments in decarbonizing the sector⁵.** The country's first carbon capture, utilization and storage project targeting upstream oilsands facilities was also announced in 2024⁶.
- 6. Concern over climate change is waning among Canadians.** Around 14% of Canadians cited climate change as one of their top 3 concerns—compared to 26% in 2019.
- 7. Clean-tech investments in heavy industry fell dramatically in 2024.** Venture capital financing slowed to \$158 million in the year, compared to a combined \$650 million on average in the previous two years, partly due to an overall global downturn in investment flows and faltering investor sentiment around cleantech⁷.
- 8. Canadian businesses see themselves on the frontlines of climate action, according to our survey.** Over half of executives identified government subsidies (55%), internal funding (53%), and C-suite buy-in (50%) as the most significant factors for driving emissions reduction in their organizations.
- 9. Cement and steel industries cut their coal consumption by 36-40%, respectively, as they made the switch from coal to natural gas to transition away from fossil-fuel power by 2050⁸.**
- 10. Transport sector emissions are 6-8% below 2019 peak ⁹.** Emissions are set to decline further as gas-powered vehicles peaked in 2021, and a hybrid workforce has dented traffic flows.



Len Wagg, Nova Scotia



Idea of the Year

Marc Gilbert, Manitoba

Canada's Climate Transformer: Why electricity holds the key

Government climate spending is at a crossroads. Governments are grappling with where to direct spending that will yield the greatest emissions reduction benefits and aid in transitioning to a low-carbon economic base. The RBC Climate Action Institute analysis shows Canada can make a significant dent in emissions over the next decade if it focuses its efforts on growing and decarbonizing the country's electricity grids.

We estimate that provinces will need to spend nearly \$160 billion to double their electricity supply with clean energy. The climate and economic benefits are substantial. Greening and expanding the grid creates the foundation for another 27% reduction in buildings and transportation emissions, and the large and secure energy supply that businesses seek when deciding where to locate their operations¹. It's also one of the most cost-effective solutions, costing an average of \$75 for each tonne of abated emissions². In comparison, the cost of abating one tonne of auto emissions is four times greater³.

The cost of inaction

The risks and costs of inaction are great. Failure to expand grid capacity can erode provincial energy security and sovereignty, by forcing provinces to import a greater share of their electricity, and compete for a limited supply of power, as grids in Canada and the U.S. face a looming supply shortage. This can erode provinces' ability to manage and control prices for consumers and businesses, or to maintain their carbon emissions goals. British Columbia has one of the cleanest electricity grids in Canada, with 98% of power generated from clean and renewable energy sources⁴. The province undermines its emissions reduction goals whenever it imports electricity from neighbouring U.S. states and Alberta, where more than 60% of electricity is generated from natural gas.

Provinces also risk losing out on foreign direct investments if they fail to ensure their grid expansions are green. Honda's decision to invest \$15 billion to build out its electric vehicle supply chain in Ontario was partly motivated by the availability of clean energy in the province⁵.

When these costs and climate considerations are weighed together, the best bet is to double down on growing and greening provincial and territorial electrical grids. Greater decarbonization in this sector will have the added benefit of amplifying and enabling further gains in electrifying the rest of the economy.



Breaking the gridlock

The success of the provinces’ efforts to green and expand their power grids is contingent on their ability to deftly handle a number of other emerging challenges.

1. The rise of NIMBYism

Canada is a vast country with massive energy resources, but limited developable land. We’ll need to de-
ploy 337 gigawatts of wind and solar energy by 2050 to keep our climate goals on track, based on mod-
elling developed by the Canada Energy Regulator⁶. That could require at least 38,000 square kilometers of
land, more than double the existing amount of developable land⁷.

We’ll need to deploy 337 gigawatts of wind
and solar energy by 2050 to keep our climate
goals on track

In addition to the competition for land, conflicting views on its optimal use are creating tensions within
non-Indigenous and Indigenous communities, businesses, and governments. Conflicts regularly arise
over the most appropriate use of land and which stakeholder’s interest takes priority: Is it housing, jobs,
or energy? Disputes that have gone to local and provincial land-use planning bodies for adjudication have
resulted in delayed or cancelled projects. In Alberta, an estimated \$10 billion in investments were diverted
elsewhere after 46 projects were cancelled because of the province’s moratorium on renewable energy
development on agriculture land⁸. As the rollout of green projects intensifies, these types of disputes will
become more common.

Communities across Canada have also opposed wind and solar projects based primarily on their visual
and physical impacts. They have used the land-use planning system to block them by taking advantage of
unclear policies on permitted land uses. This has played out most publicly in Alberta and to a lesser extent
in Ontario. These problems will persist unless provincial and local governments, working with Indigenous
communities, jointly develop a formalized and integrated policy framework that provides clarity on rules
governing land-use, economic and energy development priorities.

2. Navigating supply chains

Securing the physical and human resources needed to build out green-energy infrastructure is essential
for projects to run smoothly. In terms of sourcing key supplies and technology for nuclear, wind, and
battery storage, which will dominate the energy mix, in addition to hydroelectricity, the country’s net-zero
ambitions are reliant on four jurisdictions: China, Russia, Europe and the U.S.

- China and Russia are the main suppliers of nuclear fuel, in particular the fuel used in certain prospective
models of SMRs, which have become a more attractive option than building the large-scale plants that
dominate the industry.
- Europe and China are the main suppliers of wind turbines, controlling more than 80% of global
manufacturing capacity⁹.
- Our main source of electricity transformers is the U.S., where wait times are as long as two years due to
high demand from the rollout of renewable energy and grid modernization¹⁰.

An expected shortage of workers in the coming years could pose another threat. The situation is expected
to worsen as multiple provinces start work on expanding their grids, while the overall labour pool is projected
to shrink as more workers retire.

How governments navigate trade relations with these jurisdictions and deal with other supply chain
challenges will affect provinces’ ability to secure low-cost critical supplies and stay within project timeframes.



Len Wagg, Nova Scotia

3. Opening up electricity markets

Federal government support for growing and greening the grid has helped increase domestic and foreign investment in Canada’s energy transition. Investment tax credits (ITCs) for clean technology and electricity, are keys to reducing the costs of capital-intensive projects and boost returns for investors.

The challenge for provinces is how to continue attracting institutional capital in the event federal ITCs are withdrawn as political spending priorities shift.

Opening electricity markets to greater competition may be a partial solution. Only three provinces use a competitive bid process to procure generation capacity for their grids: Alberta, Ontario and, B.C. In this model of grid expansion, provinces put out a public call that stipulates the amount of generation capacity and the energy sources they are seeking. Energy developers who win these contracts then finance and construct the generation assets. In exchange, provinces sign a multi-decade contract to buy a specified amount of power at pre-established prices.

This energy-as-a service model shifts a province’s position from power producer and asset owner to energy buyer. It means governments don’t need to finance, operate and maintain costly capital assets. Offtake agreements come with risks for project developers and buyers. Buyers could lock themselves into a decades-long contract of high electricity prices if interest rates decline and remain low subsequent to the deal closing.



Marc Gilbert, Manitoba

For their part, developers could be exposed if interest rates increase after the contract is signed, squeezing the profitability of their investments. The 1969 Churchill Falls offtake agreement between Newfoundland and Labrador and Quebec is a high-profile example of the financial risks involved in signing multi-decade energy contracts. The contract, which until recently provided Quebec with 85% of the electricity generated at the Churchill Falls hydroelectric dam, allowed Quebec to purchase power at 0.2 cents per kilowatt hour, at least four times below the market rate¹¹.

4. Increasing Indigenous participation

Policies mandating Indigenous participation in power-generation projects through equity ownership requirements could also attract more capital into the sector. Hydro One leads the country in this regard, requiring a 50% Indigenous equity stake in its projects¹². BC Hydro’s recent competitive procurement for nine wind projects, and a requirement for 25% Indigenous equity ownership, attracted \$3 billion in investments from nine First Nations communities, half of the total \$6 billion price tag¹³.

Indigenous loan guarantee programs could further accelerate access to Indigenous participation and capital. An estimated 110 low- to zero-carbon grid expansion projects are in the planning stages, requiring \$21 billion in capital¹⁴.

Greater end-to-end technical capacity building—on such subjects as project finance, project development and legal expertise—could help more Indigenous communities gain the technical know-how to participate in or lead grid expansion projects.

Indigenous: Gearing up for a new resource development wave

Indigenous partnerships are reshaping Canada’s clean energy landscape and adding a new dimension to economic growth. Recent projects underscore how Indigenous economic partnerships are becoming the new norm in resource and energy projects.

- **A growing role:** A third of wind, and two-thirds of solar capacity were deployed by private Canadian players in partnership with Indigenous communities in recent years. According to Indigenous Clean Energy, we are now in a new wave of Indigenous participation, where First Nations leadership in clean energy project development is now the norm.
- **New financing tools:** Three new loan guarantee programs in 2024, a \$5 billion federal loan guarantee, along with a \$1 billion initiative in British Columbia and another in Manitoba for an undisclosed amount, are expected to unlock access to capital for Indigenous communities¹⁵. That said, the pace of deployment remains an open question.
- **Advancing conservation:** Innovative financing and policy tools are also being developed, funded and deployed to advance Indigenous leadership in conservation initiatives, notably, the Project Finance for Permanence (PFP) initiative. The Government of Canada agreed to fund \$800 million to support four Indigenous-led conservation initiatives, with the first one in the Northwest Territories signed in 2024¹⁶. This PFP provides \$375 million toward Indigenous-led conservation initiatives in the territory¹⁷.
- **B.C. shows the way:** First Nations were front and centre of a new B.C. push to build 5,000 gigawatt hours of electricity annually through nine wind projects¹⁸. That will boost B.C. Hydro’s current supply by 8% and generate as much electricity as Site C dam by the next decade¹⁹. Eight of the nine energy projects will have 51% First Nations equity ownership, representing \$3 billion of investments by First Nations²⁰.
- **The partnership approach:** A group made up of 24 First Nations is advancing the second phase of the Wataynikaneyap Transmission Project—the largest Indigenous-led and longest grid connection project in Ontario’s history. Approximately 1,800 kilometres of transmission line are being built through a government loan of up to \$1.34 billion for the project’s construction costs²¹. Such projects are elevating low-carbon resource development to reconciliation—both for First Nations and for Canada.
- **Capacity building:** To capitalize on these emerging opportunities, Indigenous communities will need to boost their governance capacity. This includes developing training a new generation and equipping them with legal, financial and corporate governance expertise and take ownership of Canada’s next wave of resource development.

A year of hard choices

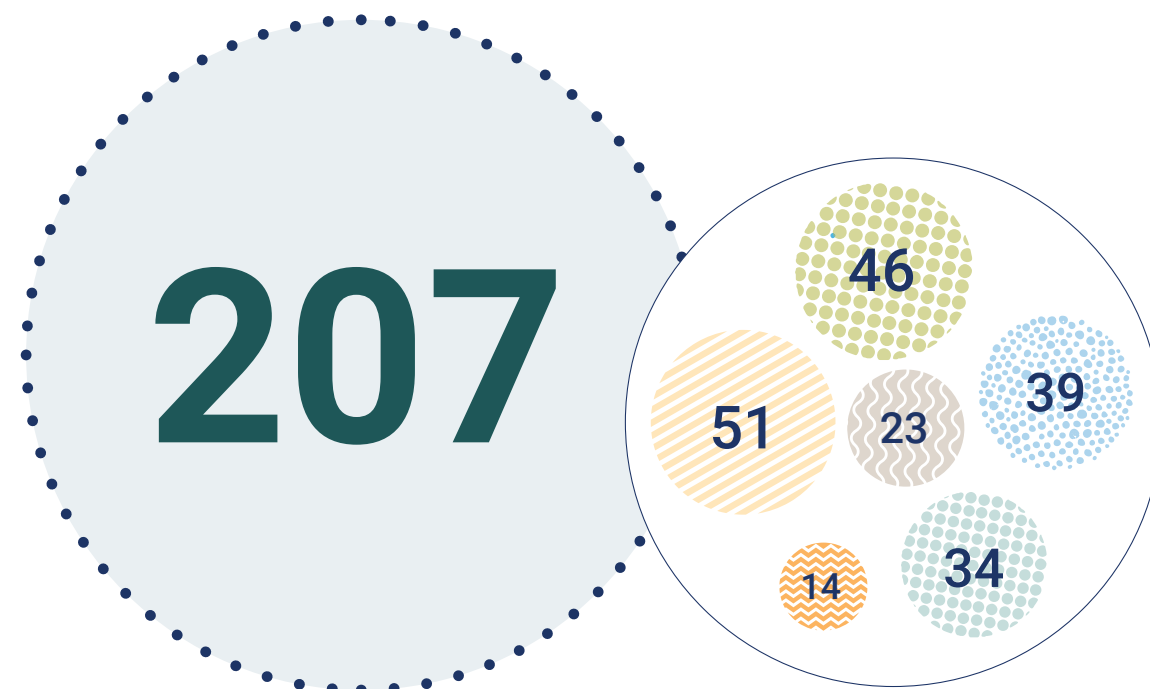
Provinces have hard choices to make in 2025 and beyond. Do they roll out their electricity expansion plans in their current state, predicated on a certain amount of federal subsidy support, or do they wait for greater clarity on climate, trade and political shifts. Given looming electricity shortages and the crucial role electricity plays in achieving economic and societal objectives, delaying construction could hurt the country’s wider interests.

The provinces may not have signed onto the 2015 Paris Agreement, but a vastly different landscape from ten years ago behooves them, willingly or reluctantly, to double down on their efforts to decarbonize and grow one of the most important services they provide—the provision of clean, reliable and affordable electricity.

Climate Action Barometer

Marc Gilbert, Manitoba

● Policy ● Capital ● Business action ● Consumer action ● Technology ● Emissions



The pace of climate action has doubled since 2019

A suite of government policies, private capital flow propelled by government subsidies, adoption of clean technologies have boosted the index. Progress is already noticeable--emissions are down by 50 megatonnes (Mt) of CO₂e since 2019, despite economic activities returning to pre-pandemic levels.



Policies in place could deliver nearly 200 Mt of CO₂e reductions compared to 2005 levels—but only if capital and action follow suit¹. An additional 100 Mt CO₂e cuts could be achieved through announced measures, putting Canada on track towards its 440 Mt target, but by 2035—five years later than planned².



Governments have earmarked \$109 billion in funding over the next decade³. Its impact will largely depend on the corporate uptake of investment tax credits and other direct subsidies. However, setbacks have emerged as Alberta's shifting attitude towards renewables led to the cancellation of 7 gigawatt of renewable capacity this year⁴. Progress with large-scale carbon capture projects has been stagnant with only 1 megatonne of annual sequestration capacity for nearly a decade⁵.



Nearly 6 out of 10 of the biggest publicly-listed firms have emissions targets⁶. A third of Canadian businesses have created new executive level roles for climate change⁷. However, access to capital, technology and regulatory uncertainties are among top challenges businesses face in executing their decarbonization strategy⁸.

