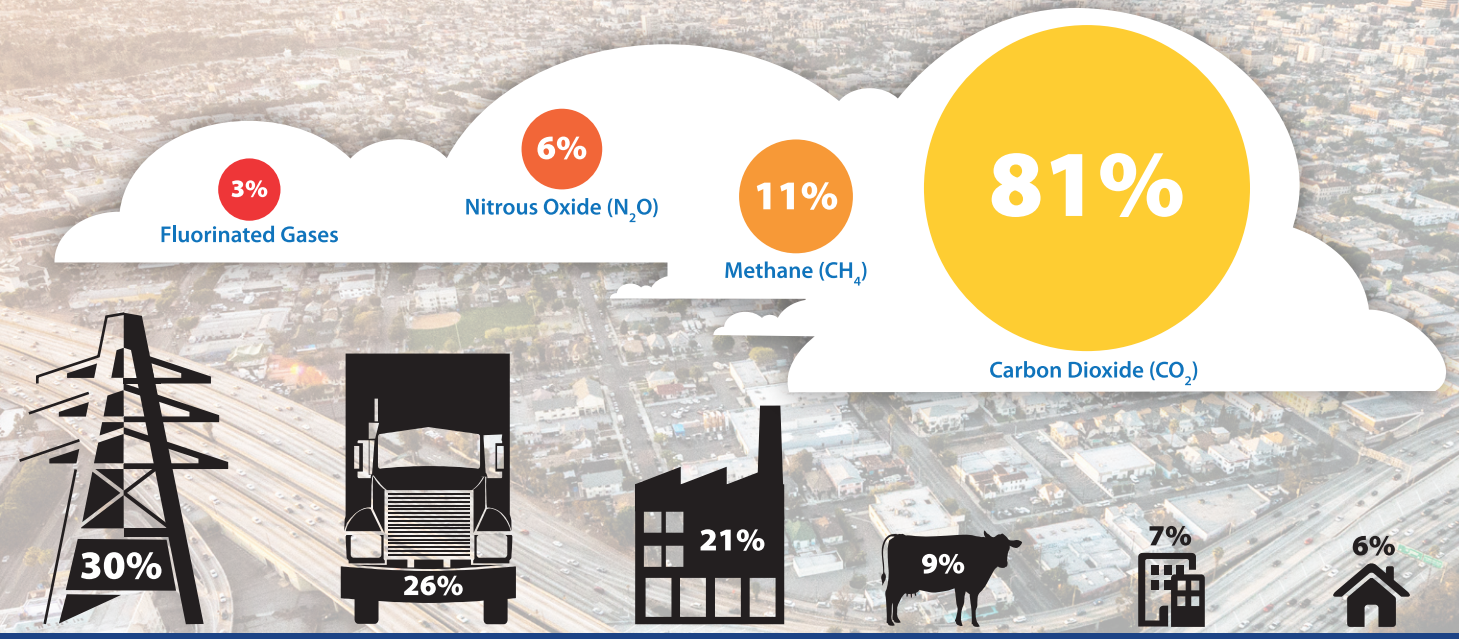
Fast Facts 1990–2014

U.S. Greenhouse Gas Emissions in 2014

National-Level U.S. Greenhouse Gas Inventory



Total U.S. Greenhouse Gas Emissions by Economic Sector in 2014

U.S. Greenhouse Gas Emissions

2014

Total Emissions	CO_2 from Fossil Fuel Combustion
6,870 million metric tons CO_2 equivalent	**76%** of total emissions
1.0% ↑ from 2013 levels	**1.0%** ↑ from 2013 levels

