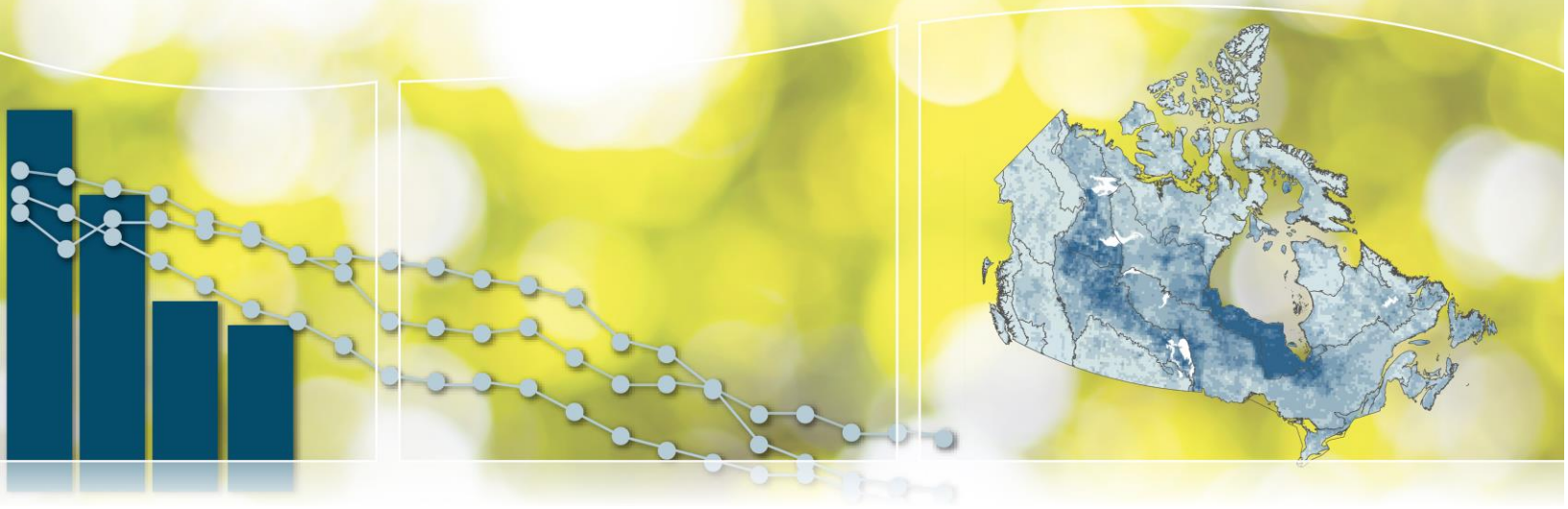
Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canadian Environmental Sustainability Indicators

Progress towards Canada's greenhouse gas emissions reduction target



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Environment and Climate Change Canada
Public Inquiries Centre
12th floor, Fontaine Building
200 Sacré-Coeur boul.
Gatineau, QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860
Fax: 819-938-3318
Email: ec.enviroinfo.ec@canada.ca

