

An aerial photograph of a river winding through a dense forest. The river is the central focus, with white water rapids and a mix of green and brown foliage on the banks. The forest is thick and covers the entire landscape.

Energy Transition in Canada

Pathway to the
2050 Energy System



Building a better
working world

Table of contents

Letter from EY Canada	2
Introduction	3
Climate change challenge and net-zero	3
Global energy transition context	4
The energy trilemma	7
Definition	7
Case studies	9
Application in North America	11
Canadian energy landscape	13
National and provincial energy profiles	13
Canadian energy trends and developments	15
Energy transition opportunities by industry	18
Current energy transition barriers	22
Five-Pillar Energy Transition Action Plan	23
Summary	23
Five-Pillar Action Plan	23
Pillar 1: Define the future energy system	25
Pillar 2: Improve public policy and regulatory frameworks	25
Pillar 3: Develop a funding mechanism	26
Pillar 4: Educate and guide consumer behaviour	26
Pillar 5: Activate corporate participation	26
Supporting enablers	27
Enabler A: Technology and innovation	27
Enabler B: Humans at centre	27
Enabler C: Collaboration and partnerships	28
Role of Canada in the global energy transition	29
Critical considerations for organizations to consider	31
Considerations	31
How can EY teams help?	31
Conclusion	32
Key contacts and authors	33
References	34



Letter from EY Canada

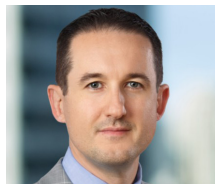
Canada and the global community have acknowledged an increased sense of urgency to address the climate change challenge. As a signatory to the Paris Agreement, Canada committed to achieving a net-zero economy by 2050, meaning that a significant amount of work remains with less than 30 years left to fulfill on those promises.

Decarbonization is one of a few key driving forces behind an immense and dynamic disruption to how society produces and consumes energy. The energy transition is the solution to achieving a decarbonized economy and, in turn, mitigating the impacts of accelerated climate change.

Canada's 2030 Emissions Reduction Plan is a notable policy platform that establishes the achievement of the future net-zero economy as a critical priority. The current sociopolitical and economic environment is in favour of pursuing the required transformation to develop more reliable, resilient, equitable and environmentally responsible energy markets. Canadian industries have an abundance of energy transition opportunities, ranging from clean electricity systems to sustainable agriculture, that should be acted on to create the desired 2050 energy system.

Looking back, Canada created a stable and world-class energy sector with a strong environmental record over the last 50 years. However, the energy transition will decarbonize value chains and bring new products to domestic and international markets, which will cause new major disruptions to traditional business models. The transition is not about abandoning the past; it's about innovating and moving forward together for a more sustainable future. Canada is facing a monumental challenge that will require change and modernization at a scale our country has not seen in a century.

We've developed the following report to provide an overview of the energy transition and to identify some of the many ways Canadian organizations could participate in this pivotal movement.



Dr. Lance Mortlock

Managing Partner, Energy
& Resources, EY Canada



Anne-Marie Hubert

East Managing Partner,
& Sustainable Finance Leader,
EY Canada



Introduction

Climate change challenge and net-zero

Decarbonization remains critical to tackling the climate change challenge and, in turn, securing a more sustainable future for all of us and future generations. In October 2022, the United Nations Environment Programme stated that, since the 26th UN Climate Change Conference of the Parties (COP26), the world has seen an inadequate amount of progress in reducing the emissions gap for 2030.¹ Global CO₂ emissions rebounded to their highest levels in history in 2022,² indicating that countries are off track to achieve their nationally determined contributions* and additional action is needed.³

At EY, we view the energy transition as an ongoing process to achieve lower carbon emissions across multiple economic sectors by taking advantage of industry-specific opportunities and developing a more sustainable 2050 energy system. This transformation will lead to significant decarbonization and, as a result, when mirrored in enough countries, may potentially reduce the pace of the climate change. Virtually all businesses and organizations must be prepared for the disruption that the energy transition will bring and reconsider their long-term strategies.

Despite a myriad of available opportunities, Canadian companies still have several complex questions around establishing a clear sense of direction in this paradigm shift:

Q1 How will the energy transition unfold in Canada and globally?	Q4 How will the energy transition balance energy sustainability, equity and security?
Q2 What is Canada's role in global energy transition efforts?	Q5 How will the Canadian energy transition be funded?
Q3 How can local industries support the Canadian energy transition objectives?	Q6 What are the required steps to enable and action the energy transition in Canada?

*Nationally determined contributions are nonbinding plans that mitigate the effects of climate change.

It will be challenging to transition from the status quo to lower carbon-intensive energy options and to adapt economic sectors to this transformation. However, the trends and developments discussed in this publication indicate that Canada is well positioned to participate in the energy transition. In truth, the transformation is arguably already underway across provinces.

Canada needs to undertake further action to deliver the energy transition on a national scale. While the country will have to navigate through various challenges to develop a more resilient, equitable and sustainable energy system, the transition is also expected to provide numerous exciting growth opportunities for Canadian organizations in the short, medium and long terms.

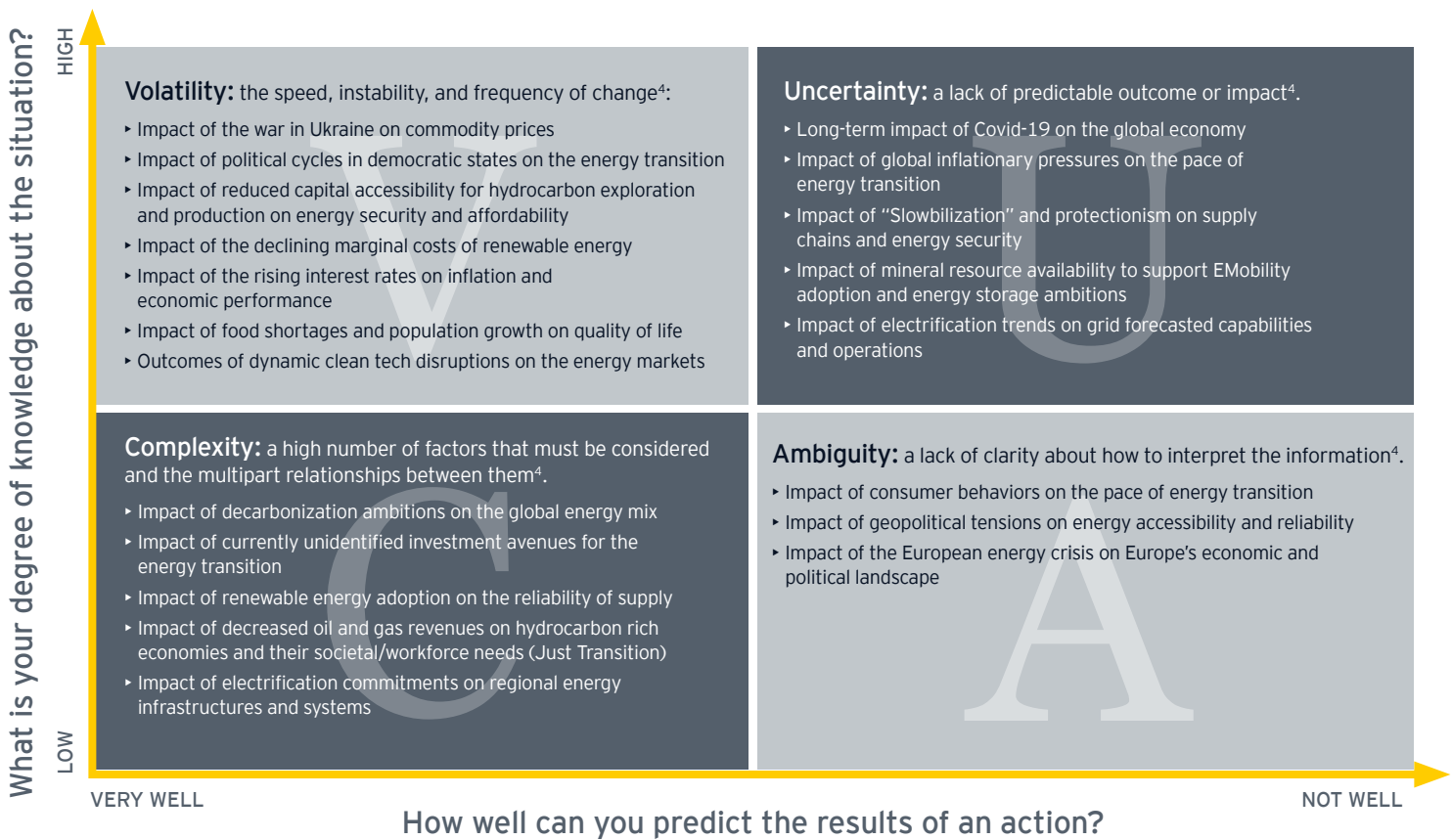
We propose a Five-Pillar Action Plan, supported by three distinct enablers, to advance Canadian net-zero aspirations and build a 2050 energy system.

Global energy transition context

Today, the world is increasingly intricate and interconnected. Simple cause and effect relationships are no longer clear or common. Strategic leaders use the VUCA framework⁴ – volatility, uncertainty, complexity and ambiguity – to better understand their operating environments, so we have similarly applied this approach to contextualize the current global state of the energy transition. VUCA organizes and streamlines various factors of a challenge into select categories to drive insights and action:

2050 energy system

A future net-zero energy system designed to tackle decarbonization and slow down the pace of climate change by being resilient, equitable and sustainable.



Volatility



The energy transition faces market turbulence that impedes and delays key stakeholder commitments to a clear decarbonization pathway. The UN announced that the transformation must be based on rapid upscaling and implementation of all available technologies, as incremental steps are no longer timely.⁵ Such change requires access to funding and stable legal and economic frameworks that continue to be challenged globally with fast-paced environments and volatilities. For instance, the war in Ukraine shook the foundations of energy systems⁶ and reinstated geopolitical competition over oil and gas,⁷ whereby global markets suffered from high inflationary environments and supply chain disruptions.

