

Fast Facts

U.S. Transportation Sector Greenhouse Gas Emissions 1990-2013



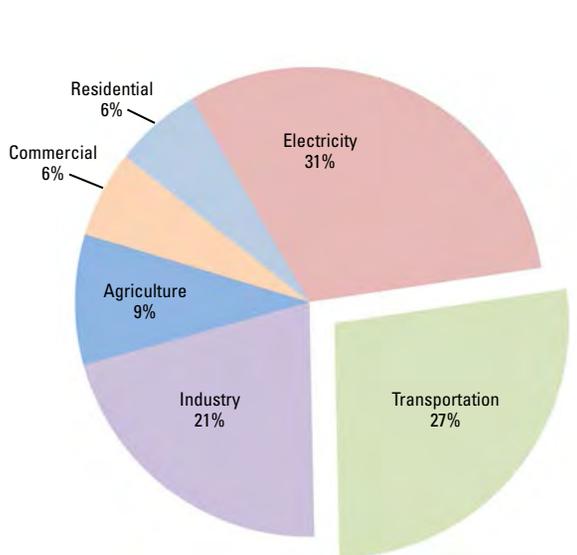
Transportation Emissions of the United States

The transportation sector 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 1990-2013* (the Inventory), 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 2013. 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 60% of GHG emissions, while medium- and heavy-duty trucks made up the second largest category, with 23% of emissions. Between 1990 and 2013, GHG emissions in the transportation sector increased more in absolute terms than any other sector (i.e. electricity generation, industry, agriculture, residential, or 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.

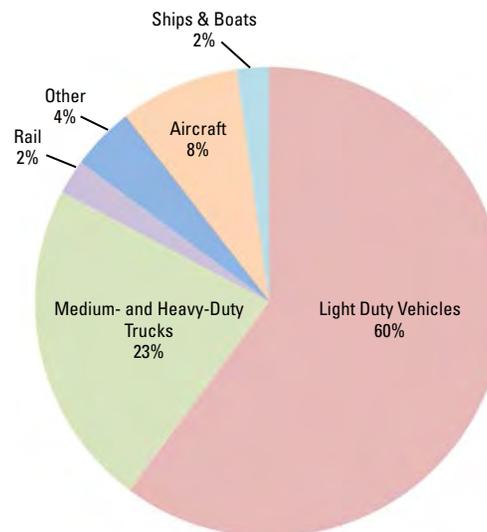
Mobile Sources	
Transportation	Non-Transportation Mobile
Highway Vehicles	Agricultural Equipment
Aircraft	Construction & Mining Equipment
Ships & Boats	Lawn & Garden Equipment
Rail	Logging Equipment
Lubricants	Recreational Equipment
Pipelines ¹	

When including emissions from *non-transportation* mobile sources such as agricultural, lawn and garden, and construction equipment, mobile sources constituted nearly a third, or 30%, of total U.S. GHG emissions in 2013.² Mobile source emissions have grown 20% since 1990 due in large part to increased demand for travel.



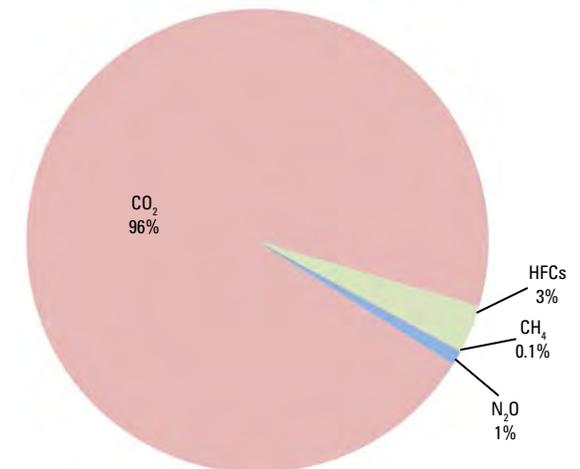
Share of U.S. GHG Emissions by Sector^{3,4}

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



Share of U.S. Transportation Sector GHG Emissions by Source^{4,5}

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



Share of U.S. Transportation Sector GHG Emissions by Gas⁴

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

¹ Pipeline emissions in the transportation sector include only CO₂ from the combustion of natural gas at compressor stations that power natural gas pipelines, not emissions from electricity use, non-CO₂ gases, or other types of pipeline equipment. Note that natural gas pipeline compressor stations are stationary equipment that are included in the transportation sector, but are not considered mobile sources.

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.

³ For presentation purposes, emissions from territories are not shown in this chart although they are included in the total emissions used to

calculate the percentage share of emissions from each sector. See Table ES-6 in the Executive Summary of the Inventory for official data. See page 4 for more information on the Inventory.

