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# Canadian Environmental Sustainability Indicators

# Global Greenhouse Gas Emissions



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April 2016

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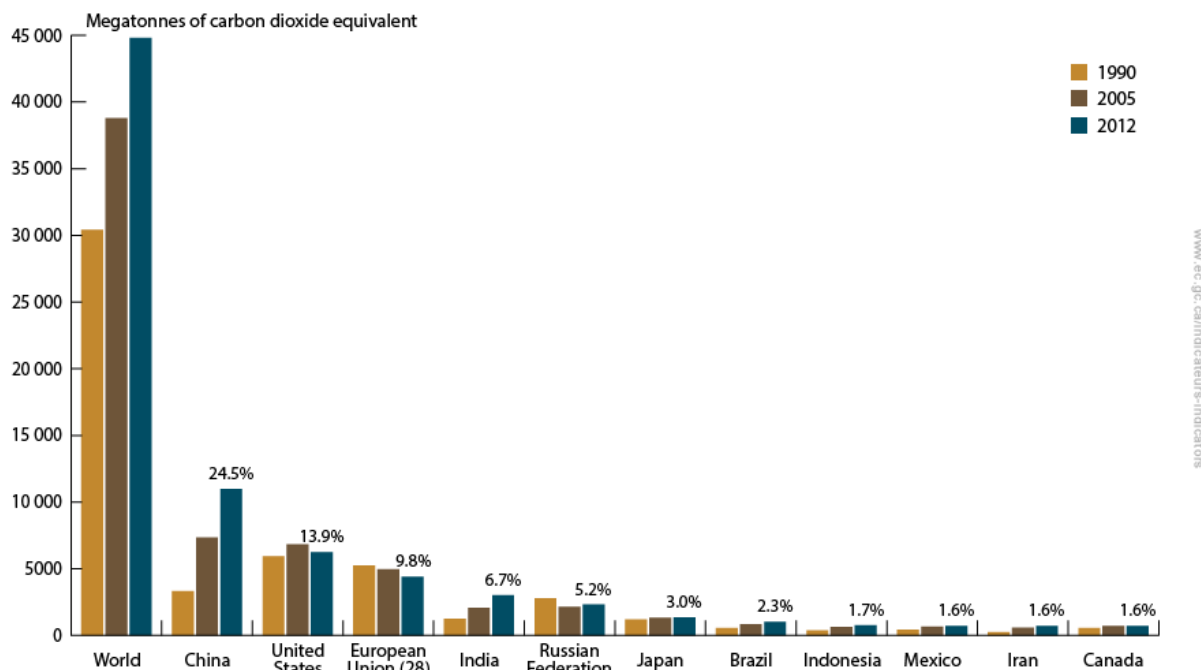
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# Part 1. Global Greenhouse Gas Emissions Indicator

Canada's greenhouse gas (GHG) emissions in 2012 accounted for 1.6% of global GHG emissions. Canada's share of global emissions, like that of other developed countries, is anticipated to continue to decline with the expected rapid increase in emissions from developing and emerging countries, particularly China, India, Brazil and Indonesia. Overall, between 1990 and 2012, global emissions of GHGs have increased by 47%.

**Figure 1. Global greenhouse gas emissions for selected countries,<sup>1</sup> 1990, 2005 and 2012**



[Data for Figure 1](#)

**Note:** Greenhouse gas emissions for each country 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 GHG emissions submitted to the United Nations Framework Convention on Climate Change (UNFCCC). As such Canada's emissions under this indicator differ from the Greenhouse Gas Emissions indicator, which is based on Canada's official National Inventory Report submitted to the UNFCCC.

**Source:** World Resources Institute (2015) [CAIT Climate Data Explorer](#).

<sup>1</sup> Countries/regions shown are the top 10 emitters of greenhouse gases globally and Canada.

# Part 2. Data Sources and Methods for the Global Greenhouse Gas Emissions Indicator

## Introduction

The [Global Greenhouse Gas Emissions](#) 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.

## Description and rationale of the Global Greenhouse Gas Emissions indicator

### Description

The Global Greenhouse Gas Emissions indicator reports global greenhouse gas (GHG) emissions for the years 1990, 2005 and 2012. 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 (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>).

### Rationale

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

### Recent changes to the indicator

Starting with the 2016 edition of this indicator, for improved comparability, emission data for all countries come from the World Resources Institute's [Climate Analysis Indicators Tool](#). Previously, Canada's emissions featured in this indicator originated from the National Inventory Report.

## Data

### Data source

The data used to compile the Global Greenhouse Gas Emissions indicator were retrieved from the World Resources Institute's (WRI) [Climate Analysis Indicators Tool](#). The data are based on the June 2015 version accessed in January 2016. This tool uses information and emissions from different sources:

- United Nations Framework Convention on Climate Change for [Greenhouse Gas \(GHG\) emissions](#).
- Carbon Dioxide Information Analysis Center for [Global, Regional, and National Fossil-Fuel Carbon Dioxide \(CO<sub>2</sub>\) emissions](#).
- 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 \(2014 edition\)](#).
- United States Energy Information Administration for their [International Energy Statistics](#).
- United States Environmental Protection Agency for their [Global Non-CO<sub>2</sub> GHG Emissions: 1990–2030](#).

