

U.S. Carbon Dioxide Emissions from Energy Sources 2006 Flash Estimate

Energy Information Administration
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This flash estimate is based on data published in the April 2007 *Monthly Energy Review* (MER).

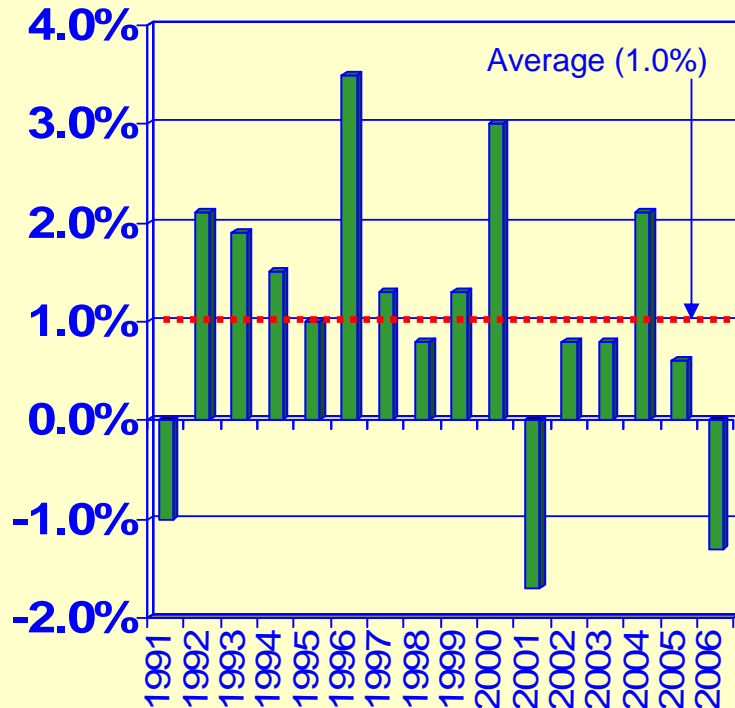
Note: These emission estimates are denominated in millions of metric tons of carbon dioxide (MMTCO₂). To convert to carbon equivalent emissions, multiply by 12/44. All 2006 data are preliminary.

U.S. Energy-Related Carbon Dioxide Emissions Declined in 2006

- U.S. energy-related CO₂ emissions declined in absolute terms – from 5,955 million metric tons (MMT CO₂) in 2005 to 5,877 MMT CO₂ in 2006, a 1.3 percent decrease
- Emissions from natural gas and petroleum fell 1.7 percent and 1.5 percent, respectively, while coal emissions declined 0.9 percent
- Energy intensity (energy consumed per \$ real GDP) fell by over 4.0 percent, as total energy demand declined 0.9 percent while the economy grew by 3.3 percent
- The total carbon intensity of the economy (CO₂ per \$ real GDP) fell by 4.5 percent, as the carbon intensity of the energy supply (CO₂ per Btu of energy) fell in addition to the decline in the energy intensity
- The 2006 decline in carbon intensity is the largest since 1990 and the 4th largest since 1949

Percent Change in Energy-Related Carbon Dioxide Emissions (1991-2006)

Annual Percent Change in CO₂ Emissions •



Long-term growth in energy CO₂ emissions is influenced by:

- Economic growth
 - Energy intensity of economy
 - Includes structural shifts as well as efficiency gains
 - Carbon intensity of energy supply
- Short-term, year-to-year variations are affected by:
- Weather
 - Economic fluctuations
 - Fuel mix, which is influenced by the relative prices of fuels

Source: Energy Information Administration, preliminary estimate for 2006.

