

EMISSIONS BY ECONOMIC SECTOR

**EXCERPT FROM THE *INVENTORY OF U.S. GREENHOUSE
EMISSIONS AND SINKS: 1990-2000***

U.S. Greenhouse Gas Inventory Program
Office of Atmospheric Programs
U.S. Environmental Protection Agency

April 2002

Original Reference

All material taken from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2000*, U.S. Environmental Protection Agency, Office of Atmospheric Programs, EPA 430-R-02-003, April 2002. <www.epa.gov/globalwarming/publications/emissions>

How to Obtain Copies

You may electronically download this document from the U.S. EPA's Global Warming web page on at: www.epa.gov/globalwarming/publications/emissions

For Further Information

Contact Mr. Michael Gillenwater, Office of Air and Radiation, Office of Atmospheric Programs, Tel: (202)564-0492, or e-mail gillenwater.michael@epa.gov

Acknowledgments

The preparation of this report was directed by Michael Gillenwater. The staff of the Climate and Atmospheric Policy Practice at ICF Consulting, especially Marian Martin and John Venezia deserve recognition for their expertise and efforts in supporting the preparation of this report.

Introduction

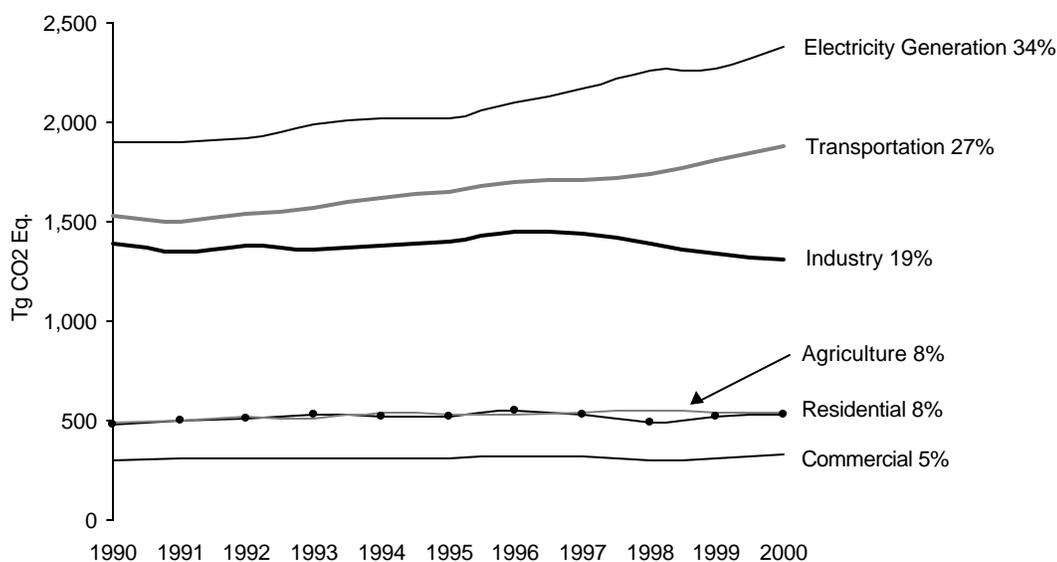
The *Inventory of U.S. Greenhouse Gas Emissions and Sinks* provides estimates that are grouped into six sectors (i.e., chapters) defined by the Intergovernmental Panel on Climate Change (IPCC): Energy, Industrial Processes, Solvent Use, Agriculture, Land-Use Change and Forestry, and Waste. While it is important to use this characterization for methodological reasons, it is also useful to allocate emissions into sectoral categories that are more intuitive. This excerpt reports emissions by the following “economic sectors”: Residential, Commercial, Industry, Transportation, Electricity Generation, Agriculture, and U.S. Territories. Using this categorization scheme, emissions from electricity generation accounted for the largest portion (34 percent) of U.S. greenhouse gas emissions. The transportation activities, in aggregate, accounted for the second largest portion (27 percent). Additional discussion and data on these two economic sectors is provided below.

