Environment and Climate Change Canada
Environnement et Changement climatique Canada

PROGRESS TOWARDS CANADA'S GREENHOUSE GAS EMISSIONS REDUCTION TARGET

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

Canada

Suggested citation for this document: Environment and Climate Change Canada (2021) Canadian Environmental Sustainability Indicators: Progress towards Canada's greenhouse gas emissions reduction target. Consulted on *Month day, year*.
Available at: www.canada.ca/en/environment-climate-change/services/environmental-indicators/progress-towards-canada-greenhouse-gas-emissions-reduction-target.html.

Cat. No.: En4-144/48-2021E-PDF
ISBN: 978-0-660-36995-2

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March 2021

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Progress towards Canada's greenhouse gas emissions reduction target

Greenhouse gases (GHGs) trap heat in the Earth's atmosphere, just as the glass of a greenhouse keeps warm air inside. Human activity increases the amount of GHG in the atmosphere. When more heat is trapped, the temperature of the planet increases. Canada is committed to implementing its strengthened climate plan to ensure Canada not only meets, but also exceeds its 2030 emissions reduction goal, and beginning work so that Canada can achieve net-zero emissions by 2050.[1] This indicator tracks Canada's progress related to the 2030 target.

Greenhouse gas emissions projections under Canada's climate plan

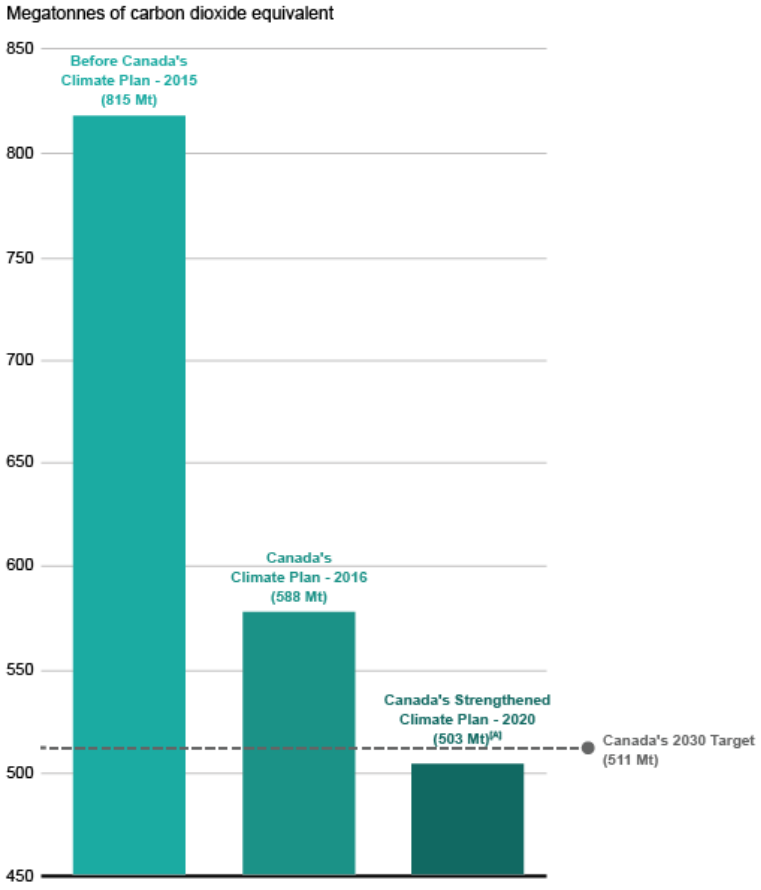
In 2016, Canada released the first-ever national climate plan – the Pan-Canadian Framework on Clean Growth and Climate Change – jointly developed by the federal, provincial and territorial governments. The measures in the Pan-Canadian Framework are projected to make significant progress in helping Canada reach its 2030 goal of a 30% reduction below 2005 levels. In December 2020, the Government of Canada released its strengthened federal climate plan, A Healthy Environment and a Healthy Economy. The plan contains 64 strengthened and new federal policies, programs and investments to cut pollution and build a stronger, cleaner, more resilient and inclusive economy. Building on the measures included in the Pan-Canadian Framework on Clean Growth and Climate Change, the proposed actions outlined in the strengthened climate plan will – once fully implemented – enable Canada to exceed its current 2030 target.

