

## Energy in Brief — What everyone should know about energy

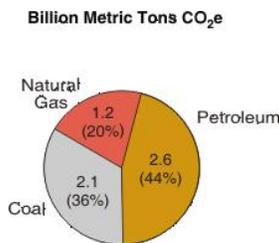
Last Reviewed: July 10, 2008

### What are greenhouse gases and how much are emitted by the United States?

Greenhouse gases trap heat from the sun and warm the planet's surface. Of U.S. greenhouse gas emissions, 87% are related to energy consumption. Since 1990, greenhouse gas emissions in the United States have grown by about 1% per year. In 2005, about 21% of the world's total energy-related carbon dioxide was emitted by the United States.



*Petroleum is the fossil fuel that accounts for the most carbon dioxide emissions.*



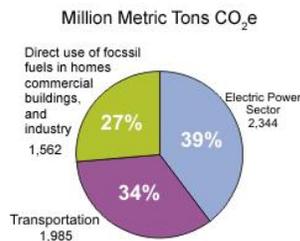
Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2006* (Nov. 2007).

Because greenhouse gases trap radiation (heat) from the sun and warm the planet's surface, a certain amount of these gases is beneficial (see "Did You Know?"). But as concentrations of these gases increase due to human activity, more warming occurs than would happen naturally. In 2006, about 7.1 billion metric tons carbon dioxide equivalent (CO<sub>2</sub>e) of greenhouse gases were emitted by the United States.<sup>1</sup> Other countries with significant emissions include China, the countries of Europe, Russia, and Japan.

#### Did You Know?

If it were not for naturally occurring greenhouse gases, the Earth would be too cold to support life as we know it. Without the greenhouse effect, the average temperature of the Earth would be about -2 degrees Fahrenheit rather than the +57 degrees Fahrenheit we currently experience.

*Electricity generation and transportation are the biggest sources of energy-related greenhouse gases.*



Source: Energy Information Administration

Seven kinds of greenhouse gases are emitted by the United States.

- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)
- High-GWP gases, which are:
  - Hydrofluorocarbons (HFCs)
  - Perfluorocarbons (PFCs)
  - Sulfur hexafluoride (SF<sub>6</sub>)
- Water vapor<sup>2</sup> (H<sub>2</sub>O)

#### How Much of Total U.S. Greenhouse Gas Emissions Are Energy Related?

Of the total amount of greenhouse gases emitted in 2006, about 5.9 billion metric tons were carbon dioxide from energy consumption (the burning of fossil fuels). Another 0.3 billion metric tons CO<sub>2</sub>e came from energy-related greenhouse gases other than carbon dioxide for a total of 6.2 out of 7.1 billion metric tons CO<sub>2</sub>e or about 87%.

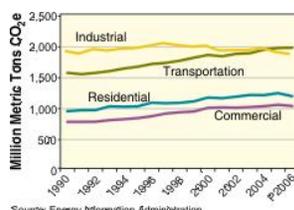
#### Which Fuel Accounts for the Largest Share of Energy-Related Carbon Dioxide Emissions?

Petroleum is the largest fuel source of carbon dioxide emissions from energy consumption in the United States. Petroleum carbon dioxide emissions were 2.6 billion metric tons, or 44% of the total, in 2006.

Other important fossil fuel sources of carbon dioxide emissions include:

- Coal—accounting for 2.1 billion metric tons (36%) in 2006
- Natural gas—accounting for 1.2 billion metric tons (20%) in 2006

*The transportation sector currently emits the most energy-related greenhouse gas.*



Source: Energy Information Administration

## What Are the Important Non-Carbon Dioxide (Non-CO<sub>2</sub>) Greenhouse Gases Related to the Production and Consumption of Energy?

Of the non-CO<sub>2</sub> gases that contribute to energy-related greenhouse gas emissions, methane contributes most of the 0.3 billion metric tons CO<sub>2</sub>e—mainly from emissions that leak out of natural gas pipelines, coal mines, and petroleum exploration and production facilities.

## How Are Energy-Related Greenhouse Gas Emissions Distributed Throughout Our Economy and What Sector of Our Economy Is Responsible for the Most Emissions?

- Electric power generation and transportation are the biggest sources of energy-related greenhouse gas emissions in our nation, with respective shares of 39.8% and 33.7% of our total energy-related emissions in 2006. Taken together, emissions in power generation and transportation increased at an average annual rate of 1.5% between 1990 and 2006. The rest of our emissions result from direct use of fossil fuels in homes, commercial buildings, and industry. These emissions are virtually unchanged since 1990.
- Since electric power is ultimately used in homes, commercial buildings, and industry, emissions associated with power generation can be allocated to each end-use sector based on their electricity consumption to obtain another perspective. Using this approach, the transportation sector is currently the largest emitter. Our cars, trucks, planes, trains, ships, and barges produced 2.0 billion metric tons CO<sub>2</sub>e (1.9 billion metric tons of carbon dioxide plus 0.1 billion metric tons CO<sub>2</sub>e in other gases) in 2006. Emissions from this sector have grown at an average rate of 1.4% since 1990.
- The industrial sector—which consists of activities such as manufacturing, construction, mining, and agriculture—emits almost as much as the transportation sector—a total of 1.9 billion metric tons of energy-related CO<sub>2</sub>e (1.7 billion metric tons of carbon dioxide plus 0.2 billion metric tons CO<sub>2</sub>e in other gases). Its emissions have been largely stable since 1990 due primarily to the loss of energy-intensive industries such as steel.
- The commercial sector—which includes such sources as schools, office buildings, and shopping malls—emits a total of 1.0 billion metric tons CO<sub>2</sub>e of energy-related carbon dioxide, with almost 80% of it coming from the power plants providing the electricity used in the buildings. Its emissions have grown the fastest since 1990, at an average annual rate of 1.8%.
- The residential sector—the homes we live in—emits 1.2 billion metric tons of CO<sub>2</sub>e, almost all of which is energy-related carbon dioxide, over 70% of which is produced at power plants providing homes electricity. Residential sector emissions have grown at an average annual rate of 1.4% since 1990.

### Learn More

- [Projections of U.S. energy-related carbon dioxide emissions](#)
- [Projections of energy-related carbon dioxide for other countries](#)
- [Details on all greenhouse gas emissions in the U.S. economy](#)

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- Analysis of proposed legislation to curb greenhouse gas emissions
- Greenhouse gases and climate science

<sup>1</sup>Values expressed as carbon dioxide equivalents (CO<sub>2</sub>e) are calculated based on their global warming potential (GWP). GWP is the ratio of the warming that would result from the emission of one kilogram of a greenhouse gas to that from the emission of one kilogram of carbon dioxide over a fixed period of time such as 100 years.

<sup>2</sup>Water vapor is the most abundant greenhouse gas, but scientists see our influence on its concentration levels as negligible and therefore data on water vapor are not collected.