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# GLOBAL GREENHOUSE GAS EMISSIONS

## CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS



Canada 

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August 2022

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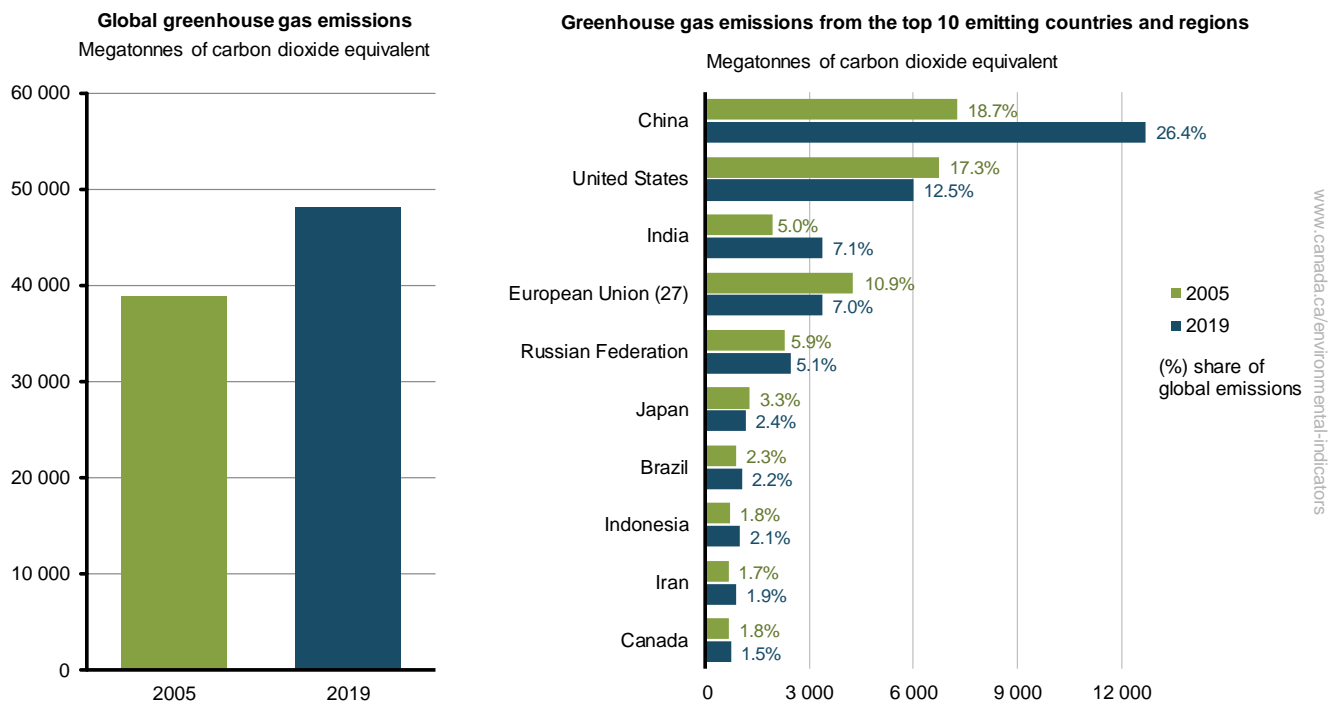
# Global greenhouse gas emissions

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 2019, global GHG emissions increased by 23.6%, from 38 669 to 48 117 megatonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq)
- In 2019, the highest emitting country was China with 12 705 Mt CO<sub>2</sub> eq, or 26.4% of global GHG emissions. Since 2005, emissions from China increased by 74.8%
- Canada's emissions<sup>1</sup> in 2019 reached 737 Mt CO<sub>2</sub> 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 2019**



[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 (2022) [Climate Watch Country Historical Greenhouse Gas Emissions](#).

In 2019, 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 2019. Like that of other economically developed countries, Canada's share is

<sup>1</sup> 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.

anticipated to continue to decline due to the expected rapid increase in emissions from economically developing and emerging countries, particularly China (+71.7% from 2005 to 2019), 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. In 2022, the Government of Canada introduced [Canada's 2030 Emissions Reduction Plan](#), which aims to achieve 40-45% emissions reductions 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.<sup>2</sup>

Canada is committed to implementing its strengthened climate plan to ensure Canada not only meets, but exceeds its 2030 emissions reduction goal, and beginning work so that Canada can achieve net-zero emissions by 2050.

## Global greenhouse gas emissions per capita

Global greenhouse gas emissions measured per capita are the amount of emissions an individual person emits in a particular country or region on average.