Emissions from industry accounted for 19 percent of U.S. greenhouse gas emissions in 2000. In contrast to electricity generation and

transportation, emissions from industry have declined over the past decade, as structural changes have occurred in the U.S. economy (i.e., shifts from a manufacturing base to a service-based economy), fuel switching has occurred, and efficiency improvements have been made. The remaining 20 percent of U.S. greenhouse gas emissions were contributed by the residential, agriculture, commercial economic sectors, and U.S. territories. Residences accounted for about 8 percent, and primarily consisted of carbon dioxide (CO₂) emissions from fossil fuel combustion. Activities related to agriculture also accounted for roughly 8 percent of U.S. emissions, but unlike all other economic sectors these emissions were dominated by nitrous oxide (N₂O) emissions from agricultural soils instead of CO₂ from fossil fuel combustion. The commercial sector accounted for about 5 percent of emissions, while U.S. territories accounted for less than 1 percent of total emissions.

Carbon dioxide was also emitted and sequestered by a variety of activities related to land-use change and forestry.

Figure 1: Emissions Allocated to Economic Sectors



Note: Does not include territories.

Emissions by Economic Sector

Table 1 presents a detailed breakdown of emissions from each of these economic sectors by source category, as they are defined in this report. Figure 1 shows the trend in emissions by sector from 1990 to 2000.

Additional discussion on emission trends for the United States can be found in the complete *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000*.

Table 1: U.S. Greenhouse Gas Emissions Allocated to Economic Sectors
(Tg CO₂ Eq. and Percent of Total in 2000)

Sector/Source	1990	1995	1996	1997	1998	1999	2000	Percent ^a
Electricity Generation	1,898.2	2,024.3	2,096.9	2,171.6	2,256.1	2,271.2	2,376.9	33.9%
CO ₂ from Fossil Fuel Combustion	1,858.9	1,989.3	2,061.2	2,137.9	2,226.4	2,246.2	2,352.5	33.6%
Transmission & Distribution ^b	31.2	26.5	26.8	24.5	20.1	15.5	14.4	0.2%
Stationary Combustion ^c	8.1	8.5	8.9	9.2	9.5	9.5	10.0	0.1%
Transportation	1,527.7	1,652.4	1,695.2	1,708.5	1,737.4	1,813.3	1,877.0	26.8%
CO ₂ from Fossil Fuel Combustion	1,471.8	1,579.4	1,618.7	1,628.8	1,655.0	1,728.2	1,789.5	25.6%
Mobile Combustion ^c	55.8	65.2	64.8	64.2	63.6	63.1	62.7	0.9%
Substitution of ODS ^d	+	7.9	11.8	15.4	18.9	22.0	24.8	0.4%
Industry	1,393.9	1,400.9	1,447.6	1,442.7	1,385.9	1,341.1	1,314.6	18.8%
CO ₂ from Fossil Fuel Combustion	825.3	838.0	884.5	876.9	823.5	798.1	778.8	11.1%
Natural Gas Systems	121.2	125.7	126.6	122.7	122.2	118.6	116.4	1.7%
Iron & Steel Production	85.4	74.4	68.3	76.1	67.4	64.4	65.7	0.9%
Coal Mining	87.1	73.5	68.4	68.1	67.9	63.7	61.0	0.9%
Cement Manufacture	33.3	36.8	37.1	38.3	39.2	40.0	41.1	0.6%
HCFC-22 Production ^e	35.0	27.0	31.1	30.0	40.2	30.4	29.8	0.4%
Substitution of ODS ^d	+	11.1	15.5	18.3	20.9	23.5	26.3	0.4%
Indirect CO ₂ from CH ₄ Oxidation	30.9	29.5	28.9	28.4	28.2	27.0	26.3	0.4%
Petroleum Systems	26.4	24.2	24.0	24.0	23.4	22.3	21.9	0.3%
Nitric Acid	17.8	19.9	20.7	21.2	20.9	20.1	19.8	0.3%
Ammonia Manufacture	18.5	18.9	19.5	19.5	20.1	18.9	18.0	0.3%
Wastewater Treatment	12.0	13.7	13.8	14.2	14.3	14.6	14.8	0.2%
Landfills	14.9	15.2	14.8	14.4	14.1	14.2	14.2	0.2%
Aluminum Production ^f	24.4	17.1	18.0	16.6	14.8	14.8	13.4	0.2%
Lime Manufacture	11.2	12.8	13.5	13.7	13.9	13.5	13.3	0.2%
Limestone & Dolomite Use	5.2	7.0	7.4	8.4	8.2	9.1	9.2	0.1%
Adipic Acid	14.9	17.9	17.8	11.5	7.7	7.7	8.1	0.1%
Semiconductor Manufacture ^d	2.9	5.9	5.4	6.5	7.3	7.7	7.4	0.1%
Stationary Combustion ^c	5.9	6.3	6.5	6.7	6.6	6.8	6.7	0.1%
Natural Gas Flaring	5.5	8.7	8.2	7.6	6.3	6.7	6.1	0.1%
Soda Ash Manufacture & Consumption	4.1	4.3	4.2	4.4	4.3	4.2	4.2	0.1%
Magnesium Production & Processing ^b	5.5	5.5	5.5	6.9	6.2	6.1	4.0	0.1%
Titanium Dioxide Production	1.3	1.7	1.7	1.8	1.8	1.9	2.0	+
Ferroalloys	2.0	1.9	2.0	2.0	2.0	2.0	1.7	+
Petrochemical Production	1.2	1.5	1.6	1.6	1.6	1.7	1.7	+
Waste Combustion ^g	1.0	1.3	1.4	1.5	1.4	1.5	1.6	+
Carbon Dioxide Consumption	0.8	1.0	1.1	1.3	1.4	1.6	1.4	+
Silicon Carbide Production	+	+	+	+	+	+	+	+
Agriculture	494.7	533.3	533.3	544.2	545.1	544.9	535.5	7.6%
Agricultural Soil Management	267.1	283.4	292.6	297.5	298.4	296.3	297.6	4.3%
Enteric Fermentation	127.9	133.2	129.6	126.8	124.9	124.5	123.9	1.8%
Manure Management ^c	45.2	51.2	51.0	52.9	55.1	54.7	55.0	0.7%
CO ₂ from Fossil Fuel Combustion	46.3	56.9	52.0	58.3	57.6	59.9	50.4	0.7%
Rice Cultivation	7.1	7.6	7.0	7.5	7.9	8.3	7.5	0.1%
Agricultural Residue Burning ^c	1.1	1.0	1.2	1.2	1.2	1.2	1.2	+
Mobile Combustion ^c	+	+	+	+	+	+	+	+
Stationary Combustion ^c	+	+	+	+	+	+	+	+