Key results

- In 2030, GHG emissions
    - are projected to be 588 megatonnes of carbon dioxide equivalent (Mt CO_2 eq) under Canada's climate plan or 227 Mt CO_2 eq lower than the 815 Mt CO_2 eq projected before the adoption of the Pan-Canadian Framework
    - are projected to be 503 Mt CO_2 eq under Canada's strengthened climate plan or about 8 Mt CO_2 eq below the 2030 target of 511 Mt CO_2 eq

[1] Canada has also committed to achieve a net-zero emissions economy by 2050. To set Canada on a path to achieve a prosperous net-zero emissions future by 2050, the Government of Canada introduced the proposed *Canadian Net-Zero Emissions Accountability Act*, in Parliament on November 19, 2020. The Act will formalize Canada's target to achieve net-zero emissions by the year 2050, and establish a series of interim emissions reduction targets at 5-year milestones towards that goal.

Figure 1. Projected greenhouse gas emissions in 2030



Data for Figure 1

Note: [A] These projections do not include further commitments from provinces and territories. For more information, please refer to the annex on Modelling and Analysis of A Healthy Environment and a Healthy Economy. The model likely underestimates emission reductions because it does not capture the full range of innovative technologies that are in the early stages of the commercialization process nor does it reflect the likely improvements in the technology performance or cost reductions.
Source: Environment and Climate Change Canada (2020) A Healthy Environment and a Healthy Economy. Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

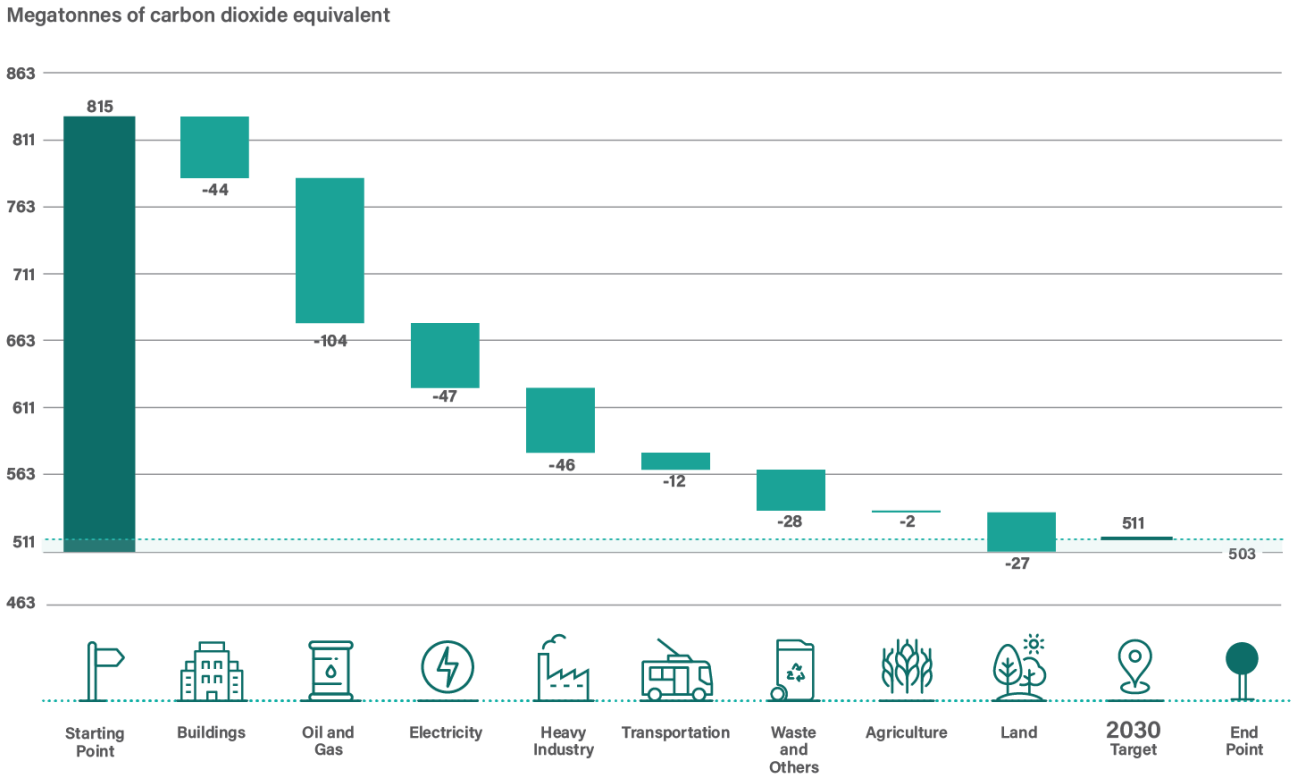
Projected greenhouse gas emissions reductions

Under the 2015 Paris Agreement, Canada committed to reducing its GHG emissions by 30% below 2005 levels by 2030, which means a reduction from 730 Mt CO_2 eq in 2005 to 511 Mt CO_2 eq in 2030.