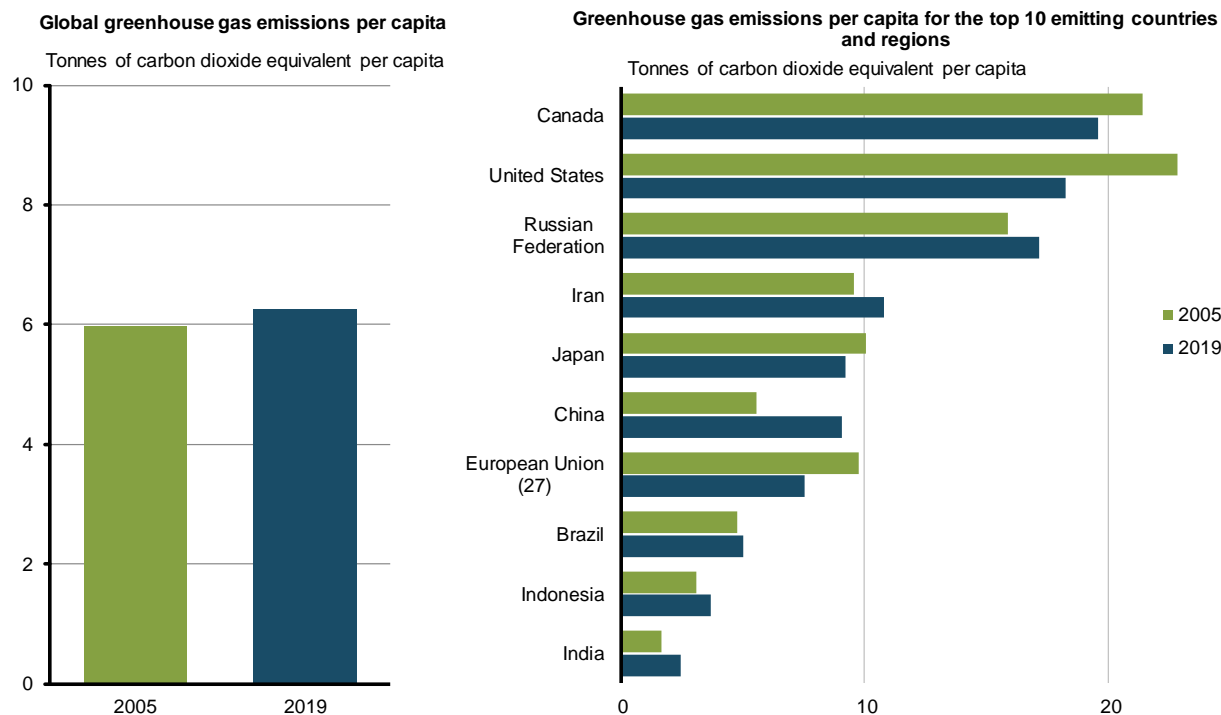
### Key results

- Between 2005 and 2019, global GHG emissions per capita increased 5%, from 6.0 to 6.3 tonnes of carbon dioxide equivalent (t CO<sub>2</sub> eq)
- In 2019, Canada was the highest GHG emitting country per capita among the top 10 emitting countries with 19.6 t CO<sub>2</sub> eq
- Canada's GHG emissions per capita has decreased 8.5% since 2005, from 21.42 t CO<sub>2</sub> eq to 19.6 t CO<sub>2</sub> eq

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<sup>2</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 May 19, 2022.

**Figure 2. Greenhouse gas emissions per capita for the world and the top 10 emitting countries and regions, 2005 and 2019**



www.canada.ca/en/environmental-indicators

[Data for Figure 2](#)

**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 limitations](#) section.

**Source:** World Resources Institute (2022) [Climate Watch Country Historical Greenhouse Gas Emissions](#).

Although Canada is ranked 10<sup>th</sup> in the world for total GHG emissions, Canada has the highest GHG emission per capita rate from the top 10 emitting countries and regions. If Canada’s GHG emissions per year were shared equally per each person in Canada, each person would emit 19.6 t CO<sub>2</sub> eq per year – which is just over 3 times the global rate. That is the same amount of GHG emissions released as someone driving around the world in a gasoline-powered car twice per year (about 78 296 km total).<sup>3</sup>

## About the indicator

### What the indicator measures

The Global greenhouse gas emissions indicator reports global human emissions of GHGs for 2005 and 2019, both in total and per capita. 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, both in total and per capita.

