

# Fast Facts

## U.S. Transportation Sector Greenhouse Gas Emissions 1990-2011



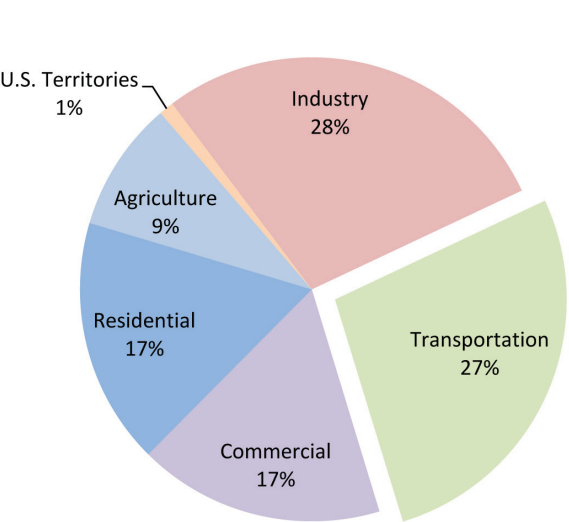
## Transportation Emissions of the United States

The transportation end-use sector<sup>1</sup> 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 1990-2011* (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 2011. 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 61% of GHG emissions, while medium- and heavy-duty trucks made up the second largest category, with 22% of emissions. Between 1990 and 2011, 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 (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and various hydrofluorocarbons (HFCs). CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O 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.

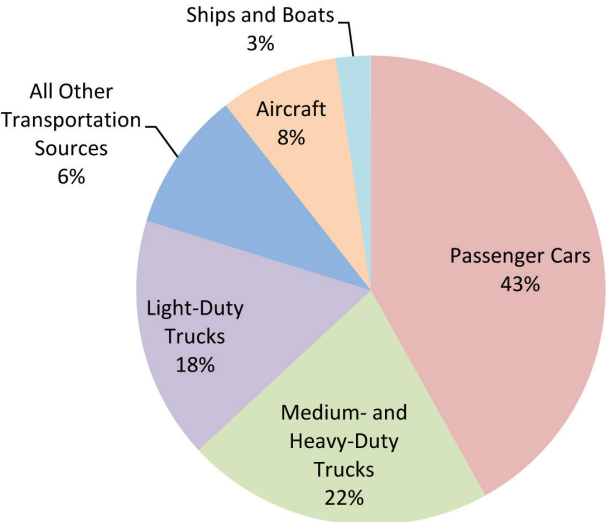
Mobile Sources	
Transportation	Non-Transportation Mobile
Highway Vehicles	Agricultural Equipment
Aircraft	Construction & Mining Equipment
Ships & Boats	Lawn & Garden Equipment
Rail	Logging Equipment
Pipelines <sup>2</sup>	Recreational Equipment
Lubricants	

When including emissions from *non-transportation* mobile sources<sup>3</sup> such as agricultural, lawn and garden, and construction equipment, mobile sources constituted nearly a third, or 30%, of total U.S. GHG emissions in 2011. In addition, mobile source emissions have grown 21% since 1990 due in large part to increased demand for travel.



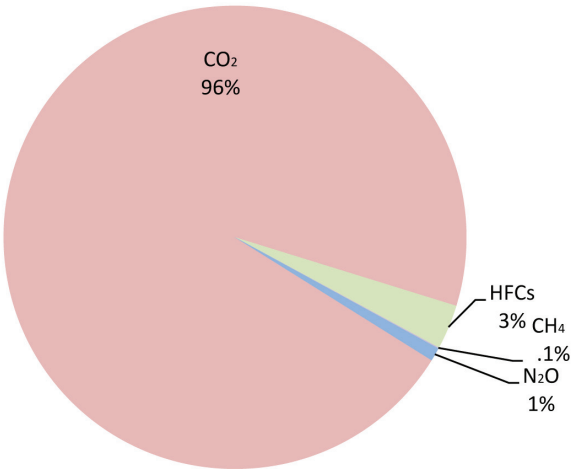
Share of U.S. GHG Emissions by End-Use Sector\*

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



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.

<sup>1</sup> 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.

<sup>2</sup> Includes only CO<sub>2</sub> from natural gas used to power natural gas pipelines, does not include emissions from electricity use or non-CO<sub>2</sub> gases.