Key results

- From the starting point of 815 Mt CO_2 eq in 2015, Canada would need a 304 Mt CO_2 eq reduction in projected 2030 emissions
- Based on the measures in the Pan-Canadian Framework, other announced provincial/territorial measures, and the new measures in under Canada's strengthened climate plan, emissions are projected to be 503 Mt CO_2 eq in 2030, or about 8 Mt CO_2 eq below the target. This represents about a 31% reduction below Canada’s 2005 emissions.

Figure 2. Sources of emission reductions contributing to reaching the 2030 target



Data for Figure 2

Note: The starting point 2015 projections are reported in Canada's Second Biennial Report on Climate Change. For more information on the projected emissions in 2030, refer to Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020 and the annex on Modelling and Analysis of A Healthy Environment and a Healthy Economy.
Source: Environment and Climate Change Canada (2020) A Healthy Environment and a Healthy Economy. Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

Collectively under the strengthened climate plan that builds on the Pan-Canadian Framework, Canada's economic sectors[2] are projected to reduce their emissions by 283 Mt CO_2 eq in 2030 relative to what was projected in 2015 in Canada's Second Biennial Report on Climate Change. Reductions from these sectors include:

- Buildings (44 Mt CO_2 eq)
- Oil and gas (104 Mt CO_2 eq)
- Electricity (47 Mt CO_2 eq)
- Heavy industry (46 Mt CO_2 eq)
- Transportation (12 Mt CO_2 eq)
- Waste and others (28 Mt CO_2 eq)
- Agriculture (2 Mt CO_2 eq)

Additional projected emissions reductions will come from land sector contribution (17 Mt CO_2 eq) and nature-based solutions and agriculture measures (10 Mt CO_2 eq). Combined, these reductions arrive at 503 Mt CO_2 eq in 2030, or about 8 Mt CO_2 eq below Canada's 2030 target. This represents about a 31% reduction below Canada's 2005 emissions.

[2] Refer to the Greenhouse gas emissions indicators for more information on how the economic sectors contribute to GHG emissions in Canada.

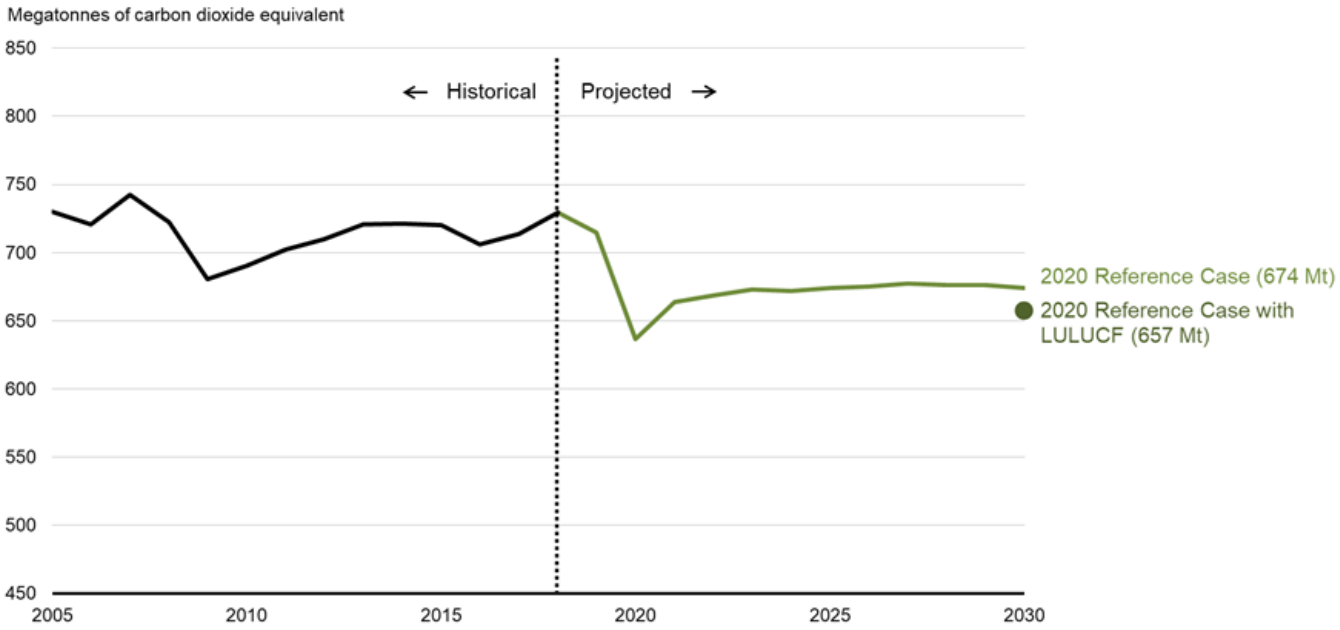
Reference case greenhouse gas emissions projections

