

Fast Facts

U.S. Transportation Sector Greenhouse Gas Emissions 1990-2010



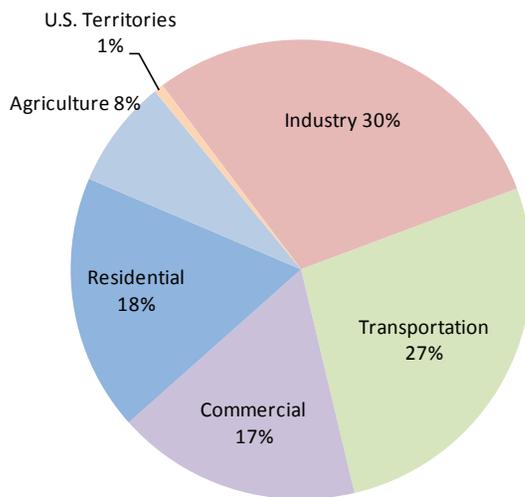
Transportation Emissions of the United States

The transportation end-use sector¹ is one of the largest contributors to U.S. greenhouse gas (GHG) emissions. According to the *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2010*, the national inventory that the U.S. prepares annually under the United Nations Framework Convention on Climate Change (UNFCCC), transportation represented 27% of total U.S. GHG emissions in 2010. Cars, trucks, commercial aircraft, and railroads, among other sources, all contribute to transportation end-use sector emissions. Within the sector, light-duty vehicles (including passenger cars and light-duty trucks) were by far the largest category, with 62% of GHG emissions, while medium- and heavy-duty trucks made up the second largest category, with 22% of emissions. Between 1990 and 2010, GHG emissions in the transportation end-use sector increased more in absolute terms than any other end-use sector (industrial, agriculture, residential, commercial).

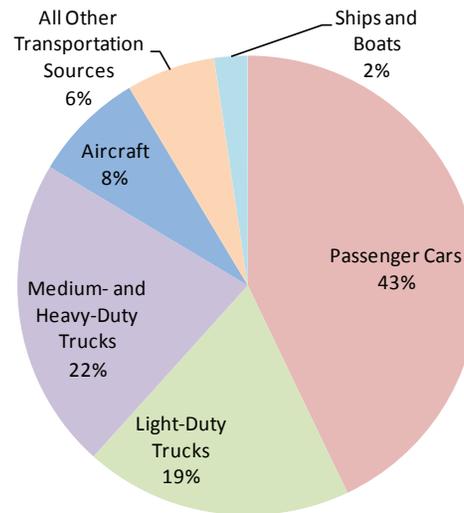
Greenhouse gas emissions from transportation sources include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and various hydrofluorocarbons (HFCs). CO₂, CH₄, and N₂O are all emitted via the combustion of fuels, while HFCs are the result of leaks and end-of-life disposal from air conditioners used to cool people and/or freight.

Mobile Sources	
Transportation	Non-Transportation Mobile
Highway Vehicles	Agricultural Equipment
Aircraft	Construction & Mining Equipment
Ships & Boats	Lawn & Garden Equipment
Rail	Logging Equipment
Pipelines	Recreational Equipment
Lubricants	

When including emissions from *non-transportation* mobile sources² such as agricultural, lawn and garden, and construction equipment, mobile sources constituted nearly a third, or 30%, of total U.S. GHG emissions in 2010. In addition, emissions have grown 20% since 1990 due in large part to increased demand for travel.