Table 1: (continued)

Sector/Source	1990	1995	1996	1997	1998	1999	2000	Percent ^a
Residential	484.6	522.7	549.0	531.1	494.3	516.0	531.6	7.6%
CO ₂ from Fossil Fuel Combustion	332.1	362.3	390.4	374.9	341.8	360.5	374.8	5.4%
Landfills	119.5	121.3	118.4	115.6	112.6	113.7	113.9	1.6%
Wastewater Treatment	12.3	13.1	13.2	13.4	13.5	13.7	13.9	0.2%
Waste Combustion ^g	8.1	10.6	11.1	12.1	11.5	12.4	12.7	0.2%
Human Sewage	7.0	7.7	7.8	7.9	8.1	8.4	8.5	0.1%
Stationary Combustion ^c	5.7	5.8	5.9	4.7	4.2	4.5	4.7	0.1%
Substitution of ODS ^d	+	1.9	2.1	2.5	2.7	2.9	3.2	+
Commercial	303.5	313.0	320.8	320.9	302.9	307.1	327.6	4.7%
CO ₂ from Fossil Fuel Combustion	217.3	223.9	232.8	233.7	217.5	219.8	239.3	3.4%
Landfills	79.0	80.1	78.3	76.4	74.4	75.1	75.3	1.1%
Waste Combustion ^g	5.3	7.0	7.3	8.0	7.6	8.2	8.4	0.1%
Substitution of ODS ^d	0.9	0.9	1.3	1.8	2.4	2.9	3.5	+
Stationary Combustion ^c	1.0	1.1	1.1	1.1	1.0	1.1	1.1	+
U.S. Territories	28.1	35.3	27.0	29.1	34.4	35.8	38.0	0.5%
CO ₂ from Fossil Fuel Combustion	28.1	35.3	27.0	29.1	34.4	35.8	38.0	0.5%
Total	6,130.7	6,481.8	6,669.8	6,748.1	6,756.2	6,829.5	7,001.2	100%
Sinks	(1,097.7)	(1,110.0)	(1,108.1)	(887.5)	(885.9)	(896.4)	(902.5)	100%
Forests	(982.7)	(979.0)	(979.0)	(759.0)	(751.7)	(762.7)	(770.0)	85%
Agricultural Soils	(37.3)	(60.2)	(60.2)	(60.4)	(67.2)	(67.7)	(67.4)	7%
Urban Trees	(58.7)	(58.7)	(58.7)	(58.7)	(58.7)	(58.7)	(58.7)	7%
Landfilled Yard Trimmings	(19.1)	(12.2)	(10.2)	(9.5)	(8.3)	(7.3)	(6.4)	1%
Net Emissions (Sources & Sinks)	5,033.0	5,371.8	5,561.7	5,860.5	5,870.3	5,933.1	6,098.7	-