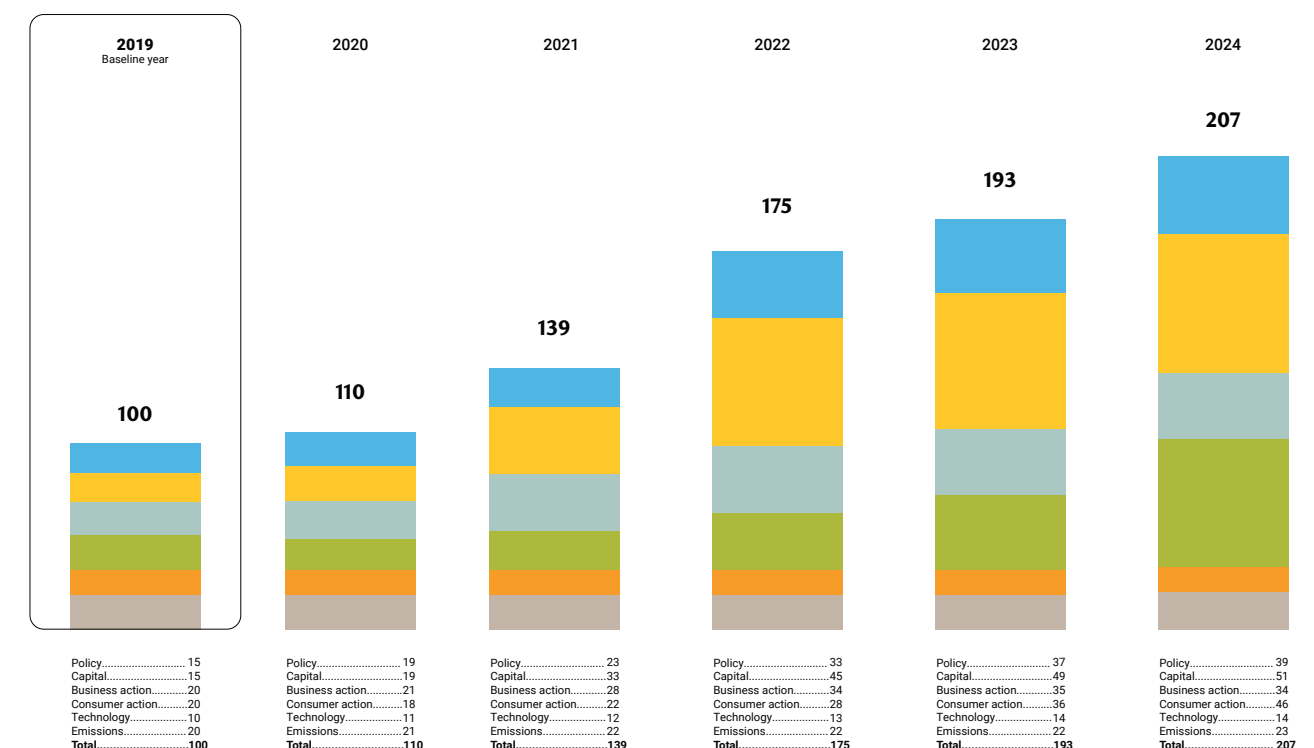


Nearly 350 climate-related emerging technology projects are underway in Canada⁹. Many are near demonstration stage, a critical step before achieving full operational capacity. Projects focused on small modular reactors (SMRs) in Ontario, methane capture projects in B.C. and alternative fuel projects in heavy industries in Quebec and the Atlantic, highlight the scale of innovation across the country.



Emissions are decoupling from economic growth. Emissions intensity has fallen 34% by 2023 compared to 2005, according to the federal government's preliminary greenhouse gas emissions estimates.

Historical Trends



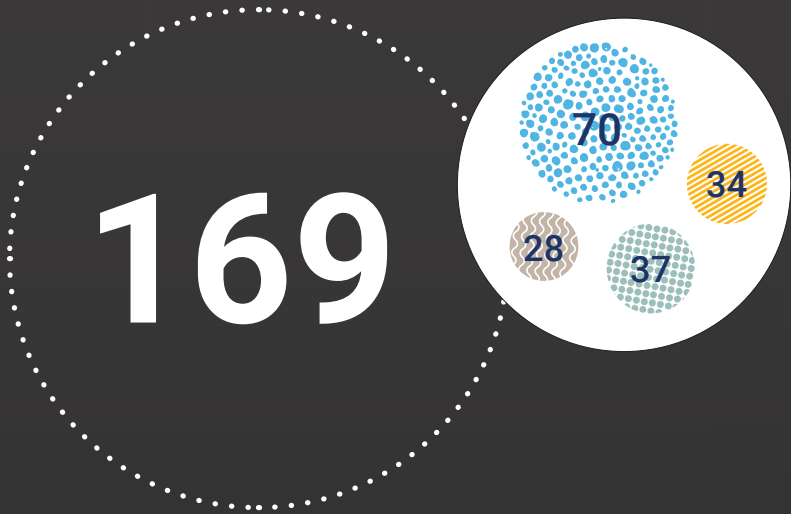


Climate Action Index

● Policy ● Capital ● Action ● Emissions

Oil and Gas

- Climate Action Index
- Thematic Breakdown
- Historical Trends
- Key Findings
- Case Study



Key index driver: Methane cuts

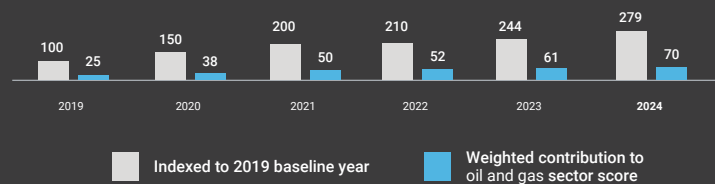
Policy measures such as an increase in the federal benchmark carbon price to \$80/tonne of CO₂e, and the creation of provincial funding for decarbonization projects drove the index higher. The scorecard's overall growth has been primarily driven by policy, which has risen threefold since 2019. Emissions scores are improving as the industry acts on containing methane emissions.

POLICY SCORE

70



More stringent methane regulations and government capital inflow into decarbonization projects has boosted the score. In addition, increases in the federal benchmark carbon price and more provincial funding programs have contributed positively to the policy score. However, there's a strong likelihood the controversial oil and gas emissions cap is shelved¹.

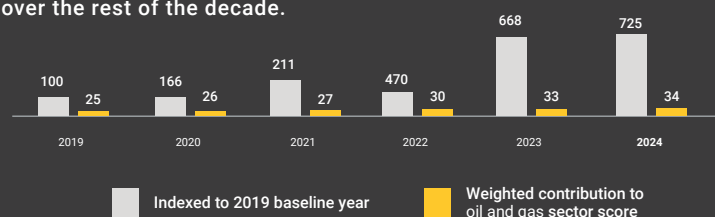


CAPITAL SCORE

34



The capital score has jumped 36% since 2019, with government-backed investments in decarbonization projects and technologies as the primary driver². The year also saw investments in carbon capture projects, such as the Canada Growth Fund's \$500 million initial investment in decarbonizing oilsands production³, which could advance investment over the rest of the decade.

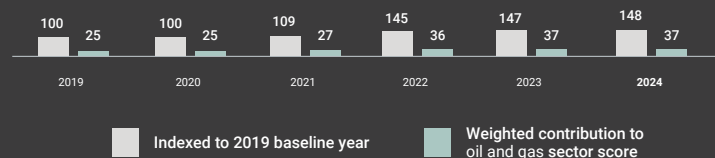


ACTION SCORE

37



Canadian operators' continued action on curtailing methane led to an estimated 50% improvement in managing methane emissions from oil and gas projects relative to 2019 levels⁴. However, further growth in the action score will need additional deployment of CCUS capacity and more efforts to prevent methane venting.

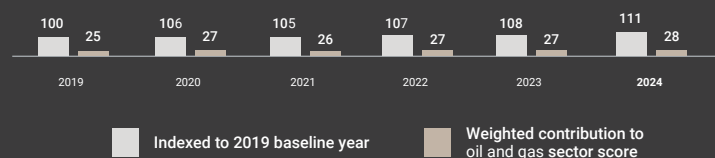


EMISSIONS SCORE

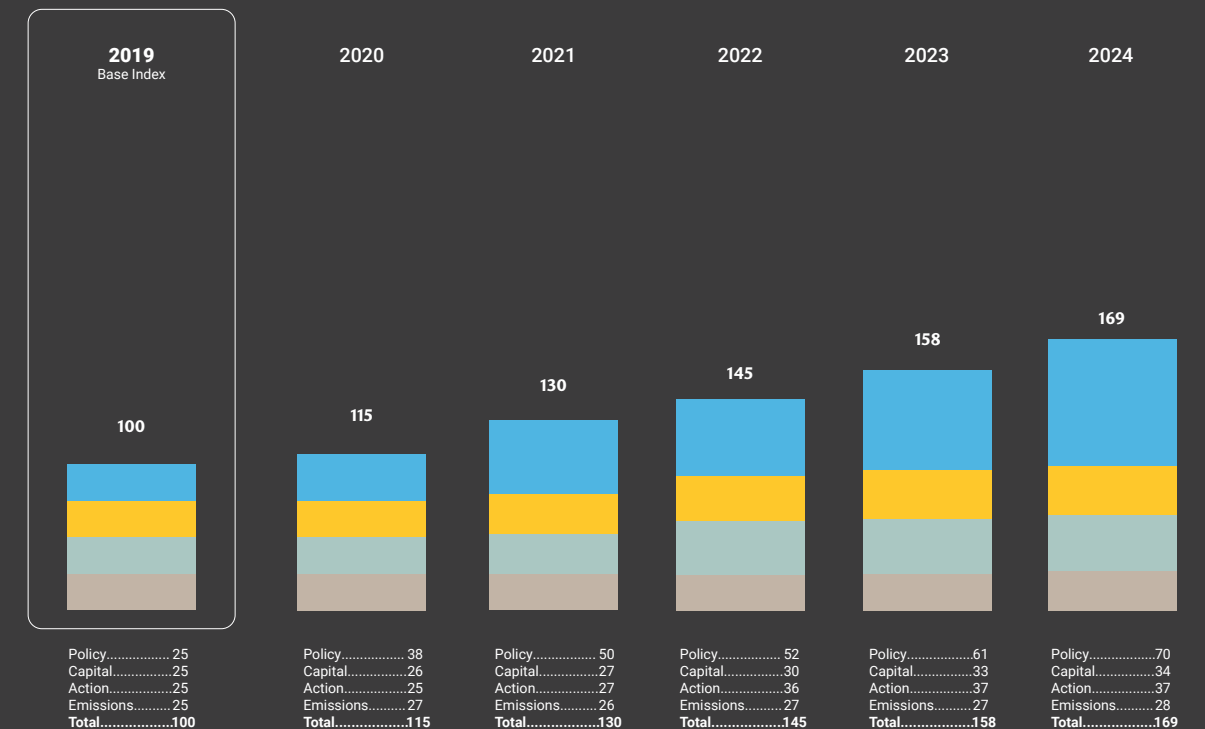
28



Oil and gas emissions have declined over the past 10 years, and are expected to be at the lowest levels since emissions peaked in 2014 (excluding the pandemic-induced low in 2020)⁵. Increased efficiencies and improved methane management have driven lower emissions amid rising production⁶.



● Policy ● Capital ● Action ● Emissions



An estimated \$8 billion of capital is earmarked for decarbonization⁷. Federal and provincial investment tax credits for carbon capture, grants from provincial innovation agencies, and recent investments from the Canada Growth Fund are priming carbon capture, utilization and storage (CCUS) and other technologies for deployment.



Emissions are showing signs of falling. Oil and gas emissions have reduced by 6% since 2019 even as production grew in Alberta, Saskatchewan and B.C. from pandemic lows⁸.



More production is coming down the pipe. The 590,000-barrel-per-day expansion of the TMX pipeline that began operations in 2024, has contributed to record oil production⁹. In addition, record natural gas demand is powering electricity generation, industrial activity and commercial and residential demand¹⁰.



The first CCUS project targeting upstream oilsands facilities was announced in 2024. Strathcona's oilsands facilities in Alberta and Saskatchewan, advanced with a \$2 billion partnership with the Canada Growth Fund, laying the foundation for deeper action on oil and gas decarbonization¹¹.

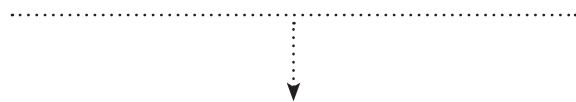


The oil and gas emissions cap has emerged as controversial policy. There is a strong likelihood that the Oil and Gas Sector Greenhouse Gas Pollution Cap, challenged by some oil-producing provinces, is not legislated¹².



Case Study

The contract that's advancing Alberta's carbon capture industry



The Issue¹³

Emission reduction projects such as carbon capture and storage (CCS) pose a market challenge: while removing CO₂ emission before reaching the atmosphere can reduce the impact of industrial activity, there is limited economic reward for companies that develop and implement the technology. The industry faces several challenges: capturing carbon is an expensive and complex process, permanent geological storage offers limited economic benefits, while carbon price volatility does not instill investor confidence. Guaranteeing stable revenue is key to unlocking risk-averse private investment—a necessary catalyst for wide-scale CCS deployment.

That's where carbon contract for difference (CCfD), or carbon credit offtake agreements, from private or public institutions can de-risk investment and improve the technology's economics.

The Company

Entropy Inc., a spin-off from Calgary-based Advantage Energy, is developing technologies to remove carbon from pre- and post-combustion emissions and permanently store them in the ground.

Entropy has developed a CCS project with its modular carbon capture solution at Advantage's Glacier Gas Plant, with early success—as the first commercial natural gas post-combustion CCS project in the world. But pursuing larger-scale projects needed robust financial backing from heavyweights like the Canada Growth Fund and Brookfield Global Transition Fund to demonstrate commercial viability, de-risk future projects and attract clients to capture a piece of the growing carbon capture sector.

The technology can be plugged into a spectrum of industries, including methanol production, natural gas processing, thermal oil production, clean electricity and data centres

The Technology

Entropy's proprietary technology captures CO₂ that's produced when natural gas is combusted—the first in the world to commercially launch the technology. The application can be plugged into a spectrum of industries—including methanol production, natural gas processing, thermal oil production, clean electricity and data centres, making it a versatile solution for many hard-to-abate industries.

Another differentiator for Entropy is its experience with Glacier Phase 1 project. Over the past two years, the company has learned to execute post-combustion CCS projects at high efficiency and lower costs. With CCS in early stage of development, Entropy's success with Glacier is a breakthrough for the technology.

The Opportunity

In late 2023, Entropy secured a pivotal opportunity by partnering with the Canada Growth Fund (CGF). The \$200 million equity investment from CGF not only provided crucial capital for new projects but also offered a carbon credit offtake (CCO) commitment, effectively a set price for carbon, in the form of a carbon credit off-take arrangement.

CGF committed to provide Entropy with one of Canada's first ever large-scale, long-term, fixed-price carbon credit offtake commitment by committing to purchase up to one million tonnes per annum of carbon credits for 15 years. That's given Entropy the opportunity to pursue projects as diverse as carbon capture for methanol production to offsetting carbon emission for natural gas-powered data centres.

The CGF deal came on the back of Entropy securing a strategic \$300 million investment agreement with Brookfield, via the Brookfield Global Transition Fund, in 2022 to scale up the deployment of Entropy's CCS technology globally.



The Lesson

Scaling cutting-edge carbon capture technology isn't solely about engineering; it's about financial innovation and creating alignment among stakeholders. Entropy's partnership with CGF illustrates the critical role of government-backed funds in de-risking first-of-a-kind projects. The relationship has enabled Entropy to validate its technology in real-world conditions, shifting perceptions from experimental to commercially reliable.

“My hope is that as we generate these \$200-million sized projects, we’re taking away commercial and technical risks, and paving the way for larger projects to get off the ground.”

— Sanjay Bishnoi, CEO, Entropy Inc.

The Unlock

The two deals effectively broadened Entropy's market reach, positioning the company for new partnerships with heavy emitters across many industries.