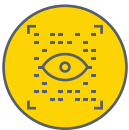
Uncertainty



The energy transition future remains difficult to confidently predict at this stage. The transition is a process and an outcome, driven by multiple interchanging factors. The change from the status quo is certain, but it's difficult to envision the exact manifestation process.

The COVID-19 pandemic destabilized global markets and livelihoods in an unprecedented manner. According to the World Economic Forum's Energy Transition Index, only 10% of the 115 analyzed countries maintained a steady onward trajectory towards the energy transition during the pandemic.⁸ Governments also had to respond to economic turmoil through extensive fiscal and monetary policy action, impairing their ability to further fund decarbonization programs in the short-term.

Complexity



The energy transition has numerous stakeholder groups, whose priorities vary from time to time, where environmental sustainability tends to jump between being a focal point to becoming more peripheral based on short- and medium-term events. Governments across the world have been reprioritizing and re-evaluating energy transition needs, resulting in inconsistent policies and changing financial commitments. For example, carbon pollution pricing systems have federal and provincial differences⁹ that could create guidance confusion for stakeholders. Collaboration is needed between private and public organizations like never before.

In addition, the investment environment remains unstable. The IEA estimates that around 70% of clean energy investment over the next decade will need to be carried out by private developers, consumers and financiers.¹⁰ Between the ever-changing stakeholder priorities and a lack of clarity on available funding for decarbonization, the energy transition space can be labelled as a complex operating environment.

Ambiguity



The energy transition stakeholders are pressured with a significant number of unsystematic risks and uncertainties that cause decision-making and analysis to be demanding and/or with a low level of certainty. Ever-changing social and consumer priorities, geopolitical tensions and a lack of stakeholder coordination create confusion for sectors attempting to determine their decarbonization strategies and the pace and amplitude of the necessary actions.

Moreover, the accelerated frequency of climate events continues to undermine energy asset planning and outage management, as extreme weather patterns test energy reliability and resilience by damaging infrastructure. Hence, interpretation and planning for the energy transition are often conducted in an ambiguous setting, where stakeholders may face information silos or misaligned expected outcomes.

Key takeaway

The energy transition is fast paced and volatile, with high degrees of uncertainty, complexity and ambiguity. To date, the transformation towards the 2050 energy system has faced multiple challenges and remains unclear due to several disruptive and complex issues, such as the impact of the war in Ukraine on commodity prices and inflation.

The multitude of factors can be also summed up in three recurring themes that test the transformation on a global scale: energy security, sustainability and equity. Together, those considerations make up the concept of the energy trilemma, which is a decision-making tool that integrates three critical factors of energy policy and design of sustainable energy systems.¹¹



The energy trilemma

Definition

The energy trilemma refers to the growing challenge of finding a balance between energy security, sustainability and equity in how we access and use energy in our daily lives.¹² The three dimensions are uniquely necessary and complementary, whereby each dimension requires a careful consideration to transform and build resilience in future energy systems.

Energy security



Measures a nation's capacity to meet current and future energy demand reliably, accessibly and resiliently against systemic shocks with minimal disruption to supplies.¹³

Relevance:

Energy security is essential for all aspects of stable economic activities. This dimension is underpinned by an ability to maintain a country's access to a reliable energy supply and a resilient energy system, which could be compromised via systemic shocks,¹⁴ such as geopolitical tensions, cybersecurity risks or extreme weather events¹⁵.

Environmental sustainability



Represents the transition of a nation's energy system towards using renewable and less carbon-intensive energy sources.¹⁶

Relevance:

Environmental sustainability has been at the forefront of climate change action over the last few decades. This dimension focuses on a country's efforts towards mitigating and avoiding potential environmental and climate change impacts.¹⁷ The current global energy crisis is becoming a key turning point in accelerating efforts towards a cleaner, more secure and affordable energy system.

Energy equity



Assesses a nation's ability to provide universal access to affordable and abundant energy for domestic and commercial use.¹⁸

Relevance:

Energy equity analyzes a country's ability to provide universal access to affordable, fairly priced and abundant energy for domestic and commercial use.¹⁹ Affordability is arguably the most important element to consumers, as energy equity directly affects standards of living. Hence, the cost competitiveness of energy solutions is very important in driving action towards meeting net-zero global emission targets by 2050.

Dimension indicators

Each dimension can be evaluated based on a set of indicators that either strengthen or weaken a country's performance in managing the energy trilemma. Below are sample indicators that are used to assess respective dimensions and countries:

- ▶ Diversity of primary energy supply
- ▶ Dependence on energy imports
- ▶ Diversity of electricity generation
- ▶ Energy storage availability
- ▶ System stability and recovery capacity
- ▶ System interconnectivity
- ▶ Reliability of the energy system

- ▶ GHG emission trends from energy production and application
- ▶ Renewable/low-carbon electricity generation
- ▶ Carbon intensity of energy products and carriers
- ▶ Final energy intensity
- ▶ Efficiency of power generation and transmission and distribution

- ▶ Access to electricity
- ▶ Access to modern energy
- ▶ Electricity prices (e.g., coal, gas, hydro, solar, nuclear)
- ▶ Gasoline and diesel prices
- ▶ Natural gas prices



Key takeaway

The energy trilemma is key to enabling the energy transition and to designing a new holistic approach to pacing and balancing decarbonization efforts. Climate change action often focuses on environmental sustainability to reduce carbon intensity of numerous economic sectors. However, energy security and equity are just as important to building resilient economies and fair energy markets. A strong energy transition policy and approach must consider balancing the energy trilemma to avoid respective risks, such as rising energy costs that could potentially lower standards of living due to limited energy security.

Case Studies

Our EY teams have found three applicable examples to help you gain a deeper understanding of how the energy trilemma concept can be applied in solving real-life energy challenges. Case studies across Europe, Sweden, and Iceland demonstrate the importance of implementing policies and actions that consider all primary goals of energy security, environmental sustainability, and energy equity. The trade-offs between each dimension are complex and may be obscure. However, a holistic development of energy systems must attempt to manage the energy trilemma to the furthest possible extent, as shown in these instances:

Case study

European focus on energy security



The what

Amid the geopolitical repercussions of the war in Ukraine, the European Union has embraced policies and structural reforms aimed at improving energy security by reducing the EU's dependence on Russian fossil fuels (28% oil, 44% gas and 52% coal in 2021),²⁰ securing new gas supplies and placing plans to accelerate the green transition.



The result

The exact outcome is yet to be determined. However, those measures are anticipated to be costly in the short term. Coal power plants have increased their electricity generation outputs to respond to soaring energy prices.²¹ Countries that are more reliant on Russian energy will face a more challenging path towards energy independence. For instance, Polish households use 60% of imported coal for heating²² and 75% of it comes from Russia.²³



The lesson

The achievement of energy security is a long-term quest that requires careful planning to avoid the near-term implications/risks on energy equity and sustainability. The energy mix must be diverse to avoid over-reliance and exposure from a single resource. Although, the initial capital investments may be challenging, they should eventually lead to greater flexibility and therefore potentially lower costs in the future.

Swedish environmental sustainability efforts

The what

In 2018, Sweden introduced legislation and a climate framework to achieve net-zero emissions by 2045.²⁴ The Swedish Government laid out several programs to support the energy transition and the industry's attempts to reach carbon neutrality well before 2018, for example reduction obligations.²⁵ The government also encouraged innovation with various public policy strategies.

The result

According to the International Energy Agency (IEA), in 2022 Sweden was already down 37.97% in total emissions from 1990 (52.07 Mt of CO₂ equivalent down to 32.3 Mt).²⁶ Sweden's journey allowed the country to become one of the global leaders in ESG and climate change mitigation practices. By 2020, Swedish electricity generation was mostly renewable, with 45% hydro, 17% wind and 1% solar. The remaining 29% were nuclear and 8% other.²⁷

The lesson

Sweden recognized the need for a long-term and stable climate policy to implement the change.²⁸ It was able to decarbonize its economy through proactive policy and active government engagement. The agenda also included energy security and equity as key considerations.

Iceland's quest towards energy equity

The what

Iceland has an isolated energy market, which until the 1970s relied heavily on imported fossil fuels.²⁹ The country was affected by fluctuating energy prices and it did not have appropriate infrastructure or knowledge to undertake transformational projects.³⁰

However, Iceland recognized, invested in and incentivized geothermal and hydro energy sources to be developed for domestic consumption.³¹ Municipalities gradually began exploring the use of both energy resources.³²

The result

The Icelandic Government established a geothermal drilling mitigation fund in the late 1960s to provide low-interest financing for geothermal research, test drilling and risk sharing with developers.³³

A combination of private and public efforts led to the country's prosperity. Today, almost 100% of consumed electricity comes from renewable sources, and 9 out of 10 houses are heated directly with geothermal energy³⁴. The cost of heating in Reykjavik is significantly less expensive in comparison with other Nordic capitals.³⁵