Residential Sector

- In 2006, residential CO₂ emissions fell 3.7 percent.
- Heating degree-days were down by 7.4 percent and cooling degree-days decreased by almost 1 percent, moderating both heating fuel demand and air-conditioning requirements.
- Between 1990 and 2006, residential sector CO₂ emissions grew by 25.6 percent (1.4% per year)
 - This increase was driven by population growth of 20.4 percent (1.2% per year) and residential electricity demand growth of 46.6 percent (2.4% per year)

Commercial Sector

- In 2006, commercial CO₂ emissions declined 1.0 percent
- Between 1990 and 2006, commercial sector CO₂ emissions grew by 33.9 percent (1.8% per year)

Industrial Sector

- In 2006, energy-related industrial CO₂ emissions declined an estimated 1.2 percent
- Between 1990 and 2006, energy-related industrial sector CO₂ emissions declined from 1,684 to 1,669 MMTCO₂
- Based on early estimates, total industrial output increased 3.9 percent in 2006*
 - Output from energy-intensive industries, such as primary metals, non-metallic minerals, and chemicals increased 4.7, 4.0 and 2.2 percent, respectively
 - The paper and petroleum industries had more modest growth – 0.8 and 0.9 percent, respectively

*Source: http://www.federalreserve.gov/releases/G17/ipdisk/ip_sa.txt

Transportation Sector

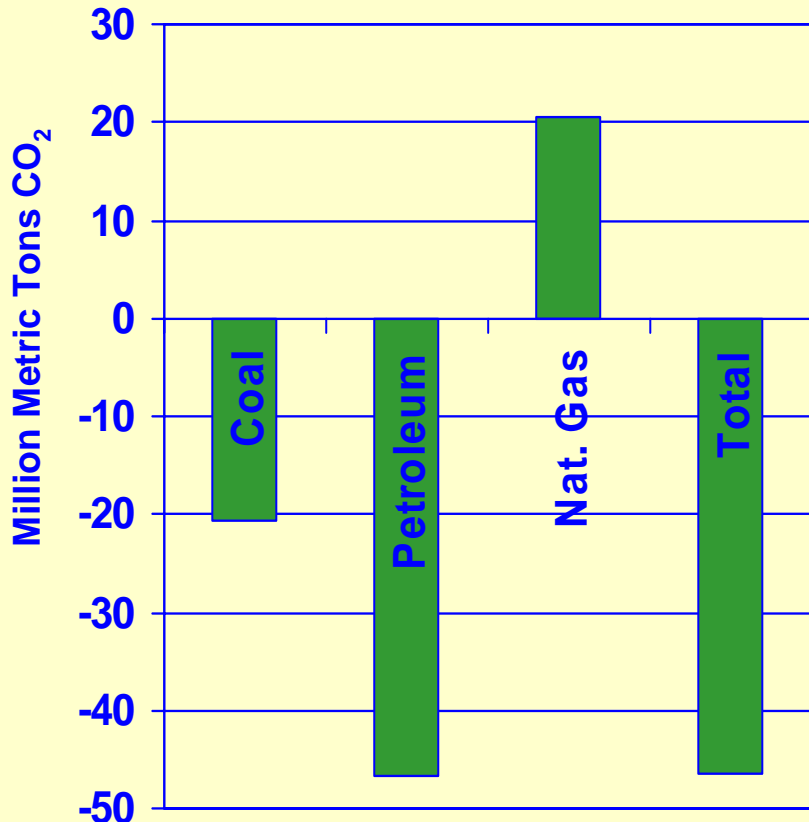
- In 2006, transportation emissions declined slightly -- by 0.1 percent
- Increases in CO₂ emissions from gasoline (0.1 %) and diesel fuel (1.8 %) were offset by declines in other petroleum fuels
- Between 1990 and 2006, transportation CO₂ emissions grew 25.4 percent (1.4 % per year)

Factors that Helped the Energy-CO2 Emissions Decline

- **Weather conditions were favorable for emission reductions in 2006 as both heating degree-days and cooling degree-days were lower than in 2005**
 - As 2006 enjoyed a mild winter, heating degree-days were down 7.4 percent
 - In addition, the summer of 2006 was cooler than the summer of 2005 and cooling degree-days declined almost 1 percent

The Electric Power Sector Fuel Mix Also Helped Reduce Emissions

Change in CO₂ Emissions by Fuel for the
the Electric Power Sector, 2005 to 2006
2006