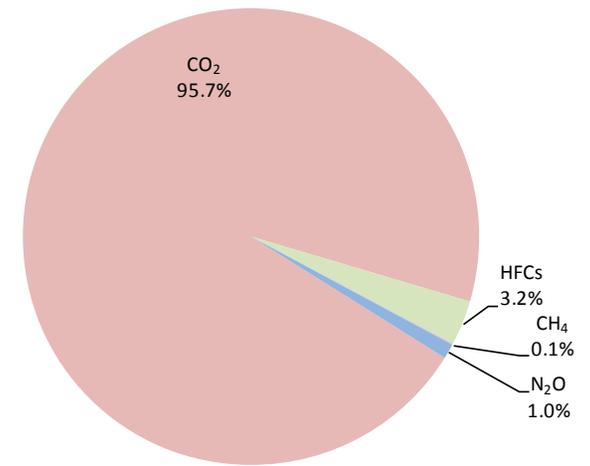


Share of U.S. GHG Emissions by End-Use Sector*



Share of U.S. Transportation End-Use Sector GHG Emissions by Source*

* Note: Totals may not add to 100% due to rounding.



Share of U.S. Transportation End-Use Sector GHG Emissions by Gas*

* Note: Totals may not add to 100% due to rounding.

¹ End use sector emissions include (1) direct emissions and (2) emissions associated with electricity generation, as allocated to the sectors in which it is used.

² CO₂ emissions from wood biomass and biofuel consumption are not included in this document. Data can be found in the Land Use, Land-Use Change, and Forestry chapter of the *Inventory*. See page 4 for more information on the *Inventory*.

U.S. Transportation GHG Emissions (Tg CO₂ Equivalent)

Change from
1990 to 2010

Source	1990	1995	2000	2005	2008	2009	2010	Absolute	Percent
On-Road Vehicles	1,235.2	1,371.3	1,575.1	1,683.0	1,603.0	1,558.4	1,556.8	321.6	26.0
Light-Duty Vehicles ³	993.9	1,082.5	1,207.4	1,260.8	1,154.0	1,148.2	1,134.3	140.3	14.1
Passenger Cars	657.4	646.0	695.3	709.6	807.0	798.7	787.9	130.5	19.9
Light-Duty Trucks	336.6	436.6	512.1	551.3	347.0	349.5	346.4	9.8	2.9
Motorcycles	1.8	1.8	1.9	1.7	4.5	4.3	3.8	2.0	114.7
Buses	8.4	9.2	11.2	12.0	17.5	16.6	16.5	8.1	97.0
Medium- and Heavy-Duty Trucks	231.1	277.8	354.6	408.5	427.1	389.3	402.3	171.1	74.0
Aircraft	181.2	175.4	204.4	198.7	158.6	142.9	143.9	-37.3	-20.6
Commercial Aviation	136.8	143.1	170.9	162.8	123.4	112.5	115.2	-21.6	-15.8
Military Aircraft	34.8	24.1	21.3	18.3	16.4	14.3	12.6	-22.1	-63.7
General Aviation	9.6	8.2	12.1	17.5	18.8	16.1	16.1	6.5	67.2
Ships and Boats	45.1	58.6	61.0	45.2	37.1	34.0	43.3	-1.8	-4.0
Rail	39.0	43.7	48.1	53.0	50.7	43.4	46.3	7.3	18.8
Pipelines	36.0	38.2	35.2	32.2	35.6	36.6	38.8	2.7	7.6
Lubricants	11.8	11.3	12.1	10.2	9.5	8.5	9.5	-2.3	-19.8
Transportation Total	1,548.3	1,698.5	1,935.8	2,022.3	1,894.6	1,823.9	1,838.6	290.2	18.7

U.S. Transportation GHG Emissions by Gas, 2010 (Tg CO₂ Equivalent)