The lesson

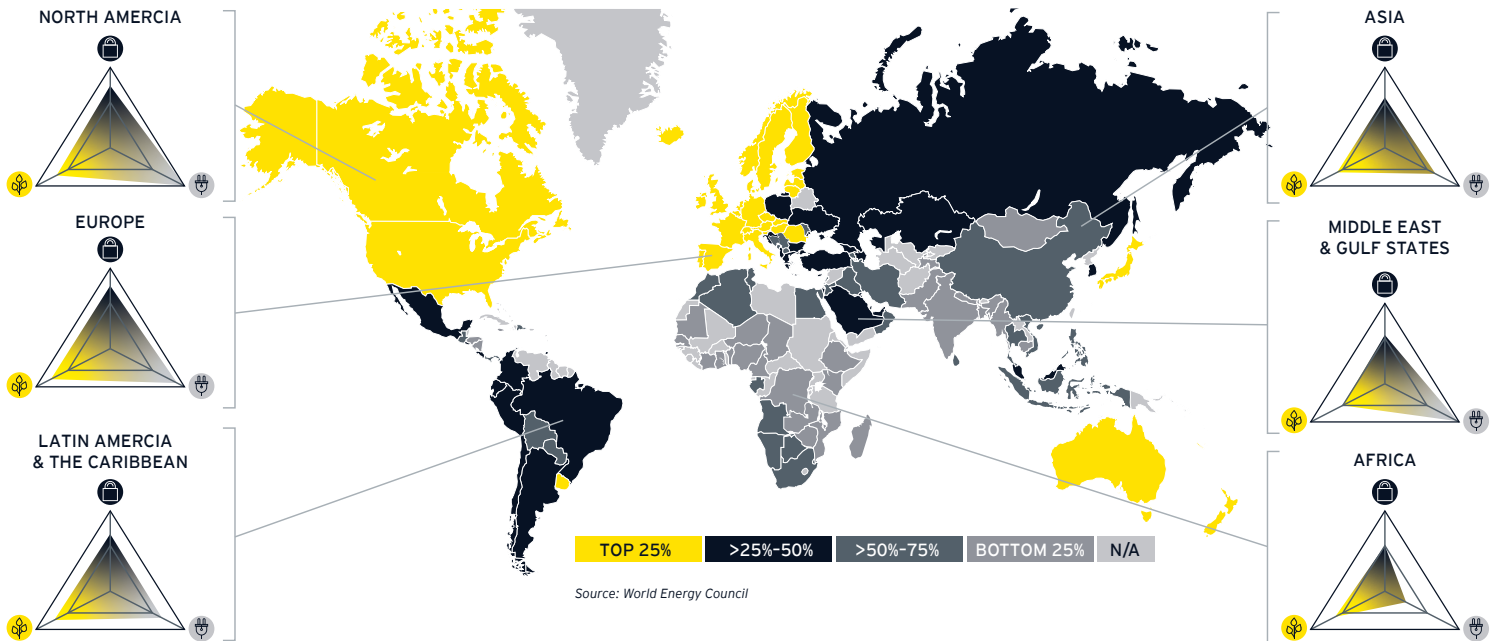
Private-public collaboration is essential to undertaking transformational change. Iceland was able to establish cohesion and collaboration between the various stakeholders, which in turn created a dialogue of trust and a solution-based mindset.³⁶

Application in North America

The World Energy Trilemma Index ranks the energy trilemma performance of 127 countries and 6 regions. According to its evaluation framework, energy security was widely considered as a strength for North America in 2021.

Energy equity remained a relatively low-profile policy issue, but recent inflationary pressures exposed energy inequities for rural and remote communities, as well as for low-income demographics.³⁷

Environmental sustainability was highlighted as an area with the most scoring diversity between Canada, the US and Mexico, with Canada receiving the highest score among the three nations.³⁸



Note: the percentages represent the average scores of regional results based on the World Energy Council's framework.⁴⁰ Used by permission of the World Energy Council.

Regional scoring	Security	Equity	Sustainability
Africa	46%	26%	60%
Asia	58%	68%	61%
Europe	66%	90%	74%
Middle East	55%	97%	48%
North America	73%	96%	68%
Latin America and Caribbean	62%	68%	72%

In comparison to other regions, North America continues to lead in energy security.⁴¹ The region is only slightly behind the Middle East in energy equity, as well as Europe and Latin America in environmental sustainability.⁴² As one of the largest producers and consumers of energy, North America faces conflicting energy priorities in supporting governments' decarbonization commitments, maintaining economic prosperity, responding to the European energy crisis, and meeting evolving consumer needs. Nevertheless, North America appears to be one of the better regions for managing the trilemma, but further improvement opportunities should be considered.

Canada scored sixth in the Energy Trilemma Index in 2021.⁴³ The abundance of natural resources, a diverse electricity generation mix and the overall resilience of the energy system bolster Canadian energy security. Energy equity also remains strong, but affordability raises a concern for some remote communities due to significant transportation costs. In addition, just transition remains to be another imperative to be considered. Canada's sustainability score remains stable and outside the top 10 performers, partly due to high-emitting industrial activities and relatively high per-capita emission levels attributed to Canada's geographical, weather and highly extractive economic conditions.⁴⁴

Key takeaway

In comparison to other global regions, the energy trilemma is quite well balanced in North America, with a strong emphasis on energy security. However, the region is heavily impacted by several trends, including the need for maintaining economic prosperity in balance with enhancing energy equity and environmental sustainability.

Canada is no exception. To meet national economic growth and climate ambitions while maintaining the current levels of living quality, Canadian business leaders need to critically and carefully challenge how the trade-offs between the energy trilemma components will impact their respective sectors.

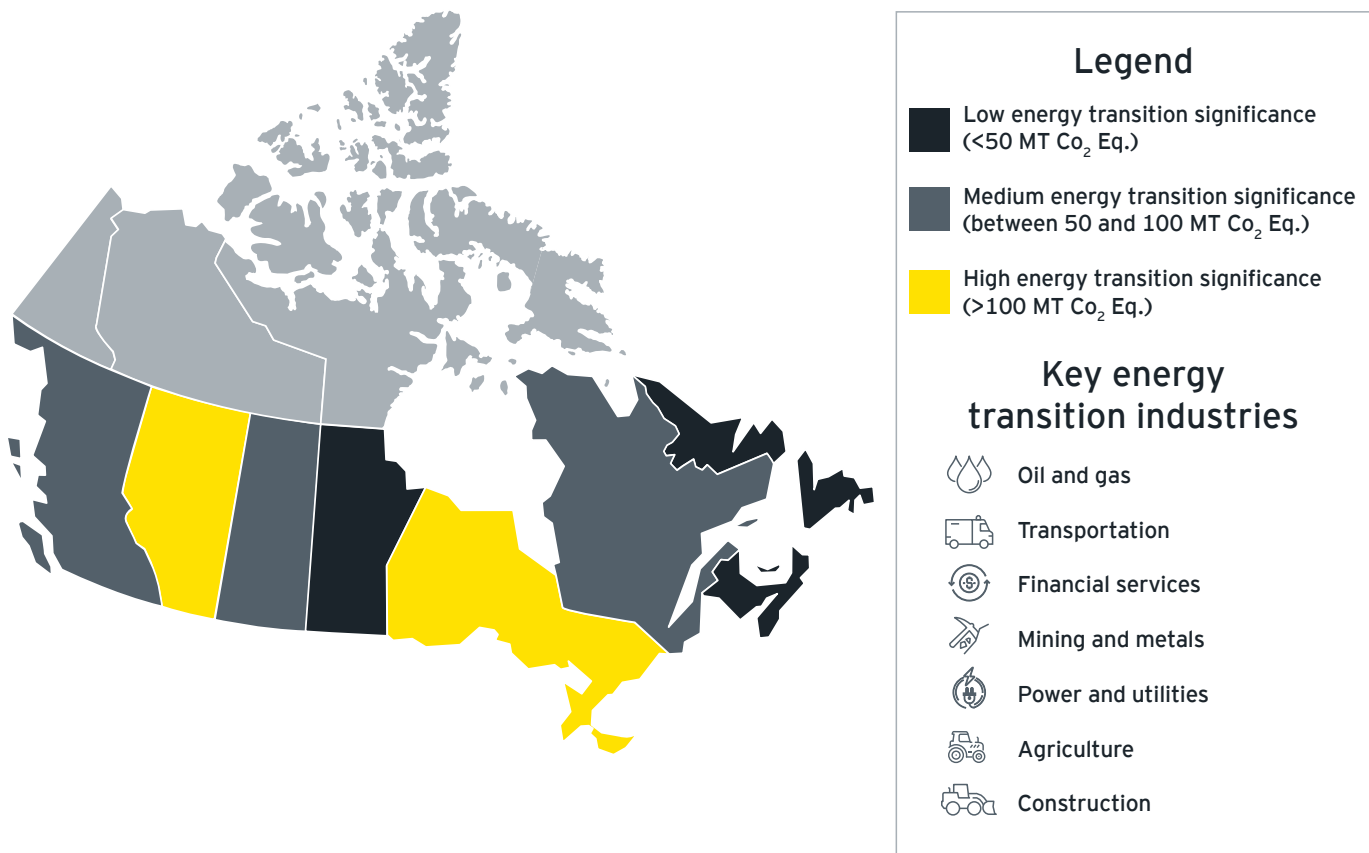
The International Labour Organization (ILO) defines “just transition” as a greening of the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.³⁹



























Canadian energy landscape

National and provincial energy profiles

While the broader global context is important, Canadian leaders must also consider national and provincial energy profiles because they are all different with various challenges and opportunities. Overall, Canada is a natural resource-rich economy and the provinces have different energy requirements due to their unique territorial features, political and social attitudes, and economic sectors:



	Energy production	GHG footprint	Key industries
British Columbia	64.3 TWh Hydro: 87% Biomass: 5% Natural gas: 4%	61.7 MT of CO₂ Transportation: 38% Oil and gas: 21% Manufacturing: 16%	  
Alberta	76.1 TWh Natural gas: 54% Coal and Coke: 36% Wind: 6%	256.4 MT of CO₂ Oil and gas: 52% Electricity generation: 11% Transportation: 11%	  
Saskatchewan	4.2 TWh Coal & coke: 41% Natural gas: 40% Hydro: 15%	65.9 MT of CO₂ Oil and gas: 26% Agriculture: 25% Electricity generation: 19%	  
Manitoba	33.9 TWh Hydro: 97% Wind: 3%	21.7 MT of CO₂ Agriculture: 34% Transportation: 31% Buildings: 14%	  
Ontario	153 TWh Uranium: 59% Hydro: 24% Wind: 8%	149.6 MT of CO₂ Transportation: 32% Buildings: 25% Manufacturing: 23%	  
Québec	212.9 TWh Hydro: 94% Wind: 5%	76.2 MT of CO₂ Transportation: 39% Manufacturing: 26% Buildings: 12%	  
Nova Scotia	9.7 TWh Coal and coke: 25% Natural gas: 22% Wind: 11%	14.6 MT of CO₂ Electricity generation: 43% Transportation: 30% Buildings: 14%	  
New Brunswick	13.4 TWh Uranium: 38% Hydro: 22% Natural gas: 15%	12.4 MT of CO₂ Oil and gas: 27% Transportation: 26% Electricity generation: 23%	  

Note: Financial services are a critical industry to every province, whereas the rest are geography specific. The industries mentioned on the map are the most relevant to each province for purposes of the energy transition. Yukon, Northern Territories and Nunavut were excluded due to limited population sizes.
 Source: Provincial and territorial energy profiles by Canada Energy Regulator.⁴⁵

The interprovincial differences are quite stark. For instance, the national average for GHG emissions in electricity generation was 110 grams of CO₂ eq. per kWh in 2020,⁴⁶ while Alberta's average was 590 grams⁴⁷ and British Columbia's was only 7.6 grams.⁴⁸ Electricity generation is just an example of varying energy profiles across Canada, but it highlights the scale and significance of those disparities.

