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# GLOBAL GREENHOUSE GAS EMISSIONS

## CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS



Canada 

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# CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS GLOBAL GREENHOUSE GAS EMISSIONS

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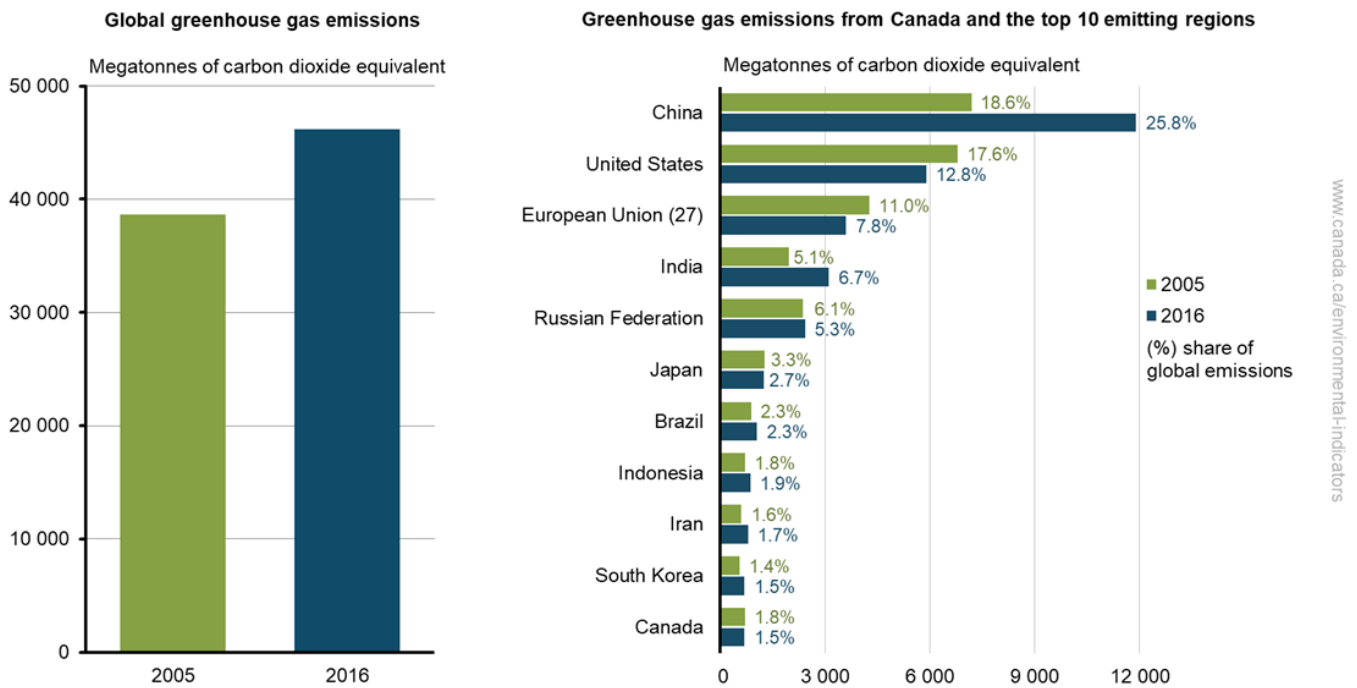
# Global greenhouse gas emissions

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 2016, global GHG emissions increased by 19.3%, from 38 679 to 46 141 megatonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq)
- In 2016, the highest emitting country was China with 11 887 Mt CO<sub>2</sub> eq, or 25.8% of global GHG emissions. Since 2005, emissions from China increased by 65.2%
- Canada's emissions in 2016 reached 695 Mt CO<sub>2</sub> eq, which made up 1.5% of global GHG emissions

**Figure 1. Greenhouse gas emissions for the world, Canada, and the top 10 emitting countries and regions, 2005 and 2016**



[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 latest official estimate of greenhouse gas emissions submitted to the United Nations Framework Convention on Climate Change. Canada's emissions under this indicator also differ from the [Greenhouse gas emissions](#) indicator which is based on Canada's submission to the United Nations Framework Convention on Climate Change. 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.

**Source:** World Resources Institute (2020) [Climate Watch - CAIT Historical Emissions](#).

In 2016, Canada ranked as the 11th GHG emitting country/region. Canada's share of global emissions decreased from 1.8% in 2005 to 1.5% in 2016. Like that of other developed countries, it is anticipated to continue to decline with the expected rapid increase in emissions from developing and emerging countries, particularly China, India, Brazil and Indonesia.

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.

