

Fast Facts

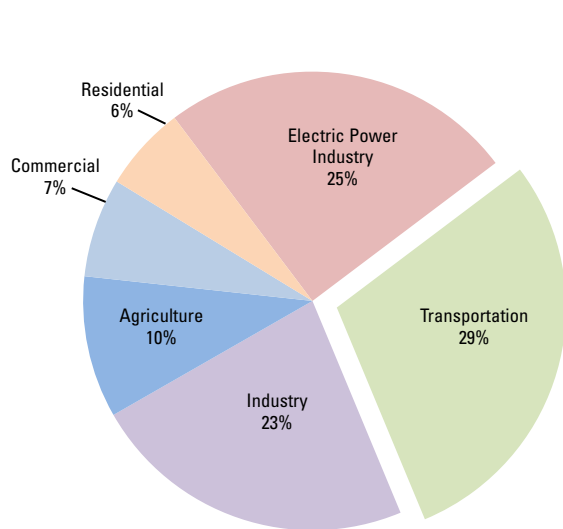
U.S. Transportation Sector Greenhouse Gas Emissions 1990–2021



Transportation Emissions of the United States

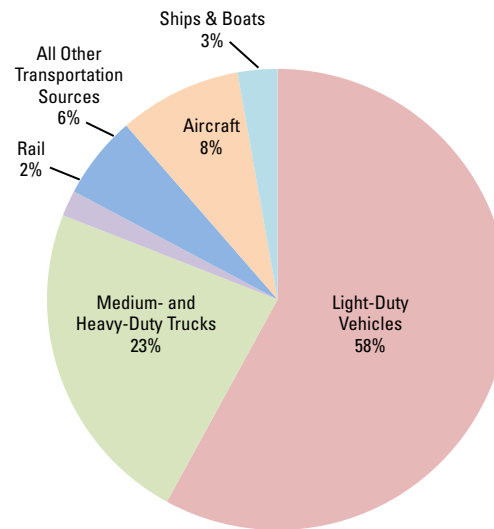
The transportation sector is one of the largest contributors to anthropogenic greenhouse gas (GHG) emissions in the United States. According to the *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2021* (the Inventory), the national inventory that the U.S. prepares annually under the United Nations Framework Convention on Climate Change (UNFCCC), the transportation sector accounted for the largest portion (29%) of total U.S. GHG emissions in 2021. 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 58% of GHG emissions, while medium- and heavy-duty trucks made up the second largest category, with 23% of emissions. Between 1990 and 2021, GHG emissions in the transportation sector increased more in absolute terms than any other sector (i.e., electricity generation, industry, agriculture, residential, commercial), due in large part to increased demand for travel.

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 HFC emissions are the result of leaks and end-of-life disposal from air conditioners used to cool people and/or freight.²



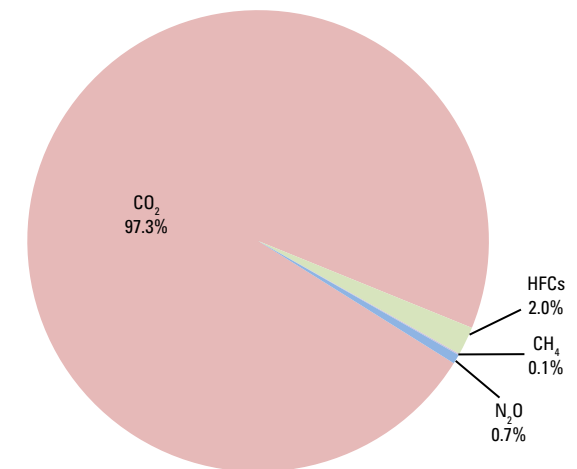
Share of U.S. GHG Emissions by Economic Sector, 2021^{3,4}

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



Share of U.S. Transportation Sector GHG Emissions by Source, 2021^{4,5}

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



Share of U.S. Transportation Sector GHG Emissions by Gas, 2021⁴

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

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 32% of total U.S. GHG emissions in 2021.

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 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.