Note: Includes all emissions of CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆. Totals may not sum due to independent rounding.

ODS (Ozone Depleting Substances)

+ Does not exceed 0.05 Tg CO₂ Eq. or 0.05%.

- Not applicable.

^a Percents for year 2000.

^b SF₆ emitted.

^c Includes both CH₄ and N₂O.

^d May include a mixture of HFCs, PFCs, and SF₆.

^e HFC-23 emitted.

^f Includes both CO₂ and PFCs.

^g Includes both CO₂ and N₂O.

Emissions with Electricity Distributed to Economic Sectors

It can also be useful to view greenhouse gas emissions from economic sectors with emissions related to electricity generation distributed into end-use categories (i.e., emissions from electricity generation are allocated to the economic sectors in which the electricity is consumed). To distribute electricity emissions among end-use sectors, emissions from the source categories assigned to the electricity generation sector were allocated to the residential, commercial, industry, transportation, and agriculture economic sectors according to retail sales of electricity (EIA 2001 and Duffield 2002). These three source categories include

CO₂ from fossil fuel combustion, CH₄ and N₂O from stationary sources, and SF₆ from electrical transmission and distribution.¹

When emissions from electricity are distributed among these sectors, industry accounts for the largest share of U.S. greenhouse gas emissions (29 percent). Emissions from the residential and commercial sectors also increase substantially due to their relatively large share of electricity

¹ Emissions were not distributed to U.S. territories, since the electricity generation sector only includes emissions related to the generation of electricity in the 50 states and the District of Columbia.

Emissions by Economic Sector

consumption. Transportation activities remain the second largest contributor to emissions. In all sectors except agriculture, CO₂ accounts for more than 75 percent of greenhouse gas emissions, primarily from the combustion of fossil fuels.

Table 2 presents a detailed breakdown of emissions from each of these economic sectors, with emissions from electricity generation distributed to them. Figure 2 shows the trend in these emissions by sector from 1990 to 2000.

Table 2: U.S. Greenhouse Gas Emissions by “Economic Sector” and Gas with Electricity-Related Emissions Distributed (Tg CO₂ Eq.) and percent of total in 2000