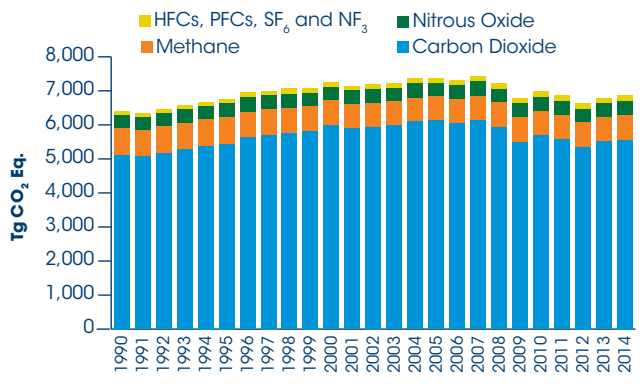
1990 to 2014

7.4% ↑ Total emissions	**9.9%** ↑ CO_2 emissions from fossil fuel combustion	**5.6%** ↓ Methane emissions
8.6% ↑ Total CO_2 emissions		

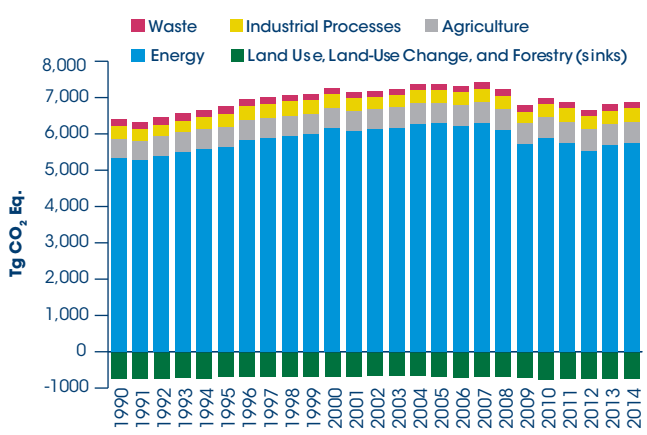
To learn more about the inventory, scan the QR code to the left, visit www.epa.gov/climatechange/emissions/usinventoryreport.html, or explore the data at www.epa.gov/climatechange/ghgemissions/inventoryexplorer.