### **Spatial coverage**

The indicator provides global coverage.

### **Temporal coverage**

The indicator uses the years 1990, 2005 and 2012.

### **Data completeness**

The analysis covers anthropogenic GHG emissions across the world, excluding emissions attributed to land use, land use change and forestry.

### **Data timeliness**

The data are current up to 2012. The data used in the Global Greenhouse Gas Emissions indicator are reported by the WRI two to three years after data collection.

## **Methods**

The Global Greenhouse Gas Emissions indicator covers greenhouse gas (GHG) emissions from energy and non-energy sources. It does not include the emissions from land use, land use change and forestry. All emissions are reported in carbon dioxide equivalents (CO<sub>2</sub> eq). The indicator is composed of the world and selected countries/regions GHG emission totals directly retrieved from the World Resources Institute's (WRI) [Climate Analysis Indicators Tool](#) (CAIT).

The national GHG emission totals from the WRI's CAIT are compiled by using as many as six different GHG emissions data sources (see the [Data source](#) section). 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 WRI.

Greenhouse gas emissions are reported in CO<sub>2</sub> eq, determined by multiplying the amount of emissions of a particular gas by the global warming potential of that gas. The indicator uses the 100 years [1995 Intergovernmental Panel on Climate Change global warming potential](#).

## **Caveats and limitations**

The emissions in the World Resources Institute's (WRI) [Climate Analysis Indicators Tool](#) (CAIT) for June 2015 may reflect restatements from data previously published by that organization. The emissions reported by WRI are also slightly different from the emissions reported by member countries in their National Inventory Report (NIR) to the United Nations Framework Convention on Climate Change. A leading cause of this difference is that many member countries, including Canada, now report emissions in their NIR using revised methodology and Global Warming Potential guidelines that have yet to be used in WRI 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 (GHG) data in the CAIT have uncertainties due to the fact that they are using many different data sources. Despite the uncertainties, WRI 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).

## Part 3. Annexes

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

**Table A.1. Data for Figure 1. Global greenhouse gas emissions for selected countries, 1990, 2005 and 2012**

Countries	1990 GHG emissions (megatonnes of carbon dioxide equivalent)	2005 GHG emissions (megatonnes of carbon dioxide equivalent)	2012 GHG emissions (megatonnes of carbon dioxide equivalent)	Share of GHG emissions in 1990 (percent)	Share of GHG emissions in 2005 (percent)	Share of GHG emissions in 2012 (percent)	1990–2012 percent change	2005–2012 percent change
World	30 424	38 782	44 816	100	100	100	47	16
China	3321	7345	10 975	10.9	18.9	24.5	230	49
United States	5937	6841	6235	19.5	17.6	13.9	5	-9
European Union (28) <sup>[A]</sup>	5235	4953	4399	17.2	12.8	9.8	-16	-11
India	1239	2082	3014	4.1	5.4	6.7	143	45
Russian Federation	2777	2141	2322	9.1	5.5	5.2	-16	8
Japan	1190	1337	1345	3.9	3.4	3.0	13	1
Brazil	565	840	1013	1.9	2.2	2.3	79	21
Indonesia	392	627	761	1.3	1.6	1.7	94	21
Mexico	435	657	724	1.4	1.7	1.6	66	10
Iran	263	579	715	0.9	1.5	1.6	171	23
Canada	569	723	714	1.9	1.9	1.6	26	-1
Rest of the World <sup>[B]</sup>	8500	10 657	12 599	27.9	27.5	28.1	48	18

**Note:** Greenhouse gas emissions for each country 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 (GHG) emissions submitted to the United Nations Framework Convention on Climate Change (UNFCCC). As such Canada's emissions under this indicator differ from the Greenhouse Gas Emissions indicator, which is based on Canada's official National Inventory Report submitted to the UNFCCC.

<sup>[A]</sup> European Union (28) 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, Sweden and United Kingdom.

<sup>[B]</sup> "Rest of the World" includes international bunkers.

**Source:** World Resources Institute (2015) [CAIT Climate Data Explorer](#).



## Annex B. References and additional information

### References and further reading

Carbon Dioxide Information Analysis Center (2015) [Global, Regional, and National Fossil Fuel CO<sub>2</sub> Emissions](#).

Environment and Climate Change Canada (2016) [National Inventory Report 1990–2014: Greenhouse Gas Sources and Sinks in Canada](#).

International Energy Agency (2015) [CO<sub>2</sub> Emissions from Fuel Combustion](#).

United States Energy Information Administration (2013) [Notes for International Energy Statistics](#).

United States Environmental Protection Agency (2012) [Non-CO<sub>2</sub> Greenhouse Gases: International Emissions and Projections](#).

World Resources Institute (2015) [CAIT Climate Data Explorer](#). Retrieved in January 2016.

### Related information

- [Canada's Action on Climate Change](#)
- [Environment and Climate Change Canada – Climate Change](#)
- [Greenhouse Gas Emissions](#)
- [Greenhouse Gas Emissions by Economic Sector](#)
- [Greenhouse Gas Emissions by Province and Territory](#)
- [Greenhouse Gas Emissions from Large Facilities](#)
- [Greenhouse Gas Emissions per Person and per Unit Gross Domestic Product](#)

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