



Global Greenhouse Gas Emissions

This indicator describes emissions of greenhouse gases worldwide.

Background

Since preindustrial times, increasing emissions of greenhouse gases due to human activities worldwide have led to a noticeable increase in atmospheric concentrations of long-lived and other greenhouse gases (see the Atmospheric Concentrations of Greenhouse Gases indicator on p. 16). Every country around the world emits greenhouse gases into the atmosphere, meaning the root causes of climate change are truly global. Some countries produce far more greenhouse gases than others, and several factors such as economic activity, population, income level, land use, and climatic conditions can influence a country's emissions levels. Tracking greenhouse gas emissions worldwide provides a global context for understanding the United States and other nations' roles in climate change.

About the Indicator

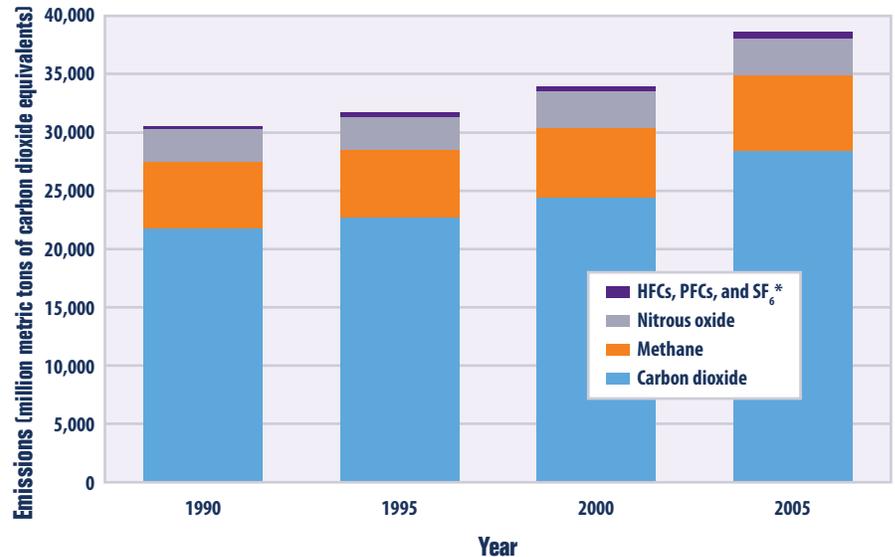
Like the U.S. Greenhouse Gas Emissions indicator (p. 12), this indicator focuses on emissions of gases covered under the United Nations Framework Convention on Climate Change: carbon dioxide, methane, nitrous oxide, and several fluorinated gases. These are all important greenhouse gases that are influenced by human activities, and the Convention requires participating countries to develop and periodically submit an inventory of emissions.

Data and analysis for this indicator come from the World Resources Institute's Climate Analysis Indicators Tool (CAIT), which compiles data from peer-reviewed and internationally recognized greenhouse gas inventories developed by EPA and other government agencies worldwide. Global estimates for carbon dioxide are published annually, but estimates for other gases, such as methane and nitrous oxide, are available only every fifth year.

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Figure 1. Global Greenhouse Gas Emissions by Gas, 1990–2005

This figure shows worldwide emissions of carbon dioxide, methane, nitrous oxide, and several fluorinated gases from 1990 to 2005. For consistency, emissions are expressed in million metric tons of carbon dioxide equivalents. These totals do not include emissions due to land-use change or forestry.

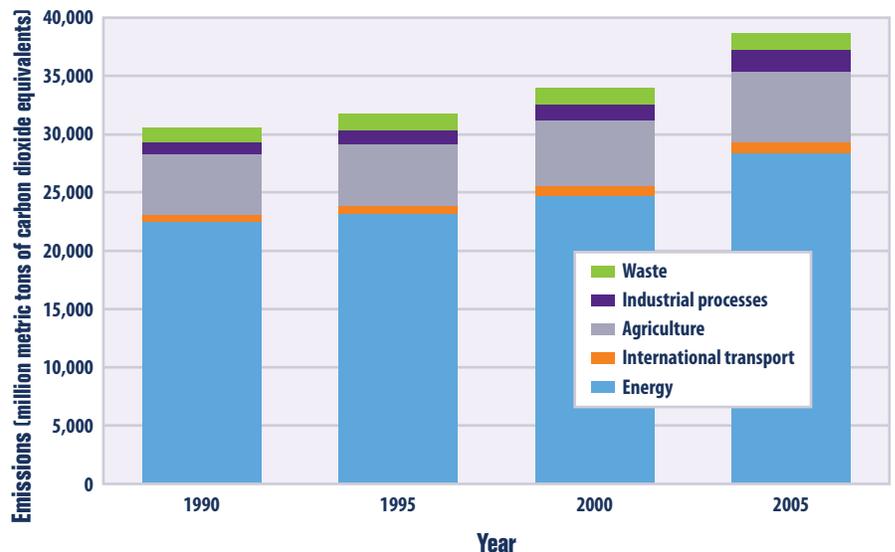


* HFCs are hydrofluorocarbons, PFCs are perfluorocarbons, and SF₆ is sulfur hexafluoride.