Transportation Source	CO ₂	CH ₄	N ₂ O	HFCs	Total	Percent
On-Road Vehicles	1,482.6	1.4	16.7	56.1	1,556.8	76.2
Light-Duty Vehicles	1,073.5	1.2	15.5	44.1	1,134.3	55.5
Passenger Cars	757.5	0.9	10.9	18.6	787.9	38.6
Light-Duty Trucks	316.0	0.3	4.7	25.4	346.4	17.0
Motorcycles	3.7	0.0	0.0	0.0	3.8	0.2
Buses	16.0	0.0	0.0	0.4	16.5	0.8
Medium- and Heavy-Duty Trucks	389.3	0.2	1.1	11.6	402.3	19.7
Aircraft	142.4	0.1	1.3	0.0	143.9	7.0
Commercial Aviation	114.0	0.1	1.1	0.0	115.2	5.6
Military Aircraft	12.5	0.0	0.1	0.0	12.6	0.6
General Aviation	15.9	0.0	0.1	0.0	16.1	0.8
Ships and Boats	42.6	0.0	0.6	0.0	43.3	2.1
Rail	43.5	0.1	0.3	2.3	46.3	2.3
Pipelines	38.8	0.0	0.0	0.0	38.8	1.9
Lubricants	9.5	0.0	0.0	0.0	9.5	0.5
Transportation Total	1,759.5	1.6	19.1	58.4	1,838.5	90.0

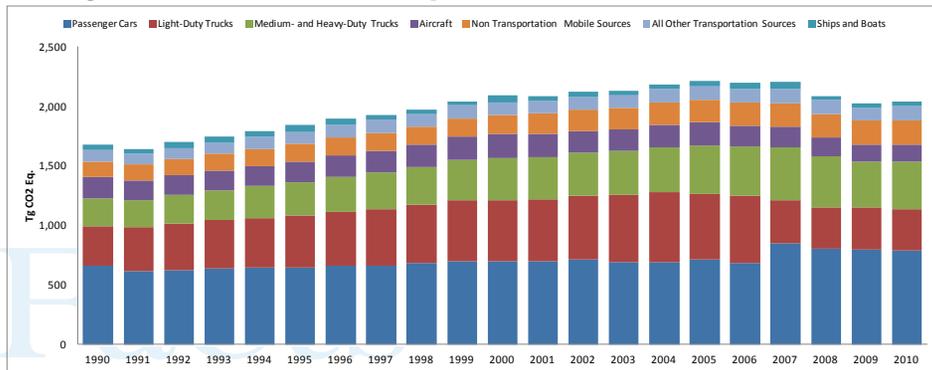
U.S. Non-Transportation Mobile GHG Emissions

Non-Transportation Mobile	128.8	146.8	158.3	190.7	194.2	197.7	204.3	75.6	58.7
Agricultural Equipment	31.4	37.0	39.2	47.3	45.9	47.2	48.2	16.8	53.5
Construction Equipment	42.4	49.4	55.8	66.5	69.9	71.2	73.6	31.2	73.7
Other Non-Transportation Mobile	55.0	60.4	63.4	76.9	78.4	79.3	82.5	27.5	50.1
Non-Transportation + Transportation Total	1,677.1	1,845.3	2,094.1	2,213.0	2,088.8	2,021.6	2,042.9	365.8	21.8

U.S. Non-Transportation Mobile GHG Emissions by Gas, 2010

Non-Transportation Mobile	202.4	0.3	1.6	0.0	204.3	10.0
Agricultural Equipment	47.6	0.1	0.4	0.0	48.2	2.4
Construction Equipment	73.0	0.1	0.6	0.0	73.6	3.6
Other Non-Transportation Mobile	81.8	0.1	0.6	0.0	82.5	4.0
Non-Transportation + Transportation Total	1,961.9	1.9	20.6	58.4	2,042.9	100.0

Change in GHG Emissions by Sector: 1990-2010



³ FHWA has changed how vehicles are classified, moving from a system based on body-type to one that is based on wheelbase. This change was incorporated for the 2010 Inventory and resulted in large changes in fuel consumption data by vehicle class, thus leading to a shift in emissions among on-road vehicle classes in the 2007-2010 time period. FHWA changed from using designations of "Passenger Cars" and "Other 2-Axle 4-Tire Vehicles" to "Light Duty Vehicles Short WB" (passenger cars, light trucks, vans, and sport utility vehicles with a wheelbase equal to or less than 121 inches), and "Light Duty Vehicles Long WB" (large passenger cars, vans, pickup trucks, and sport/utility vehicles with wheelbases larger than 121 inches).