⁴ "Transportation" emissions in these pie charts include CO₂, N₂O, CH₄, and HFCs from transportation sources like highway vehicles, aircraft, ships and boats, rail, pipelines and lubricants. They do not include emissions from non-transportation mobile sources such as agriculture and construction equipment.

⁵ "Other" sources include buses, motorcycles, pipelines, and lubricants.

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

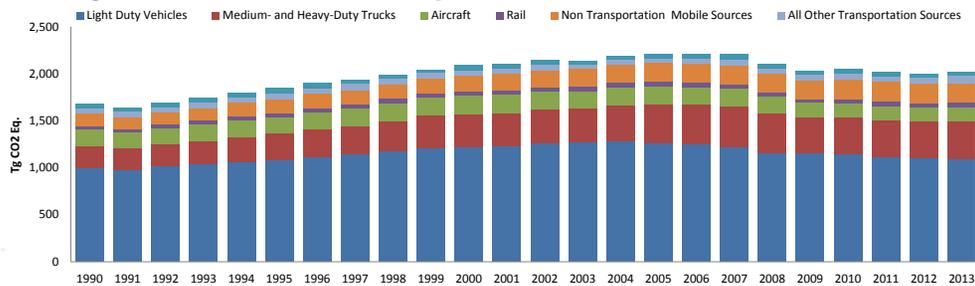
Change from
1990 to 2013

Source	1990	1995	2000	2005	2010	2012	2013	Absolute	Percent
On-Road Vehicles⁶	1,233.5	1,372.7	1,584.6	1,688.1	1,555.2	1,517.6	1,516.6	283.1	23.0
Light-Duty Vehicles	992.2	1,083.6	1,215.6	1,264.5	1,132.6	1,094.1	1,086.7	94.5	9.5
Passenger Cars	656.6	646.7	699.6	711.2	783.6	768.0	763.3	106.6	16.2
Light-Duty Trucks	335.6	436.8	516.0	553.3	349.0	326.2	323.4	-12.2	-3.6
Motorcycles	1.8	1.8	1.9	1.7	3.7	4.2	4.0	2.2	123.0
Buses	8.4	9.2	11.2	12.1	15.9	18.0	18.3	9.9	118.4
Medium- and Heavy-Duty Trucks	231.1	278.1	355.8	409.8	403.0	401.4	407.7	176.6	76.4
Aircraft	189.1	176.7	199.4	193.6	154.8	146.5	150.0	-39.1	-20.7
Commercial Aviation	110.9	116.3	140.6	133.9	114.3	114.3	115.4	4.5	4.0
Military Aircraft	35.3	24.5	22.8	19.5	13.7	12.2	11.1	-24.2	-68.6
General Aviation	42.9	35.8	35.9	40.1	26.7	19.9	23.6	-19.3	-45.0
Ships and Boats	44.9	58.6	61.3	45.2	45.0	40.4	39.6	-5.3	-11.8
Rail	35.8	40.6	44.9	48.5	41.9	42.8	43.4	7.6	21.2
Pipelines⁷	36.0	38.2	35.2	32.2	37.1	40.3	47.7	11.7	32.5
Lubricants	11.8	11.3	12.1	10.2	9.5	8.3	8.8	-3.1	-25.9
Transportation Total	1,551.3	1,698.1	1,937.4	2,017.7	1,843.5	1,795.9	1,806.2	255.0	16.4

U.S. Non-Transportation Mobile GHG Emissions

Non-Transportation Mobile	128.8	146.8	158.4	190.5	202.5	207.8	213.1	84.3	65.5
Agricultural Equipment	31.4	37.0	39.2	47.3	48.0	51.3	50.2	18.8	60.0
Construction Equipment	42.4	49.4	55.8	66.4	73.5	76.3	81.7	39.3	92.7
Other Non-Transportation Mobile	55.0	60.4	63.4	76.7	81.1	80.3	81.2	26.2	47.6
Non-Transportation + Transportation Total	1,680.0	1,844.9	2,095.8	2,208.2	2,046.1	2,003.7	2,019.3	339.3	20.2

Change in GHG Emissions by Sector: 1990-2013



U.S. Transportation GHG Emissions by Gas, 2013 (Tg CO₂ Equivalent)