<sup>3</sup> CO<sub>2</sub> 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 CO<sub>2</sub> Equivalent)

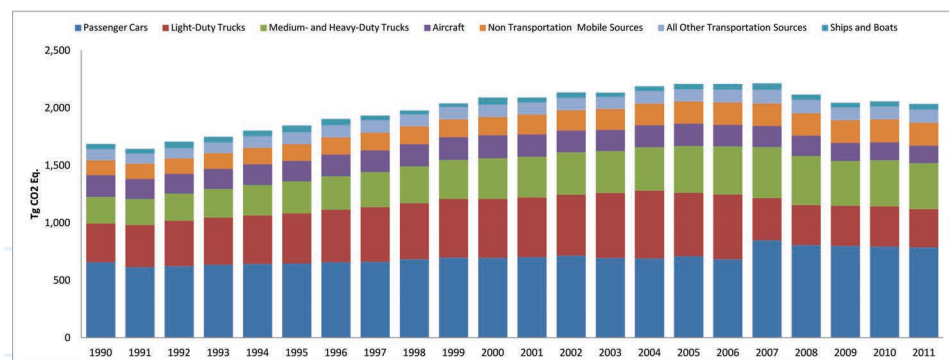
Change from  
1990 to 2011

Source	1990	1995	2000	2005	2009	2010	2011	Absolute	Percent
<b>On-Road Vehicles<sup>4</sup></b>	<b>1,235.2</b>	<b>1,371.3</b>	<b>1,575.1</b>	<b>1,682.9</b>	<b>1,558.2</b>	<b>1,565.1</b>	<b>1,540.9</b>	<b>305.7</b>	<b>24.8</b>
Light-Duty Vehicles	993.9	1,082.5	1,207.4	1,260.8	1,148.2	1,142.1	1,118.8	124.9	12.6
Passenger Cars	657.4	646.0	695.3	709.5	798.7	794.1	787.4	130.1	19.8
Light-Duty Trucks	336.6	436.6	512.1	551.3	349.5	348.0	331.4	-5.2	-1.5
Motorcycles	1.8	1.8	1.9	1.7	4.3	3.8	3.7	1.9	109.5
Buses	8.4	9.2	11.2	12.1	16.5	16.3	17.4	9.0	107.5
Medium- and Heavy-Duty Trucks	231.1	277.8	354.6	408.4	389.2	402.9	401.1	169.9	73.5
<b>Aircraft</b>	<b>189.2</b>	<b>176.7</b>	<b>199.4</b>	<b>193.7</b>	<b>157.5</b>	<b>154.8</b>	<b>149.9</b>	<b>-39.4</b>	<b>-20.8</b>
Commercial Aviation	110.9	116.4	140.7	134.0	120.7	114.4	115.7	4.8	4.3
Military Aircraft	35.3	24.5	22.9	19.5	15.6	13.7	12.7	-22.6	-64.1
General Aviation	43.0	35.8	35.9	40.1	21.2	26.7	21.5	-21.5	-50.0
<b>Ships and Boats</b>	<b>45.1</b>	<b>58.6</b>	<b>61.0</b>	<b>45.2</b>	<b>40.8</b>	<b>44.1</b>	<b>48.2</b>	<b>3.1</b>	<b>6.8</b>
<b>Rail</b>	<b>39.0</b>	<b>43.7</b>	<b>48.1</b>	<b>53.0</b>	<b>43.4</b>	<b>46.3</b>	<b>48.0</b>	<b>9.1</b>	<b>23.3</b>
<b>Pipelines*</b>	<b>36.0</b>	<b>38.2</b>	<b>35.2</b>	<b>32.2</b>	<b>36.7</b>	<b>37.1</b>	<b>37.7</b>	<b>1.7</b>	<b>4.7</b>
<b>Lubricants</b>	<b>11.8</b>	<b>11.3</b>	<b>12.1</b>	<b>10.2</b>	<b>8.5</b>	<b>9.5</b>	<b>9.0</b>	<b>-2.8</b>	<b>-23.9</b>
<b>Transportation Total</b>	<b>1,556.3</b>	<b>1,699.8</b>	<b>1,930.9</b>	<b>2,017.2</b>	<b>1,845.2</b>	<b>1,856.9</b>	<b>1,833.7</b>	<b>277.4</b>	<b>17.8</b>

## U.S. Non-Transportation Mobile GHG Emissions

<b>Non-Transportation Mobile</b>	<b>128.8</b>	<b>146.8</b>	<b>158.3</b>	<b>190.7</b>	<b>197.7</b>	<b>204.3</b>	<b>207.0</b>	<b>78.3</b>	<b>60.8</b>
Agricultural Equipment	31.4	37.0	39.2	47.3	47.2	48.2	50.0	18.6	59.2
Construction Equipment	42.4	49.4	55.8	66.5	71.2	73.6	74.8	32.4	76.3
Other Non-Transportation Mobile	55.0	60.4	63.4	76.9	79.3	82.5	82.3	27.3	49.7
<b>Non-Transportation + Transportation Total</b>	<b>1,685.1</b>	<b>1,846.6</b>	<b>2,089.2</b>	<b>2,207.9</b>	<b>2,042.9</b>	<b>2,061.2</b>	<b>2,040.7</b>	<b>355.6</b>	<b>21.1</b>