Environment and Climate Change Canada publishes updated GHG emissions projection scenarios annually that reflect the latest historical data and up-to-date future economic and energy market assumptions. The 2020 Reference Case scenario projects GHG emissions based on federal, provincial, and territorial policies and measures that were in place as of September 2020. This scenario assumes governments take no further climate action after September 2020. The 2020 Reference Case also serves as a baseline for the assessment of Canada's strengthened climate plan, A Healthy Environment and a Healthy Economy.

Key results

- The most recent 2020 Reference Case scenario includes actions taken by governments, consumers and businesses put in place up to September 2020 shows:
    - projected emissions of 674 megatonnes of carbon dioxide equivalent (Mt CO_2 eq) in 2030, or 8% below 2005 levels
    - when including the contribution from the land use, land use change and forestry (LULUCF) sector, emissions are projected to be 657 Mt CO_2 eq in 2030, or 10% below 2005 levels

Figure 3. Historical greenhouse gas emissions and projections, Canada, 2005 to 2030



Data for Figure 3

Note: LULUCF = land use, land use change and forestry. The Reference Case scenario is the "with measures" scenario as defined by the United Nations Framework Convention on Climate Change. For more information on the projection scenario, refer to the Data sources and methods.
Source: Environment and Climate Change Canada (2020) National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada. Environment and Climate Change Canada (2020) Modelling and Analysis of a Healthy Environment and a Healthy Economy annex. Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

Under the 2020 Reference Case scenario, it is projected that Canada's emissions in 2030 would be 674 Mt CO_2 eq, or 141 Mt CO_2 eq below Canada's 2015 projections of 815 Mt CO_2 eq. that were published in the Canada's Second Biennial Report on Climate Change. Taking into consideration a 17 Mt CO_2 eq contribution from the LULUCF sector, emissions in 2030 would be 657 Mt CO_2 eq, or 158 Mt CO_2 eq below the 2015 projections.

About the indicator

What the indicator measures

The indicator provides an overview of Canada's projected GHG emissions up to 2030. These projections are based on:

- historical data from Canada's National Inventory Report
- expectations about future energy markets, population and economic growth from authoritative sources including the Canada Energy Regulator, Statistics Canada and Finance Canada
- policies and measures that were in place as of September 2020
- initiatives announced under Canada's strengthened climate plan that have not yet been funded, legislated or implemented

Why this indicator is important

In 2015, Canada and 194 other countries reached the Paris Agreement. This agreement aims to limit the global average temperature rise to well below 2 degrees Celsius and pursue efforts to limit the increase to 1.5 degrees Celsius. Under the Agreement, Canada has committed to a target to reduce GHG emissions by 30% below 2005 levels by 2030. In addition, the Government of Canada is committed to implementing its strengthened climate plan to ensure Canada not only meets, but also exceeds Canada's 2030 emissions reduction goal and beginning work so that Canada can achieve net-zero emissions by 2050.

This indicator allows the public and policy-makers to see Canada's progress related to the 2030 target.

Further, this indicator is important because of the human health, environmental and economic impacts associated with GHG emissions. For more information on these impacts, consult Greenhouse gas emissions: drivers and impacts.