While the Glacier project accounts for approximately 160,000 tonnes backstopped by CGF, that leaves Entropy with around 840,000 tonnes of carbon credits for other high-emitting projects.

The company is eyeing four more developments, including a promising agreement with Methanex, a methanol producer. The collaboration, if successful, would mark another world-first for Entropy—capturing over 400 tonnes of CO₂ per day from methanol production and creating “blue” methanol. The project could secure a final investment decision next year.

The company is also in talks with thermal oil producers in North America, while another

Entropy could soon emerge as a first mover in several sectors, from capturing CO₂ from natural gas compressor exhausts to CO₂ sequestration in clean power generation

project in engineering phase is with a data centre developer seeking to source a baseload, low-carbon power solution.

If completed, these projects each in the \$200-million range will see Entropy emerge as a first mover in several sectors, from capturing CO₂ from natural gas compressor exhausts to CO₂ sequestration in clean power generation.



Climate Action Index

● Policy ● Capital ● Action ● Emissions

Transportation

- Climate Action Index
- Thematic Breakdown
- Historical Trends
- Key Findings
- Case Study



Key index driver: Federal and provincial subsidies

The index has doubled since 2019, driven primarily by electric vehicle (EV) adoption. Federal and provincial EV subsidies aided nearly 90% of purchases¹. Combined with changing commuting trends post-pandemic, the rising number of EV purchases on the roads have curtailed emissions growth. Major national decarbonization policies such as the federal EV mandate have also boosted the index.

Neil Dankoff, Ontario

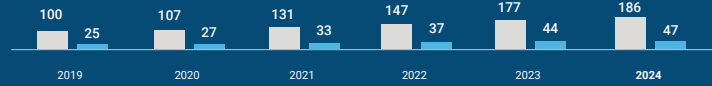


POLICY SCORE

47



In the absence of new major fiscal spending programs and emissions reduction policies, higher federal carbon prices were the primary factor driving up the index in 2024. However, Clean Fuel Regulations policy, legislated in mid-2023, is already having an impact, with renewable fuel production increasing 30% in the year².



Indexed to 2019 baseline year

Weighted contribution to transportation sector score

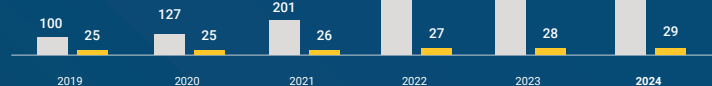


CAPITAL SCORE

29



Federal and Quebec EV subsidy programs, budgeted at a combined \$1 billion, helped the capital index eke out gains for the year³. The funding was enough to offset declines in venture capital and private equity investments in transport climate-tech during the year.



Indexed to 2019 baseline year

Weighted contribution to transportation sector score

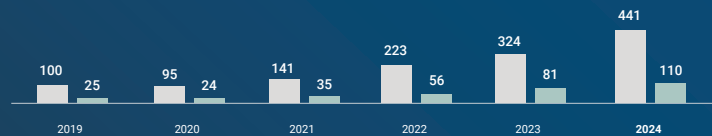


ACTION SCORE

110



The action index has quadrupled over the past five years with more than 190,000 new EVs sold in the first nine months of 2024⁴. Estimated EV sales growth of over 30% has outpaced overall car sales growth of 10% in 2024 compared to 2023⁵. A near-doubling of new public chargers in the year to more than 31,000 total public chargers across the country is another plus⁶.



Indexed to 2019 baseline year

Weighted contribution to transportation sector score



EMISSIONS SCORE

25



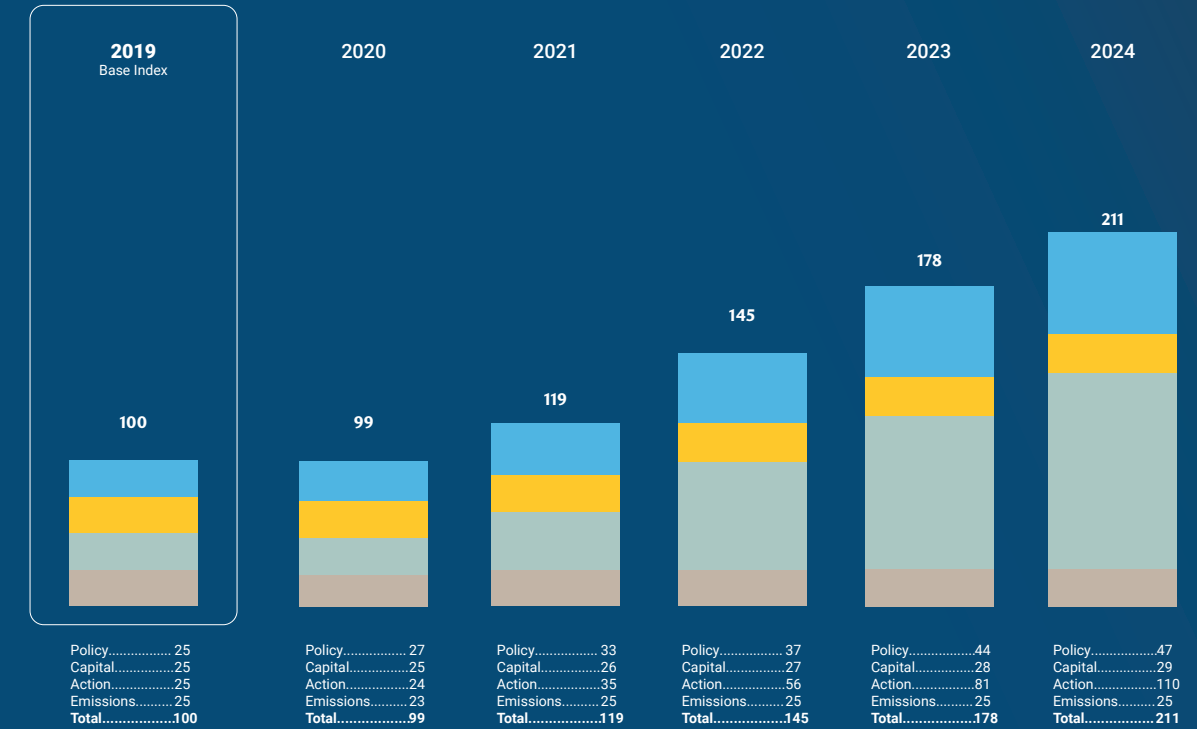
Emissions most likely plateaued at around 158 Mt CO₂e, similar to the past two years⁷. The year 2024 marks the first decline in sector emissions following the post-pandemic recovery, according to the Emissions Reduction Plan.



Indexed to 2019 baseline year

Weighted contribution to transportation sector score

Policy Capital Action Emissions



EVs and plug-in hybrid electric vehicles now account for 13.5% of new car sales. Quadrupling since 2019, total EV fleet now sits at 3% of Canadian car stock. Federal EV incentives aided over two-thirds of all EVs purchased in the country.



Eight Canadian provinces now offer purchase incentives. Some subsidies are being rolled back, and this may slow down EV adoption in the coming year if mandated zero-emission vehicles sales targets are rescinded before they come into effect in 2026. Quebec—a national leader in EV adoption—slashed its support nearly in half from \$7,000 to \$4,000 starting 2025, with a complete phase-out planned by the end of 2026.



Sector emissions are 6-8% below 2019 peak level. Emissions are set to decline as the sales of gas-powered vehicles peaked in 2017.



There are as many hybrids on the roads as EVs. With gasoline prices nearly doubling during the pandemic, drivers are favouring hybrids that offer fuel savings without compromising on driving range, reliance on charging infrastructure, and have a price advantage over EVs.



The federal 2026 EV sales mandate is facing headwinds. A softening economy and high cost of living led to fewer Canadians considering purchasing an EV—28% in 2024, down from 47% in 2022. Carmakers' stalled EV plans will likely further delay price parity between EVs and gas-powered vehicles.



Case Study

Purolator: Transitioning the fleet, mile by mile

The Issue⁸

Canada's transportation sector has a substantial carbon footprint—22% of the country's overall emissions, which is second only to the oil and gas sector. The freight sector alone accounts for 7% of Canada's emissions. As other industries focus on their Scope 3 emissions—emanating from their supply chains, such as freight and distribution—logistics firms are under pressure to demonstrate their decarbonization bona fides.

The Company

Purolator, which is 91% owned by Canada Post, a Crown corporation, has ambitions to be the country's greenest courier, with clear net-zero emissions by 2050 target. It's well on its way with Scope 1 and 2 emissions cut by 11% in 2023—part of its ambition to cut its greenhouse gas footprint by 42.7% (from a 2020 base year) by 2030. Deeper cuts would involve sourcing 100% renewable electricity by 2030. So when Purolator earmarked \$1 billion to decarbonize its fleet and infrastructure, the company knew it had to address two challenges at each end of its business spectrum: create a low-carbon fleet that can traverse Canada's far-flung geography but also navigate its densest cities.

The Opportunity

Purolator's customers, conscious of their Scope 3 emissions, increasingly want details on the company's plans to lower its carbon footprint— from buildings to business travel emissions. The company saw an opportunity to differentiate itself from the competition, sparking a company-wide effort, led by a chief sustainability officer, to electrify delivery vehicles, divert waste from landfill and source sustainable aviation fuel. It was an everything-on-the-table approach to constraining carbon.

Purolator bought 95 new all-electric trucks in 2023, as part of its goal to electrify 60% of its last-mile delivery fleet





The Technology

Purolator bought 95 new all-electric trucks in 2023, as part of its goal to electrify 60% of its last-mile delivery fleet – approximately 3,000 vehicles across more than 60 terminals. But before rolling out electric vehicles (EVs) at scale, the company initiated pilot programs in major urban centres like Vancouver, Quebec City and London, Ont., to assess vehicle and battery performance, and infrastructure needs. This brought to the fore technical challenges unique to Canadian operations, including battery performance in cold weather. It also required Purolator to work with utilities, governments and industry experts to deploy charging infrastructure across cities.

As Purolator deployed EVs and learned more about the types of vehicles that would best fit its use case in Canada, it began collaborating directly with original equipment manufacturers (OEMs). In British Columbia, where clean fuel standards supported renewable diesel usage, it partnered with suppliers to source renewable diesel, allowing the company to reduce emissions from diesel trucks on key routes.

The transition to EVs requires robust and versatile charging infrastructure, which Purolator is typically installing inside its terminals where vehicles are parked and loaded. With a large network of 150+ of facilities across Canada, considerable investments are required to charge a growing fleet of electric vehicles. Where Purolator has been challenged with facility power upgrades, it is installing portable charging containers in their parking lots to support the continued deployment of vehicles.

The Model

Purolator’s decarbonization mandate is helping pave the way for others looking to adopt electric vehicles and low-carbon fleet solutions.

The Unlock

The multifaceted approach is unlocking Purolator’s ability to meet its fleet decarbonization goals across diverse geographic regions. In some neighbourhoods, replacing Purolator truck traffic with cargo e-bikes, reduced GHG emissions and lessened traffic congestion and noise. and accept the findings and then integrate them into existing carbon accounting programs and tools.

Purolator’s decarbonization mandate is helping pave the way for others looking to adopt electric vehicles and low-carbon fleet solutions

The Lesson

Purolator’s solution to a complex logistical challenge demonstrates that embracing adaptable technology can pave the way for overcoming barriers to decarbonization. By thinking beyond conventional infrastructure and focusing on scalable, temporary solutions, the company is staying on track with its ambitious fleet decarbonization goals.

“We were early, and we timed it well. We were able to set our sights and have all these innovations that are going to allow us to get there.”

—John Ferguson, CEO, Purolator



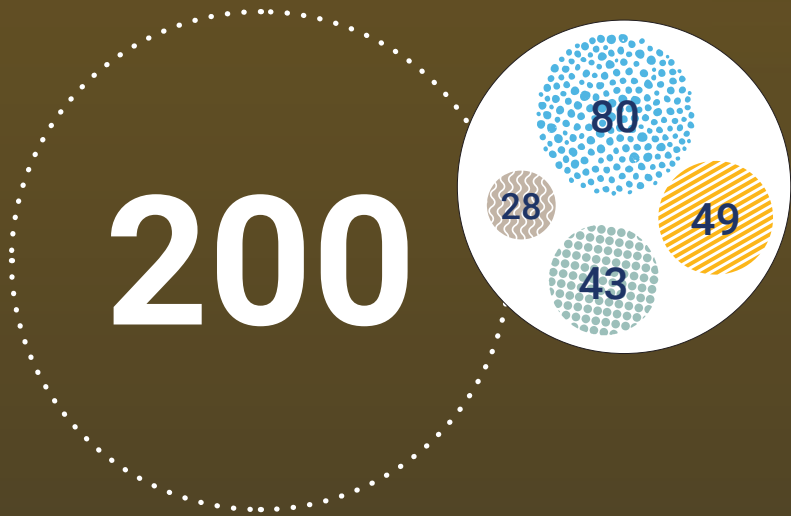
Buildings

- Climate Action Index
- Thematic Breakdown
- Historical Trends
- Key Findings
- Case Study

Neil Dankoff, Ontario

Climate Action Index

● Policy ● Capital ● Action ● Emissions



Key index driver: Residential space heating

The pace of climate action has doubled since 2019, driven by a combination of federal government policies and subsidies programs, residential building retrofits, and new non-residential construction of more energy efficient buildings. Still, the sector is not on track to hit its 2030 target of lowering emissions by 34 megatonnes (Mt). Policy had the biggest impact on the index, tripling since 2019. Consumer climate action and capital mobilization had similar-sized effects.

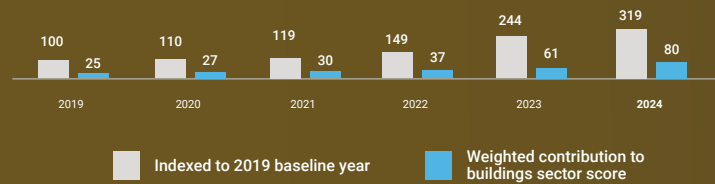


POLICY SCORE

80



The federal government's green building strategy, an increase in the federal benchmark carbon price, and greater number of provincial programs to encourage residential energy efficiency retrofits contributed to raising the policy score by almost a third from 2023.

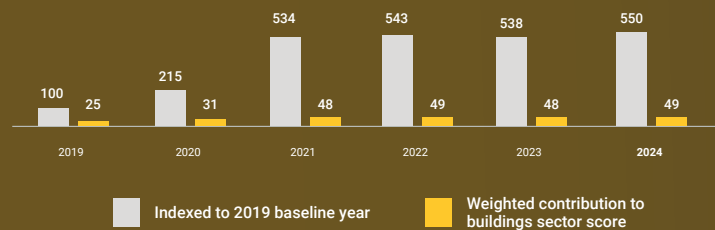


CAPITAL SCORE

49



Supply-side capital flows to decarbonize the sector continues to fall short of the annual \$5.4 billion needed to hit 2030 targets. Annual capital flows have remained largely unchanged, at roughly \$2 billion, since 2021¹. Cumulative capital flows reached \$10.2 billion in 2024², shy of the required \$32.5 billion. Despite these shortfalls, annual capital flows and the compounding effect of capital spends are recognized and rewarded in the capital score.

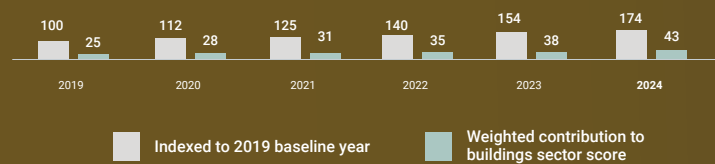


ACTION SCORE

43



The on-going electrification of residential space heating, via heat pump adoption, continues to dominate and drive up the action score, accounting for four-fifths of the increase in the year. Commercial real estate floor area that is LEED certified energy efficient or zero-carbon is increasingly playing a bigger role on an annual basis, as new supply of low emissions floor space enters service.