+ Less than .05 Tg CO₂ Eq.

— Not calculated

* Note that CH₄ and N₂O emissions are not calculated for pipelines in the transportation GHG Inventory.

2010 Fuel Consumption

	Volume (Billion Gallons)	Energy (Tbtu)	CO ₂ (Tg)
MOTOR GASOLINE *	142.2	17,660.7	1,183.4
Transportation			
Light-Duty Vehicles	127.3	15,813.4	1,056.0
Passenger Cars	90.9	11,288.3	753.8
Light-Duty Trucks	36.4	4,525.2	302.2
Medium- and Heavy-Duty Trucks	5.2	650.5	43.4
Motorcycles	0.5	56.0	3.7
Buses	0.1	11.2	0.7
Recreational Boats	1.6	196.1	13.1
Non-Transportation			
Agricultural Equipment	0.7	86.0	6.1
Construction Equipment	0.7	81.6	5.8
Other Non-Transportation Mobile	6.2	765.8	54.5
DISTILLATE FUEL*	54.1	7,502.9	554.9
Transportation			
Light-Duty Vehicles	1.6	220.5	16.3
Passenger Cars	0.4	50.7	3.7
Light-Duty Trucks	1.2	169.8	12.6
Buses	1.4	189.1	14.0
Medium- and Heavy-Duty Trucks	33.7	4,669.2	345.3
Recreational Boats	0.3	47.9	3.5
Ships and Boats	0.1	9.3	0.7
Rail	3.8	528.0	39.0
Non-Transportation			
Agricultural Equipment	4.0	561.2	41.5
Construction Equipment	6.5	908.0	67.2
Other Non-Transportation Mobile	2.7	369.8	27.3
RESIDUAL FUEL OIL	2.3	337.2	25.3
Ships and Boats	2.3	337.2	25.3
JET FUEL	14.4	1,945.4	140.5
Commercial Aircraft	11.7	1,579.0	114.0
General Aviation Aircraft	1.4	193.4	14.0
Military Aircraft	1.3	173.0	12.5
AVIATION GASOLINE	0.2	27.7	1.9
General Aviation Aircraft	0.2	27.7	1.9
NATURAL GAS	—	668.7	40.1
Buses	—	22.0	1.3
Pipelines	—	646.7	38.8

	Volume (Billion Gallons)	Energy (Tbtu)	CO ₂ (Tg)
LPG	—	65.3	1.8
Light-Duty Trucks	—	45.0	1.2
Medium- and Heavy-Duty Trucks	—	20.3	0.6
Buses	—	0.0	0.0
ELECTRICITY	—	72.1	4.5
Rail	—	72.1	4.5
LUBRICANTS	—	152	9.5
Total	213.1	28,280.0	1,961.9

* Figures include ethanol blended in motor gasoline

+ Less than .05 billion gallons or Tg CO₂ as appropriate

— Not calculated

International Bunker Fuels* (Tg CO₂ Equivalent)

Change from
1990 to 2010

Source	1990	1995	2000	2005	2009	2010	Absolute	Percent
Marine Residual Fuel Oil	53.7	39.3	33.0	43.6	45.4	46.5	-7.2	-13.4
Marine Distillate Fuel Oil	11.7	9.3	6.3	9.4	8.3	8.8	-2.9	-25.1
Aviation Jet Fuel	46.4	51.2	58.8	56.8	68.6	72.5	26.1	56.3
Total	111.8	99.8	99.0	109.8	122.3	127.8	16.0	14.3

* This document includes international bunker fuels, fuels used for international transport activities by commercial aircraft and ships, although they are not included in the Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2010. See page 4 for more information on the Inventory. Fluctuations in emissions estimates from the combustion of residual fuel oil are associated with fluctuations in reported fuel consumption and may reflect data collection problems.