Other notable sectors critical to the national economy and responsible for the provincial and territorial GHG footprints include oil and gas, construction, agriculture, transportation, and mining and metals. Note that the sector shortlist is non-exhaustive, and that every industry in Canada will have some form of relevance to the energy transition.

Canadian energy trends and developments

To further contextualize the current state of the Canadian energy transition, EY teams conducted a high-level macro assessment to provide a summary of notable trends and developments. The analysis included six distinct elements, such as political, economic, social, technological, legal, and environmental categories.



Political

Canada has institutional commitments towards tackling climate change, but the country also faces a misaligned interregional policy framework.

Accelerated GHG reduction: In 2021, the federal GHG target increased from a 30% reduction below 2005 levels by 2030, to 40%-45%.⁴⁹

Provincial and municipal action: Various governments introduced climate change action strategies, such as the Clean BC Roadmap to 2030⁵⁰ or Calgary's Climate Strategy - Pathways to 2050.⁵¹ However, their alignment on goals and actions may be insufficient.

Proactive legislation: In 2018, Canada passed the national GHG Pollution Pricing Act based on carbon emissions from fuel usage.⁵²

Leading ESG position: Canada ranks #1 for its ESG practices among the world's top oil reserve holders and #3 overall among the largest oil-producing countries.⁵³



Economic

Canada has a strong and resilient economic environment.

Energy sector importance: Canada's energy sector accounted for approximately 9.7% of nominal GDP in 2021,⁵⁴ whereby energy exports worth \$154.3 billion were sent to 142 countries⁵⁴ (91% accounts for the US).

Global attractiveness: According to the UN, Canada had the second-largest foreign direct investment (FDI) stock-to-GDP ratio among the G20 countries over the 2016-20 period.⁵⁵

Resilient banking sector: Canadian financial institutions proved to be resilient and reliable in times of recession (e.g., 2008, 1990s, 1980s) due to tight regulatory regimes,⁵⁶ where their role in engineering products and services to support Canada's decarbonization journey will be critical.



Social

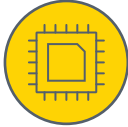
Canada's social landscape is demanding transparency when it comes to the energy transition.

ESG requirements: EY's Investor Survey 2020 showed that respondents engaged in more rigorous ESG evaluation processes to better assess risks and uncover opportunities.⁵⁷

Clean energy desire: According to the Clean Energy Canada survey, 83% of respondents believe that it is important for Canada to invest in clean energy-related economic opportunities.⁵⁸

E-mobility: Electric vehicle (EV) sales in Canada have grown to 66,815 in 2021, a 1,176% increase since 2015 and a 42.5% change from the previous year.⁵⁹

Indigenous participation: Canadian stakeholders must continue to partner with Indigenous communities and consider their perspectives when tackling the energy transition issues to ensure diversity, inclusivity and a recognition of the historical context.



Technological

Canada's technology research, development and implementation continue to create new opportunities.

Cleantech investment: Combined, environmental and clean technology sectors, contributed \$73.1 billion to Canadian GDP in 2021.⁶⁰

New technology integration: Canada ranked 8th in the world for installed wind energy capacity by the end of 2022.⁶¹ In the Prairies, wind and solar will play a significant role in capacity growth. For example, Alberta's share of renewables in the capacity mix will increase from 16% in 2017 to 26% by 2023.⁶²

Hydrogen strategy: Natural Resources Canada issued a strategic directional document to modernize the Canadian energy system through an ambitious hydrogen framework and achievement of relevant net-zero emissions by 2050.⁶³ EY's Canada's Hydrogen Future report highlights the promising hydrogen ecosystem potential to reduce Canadian GHG emissions by up to 26% annually by 2050.⁶⁴



Legal

Canada has new ESG (environmental, social and governance) requirements and legislation to support the energy transition.

International ESG disclosures: The ISSB announced the first two standards on Sustainability Disclosures in 2023, which will become effective in 2024.⁶⁵

Canadian ESG disclosures: The CSA issued a proposal for mandatory climate-related disclosures that are closely aligned to TCFD recommendations. Additionally, the federal government is making TCFD-aligned disclosures mandatory for Canada's Crown corporations for FY22 reporting and now federally regulated institutions for FY23 reporting. Pension funds are anticipated to be next.⁶⁶

Climate lawsuits: The number of climate-related lawsuits around the world has more than doubled since 2015, whereby oil and gas, food and agriculture, transport, plastics and finance sectors are increasingly targeted.⁶⁷ Most of those cases attempt to tackle greenwashing,⁶⁷ which is a new risk for any entity.



Environmental

Canada is a resource-rich economy with high environmental awareness and a progressive policy landscape. However, at times the policy can create systemic inefficiencies for investments.

Abundant resources: Canada's natural resource wealth (i.e., proven and probable reserves of minerals) was \$1,444 billion in 2021 (149% increase from 2020).⁶⁸

Environmental performance: Canada and the US are the only G7 countries whose emissions have risen since signing the Paris Agreement.⁶⁹ However, Canada is still among the best in reducing the GHG intensity of industrial processes: total industrial sector GHG per US\$GDP is 53 MT vs. the global average of 106 MT (ranked 4th behind Norway, the US and the EU).⁷⁰

Strong environmental regulation: Canada has progressive environmental regulations, such as biodiversity protection and water conservation laws. Although it is important to have reliable regulations surrounding the treatment and maintenance of the Canadian environment, they have led to some challenges. For example, the Canadian carbon tax has sizeable regressions and drawbacks of the initiative. A carbon tax increases the cost of electricity generation, fuel and food production, particularly for low-income households. According to a study conducted by the National Bureau of Economic Research, the burden of a carbon tax for low-income households is 1.4 times higher than it would be on their higher income counterparts.⁷¹



Key takeaway

Canada is a resource-rich economy that has significant interprovincial political, economic and environmental differences and challenges. The country has not introduced a unified national energy strategy or an integrated energy infrastructure plan that could accelerate the uptake in the energy transition. Moreover, GHG-intensive industries, such as oil and gas or construction, will continue to play an important role for the economy in the future.

Canadian stakeholders are widely interested in the energy transition, but progress to date has been limited. Despite numerous investments and policies designed to reduce GHG emissions, and the positive macroenvironment surrounding the desire for the energy transition, Canada and the US are the only G7 countries whose emissions have risen since signing the Paris Agreement in 2015.⁷²

Nonetheless, the macroanalysis highlights an abundance of core prerequisites for the interest in, and acknowledgement of, the energy transition in Canada. Canadian stakeholders have made some sustainability strides across a variety of industries by introducing innovation and reducing the GHG intensity of industrial processes. With that said, a significant amount of action is still needed to decarbonize value chains and develop the 2050 energy system.

Energy transition opportunities by industry

Canada can continue to develop its energy system by establishing and maintaining an effective balance between energy security, environmental sustainability and energy equity. The trilemma will challenge business leaders to think more critically about the given trade-offs when generating solutions and planning strategically. With that said, each industry is going to face its own key challenges and opportunities on its decarbonization journey.

Oil and gas

In Canada, oil and gas is at the centre of attention to decarbonize and participate in the energy transition. As a result, the majority of opportunities revolve around reducing the carbon footprint to maintain and expand output production.

Furthermore, new energy products will create business opportunities in Canada and abroad, as demand for energy procurement is going to be facilitated with new downstream applications, such as long-haul hydrogen trucks.

Companies in the sector should prioritize sustainable investments to protect land and water and adjust their internal rates of return to demonstrate climate leadership. Societal and environmental value will potentially offset financial returns when presented to stakeholders through an ESG reporting framework.

Key challenges

- ▶ Carbon-intensive operations
- ▶ Sensitivity to global competition and trade exposures
- ▶ Employee safety and wellbeing
- ▶ Complex disclosure frameworks
- ▶ Increasing environmental and climate action regulations

Key opportunities

- ▶ Decarbonize the value chain, for example carbon capture, utilization and storage (CCUS) infrastructure or blue/green hydrogen
- ▶ Generate carbon credits
- ▶ Join partnerships and alliances
- ▶ Generate renewable electricity
- ▶ Create value-added products to mitigate cost gaps to international competition

Power and utilities

Power and utilities organizations are undergoing a major transformation associated with the emergence of 4 Ds: decarbonization, decentralization, digitalization and democratization. Utilities will face an abundance of growth opportunities in the energy transition but will first need to address their core business challenges.

The traditional utility model will need to evolve to accommodate bidirectional flows from distributed energy resources, electric vehicles, battery storage and other grid innovations with transmission and distribution infrastructure upgrades. Generation will need to decarbonize, for instance in Alberta and Saskatchewan.

The energy transition is expected to increase the total load demand through electrification. P&U businesses need to support the future growth and satisfy customer expectations and needs.

Key challenges

- ▶ Low level of alignment among stakeholders on the future of regulated businesses
- ▶ Limited capital availability
- ▶ Traditional asset sweating mindset
- ▶ Fossil fuel-based power generation
- ▶ Solution delivery to remote areas

Key opportunities

- ▶ Consider integrating diversified power generation sources, including nuclear
- ▶ Revisit and update network planning practices
- ▶ Influence regulatory perspectives
- ▶ Invest in pilots and innovative grid solutions
- ▶ Explore distribution system operator (DSO) or transmission system operator (TSO) models



Mining and metals

Most industries participating in the energy transition will require raw materials for production, manufacturing and construction of new infrastructure and low-carbon solutions.

Minerals like cobalt, lithium, nickel, graphite and others are commonly used resources to make parts for renewable technologies, such as cleantech batteries, electric vehicles and wind turbines.⁷³ The IEA estimates that the total mineral demand from clean energy technologies will double or even quadruple by 2040,⁷⁴ so mining and metals will see considerable opportunities in serving those markets.