## Change in GHG Emissions by Sector: 1990-2011



## U.S. Transportation GHG Emissions by Gas, 2011 (Tg CO<sub>2</sub> Equivalent)

Source	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	Total	Percent
<b>On-Road Vehicles</b>	<b>1,470.4</b>	<b>1.3</b>	<b>14.5</b>	<b>54.8</b>	<b>1,540.9</b>	<b>75.5</b>
Light-Duty Vehicles	1,061.6	1.1	13.4	42.7	1,118.8	54.8
Passenger Cars	759.0	0.8	9.4	18.3	787.4	38.6
Light-Duty Trucks	302.6	0.3	4.0	24.5	331.4	16.2
Motorcycles	3.6	0.0	0.0	0.0	3.7	0.2
Buses	16.9	0.0	0.0	0.4	17.4	0.9
Medium- and Heavy-Duty Trucks	388.3	0.1	1.0	11.7	401.1	19.7
<b>Aircraft</b>	<b>148.4</b>	<b>0.0</b>	<b>1.4</b>	<b>0.0</b>	<b>149.9</b>	<b>7.3</b>
Commercial Aviation	114.6	0.0	1.1	0.0	115.7	5.7
Military Aircraft	12.6	0.0	0.1	0.0	12.7	0.6
General Aviation	21.2	0.0	0.2	0.0	21.5	1.1
<b>Ships and Boats</b>	<b>47.4</b>	<b>0.0</b>	<b>0.7</b>	<b>0.0</b>	<b>48.2</b>	<b>2.4</b>
<b>Rail</b>	<b>45.3</b>	<b>0.1</b>	<b>0.4</b>	<b>2.3</b>	<b>48.0</b>	<b>2.4</b>
<b>Pipelines*</b>	<b>37.7</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>37.7</b>	<b>1.8</b>
<b>Lubricants</b>	<b>9.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>9.0</b>	<b>0.4</b>
<b>Transportation Total</b>	<b>1,758.3</b>	<b>1.4</b>	<b>16.9</b>	<b>57.1</b>	<b>1,833.7</b>	<b>89.9</b>

## U.S. Non-Transportation Mobile GHG Emissions by Gas, 2011

<b>Non-Transportation Mobile</b>	<b>205.1</b>	<b>0.3</b>	<b>1.6</b>	<b>0.0</b>	<b>207.0</b>	<b>10.1</b>
Agricultural Equipment	49.4	0.1	0.4	0.0	50.0	2.4
Construction Equipment	74.1	0.1	0.6	0.0	74.8	3.7
Other Non-Transportation Mobile	81.6	0.1	0.6	0.0	82.3	4.0
<b>Non-Transportation + Transportation Total</b>	<b>1,963.4</b>	<b>1.7</b>	<b>18.5</b>	<b>57.1</b>	<b>2,040.7</b>	<b>100.0</b>

<sup>4</sup> FHWA changed its methods for estimated vehicle miles traveled (VMT) and related data. 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 2007-11 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 vehicle, short WB" and other 4 axle-2 tire has been replaced by "Light duty vehicle, long WB."

\* CH<sub>4</sub> and N<sub>2</sub>O emissions from pipelines are not included in transportation end-use sector totals.

## 2011 Fuel Consumption

	Volume (Billion Gallons)	Energy (Tbtu)	CO <sub>2</sub> (Tg)
<b>MOTOR GASOLINE *</b>	<b>140.0</b>	<b>17,395.3</b>	<b>1,166.4</b>
<b>Transportation</b>			
Light-Duty Vehicles	125.6	15,608.2	1,043.0
Passenger Cars	90.9	11,295.9	754.8
Light-Duty Trucks	34.7	4,312.3	288.2
Medium- and Heavy-Duty Trucks	4.8	597.7	39.9
Motorcycles	0.4	54.5	3.6
Buses	0.1	11.3	0.8
Recreational Boats	1.6	194.7	13.0
<b>Non-Transportation</b>			
Agricultural Equipment	0.8	99.3	7.1
Construction Equipment	0.6	76.3	5.4
Other Non-Transportation Mobile	6.1	753.3	53.6
<b>DIESEL FUEL *</b>	<b>56.0</b>	<b>7,767.1</b>	<b>574.4</b>
<b>Transportation</b>			
Light-Duty Vehicles	1.7	232.9	17.2
Passenger Cars	0.4	55.6	4.1
Light-Duty Trucks	1.3	177.4	13.1
Buses	1.5	204.3	15.1
Medium- and Heavy-Duty Trucks	33.9	4,702.3	347.8
Recreational Boats	0.4	49.0	3.6
Ships and Boats	1.0	144.3	10.7
Rail	4.0	554.5	41.0
<b>Non-Transportation</b>			
Agricultural Equipment	4.1	572.6	42.4
Construction Equipment	6.7	928.3	68.7
Other Non-Transportation Mobile	2.7	378.8	28.0
<b>RESIDUAL FUEL OIL</b>	<b>1.8</b>	<b>268.1</b>	<b>20.1</b>
Ships and Boats	1.8	268.1	20.1
<b>JET FUEL</b>	<b>15.0</b>	<b>2,029.0</b>	<b>146.5</b>
Commercial Aircraft	12.1	1,629.0	114.6
General Aviation Aircraft	1.8	242.6	19.4
Military Aircraft	1.2	157.4	12.6
<b>AVIATION GASOLINE</b>	<b>0.2</b>	<b>27.1</b>	<b>1.9</b>
General Aviation Aircraft	0.2	27.1	1.9
<b>NATURAL GAS</b>	<b>—</b>	<b>720.4</b>	<b>38.8</b>
Buses	—	19.6	1.1
Pipelines	—	700.8	37.7

