Environment and Climate Change Canada
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GLOBAL GREENHOUSE GAS EMISSIONS

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

Canada

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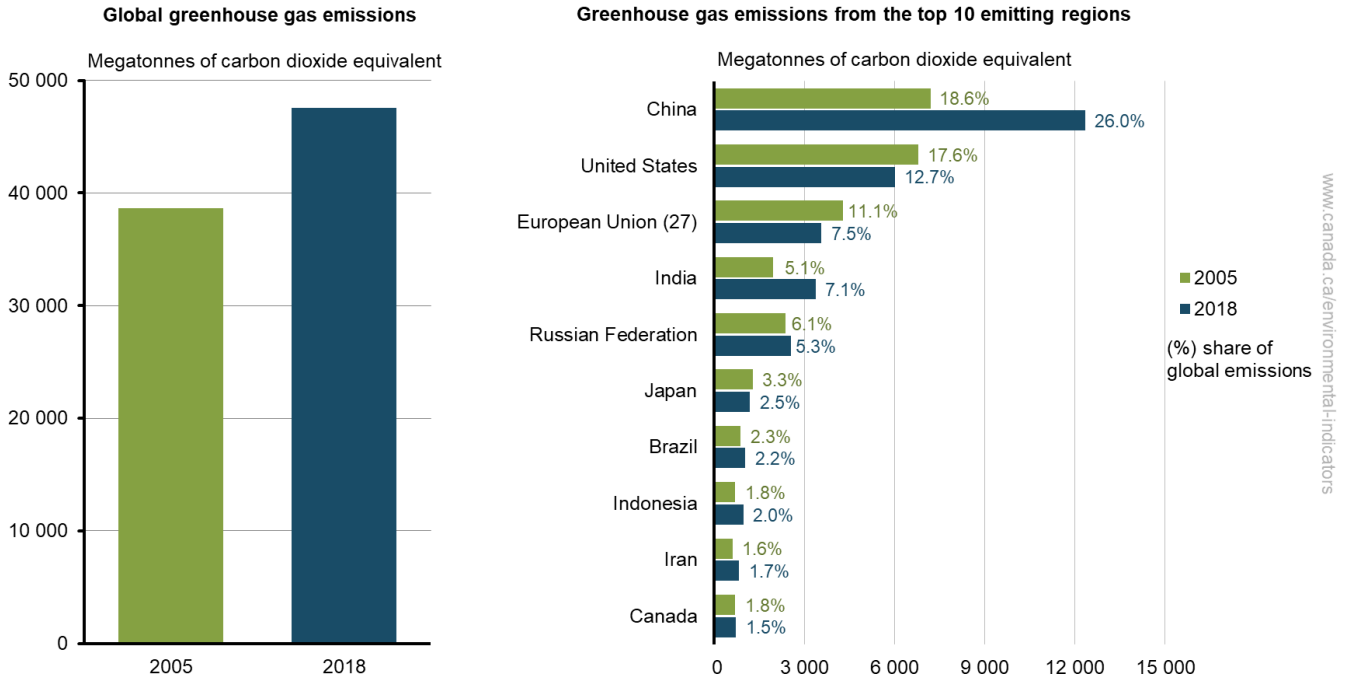
Global greenhouse gas emissions

The release of greenhouse gases (GHGs) and their increasing concentration in the atmosphere is leading to a changing climate. This change has an impact on the environment, human health and the economy. Greenhouse gases remain in the atmosphere for periods ranging from a few years to thousands of years. As such, they have a worldwide impact, no matter where they were first emitted. This indicator highlights GHG emissions caused by human activity around the world.

Key results

- Between 2005 and 2018, global GHG emissions increased by 23.0%, from 38 669 to 47 552 megatonnes of carbon dioxide equivalent (Mt CO_2 eq)
- In 2018, the highest emitting country was China with 12 355 Mt CO_2 eq, or 26.0% of global GHG emissions. Since 2005, emissions from China increased by 71.7%
- Canada's emissions[1] in 2018 reached 725 Mt CO_2 eq, which made up 1.5% of global GHG emissions

Figure 1. Greenhouse gas emissions for the world and the top 10 emitting countries and regions, 2005 and 2018



Data for Figure 1

Note: Greenhouse gas emissions for each country and region presented in this comparison were calculated by the World Resources Institute. For certain countries, including Canada, these values differ from the official estimates of greenhouse gas emissions submitted to the United Nations Framework Convention on Climate Change. For more information, please consult the Caveats and limitation section.
Source: World Resources Institute (2021) Climate Watch Country Historical Greenhouse Gas Emissions.