Additional Information

Data Sources for This Document

The source for all data in this document is the *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2010* (EPA 2012). The U.S. Environmental Protection Agency prepares the national emissions inventory annually to fulfill our commitment under the United Nations Framework Convention on Climate Change (UNFCCC), using calculation methods that are consistent with guidelines from the Intergovernmental Panel on Climate Change (IPCC). Complete information on this inventory is available at: www.epa.gov/climatechange/ghgemissions/usinventoryreport.html. The inventory methods and assumptions related to transportation and non-transportation mobile sources are available in the main body of the Inventory and Annex 3.2.

Definitions of Selected Transportation Categories



Passenger Cars:⁴ Automobiles used primarily to transport less than 10 passengers. In 2010, the average fuel economy for passenger cars was 23.49 miles per gallon (mpg), and passenger cars traveled a total of 2,025,396 million vehicle miles.



Light-Duty Trucks:⁴ Pick-up trucks, sport utility vehicles (SUVs), minivans, and similar vehicles that have a gross vehicle weight rating (GVWR) of less than 8,500 pounds. GVWR is the maximum weight a vehicle is designed to carry when passengers, fuel, cargo, and any other additions to the vehicle are accounted for. In this document, trucks with 2 axles and 4 tires (that are not otherwise categorized as passenger cars) represent the light duty truck category.



Medium- and Heavy-Duty Trucks: Vehicles with a gross vehicle weight rating (GVWR) of more than 8,500 pounds. For medium- and heavy-duty trucks, GVWR is the sum of the weight of the vehicle plus the maximum weight of the cargo that the vehicle can carry. In this document, single unit trucks (with at least 2 axles and 6 tires) and combination trucks represent the medium- and heavy-duty truck category, including tractor-trailers and box trucks used for freight transportation. In addition, this category includes some vehicles that are not typically used for freight movement such as service and utility trucks.



Pipelines: Systems that transport liquids, gases, or slurries through either above or below ground pipes. In the *Inventory*, the pipelines category includes emissions from the combustion of natural gas used to power pumps and other distribution equipment, while leaks and other emission sources from pipelines are assigned to the natural gas systems category.

Emissions Metrics

A Teragram (Tg) is equal to 1 million metric tons.

Greenhouse gas (GHG) emissions are measured in this document in terms of Teragrams of “carbon dioxide equivalent” (CO₂ Eq); an “equivalent” refers to the Global Warming Potential (GWP) of a greenhouse gas. GWP values are determined based on the chosen time horizon and properties of the gas, such as the ability to absorb radiation and its atmospheric lifetime. CO₂ has a GWP of “1”; all other greenhouse gases have GWP values relative to that of CO₂. For example, methane (CH₄) has a radiative forcing value⁵ or GWP of 21, which means that releasing one ton of CH₄ is equivalent to releasing 21 tons of CO₂.

The data in this document is based on the 100-year time horizon GWP values from the Intergovernmental Panel on Climate Change’s (IPCC’s) Second Assessment Report, in accordance with UNFCCC reporting guidelines for national GHG inventories. More information on greenhouse gases, radiative forcing, and GWPs can be found in the sources listed below.

Additional GWP Information Sources

www.epa.gov/climatechange/index.html

www.global-greenhouse-warming.com/global-warming-potential.html

www.epa.gov/highgwp/

⁴ FHWA has changed how vehicles are classified, moving from a system based on body-type to one that is based on wheelbase. This change was incorporated for the 2010 Inventory and resulted in large changes in fuel consumption data by vehicle class, thus leading to a shift in emissions among on-road vehicle classes in the 2007-2010 time period. FHWA changed from using designations of “Passenger Cars” and “Other 2-Axle 4-Tire Vehicles” to “Light Duty Vehicles Short WB” (passenger cars, light trucks, vans, and sport utility vehicles with a wheelbase equal to or less than 121 inches), and “Light Duty Vehicles Long WB” (large passenger cars, vans, pickup trucks, and sport/utility vehicles with wheelbases larger than 121 inches).

⁵ Radiative forcing is a measure of the influence a factor has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system and is an index of the importance of the factor as a potential climate change mechanism (www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)