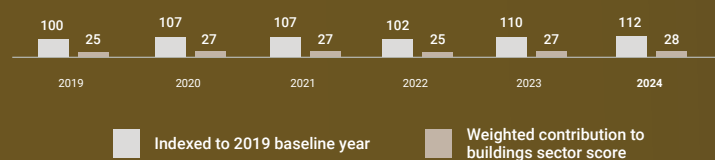


EMISSIONS SCORE

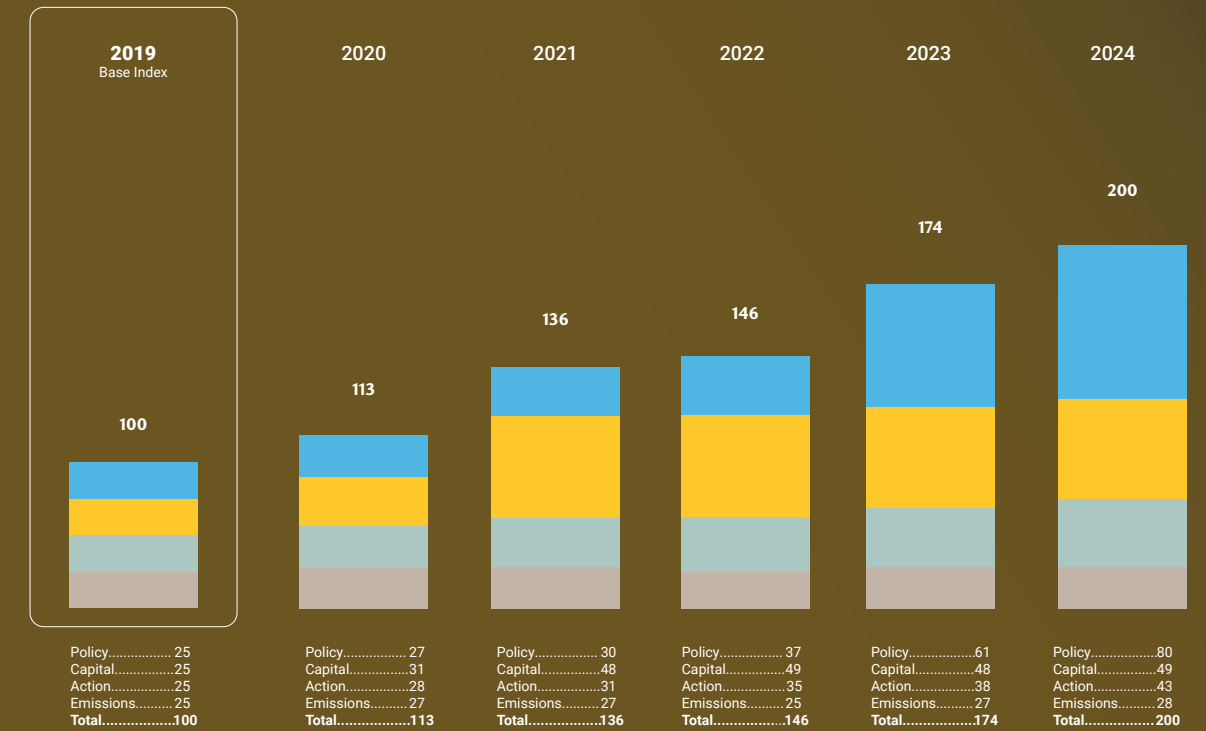
28



Emissions peaked in 2019, at 94 Mt, and have fallen 3% annually on average³. Economic growth is also decoupling from emissions, with emissions intensity falling to its lowest level in six years.



Policy Capital Action Emissions



Heat pump adoption has jumped 58% in four years⁴. Federal subsidies of \$1 billion⁵ and homeowners out-of-pocket spending of \$2 billion⁶ raised heat pump adoption to an estimated 8%⁷ of Canadian housing stock in 2024.



Five provinces now have green building requirements. The rules cover various parts of the building value chain, from green procurement to construction. Quebec's stringent policy includes banning oil-powered furnaces in existing buildings at the start of 2024⁸.



The federal government released its long-awaited Green Building Strategy. Rolled out in June 2024, Ottawa's roadmap borrows heavily from existing provincial policies but lacks financial commitments. Its key planks include accelerating new green construction and expanding low-carbon district energy systems.



One per cent of commercial space is now net-zero⁹. LEED Zero Carbon Build certification, increased by five-fold from 2023, and ten-fold from four years earlier, reflecting market demand for more energy efficient and low emissions buildings^{10,*}



Crediting low carbon district heating and cooling. Global carbon credits for low-carbon district energy systems may be on the rise in 2025, after Tabreed's Abu Dhabi district cooling plant achieved Verified Carbon Standard and became eligible to trade carbon credits¹¹.



Case Study

CMHC: The new climate code

The Issue¹²

Canada's buildings sector needs to build more homes to alleviate the housing crisis, while making them energy efficient, low-carbon, and resilient amid a worsening climate crisis. The push could have a big impact as buildings are the country's third-largest source of greenhouse gas emissions, generating roughly 90 megatonnes, primarily from heating and cooling.

Builders are also facing higher cost of materials and equipment, inflation, and interest rates, compounded by elevated government fees, and a skilled labour shortage. Building to greener standards can be costlier still and require changes in homebuilding in an industry notoriously slow to change. Retrofitting existing buildings could also be cumbersome if tenants need to be displaced. The Canada Mortgage and Housing Corporation (CMHC) forecasts Canada needs 3.5 million additional new homes on top of what's already being built by 2030 to restore affordability. But as the RBC Climate Action Institute estimates, without changes to existing practices, adding that stock could contribute an additional 18 Mt of emissions annually.

Developing more energy-efficient buildings cost-effectively is going to be critical in meeting Canada's climate goals.

The Company

CMHC, an 80-year-old federal Crown corporation with a mandate to improving access to housing, is also charged with contributing to two federal programs: the National Housing Strategy that aims to build affordable and sustainable housing, and the Canada Green Buildings Strategy, a federal plan to improve energy efficiency in homes and buildings through funding, financial incentives, and phasing out oil heating systems in new construction. The latter dovetails with the country's overarching goal to reach net-zero by 2050.

More than

250,000 units

have been approved with energy efficiency commitments, with more than 140,000 reaching Level 3 threshold

The Opportunity

Canada announced the National Housing Strategy in 2017– the year housing prices rose and then fell rapidly. Responding to the turmoil and rising need for affordability, CMHC launched MLI Flex, a mortgage loan insurance product for affordable multi-unit buildings.

Five years later, CMHC introduced the MLI Select product in 2022, a product evolution that provides builders significantly more borrowing flexibility if they inject sustainable practices in their building blueprints. Given varying standards across Canada's housing markets, CMHC wanted to incentivize a wider range of builders including those that might be early in their sustainability journey. The Crown corporation was already providing flexibilities for builders who could demonstrate that their properties would be 5% more energy efficient than the provincial/territorial requirements or the National Energy Code for Buildings, by reducing their CMHC premiums by up to 10%. MLI Select incorporated energy efficiency, affordability, and accessibility requirements (to support residents with physical, sensory, and/or cognitive disabilities). The timing was fortuitous—as inflation and interest rates began soaring and taking construction costs higher with them, borrowers flocked to the product to help absorb the higher capex shock.

The Model

MLI Select created different levels across categories of affordability, energy efficiency, and accessibility for borrowers to meet, with a certain number of points awarded based on how energy efficient their building is compared to the National Energy Code for Buildings. For new construction, borrowers would reach Level 1 if they exceeded building code requirements by 20%, Level 2 by 25%, and Level 3 by 40% through a points-based system.

The more points a borrower can rack up, the greater the incentives they can access to reduce the cost of borrowing, including longer amortization periods and higher loan-to-value ratios.



Similar to its other mortgage loan insurance products, MLI Select is facilitated through CMHC’s approved lenders, who are responsible for verifying developers’ commitments.

Borrowers can also MLI Select stack with other programs for which they’re eligible—for example, the Apartment Construction Loan Program (ACLP), a financing program from the federal National Housing Strategy that is delivered by CMHC. The ACLP provides favourable terms and low-cost financing to support the construction of rental housing.

The Unlock

CMHC did extensive consultations with the buildings sector before MLI Select’s launch to evolve the MLI Flex product and encourage applicants to achieve greater climate gains.

CMHC’s status as a Crown corporation gives it the leeway to offer products focused on social and environmental) good. In delivering its commercial mortgage loan insurance, CMHC can balance risks and return while supporting certain social policy objectives.

The product has been immensely popular with developers, prompting CMHC to adjust its processes to meet the operational demand.

More than 250,000 units have been approved with energy efficiency commitments, with more than 140,000 reaching Level 3 threshold. Over 100,000 of the total approvals are in Quebec alone.

The Lesson

The high uptake of MLI Select surprised even CMHC’s product strategy teams, revealing a change in attitude with the right incentives and supports.

The CMHC team is now exploring ways to improve the product, including tailoring their approach to specific regions as what works well in British Columbia may not in New Brunswick. A test will be to create a model that does not advantage one jurisdiction over another.

The focus on customer experience is serving the agency well, too. In 2023, 39% of all the dwelling units it supports were climate compatible, surpassing its target of 14% – driven by MLI Select.

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39%

of all the dwelling units it supports were climate compatible, surpassing its target of 14% – driven by MLI Select

“There’s a recognition that there is a cost to delivering more energy-efficient buildings, there’s recognition of markets being different, of regulations being different. It was important to give borrowers some choice around what outcomes to pursue and what flexibilities would come with that.”

— Richard Cho, Advisor, Risk Management, Strategy, and Products, CMHC



Electricity

- Climate Action Index
- Thematic Breakdown
- Historical Trends
- Key Findings
- Case Study

Climate Action Index

● Policy ● Capital ● Action ● Emissions



Key index driver: Alberta’s coal phase-out

One of Canada’s best performing sectors on climate action has seen environmental activity more than double compared to 2019. The surge in activity was driven by Alberta’s coal phase-out, growing adoption of wind and solar power¹, and the federal government’s substantive fiscal support. Activity levels shot up again after peaking in 2022—a year marked by a record 85% non-emitting power generation in Canada.

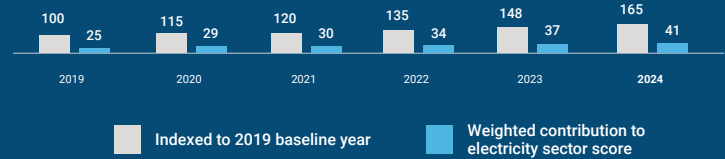
Marc Gilbert, Manitoba

POLICY SCORE

41



The finalization of the Clean Electricity Regulations (CER) was the most notable policy change in 2024. In a concession to provinces, the final regulation extended the sector's net-zero target by 15 years to 2050, with more flexibility for natural gas during peak load.

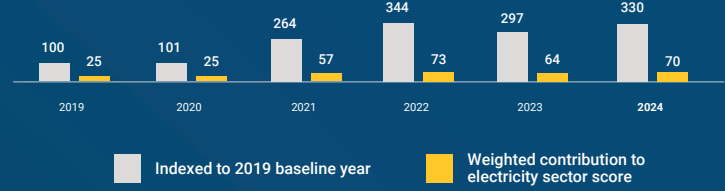


CAPITAL SCORE

70



Private sector capital expenditures were down slightly², with capex from coal-to-gas conversions largely completed in 2022/2023. The proposed Clean Electricity Investment Tax Credit, budgeted at over \$25 billion until 2034, should send the capital index higher over time.

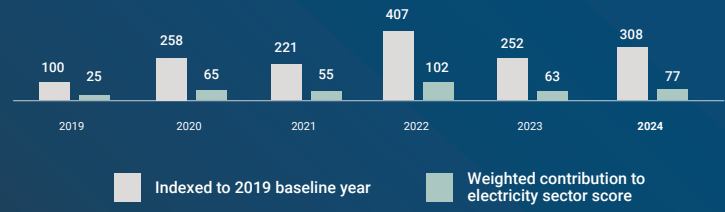


ACTION SCORE

77



The action score rose as Alberta's coal generation declined 70% in tandem with the province's full phase-out of coal³. The score, however, was partially weighed down by slower development of solar and wind projects, with capacity additions falling by 35% in 2024, compared to 2023⁴.

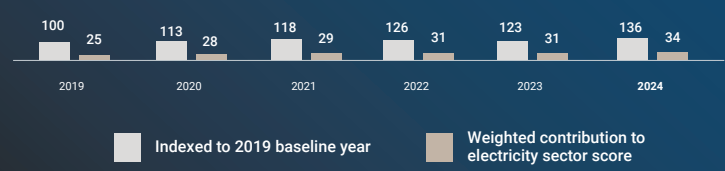


EMISSIONS SCORE

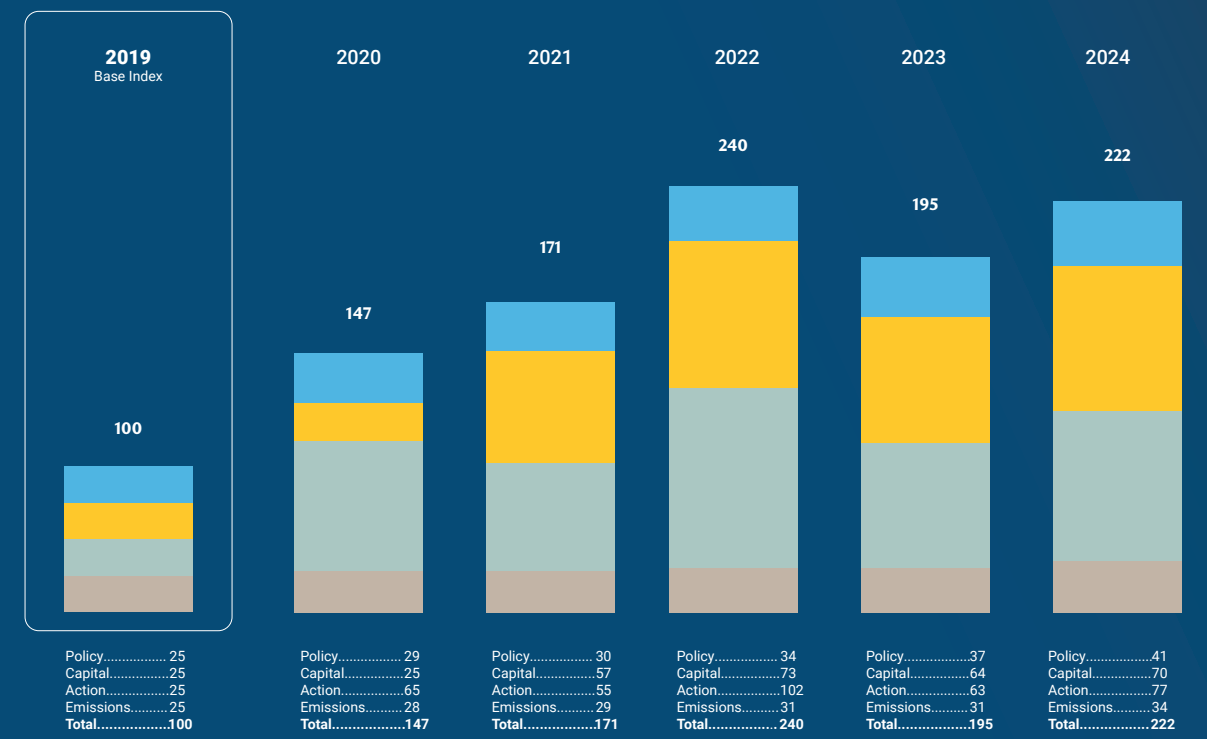
34



We estimate absolute electricity emissions declined by about 10%, in 2024 compared to 2023⁵. The decline was predominantly due to the removal of over six million tonnes of coal-based emissions year-on-year from Alberta⁶.