	Volume (Billion Gallons)	Energy (Tbtu)	CO <sub>2</sub> (Tg)
<b>LPG</b>	<b>—</b>	<b>67.5</b>	<b>1.9</b>
Light-Duty Trucks	—	47.0	1.3
Medium- and Heavy-Duty Trucks	—	20.5	0.6
Buses	—	0.0	0.0
<b>ELECTRICITY</b>	<b>—</b>	<b>71.2</b>	<b>4.3</b>
Rail	—	71.2	4.3
<b>LUBRICANTS</b>	<b>—</b>	<b>133.9</b>	<b>9.0</b>
<b>Total</b>	<b>213.1</b>	<b>28,345.7</b>	<b>1,963.4</b>

\* Volume and energy figures include ethanol mixed with gasoline and biodiesel mixed with diesel in low volumes (e.g., gasohol), but not high volume mixtures (e.g., E85). CO<sub>2</sub> figures do not include any emissions from biofuels.

— Not calculated.

## CO<sub>2</sub> from International Bunker Fuels<sup>5</sup> (Tg)

Change from  
1990 to 2011

Source	1990	1995	2000	2005	2009	2010	2011	Absolute	Percent
<b>Marine Residual Fuel Oil</b>	<b>53.7</b>	<b>39.3</b>	<b>33.3</b>	<b>43.6</b>	<b>45.4</b>	<b>46.5</b>	<b>38.9</b>	<b>-14.8</b>	<b>-27.6</b>
<b>Marine Distillate Fuel Oil</b>	<b>11.7</b>	<b>9.3</b>	<b>6.3</b>	<b>9.4</b>	<b>8.2</b>	<b>9.5</b>	<b>7.5</b>	<b>-4.2</b>	<b>-35.5</b>
<b>Aviation Jet Fuel</b>	<b>38.0</b>	<b>49.9</b>	<b>62.0</b>	<b>60.1</b>	<b>52.8</b>	<b>61.0</b>	<b>64.9</b>	<b>26.8</b>	<b>70.5</b>
<b>Total</b>	<b>103.5</b>	<b>98.5</b>	<b>101.7</b>	<b>113.1</b>	<b>106.4</b>	<b>117.0</b>	<b>111.3</b>	<b>7.9</b>	<b>7.6</b>

<sup>5</sup> International bunker fuels are fuels used for international transport activities by commercial aircraft and ships. They are not included in Transportation or Non-Transportation Mobile Sector totals.

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## 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 1990-2011* (the Inventory) (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](http://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.

### Definitions of Selected Transportation Categories



**Passenger Cars:**<sup>6</sup> Automobiles used primarily to transport less than 10 passengers. In 2011, passenger cars traveled a total of 2,043,409 million vehicle miles.



**Light-Duty Trucks:**<sup>6</sup> 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, light-duty vehicles with long wheelbases represent the light duty truck category. In 2011, light-duty trucks traveled a total of 603,232 million vehicle miles.



**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. In 2011, medium- and heavy-duty trucks traveled a total of 280,990 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” (CO<sub>2</sub> 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. CO<sub>2</sub> has a GWP of “1”; all other greenhouse gases have GWP values relative to that of CO<sub>2</sub>. For example, methane (CH<sub>4</sub>) has a radiative forcing value<sup>7</sup> or GWP of 21, which means that releasing one ton of CH<sub>4</sub> is equivalent to releasing 21 tons of CO<sub>2</sub>.

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 and GWP is available at: [www.epa.gov/climatechange/ghgemissions/gases.html](http://www.epa.gov/climatechange/ghgemissions/gases.html).

<sup>6</sup> FHWA changed its methods for estimating vehicle miles traveled (VMT) and related data. 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 2007-11 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 vehicle, short WB” and other 4 axle-2 tire has been replaced by “Light duty vehicle, long WB.”

<sup>7</sup> 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](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)).