EPA United States Environmental Protection Agency
April 2016
EPA 430-F-16-002

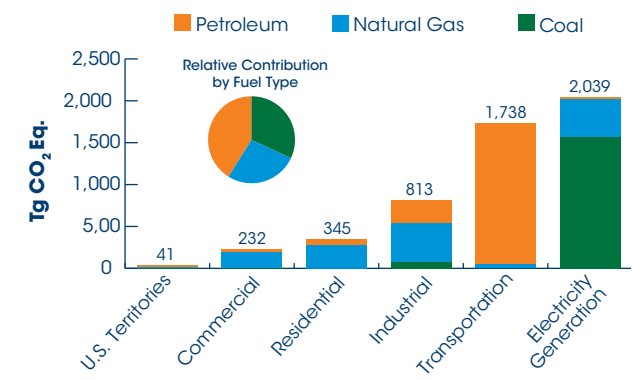
U.S. Greenhouse Gas Emissions by Gas



U.S. Greenhouse Gas Emissions/Sinks by Chapter/IPCC Sector

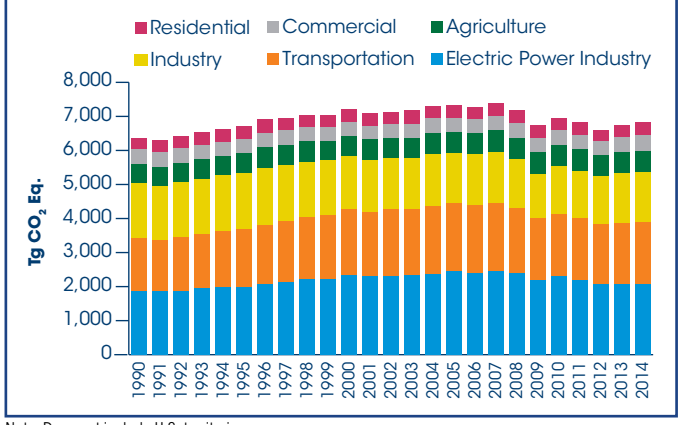


2014 U.S. CO_2 Emissions from Fossil Fuel Combustion by Fuel Type and End-Use Sector



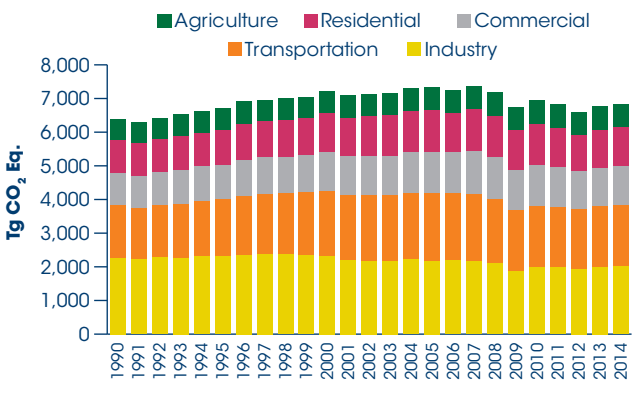
Note: Electricity generation also includes emissions of less than 0.5 Tg CO_2 Eq. from geothermal-based electricity generation.

U.S. Greenhouse Gas Emissions Allocated to Economic Sectors



Note: Does not include U.S. territories.

U.S. Greenhouse Gas Emissions with Electricity Distributed to Economic Sectors



Note: Does not include U.S. territories.

U.S. Greenhouse Gas Emissions and Sinks (MMT CO_2 Equivalents)