Mining businesses will also need to closely consider environmental and social implications of their industrial activities, for instance water preservation and Indigenous participation. Those aspects are particularly important when mining companies may need to quickly scale their operations to meet ever-rising demand.

Key challenges

- ▶ Carbon-intensive operations
- ▶ Complex ESG disclosure frameworks
- ▶ Water contamination and biodiversity preservation
- ▶ Fluctuation in commodity pricing
- ▶ Employee safety and wellbeing

Key opportunities

- ▶ Increase production and materials supply
- ▶ Invest in new assets and technologies
- ▶ Join partnerships and alliances
- ▶ Procure lower-carbon materials for large infrastructure projects and private-public partnerships
- ▶ Electrify and automate operations from the extraction sites to processing facilities



Construction

Heavy industrial and civil construction will be in high demand to support the energy transition. Construction companies will be involved in numerous public, private and even public-private partnership (P3) projects to develop the needed infrastructure ranging from new transit routes and roads to transmission corridors and power generation facilities like hydro dams and nuclear facilities.

Construction companies can expect plenty of incoming business. However, they must also identify their key challenges and solutions to adapt to the energy transition landscape. Decarbonization is once again the primary concern, whereby one cubic yard of concrete (about 3,900 lbs) is responsible for emitting ~400 lbs of CO₂.⁷⁵ More and more businesses are attempting to reduce their carbon footprints across value chains, so addressing the carbon intensity of products and services will be critical in construction.

Key challenges

- ▶ Carbon-intensive operations
- ▶ Increasing environmental regulations
- ▶ Limited experienced labour supply
- ▶ Rising materials costs
- ▶ Tracking and quantifying embodied carbon

Key opportunities

- ▶ Transition to less carbon-intensive construction and procurement options
- ▶ Use alternative fuel sources
- ▶ Support renewable energy deployment
- ▶ Join partnerships and alliances
- ▶ Integrate new digital technologies in project management, communications, etc.



Agriculture

The agriculture sector is going to evolve in the energy transition. Agriculture is responsible for 10% of Canada's GHG emissions, which come from 3 primary sources: enteric fermentation, crop production and on-farm fuel use.⁷⁶ Hence, the energy transition will enable and encourage farmers to integrate new technologies and in turn reduce the carbon footprint of their practices.

As populations grow, decarbonization becomes more prescriptive and consumers begin to demand more sustainable products, agriculture companies will see plenty of opportunities to expand their businesses and reduce operational costs. The sector will need to explore fiscally responsible avenues to implementing the shortlisted solutions to continue growing affordable and quality products for Canadian and global consumers.

Key challenges

- ▶ Carbon-intensive operations
- ▶ Climate change impact on yields
- ▶ Increased input costs
- ▶ Increased competition from global players
- ▶ Diminishing natural resource availability

Key opportunities

- ▶ Source low-carbon fertilizers
- ▶ Reduce deforestation
- ▶ Decrease emissions from livestock, soil and nutrient management
- ▶ Develop carbon offsets on farming properties
- ▶ Electrify fleets



Financial services

Financial services will play a critical role in driving the energy transition by providing capital accessibility from the private sector.

Currently, investment in the energy transition is not materializing quickly enough, leaving financing gaps and uncertainties. Unlocking capital accessibility globally for investments in clean energy alternatives, energy efficiency and electrification will remain paramount in facilitating the energy transition process.

Given the importance of financial services for the energy transition, investment institutions should see an increased demand for their services. However, they must maintain high levels of due diligence and analysis in evaluating financing bets to weed out the unworthy projects.

Key challenges

- ▶ Rising cost of capital
- ▶ Balancing financial goals with ESG aspirations
- ▶ Managing risks related to low-carbon solutions
- ▶ Lack of comparable ESG disclosures
- ▶ Shifting consumer perceptions

Key opportunities

- ▶ Focus on net-zero portfolios
- ▶ Incentivize funding for the energy transition
- ▶ Influence the net-zero agenda for stakeholders
- ▶ Provide capital access for sustainable ventures
- ▶ Develop a new evaluation approach with ESG criteria and metrics for investment decisions



Transportation

Canadians are already seeking new and more sustainable transportation means. The sector will have to accommodate their needs from both personal consumption and infrastructure perspectives, which create numerous growth opportunities.

eMobility – including EV adoption, LRT/subway, railway and others – will revolutionize the transportation sector. Electrified transport will replace traditional fleets, including municipal buses, so new transportation infrastructure will have to be deployed. There is also room for growth in the railway space, which has consistently been a cornerstone of the Canadian economy. For example, Metrolinx recently procured the ON-Corridor Toronto Transit extension with an approximate cost of \$15 billion.⁷⁷

Key challenges

- ▶ Existing infrastructure constraints
- ▶ High capital requirements
- ▶ Increasing regulation around EV production
- ▶ Shortage of sustainable and clean materials
- ▶ Limited experienced labour supply, ranging from drivers to mechanics

Key opportunities

- ▶ Foster EV adoption
- ▶ Provide EV charging and fleet solutions
- ▶ Invest in technologies (e.g., clean hydrogen)
- ▶ Join partnerships and alliances
- ▶ Support other industries via infrastructure development and deployment

Key takeaway

Industry-specific opportunities will help Canada in decarbonizing relevant value chains, while pushing Canadian businesses to support the energy transition and create a clean, affordable and secure energy system. Although more opportunities are available, the shortlisted examples should excite the stakeholders and indicate that the energy transition participation can be beneficial, particularly for oil and gas, power and utilities, mining and metals, construction, agriculture, financial services and transportation sectors.

Each industry will face a varying degree of disruption and change. However, Canada needs a more integrated, multi-sector approach for the energy transition to ensure national alignment and cohesive progress towards decarbonization. Canada needs a bold strategy to invest in infrastructure projects to facilitate the energy transition and encourage a renewed level of co-operation and compromise between all levels of government and the private sector.

Current energy transition barriers

The energy transition is a significant national undertaking, but the Canadian pursuit of the 2050 energy system has been limited thus far. According to our client experience and research, there are four primary barriers responsible for the slow decarbonization efforts to date.

Misalignment

Canada is a large country with diverse political and social views between people, companies, provinces and political parties. To successfully tackle climate change, the energy transition must be undertaken throughout the country with an aligned mindset. Climate change action is critical and the energy transition is a key solution. However, the stakeholders still have varying perspectives and strategies to addressing this issue, which result in increased climate risks and disruption of decarbonization activities.

Underfinancing

The energy transition is underfinanced due to limited capital accessibility and the rising cost of capital. Canada needs approximately \$2 trillion between now and 2050 for the transition to a net-zero economy.⁷⁸ Such a massive investment requirement will need funds from both, private and public sectors, to innovate, test and deploy new technologies at scale. However, businesses and governments are already struggling to effectively source and direct funding towards those needs on a consistent basis.

Fragmented solutions

Sometimes government and corporate stakeholders are overly focused on solving a singular issue without fully considering the overarching environment and consequences. They also tend to operate in silos by disregarding the value of collaboration and partnerships. As a result, the stakeholders often develop fragmented solutions that create new and unintended consequences over an extended period, which add to the decarbonization process complexity and uncertainty.

Lack of accountability

Any transformation requires strong leadership. In the context of the energy transition, Canada needs various figures to take ownership, guide and provide accountability towards strategic action. Governments at all levels must play an important role in driving policy, funding and regulation. Business and public leaders also need to ensure that their organizations and communities are continuing the momentum by appropriately addressing their energy transition commitments, goals and actions. So far, the stakeholders have been proactive in claiming to drive sustainable measures, but few are yielding positive results.

Key takeaway

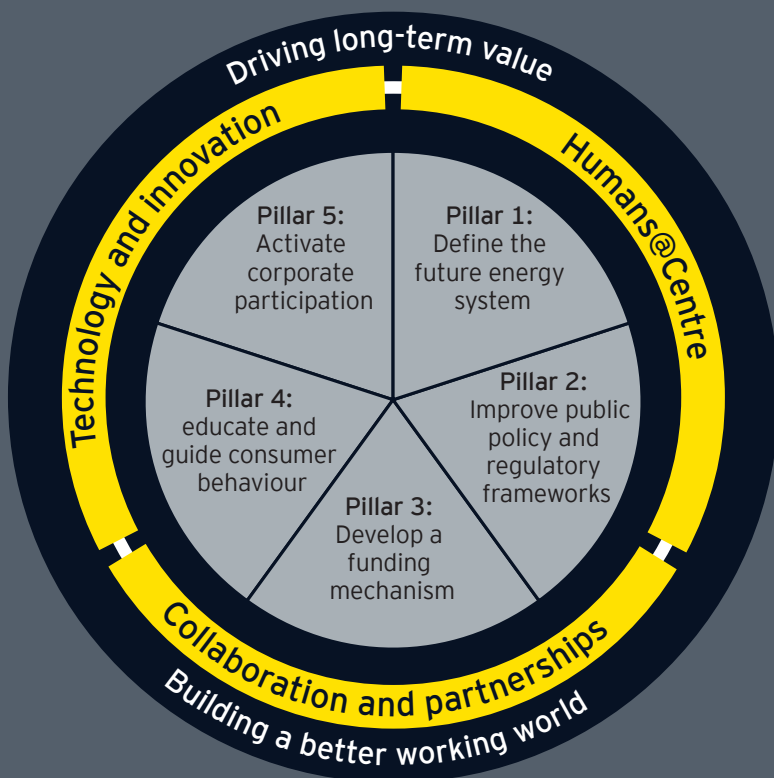
The progress towards the 2050 energy system has been limited in Canada due to four primary barriers: misalignment, underfinancing, fragmented solutions and a lack of accountability. To be blunt, stakeholders should expect the energy transition to be costly and, in some ways, difficult.

The Canadian economy requires a high degree of transformation to tackle the climate change challenge and capitalize on industry-specific opportunities. A new, wholesome approach is needed to develop an action plan that incorporates context, opportunities and barriers.