Effective action on climate change

This indicator supports the measurement of progress towards the following 2019 to 2022 Federal Sustainable Development Strategy long-term goal: A low-carbon economy contributes to limiting global average temperature rise to well below 2 degrees Celsius and supports efforts to limit the increase to 1.5 degrees Celsius.

Greening government

This indicator supports the measurement of progress towards the following 2019 to 2022 Federal Sustainable Development Strategy long-term goal: The Government of Canada will transition to low-carbon, climate-resilient, and green operations.

In addition, the indicator contributes to the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. It is linked to the 2030 Agenda's Goal 13, Take urgent action to combat climate change and its impacts and Target 13.2, "Integrate climate change measures into national policies, strategies and planning."

Related indicators

The Greenhouse gas emissions indicators report trends in total anthropogenic (human-made) GHG emissions at the national level, per person and per unit gross domestic product, by province and territory and by economic sector.

The Greenhouse gas emissions from large facilities indicator reports GHG emissions from the largest GHG emitters in Canada (industrial and other types of facilities).

The Global greenhouse gas emissions indicator provides a global perspective on Canada's share of global GHG emissions.

The Carbon dioxide emissions from a consumption perspective indicator shows the impact of Canada's consumption of goods and services, regardless of where they are produced, on the levels of carbon dioxide released into the atmosphere.

The Land-based greenhouse gas emissions and removals indicator tracks exchanges of greenhouse gas emissions and removals between the atmosphere and Canada's managed lands.

Data sources and methods

Data sources

The data for this indicator come from Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020 and Canada's GHG emissions projections as reported in A Healthy Environment and a Healthy Economy. The indicator reflects the latest GHG emissions projections published by the department at the time of production.

The latest projections (December 2020) use historical GHG emissions data from the 2020 National Inventory Report for the years 2005 to 2018. The Reference Case projection scenario covers the years 2019 to 2030. Emissions projections under Canada's strengthened climate plan are reported for 2030.

Methods

No changes or additional calculations are performed on the data.

More information

The indicator is based on analysis that incorporates the most up-to-date information on GHG emissions, economic and population growth and energy price and production projections available at the time the technical modelling was completed. Data and information on policies and measures modelled under the Reference Case scenario and Canada's strengthened climate plan were included in Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020 and the annex on Modelling and Analysis of A Healthy Environment and a Healthy Economy.

Emissions projections

The emissions projections have been developed in line with generally recognized best practices. This includes:

- incorporating Intergovernmental Panel on Climate Change standards for estimating GHG emissions across different fuels and processes
- relying on outside expert views and the most up-to-date data available for key drivers, such as economic and population growth, energy prices, and energy demand and supply
- applying an internationally recognized energy and macroeconomic modelling framework for estimating emissions and economic interactions
- using a methodology to develop the projections and underlying assumptions that has been subject to peer review by leading external experts on economic modelling and GHG emissions projections, and vetted by key stakeholders

The approach to developing Canada's GHG emissions projections involves:

- using the most up-to-date statistics on GHG emissions and energy use, and sourcing key assumptions from the best available public and private expert sources
- developing emissions projection scenarios using the detailed and proven Energy, Emissions and Economy Model for Canada (E3MC)

The methodology for developing the emissions scenarios is described in Annex 2.7 of Canada's Fourth Biennial Report on Climate Change and the annex on Modelling and Analysis of A Healthy Environment and a Healthy Economy.

Scenarios

The indicator presents the 2020 Reference Case scenario, shown from 2019 to 2030, was reported in Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020. This scenario includes policies and measures in place as of September 2020.

The indicator also presents the projected emissions for 2030 under Canada's climate plan. This takes into account initiatives as of September 2020 under the plan that have not yet been funded, legislated or implemented.

Recent changes

The calculation of this indicator reflects methodological revisions that were applied to the 2020 National Inventory Report, as well as revisions to the Energy, Emissions and Economy Model for Canada. For a list of the modelling and methodological changes, refer to Section 1.3.1 of Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020 and Annex 2.4 of Canada's Fourth Biennial Report on Climate Change.

The indicator was updated with the latest GHG emissions projection for 2030 published under Canada's strengthened climate plan, A Healthy Environment and a Healthy Economy. This plan builds on the foundation established by the Pan-Canadian Framework on Clean Growth and Climate Change and focuses on a series of new and strengthened federal climate actions to ensure Canada not only meets, but also exceeds its 2030 Paris Agreement target.