In 2018, Canada ranked as the 10th GHG emitting country/region. Canada's share of global emissions decreased from 1.8% in 2005 to 1.5% in 2018. Like that of other developed countries, its share is anticipated to continue to

[1] To allow comparison between Canada and other countries, emissions data are taken from the same source - the World Research Institute. Canada's emissions reported in this indicator differ from Canada's official estimate of greenhouse gas emissions submitted to the United Nations Framework Convention on Climate Change.

decline with the expected rapid increase in emissions from developing and emerging countries, particularly China (+71.7%), India (+71.3%), Brazil (+16.2%) and Indonesia (+37.9%).

On December 12, 2015, Canada and 194 other countries reached the Paris Agreement, an ambitious and balanced agreement to fight climate change. This new agreement strengthens the effort to limit the global average temperature rise to well below 2°C and pursue efforts to limit the increase to 1.5°C. Under the Agreement, Canada has committed to reduce its GHG emissions by 30% below 2005 levels by 2030.

According to the Intergovernmental Panel on Climate Change, reaching this goal implies large-scale changes in energy systems and potentially land use across the world. In addition, the efforts and associated costs needed to reach this goal will vary between countries, with the distribution of costs across countries potentially being different from the distribution of the actions themselves.[2]

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.

About the indicator

What the indicator measures

The Global greenhouse gas emissions indicator reports global human emissions of greenhouse gases (GHGs) for 2005 and 2018. Emissions from energy and non-energy related sources are included in this indicator, while emissions from land use, land use change and forestry are excluded. The emissions of GHGs include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

Why this indicator is important

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

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 Progress towards Canada's greenhouse gas emissions reduction target indicator provides an overview of Canada's projected GHG emissions up to 2030.

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 used to compile the Global greenhouse gas emissions indicator were retrieved from the Climate Watch Country Historical Greenhouse Gas Emissions dataset developed by the World Resources Institute. The dataset is accessible through the Climate Watch GHG Emissions platform which presents data from various sources. It

[2] Intergovernmental Panel on Climate Change (2014) Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change – Summary for Policy Makers (PDF; 2.0 MB). Retrieved on January 20, 2021.

was previously published through the World Resources Institute's Climate Analysis Indicator Tool (CAIT). The data are based on the April 2021 version of the dataset.

More information

The World Resources Institute's Climate Watch Country Historical Greenhouse Gas Emissions dataset uses information and emissions from different sources:

- Carbon Dioxide Information Analysis Center for Global, Regional, and National Fossil-Fuel Carbon Dioxide (CO_2) Emissions.
- Food and Agriculture Organization of the United Nations for Land Use Change and Forestry Data.
- International Energy Agency for their CO_2 Emissions from Fuel Combustion.
- United States Energy Information Administration for their International Energy Statistics.
- United States Environmental Protection Agency for their Global Anthropogenic Non-CO_2 GHG Emissions: 1990-2030.

It covers anthropogenic GHG emissions across the world, excluding emissions attributed to land use, land use change and forestry. The data are reported by the World Resources Institute's 2 to 3 years after data collection. The latest year available at the time of the update was 2018.

Methods

The indicator is composed of the GHG emission totals for the world and the top 10 emitting countries/regions for 2005 and 2018 as retrieved from the World Resources Institute's Climate Watch Country Historical Greenhouse Gas Emissions dataset. The dataset is available on the Climate Watch Historical GHG Emissions platform.

More information

The national GHG emission totals from the World Resources Institute's Climate Watch Country Historical Greenhouse Gas Emissions are compiled by using as many as 5 different GHG emissions data sources. The selection of these data sources is done by the use of different completeness criteria like geographic coverage, temporal coverage and accuracy. For more information on the data sources selection and the national and global emissions compilation consult the CAIT Country Greenhouse Gas Emissions: Sources & Methods (PDF; 681 KB) document from the World Resources Institute.