Policy Capital Action Emissions



Climate capex reached \$8 billion in 2024, up 3x from 2019⁷. Federal investment tax credits for clean power and the build out of wind and solar projects, primarily in Alberta, drove emissions reduction.



Alberta is coal free, six years ahead of schedule. Saskatchewan, Nova Scotia and New Brunswick remain the only coal-dependent provinces. For Atlantic Canada, expanding renewables capacity and keeping costs manageable for rate payers will remain a challenge.



Growth in renewable capacity fell 35% in 2024⁸. Alberta's seven-month renewables moratorium increased uncertainty around project development, impacting over 7 gigawatts of projects under development⁹. Purchase power agreements in Alberta in 2024 were down 95% compared to the previous three years¹⁰.



The sector is now Paris-agreement compliant. Emissions in 2024 are projected to be 60% lower compared to 2005¹¹, ahead of the 40-45% drop by 2030 as targeted under the Paris Agreement.



Natural gas remains critical to provincial grid expansion. Ontario's latest forecast regards natural gas central to the power mix until refurbished nuclear power takes over by around 2040¹². Alberta and Saskatchewan also view natural gas central to grid reliability and expansion plans. Across Canada, natural gas will likely account for an additional 8-12 megatonnes of emissions by 2040 relative today¹³.



Case Study

Jule: How micro grids are powering EVs

The Issue¹⁴

Provincial utilities are grappling with twin long-term challenges: adding capacity and maintaining a low-carbon grid. They also have medium-term imperatives: managing outages brought on by extreme weather, unseasonal peaks in power demand, and the ability to respond to new energy demands such as electric vehicles and data centres.

The Company

Founded in Toronto in 2009, Jule was one of the first companies in North America to integrate lithium-ion batteries into the grid for backup power during outages, in collaboration with Toronto Hydro, and to deploy a battery-buffered fast charging system for electric vehicles across the Trans-Canada Highway in 2018. Jule’s micro-grid-based solutions not only expand EV charging infrastructure but also enable utilities to improve load management, load forecasting, minimize grid input, and reduce high demand charges.

Originally an energy management company offering battery storage and software for energy management solutions, Jule expanded in 2018 to offer EV charging and take advantage of the spate of EV-related infrastructure incentives being offered by all levels of governments across Canada and the U.S. Its energy-management solutions target industries such as utilities, retail, auto dealerships, hospitality, and fuel/rest stops.

The Opportunity

To handle increasing electrification, utilities levy demand charges on customers who use electricity above certain thresholds during peak consumption, often sourced from carbon-intensive natural gas. These charges, designed to recover infrastructure and operation costs for delivering higher load, have become a significant financial burden for high-demand users like fast EV charging facilities.

In British Columbia, for example, demand charges can make up as much as 80% of total electricity costs for operators of Level 3 DC fast chargers.

Jule addresses this challenge with a solution centered around battery storage. By dynamically charging batteries at an optimal grid capacity and during off-peak hours, operators can store energy when costs are most favourable. During peak periods, the stored energy is discharged at amplified power levels allowing operators to meet high-power demands without incurring excessive utility charges.

The company’s battery-buffered EV chargers can deliver up to 350 kW of power per port, enabling fast and efficient charging. Complementing this hardware is an internally developed energy management software that optimizes the performance of batteries and chargers, providing real-time analytics and actionable insights.

In B.C., demand charges can make up as much as

80%

of total electricity costs for operators of Level 3 DC fast chargers—Jule addresses this challenge



The Model

The company sources battery cells from abroad but manufactures the batteries and charging systems locally in Toronto, develops its own software solutions, and offers project management services for a complete solution.

It offers three models: host-owned and paid; energy-as-a-service where the site owner pays Jule a subscription fee but operates and earns revenue from the charging systems; and a fully Jule-owned and operated site at no cost to the property owner.

Jule is also expanding its reach into industries such as real estate development, business parks, multifamily housing, and fleet operations.

The Unlock

Jule became vertically integrated out of necessity. As it tried to source various parts of its supply chain, the company realized market offerings lacked what it needed—from charger hardware and software to installation services. That led to an end-to-end energy management solution that can maintain 97% charger uptime. The high uptime has an added benefit of qualifying Jule for various government funding programs, such as the Zero Emission Vehicle Infrastructure program administered by Natural Resources Canada, and the National Electric Vehicle Infrastructure program in the U.S.

The company has also benefited from technology improvements. Silicon carbide has emerged as a preferred material over traditional silicon, with significant advantages for high power EV charging, including a higher power density that means more energy can be delivered with smaller and lighter components in a more compact system—a game-changer in dense urban centres such as Toronto. Material costs are also starting to drop as it scales across EV supply chains.

Technology shifts mean Jule can deliver more energy in a more compact system—a **game-changer in dense urban centres such as Toronto**

The Lesson

Jule attributes its growth to its ability to pivot quickly, develop an expertise in system integration, and leverage government programs. It has also learned to work within the existing electrical infrastructure system and complement utilities. As the latter steadily works through system upgrades and infrastructure expansion, Jule provides them with access and visibility into its sites, which helps amplify existing infrastructure and reduce overhead.

“It’s an infrastructure game—strategic electrification will drive economic growth and support sustainable business development.”

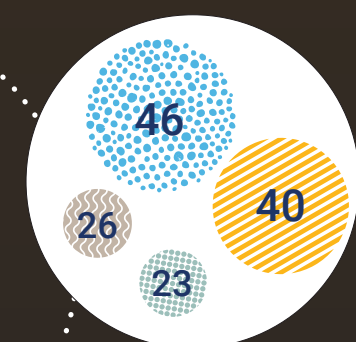
— Monsoon Fu, director of product and innovation, Jule



Climate Action Index

● Policy ● Capital ● Action ● Emissions

135



Key index driver: CCUS tax credits

Climate progress slipped slightly across heavy industry, but is up by roughly a third over the past five years. For several hard-to-decarbonize industries—including cement, iron and steel, and petrochemicals—progress has been driven by capital flows and policy advancement. Emissions and action scores are relatively muted as advanced technologies and alternative fuels and feedstocks are at a nascent stage.

Heavy Industry

- Climate Action Index
- Thematic Breakdown
- Historical Trends
- Key Findings
- Case Study

Mitchell Milbury, New Brunswick

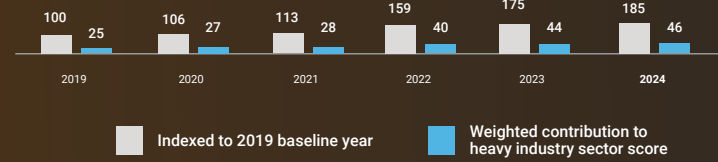


POLICY SCORE

46



Progress was mostly driven by the federal carbon price bump, with additional support from the rollout of provincial industrial decarbonization programs and legislation of key incentives such as the CCUS investment tax credit.

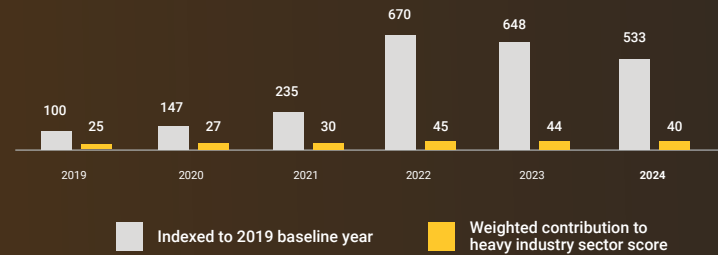


CAPITAL SCORE

40



A drop in private investment flows to decarbonize Canada's heavy industries drop, amid a broader slowdown in climate-related venture capital, saw the capital score drop¹. These investments had driven the capital score higher in 2022 and 2023. However, government subsidies continue to contribute positively to the overall score.

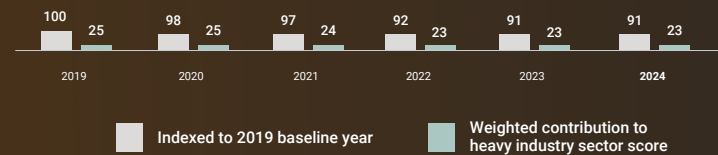


ACTION SCORE

23



The continued use of natural gas in industries such as iron and steel, and cement, has kept the sector score flat over the past three years.

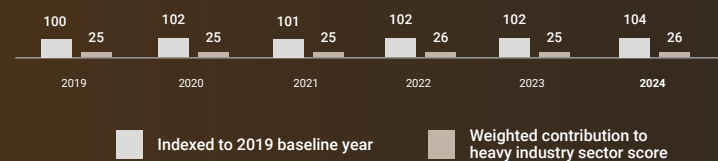


EMISSIONS SCORE

26



Absolute emissions and emissions intensity relative to GDP were largely unchanged over the past few years, leaving the index flat².

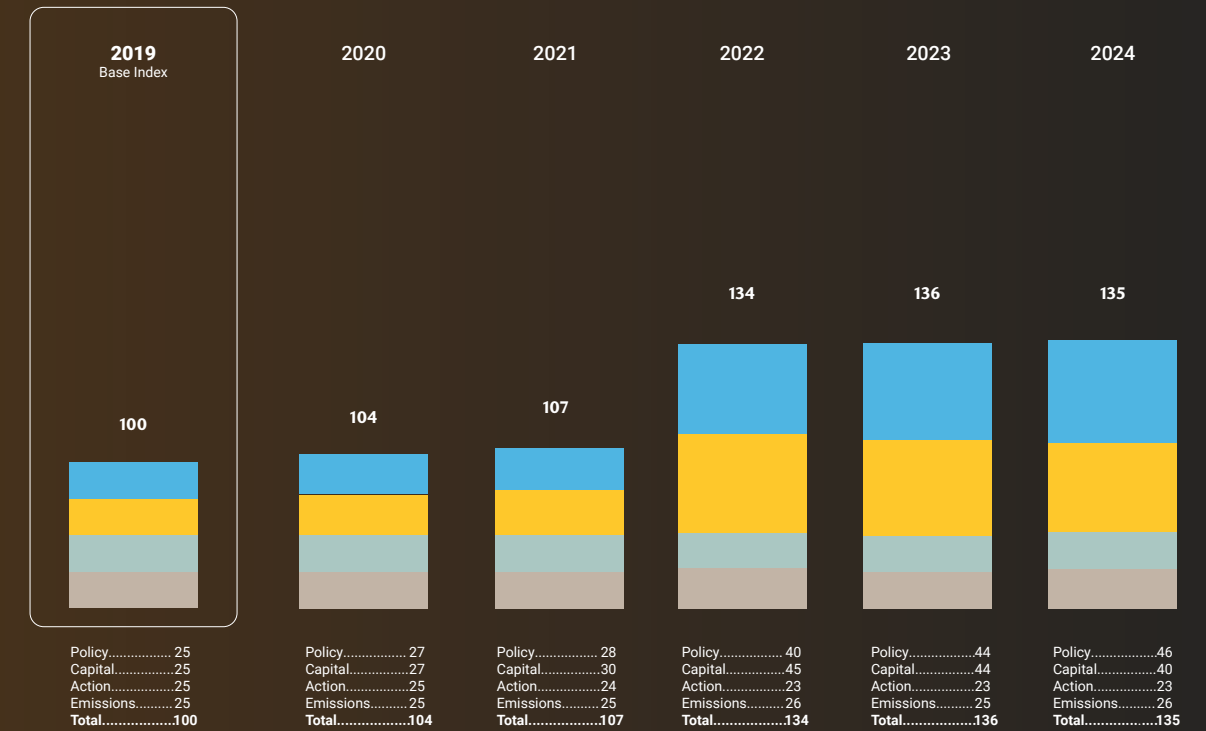


Policy

Capital

Action

Emissions



Provinces spurred deployment of low-carbon projects. The CleanBC Industry Fund and Emissions Reduction Alberta enabled \$300 million in financing for research and development, mine electrification, waste heat recovery, and the utilization of biomass for industrial heating, and other initiatives³.



Coal consumption fell 36% in cement and 40% in the steel industry as part of their energy transition⁴. But the continued use of natural gas in certain industries that require high heat and high carbon feedstocks make them especially challenging to decarbonize.



Greener projects are on the horizon. Shell unveiled its plans to build Polaris, a carbon capture project, at its Scotford facility in Alberta⁵. The project aims to abate more than half a million tonnes of CO₂ emissions. The Carbon Capture Utilization and Storage (CCUS) investment tax credits, that came into force in 2024, could spark more capital flow in carbon capture projects.



Cleantech entrepreneurs are driving innovation. Companies focused on carbon capture materials, low-carbon hydrogen, and other technologies, raised a combined \$650 million on average over the past two years, before falling to \$158 million in 2024⁶.



Offtake agreements are bringing certainty to high capex projects. Investments and offtake agreements from investors into companies such as Canada Nickel and Rio Tinto's Elysium joint venture, signal a new source of capital and market interest for low-carbon industrial products.



Case Study

Canada Nickel: The low emissions mining model

The Issue⁷

Critical minerals such as nickel, lithium and cobalt are vital for the acceleration of energy transition. But their extraction is a carbon-intensive process, which could become especially problematic as the world quadruples mineral production for clean energy technologies by 2040, according to International Energy Agency projections.

Mining also accounts for 2% of Canada's emissions and 15% of the country's heavy industry footprint. With the Canadian government eager to tap the country's vast mineral resources to build electric vehicle batteries, solar panels and wind turbines, industry players are exploring innovative ways to develop new mines without adding to Canada's carbon footprint.

The Company

Founded in 2019, Canada Nickel is a relatively small Toronto-based mining company. Its flagship Crawford Nickel-Sulphide Project, in northern Ontario, is one of the world's biggest nickel projects under way, with an estimated production of 1.6 million tonnes nickel and 24,000 tonnes of cobalt over its life. Currently under regulatory review, the \$3.5 billion project in the Timmins region could potentially begin in 2027, extending Canada's reputation as a budding hub for the EV supply chain.

Canada Nickel's **\$3.5 billion** project in the Timmins region could potentially begin in 2027, boosting Canada's reputation as a budding hub for the EV supply chain

The company had to make a call very early during its inception in 2019: should it build a net-zero carbon company from the outset, or focus on mining nickel, seeing it as critical to decarbonization? It chose the harder, more expensive route of building a "net negative carbon" company that would power electric vehicles.

The Technology

"Ultramafic" rocks, which naturally absorb and sequester carbon, did some of the heavy lifting for the company's "net-zero" model. (Canada Nickel holds NetZero Nickel, NetZero Cobalt and NetZero Iron trademarks across several jurisdictions).

But to help nature along, Canada Nickel developed a proprietary In-Process Tailings (IPT) carbonation, which involves injecting CO₂ into tailings generated by ore milling. The tailings could be one of Canada's largest carbon storage facilities, with 1.3 million tonnes of carbon storage annually—roughly 12% of Canada's mining emissions.