Caveats and limitations

Emissions projections are subject to uncertainty, and are most appropriately viewed as a range of plausible outcomes. Many of the events that shape emissions and energy markets cannot be anticipated. In addition, future developments in technologies, demographics and resources cannot be foreseen with certainty.

More information

The projection scenarios derive from a series of plausible assumptions regarding, among others, population and economic growth, prices, demand and supply of energy, and the evolution of energy efficiency technologies. The 2020 Reference Case scenario assumes no further government actions to address GHG emissions beyond those already in place as of September 2020.

Under the Pan-Canadian Framework on Clean Growth and Climate Change and A Healthy Environment and a Healthy Economy, a number of policies and measures have been announced. As the policy development process is not yet finished, some policies were not included in the 2020 Reference Case scenario. For a complete list of included policies and measures, refer to Table A.33 in Annex 3 of Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020. The Reference Case does not take into account the impact of broader strategies or future measures within existing plans where significant details are still under development. Policies still under development will be included in subsequent reference cases as their details become finalized.

The emission reduction projections are conservative relative to the significant investments and economic transformation likely to unfold over the coming decade. Certain investments, such as those in clean technology or public transit, are difficult to quantify in advance but can be expected to have a material impact on greenhouse gas emissions. These projections also do not account for the reality that Canada is just starting along the innovation curves associated with some promising decarbonization technologies. It is expected that GHG estimates will continue to decline in the near to medium term, especially with the expected impact of the COVID-19 pandemic and economic recession in 2020 and a gradual recovery in the following years.

In December 2020, the federal government released its strengthened federal climate plan. The plan, A Healthy Environment and a Healthy Economy, contains 64 strengthened and new federal policies, programs and investments to cut pollution and build a stronger, cleaner, more resilient and inclusive economy. Some of the investments in this plan will begin immediately, to ensure Canada continues to make rapid progress. Other measures require engagement with provinces and territories, with stakeholders and Indigenous partners, and with Canadians. The plan includes $15 billion in new investments, bringing the government's total committed funding for climate change and clean growth to about $100 billion since 2017.

Canada is committed to reaching net-zero emissions by 2050 and tabled the *Canadian Net-Zero Emissions Accountability Act* in November 2020 to establish a legally-binding process to achieve that goal. The Act will require Canada to set emissions reduction targets for milestones at 5-year intervals. It will also require the Government to report to Parliament with plans to reach these targets, interim progress reports on implementation and effectiveness, as well as final assessment reports on each target. The Bill also proposes to enshrine in the law an advisory body to provide independent advice and engage Canadians on optimal pathways to achieve net-zero emissions by 2050. Input from across the country will be key to these efforts. The *Canadian Net-Zero Emissions Accountability Act* requires that provinces and territories, Indigenous peoples, stakeholders, and experts be given the opportunity to provide input into this process.

The projections presented in the indicator are based on a series of assumptions, including that the current planned policy context will continue into the future. The projections do not attempt to account for the inevitable but as yet unknown changes that will occur in government policy; energy supply, demand and technology; or domestic and international economic and political events.

The future level of GHG emissions in Canada depends on a number of factors, including changes in future energy markets and economic assumptions, technological change, consumer behaviour, and introduction of additional policies aimed at emissions reductions. A sensitivity analysis was conducted to address the uncertainty regarding the key drivers of GHG emissions. The analysis focuses on variability in 2 key factors: future economic growth and population projections, and the evolution of oil and natural gas prices and production. For more details about the sensitivity analysis, please consult Section 1.3.6 and Annex 2 of Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

While the Energy, Emissions and Economy Model for Canada is a sophisticated analytical tool, no model can fully capture the complicated interactions associated with given policy measures between and within markets or between firms and consumers.

The Energy, Emissions and Economy Model for Canada has a broad model boundary that captures the complex interactions that occur between producers, consumers and the environment across all energy sectors in the Canadian context. In addition, the Energy, Emissions and Economy Model for Canada has an explicit causal structure that can be used to understand the origins of the patterns of behavior observed and also captures capital stock dynamics. Combined with the fact that it is calibrated to the Canadian experience, these provide considerable flexibility for the modeling of energy and environmental policies.