Greenhouse gas emissions are reported in carbon dioxide equivalent (CO_2 eq), determined by multiplying the amount of emissions of a particular gas by its global warming potential. The indicator uses the Intergovernmental Panel on Climate Change's 1995 100-year global warming potentials.

Recent changes

The time coverage of the indicator has been modified and now presents data for 2005 and 2018. It previously presented data for 2005 and 2016.

Emissions from the European Union (27) for all years no longer includes emissions from United Kingdom.

Caveats and limitations

The emissions in the World Resources Institute's Climate Watch Country Historical Greenhouse Gas Emissions dataset as of April 2021 may reflect revisions of data previously published by that organization. The emissions reported by the World Resources Institute are also slightly different from the emissions reported by member countries in their National Inventory Report to the United Nations Framework Convention on Climate Change.

More information

A leading cause of the difference between the data reported by the World Resources Institute and by individual countries in their National Inventory Report is that many member countries, including Canada, now report emissions using revised methodology and global warming potential guidelines that have yet to be used in the World Resources Institute's calculations. Caution is advised when comparing data released in different years and reports.

Emissions from international bunker fuels (which are estimated based on the location of marine and aviation refueling) are not reflected in reported countries and regions emissions totals. However, they are included in the total world emissions and the "Rest of the world" emissions.

Greenhouse gas data in the Climate Analysis Indicators Tool have uncertainties due to the fact that they are using many different data sources. Despite the uncertainties, the World Resources Institute has chosen to err on the side of inclusiveness, by capturing the widest possible range of GHG sources and sinks that contribute to global climate change. For more information on uncertainties please consult section 7 of the document CAIT Country Greenhouse Gas Emissions: Sources & Methods (PDF; 681 KB).

Resources

References

Carbon Dioxide Information Analysis Center (2019) Global, Regional, and National Fossil-Fuel Carbon Dioxide (CO_2) emissions. Retrieved on April 8, 2021.

Food and Agriculture Organization of the United Nations (2020) Land Use Change and Forestry Data. Retrieved on April 8, 2021.

International Energy Agency (2020) CO_2 Emissions from Fuel Combustion. Retrieved on January 20, 2021.

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World Resources Institute (2021) Climate Watch Country Historical Greenhouse Gas Emissions. Retrieved on April 8, 2021.

Related information

Canada's action on climate change

Climate change

Greenhouse gas emissions: drivers and impacts

Greenhouse gas emissions

Annex

Annex A. Data table for the figure presented in this document

Table A.1. Data for Figure 1. Greenhouse gas emissions for the world and the top 10 emitting countries and regions, 2005 and 2018

Country or region	2005 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	Share of global greenhouse gas emissions in 2005 (percent)	2018 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	Share of global greenhouse gas emissions in 2018 (percent)	2005 to 2018 percent change in national emissions
China	7 194	18.6	12 355	26.0	71.7
United States	6 802	17.6	6 024	12.7	-11.4
European Union (27)[A]	4 288	11.1	3 567	7.5	-16.8
India	1 970	5.1	3 375	7.1	71.3
Russian Federation	2 373	6.1	2 543	5.3	7.2
Japan	1 284	3.3	1 187	2.5	-7.6
Brazil	889	2.3	1 033	2.2	16.
Indonesia	703	1.8	970	2.0	37.9
Iran	613	1.6	828	1.7	35.1
Canada	705	1.8	725	1.5	2.8
Rest of the world[B]	11 847	30.6	14 946	31.4	26.2
World	38 669	100.0	47 552	100.0	23.0

Note: Totals may not add up due to rounding. Greenhouse gas emissions for each country and region presented in this comparison were calculated by the World Resources Institute. For certain countries, including Canada, these values differ from the official estimates of greenhouse gas emissions submitted to the United Nations Framework Convention on Climate Change. For more information, please consult the Caveats and limitation section.

[A] European Union (27) includes: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

[B] "Rest of the world" includes international bunkers.

Source: World Resources Institute (2021) Climate Watch Country Historical Greenhouse Gas Emissions.

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