Source	CO ₂	CH ₄	N ₂ O	HFCs	Total	Percent
On-Road Vehicles⁶	1,442.7	1.6	14.5	57.8	1,516.6	75.1
Light-Duty Vehicles	1,028.0	1.4	13.3	44.0	1,086.7	53.8
Passenger Cars	735.5	1.1	9.4	17.3	763.3	37.8
Light-Duty Trucks	292.4	0.3	3.9	26.7	323.4	16.0
Motorcycles	3.9	0.0	0.0	0.0	4.0	0.2
Buses	17.7	0.0	0.1	0.4	18.3	0.9
Medium- and Heavy-Duty Trucks	393.2	0.1	1.1	13.3	407.7	20.2
Aircraft	148.7	0.0	1.4	0.0	150.0	7.4
Commercial Aviation	114.3	0.0	1.1	0.0	115.4	5.7
Military Aircraft	11.0	0.0	0.1	0.0	11.1	0.5
General Aviation	23.4	0.0	0.2	0.0	23.6	1.2
Ships and Boats	38.9	0.0	0.7	0.0	39.6	2.0
Rail	40.4	0.1	0.3	2.6	43.4	2.2
Pipelines⁷	47.7	0.0	0.0	0.0	47.7	2.4
Lubricants	8.8	0.0	0.0	0.0	8.8	0.4
Transportation Total	1,727.2	1.7	16.8	60.5	1,806.2	89.4

Rail Electricity	4.01	0.00	0.04	0.00	4.04	NA
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U.S. Non-Transportation Mobile GHG Emissions by Gas, 2013

Non-Transportation Mobile	211.1	0.4	1.6	0.0	213.1	10.6
Agricultural Equipment	49.7	0.2	0.4	0.0	50.2	2.5
Construction Equipment	81.0	0.1	0.6	0.0	81.7	4.0
Other Non-Transportation Mobile	80.5	0.1	0.6	0.0	81.2	4.0
Non-Transportation + Transportation Total	1,938.3	2.1	18.4	60.5	2,019.3	100.0

⁶ GHG emissions and vehicle miles traveled (VMT) estimates for on-road vehicles presented in the Inventory are based on FHWA data. FHWA changed its methods for estimating (VMT) and related data in 2011. These methodological changes included how vehicles are classified, moving from a system based on body-type to one that is based on wheelbase. These changes were first incorporated for the 2010 Inventory and apply to the 2007-13 time period. This resulted in large changes in VMT and fuel consumption data by vehicle class, thus leading to a shift in emissions among on-road vehicle classes. For instance, "passenger car" has been replaced by "light duty vehicles short WB" and "other 2-axle 4-tire vehicles" has been replaced by "light duty vehicles long WB."

⁷ Includes only CO₂ from natural gas used to power natural gas pipelines, does not include emissions from electricity use or non-CO₂ gases.

2013 Fuel Consumption

	Volume (Billion Gallons)	Energy (Tbtu)	CO ₂ (Tg)
MOTOR GASOLINE	127.9	15,868.7	1,131.9
Transportation⁸			
Light-Duty Vehicles	113.8	14,145.6	1,009.1
Passenger Cars	82.5	10,253.2	731.5
Light-Duty Trucks	31.3	3,892.4	277.7
Medium- and Heavy-Duty Trucks	4.5	553.9	39.5
Motorcycles	0.4	54.4	3.9
Buses	0.1	11.7	0.8
Recreational Boats	1.4	174.3	12.4
Non-Transportation⁹			
Agricultural Equipment	0.7	78.9	5.6
Construction Equipment	1.1	130.9	9.3
Other Non-Transportation Mobile	6.0	719.0	51.1
DISTILLATE FUEL¹⁰	56.8	7,878.7	582.7
Transportation⁸			
Light-Duty Vehicles	1.7	230.6	17.1
Passenger Cars	0.4	55.2	4.1
Light-Duty Trucks	1.3	175.4	13.0
Buses	1.5	214.2	15.8
Medium- and Heavy-Duty Trucks	34.4	4,772.5	353.0
Recreational Boats	0.4	50.2	3.7
Ships and Boats	0.7	103.7	7.7
Rail	3.9	546.4	40.4
Non-Transportation⁹			
Agricultural Equipment	4.3	595.5	44.0
Construction Equipment	7.0	968.7	71.6
Other Non-Transportation Mobile	2.9	396.9	29.4
RESIDUAL FUEL OIL	1.3	200.4	15.0
Ships and Boats	1.3	200.4	15.0
JET FUEL	15.1	2,036.9	147.1
Commercial Aircraft	12.0	1,624.2	114.3
General Aviation Aircraft	2.0	274.4	21.8
Military Aircraft	1.0	138.3	11.0

	Volume (Billion Gallons)	Energy (Tbtu)	CO ₂ (Tg)
AVIATION GASOLINE	0.2	22.4	1.5
General Aviation Aircraft	0.2	22.4	1.5
NATURAL GAS	—	920.3	48.8
Buses	—	19.7	1.0
Pipelines	—	900.5	47.7
LPG	—	40.3	2.5
Light-Duty Trucks	—	28.8	1.8
Medium- and Heavy-Duty Trucks	—	11.5	0.7
Buses	—	0.0	0.0
LUBRICANTS	—	130.4	8.8
Total	201.3	27,097.9	1,938.3

<i>Biodiesel¹¹</i>	1.4	179.1	0.0
<i>Ethanol¹¹</i>	12.6	1,071.5	0.0

⁸ Fuel consumption, energy, and CO₂ emissions from transportation sources exclude biofuels.