The Opportunity

North America’s hopes for expanded production rests on Canada’s nickel reserves—the seventh largest in the world—to make battery grade nickel sulfate that power electric vehicle batteries. In addition, “net-zero” nickel could give Canada a competitive edge in a world of rising environmental trade tariffs such as the EU’s Carbon Border Adjustment Mechanism. Canada Nickel aims to capture that opportunity, and leverage Crawford to spawn a low-carbon industry in the emerging Timmins-Cochrane mining district, with refining capacity of 80,000 of tonnes of nickel for third parties and storage capacity of 20 million tonnes annually.

North America’s hopes for expanded production rests on Canada’s nickel reserves—the seventh largest in the world—to make battery grade nickel sulfate that power electric vehicle batteries

The Unlock

Eager to cut their own Scope 3 emissions, deep-pocketed institutions have come calling: Agnico Eagle (with an 11% stake in Canada Nickel), Samsung SDI (8.7%) and Anglo American (7.6%) are early investors, while Export Development Canada has expressed an interest in providing long-term debt loan of up to US\$500 million. In addition, Canada Nickel aims to tap the federal government’s refundable tax credits for carbon capture.

Licensing the technology to other producers, especially those in iron- and magnesium-rich rocks that can store CO2 in their mine tailings, can further create a decarbonizing ripple effect cascading across the wider industry.

But Canada Nickel’s net-zero math partially depends on Ontario’s grid. The province’s low-carbon electricity, generated through nuclear and hydro facilities, has allowed the junior miner to plan with clean power at its heart.

The company has also deployed electric shovels and trolley-assisted haul trucks to minimize diesel use, and ensure its operations remain low-carbon independent of the provincial grid’s energy mix. The company’s direct emissions fell 76% from 2023 to 2022, as it cut diesel gasoline and jet fuel consumption.

The low-carbon footprint, combined with 50 tonnes of CO2 storage for every tonne of nickel produced, would make Canada Nickel one of the world’s cleanest suppliers of critical minerals.

The Lesson

Sustainability is now a competitive advantage in the carbon-intensive mining sector. Canada Nickel’s early decisions to embed carbon capture technology in its business model attracted institutional investors with offtake agreements. It also allowed the company to tap the government’s green subsidies and incentives, bringing much-needed financial certainty and flexibility to the project.

“Investors are looking for novel ways to help solve the carbon issue for the planet. Having a negative carbon footprint mining operation is pretty unique, globally.”

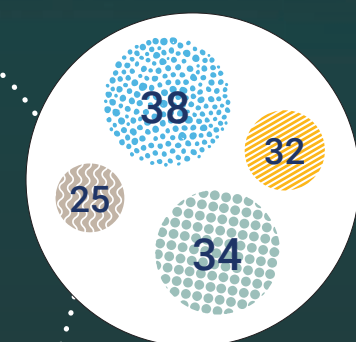
— Mark Selby, CEO, Canada Nickel



Climate Action Index

● Policy ● Capital ● Action ● Emissions

129



Key index driver: Efficiency gains

Climate progress inched up again in 2024, and is now up 29% in the past five years, with steady progress from diesel-use efficiency and fertilizer management plans on farms. Climate policy, especially from the federal government, has been a catalyst for capital investments and on-farm action. This activity has yet to make a dent in emissions as annual efficiencies have not tipped the scale, disruptive technologies are not mainstreamed, and current GHG accounting does not capture all climate innovations on farm¹.

Agriculture

- Climate Action Index
- Thematic Breakdown
- Historical Trends
- Key Findings
- Case Study

Neil Dankoff, Ontario

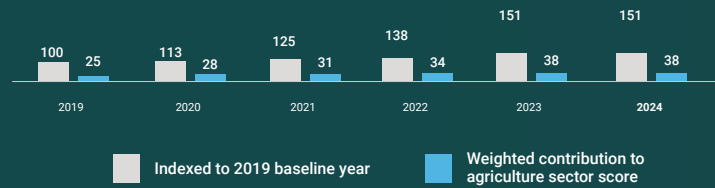


POLICY SCORE

38



The index barely moved in 2024, but it has seen significant policy action in the past few years. Starting in 2020, climate policy kick-started activity in the index with the announcement of the fertilizer emissions target. This was followed by the launch of the Sustainable Agriculture Strategy development process in partnership with industry in 2022, which is now in limbo as key industry partners have pulled out of the process².

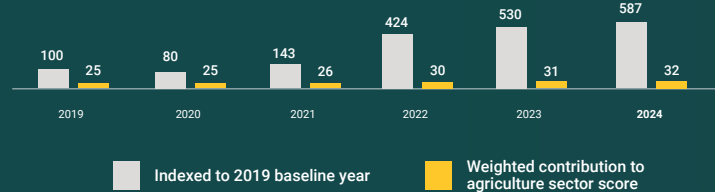


CAPITAL SCORE

32



The capital score got a bump over the past three years from the On-Farm Climate Action Fund and a \$329 million top-up to the Agricultural Clean Technology program, coupled with private investments in technologies and products that improved energy efficiency and provided alternative low-carbon agri-inputs³. These investments have driven the capital score up 28% over the past five years.

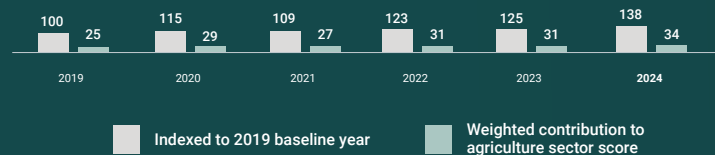


ACTION SCORE

34



A 10% increase in climate action in 2024 compared to 2023 was driven by efficiency gains in fuel use and animal production, and advanced fertilizer management, which is propped up by long-term incremental improvements⁴. While the trend is positive, widespread action is moving at a slow pace, as climate innovations work their way across Canada's nearly 190,000 farms.

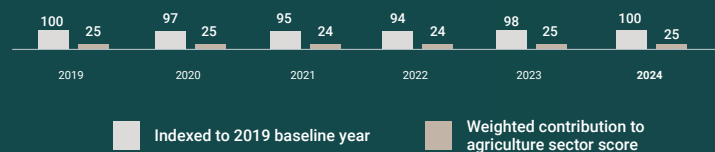


EMISSIONS SCORE

25



Actions have yet to tip the scale, with emissions estimated to have flatlined at 69 megatonnes in 2024. However, cropland carbon stocks have fluctuated due to a 2021 drought in the Prairies, that led to a decline in the emissions score as croplands switched from a carbon sink to a carbon source in 2022⁵.

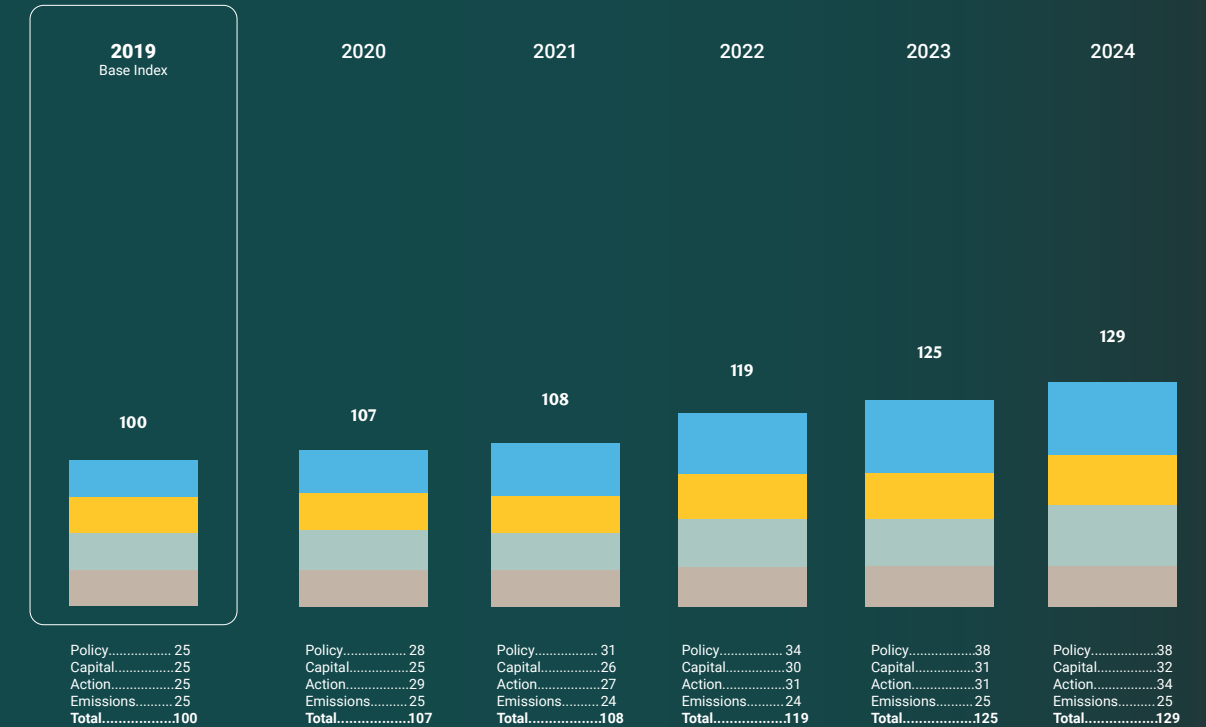


Policy

Capital

Action

Emissions



Substantial climate spending has yet to translate into emission cuts. The federal \$704 million On-Farm Climate Action Fund and other fiscal supports are encouraging adoption of sustainable practices. The supported actions are projected to draw down approximately 11 Mt CO₂e by 2030—but agriculture is still off course⁶.



Farmers have roughly tripled adoption of programs that optimize the use of carbon-intensive fertilizers over the past five years. On-farm diesel use continues to drop and animal production efficiencies such as improvements in feed rations are optimizing meat and dairy production, creating advancements in on-farm climate action. Incremental improvements may not spark excitement but are a critical piece of agriculture's contribution to climate action and productivity⁷.



Climate-tech capital deployment has been above \$100 million annually since 2022, but spread thin. Industry investments in innovations such as alternative proteins and GHG tracking software are climbing but the dilution effect is limiting breakthroughs that would result in widespread adoption of emission cutting practices⁸.



Companies are shifting their decarbonization strategies to a “farmer-first” approach. PepsiCo's Pep+ program, Agropur's Sustainable Farms Program, and Oatly's F.A.R.M., collectively signal industry efforts to build a buffet of sustainable agriculture program options that match project design with regional context and needs of farmers.



The gold standard for GHG emissions accounting and reporting will be released in early 2025. If the forthcoming GHG Protocol Land Sector and Removals Guidance is practical and addresses accounting ambiguities, it should speed up corporate action by providing consistency between reporting companies' sustainable agriculture programs and Scope 3 accounting standards.



Case Study

Semex: The quest to quash methane with genetics



The Issue¹⁰

Beef and dairy are vital for Canada's economy and are staples in our diets, but cattle-raising is the largest source of agriculture emissions in the country.

While farmers and agri-businesses are doubling down on sustainable practices, methane emissions—driven in large part by cattle's natural digestive process, known as enteric fermentation—have proven challenging to abate.

Enteric fermentation accounts for 27 megatonnes (Mt) of CO₂e emissions each year in Canada, (39% of the agriculture sector's total footprint) with dairy cattle alone contributing 4 Mt.⁹

The Company

Guelph-based Semex is a farmer-owned breeding and genetics company founded in 1974 with annual revenues topping \$180 million. The company offers animal semen, embryos, breeding services, and software to farmers in more than 80 countries. The company and its research partners leverage technological advances and big data to help customers breed cattle with a lower methane footprint.

The Opportunity

In the early 2010s, University of Guelph researchers began exploring ways to improve feed efficiency and reduce methane emissions in dairy cattle. But GreenFeed technology considered to be the world's most accurate tool for measuring on-farm methane emissions, was too expensive to scale.

The researchers tapped Guelph-based Lactanet to see if their existing national milk database, collected using mid-infrared (MIR) spectroscopy for insights on herd performance and milk quality, could also be used for providing insights on methane production. Comparing Lactanet's MIR datasets with data on methane production collected directly by the GreenFeed system revealed a striking discovery: MIR data already collected to improve milk production can also be used to accurately predict a cow's methane emissions.





Marc Gilbert, Manitoba

The Technology

As a next step, Semex joined the effort to create the world’s first genetic evaluation—the Methane Efficiency trait—to cut methane emissions in Holstein, Canada’s largest cattle breed.

Between now and 2050,
herd emissions can be
cut permanently by

20-30%

Semex provides farmers with the ability to test their animals’ DNA and rank them based on their methane production. The company publishes rankings of animals based on various traits that farmers can use to select bull semen and/or embryos and make breeding decisions. Each new generation of cows selected for methane efficiency would reduce emissions by 2-3%. Semex predicts that between now and 2050, herd emissions can be cut permanently by 20-30% with this trait.

The Model

Currently, there is little demand to raise methane-efficient cattle. Semex and its collaborators are creating the demand by first making the Methane Efficiency trait accessible to farmers. To incentivize farmers to select the trait, Semex is now taking steps to bring the innovation to the environmental marketplace, which involves engaging with agri-food companies that set climate targets and are eyeing cleantech innovations.

Semex is developing a measuring, monitoring, reporting and verification (MMRV) protocol to provide the assurance these companies need to include the Methane Efficiency trait in their climate reporting and investments in on-farm climate action.

The Unlock

Once an MMRV protocol is developed and trialled, the goal is to scale up selection for methane efficiency, which requires widespread acceptance of the protocol, enabling agri-food companies and even countries to incentivize and account for the trait in a credible, accurate, and cost-effective way towards climate targets.

To get there, Semex and its partners are demonstrating that emissions are being reduced with the trait through the development of the MMRV protocol reviewed by experts and supported with peer-review publications that outline how emission reductions are measured and verified.

That’s the easy part. Lactanet’s database of more than 19 million milk samples using MIR accounts for 90% of milk records since 2018 in Canada, which underscores its track record of emission reductions data. A bigger challenge is to educate and train those not steeped in genetics to review, understand, and accept the findings and then integrate them into existing carbon accounting programs and tools.

The Lesson

Scaling new climate innovations sometimes requires a dual-track approach: introduce the technology to the market, but also simultaneously build environmental market infrastructure such as MMRV protocols around the innovation to incentivize adoption.

On this dual track, Semex engaged with supply chain partners, such as retailers, early in the process to understand their needs and the burden of proof required. Given the complexity of genetics, it also involved educating the industry right at the outset. That early work in nurturing the technology, communicating with partners and potential customers helped with adoption.

It has also highlighted the importance of academia collaborating with business to bring new innovations to the market.

Semex provides farmers with the ability to test their animals’ DNA and rank them based on their methane production

“Genetics is a viable option...It’s very cost-effective to reduce emissions. And it’s permanent, so it checks a lot of the boxes.”

— Michael Lohuis, VP Research and Innovation at Semex

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Methodology

1. Climate Action Barometer

What we measured

The Climate Action Barometer is a diagnostic tool designed to track economy wide climate action across five key drivers of change. These drivers, or themes, are Policy, Capital, Action & Sentiment, Emissions and Technology. Each theme consists of progress indicators that measure key decarbonization policies and activities for that theme. The choice of progress indicators was dictated by the availability of good quality time series proprietary or third-party data.

The Barometer measures annual changes in climate action, starting in 2019. That year was chosen as the baseline as it marked the start of federal climate policies—aligned to the Paris Agreement of limiting global temperature increases to below 2 degrees Celsius above pre-industrial levels—, and data collection efforts to track climate action by governments and third-party data providers. We also wanted to limit skewing of results from pandemic-induced historic lows in emissions.

