Emission Factors for Greenhouse Gas Inventories

Last Modified: 4 April 2014

Red text indicates an update from the 2011 version of this document.

Typically, greenhouse gas emissions are reported in units of carbon dioxide equivalent (CO_2e). Gases are converted to CO_2e by multiplying by their global warming potential (GWP). The emission factors listed in this document have not been converted to CO_2e . To do so, multiply the emissions by the corresponding GWP listed in the table below.

Gas	100-year GWP
CH ₄	25
N ₂ O	298

Source: Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 2007. See the source note to Table 9 for further explanation.

Table 1 Stationary Combustion Emission Factors

Fuel Type	Heating Value	CO₂ Factor	CH₄ Factor	N₂O Factor	CO₂ Factor	CH ₄ Factor	N₂O Factor	Unit
	mmBtu per short	kg CO ₂ per	g CH ₄ per mmBtu	g N₂O per mmBtu	kg CO ₂ per short	g CH ₄ per short	g N ₂ O per short	
	ton	mmBtu			ton	ton	ton	
Coal and Coke	05.00	400.00			0.000	070	40	1
Anthracite Coal	25.09	103.69 93.28	11	1.6	2,602 2,325	276 274	40	short tons
Bituminous Coal Sub-bituminous Coal	24.93 17.25	93.28	11	1.6 1.6	1,676	190	40 28	short tons
Lignite Coal	14.21	97.17	11	1.6	1,389	156	23	short tons short tons
Mixed (Commercial Sector)	21.39	94.27	11	1.6	2,016	235	34	short tons
Mixed (Electric Power Sector)	19.73	95.52	11	1.6	1,885	217	32	short tons
Mixed (Industrial Coking)	26.28	93.90	11	1.6	2,468	289	42	short tons
Mixed (Industrial Sector)	22.35	94.67	11	1.6	2,116	246	36	short tons
Coal Coke	24.80	113.67	11	1.6	2,819	273	40	short tons
Fossil Fuel-derived Fuels (Solid)				1	1		1	
Municipal Solid Waste	9.95	90.70	32	4.2	902	318	42	short tons
Petroleum Coke (Solid)	30.00	102.41	32	4.2	3,072	960	126	short tons
Plastics Tires	38.00 28.00	75.00 85.97	32 32	4.2	2,850 2,407	1,216 896	160 118	short tons short tons
Biomass Fuels (Solid)	28.00	85.97	32	4.2	2,407	090	110	SHOIT TOHS
Agricultural Byproducts	8.25	118.17	32	4.2	975	264	35	short tons
Peat	8.00	111.84	32	4.2	895	256	34	short tons
Solid Byproducts	10.39	105.51	32	4.2	1,096	332	44	short tons
Wood and Wood Residuals	17.48	93.80	7.2	3.6	1,640	126	63	short tons
	mmBtu per scf	kg CO ₂ per	g CH ₄ per mmBtu	g N₂O per mmBtu	kg CO ₂ per scf	g CH ₄ per scf	g N₂O per scf	
Natural Con		mmBtu						
Natural Gas	0.001026	53.06	1.0	0.10	0.05444	0.00103	0.00010	cof
Natural Gas (per scf) Fossil-derived Fuels (Gaseous)	0.001026	53.06	1.0	0.10	0.05444	0.00103	0.00010	scf
Blast Furnace Gas	0.000092	274.32	0.022	0.10	0.02524	0.000002	0.000009	scf
Coke Oven Gas	0.000599	46.85	0.48	0.10	0.02806	0.000288	0.000060	scf
Fuel Gas	0.001388	59.00	3.0	0.60	0.08189	0.004164	0.000833	scf
Propane Gas	0.002516	61.46	0.022	0.10	0.15463	0.000055	0.000252	scf
Biomass Fuels (Gaseous)								