Sector/Gas	1990	1995	1996	1997	1998	1999	2000	Percent*
Industry	2,029.7	2,071.6	2,136.2	2,151.5	2,104.0	2,059.7	2,054.7	29.3%
Direct Emissions	1,393.9	1,400.9	1,447.6	1,442.7	1,385.9	1,341.1	1,314.6	18.8%
CO ₂	1,030.9	1,041.5	1,083.4	1,085.4	1,023.6	994.7	974.7	13.9%
CH ₄	265.0	256.1	251.6	247.5	245.9	237.5	232.3	3.3%
N ₂ O	36.6	41.9	42.7	37.0	32.9	32.3	32.2	0.5%
HFCs, PFCs, and SF ₆	61.4	61.4	70.0	72.7	83.6	76.7	75.4	1.1%
Electricity-Related	635.8	670.7	688.6	708.8	718.1	718.6	740.0	10.6%
CO ₂	622.7	659.1	676.9	697.8	708.7	710.7	732.4	10.5%
CH ₄	0.2	0.2	0.2	0.2	0.2	0.2	0.2	+
N ₂ O	2.5	2.6	2.8	2.8	2.8	2.8	2.9	+
SF ₆	10.5	8.8	8.8	8.0	6.4	4.9	4.5	0.1%
Transportation	1,530.5	1,655.1	1,697.9	1,711.2	1,740.2	1,816.0	1,879.7	26.8%
Direct Emissions	1,527.7	1,652.4	1,695.2	1,708.5	1,737.4	1,813.3	1,877.0	26.8%
CO ₂	1,471.8	1,579.4	1,618.7	1,628.8	1,655.0	1,728.2	1,789.5	25.6%
CH ₄	4.9	4.8	4.7	4.6	4.5	4.4	4.4	0.1%
N ₂ O	50.9	60.4	60.1	59.7	59.1	58.7	58.3	0.8%
HFCs ^b	+	7.9	11.8	15.4	18.9	22.0	24.8	0.4%
Electricity-Related	2.8	2.6	2.7	2.7	2.7	2.7	2.8	+
CO ₂	2.7	2.6	2.6	2.7	2.7	2.7	2.7	+
CH ₄	+	+	+	+	+	+	+	+
N ₂ O	+	+	+	+	+	+	+	+
SF ₆	+	+	+	+	+	+	+	+
Residential	1,131.2	1,213.1	1,270.1	1,265.6	1,266.3	1,293.5	1,357.4	19.4%
Direct Emissions	484.6	522.7	549.0	531.1	494.3	516.0	531.6	7.6%
CO ₂	340.0	372.8	401.4	386.8	353.1	372.7	387.4	5.5%
CH ₄	136.4	139.1	136.4	132.7	129.4	131.0	131.5	1.9%
N ₂ O	8.3	9.0	9.1	9.0	9.1	9.4	9.5	0.1%
HFCs	+	1.9	2.1	2.5	2.7	2.9	3.2	+
Electricity-Related	646.6	690.5	721.1	734.5	772.0	777.5	825.7	11.8%
CO ₂	633.2	678.5	708.9	723.1	761.8	768.9	817.3	11.7%
CH ₄	0.2	0.2	0.2	0.2	0.2	0.2	0.2	+
N ₂ O	2.6	2.7	2.9	2.9	3.0	3.1	3.2	+
SF ₆	10.6	9.0	9.2	8.3	6.9	5.3	5.0	0.1%
Commercial	890.7	944.9	974.3	1,022.4	1,040.0	1,057.5	1,113.8	15.9%
Direct Emissions	303.5	313.0	320.8	320.9	302.9	307.1	327.6	4.7%
CO ₂	222.5	230.8	240.1	241.6	225.0	227.9	247.6	3.5%
CH ₄	79.7	80.9	79.0	77.1	75.1	75.9	76.1	1.1%
N ₂ O	0.4	0.4	0.4	0.4	0.4	0.4	0.4	+
HFCs	0.9	0.9	1.3	1.8	2.4	2.9	3.5	+
Electricity-Related	587.1	631.9	653.5	701.5	737.0	750.4	786.2	11.2%
CO ₂	575.0	621.0	642.4	690.6	727.3	742.1	778.1	11.1%
CH ₄	0.2	0.2	0.2	0.2	0.2	0.2	0.2	+
N ₂ O	2.3	2.5	2.6	2.8	2.9	3.0	3.1	+
SF ₆	9.7	8.3	8.3	7.9	6.6	5.1	4.8	0.1%

Table 2: (continued)