Unlike computable general equilibrium models, the Energy, Emissions and Economy Model for Canada does not fully equilibrate government budgets and the markets for employment and investment. That is, the modeling results reflect rigidities such as unemployment and government surpluses and deficits. The model, as used by Environment and Climate Change Canada, also does not generate changes in nominal interest rates and exchange rates, as would occur under a monetary policy response to a major economic event. Consequently, the model is not designed to undertake welfare analysis.

Finally, the model lacks endogenous technological change for the industrial and transportation sectors. As a result, the Energy, Emissions and Economy Model for Canada is not well-suited to modeling disruptive technological changes.

Resources

References

Environment and Climate Change Canada (2016) Pan-Canadian Framework on Clean Growth and Climate Change. Retrieved on March 1, 2021.

Environment and Climate Change Canada (2020) A Healthy Environment and a Healthy Economy. Retrieved on March 1, 2021.

Environment and Climate Change Canada (2020) National Inventory Report 1990-2018: Greenhouse gas sources and sinks in Canada. Retrieved on March 1, 2021.

Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020. Retrieved on March 1, 2021.

Related information

Canada's climate plan

Greenhouse gas emissions: drivers and impacts

Greenhouse gas emissions projections

Annex

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. Projected greenhouse gas emissions in 2030

Climate plan	Projected emissions in 2030 (megatonnes of carbon dioxide equivalent)
Before Canada's climate plan – 2015	815
Canada's climate plan – 2016	588
Canada's strengthened climate plan – 2020[A]	503

Note: [A] These projections do not include further commitments from provinces and territories. For more information, please refer to the annex on Modelling and Analysis of A Healthy Environment and a Healthy Economy. The model likely underestimates emission reductions because it does not capture the full range of innovative technologies that are in the early stages of the commercialization process nor does it reflect the likely improvements in the technology performance or cost reductions.
Source: Environment and Climate Change Canada (2020) A Healthy Environment and a Healthy Economy. Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

Table A.2. Data for Figure 2. Sources of emission reductions contributing to reaching the 2030 target

Sector	Projected emissions reductions in 2030 (megatonnes of carbon dioxide equivalent)
Buildings	44
Oil and gas	104
Electricity	47
Heavy industry	46
Transportation	12
Waste and others	28
Agriculture	2
Nature-based solutions and agriculture measures	10
Land use, land use change and forestry	17

Note: For more information on the projected emissions in 2030, refer to Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020 and the annex on Modelling and Analysis of A Healthy Environment and a Healthy Economy.
Source: Environment and Climate Change Canada (2020) A Healthy Environment and a Healthy Economy. Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

Table A.3. Data for Figure 3. Historical greenhouse gas emissions and projections, Canada, 2005 to 2030

Year	2020 Reference Case[A] (megatonnes of carbon dioxide equivalent)	Canada's target (megatonnes of carbon dioxide equivalent)
2005	730	n/a
2006	721	n/a
2007	742	n/a
2008	723	n/a
2009	681	n/a

Year	2020 Reference Case[A] (megatonnes of carbon dioxide equivalent)	Canada's target (megatonnes of carbon dioxide equivalent)
2010	691	n/a
2011	702	n/a
2012	710	n/a
2013	721	n/a
2014	721	n/a
2015	720	n/a
2016	706	n/a
2017	714	n/a
2018	729	n/a
2019	715	n/a
2020	637	n/a
2021	664	n/a
2022	669	n/a
2023	673	n/a
2024	672	n/a
2025	674	n/a
2026	675	n/a
2027	677	n/a
2028	676	n/a
2029	677	n/a
2030	674[B]	511

Note: n/a = not applicable. [A] Reported in Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020. Historical greenhouse gas emissions data from 2005 to 2018 were taken from the National Inventory Report 1990-2018: Greenhouse gas sources and sinks in Canada. The 2020 Reference Case scenario includes policies and measures in place as of September 2020. [B] Taking into consideration a 17 megatonnes of carbon dioxide equivalent contribution from the land use, land use change and forestry sector, emissions in 2030 would be 657 megatonnes of carbon dioxide equivalent.The Reference Case scenario is the "with measures" scenario as defined by the United Nations Framework Convention on Climate Change. For more information on the projection scenario, refer to the Data sources and methods.
Source: Environment and Climate Change Canada (2020) National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada. Environment and Climate Change Canada (2020) Modelling and Analysis of a Healthy Environment and a Healthy Economy annex. Environment and Climate Change Canada (2021) Canada's Greenhouse Gas and Air Pollutant Emissions Projections 2020.

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