<sup>3</sup> Environmental Protection Agency (2022) [Greenhouse Gas Equivalencies Calculator](#). Retrieved May 30, 2022.

## 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 [Greenhouse gas emissions projections](#) 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 emissions and emissions per capita 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 was previously published through the World Resources Institute's Climate Analysis Indicator Tool (CAIT). The data are based on the May 2022 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:

- Food and Agriculture Organization of the United Nations for [Land Use Change and Forestry Data](#)
- Global Carbon Project for their [Global Carbon Budget](#) reports
- International Energy Agency for their [CO<sub>2</sub> Emissions from Fuel Combustion](#)
- 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 2019.

The population data used to calculate the GHG emissions per capita are retrieved from the World Bank's [World Development Indicators](#).

### Methods

The indicator is composed of the GHG emission totals for the world and the top 10 emitting countries/regions for 2005 and 2019 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 [Climate Watch Country Greenhouse Gas Emission Data Method Note](#) (PDF; 498 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](#).

Greenhouse gas emissions per capita are determined by dividing a country/region's total greenhouse gas emissions by its population.

## Recent changes

The time coverage of the indicator has been modified and now presents data for 2005 and 2019. It previously presented data for 2005 and 2018.

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

Greenhouse gas emissions per capita at the global level and from the top 10 emitting regions for 2005 and 2019 have been added to the indicator.

## Caveats and limitations

The emissions in the World Resources Institute's [Climate Watch Country Historical Greenhouse Gas Emissions](#) dataset as of May 2022 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

Due to the differences in data sources and methodologies used, Climate Watch estimated country GHG emissions may be different than official inventories prepared by countries. 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 the [Climate Watch Country Greenhouse Gas Emission Data Method Note](#) (PDF; 498 kB).

## Resources

### References

International Energy Agency (2019) [Fuel Economy in Major Car Markets: Technology and Policy Drivers, 2005-2017](#) (PDF; 6.5 MB). Retrieved May 30, 2022.

United States Environmental Protection Agency (2021) [Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019](#) (PDF; 3 MB). Retrieved May 30, 2022.

World Resources Institute (2022) [Climate Watch Country Historical Greenhouse Gas Emissions](#). Retrieved on May 19, 2022.

### 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 2019

Country or region	2005 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	Share of global greenhouse gas emissions in 2005 (percent)	2019 greenhouse gas emissions (megatonnes of carbon dioxide equivalent)	Share of global greenhouse gas emissions in 2019 (percent)	2005 to 2019 percent change in national emissions
China	7 267	18.7%	12 705	26.4%	74.8%
United States	6 753	17.3%	6 001	12.5%	-11.1%
India	1 940	5.0%	3 395	7.1%	75.0%
European Union (27) <sup>[A]</sup>	4 250	10.9%	3 383	7.0%	-20.4%
Russian Federation	2 279	5.9%	2 477	5.1%	8.7%
Japan	1 288	3.3%	1 167	2.4%	-9.4%
Brazil	891	2.3%	1 057	2.2%	18.7%
Indonesia	706	1.8%	1 002	2.1%	49.9%
Iran	669	1.7%	894	1.9%	45.7%
Canada	691	1.8%	737	1.5%	6.7%
Rest of the world <sup>[B]</sup>	12 298	31.6%	15 298	31.8%	24.4%
World	38 938	100.0%	48 117	100.0%	23.6%

**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.

<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 international bunkers.

**Source:** World Resources Institute (2022) [Climate Watch Country Historical Greenhouse Gas Emissions](#).

**Table A.2. Data for Figure 2. Greenhouse gas emissions per capita for the world and the top 10 emitting countries and regions, 2005 and 2019**

Country or region	2005 greenhouse gas emissions per capita (tonnes of carbon dioxide equivalent)	2019 greenhouse gas emissions per capita (tonnes of carbon dioxide equivalent)	2005 to 2019 percent change in national emissions per capita
Canada	21.42	19.60	-8.5%
United States	22.85	18.28	-20.0%
Russian Federation	15.88	17.15	8.0%
Iran	10.08	10.78	6.9%
Japan	10.08	9.24	-8.3%
China	5.57	9.09	63.2%
European Union (27) <sup>[A]</sup>	9.76	7.56	-22.5%
Brazil	4.79	5.01	4.6%
Indonesia	3.12	3.70	18.6%
India	1.69	2.48	46.7%
World	5.98	6.27	4.8%

**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.

<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.

**Source:** World Resources Institute (2022) [Climate Watch Country Historical Greenhouse Gas Emissions](#).

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