The progress indicators for each of the five themes track a combination of annual changes in stock or flows. We measure annual flows for the Action and Sentiment Emissions and Capital themes. The Policy and Technology themes are measured using a stock approach.

How the Barometer was constructed

The Barometer is constructed using a two-step approach. For each theme, we sum up the values of all progress indicators, on an annual basis. We then index the aggregate values to the baseline year and apply each theme's weight to the indexed value to derive an annual thematic score. All the thematic scores, for each year, are then added together to derive a single annual score. Each theme's weight in the Barometer, a description of its progress indicators, and additional thematic specific calculations are discussed below.

How to interpret the Barometer score

The Barometer's starting value is 100, starting from 2019. Increases in its value, in subsequent years represents a percentage change from 2019, the baseline year. For example, the 2024 score of 207 represents a 107% cumulative increase in climate action across all five themes, since 2019.

A. Policy (15% weight)

Policy scores are based on projected emissions declines, as provided by Environment and Climate Change Canada. Scores are calculated as the changes in emissions for stated Reference Case and Additional Measures scenarios, relative to 2005 levels. Land Use, Land-use Change and Forestry (LULUCF)

contributions are excluded from national emissions accounting to minimize uncertainty and variability.

Projections not available through the primary source are complemented by analyses from other sources.

B. Capital (15% weight)

Capital includes both public and private capital directed towards low-carbon technologies, measured in dollars.

Private capital tracks expenditures on renewable and clean energy, carbon capture, sales of commercial low-carbon vehicles, public charging installations, and the production of sustainable materials and clean fuels.

Public expenditures are sourced from the federal budget and the provincial budgets of the four largest provinces (Alberta, British Columbia, Ontario and Quebec). Public expenditures include program spending and tax credits.

C. Action and Sentiment (40% weight)

Action tracks business and consumer behaviour and sentiment. Business and consumer action consists of technology adoption and climate sentiment measures. Business action and sentiment contributes to 20% of the index's weight, and another 20% is derived from consumer action and sentiment.

Business technology adoption consists of renewable deployment (wind and solar), carbon capture and sequestration volumes, and adoption of low-carbon commercial vehicles. Consumer technology adoption tracks the purchase of personal electric vehicles and residential heat pumps. Each progress indicator is converted to a common unit of measurement—tonnes of carbon dioxide equivalent (CO2e) abated.

Business sentiment tracks both the percentage of the S&P/TSX Composite constituents with a stated emissions reduction target, and the challenges organizations face around capital, technology and regulations.

Consumer sentiment tracks the importance of climate relative to other issues such as housing affordability, healthcare and macroeconomic conditions. The relative rank of climate is scored between 0 and 1.

D. Emissions (20% weight)

The Emissions score tracks changes in both absolute emissions and emissions intensity. Absolute emissions are sourced from National Inventory Reports. Emissions intensity is calculated on a real GDP basis, using October 2024 data, the latest available at the end of 2024. For 2024, emissions are estimated based on historical trends and forecasting from Environment and Climate Change Canada.Changes to both absolute and intensity-based emissions are indexed and then aggregated using equal weights. Final scores are inverted, such that decreasing emissions contribute positively to the emissions score.

E. Technology (10% weight)

Technology scores track the adoption readiness of major anticipated decarbonization technologies: carbon capture and storage, hydrogen, small modular nuclear reactors, utility-scale batteries and anerobic digestors.

Each technology's adoption readiness is scored across eight criteria: price, development stage, infrastructure, technological maturity, supply chains, regulatory environment, market opportunity, and market competitiveness, illustrating the viable ecosystem for the commercial deployment of the technology through market forces. Criteria scores range from a low of 1 to a high of 4, with each technology score weighted based on its emissions reduction potential.

2. Sectoral Climate Action Indices

The Sectoral Climate Indices is a diagnostic tool designed to track sector specific climate action across four key drivers (themes) of change—Policy, Action, Capital and Emissions—, across six sectors: agriculture, buildings, electricity, heavy industry, oil & gas, and transportation.

Each theme's contribution to each sector's index score is equally weighted at 25%. Similar to the Climate Action Barometer, each theme consists of progress indicators that measure key decarbonization policies and activities for that theme. The choice of progress indicators was dictated by the availability of good quality time series proprietary or third-party data.

The measurement timeframe is from 2019 to 2024. Progress indicators track annual changes in stock or flow. Data values for 2024 are estimates, based on projections or annualized year-to-date data, if applicable. Where data for a given year is unavailable, estimates are derived based on projections or annualized year-to-date data. The index values are calculated and derived using the same approach as the Climate Action Barometer. Each

Agriculture

- On farm diesel use
- 4R Nutrient Stewardship Plan
- Head of cattle
- Dairy cattle efficiency
- Average cold dressed weight of meat production
- Tillage

Buildings

- Residential heat pump adoption
- New or retrofit of industrial, commercial and institutional (ICI) buildings that are LEED certified
- New ICI buildings constructed with low-carbon building materials

Electricity

- Capacity additions in solar and wind power
- Reductions in coal-powered electricity generation

theme's index weight, a description of its progress indicators, and additional thematic specific calculations are discussed below.

A. Policy (25% weight)

Policy is scored both qualitatively and quantitatively across three policy mechanisms:

- i) Carbon pricing
- ii) Fiscal spending
- iii) Non-fiscal support (regulations, targets, etc.)

Carbon pricing references changes in the federal benchmark carbon price. Scoring is a function of both the nominal price of the carbon tax (i.e., increasing yearly towards \$170/tonne by 2030) and the scope of greenhouse gases (GHG) coverage subject to the carbon tax.

Fiscal spending is qualitatively scored and takes into account direct and indirect spending by the federal and provincial governments.

Non-fiscal support encompasses policy measures impacting climate action. A maximum of three measures are selected and scored on policy progress, e.g., issuance of consultation paper, draft legislation and/or regulations, enacted legislation/ regulations. Scoring is done both at the federal and provincial levels.

B. Action (25% weight)

The Action theme tracks each sector's key climate mitigation practices aligned with Canada's official National Inventory Reports (NIR).

Action metrics are aggregated as a physical metric, such as square footage for buildings or megawatts for electricity. If metrics cannot be aggregated into one physical unit, either the emissions abatement potential is used as a proxy, or each specific metric is indexed and then aggregated into one composite value. The sector specific progress indicators are noted below.

Heavy Industry

- Changes in CO2 intensity of final energy consumption
- Changes in CO2 intensity of industrial production

Oil and Gas

- Changes in CO2 intensity from venting of associated gas
- CO2 sequestration from carbon capture applied to oil and gas facilities.

Transportation

- Adoption of passenger, medium- and heavy-duty electric vehicles
- Deployment of public chargers

C. Capital (25% weight)

Capital flows are aggregated across both the private and public sector.

Public sector climate spending is sourced from federal budgets and the budgets of the four largest provinces. Private sector spending includes climate-oriented private equity and venture capital fund raising and operator capital expenditures, where distinguishable.

The total dollar value of climate expenditures is aggregated and then adjusted relative to the level of capital expenditures required to achieve a net-zero transition—as outlined in [The \\$2 Trillion Transition: Canada's Road To Net Zero](#). This adjustment to derive the final Capital score provides a more accurate comparison of capital progress across the six sectors.

D. Emissions (25% weight)

The Emissions score tracks changes in both absolute emissions and emissions intensity.

Absolute emissions are sourced from NIR by economic sectors. Emissions intensity is calculated on a real GDP basis. Agriculture emissions includes LULUCF cropland emissions to track soil carbon stocks, which is proportionally weighted.

For 2024, emissions are estimated based on historical trends and forecasting from Environment and Climate Change Canada. GDP estimates are annualized year-on-year change based on October 2024 GDP data, the latest available at the end of 2024.

Changes to both absolute and intensity-based emissions are indexed and then aggregated using equal weights. Final scores are inverted, such that decreasing emissions contribute positively to the emissions score.

Independent Electricity System Operators. Pathway to Decarbonization Report, 2022.
International Energy Agency. Energy Technology Perspectives, 2024.
International Renewable Energy Agency. Renewable Power Generation Costs in 2023.
Ipsos. Earth Day, 2023, 2024.
Ipsos. Predictions 2025 report.
National Infrastructure Advisory Council: Addressing the Critical Shortage of Power Transformers to Ensure Reliability of the U.S. Grid report.
Ontario Power Generation. Annual Report, 2022 and 2023.
U.S. Energy Information Administration. Levelized Costs of New Generation Resources in the Annual Energy Outlook, 2022
Wood Mackenzie. Looking overseas: global reach of China's solar and storage industry, 2024.
And other sources listed below, under the Electricity section

Climate Action Barometer

Clean Energy Canada. Making the Grade, 2024.
Climate Action Tracker. Country Assessments, 2024.
Efficiency Canada. The Canadian Energy Efficiency Scorecard, 2024.
Gouvernement du Québec. Technoclimat.
International Energy Agency. ETP Clean Energy Technology Guide, 2024.
Pembina Institute. All Together Now, 2024.
U.S. Department of Energy. Adoption Readiness Assessment, 2024.

Agriculture

Agriculture and Agri-Food Canada. Historical Milk Production, 2024.
Emissions Reductions Alberta. Projects, 2024.
Fertilizer Canada. Fertilizer Use Survey, 2019, 2020, 2021, 2022, 2023.
Office of the Auditor General of Canada. Reports of the Commissioner of the Environment and Sustainable Development to the Parliament of Canada - Agriculture and Climate Change Mitigation - Agriculture and Agri-Food Canada, 2024.

Buildings

Alberta Energy Efficiency Alliance. Efficiency Financing for New Homes, 2024.
Building Decarbonization Alliance. Grid Implications of Electrifying Residential New Construction – Update, 2024.
Canadian Mortgage and Housing Corporation. Housing Supply Report, Spring 2024.
Efficiency Canada. 2022 Canadian Energy Efficiency Scorecard: Provinces and Territories.
Federation of Canadian Municipalities. Making Canada's Growth a Success: The case for a Municipal Growth Framework, 2024.
Green Building Council of Canada. Project Database. Heating, Refrigeration, and Air Conditioning Institute of Canada. HVACR Quarterly Statistics.
Statistics Canada. The prevalence of household air conditioning in Canada, 2023.
Task Force for Housing & Climate. Blueprint for More and Better Housing, 2024.

* These are the Canada Green Building Council certification levels. Details including definition of LEED Zero Carbon Build can be found [here](#).

Electricity

Alberta Electric System Operator. Annual Market Statistics Reports, 2019-2023
Alberta Electric System Operator. Current Supply Demand Report (accessed December 19, 2024)
Canada Growth Fund. Canada Growth Fund to Invest up to US\$100 million in Svante to Accelerate Growth (August 15, 2024)
Canada Growth Fund. Canada Growth Fund Announces First Investment (October 25, 2023)
Canadian Renewable Energy Association. By The Numbers (as of October 15, 2024)
Capital Power. June 2022 Investor Presentation
Government of Canada. Greenhouse Gas Reporting Program (GHGRP) Facility GHG Data
Heartland Generation. Heartland Generation announces completion off of coal transitions at Battle River and Sheerness Generating Stations (November 9, 2021)
Independent Electricity System Operator. IESO Active Contracted Generation List
SaskPower. 2023-2024 Annual Report
SaskPower. 2022-2023 Annual Report

TransAlta. TransAlta completes coal phaseout at Canadian facilities

Heavy Industry

Alcoa, Alcoa Announces Agreement on Industrial-Scale Demonstration of ELYSIS™ Carbon-Free Smelting Technology, 2024
Cement Association of Canada, Concrete Zero: Canada's cement and concrete industry action plan to net-zero, 2023
Canada Nickel Company, Canada Nickel Receives Equity Investment from Samsung SDI, 2024
Emissions Reduction Alberta, Emissions Reduction Alberta - Project Portfolio, 2024
Energy and Materials Research Group, School of Resource and Environmental Management, Simon Fraser University, Canadian Energy and Emissions Data Centre
Government of British Columbia, CleanBC Industry Fund Funded Projects, 2024
Natural Resources Canada, National Energy Use Database
Shell Global, Shell to build carbon capture and storage projects in Canada, 2024

Oil and Gas

Alberta Energy Regulator, Supply and Disposition of Crude Oil and Equivalent, 2024
Alberta Department of Energy and Materials, Quest Carbon Capture and Storage Project Annual Summary Report 2023, 2024
Alberta Energy Regulator, Supply and Disposition of Natural Gas, 2024
Alberta Energy Regulator, Upstream Petroleum Industry Emissions Report Industry Performance for Year Ending December 31, 2022, 2024
Canada-Newfoundland and Labrador Offshore Petroleum Board, Annual Emissions Reduction Initiatives Report, 2023
Canada-Newfoundland Offshore Petroleum Board, Total Oil Production in Barrels, 2024
Emissions Reduction Alberta, Emissions Reduction Alberta - Project Portfolio, 2024
Government of British Columbia, CleanBC Industry Fund Funded Projects, 2024
Government of British Columbia, Supply & Distribution of Natural Gas in British Columbia, 2024.
Government of Saskatchewan Ministry of Energy and Resources, The Oil and Gas Emissions Management Regulations Annual Report, 2023.
Government of Saskatchewan, Oil and Gas Statistical Reports, 2024

Transportation

Electric Autonomy. EV Rebates and Incentives, 2024.
International Energy Agency. Global EV Outlook, 2024.
Pembina Institute. Urban Delivery Trucks, 2023.
Transport Canada. Statistics on the Incentives for Medium-and Heavy-Duty Zero-Emission Vehicles Program (iMHZEV).

Endnotes

Overview

¹ Data Source: Christian Aid. [New study: Top 10 climate disasters cost the world billions in 2024](#)
² Analysis derived from the following data sources: Federal Budgets 2016 to 2024, and provincial budgets for B.C., Alberta, Ontario, and Quebec, for the same time period.