³ For presentation purposes, emissions from territories which constitute less than 1% of the total U.S. GHG emissions, 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-5 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 domestic transportation sources like highway vehicles, aircraft, ships and boats, rail, pipelines and lubricants. They do not include emissions from international bunker fuel use by aircraft and ships or 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 2021

Source	1990	2005	2017	2018	2019	2020	2021	Absolute	Percent
On-Road Vehicles	1,202.0	1,637.9	1,535.1	1,557.9	1,549.1	1,374.1	1,496.4	294.4	24.5
Passenger Cars	648.4	564.4	392.7	398.7	395.5	341.7	374.2	-274.2	-42.3
Light-Duty Trucks	302.5	659.5	716.2	720.6	711.8	615.4	671.8	369.4	122.1
Motorcycles	3.4	5.0	7.2	7.4	7.5	6.7	7.5	4.1	120.9
Buses	13.4	17.7	23.4	24.4	24.8	23.6	25.7	12.3	91.5
Medium- and Heavy-Duty Trucks	234.3	391.3	395.6	406.7	409.5	386.7	417.1	182.9	78.0
Aircraft	188.8	193.3	174.6	175.3	183.4	123.0	155.4	-33.4	-17.7
Commercial Aviation	110.8	133.8	129.0	130.7	137.8	92.0	120.0	9.2	8.3
Military Aircraft	36.0	19.9	12.6	12.2	12.3	11.8	12.6	-23.4	-65.0
General Aviation	42.0	39.6	32.9	32.4	33.3	19.2	22.8	-19.1	-45.6
Ships and Boats	47.0	45.5	43.8	41.1	40.0	32.4	50.2	3.3	6.9
Rail	39.0	51.4	41.3	42.5	39.7	34.0	35.2	-3.7	-9.6
Pipelines⁶	36.0	32.6	41.6	50.2	58.2	57.9	64.2	28.2	78.4
Lubricants	11.8	10.2	9.6	9.2	8.8	7.8	8.0	-3.9	-32.6
Transportation Total	1,524.6	1,970.9	1,846.0	1,876.2	1,879.2	1,629.2	1,809.5	284.9	18.7

U.S. Transportation GHG Emissions by Gas, 2021 (Tg CO₂ Equivalent)

Source	CO ₂	CH ₄	N ₂ O	HFCs	Total	Percent
On-Road Vehicles	1,459.4	1.0	9.4	26.6	1,496.4	74.3
Passenger Cars	365.0	0.3	1.9	7.0	374.2	18.6
Light-Duty Trucks	654.0	0.5	4.2	13.0	671.8	33.3
Motorcycles	7.4	0.0	0.1	0.0	7.5	0.4
Buses	25.1	0.0	0.2	0.4	25.7	1.3
Medium- and Heavy-Duty Trucks	407.8	0.1	3.0	6.3	417.1	20.7
Aircraft	154.1	0.0	1.3	0.0	155.4	7.7
Commercial Aviation	119.0	0.0	1.0	0.0	120.0	6.0
Military Aircraft	12.5	0.0	0.1	0.0	12.6	0.6
General Aviation	22.6	0.0	0.2	0.0	22.8	1.1
Ships and Boats	45.0	0.5	0.3	4.5	50.2	2.5
Rail	34.7	0.1	0.3	0.1	35.2	1.7
Pipelines⁶	64.2	0.0	0.0	0.0	64.2	3.2
Lubricants	8.0	0.0	0.0	0.0	8.0	0.4
Transportation Total	1,765.4	1.5	11.2	31.2	1,809.5	89.8

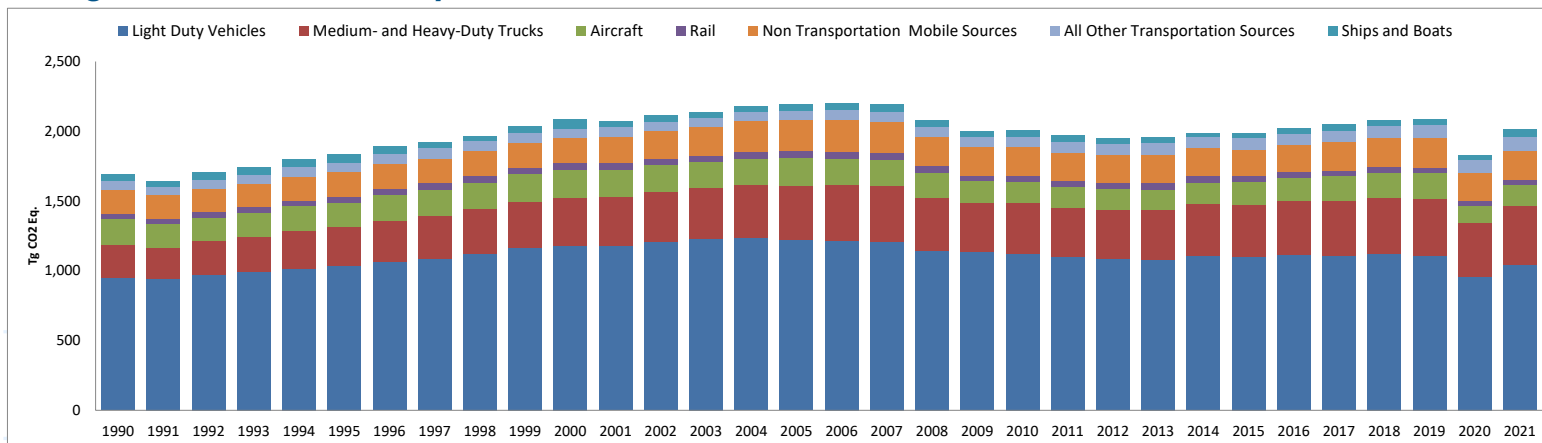
U.S. Non-Transportation Mobile GHG Emissions

