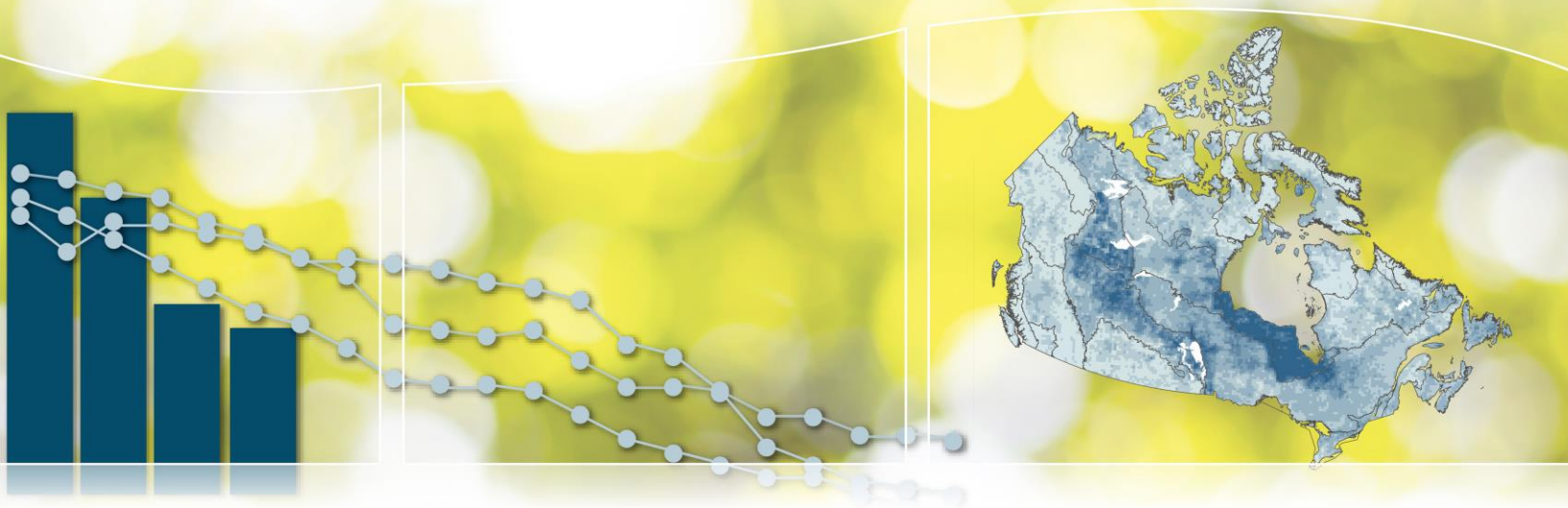




Canadian Environmental Sustainability Indicators

Progress Toward Canada's Greenhouse Gas Emissions Reduction Target



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**Canadian Environmental
Sustainability Indicators**

**Progress Toward Canada's
Greenhouse Gas Emissions
Reduction Target**

April 2016

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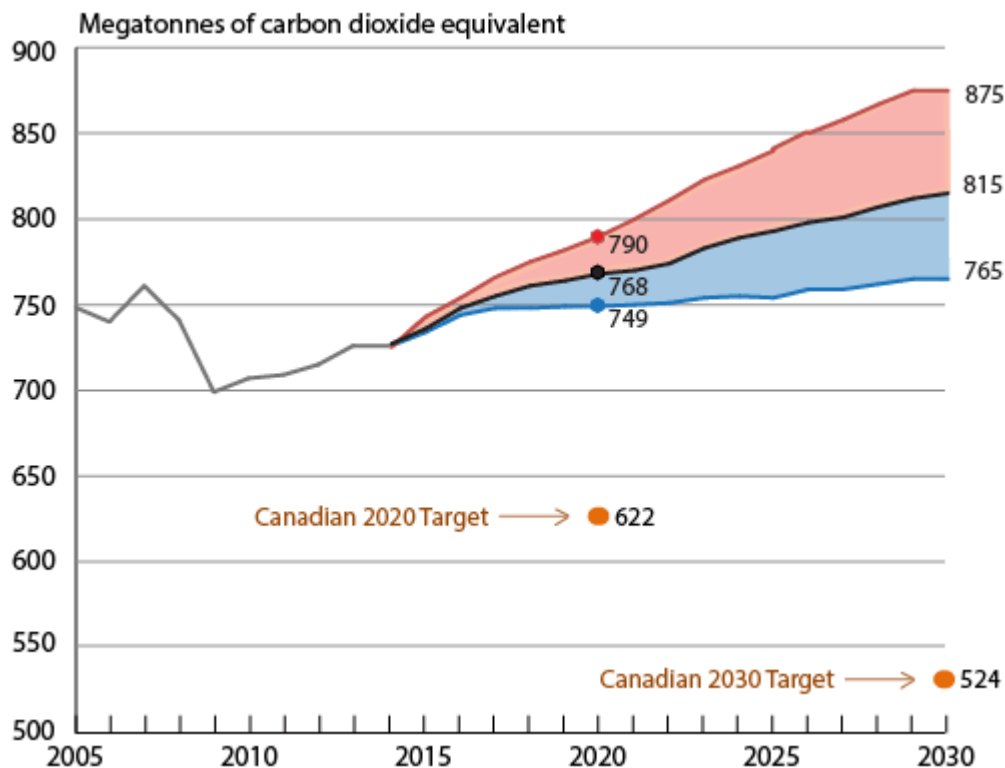
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Part 1. Progress Toward Canada's Greenhouse Gas Emissions Reduction Target Indicator