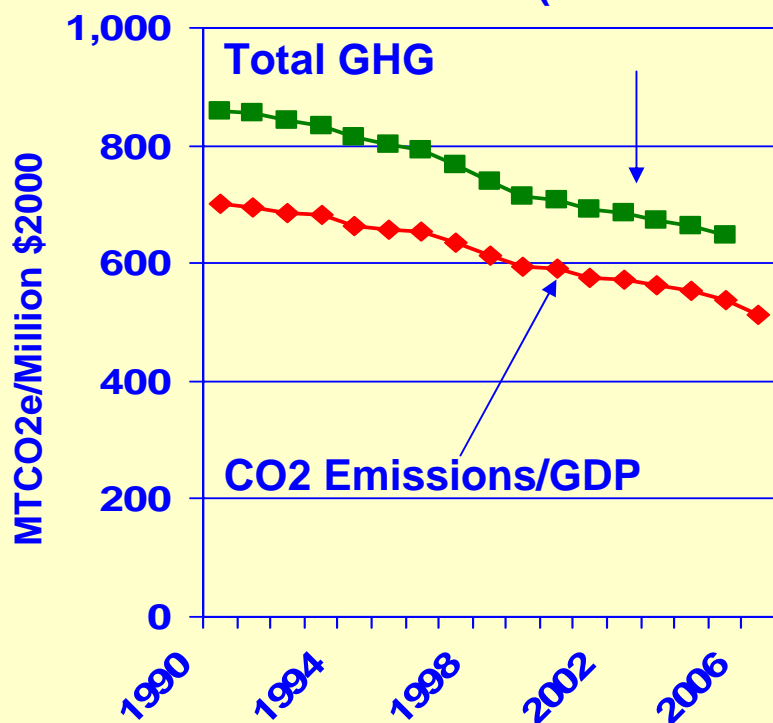


- Emissions from the electric power sector decreased by 46.4 MMTCO₂ (2.0 percent) in 2006
- Generation was down by 0.1 percent.
- The resulting decrease in carbon intensity of 1.9 percent was driven by increased use of natural gas, the least carbon-intensive fossil fuel, and greater reliance on non-fossil fuels:
 - Natural gas-related emissions from electric generation increased 20.5 MMTCO₂ (6.4 %). However, coal emissions from electric generation decreased by 20.7 MMTCO₂ (1.1 %), while petroleum decreased by 46.6 MMTCO₂ (46.4%)
 - Non-fossil generation increased by 32 billion kWh (0.8 percent of total generation), as hydro, wind, nuclear and wood/biogenic waste power increased generation by 18, 8, 5 and 1 billion kWh respectively.

Source: Energy Information Administration, preliminary estimate for 2006.

Greenhouse Gas Intensity Measures

Greenhouse Gas (1990 – 2005) and Carbon Intensities (1990 – 2006)