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.<sup>1</sup>

## About the indicator

### What the indicator measures

The Global greenhouse gas emissions indicator reports global human emissions of greenhouse gases (GHGs) for 2005 and 2016. 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 from large facilities](#) indicator reports GHG emissions from the largest GHG emitters in Canada (industrial and other types of facilities).

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

## Data sources and methods

### Data sources

The data used to compile the Global greenhouse gas emissions indicator were retrieved from the [Climate Watch Historical GHG Emissions](#) tool, managed by the World Resources Institute. This tool presents data from various sources. The data source selected is the World Resources Institute's Climate Analysis Indicator Tool (CAIT). The data are based on the March 2020 version of the CAIT Country Greenhouse Gas Emissions dataset.

### More information

The World Resources Institute's Climate Analysis Indicator Tool uses information and emissions from different sources:

- Carbon Dioxide Information Analysis Center for [Global, Regional, and National Fossil-Fuel Carbon Dioxide \(CO<sub>2</sub>\) Emissions](#).

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<sup>1</sup> 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 March 30, 2020.

- Food and Agriculture Organization of the United Nations for [Land Use Change and Forestry Data](#).
- International Energy Agency for their [CO<sub>2</sub> Emissions from Fuel Combustion \(2018 edition\)](#).
- United States Energy Information Administration for their [International Energy Statistics](#).
- United States Environmental Protection Agency for their [Global Anthropogenic Non-CO<sub>2</sub> 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 2016.

## Methods

The indicator is composed of the GHG emission totals for the world, Canada, and the top 10 emitting countries/regions for 2005 and 2016 as retrieved from the World Resources Institute's CAIT Country 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 CAIT Country 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<sub>2</sub> 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 2016. It previously presented data for 2005 and 2014.

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

## Caveats and limitations

The emissions in the World Resources Institute's CAIT Country Greenhouse Gas Emissions dataset as of March 2020 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 \(CO<sub>2</sub>\) emissions](#). Retrieved in December 2019.
- Food and Agriculture Organization of the United Nations (2019) [Land Use Change and Forestry Data](#). Retrieved in December 2019.
- International Energy Agency (2019) [CO<sub>2</sub> Emissions from Fuel Combustion \(2018 edition\)](#). Retrieved in December 2019.
- United States Energy Information Administration (2019) [International Energy Statistics](#). Retrieved in December 2019.
- United States Environmental Protection Agency (2012) [Global Anthropogenic Non-CO<sub>2</sub> Greenhouse Gas Emissions: 1990-2030](#). Retrieved in December 2019.
- World Resources Institute (2020) [Climate Watch - CAIT Historical Emissions](#). Retrieved in March 2020.

### Related information

[Canada's Action on Climate Change](#)

[Climate Change](#)

[Greenhouse gas emissions: drivers and impacts](#)

[Greenhouse gas emissions](#)



## Annex

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

Table A.1. Data for [Figure 1. Greenhouse gas emissions for the world, Canada, and the top 10 emitting countries and regions, 2005 and 2016](#)

Country or region	2005 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	Share of global greenhouse gas emissions in 2005 (percent)	2016 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	Share of global greenhouse gas emissions in 2016 (percent)	2005 to 2016 percent change in national emissions
China	7 193	18.6	11 887	25.8	65.2
United States	6 802	17.6	5 907	12.8	-13.2
European Union (27) <sup>[A]</sup>	4 260	11.0	3 598	7.8	-15.6
India	1 967	5.1	3 109	6.7	58.1
Russian Federation	2 373	6.1	2 427	5.3	2.3
Japan	1 266	3.3	1 259	2.7	-0.5
Brazil	889	2.3	1 050	2.3	18.2
Indonesia	704	1.8	866	1.9	22.9
Iran	613	1.6	801	1.7	30.6
South Korea	549	1.4	697	1.5	27.0
Canada	706	1.8	695	1.5	-1.5
Rest of the world <sup>[B]</sup>	11 356	29.4	13 844	30.0	21.9
World	38 679	100.0	46 141	100.0	19.3

**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 latest official estimate of greenhouse gas emissions submitted to the United Nations Framework Convention on Climate Change. Canada's emissions under this indicator also differ from the [Greenhouse gas emissions](#) indicator which is based on Canada's submission to the United Nations Framework Convention on Climate Change.

<sup>[A]</sup> 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.

<sup>[B]</sup> "Rest of the world" includes emissions from international aviation and marine bunkers.

**Source:** World Resources Institute (2020) [Climate Watch - CAIT Historical Emissions](#).

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