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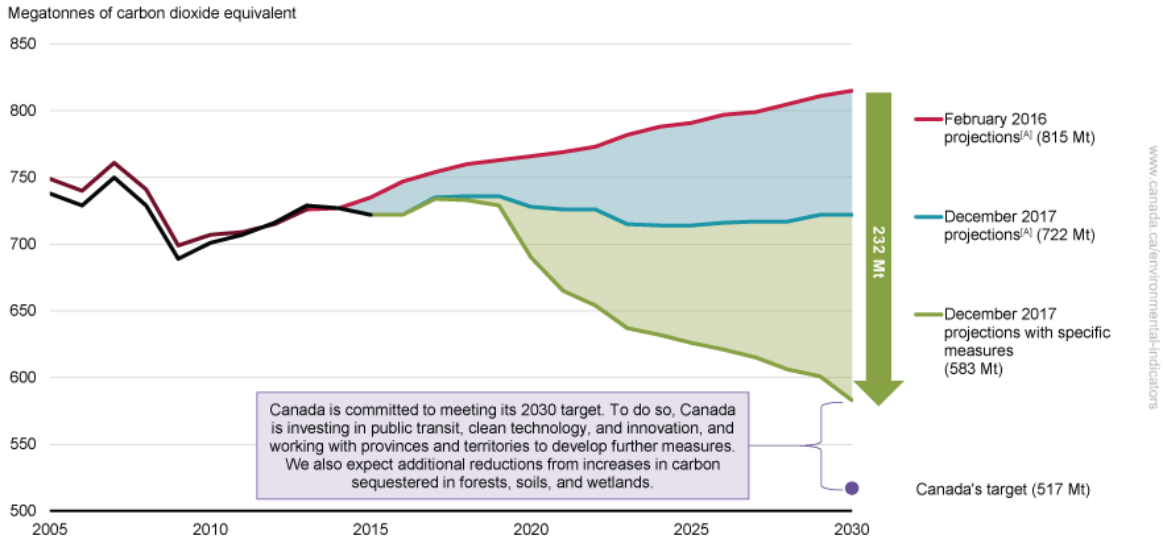
Progress towards Canada's greenhouse gas emissions reduction target indicator

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. As a result, more heat is being trapped and the temperature of the planet is increasing. Under the Paris Agreement, Canada has committed to reducing GHG emissions by 30% below 2005 levels by 2030. This indicator tracks Canada's progress towards meeting its target.

Key results

- In early 2016, GHG emissions in 2030 were projected to be 815 megatonnes of carbon dioxide equivalent (Mt CO_2 eq).
- In December 2017, projections were updated and 2 scenarios were developed:
  - with measures in place as of September 2017, emissions are projected to be 722 Mt CO_2 eq in 2030, or 2% below 2005 levels.
  - with specific measures from Canada's clean growth and climate plan and for which enough information is available, emissions are projected to be 583 Mt CO_2 eq, or 21% below 2005 levels.

Figure 1. Historical greenhouse gas emissions and projections, Canada, 2005 to 2030[1]



Data for Figure 1

Note: [A] These scenarios are the "with measures" scenarios as defined by the United Nations Framework Convention on Climate Change. The February 2016 projections were reported in Canada's Second Biennial Report on Climate Change and include policies and measures in place as of September 2015. The December 2017 projections are reported in Canada's Seventh National Communication on Climate Change (PDF; 2.99 MB) and include policies and measures in place as of September 2017; the scenario with specific measures also includes specific measures from Canada's clean growth and climate plan that have been announced but are still under development. For more information refer to the Data sources and methods**.**
Source: Environment and Climate Change Canada (2017) National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Environment and Climate Change Canada (2017) Canada's Seventh National Communication on Climate Change (PDF; 2.99 MB).

[1] The projected values presented here do not take into account the contribution of the land use, land-use change and forestry sector.

Canada committed to reducing its GHG emissions by 30% below the 2005 level of 738 Mt CO_2 eq by 2030.

The December 2017 projections include actions taken by governments, consumers and businesses put in place up to September 2017. Under this scenario, it is projected that Canada's emissions in 2030 would be 722 Mt CO_2 eq, or 93 Mt CO_2 eq below the projections published in February 2016.

Taking into consideration climate change policies and measures that have been announced in Canada and for which enough information is available, a "with specific measures" scenario has also been developed. Under this scenario, emissions in 2030 would be 583 Mt CO_2 eq, or 232 Mt CO_2 eq below the projections published in February 2016. This projected decline, equivalent to approximately a third of Canada's emissions in 2015, is widespread across all economic sectors, reflecting the breadth of the measures announced in the Pan-Canadian Framework on Clean Growth and Climate Change.

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 National Energy Board, Statistics Canada and Finance Canada
- policies and measures that were in place as of September 2017 (for the December 2017 projections)
- policies and measures that are under development but not yet fully implemented (for the scenario with specific measures)

Why this indicator is important

This indicator allows the public and policy-makers to see Canada's progress towards meeting its GHG emissions target.