Sector/Gas	1990	1995	1996	1997	1998	1999	2000	Percent ^a
Agriculture	520.5	561.8	564.3	568.2	571.4	567.0	557.7	8.0%
Direct Emissions	494.7	533.3	533.3	544.2	545.1	544.9	535.5	7.6%
CO ₂	46.3	56.9	52.0	58.3	57.6	59.9	50.4	0.7%
CH ₄	164.9	176.2	171.5	170.9	171.6	171.1	169.6	2.4%
N ₂ O	283.5	300.2	309.8	315.0	316.0	313.9	315.5	4.5%
Electricity-Related	25.8	28.5	31.0	24.1	26.2	22.0	22.2	0.3%
CO ₂	25.3	28.0	30.5	23.7	25.9	21.8	22.0	0.3%
CH ₄	+	+	+	+	+	+	+	+
N ₂ O	0.1	0.1	0.1	0.1	0.1	0.1	0.1	+
SF ₆	0.4	0.4	0.4	0.3	0.2	0.2	0.1	+
U.S. Territories	28.1	35.3	27.0	29.1	34.4	35.8	38.0	0.5%
CO ₂	28.1	35.3	27.0	29.1	34.4	35.8	38.0	0.5%
Total	6,130.7	6,481.8	6,669.8	6,748.1	6,756.2	6,829.5	7,001.2	-

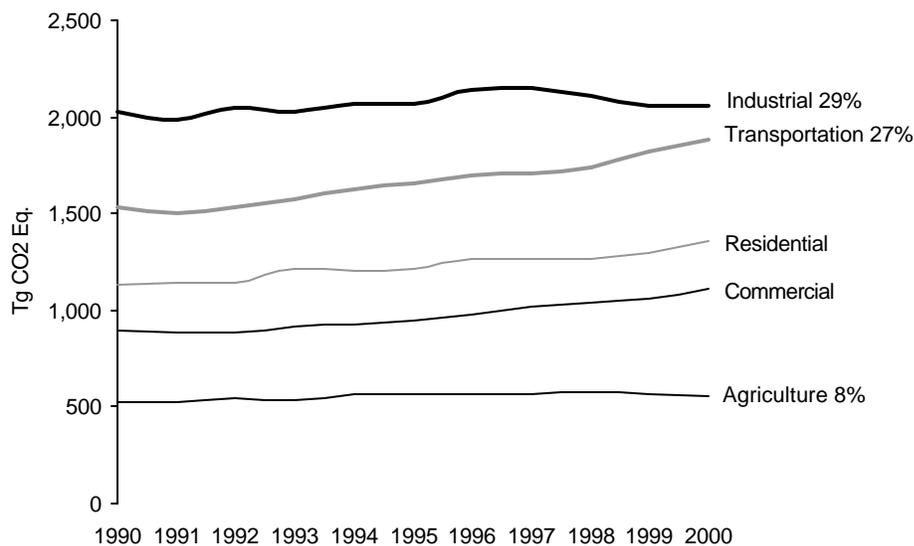
Note: Emissions from electricity generation are allocated based on aggregate electricity consumption in each end-use sector.

Totals may not sum due to independent rounding.

+ Does not exceed 0.05 Tg CO₂ Eq. or 0.05 percent.

^a Percents for year 2000.

^b Includes primarily HFC-134a.

Figure 2: Emissions with Electricity Distributed to Economic Sectors

Note: Does not include territories.

Electricity Generation

Activities related to the generation, transmission, and distribution of electricity in the United States accounted for 34 percent of total U.S. greenhouse gas emissions. Emissions from this economic sector increased by 25 percent since 1990, as electricity demand grew and fossil fuels remained the dominant energy source for generation. The electricity generation sector in the United States is composed of traditional

electric utilities as well as other entities, such as power marketers and nonutility power producers. The majority of electricity generated by these entities was through the combustion of coal in boilers to produce high pressure steam that is passed through a turbine. Table 3 provides a detailed summary of emissions from electricity generation-related activities.

Table 3: Electricity Generation-Related Greenhouse Gas Emissions (Tg CO₂ Eq.)