Key Findings

¹ Analysis derived from the following data sources: Canada's [National inventory report 1990-2022](#), and Canada's [Preliminary Greenhouse Gas Emissions 1990-2023](#).
² Analysis derived from the following data source: [Alberta Electric System Operator. Current and historical market reports](#)
³ Analysis derived from the following data sources: Ministry of Energy and Resources, Government of Saskatchewan [The Oil and Gas Emissions Management Regulations Annual Report 2023](#); Canada-Newfoundland & Labrador Offshore Petroleum Board [Annual Emissions Reduction Initiatives Report 2022](#); Alberta Energy Regulator [Upstream Petroleum Industry Emissions Report 2023](#); Government of British Columbia [Provincial Inventory of greenhouse gas emissions](#); Government of Newfoundland and Labrador [Historical GHG Emissions Summary 1990 - 2022](#); Alberta Energy Regulator [Alberta Energy Resource Industries Monthly Statistics 2019 - 2024](#); Government of British Columbia [Natural Gas & Oil Statistics 2008 - current](#); Government of Saskatchewan [Oil Production 2019 – 2024](#); Newfoundland and Labrador Statistics Agency [Total Oil Production, Barrels, November 1997 to Date](#)
⁴ Analysis derived from the following data sources: Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#); Statistics Canada. Table 36-10-0434-03 Gross domestic product (GDP) at basic prices, by industry, annual average (x 1,000,000)
⁵ Analysis derived from the following data sources: Government of Canada, Department of Finance, Budgets 2019-2024; Government of Alberta, Ministry of Treasury Board and Finance, Budgets 2019-2024; Canada Growth Fund, Canada Growth Fund Announces up to \$2 Billion Carbon Capture and Sequestration Partnership with Strathcona Resources.
⁶ Data source: Canada Growth Fund, [Canada Growth Fund Announces up to \\$2 Billion Carbon Capture and Sequestration Partnership with Strathcona Resources](#).
⁷ Analysis derived from the following data sources: BloombergNEF; Capital IQ.
⁸ Analysis derived from the following sources: Statistics Canada, Table: 25-10-0029-01 Supply and demand of primary and secondary energy in terajoules, annual; communications with the Canadian Steel Producers Association and the Cement Association of Canada.
⁹ Ibid

Idea of the Year

¹ Analysis derived from the following data sources: Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#).
² Analysis derived from the following data sources: BloombergNEF; Goldman Sachs Global Investment Research
³ Analysis derived from the following data sources: Statistics Canada [Canadian vehicle survey](#); Statista [Age of vehicles on roads in Canada 1990-2016](#); McKinsey & Company [The race to decarbonize electric-vehicle batteries](#); EPA [Greenhouse Gas Emissions from a Typical Passenger Vehicle](#); Driving.ca [How It Works: Making sense of EV specifications](#); BloombergNEF [When will EVs be cheaper than conventional vehicles?](#)
⁴ Analysis derived from the following data sources:

Government of British Columbia BC's energy system backgrounder; Government of British Columbia [New wind projects will boost B.C.'s affordable clean-energy supply](#).
⁵ Honda Canada, [Honda Plans to Establish Comprehensive Electric Vehicle Value Chain in Ontario, Canada](#).
⁶ Canada Energy Regulator, [Canada Energy Regulator's 2030 Emissions Reduction Plan: Clean Air, Strong Economy](#).
⁷ Analysis derived from the following data sources: Canada Energy Regulator's [2030 Emissions Reduction Plan: Clean Air, Strong Economy](#); William Noel, Timothy M. Weis et al. [Renewable and Sustainable Energy Reviews: Mapping the evolution of Canada's wind energy fleet](#); U.S. Department of Energy. [Wind Vision: A new era for wind power in the U.S.](#); Statistics Canada Table: 38-10-0163-01 [Extent and growth of contiguously settled areas](#).
⁸ Analysis derived from the following data source: Alberta Electricity System Operator [Connection Project Reporting](#), November 2024.
⁹ Analysis derived from the following data source: International Energy Agency's [Energy Technology Perspectives 2024](#).
¹⁰ Analysis derived from the following data sources: National Infrastructure Advisory Council: [Addressing the Critical Shortage of Power Transformers to Ensure Reliability of the U.S. Grid report](#); private discussions with power and utilities organizations, not-for-profits, and think-tanks at New York Climate Week.
¹¹ Analysis derived from the following data sources: CBC News [Why Quebec struck a new hydro deal with Newfoundland and Labrador](#); Hydro Quebec 2023 [Comparison of Electricity Prices In Major North American Cities](#).
¹² Hydro One: [Indigenous relations](#)
¹³ Data source: Government of British Columbia, [New wind projects will boost B.C.'s affordable clean-energy supply](#).
¹⁴ Data source: Natural Resources Canada, Major [Projects Planned and Under Construction 2023 to 2023](#).
¹⁵ Data sources: Government of Canada, [Federal Budget 2024](#) Chapter 6; Government of British Columbia, [Provincial Budget 2024](#).
¹⁶ Government of Canada, [Protecting nature: Canada's story](#)
¹⁷ Ibid
^{18, 19, 20} Ibid
²¹ Data source: [Wataynikaneyap Transmission Project](#)

Climate Action Barometer

¹ Analysis derived from the following data sources: Environment and Climate Change [Canada Greenhouse gas emissions projections](#)
² Analysis derived from the following data sources: Environment and Climate Change [Canada Greenhouse gas emissions projections](#)
³ Analysis derived from the following data sources: Federal Budgets 2016 to 2024, and provincial budgets for B.C., Alberta, Ontario, and Quebec, for the same time period.
⁴ Analysis derived from the following data source: Alberta Electricity System Operator [Connection Project Reporting](#), November 2024.
⁵ Data source: Alberta Energy Regulator [Quest Carbon Capture and Storage project - annual report, 2023](#)
⁶ RBC Business Executive Survey with Kantar
⁷ Ibid
⁸ Ibid
⁹ Analysis derived from the following data source: Emissions Reduction Alberta [Projects](#); Gouvernement du Québec [Tech-noclimat program projects](#); Government of British Columbia [CleanBC Industry Fund Funded Projects](#)

Oil and Gas

¹ Data source: [Conservative Party of Canada, More Canadian energy, not less](#).
² Analysis derived from the following data sources: Government of Canada, Department of Finance, Budgets 2019-2024; Government of Alberta, Ministry of Treasury Board and Finance, Budgets 2019-2024; Canada Growth Fund, Canada Growth Fund Announces up to \$2 Billion Carbon Capture and Sequestration Partnership with Strathcona Resources.
³ Data source: Canada Growth Fund, [Canada Growth Fund Announces up to \\$2 Billion Carbon Capture and Sequestration Partnership with Strathcona Resources](#)
⁴ Analysis derived from the following data sources: Ministry of Energy and Resources, Government of Saskatchewan [The Oil and Gas Emissions Management Regulations Annual Report 2023](#); Canada-Newfoundland & Labrador Offshore Petroleum Board [Annual Emissions Reduction Initiatives Report 2022](#); Alberta Energy Regulator [Upstream Petroleum Industry Emissions Report 2023](#); Government of British Columbia [Provincial Inventory of greenhouse gas emissions](#); Government of Newfoundland and Labrador [Historical GHG Emissions Summary 1990 - 2022](#); Alberta Energy Regulator [Alberta Energy Resource Industries Monthly Statistics 2019 - 2024](#); Government of British Columbia [Natural Gas & Oil Statistics 2008 - current](#); Government of Saskatchewan [Oil Production 2019 – 2024](#); Newfoundland and Labrador Statistics Agency [Total Oil Production, Barrels, November 1997 to Date](#)
⁵ Analysis derived from the following data source: Government of Canada, Environment and Climate Change Canada, Greenhouse Gas Emissions
⁶ Analysis derived from the following data sources: Canada Energy Regulator [Canada's Energy Futures 2021 Fact Sheet](#); Environment and Climate Change [Canada Canada's Preliminary Greenhouse Gas Emissions \(1990-2023\)](#).
⁷ Analysis derived from the following data sources: Government of Canada, Department of Finance, Budgets 2019-2024; Government of Alberta, Ministry of Treasury Board and Finance, Budgets 2019-2024
⁸ Analysis derived from the following data sources: Government of Canada, Environment and Climate Change Canada, Greenhouse Gas Emissions; Alberta Energy Regulator [Alberta Energy Resource Industries Monthly Statistics 2019 - 2024](#); [Government of British Columbia Natural Gas & Oil Statistics 2008 - current](#); Government of Saskatchewan [Oil Production 2019 – 2024](#); Newfoundland and Labrador Statistics Agency [Total Oil Production, Barrels, November 1997 to Date](#)
⁹ Analysis derived from the following data sources: Government of Canada, Canada Energy Regulator, [Estimated Production of Canadian Crude Oil and Equivalent: Statistics Canada Energy Statistics June 2024](#)
¹⁰ Analysis derived from the following data sources: Statistics Canada Table 25-10-0055-01 [Supply and disposition of natural gas](#); Canada Energy Regulator Market Snapshot: [Canadian natural gas production hits a record high in 2023, and industrial gas use continues to increase](#)
¹¹Data source: Canada Growth Fund, [Canada Growth Fund Announces up to \\$2 Billion Carbon Capture and Sequestration Partnership with Strathcona Resources](#)
¹² Data source: Government of Alberta, [Alberta's response to the federal oil and gas emissions cap technical submission](#)
¹³ All data and analysis sourced from Entropy

Transportation

¹ Analysis derived from the following data sources: Statistics Canada [New motor vehicle registrations](#); Transport Canada [Statistics on the incentives for zero-emission vehicles \(iZEV\) program](#)

² Analysis derived from the following data source: Statistics Canada [Renewable fuel plant statistics](#)
³ Analysis derived from the following data sources: Federal and Quebec Budgets for 2024.
⁴ Analysis derived from the following data source: Statistics Canada [New motor vehicle registrations](#)
⁵ Analysis derived from the following data source: Statistics Canada [New motor vehicle registrations](#)
⁶ Analysis derived from the following data source: BloombergNEF [Public charging overview database](#)
⁷ Analysis derived from the following data sources: Environment and Climate Change Canada [Canada's Preliminary Greenhouse Gas Emissions \(1990-2023\)](#); Environment and Climate Change [Canada Greenhouse gas emissions projections](#)
⁸ All data and analysis sourced from Purolator

Buildings

¹ Analysis derived from the following data sources: Federal Budgets 2016 to 2024, and provincial budgets for B.C., Alberta, Ontario, and Quebec, for the same time period.
² Ibid
³ Analysis derived from the following data sources: Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#).
⁴ Analysis derived from the following data sources: Natural Resources Canada program updates for [Canada Greener Homes Initiatives](#); Statistics Canada. [Table 38-10-0286-01 Primary heating systems and type of energy](#); Statistics Canada. [Table 36-10-0688-01 Housing stock in unit by institutional sector, housing type, dwelling occupation, dwelling type, and tenure type](#); Heating, Refrigeration, and Air Conditioning Institute of Canada [HVACR Quarterly Statistics](#).
^{5, 6, 7} Ibid
⁸ Data source: Government of Quebec, [regulations respecting oil-fired heating appliances](#)
⁹ Analysis derived from the following data sources: Canada's Green Building Council [Project Database](#) and proprietary residential, commercial and institutional real estate data.
¹⁰ Ibid
¹¹ Data source: International District Energy Association, [Blog Viewer](#).
¹² All data and analysis sourced from CMHC.

Electricity

¹ Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#)
² Analysis derived from the following data sources: Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#); Government of Alberta, [Alberta Major Projects](#); Bloomberg New Energy Finance; Capital IQ Pro
³ Alberta Electric System Operator, [Current and historical market reports](#)
⁴ Analysis derived from the following data sources: Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#); Alberta Electric System Operator, [Current supply and demand](#)
⁵ Analysis derived from the following data sources: Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#); Alberta Electric System Operator, [Current and historical market reports](#); Alberta Electric System Operator, [Current supply and demand](#); Canada Energy Regulator, [Canada's Energy Future 2023](#); Government of Canada, Environment and Climate Change Canada, [Canada's Preliminary Greenhouse Gas Emissions \(1990-2023\)](#)
⁶ Alberta Electric System Operator, [Current and historical market reports](#)

⁷ Analysis derived from the following data sources: Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#); Government of Alberta, [Alberta Major Projects](#); Bloomberg New Energy Finance; Capital IQ Pro; Government of Canada, Department of Finance, Budgets 2018-2024; Government of Ontario, Ministry of Finance, Budgets 2016-2023; Government of Quebec, Ministère des Finances, Budgets 2016-2024; Government of Alberta, Ministry of Treasury Board and Finance, Budgets 2019-2024; Government of British Columbia, Ministry of Finance, Budgets 2019-2024

⁸ Analysis derived from the following data sources: Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#); Alberta Electric System Operator, [Current supply and demand](#)

⁹ Alberta Electric Systems Operator, [Connection Project Reporting](#)

¹⁰ Business Renewables Centre, [Deal Tracker](#)

¹¹ Analysis derived from the following data sources: Canadian Renewable Energy Association, [Energy Transition – By the Numbers](#); Alberta Electric System Operator, [Current and historical market reports](#); Alberta Electric System Operator, [Current supply and demand](#); Canada Energy Regulator, [Canada's Energy Future 2023](#); Government of Canada, Environment and Climate Change Canada, [Canada's Preliminary Greenhouse Gas Emissions \(1990-2023\)](#)

¹² Government of Ontario, Ontario Ministry of Energy and Electrification, [Ontario's Affordable Energy Future](#)

¹³ Analysis derived from the following data sources: Canada Energy Regulator, [Canada's Energy Future 2023](#)

¹⁴ All data and analysis sourced from Jule

Heavy Industry

¹ Analysis derived from the following data sources: Bloomberg New Energy Finance; Capital IQ Pro; Government of Canada, Department of Finance, Budgets 2018-2024; Government of Ontario, Ministry of Finance, Budgets 2016-2023; Government of Quebec, Ministère des Finances, Budgets 2016-2024; Government of Alberta, Ministry of Treasury Board and Finance, Budgets 2019-2024; Government of British Columbia, Ministry of Finance, Budgets 2019-2024

² Analysis derived from the following data sources: Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#); Statistics Canada. Table 36-10-0434-03 Gross domestic product (GDP) at basic prices, by industry, annual average (x 1,000,000)

³ Analysis derived from the following data sources: Government of British Columbia, CleanBC Industry Fund; Government of Alberta, Emissions Reduction Alberta

⁴ Analysis derived from the following sources: Statistics Canada, Table: 25-10-0029-01 Supply and demand of primary and secondary energy in terajoules, annual; communications with the Canadian Steel Producers Association and the Cement Association of Canada.

⁵ Shell Canada, [Shell to Build carbon capture and storage projects in Canada](#)

⁶ Analysis derived from the following sources: Bloomberg New Energy Finance

⁷ All data and analysis sourced from Canada Nickel

Agriculture

¹ Analysis derived from the following data sources: Fertilizer Canada. [Fertilizer Use Survey](#), 2019-2023. Statistics Canada. Cattle and calves, farm and meat production; Statistics Canada. [Supply and demand of primary and secondary energy in terajoules, annual](#); Agriculture and Agri-Food Canada. [Historical Milk Production](#). Statistics Canada. [Number of cattle, by class and farm type](#); Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#).

² Analysis derived from the following data sources: Federal policy and budgets 2016 to 2024, and provincial policy and budgets for B.C., Alberta, Saskatchewan, Manitoba, Ontario, and Quebec, for the same time period.

³ Analysis derived from the following data sources: Bloomberg New Energy Finance; Capital IQ Pro; Federal Budgets 2016 to 2024, and provincial budgets for B.C., Alberta, Saskatchewan, Manitoba, Ontario, and Quebec, for the same time period.

⁴ Analysis derived from the following data sources: Fertilizer Canada. [Fertilizer Use Survey](#), 2019-2023. Statistics Canada. Cattle and calves, farm and meat production; Statistics Canada. [Supply and demand of primary and secondary energy in terajoules, annual](#); Agriculture and Agri-Food Canada. [Historical Milk Production](#). Statistics Canada. [Number of cattle, by class and farm type](#).

⁵ Analysis derived from the following data source: Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#); Statistics Canada. Table 36-10-0434-03 Gross domestic product (GDP) at basic prices, by industry, annual average (x 1,000,000)

⁶ Analysis derived from the following data sources: Government of Canada [National inventory report 1990-2022](#); Government of Canada [Preliminary Greenhouse Gas Emissions 1990-2023](#); Office of the Auditor General of Canada. [Reports of the Commissioner of the Environment and Sustainable Development to the Parliament of Canada - Agriculture and Climate Change Mitigation - Agriculture and Agri-Food Canada, 2024](#).

⁷ Analysis derived from the following data sources: Fertilizer Canada. [Fertilizer Use Survey, 2019-2023](#). Statistics Canada. Cattle and calves, farm and meat production; Statistics Canada. [Supply and demand of primary and secondary energy in terajoules, annual](#); Agriculture and Agri-Food Canada. [Historical Milk Production](#). Statistics Canada. [Number of cattle, by class and farm type](#).

⁸ Analysis derived from the following data sources:

BloombergNEF; Capital IQ.

⁹ Analysis derived from the following data sources: [National Inventory Report, 2024](#).

¹⁰ All data and analysis sourced from Semex.

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