Gas/Source	1990	2005	2010	2011	2012	2013	2014
CO_2	**5,115.1**	**6,122.7**	**5,688.8**	**5,559.5**	**5,349.2**	**5,502.6**	**5,556.0**
Fossil Fuel Combustion	4,740.7	5,747.1	5,358.3	5,227.7	5,024.7	5,157.6	5,208.2
Electricity Generation	1,820.8	2,400.9	2,258.4	2,157.7	2,022.2	2,038.1	2,039.3
Transportation	1,493.8	1,887.0	1,728.3	1,707.6	1,696.8	1,713.0	1,737.6
Industrial	842.5	828.0	775.5	773.3	782.9	812.2	813.3
Residential	338.3	357.8	334.6	326.8	282.5	329.7	345.1
Commercial	217.4	223.5	220.1	220.7	196.7	221.0	231.9
U.S. Territories	27.9	49.9	41.4	41.5	43.6	43.5	41.0
Non-Energy Use of Fuels	118.1	138.9	114.1	108.5	105.6	121.7	114.3
Iron and Steel Production and Metallurgical Coke Production	99.7	66.5	55.7	59.9	54.2	52.2	55.4
Natural Gas Systems	37.7	30.1	32.4	35.7	35.2	38.5	42.4
Cement Production	33.3	45.9	31.3	32.0	35.1	36.1	38.8
Petrochemical Production	21.6	27.4	27.2	26.3	26.5	26.4	26.5
Lime Production	11.7	14.6	13.4	14.0	13.7	14.0	14.1
Other Process Uses of Carbonates	4.9	6.3	9.6	9.3	8.0	10.4	12.1
Ammonia Production	13.0	9.2	9.2	9.3	9.4	10.0	9.4
Incineration of Waste	8.0	12.5	11.0	10.5	10.4	9.4	9.4
Carbon Dioxide Consumption	1.5	1.4	4.4	4.1	4.0	4.2	4.5
Urea Consumption for Non-Agricultural Purposes	3.8	3.7	4.7	4.0	4.4	4.2	4.0
Petroleum Systems	3.6	3.9	4.2	4.2	3.9	3.7	3.6
Aluminum Production	6.8	4.1	2.7	3.3	3.4	3.3	2.8
Soda Ash Production and Consumption	2.8	3.0	2.7	2.7	2.8	2.8	2.8
Ferroalloy Production	2.2	1.4	1.7	1.7	1.9	1.8	1.9
Titanium Dioxide Production	1.2	1.8	1.8	1.7	1.5	1.7	1.8
Glass Production	1.5	1.9	1.5	1.3	1.2	1.3	1.3
Phosphoric Acid Production	1.5	1.3	1.1	1.2	1.1	1.1	1.1
Zinc Production	0.6	1.0	1.2	1.3	1.5	1.4	1.0
Lead Production	0.5	0.6	0.5	0.5	0.5	0.5	0.5
Silicon Carbide Production and Consumption	0.4	0.2	0.2	0.2	0.2	0.2	0.2
Magnesium Production and Processing	+	+	+	+	+	+	+
Wood Biomass and Ethanol Consumption[a]	*219.4*	*229.8*	*265.1*	*268.1*	*267.7*	*286.3*	*293.7*
International Bunker Fuels[b]	*103.5*	*113.1*	*117.0*	*111.7*	*105.8*	*99.8*	*103.2*
CH_4	**773.9**	**717.4**	**722.4**	**717.4**	**714.4**	**721.5**	**730.8**
Natural Gas Systems	206.8	177.3	166.2	170.1	172.6	175.6	176.1
Enteric Fermentation	164.2	168.9	171.3	168.9	166.7	165.5	164.3
Landfills	179.6	154.0	142.1	144.4	142.3	144.3	148.0
Petroleum Systems	38.7	48.8	54.1	56.3	58.4	64.7	68.1
Coal Mining	96.5	64.1	82.3	71.2	66.5	64.6	67.6
Manure Management	37.2	56.3	60.9	61.5	63.7	61.4	61.2
Wastewater Treatment	15.7	15.9	15.5	15.3	15.0	14.8	14.7
Rice Cultivation	13.1	13.0	11.9	11.8	11.9	11.9	11.9
Stationary Combustion	8.5	7.4	7.1	7.1	6.6	8.0	8.1
Abandoned Underground Coal Mines	7.2	6.6	6.6	6.4	6.2	6.2	6.3
Composting	0.4	1.9	1.8	1.9	1.9	2.0	2.1
Mobile Combustion	5.6	2.7	2.3	2.2	2.2	2.1	2.0
Field Burning of Agricultural Residues	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Petrochemical Production	0.2	0.1	+	+	0.1	0.1	0.1
Ferroalloy Production	+	+	+	+	+	+	+
Silicon Carbide Production and Consumption	+	+	+	+	+	+	+
Iron and Steel Production and Metallurgical Coke Production	+	+	+	+	+	+	+
Incineration of Waste	+	+	+	+	+	+	+
International Bunker Fuels[b]	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
N_2O	**406.2**	**397.6**	**410.3**	**416.5**	**409.3**	**403.4**	**403.5**
Agricultural Soil Management	303.3	297.2	320.7	323.1	323.1	318.6	318.4
Stationary Combustion	11.9	20.2	22.2	21.3	21.4	22.9	23.4
Manure Management	14.0	16.5	17.2	17.4	17.5	17.5	17.5
Mobile Combustion	41.2	34.4	23.6	22.4	20.0	18.2	16.3
Nitric Acid Production	12.1	11.3	11.5	10.9	10.5	10.7	10.9
Adipic Acid Production	15.2	7.1	4.2	10.2	5.5	4.0	5.4
Wastewater Treatment	3.4	4.3	4.5	4.7	4.8	4.8	4.8
N_2O from Product Uses	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Composting	0.3	1.7	1.6	1.7	1.7	1.8	1.8
Incineration of Waste	0.5	0.4	0.3	0.3	0.3	0.3	0.3
Semiconductor Manufacture	+	0.1	0.1	0.2	0.2	0.2	0.2
Field Burning of Agricultural Residues	0.1	0.1	0.1	0.1	0.1	0.1	0.1
International Bunker Fuels[b]	*0.9*	*1.0*	*1.0*	*1.0*	*0.9*	*0.9*	*0.9*
HFCs, PFCs, SF_6, and NF_3	**102.0**	**141.1**	**164.0**	**171.9**	**170.1**	**172.6**	**180.1**
HFCs	**46.6**	**119.9**	**149.4**	**154.3**	**155.9**	**158.9**	**166.7**
Substitution of Ozone Depleting Substances[c]	0.3	99.7	141.2	145.3	150.2	154.6	161.2
HCFC-22 Production	46.1	20.0	8.0	8.8	5.5	4.1	5.0
Semiconductor Manufacture	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Magnesium Production and Processing	-	-	+	+	+	0.1	0.1
PFCs	**24.3**	**6.7**	**4.5**	**7.0**	**6.0**	**5.8**	**5.6**
Semiconductor Manufacture	2.8	3.2	2.7	3.5	3.1	2.9	3.0
Aluminum Production	21.5	3.4	1.9	3.5	2.9	3.0	2.5
SF_6	**31.1**	**14.0**	**9.5**	**10.0**	**7.6**	**7.2**	**7.3**
Electrical Transmission and Distribution	25.4	10.6	7.0	6.8	5.6	5.4	5.6
Magnesium Production and Processing	5.2	2.7	2.1	2.8	1.6	1.5	1.0
Semiconductor Manufacture	0.5	0.7	0.4	0.4	0.4	0.4	0.7
NF_3	**+**	**0.5**	**0.6**	**0.7**	**0.6**	**0.6**	**0.5**
Semiconductor Manufacture	+	0.5	0.6	0.7	0.6	0.6	0.5
Total Emissions[d]	**6,397.1**	**7,378.8**	**6,985.5**	**6,865.4**	**6,643.0**	**6,800.0**	**6,870.5**
LULUCF Emissions	15.0	28.2	17.8	22.9	32.3	24.1	24.6
LULUCF Total Net Flux	(753.0)	(726.7)	(784.3)	(784.9)	(782.0)	(783.7)	(787.0)
LULUCF Sector Total	(738.0)	(698.5)	(766.4)	(762.0)	(749.7)	(759.6)	(762.5)
Net Emissions (Sources and Sinks)	**5,659.2**	**6,680.3**	**6,219.0**	**6,103.4**	**5,893.3**	**6,040.4**	**6,108.0**