Canada's annual greenhouse gas (GHG) emissions are expected to be between 749 and 790 megatonnes of carbon dioxide equivalent (Mt CO₂ eq) in 2020 and between 765 and 875 Mt CO₂ eq in 2030, without taking into account the contribution of the land use, land-use change and forestry sector (LULUCF). These projections are found in [Canada's Second Biennial Report on Climate Change](#) (PDF; 2616 KB). Greenhouse gas emissions under the reference or "with current measures" scenario are projected to be 768 Mt CO₂ eq in 2020 and 815 Mt CO₂ eq in 2030. These projections are based on historical data and actions taken by governments, consumers and businesses up to 2013, as well as the future impacts of policies and measures put in place as of September 2015.

Oil and gas prices and economic growth are key drivers of GHG emissions trends in Canada. Because these drivers can be quite volatile, sensitivity analysis is presented through alternative scenarios (low and high), reflecting different assumptions about oil and natural gas prices and production as well as different rates of economic growth.

Figure 1. Historical greenhouse gas emissions and projections to 2030 with measures as of September 2015, Canada, 2005 to 2030



[Data for Figure 1](#)

Source: Environment and Climate Change Canada (2015) [National Inventory Report 1990–2013: Greenhouse Gas Sources and Sinks in Canada](#). Environment and Climate Change Canada (2016) [Canada's Second Biennial Report on Climate Change](#) (PDF; 2616 KB).

The future rate of GHG emissions in Canada depends on a number of factors, including the pace of expected economic and population growth, the development of energy markets and their influence on prices, technological change, consumer behaviour, and policies aimed at emissions reductions.



This indicator is used to measure progress toward [Target 1.1: Climate Change Mitigation – Relative to 2005 emission levels, reduce Canada's total GHG emissions 17% by 2020](#) of the [Federal Sustainable Development Strategy 2013–2016](#).

Part 2. Data Sources and Methods for the Progress Toward Canada's Greenhouse Gas Emissions Reduction Target Indicator

Introduction

The [Progress Toward Canada's Greenhouse Gas Emissions Reduction Target](#) indicator is part of the [Canadian Environmental Sustainability Indicators](#) (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the [Federal Sustainable Development Strategy 2013–2016](#).

Description and rationale of the Progress Toward Canada's Greenhouse Gas Emissions Reduction Target indicator

Description

The Progress Toward Canada's Greenhouse Gas Emissions Reduction Target indicator provides an overview of the projected greenhouse gas (GHG) emissions in Canada until the year 2030. This indicator was developed using historical emissions data from 1990 to 2013. The reference scenario represents a "with current measures" scenario that takes into account actions taken by governments, consumers and businesses up to 2013 as well as the future impacts of federal and provincial policies and measures put in place as of September 2015. Key drivers of GHG emissions in Canada are oil and gas prices (which are subject to external commodity market pricing) and economic growth. Because these drivers can be quite volatile and have a critical impact on GHG projections, alternative scenarios that reflect different assumptions about oil and gas prices and production as well as different rates of economic growth have been developed:

- The highest emissions scenario uses high oil and gas price projections utilized by Canada's National Energy Board and a higher-than-average annual growth in gross domestic product (GDP) between 2013 and 2030.
- The lowest emissions scenario uses low world oil and gas price projections utilized by the National Energy Board and slower GDP growth.

These scenarios are reported in [Canada's Second Biennial Report on Climate Change](#) (PDF; 2616 KB) to the United Nations Framework Convention on Climate Change (UNFCCC).

Rationale

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

Recent changes to the indicator

This release of the indicator uses the GHG projections reported in the Second Biennial Report to the UNFCCC. Previous versions of the indicator used projections from Canada's Emissions Trends reports. The calculation of this indicator reflects methodological revisions that were applied to the 2015 edition of Environment and Climate Change Canada's annual [National](#)

[Inventory Report](#). A notable revision from the 2015 National Inventory Report is the update of global warming potentials of GHG.¹ For example, the 100-year global warming potentials for methane is now 25, compared with 21 in previous years. This change resulted in an increase in historical emissions upon which the projections are built.

This version of the indicator does not include an estimate of the contribution of the land use, land-use change and forestry (LULUCF) sector.

The indicator no longer uses, for comparison, a scenario projecting what emissions would have been had consumers, businesses and governments not taken any action to reduce emissions since 2005.

This version of the indicator now includes high and low alternative emissions scenarios in addition to the reference "with current measures" scenario, to account for the sensitivity of the forecast to two key uncertainties: 1) the growth of the economy, and 2) the evolution of oil and gas prices.