Five-Pillar Energy Transition Action Plan

The energy transition progress is complex and nuanced to evaluate. On the one hand, Canada should be proud, as its major fossil fuel market players have already introduced decarbonization targets and are innovating to develop new technologies together, such as clean hydrogen initiatives.⁷⁹ On the other hand, the gross emissions from the industry have either gone up or stabilized across provinces. Thus, the energy transition story here is complicated and the future outcome is unclear.

However, at EY we believe a more fulsome approach is required to effectively pursue a 2050 energy system in Canada. EY teams suggest a Five-Pillar Energy Transition Action Plan, supported by three strategic enablers, to pave the way towards a decarbonized economy:



Pillar 1: Define the future energy system

Recognize the future energy mix

Identify energy supply gaps

Develop a national energy strategy

Develop a national infrastructure corridor





Pillar 2:
Improve public policy
and regulatory
frameworks

- Continue publishing regulatory white papers
- Design energy transition enabling regulation
- Incentivize biodiversity preservation in regulations



Pillar 3:
Develop a funding
mechanism

- Create a new investment evaluation framework
- Allocate more public funds towards research and incentives
- Expand climate change funds



Pillar 4:
Educate and
guide consumer
behaviour

- Invest in sustainability education
- Develop incentives for educational materials for consumers



Pillar 5:
Activate corporate
participation

- Introduce new sustainability training for executives
- Build internal reporting and accountability mechanisms
- File new sustainability and GHG reporting requirements
- Develop internal standards

PILLAR

Define the future energy system

1



The 30-year energy transition journey is going to require patience, investment and change management. Numerous opportunities are available, including electrification, clean hydrogen, renewables and others that can eventually be scaled economically and become widely adopted. However, Canadians should also recognize that traditional energy, such as oil and gas, will also continue to be applicable and useful, as the energy transition will evolve over decades and a quick turnaround will not be feasible. Canada needs a mix of those sources to effectively manage the energy trilemma and continue building a 2050 energy system.

As mentioned previously, energy is a provincial jurisdiction and each province and territory has its own energy challenges, future perspectives and climate change plans. Canada still requires a more unified voice and vision on how to transition to a less carbon-intensive economy. Environment could be a federal jurisdiction under certain circumstances, so building a national energy plan could be possible to reduce risks of information silos, uncertainty and counterproductive measures. A national infrastructure corridor could also supplement this approach.

PILLAR

Improve public policy and regulatory frameworks

2



Effective policy and regulatory regimes allow countries to undertake economically rational and predictable decarbonization processes. Various levels of Canadian government, ranging from municipal to federal, have already introduced climate change mitigation plans. However, they also need to develop more policies to encourage more tangible action and capital allocation towards satisfying the energy transition needs. The regulators should provide supportive regulations, such as ESG and decarbonization disclosure standards, to encourage industry participation in decarbonization activities.

For example, the price of carbon will incentivize a wider consideration of decarbonization initiatives, whereby a carbon levy increase from \$50 to \$170 per ton by 2030 is expected to be important to achieving net-zero.⁸⁰ The federal government's planned introduction of an emissions cap on oil and gas⁸¹ will also motivate faster energy transition efforts in the industry.

Biodiversity preservation is another critical area of public policy and regulatory consideration. An increased focus on biodiversity can lead to more carbon offsetting capabilities in Canada, along with the ability to sell credits on the international market. As a proof of concept, the Darkwoods Forest Carbon project in British Columbia covers 255,000 acres and generates an estimated annual emissions reduction of 125,000 tons of CO₂ eq.⁸²

PILLAR

3



Develop a funding mechanism

Investors and financial markets can unlock Canada's net-zero potential. As previously mentioned, Canada needs approximately \$2 trillion between now and 2050 for the transition to a net-zero economy.⁸³ In February 2022, the federal government committed \$9.1 billion as part of the 2030 Emissions Reduction Plan to tackle climate change.⁸⁴ The announcement was welcome news, but the funds are clearly nowhere near the necessary amount. Therefore, appropriate action to improve capital accessibility is arguably the most critical requirement for the Canadian energy transition.

The market needs some form of blended financing, both public and private, to enable the achievement of the 2050 energy system. Institutional investors and fiduciary banks require innovative investment frameworks for ESG and net-zero purposes to streamline capital accessibility at scale for energy transition enterprises (i.e., companies with strong decarbonization agendas, projects and initiatives).

PILLAR

4



Educate and guide consumer behaviour

Canadians need to better understand why the energy transition matters and how their purchase decisions have relevance. According to the EY Future Consumer Index Survey, 61% of Canadians will pay more attention to the environmental impact of what they consume⁸⁵ and 69% of consumers expect companies to solve sustainability issues.⁸⁵ However, consumer actions often do not match their perceptions, threatening the longevity of positive attitudes towards sustainable behaviours.⁸⁵

Canadians must consume differently for the country to see a meaningful decline in GHG emissions, for example by switching to electric vehicles, reducing energy usage at home or purchasing locally farmed produce. A simple desire for corporate action to address climate change alone will not yield meaningful results. Hence, there's a greater need for education and guidance with regards to sustainability and the energy transition, because without a widespread change in consumer behaviour the energy transition will stall and miss out on key opportunities.

PILLAR

5



Activate corporate participation

Various industries will see numerous opportunities in the energy transition. Their primary role will be to continue the decarbonization process with credible plans and with the adoption of new technologies that could support the achievement of net-zero aspirations. Businesses must follow applicable ESG disclosure standards, establish and commit to decarbonization strategies, and proactively increase their capital allocation spends on energy transition projects.

Companies should be accountable for their decarbonization efforts, while external stakeholders should facilitate their net-zero aspirations with relevant public initiatives. New disclosure and reporting standards will provide a more binding participation requirement for corporate entities, but their pursuit of decarbonization should be driven by their own intentions and perspectives rather than by outside pressure.

ENABLER

Technology and innovation

A



Technology is a critical enabler and not a solution to the energy transition. Decarbonization requires innovative means to traditional processes and systems. Any transformation becomes easier by leveraging technologies and reducing inefficiencies, so proactive investments in innovation should be encouraged to yield a faster achievement of the net-zero aspirations.

Canadian stakeholders can apply new tools and gadgets throughout the five pillars, but they need to be adapted, adjusted and enhanced to supplement the course towards decarbonization. Pilot studies are necessary to showcase quantifiable evidence, reduce risk exposures and build business cases to justify innovation costs. For regulated markets, this approach becomes necessary to educate and steer the regulatory perspectives.

ENABLER

Humans@Centre

B



At EY, we believe people are at the heart of driving value. According to our research, business leaders who take deliberate steps to manage people through the change are 2.6 times more likely to be successful. The energy transition is no exception. The required transformation is fueled by a purpose of making the world a better place for us and future generations. Talent should be enabled by supportive cultures to drive societal change. If people cannot evolve themselves, how can the stakeholders expect to change the broader systems in society at large?

The action plan pillars must also always consider the impact on people. Every step towards the 2050 energy system must create and deliver value to the relevant stakeholders and communities. Just transition is becoming a more prolific concept, and it is a perfect example where the energy transition should yield fair and shareable benefits for people, especially for vulnerable groups.

ENABLER



Collaborations and associations

Industry collaborations and associations, such as Pathways Alliance, can encourage cross-industry collaboration, knowledge-sharing and combined action. In addition, federal and corporate programs are similarly valuable to attracting awareness, participation, implementation and funding of energy transition opportunities. The pursuit of decarbonization will require an abundance of resources, so collaborations and partnerships are extremely important for satisfying the resourcing requirements through a combination of knowledge, learning and expertise. An effective energy transition process involves multiple industries working together and supporting one another towards the common goal.

Collaboration hubs

Federal and corporate programs, such as the Pathways Alliance, are critical to attracting awareness, participation, implementation and funding of energy transition opportunities.

Key takeaway

The Canadian economy requires a high degree of transformation to tackle the climate change challenge and to capitalize on industry-specific opportunities. A new, holistic approach is needed to develop an action plan that incorporates context, opportunities and barriers. EY teams suggest a Five-Pillar Energy Transition Action Plan that incorporates those elements. The pillars are: define the future energy system, improve public policy and regulatory frameworks, develop a funding mechanism, educate and guide consumer behaviour, and activate corporate participation. Those pillars are also supported by three enablers: technology and innovation, humans@Centre, and collaboration and partnerships.

Canada's role in the global energy transition

Canada is integrated in the world energy markets and environmental management, so it has some influence on tackling the world's challenges. The currently volatile global geopolitical environment presents Canada with a unique opportunity to support global energy transition efforts abroad, while pursuing the 2050 energy system domestically.

1 Share leading disclosure practices

Canada has leading ESG practices on extracting, procuring and transporting natural resources.⁸⁶ Major players in the investment community in Canada demand better ESG and climate disclosures to enhance capital allocation decision-making and to better assess ESG and climate-related risks to the business and operations.⁸⁷

For this, the recommendation has been to measure and disclose the performance of ESG-relevant factors leveraging the International Sustainability Standards Board (ISSB). The IFRS foundation launched the ISSB in Montréal in June 2022, placing Canada at the forefront of the convergence and adoption of sustainability standards. Canada could share knowledge on leading disclosure standards with other jurisdictions.

2 Provide clean energy exports

The Canadian energy sector can support global stakeholders with a focus on meeting clean hydrogen and LNG consumption needs. Canada has a long history of exporting natural resources, while its industries have been improving their environmental records. With less carbon-intensive value chains and infrastructure availability, Canada can support other nations by exporting and supplying them with more clean products. For example, Canada is set to deliver ammonia to Japan by 2026 through Itochu's Alberta operations.⁸⁸ Where Canadian downstream applications and technologies are cost competitive, for instance automotive or machinery, those products can also be exported to other economies and used to support their respective uptakes in the adoption of less carbon-intensive goods and services.



3

Support developing nations

Canada has a role in assisting developing nations achieve their respective net-zero aspirations, with those markets accounting for 63% of global GHG emissions,⁸⁹ so the climate change challenge can only be tackled through truly global collaboration and action.

Over the last decade, the Clean Development Mechanism (CDM) of the Kyoto Protocol has been funding development and change in developing nations.⁹⁰ This protocol allows a country with an emissions-reduction commitment to implement net-zero projects in developing countries. Reductions experienced under this initiative can be counted towards meeting targets domestically for the patrons. Canada could potentially amplify support of this initiative, continue sharing innovation and technology knowledge, and support global decarbonization efforts, while benefiting from additional international carbon credits.