Non-Transportation Mobile ⁷	1990	2005	2017	2018	2019	2020	2021	Absolute	Percent
Non-Transportation Mobile⁷	166.9	224.2	201.4	207.0	210.9	200.6	205.5	38.7	23.2
Agricultural Equip.	44.7	52.5	41.4	41.1	40.9	39.8	37.6	-7.1	-15.9
Construction Equip.	50.2	78.3	66.9	70.0	72.2	68.0	71.2	21.0	41.8
Other	71.9	93.4	93.5	96.0	97.9	92.8	96.7	24.8	34.5
Non-Transportation + Transportation Total	1,691.4	2,195.0	2,047.4	2,083.2	2,090.2	1,829.8	2,015.0	323.6	19.1

U.S. Non-Transportation Mobile GHG Emissions by Gas, 2021

Non-Transportation Mobile ⁷	CO ₂	CH ₄	N ₂ O	HFCs	Total	Percent
Non-Transportation Mobile⁷	198.9	1.1	5.6	0.0	205.5	10.2
Agricultural Equip.	36.5	0.1	1.0	0.0	37.6	1.9
Construction Equip.	69.3	0.2	1.7	0.0	71.2	3.5
Other	93.1	0.7	2.9	0.0	96.7	4.8
Non-Transportation + Transportation Total	1,964.3	2.6	16.7	31.2	2,015.0	100.0

Change in GHG Emissions by Source: 1990–2021



⁶ Includes only CO₂ from natural gas used to power natural gas pipelines; does not include emissions from electricity use or non-CO₂ gases.

⁷ Note: non-transportation mobile source CO₂ emissions estimates are presented here and in Annex 3.2 of the Inventory for informational purposes, but these emissions are officially accounted for in the industrial and commercial sectors of the Inventory. See Annex 3.2 of the Inventory for more information.

2021 Fuel Consumption

	Volume (billion gallons unless otherwise specified)	Energy (Tbtu)	CO ₂ (Tg)
MOTOR GASOLINE	122.9	15,255.0	1,077.8
Transportation⁸			
Passenger Cars	41.0	5,102.4	360.5
Light-Duty Trucks	70.6	8,774.3	619.9
Medium- and Heavy-Duty Trucks	3.1	387.7	27.4
Motorcycles	0.8	104.8	7.4
Buses	0.3	40.4	2.9
Recreational Boats	1.2	149.4	10.6
Non-Transportation Mobile⁹			
Agricultural Equipment	0.1	16.2	1.1
Construction Equipment	0.4	46.8	3.3
Other Non-Transportation Mobile	5.3	633.1	44.6
DISTILLATE FUEL	59.6	8,263.2	612.5
Transportation⁸			
Passenger Cars	0.3	36.6	2.7
Light-Duty Trucks	3.2	449.6	33.3
Buses	2.1	289.3	21.4
Medium- and Heavy-Duty Trucks	37.0	5,127.5	380.1
Recreational Boats	0.3	37.9	2.8
Ships and Non-Recreational Boats	0.8	105.1	7.8
Rail	3.1	434.3	32.2
Non-Transportation Mobile⁹			
Agricultural Equipment	3.4	475.5	35.2
Construction Equipment	6.4	884.1	65.5
Other Non-Transportation Mobile	3.1	423.4	31.4
RESIDUAL FUEL OIL	2.1	318.1	23.9
Ships and Boats	2.1	318.1	23.9
JET FUEL	15.7	2,113.6	152.6
Commercial Aircraft	12.5	1,691.2	119.0
General Aviation Aircraft	2.0	265.4	21.1
Military Aircraft	1.2	157.0	12.5
AVIATION GASOLINE	0.2	21.6	1.5
General Aviation Aircraft	0.2	21.6	1.5
ELECTRICITY (Billion Kilowatt hours)	12.9	43.9	5.0
Transportation			
Passenger Cars	4.5	15.5	1.8
Light-Duty Trucks	1.8	6.1	0.7
Buses	0.2	0.7	0.1
Rail	6.3	21.6	2.5