Gas/Fuel Type or Source	1990	1995	1996	1997	1998	1999	2000
CO₂	1,858.9	1,989.3	2,061.2	2,137.9	2,226.4	2,246.2	2,352.5
Coal	1,541.5	1,647.9	1,739.1	1,789.0	1,817.0	1,828.0	1,915.4
Natural Gas	213.8	276.8	252.5	270.4	302.9	310.4	341.9
Petroleum	103.4	64.5	69.5	78.4	106.5	107.7	95.2
Geothermal	0.2	0.1	0.1	0.1	0.1	+	+
CH₄	0.5	0.5	0.5	0.6	0.6	0.6	0.6
Stationary Sources*	0.5	0.5	0.5	0.6	0.6	0.6	0.6
N₂O	7.6	8.0	8.4	8.7	8.9	8.9	9.3
Stationary Sources*	7.6	8.0	8.4	8.7	8.9	8.9	9.3
SF₆	31.2	26.5	26.8	24.5	20.1	15.5	14.4
Electrical Transmission and Distribution	31.2	26.5	26.8	24.5	20.1	15.5	14.4
Total	1,898.2	2,024.3	2,096.9	2,171.6	2,256.1	2,271.2	2,376.9

Note: Totals may not sum due to independent rounding.

* Includes only stationary source emissions related to the generation of electricity.

+ Does not exceed 0.05 Tg CO₂ Eq.

Transportation

Transportation activities accounted 27 percent of U.S. greenhouse gas emissions. From 1990 to 2000, emissions from transportation rose by 23 percent due, in part, to increased demand for travel and the stagnation of fuel efficiency across the U.S. vehicle fleet. Since the 1970s, the number of highway vehicles registered in the United States has increased faster than the overall population, according to the Federal Highway Administration (FHWA). Likewise, the number of miles driven—up 28 percent from 1990 to 2000—and gallons of gasoline consumed each year in the United States have increased steadily since the 1980s, according to the FHWA and Energy Information Administration, respectively. These increases in motor vehicle usage are the result of a confluence of factors including

population growth, economic growth, urban sprawl, low fuel prices, and increasing popularity of sport utility vehicles and other light-duty trucks that tend to have lower fuel efficiency. A similar set of social and economic trends has led to a significant increase in air travel and freight transportation—by both air and road modes—during the 1990s.

Almost all of the energy consumed for transportation was supplied by petroleum-based products, with nearly two-thirds being related to gasoline consumption in automobiles and other highway vehicles. Other fuel uses, especially diesel fuel for freight trucks and jet fuel for aircraft, accounted for the remainder. These emissions were primarily CO₂ from fuel

Emissions by Economic Sector

combustion, which increased by 22 percent from 1990 to 2000. However, because of larger increases in HFC emissions during this period, overall emissions from transportation activities

actually increased by 23 percent. Table 4 provides a detailed summary of greenhouse gas emissions from transportation-related activities.

Table 4: Transportation-Related Greenhouse Gas Emissions (Tg CO₂ Eq.)

Gas/Vehicle Type	1990	1995	1996	1997	1998	1999	2000
CO₂	1,474.5	1,582.0	1,621.3	1,631.5	1,657.7	1,731.0	1,792.2
Passenger Cars	619.9	641.9	654.1	660.2	673.5	687.2	691.7
Light-Duty Trucks	283.1	325.3	333.5	337.3	356.4	366.5	369.4
Other Trucks	206.0	235.9	248.1	257.0	257.9	282.4	294.3
Buses	10.7	13.5	11.3	12.0	12.4	13.1	13.7
Aircraft ^a	176.9	171.4	180.2	178.9	183.0	186.7	196.5
Boats and Vessels	59.4	66.9	63.8	50.2	47.8	63.0	89.9
Locomotives	28.5	31.6	33.6	34.5	33.8	35.3	36.9
Other ^b	90.1	95.3	96.8	101.5	93.0	96.7	99.9
International Bunker Fuels ^c	113.9	101.0	102.3	109.9	112.9	105.3	100.2
CH₄	4.9	4.8	4.7	4.6	4.5	4.4	4.4
Passenger Cars	2.4	2.0	2.0	2.0	1.9	1.9	1.9
Light-Duty Trucks	1.6	1.8	1.8	1.7	1.6	1.6	1.5
Other Trucks and Buses	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Aircraft	0.2	0.1	0.1	0.2	0.1	0.2	0.2
Boats	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Locomotives	0.1	0.1	0.1	0.1	+	+	0.1
Other ^d	0.2	0.2	0.2	0.2	0.2	0.2	0.2
International Bunker Fuels ^c	0.2	0.1	0.1	0.1	0.1	0.1	0.1
N₂O	50.9	60.4	60.1	59.7	59.1	58.7	58.3
Passenger Cars	31.1	33.1	32.7	32.2	32.0	31.2	30.7
Light-Duty Trucks	14.4	21.0	20.9	21.0	20.6	20.6	20.4
Other Trucks and Buses	2.5	3.3	3.4	3.5	3.6	3.8	3.8
Aircraft	1.7	1.7	1.8	1.7	1.8	1.8	1.9
Boats	0.4	0.5	0.4	0.3	0.3	0.4	0.6
Locomotives	0.3	0.3	0.3	0.2	0.2	0.2	0.2
Other ^d	0.6	0.6	0.6	0.6	0.6	0.6	0.6
International Bunker Fuels ^c	1.0	0.9	0.9	1.0	1.0	0.9	0.9
HFCs	+	7.9	11.8	15.4	18.9	22.0	24.8
Mobile Air Conditioners ^e	+	6.7	9.8	12.9	15.7	18.2	20.4
Refrigerated Transport	+	1.2	1.9	2.5	3.2	3.8	4.4
Total	1,530.4	1,655.1	1,697.9	1,711.2	1,740.2	1,816.0	1,879.7