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.

Consult Greenhouse gas emissions: drivers and impacts for information on the human health, environmental and economic impacts of GHG emissions.

Related indicators

The Greenhouse gas emissions indicators report trends in total anthropogenic (human-made) GHG emissions.

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.

Effective action on climate change

This indicator supports the measurement of progress towards the following 2016–2019 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.

Data sources and methods

Data sources

The data for this indicator come from Environment and Climate Change Canada's GHG emissions projections. These projection scenarios are reported in Canada's Seventh National Report on Climate Change (PDF; 2.99 MB) to the United Nations Framework Convention on Climate Change. The indicator reflects the latest GHG emissions projections published by the Department at time of production.

The indicator also presents historical GHG emissions data from the 2017 National Inventory Report for the years 2005 to 2015. The projection scenarios cover the years 2016 to 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 each scenario were included in Canada's Seventh National Communication on Climate Change.

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 Chapter 5, Annex 4 of Canada's Seventh National Report on Climate Change (PDF; 2.99 MB).

Scenarios

The indicator presents 3 different scenarios:

- The February 2016 projections, shown from 2005 to 2030, refers to the "with current measures" projections as published in Canada's Second Biennial Report on Climate Change. It was based on historical GHG emissions data from 2005 to 2013, and included data and information on policies and measures up to September 2015.
- The December 2017 projections, shown from 2016 to 2030, takes into account actions taken by governments, consumers and businesses up to 2015, as well as the future impacts of federal and provincial policies and measures put in place as of September 2017. This scenario does not account for all the measures in the Pan-Canadian Framework on Clean Growth and Climate Change as a number of them are still under development.
- The December 2017 projections with specific measures, also shown from 2016 to 2030, includes all of the actions, policies and measures of the December 2017 projections as well as all climate change policies and measures that have been announced in Canada and for which enough information is available. This scenario accounts for those additional policies and measures that are under development but have not yet been fully implemented, some of which announced as part of the Pan-Canadian Framework (for example, the pan-Canadian carbon pricing). This projection is included in the "with measures" projection in Canada's Second Biennial Report to the United Nations Framework Convention on Climate Change.

Recent changes

This release uses the GHG projections reported in Canada's Seventh National Report on Climate Change (PDF; 2.99 MB) to the United Nations Framework Convention on Climate Change. The previous versions of the indicator used projections from Canada's 2016 greenhouse gas emissions reference case.

The calculation of this indicator reflects methodological revisions that were applied to the 2017 National Inventory Report, as well as to the Energy, Emissions and Economy Model for Canada. For a list of the modelling and methodological changes, refer to Chapter 5, Annex 2 of Canada's Seventh National Communication on Climate Change.

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 December 2017 projections assumes no further government actions to address GHG emissions beyond those already in place as of September 2017.

Under the Pan-Canadian Framework on Clean Growth and Climate Change, a number of policies and measures have been announced. As the policy development process is not yet finished, the majority of these policies were not included in the December 2017 projections, but they were included in the December 2017 projections with specific measures scenario. For a complete list of included policies and measures modelled under each scenario, refer to Table 5A.9 in Canada's Seventh National Communication on Climate Change. Note that the modelled policies and measures do not match the full list of announced measures. This is because the economic modelling will only account for measures where sufficiently detailed data exist that makes it possible to add them to the modelling platform.

Current estimates do not include the full reductions from investment in public transit, clean technology and innovation. Potential increases in stored carbon (carbon sequestration) in forests, soils and wetlands are also excluded from this analysis but would be expected to contribute to reductions which, for a country such as Canada, could play a role in achieving the 2030 target.

The projected emission reductions do not account for additional mitigation measures that could be implemented by the provinces and territories between now and 2030. Emissions reductions from additional future actions will be assessed as new measures are implemented.

The projections presented in the indicator cannot be viewed as a forecast or prediction of emissions at a future date. They do not attempt to account for the inevitable but 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 5.7.1 and Section 5, Annex 3 of Canada's Seventh National Report on Climate Change (PDF; 2.99 MB).