	Volume (billion gallons unless otherwise specified)	Energy (Tbtu)	CO ₂ (Tg)
NATURAL GAS (billion cubic feet)	1,234.8	1,280.5	67.7
Transportation			
Passenger Cars	0.0	0.0	0.0
Light-Duty Trucks	0.2	0.2	0.0
Medium- and Heavy-Duty Trucks	2.2	2.2	0.1
Buses	13.4	13.9	0.7
Pipelines	1,170.5	1,213.8	64.2
Non-Transportation Mobile⁹			
Agricultural Equipment	1.4	1.4	0.1
Construction Equipment	6.2	6.5	0.3
Other Non-Transportation Mobile	40.9	42.4	2.2
LPG	2.7	243.0	15.3
Transportation			
Passenger Cars	0.0	0.0	0.0
Light-Duty Trucks	0.0	0.8	0.1
Medium- and Heavy-Duty Trucks	0.0	3.6	0.2
Buses	0.0	0.2	0.0
Non-Transportation Mobile⁹			
Agricultural Equipment	0.0	0.0	0.0
Construction Equipment	0.0	2.4	0.2
Other Non-Transportation Mobile	2.6	235.9	14.8
LUBRICANTS	0.0	1.0	8.0
Total¹⁰	213.5	27,539.8	1,964.3

BIOFUELS¹¹	14.7	1,319.7	91.5
Transportation			
<i>Biodiesel</i>	1.7	218.0	16.1
<i>Ethanol</i>	13.0	1,101.7	75.4

⁸ Excludes contributions from biofuels.

⁹ Non-transportation mobile fuel consumption, energy, and CO₂ are estimated in part by the MOVES-Nonroad model (see www.epa.gov/moves). Fuel consumption in MOVES-Nonroad is intended to reflect real-world usage and may include low-level ethanol blends. Note that non-transportation mobile source CO₂ estimates are presented here and in Annex 3.2 of the Inventory for informational purposes, but these emissions are officially accounted for in the industrial and commercial sectors of the Inventory and do not include emissions from biofuels.

¹⁰ Total Volume is the sum of physical (billion) gallons of fuel; because natural gas volumes are reported as million cubic feet, natural gas volumes are converted to billion gallons of gasoline equivalent for the Total Volume (billion gallons) sum in this table.

¹¹ Biofuels are presented as line items for informational purposes only, in line with IPCC methodological guidance and UNFCCC reporting obligations. Biofuel estimates only reflect transportation sources and do not include biofuels used in non-transportation mobile sources, e.g., ethanol used in commercial or industrial applications. CO₂ emissions from the combustion of biofuels are not directly included in the energy sector (which includes transportation sources) of 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 1990–2021* (EPA 2023). The U.S. Environmental Protection Agency prepares the 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 the inventory is available at: www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks. 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



Passenger Cars: automobiles used primarily to transport 12 people or less. In 2021, passenger cars traveled a total of 1,102,799 million vehicle miles.



Light-Duty Trucks: 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 2021, light-duty trucks traveled a total of 1,492,200 million vehicle miles.



Medium- and Heavy-Duty Trucks: 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 2021, medium- and heavy-duty trucks traveled a total of 317,245 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 value or GWP of 28, which means that releasing one ton of CH₄ is equivalent to releasing 28 tons of CO₂.

The data in this document is based on the 100-year time horizon GWP values from the IPCC’s *Fifth Assessment Report*¹³, in accordance with UNFCCC reporting guidelines for national GHG inventories. More information on greenhouse gases and GWP is available at: www.epa.gov/ghgemissions/overview-greenhouse-gases.

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 IPCC (2013) *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. [Stocker, T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.