Note: Totals may not sum due to independent rounding.

+ Does not exceed 0.05 Tg CO₂ Eq.

^a Aircraft emissions consist of emissions from all jet fuel (less bunker fuels) and aviation gas consumption.

^b "Other" CO₂ emissions include motorcycles, construction equipment, agricultural machinery, pipelines, and lubricants.

^c Emissions from International Bunker Fuels include emissions from both civilian and military activities, but are not included in totals.

^d "Other" CH₄ and N₂O emissions include motorcycles, construction equipment, agricultural machinery, industrial equipment, and snowmobiles.

^e Includes primarily HFC-134a.

Methodology and Data Sources

In order to aggregate emissions by economic sector, source category emission estimates were generated according to the methodologies outlined in the appropriate sections of the *Inventory* report. Those emissions, then, were simply reallocated into economic sectors. In most cases, the IPCC subcategories distinctly fit into an apparent economic sector category. Several exceptions exist, and the methodologies used to disaggregate these subcategories are described below:

- *Agricultural CO₂ Emissions from Fossil Fuel Combustion, and non-CO₂ emissions from Stationary and Mobile Combustion.* Emissions from on-farm energy use were accounted for in the Energy chapter as part of the industrial and transportation end-use sectors. To calculate agricultural emissions related to fossil fuel combustion, energy consumption estimates were obtained from economic survey data from the U.S. Department of Agriculture (Duffield 2002). To avoid double counting, emission estimates of CO₂ from fossil fuel combustion and non-CO₂ from stationary and mobile sources were subtracted from the industrial economic sector, although some of these fuels may have been originally be accounted for under the transportation end-use sector.

- *Landfills and Waste Combustion.* Methane emissions from landfills, as well as CO₂ and N₂O emissions from waste combustion were allocated to the residential (56 percent), commercial (37 percent), and industrial (7 percent) economic sectors based on waste generation surveys (EPA 2000).
- *Substitution of Ozone Depleting Substances.* All greenhouse gas emissions resulting from the substitution of ozone depleting substances were placed in the industrial economic sector, with the exception of emissions from domestic, commercial, mobile and transport refrigeration/air-conditioning systems were placed in the residential, commercial, and transportation sectors, respectively. Emissions from non-MDI aerosols were attributed to the residential economic sector.

Detailed discussion on the data sources and methodologies used to estimate emissions or removals for every source or sink category is documented in the complete *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000*.

References

- Duffield, Jim (2002) Telephone and Email conversation between Caren Mintz of ICF Consulting and Jim Duffield, Office of Energy Policy and New Uses, USDA, January.
- EPA (2000) *Characterization of Municipal Solid Waste in the United States: Source Data on the 1999 Update*. Report No. EPA530-F-00-024. U.S. Environmental Protection Agency, Office of Solid Waste, EPA. Washington, DC.