Key takeaway

Canada does not necessarily drive universal energy or product consumption. Global opportunities for Canadian businesses mostly concern driving innovation and supporting other nations with knowledge and resource sharing, particularly in the clean energy exports space, which could be quite lucrative for the economy.

Canada can reduce today's urgent global oil and gas demand challenges by delivering lower carbon-intensity products with sustainability-conscious procurement practices. Demand for fossil fuels is not expected to drop any time soon, so Canadian energy companies could deliver ethically sourced products to other nations in need.

Critical considerations for organizations

Stakeholders in the energy transition will face several challenges and uncertainties, alongside exciting opportunities, throughout the transformation. Consider the following questions to determine whether your organization is prepared to support the 2050 energy system:

1. Does our organization have a strategy and vision to enable the energy transition?
2. What is our role in the energy transition?
3. What is our stakeholder engagement approach to enable the energy transition?
4. How are our competitors positioning themselves to participate in the energy transition?
5. How can we capitalize on the energy transition opportunities?
6. What ESG disclosure standards apply to our organization and how should we follow them?
7. What subsidies and other energy transition incentives apply to our business?
8. Do we have a robust scenario planning for the energy transition?

How can EY teams help?

The energy transition is critical to achieving Canada's net-zero aspirations and to transforming the economy for the future. EY teams are fully aware of the market transition and the current trends, and we are dedicated to supporting the relevant stakeholders along this journey. We help organizations in both the public and private sectors overcome existing barriers and develop strategies to drive implementation with real and tangible results.

Our services include:

Transformation Strategy Services operating model design, market research and analysis, go-to-market strategy, scenario planning, innovation and integrated planning.

Climate Change and Sustainability Services energy optimization strategies, climate change risk and scenario planning, climate change and decarbonization strategy advisory, renewable energy or carbon abatement analysis, public and private sector policy, management systems for GHG emissions, ESG strategy and disclosure.

Supply Chain and Operations Services supply chain strategy and establishing broad visibility, integrated digital planning, supply-side optimizations, manufacturing excellence and smart factory, and digital fulfillment.

Tax Services global compliance and reporting, incentives, carbon credits, transfer pricing and documentation, tax planning, transaction tax, tax accounting and risk advisory services, tax policy and controversy.

EY-Parthenon strategy consulting, corporate and growth strategy, transaction strategy and execution, restructuring and turnaround strategy, digital strategy, and commercial strategy.



Conclusion

A successful energy transition is crucial to tackling Canada's climate change objectives and unlocking economic opportunities. While the transformation is arguably already underway, Canada is still in the early days of its own energy transition journey. To succeed, Canada will need a broad stakeholder buy-in, which includes federal, provincial and municipal governments. It's imperative for them to work together to determine an effective balance and a path forward, while collaborating to fully address the energy trilemma.

Canada has unique opportunities across the country, from clean electricity systems to sustainable agriculture. Each province has its own set of priorities and opportunities, based on their respective populations, economic factors and the presence of GHG-reduction options. Canada has a role on the international stage, whereby it can share key knowledge and resources from its own decarbonization pathway.

The energy transition future in Canada is bright and full of opportunities to decarbonize value chains, innovate and bring new products and solutions to domestic and international markets. Our Five-Pillar Energy Transition Action Plan is a guiding pathway to achieving a decarbonized economy.

Overall, successful organizations will be the ones that are able to understand the energy transition context, identify the relevant opportunities, and proactively engage with other market stakeholders to fulfill their own and the nation's energy transition commitments and needs. The 2050 energy system is in the near future, and Canada has the potential to transform the economy to be more environmentally sustainable and financially prosperous.

The change begins today.

Key contacts and editors



Kent Kaufield

ESG Markets Leader &
Chief Sustainability Officer,
Ernst & Young LLP
kent.d.kaufield@ca.ey.com
+1 403 206 5100



Thibaut Millet

Partner, Climate Change
and Sustainability Services,
Ernst & Young LLP
thibaut.millet@ca.ey.com
+1 514 879 2846



Stephanie Hamilton

Director, Climate Change
and Sustainability Services,
Ernst & Young LLP
stephanie.hamilton@ca.ey.com
+1 514 879 6501



Anne-Marie Hubert

Partner, Sustainable Finance,
Ernst & Young LLP
anne-marie.j.hubert@ca.ey.com
+1 514 874 4382



Daniela Carcasole

Partner & Assurance
Central Markets Leader,
Ernst & Young LLP
daniela.carcasole@ca.ey.com
+1 416 943 5306



Greg Boone

Partner & Energy Tax Market Leader,
Ernst & Young LLP
greg.boone@ca.ey.com
+1 403 206 5306



Dr. Lance Mortlock

Canadian Managing Partner Energy,
Ernst & Young LLP
lance.mortlock@ca.ey.com
+1 403 206 5277



Craig Sabine

Associate Partner & Executive Director
Energy Transition, Ernst & Young LLP
craig.sabine@ca.ey.com,
+1 416 932 4219



Dan Ziinik

Partner, Strategy and Transactions,
Ernst & Young LLP
dan.ziinik@parthenon.ey.com
+1 416 892 7730



Francis Claude

Senior Manager,
Ernst & Young LLP
francis.claude@ca.ey.com
+1 403-472-2952



Chris Palmer

Senior Manager,
Ernst & Young LLP
chris.palmer@ca.ey.com
+1 403 206 5465



Alexandr Kim

Senior Consultant,
Ernst & Young LLP
alexandr.kim@ca.ey.com
+1 403 592 9987



Maria Suarez

Senior Consultant,
Ernst & Young LLP
maria.suarez.santana@ca.ey.com
+ 604 364 9974