Data

Data source

The data source of this indicator is the Environment and Climate Change Canada's greenhouse gas (GHG) emissions projections used to inform [Canada's Second Biennial Report on Climate Change](#) (PDF; 2616 KB) to the United Nations Framework Convention on Climate Change (UNFCCC). Annex 3 of the Second Biennial Report provides a description of the sources and assumptions used to develop the reference and alternative scenarios.

Spatial coverage

Coverage is national.

Temporal coverage

Historical GHG data presented cover the years from 2005 to 2013. The GHG projections cover the years 2014 to 2030.

Data completeness

The indicator is based on analysis that incorporates the most up-to-date statistics on GHG emissions, economic and population growth and energy price and production projections available at the time the technical modelling was completed for the report. Data and information on policies and measures up to September 2015 were included in Canada's Second Biennial Report to the UNFCCC.

Data timeliness

The indicator reflects the latest GHG emissions projections published by Environment and Climate Change Canada at time of production.

¹ GHG emissions are reported in carbon dioxide equivalents, determined by multiplying the amount of emissions of a particular gas by the global warming potential (GWP) of that gas. GHGs differ in their ability to absorb heat in the atmosphere due to their differing chemical properties and atmospheric lifetimes. For example, over a period of 100 years, methane's (CH₄) potential to trap heat in the atmosphere is 25 times greater than carbon dioxide's potential, and thus it is considered to have a GWP of 25. The Intergovernmental Panel on Climate Change publishes the GWPs and atmospheric lifetimes for each GHG which can be found in Table 1-1 of the National Inventory Report.

Methods

The emissions projections have been developed in line with generally recognized best practices, including:

- Incorporating Intergovernmental Panel on Climate Change (IPCC) standards for estimating greenhouse gas emissions (GHG) across different fuels and processes.
- Relying on outside expert reviews 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 that has been vetted with key stakeholders.
- Using the most up-to-date statistics on GHG emissions and energy use, and using key assumptions from the best available public and private expert sources.
- Developing emissions projections scenarios using the detailed and proven Energy, Emissions and Economy Model for Canada, also known as E3MC.

Caveats and limitations

A series of plausible assumptions regarding, among others, the level of continuing population and economic growth, prices, demand and supply of energy, and the evolution of energy efficiency technologies were employed to make the projections. The projections assume no further government actions to address greenhouse gas emissions beyond those in place as of September 2015.

The emissions 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, or as yet unknown changes that will occur in government policy; energy supply, demand and technology; or domestic and international economic and political events.

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.

Part 3. Annexes

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

Table A.1. Data for Figure 1. Historical greenhouse gas emissions and projections to 2030 with measures as of September 2015, Canada, 2005 to 2030

Year	Historical emissions (megatonnes of carbon dioxide equivalent) ^[A]	Reference scenario (megatonnes of carbon dioxide equivalent)	High emissions scenario (megatonnes of carbon dioxide equivalent)	Low emissions scenario (megatonnes of carbon dioxide equivalent)	Canada's targets (megatonnes of carbon dioxide equivalent)
2005	749	-	-	-	-
2006	740	-	-	-	-
2007	761	-	-	-	-
2008	741	-	-	-	-
2009	699	-	-	-	-
2010	707	-	-	-	-
2011	709	-	-	-	-
2012	715	-	-	-	-
2013	726	-	-	-	-
2014	-	727	725	726	-
2015	-	736	743	734	-
2016	-	748	754	744	-
2017	-	755	766	748	-
2018	-	761	775	748	-
2019	-	764	782	749	-
2020	-	768	790	749	622
2021	-	770	800	750	-
2022	-	774	811	751	-
2023	-	783	823	754	-

Year	Historical emissions (megatonnes of carbon dioxide equivalent)^[A]	Reference scenario (megatonnes of carbon dioxide equivalent)	High emissions scenario (megatonnes of carbon dioxide equivalent)	Low emissions scenario (megatonnes of carbon dioxide equivalent)	Canada's targets (megatonnes of carbon dioxide equivalent)
2024	-	789	831	755	-
2025	-	793	840	754	-
2026	-	798	850	759	-
2027	-	801	858	759	-
2028	-	807	867	762	-
2029	-	812	875	765	-
2030	-	815	875	765	524

Note: ^[A] Historical emissions taken from National Inventory Report 1990–2013: Greenhouse Gas Sources and Sinks in Canada.

Source: Environment and Climate Change Canada (2015) [National Inventory Report 1990–2013: Greenhouse Gas Sources and Sinks in Canada](#). Environment and Climate Change Canada (2016) [Canada's Second Biennial Report on Climate Change](#) (PDF; 2616 KB).

Annex B. References and additional information

References and further reading

Environment and Climate Change Canada (2015) [National Inventory Report 1990–2013: Greenhouse Gas Sources and Sinks in Canada](#). Retrieved on April 11, 2016.

Environment and Climate Change Canada (2016) [Canada's Second Biennial Report on Climate Change](#) (PDF; 2616 KB). Retrieved on April 11, 2016.

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