+ Does not exceed 0.05 MMT CO_2 Eq.

[a] Emissions from wood biomass and ethanol consumption are not included specifically in summing energy sector totals. Net carbon fluxes from changes in biogenic carbon reservoirs are accounted for in the estimates for land use, land-use change, and forestry.

[b] Emissions from international bunker fuels are not included in totals.

[c] Small amounts of PFC emissions also result from this source.

[d] Total gross emissions exclude land use, land-use change, and forestry. Net emissions include this category.

Note: Totals may not sum due to independent rounding.

Global Warming Potentials (100-Year Time Horizon)

Gas	GWP
CO_2	1
CH_4	25
N_2O	298
HFC-23	14,800
HFC-32	675
HFC-43-10mee	1,640
HFC-125	3,500
HFC-134a	1,430
HFC-143a	4,470
HFC-152a	124
HFC-227ea	3,220
HFC-236fa	9,810
CF_4	7,390
C_2F_6	12,200
C_3F_8	8,830
C_4F_{10}	8,860
c-C_4F_8	10,300
C_5F_{12}	9,160
C_6F_{14}	9,300
SF_6	22,800
NF_3	17,200

Global warming potential (GWP) is defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas. The GWP-weighted emissions of direct greenhouse gases in the U.S. Inventory are presented in terms of equivalent emissions of carbon dioxide (CO_2), using units of million metric tons of carbon dioxide equivalents (MMT CO_2 Eq.).

Conversion:

1 million metric tons = 106 metric tons = 109 kg
The molecular weight of carbon is 12, and the molecular weight of oxygen is 16; therefore, the molecular weight of CO_2 is 44 (i.e., 12 + [16 × 2]), as compared to 12 for carbon alone. Thus, the weight ratio of carbon to carbon dioxide is 12/44.