Jonathan Malowney

Staff Consultant,
Ernst & Young LLP
jonathan.malowney@ca.ey.com
+1 416 932 4023

References

- 1, 3 UN environment programme. (2022, October 27). Retrieved from Emissions Gap Report 2022: <https://www.unep.org/resources/emissions-gap-report-2022>
- 2 IEA. (2023, March). CO2 Emissions in 2022. Retrieved from <https://www.iea.org/reports/co2-emissions-in-2022>
- 4 CBC. (2022, March 29). Canada releases plan for a 40 per cent cut in carbon emissions by 2030. Retrieved from CBC Politics: <https://www.cbc.ca/news/politics/canada-2030-emissions-reduction-plan-1.6401228>
- 5 United Nations. (2021). Theme Report on Energy Transition. United Nations.
- 6 Bocca, R. (2022, May 26). 5 strategies to navigate the shifting frontiers of the energy transition. Retrieved from World Economic Forum: <https://www.weforum.org/agenda/2022/05/5-strategies-actions-navigate-energy-transition/>
- 7 Oxford Institute for Energy Studies. (2021). Uncertain Past, Uncertain Future: How Assumptions About the Best Shape Energy Transition Expectations. Oxford Institute for Energy Studies.
- 8 World Economic Forum. (2021). Fostering Effective Energy Transition - Insight Report. World Economic Forum.
- 9 Government of Canada. (2022, November 11). Carbon pollution pricing systems across Canada. Retrieved from Government of Canada: <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work.html>
- 10 IEA. (2021, December 17). The cost of capital in clean energy transitions. Retrieved from IEA: <https://www.iea.org/articles/the-cost-of-capital-in-clean-energy-transitions>
- 11 Glasgow Science Centre. (2021, April 7). The Energy Trilemma. Retrieved from Glasgow Science Centre: <https://www.glasgowsciencecentre.org/our-blog/the-energy-trilemma#:~:text=The%20Energy%20Trilemma%20refers%20to,world%20we%20live%20in%20today.>
- 12,13,14,16,17,18,19 World Energy Council. (n.d.). World Energy Trilemma Index. Retrieved from World Energy Council: <https://www.worldenergy.org/transition-toolkit/world-energy-trilemma-index>
- 15 IEA. (n.d.). Electricity security matters more than ever. Retrieved from IEA: <https://www.iea.org/reports/power-systems-in-transition/electricity-security-matters-more-than-ever>
- 20 Eurostat. (n.d.). Shedding light on energy - 2023 edition. Retrieved from Eurostat: <https://ec.europa.eu/eurostat/web/interactive-publications/energy-2023#energy-mix>
- 21 Conolly, K. (2022, July 8). Germany to reactivate coal power plants as Russia curbs gas flow. Retrieved from The Guardian: <https://www.theguardian.com/world/2022/jul/08/germany-reactivate-coal-power-plants-russia-curbs-gas-flow>
- 22 Maximow, T. (2022, May 8). Energy Security in Europe - National Perspectives Part 1: Poland. Retrieved from Federal Ministry for Economic Affairs and Climate Action: <https://www.euki.de/en/news/energy-security-europe-poland/>
- 23 Abnett, K. (2022, March 17). Poland 'looking again' at role of gas in green energy transition. Retrieved from Reuters: <https://www.reuters.com/business/sustainable-business/poland-looking-again-role-gas-green-energy-transition-2022-03-17/>
- 24 Naturvardsverket. (n.d.). Swedens Climate Act and Climate Policy Framework. Retrieved from Naturvardsverket: <https://www.naturvardsverket.se/en/topics/climate-transition/sveriges-klimatarbete/swedens-climate-act-and-climate-policy-framework/#:~:text=The%20Climate%20Act%20entered%20into,is%20to%20be%20carried%20out.>
- 25,28 Government Offices of Sweden - Ministry of Environment. (2020). Sweden's long-term strategy for reducing greenhouse gas emissions. Government of Sweden.
- 26 EA. (n.d.). Sweden - Key Energy Statistics. Retrieved from IEA: <https://www.iea.org/countries/sweden>
- 27 Energimyndigheten. (2022). Energy in Sweden 2022 - an overview. Energimyndigheten. Retrieved from Energimyndigheten.
- 29 Logadóttir, H. H. (2015, December). Iceland's Sustainable Energy Story: A Model for the World? Retrieved from United Nations - UN Chronicle: <https://www.un.org/en/chronicle/article/icelands-sustainable-energy-story-model-world>
- 30,31,32,33,34,35,36 Richter, A. (2020). Iceland Overview - Energy Market & Geothermal Energy. Renewable Energy Cluster.
- 37,38,40,41,42,43,44 World Energy Council. (2021). World Energy Trilemma Index 2021. World Energy Council.
- 39 International Labour Organization. (n.d.). Climate change and financing a just transition. Retrieved from International Labour Organization: https://www.ilo.org/empent/areas/social-finance/WCMS_825124/lang--en/index.htm
- 45,46 Canada Energy Regulator. (2022, July 28). Provincial and Territorial Energy Profiles. Retrieved from Canada Energy Regulators: <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/index.html>
- 47 Canada Energy Regulator. (2022, July 28). Provincial and Territorial Energy Profiles - Alberta. Retrieved from Canada Energy Regulator: <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-alberta.html>
- 48 Canada Energy Regulator. (2022, July 28). Provincial and Territorial Energy Profiles - British Columbia. Retrieved from Canada Energy Regulator: <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-british-columbia.html>
- 49 Government of Canada. (2021, July 12). Government of Canada confirms ambitious new greenhouse gas emissions reduction target. Retrieved from Government of Canada: <https://www.canada.ca/en/environment-climate-change/news/2021/07/government-of-canada-confirms-ambitious-new-greenhouse-gas-emissions-reduction-target.html>
- 50 CleanBC. (n.d.). B.C. is rising to the challenge of climate change. Retrieved from CleanBC: <https://cleanbc.gov.bc.ca/>
- 51 City of Calgary. (n.d.). Calgary Climate Strategy - Pathways to 2050. Retrieved from City of Calgary: <https://www.calgary.ca/environment/climate.html>
- 52 Grey, D. (2022, March 28). Carbon Tax in Canada. Retrieved from Wealthisimple: https://www.wealthisimple.com/en-ca/learn/canada-carbon-tax#is_there_a_carbon_tax_in_canada
- 53,70 Ollenberger, R., Kwan, R., Dziuba, J., Murphy, M., Gibson, J., & Morrow, D. (2021). Building a Sustainable Future: ESG in Canadian Oil & Gas. BMO Capital Markets.
- 54 Government of Canada. (2022, December 22). Key energy, economic, and environmental indicators. Retrieved from Government of Canada: <https://natural-resources.canada.ca/science-and-data/data-and-analysis/energy-data-and-analysis/energy-facts/key-energy-economic-and-environmental-indicators/23926>
- 55 Government of Canada. (2022, May). Key facts about Canada's competitiveness for foreign direct investment. Retrieved from Government of Canada: https://www.international.gc.ca/trade-commerce/economist-economiste/analyse-analyse/key-facts-2022-05-faits_sallants.aspx?lang=eng
- 56 Bordo, M. D., Redish, A., & Rockoff, H. (2011). WHY DIDN'T CANADA HAVE A BANKING CRISIS IN 2008 (OR IN 1930, OR. Cambridge: National Bureau of Economic Research.
- 57,87 Nelson, M. (2020). How will ESG performance shape your future. EY.
- 58 Clean Energy Canada. (2022, December 13). Poll: Canadians see a clean energy system as more affordable and secure than a fossil fuel one. Retrieved from Clean Energy Canada: <https://cleanenergycanada.org/poll-canadians-see-a-clean-energy-system-as-more-affordable-and-secure-than-a-fossil-fuel-one/>
- 59 Carlier, M. (2022, March 9). Electric vehicle sales in Canada between 2014 and 2021. Retrieved from Statista: <https://www.statista.com/statistics/665870/sales-of-plug-in-light-vehicles-in-canada/>
- 60 Statistics Canada. (2022, December 19). Environmental and Clean Technology Products Economic Account, 2021. Retrieved from Statistics Canada: <https://www150.statcan.gc.ca/n1/daily-quotidien/221219/dq221219c-eng.htm>
- 61 Canadian Renewable Energy Association. (n.d.). By the Numbers. Retrieved from Canadian Renewable Energy Association: <https://renewablesassociation.ca/by-the-numbers/>
- 62 Canada Energy Regulator. (2021, March 23). Prairie Provinces to lead Canada in renewable energy growth. Retrieved from Canada Energy Regulator: <https://www.cer-rec.gc.ca/en/about/news-room/news-releases/2021/prairie-provinces-to-lead-canada-in-renewable-energy-growth.html?=&wbdisable=true>
- 63 Natural Resources Canada. (2020). Hydrogen Strategy for Canada. Natural Resources Canada.
- 64,79 Mortlock, L. (2021). Canada's hydrogen future - risk and rewards. EY.
- 65 IFRS. (n.d.). General Sustainability-related Disclosures. Retrieved from IFRS: <https://www.ifrs.org/projects/work-plan/general-sustainability-related-disclosures/>
- 66 Manifest Climate. (2021, October 20). Canadian Securities Administrators Propose Mandatory TCFD-aligned Reporting Rules. Retrieved from Manifest Climate: <https://www.manifestclimate.com/blog/csa-propose-mandatory-tcfd-aligned-reporting/>
- 67 Kaminski, I. (2022, June 30). Fossil fuel industry faces surge in climate lawsuits. Retrieved from The Guardian: <https://www.theguardian.com/environment/2022/jun/30/fossil-fuel-industry-surge-climate-lawsuits>

- 68 Statistics Canada. (2022, November 14). *Canada's natural resource wealth, 2021 (preliminary data)*. Retrieved from Statistics Canada: <https://www150.statcan.gc.ca/n1/daily-quotidien/221114/dq221114d-eng.htm>
- 69,72 Vitello, C. (2021, June 1). *Report Reveals Canada's Emissions Increase Greatest in G7*. Retrieved from Environmental Journal: <https://environmentjournal.ca/report-indicates-canadas-emissions-increase-greatest-in-g7/>
- 71 Belsie, L. (2010, January). *How Regressive is a Price on Carbon?* Retrieved from National Bureau of Economic Research: <https://www.nber.org/digest/jan10/how-regressive-price-carbon>
- 73 Flemming, S. (2021, May 19). *This is why the energy transition will be reliant on the mining industry*. Retrieved from World Economic Forum: <https://www.weforum.org/agenda/2021/05/energy-transition-reliant-on-mining/>
- 74 IEA. (n.d.). *Mineral requirements for clean energy transitions*. Retrieved from IEA: <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/mineral-requirements-for-clean-energy-transitions>
- 75 Portland Cement Association. (n.d.). *Carbon Footprint*. Illinois.
- 76 Government of Canada. (n.d.). *Greenhouse Gases and Agriculture*. Retrieved from Government of Canada: <https://agriculture.canada.ca/en/environment/greenhouse-gases>
- 77 Top 100 Projects. (n.d.). *Go Expansion - On Corridor Works*. Retrieved from Top 100 Canada's Biggest Infrastructure Projects: <https://top100projects.ca/the-projects/go-expansion-projects-on-corridor/>
- 78,83 RBC. (2021). *The \$2 Trillion Transition: Canada's Road to Net Zero*. RBC.
- 80 Williams, N. (2022, May 12). *Canada, industry in talks to cement future carbon price hikes*. Retrieved from Reuters: <https://www.reuters.com/business/sustainable-business/canada-industry-talks-cement-future-carbon-price-hikes-2022-05-12/#:~:text=MARKET%20RISK,reach%20net%20zero%20by%202050>
- 81 Government of Canada. (2022, October 4). *Oil and gas emissions cap*. Retrieved from Government of Canada: <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/oil-gas-emissions-cap.html>
- 82 Offsetters Community. (n.d.). *Darkwoods Forest Carbon Project*. Retrieved from Offsetters Community: <https://ostromclimate.com/portfolio/darkwoods-forest-carbon-project/#:~:text=Darkwoods%20Forest%20Carbon%20Project%20-%20Ostrom%20Climate%20Darkwoods,in%20partnership%20with%20The%20Nature%20Conservancy%20of%20Canada>
- 84 Office of the Prime Minister of Canada. (2022, March 29). *Delivering clean air and a strong economy for Canadians*. Retrieved from Office of the Prime Minister of Canada: <https://pm.gc.ca/en/news/news-releases/2022/03/29/delivering-clean-air-and-strong-economy-canadians>
- 85 Elshurafa, D. (2021, August 5). *69% of Canadian consumers expect companies to solve sustainability issues*. Retrieved from EY: https://www.ey.com/en_ca/news/2021/08/sixty-nine-percent-of-canadian-consumers-expect-companies-to-solve-sustainability-issues
- 86 Canada Action. (n.d.). *Canada's Environmental, Social, Governance (ESG) Leadership*. Retrieved from Canada Action - Taking action in support of our vital natural resource sector: <https://www.canadaaction.ca/esg>
- 88 Yaku, F. (2021, August 3). *Itochu's 'blue' ammonia from Canada to power Japan's green future*. Retrieved from Nikkei Asia: <https://asia.nikkei.com/Business/Energy/Itochu-s-blue-ammonia-from-Canada-to-power-Japan-s-green-future>
- 89 Center for Global Development. (n.d.). *Developing Countries Are Responsible for 63 Percent of Current Carbon Emissions*. Retrieved from Center for Global Development: <https://www.cgdev.org/media/developing-countries-are-responsible-63-percent-current-carbon-emissions>
- 90 *The Clean Development Mechanism*. (n.d.). Retrieved from United Nations - Climate Change: <https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism>

EY | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. Information about how EY collects and uses personal data and a description of the rights individuals have under data protection legislation are available via [ey.com/privacy](https://www.ey.com/privacy). EY member firms do not practice law where prohibited by local laws. For more information about our organization, please visit [ey.com](https://www.ey.com).

© 2023 Ernst & Young LLP. All Rights Reserved.
A member firm of Ernst & Young Global Limited.

4204748
ED 00

This publication contains information in summary form, current as of the date of publication, and is intended for general guidance only. It should not be regarded as comprehensive or a substitute for professional advice. Before taking any particular course of action, contact Ernst & Young or another professional advisor to discuss these matters in the context of your particular circumstances. We accept no responsibility for any loss or damage occasioned by your reliance on information contained in this publication.

[ey.com/ca](https://www.ey.com/ca)