Data source: World Resources Institute, 2012⁹

Figure 2. Global Greenhouse Gas Emissions by Sector, 1990–2005

This figure shows worldwide greenhouse gas emissions by sector from 1990 to 2005.* For consistency, emissions are expressed in million metric tons of carbon dioxide equivalents. These totals do not include emissions due to land-use change or forestry.



* Note that the sectors shown here are different from the economic sectors used in U.S. emissions accounting (see the U.S. Greenhouse Gas Emissions indicator). Emissions from international transport (aviation and marine) are separate from the energy sector because they are not part of individual countries' emissions inventories. The energy sector includes all other transportation activities.

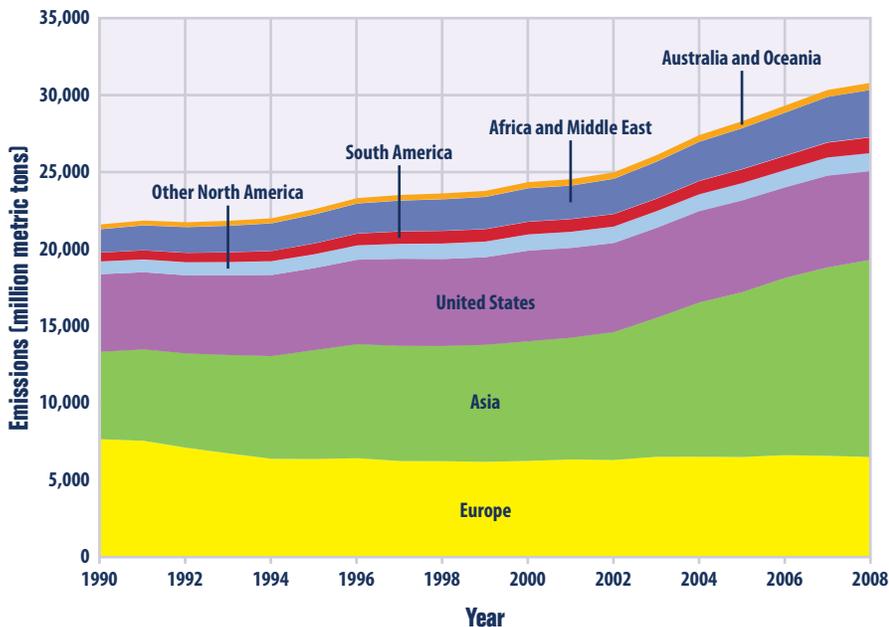
Data source: World Resources Institute, 2012¹⁰

Key Points

- In 2005, estimated worldwide emissions totaled nearly 39 billion metric tons of greenhouse gases, expressed as carbon dioxide equivalents. This represents a 26 percent increase from 1990 (see Figures 1 and 2).
- Between 1990 and 2005, global emissions of all major greenhouse gases increased (see Figure 1). Emissions of carbon dioxide increased by 31 percent, which is particularly important because carbon dioxide accounts for nearly three-fourths of total global emissions. Methane emissions increased the least—10 percent—while emissions of nitrous oxide increased by 14 percent. Emissions of fluorinated gases more than doubled.
- Energy production and use (including energy used by vehicles) represent the largest source of greenhouse gas emissions worldwide (about 73 percent of the total), followed by agriculture (16 to 17 percent) (see Figure 2).
- Carbon dioxide emissions are increasing faster in some parts of the world than in others (see Figure 3).

Figure 3. Global Carbon Dioxide Emissions by Region, 1990–2008

This figure shows carbon dioxide emissions from 1990 to 2008 for different regions of the world. These totals do not include emissions due to land-use change or forestry.



Data source: World Resources Institute, 2012¹¹

This indicator tracks emissions of greenhouse gases according to their 100-year global warming potential, a measure of how much a given amount of the greenhouse gas is estimated to contribute to global warming over a period of 100 years after being emitted. For purposes of comparison, global warming potential values are calculated in relation to carbon dioxide and are expressed in terms of carbon dioxide equivalents.

Indicator Notes

Like the U.S. Greenhouse Gas Emissions indicator (p. 12), this indicator does not include emissions of a number of gases that affect climate but are not covered under the United Nations Framework Convention on Climate Change. For example, this indicator excludes ozone-depleting substances such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), which have high global warming potentials, because these gases are being phased out under an international agreement called the Montreal Protocol. This indicator is restricted to emissions associated with human activities, but it does not account for emissions associated with land-use change or forestry. There are also various emissions of greenhouse gases of natural origin, which this indicator does not cover.

Global emissions inventories for gases other than carbon dioxide are limited to five-year intervals. The United Nations Framework Convention on Climate Change database has more comprehensive data; however, these data are available mainly for a group of mostly developed countries that account for only about half of global greenhouse gas emissions. Thus, to provide a more representative measure of global greenhouse gas emissions, this indicator uses the broader CAIT database.

Data Sources

Data for this indicator came from the World Resources Institute's CAIT database, which is accessible online at: <http://cait.wri.org>. CAIT compiles data that were originally collected by organizations including the International Energy Agency, EPA, the U.S. Carbon Dioxide Information Analysis Center, and the European Commission.