Conversion from gigagrams of gas to million metric tons of carbon dioxide equivalents:

$$\text{MMT } CO_2 \text{ Eq.} = \left(\frac{\text{Gg}}{\text{of gas}}\right) \times (\text{GWP}) \times \left(\frac{\text{MMT}}{1{,}000\ \text{Gg}}\right)$$

Source:
IPCC Fourth Assessment Report (2007)

Energy Units

Btu	British thermal unit	1 Btu
MBtu	Thousand Btu	1×10^3 Btu
MMBtu	Million Btu	1×10^6 Btu
BBtu	Billion Btu	1×10^9 Btu
TBtu	Trillion Btu	1×10^{12} Btu
QBtu	Quadrillion Btu	1×10^{15} Btu

For more information on calculating CO_2 emissions per kWh, download eGRID at www.epa.gov/energy/egrid.

For other related information, see www.epa.gov/climatechange and http://unfccc.int.

Carbon Information

Conversion Factors to Energy Units and Carbon Contents by Fuel Type

The values in this table provide conversion factors from physical units to energy equivalent units and from energy units to carbon contents. These factors can be used as default factors, if local data are not available.

Fuel Type	Heat Content	Carbon (C) Content Coefficients	Carbon Dioxide (CO_2) per Physical Unit
Solid Fuels	**Million Btu/Metric Ton**	**kg C/Million Btu**	**kg CO_2/Metric Ton**
Anthracite Coal	24.88	28.28	2,579.9
Bituminous Coal	26.33	25.44	2,456.1
Sub-bituminous Coal	18.89	26.50	1,835.5
Lignite	14.18	26.65	1,385.6
Coke	25.76	31.00	2,928.1
Unspecified Coal	27.58	25.34	2,562.5
Gas Fuels	**Btu/Cubic Foot**	**kg C/Million Btu**	**kg CO_2/Cubic Foot**
Natural Gas	1,032	14.46	0.0547
Liquid Fuels	**Million Btu/Petroleum Barrel**	**kg C/Million Btu**	**kg CO_2/Petroleum Barrel**
Motor Gasoline	5.06	19.46	361.0
Distillate Fuel Oil	5.83	20.17	431.2
Residual Fuel Oil	6.29	20.48	472.3
Jet Fuel	5.67	19.70	409.6
Aviation Gasoline	5.05	18.86	349.2
LPG	3.54	16.83	218.5
Kerosene	5.67	19.96	415.0
Still Gas	6.00	18.20	400.4
Petroleum Coke	6.02	27.85	614.7
Pentanes Plus	4.62	19.10	323.6
Unfinished Oils	5.83	20.31	434.2

Note: For fuels with variable heat contents and carbon content coefficients, this table presents 2014 U.S. average values. All factors are presented in gross calorific values (GCV) (i.e., higher heating values). LPG = liquefied petroleum gases.

Unit Conversions

1 pound	= 0.454 kilograms	= 16 ounces	
1 kilogram	= 2.205 pounds	= 35.27 ounces	
1 short ton	= 0.9072 metric tons	= 2,000 pounds	
1 cubic foot	= 0.02832 cubic meters	= 28.3168 liters	
1 cubic meter	= 35.315 cubic feet	= 1,000 liters	
1 U.S. gallon	= 3.78541 liters	= 0.03175 barrels	= 0.02381 barrels petroleum
1 liter	= 0.2642 U.S. gallons	= 0.0084 barrels	= 0.0063 barrels petroleum
1 barrel	= 31.5 U.S. gallons	= 119 liters	= 0.75 barrels petroleum
1 barrel petroleum	= 42 U.S. gallons	= 159 liters	
1 mile	= 1.609 kilometers	= 5,280 feet	
1 kilometer	= 0.6214 miles	= 3,280.84 feet	
1 square mile	= 2.590 square kilometers	= 640 acres	
1 square kilometer	= 0.386 square miles	= 100 hectares	
1 acre	= 43,560 square feet	= 0.4047 hectares	= 4,047 square meters