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. 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. This approach is useful to understand how the Canadian economy changes over time. Finally, the model, as used by Environment and Climate Change Canada, does not generate changes in nominal interest rates and exchange rates, as would occur under a monetary policy response to a major economic event.

Resources

References

Environment and Climate Change Canada (2017) National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Retrieved on November 14, 2017.

Environment and Climate Change Canada (2017) Canada's Seventh National Report on Climate Change (PDF; 2.99 MB). Retrieved on January 3, 2018.

Related information

Greenhouse gas emissions: drivers and impacts

Annex

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

Table A.1. Data for Figure 1. Historical greenhouse gas emissions and projections, Canada, 2005 to 2030

Year	Historical emissions (megatonnes of carbon dioxide equivalent)	February 2016 projections[A,B] (megatonnes of carbon dioxide equivalent)	December 2017 projections[A] (megatonnes of carbon dioxide equivalent)	December 2017 projections with specific measures (megatonnes of carbon dioxide equivalent)	Canada's target (megatonnes of carbon dioxide equivalent)
2005	738	749	n/a	n/a	n/a
2006	729	740	n/a	n/a	n/a
2007	750	761	n/a	n/a	n/a
2008	729	741	n/a	n/a	n/a
2009	689	699	n/a	n/a	n/a
2010	701	707	n/a	n/a	n/a
2011	707	709	n/a	n/a	n/a
2012	716	715	n/a	n/a	n/a
2013	729	726	n/a	n/a	n/a
2014	727	727	n/a	n/a	n/a
2015	722	735	722	722	n/a
2016	n/a	747	722	722	n/a
2017	n/a	754	735	734	n/a
2018	n/a	760	736	733	n/a
2019	n/a	763	736	729	n/a
2020	n/a	766	728	690	n/a
2021	n/a	769	726	665	n/a
2022	n/a	773	726	654	n/a
2023	n/a	782	715	637	n/a
2024	n/a	788	714	632	n/a
2025	n/a	791	714	626	n/a
2026	n/a	797	716	621	n/a
2027	n/a	799	717	615	n/a
2028	n/a	805	717	606	n/a
2029	n/a	811	722	601	n/a

Year	Historical emissions (megatonnes of carbon dioxide equivalent)	February 2016 projections[A,B] (megatonnes of carbon dioxide equivalent)	December 2017 projections[A] (megatonnes of carbon dioxide equivalent)	December 2017 projections with specific measures (megatonnes of carbon dioxide equivalent)	Canada's target (megatonnes of carbon dioxide equivalent)
2030	n/a	815	722	583	517

Note: [A] These scenarios are the "with measures" scenarios as defined by the United Nations Framework Convention on Climate Change. [B] Historical emissions for the February 2016 projections were taken from the National Inventory Report 1990-2013: Greenhouse Gas Sources and Sinks in Canada. n/a = not applicable. The projected values presented here do not take into account the contribution of the land use, land-use change and forestry sector. The February 2016 projections were reported in Canada's Second Biennial Report on Climate Change and include policies and measures in place as of September 2015. The December 2017 projections are reported in Canada's Seventh National Communication on Climate Change (PDF; 2.99 MB) and include policies and measures in place as of September 2017; the scenario with specific measures also includes specific measures from Canada's clean growth and climate plan that have been announced but are still under development. For more information refer to the Data sources and methods**.**
Source: Environment and Climate Change Canada (2017) National Inventory Report 1990-2015: Greenhouse Gas Sources and Sinks in Canada. Environment and Climate Change Canada (2017) Canada's Seventh National Communication on Climate Change (PDF; 2.99 MB).

Additional information can be obtained at:

Environment and Climate Change Canada
Public Inquiries Centre
12th Floor, Fontaine Building
200 Sacré-Coeur boul.
Gatineau, QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860
Fax: 819-938-3318
Email: ec.enviroinfo.ec@canada.ca