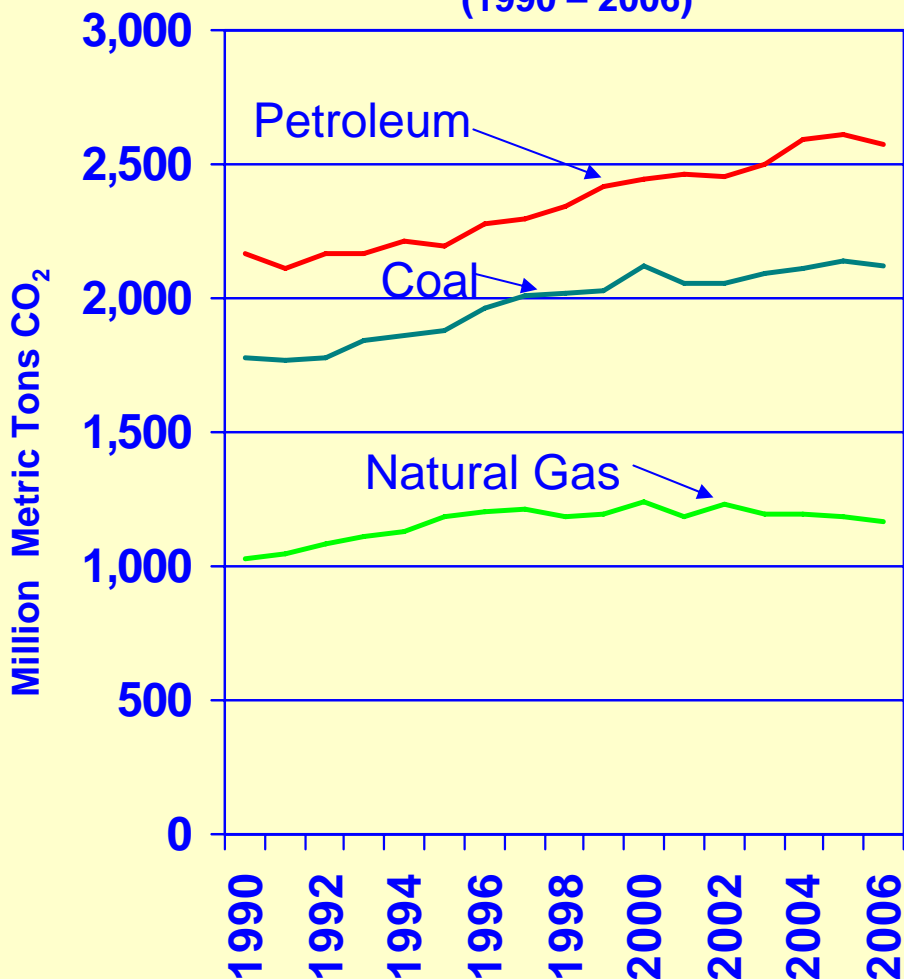


- In 2006, carbon dioxide intensity (carbon dioxide emissions per unit of economic output) fell by 4.5 percent
- Between 1990 and 2006, CO₂ emissions per unit of GDP declined by 26.5 percent (-1.9% per year)
- Between 1990 and 2005, total greenhouse gas emissions per unit of GDP declined by 24.7 percent (-1.9% per year)

Source: Energy Information Administration, preliminary estimate for 2006.

Carbon Dioxide Emissions by Fossil Fuel Type

CO₂ Emissions By Fossil Fuel
(1990 – 2006)

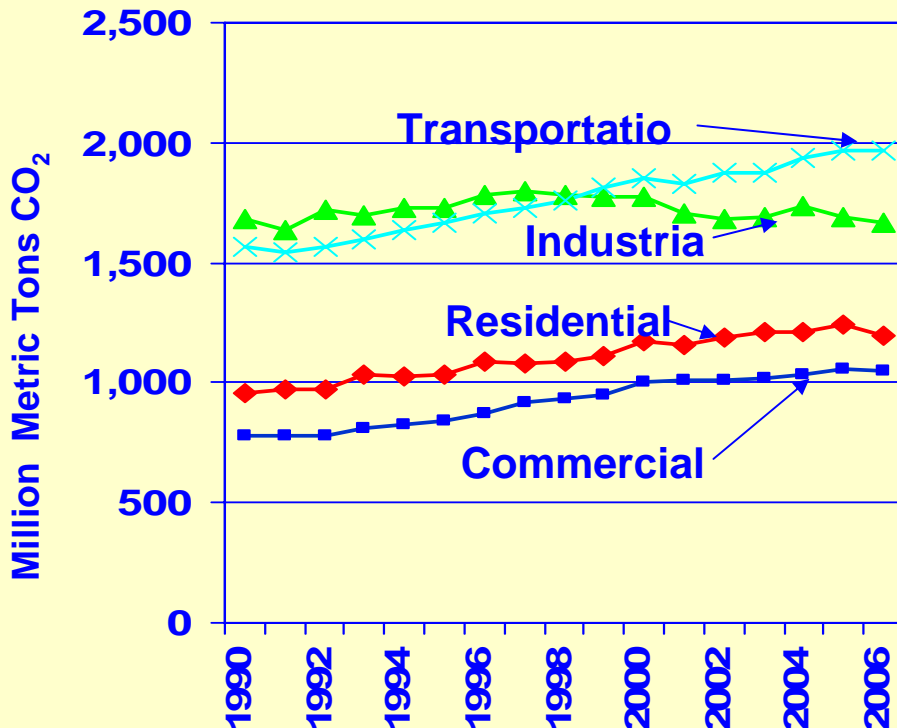


- In 2006, CO₂ emissions from petroleum were 2,575, from coal 2,121, and from natural gas 1,169 MMTCO₂
- While coal use emits the most CO₂ per unit of energy, petroleum produces the most CO₂ emissions due to its higher consumption levels
- 2006 emissions growth by fuel type was -1.5% for petroleum, -0.9% for coal, and -1.7% for natural gas
- Average annual emissions growth since 1990 is 1.1%/year for both petroleum and coal, and 0.8%/year for natural gas

Source: Energy Information Administration, preliminary estimate for 2006.