⁹ Non-transportation mobile fuel consumption, energy, and CO₂ are estimated based on EPA's NONROAD model (see epa.gov/otaq/nonrdmdl.htm, last accessed). Because the fuel composition in the NONROAD model is intended to reflect real-world usage, these estimates may include low-level ethanol blends. Note that these estimates are presented here and in Annex 3.2 of the Inventory for informational purposes, but that non-transportation mobile sources are officially accounted for in other energy sectors in the Inventory (e.g., the industrial sector) and the CO₂ estimates for those energy sectors do not include emissions from biofuels.

¹⁰ Energy values for distillate fuel oil consumption by transportation and non-transportation mobile sources are calculated using a heat content factor from EIA's *Monthly Energy Review*. The values shown in the table, which match those in the Inventory, use an older heat content for distillate fuel oil of 5.825 MMBtu/barrel. Using EIA's updated annually-variable heat content factor of 5.774 MMBtu/barrel for 2013 would slightly lower these energy consumption estimates and the corresponding CO₂ values. Note that the fuel consumption estimates shown in the first column are unaffected by this change.

¹¹ Biofuels are presented as line items below the total for informational purposes only, in line with IPCC methodological guidance and UNFCCC reporting obligations. CO₂ emissions from the combustion of biofuels are not directly included in the energy sector contribution (which includes the contribution of transportation and non-transportation mobile sources) to U.S. totals in the Inventory; instead, net carbon fluxes from changes in biogenic carbon reservoirs are accounted in the estimates for Land Use, Land-Use Change, and Forestry in the Inventory. See page 4 for more information on the Inventory.

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 1990-2013* (the Inventory) (EPA 2015). The U.S. Environmental Protection Agency prepares the national emissions inventory annually to fulfill the U.S. 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 as well as Annex 3.2 of the Inventory.

Inventory Definitions of Selected Transportation Categories¹²

Light-Duty Vehicles: passenger cars and light-duty trucks



Passenger Cars:¹³ automobiles used primarily to transport 12 people or less. In 2013, passenger cars traveled a total of 2,074,458 million vehicle miles.



Light-Duty Trucks:¹³ vehicles used primarily for transporting light-weight cargo or which are equipped with special features such as four-wheel drive for off-road operation. In the U.S., this category also includes many vehicles that primarily transport passengers such as sport utility vehicles (SUVs) and minivans. The gross vehicle weight rating (GVWR) normally ranges around 8,500 pounds or less. 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 2013, light-duty trucks traveled a total of 603,313 million vehicle miles.



Medium- and Heavy-Duty Trucks:¹³ vehicles with GVWR of more than around 8,500 pounds. In the Inventory, single unit trucks 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. In 2013, medium- and heavy-duty trucks traveled a total of 290,185 million vehicle miles.



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 its 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 value¹⁴ or GWP of 25, which means that releasing one ton of CH₄ is equivalent to releasing 25 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) Fourth Assessment Report, in accordance with UNFCCC reporting guidelines for national GHG inventories. More information on greenhouse gases and GWP is available at: www.epa.gov/climatechange/ghgemissions/gases.html.

¹² The data used to estimate emissions for specific transportation categories may not directly align with the Inventory’s definition of the categories; both the data and Inventory definitions may also differ from EPA’s regulatory definitions for the same categories.

¹³ GHG emissions and vehicle miles traveled (VMT) estimates for on-road vehicles presented in the Inventory are based on FHWA data. FHWA changed its methods for estimating (VMT) and related data in 2011. These methodological changes included how vehicles are classified, moving from a system based on body-type to one that is based on wheelbase. These changes were first incorporated for the 2010 Inventory and apply to the 2007-13 time period. This resulted in large changes in VMT and fuel consumption data by vehicle class, thus leading to a shift in emissions among on-road vehicle classes. For instance, “passenger car” has been replaced by “light duty vehicles short WB” and “other 2-axle 4-tire vehicles” has been replaced by “light duty vehicles long WB.”

¹⁴ 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).