Carbon Dioxide Emissions by End-Use Sector

CO₂ Emissions by End-Use Sector
(1990 – 2006)



- Since 1990, industrial emissions have declined while transportation emissions have grown 1.4 % per year
- Residential sector emissions have grown 1.4 % per year
- Commercial emissions have averaged the highest growth (1.8 % per year), although they remain the smallest sector for CO₂ emissions
- Both the residential and commercial sectors are dominated by electricity

Source: Energy Information Administration, preliminary estimate for 2006.
Electric Power sector emissions are distributed across the end-use sectors.

**U.S. Energy-Related Carbon Dioxide Emissions
by Fossil Fuel
(Million Metric Tons Carbon Dioxide)**

	Petroleum	Coal	Natural Gas	Total*
1990	2170	1782	1027	4985
1995	2192	1879	1185	5266
1996	2275	1960	1207	5452
1997	2294	2005	1212	5522
1998	2346	2022	1189	5568
1999	2413	2024	1192	5640
2000	2443	2119	1238	5810
2001	2462	2051	1185	5709
2002	2458	2054	1227	5752
2003	2500	2093	1196	5800
2004	2597	2115	1195	5919
2005	2613	2141	1189	5955
2006P	2575	2121	1169	5877

Source: Energy Information Administration, preliminary estimate for 2006.

* The total includes small amounts of CO₂ from municipal solid waste and geothermal energy.

Percentage Change in U.S. Energy-Related Carbon Dioxide Emissions by Fuel Type

<i>Primary Energy</i>	<i>Total Percentage Change</i>		<i>Annual Average Percentage Growth</i>	
	1990 - 2006	1990 - 2006	2004 - 2005	2005 - 2006
<i>Petroleum</i>	18.7%	1.1%	0.6%	-1.5%
<i>Coal</i>	19.0%	1.1%	1.2%	-0.9%
<i>Natural Gas</i>	13.8%	0.8%	-0.5%	-1.7%
<i>Total Fossil Fuels*</i>	17.9%	1.0%	0.6%	-1.3%

Source: Energy Information Administration, preliminary estimate for 2006.

* The total includes small amounts of CO₂ from municipal solid waste and geothermal energy.

U.S. Energy-Related Carbon Dioxide Emissions by End-Use Sector (Million Metric Tons Carbon Dioxide)

	Residential	Commercial	Industrial	Transport
1990	954	781	1684	1567
1995	1031	841	1729	1665
1996	1089	871	1783	1708
1997	1081	915	1800	1726
1998	1088	936	1782	1762
1999	1111	948	1771	1810
2000	1172	1006	1778	1854
2001	1160	1013	1704	1832
2002	1187	1010	1683	1872
2003	1215	1021	1686	1878
2004	1212	1035	1734	1939
2005	1243	1056	1689	1966
2006P	1197	1046	1669	1965

Percentage Change In U.S. Energy-Related Carbon Dioxide Emissions By End-Use Sector

<i>Energy Sector</i>	<i>Total Percentage Change</i>	<i>Annual Average Percentage Growth</i>		
		1990 – 2006	1990 - 2006	2004 - 2005
<i>Residential</i>	25.6%	1.4%	2.6%	-3.7%
<i>Commercial</i>	33.9%	1.8%	2.1%	-1.0%
<i>Industrial</i>	-0.9%	-0.1%	-2.6%	-1.2%
<i>Transportation</i>	25.4%	1.4%	1.4%	-0.1%
<i>Total Energy</i>	17.9%	1.0%	0.6%	-1.3%

Source: Energy Information Administration, preliminary estimate for 2006.