Landfill Gas	0.000485	52.07	3.2	0.63	0.025254	0.001552	0.000306	scf
Other Biomass Gases	0.000655	52.07	3.2	0.63	0.034106	0.002096	0.000413	scf
	mmBtu per gallon	kg CO₂ per mmBtu	g CH₄ per mmBtu	g N₂O per mmBtu	kg CO ₂ per gallon	g CH₄ per gallon	g N₂O per gallon	
Petroleum Products		btu		l	l			
Asphalt and Road Oil	0.158	75.36	3.0	0.60	11.91	0.47	0.09	gallon
Aviation Gasoline	0.120	69.25	3.0	0.60	8.31	0.36	0.07	gallon
Butane	0.103	64.77	3.0	0.60	6.67	0.31	0.06	gallon
Butylene	0.105	68.72	3.0	0.60	7.22	0.32	0.06	gallon
Crude Oil	0.138	74.54	3.0	0.60	10.29	0.41	0.08	gallon
Distillate Fuel Oil No. 1	0.139	73.25	3.0	0.60	10.18	0.42	0.08	gallon
Distillate Fuel Oil No. 2	0.138	73.96	3.0	0.60	10.21	0.41	0.08	gallon
Distillate Fuel Oil No. 4	0.146	75.04	3.0	0.60	10.96	0.44	0.09	gallon
Ethane	0.068	59.60	3.0	0.60	4.05	0.20	0.04	gallon
Ethylene Heavy Gas Oils	0.058 0.148	65.96 74.92	3.0	0.60 0.60	3.83 11.09	0.17 0.44	0.03	gallon gallon
Isobutane	0.099	64.94	3.0	0.60	6.43	0.30	0.06	gallon
Isobutylene	0.103	68.86	3.0	0.60	7.09	0.31	0.06	gallon
Kerosene	0.135	75.20	3.0	0.60	10.15	0.41	0.08	gallon
Kerosene-type Jet Fuel	0.135	72.22	3.0	0.60	9.75	0.41	0.08	gallon
Liquefied Petroleum Gases (LPG)	0.092	61.71	3.0	0.60	5.68	0.28	0.06	gallon
Lubricants	0.144	74.27	3.0	0.60	10.69	0.43	0.09	gallon
Motor Gasoline	0.125	70.22	3.0	0.60	8.78	0.38	0.08	gallon
Naphtha (<401 deg F)	0.125	68.02	3.0	0.60	8.50	0.38	0.08	gallon
Natural Gasoline	0.110	66.88	3.0	0.60 0.60	7.36	0.33	0.07	gallon
Other Oil (>401 deg F) Pentanes Plus	0.139 0.110	76.22 70.02	3.0	0.60	10.59 7.70	0.42	0.08	gallon gallon
Petrochemical Feedstocks	0.110	71.02	3.0	0.60	8.88	0.38	0.07	gallon
Petroleum Coke	0.143	102.41	3.0	0.60	14.64	0.43	0.09	gallon
Propane	0.091	62.87	3.0	0.60	5.72	0.27	0.05	gallon
Propylene	0.091	65.95	3.0	0.60	6.00	0.27	0.05	gallon
Residual Fuel Oil No. 5	0.140	72.93	3.0	0.60	10.21	0.42	0.08	gallon
Residual Fuel Oil No. 6	0.150	75.10	3.0	0.60	11.27	0.45	0.09	gallon
Special Naphtha	0.125	72.34	3.0	0.60	9.04	0.38	0.08	gallon
Still Gas	0.143	66.72	3.0	0.60	9.54	0.43	0.09	gallon
Unfinished Oils	0.139	74.54	3.0	0.60	10.36	0.42	0.08	gallon
Used Oil Biomass Fuels (Liquid)	0.138	74.00	3.0	0.60	10.21	0.41	0.08	gallon
Biodiesel (100%)	0.128	73.84	1.1	0.11	9.45	0.14	0.01	gallon
Ethanol (100%)	0.084	68.44	1.1	0.11	5.75	0.09	0.01	gallon
Rendered Animal Fat	0.125	71.06	1.1	0.11	8.88	0.14	0.01	gallon
Vegetable Oil	0.120	81.55	1.1	0.11	9.79	0.13	0.01	gallon
	mmBtu per gallon	kg CO₂ per		g N₂O per mmBtu				
		mmBtu						
Steam and Hot Water								
Steam and Hot Water	1	66.33	1.250	0.125				mmBtu

Source:

Solid, gaseous, liquid and biomass fuels: Federal Register (2009) EPA; 40 CFR Parts 86, 87, 89 et al; Mandatory Reporting of Greenhouse Gases; Final Rule, 300ct09, 261 pp. Tables C-1 and C-2 at FR pp. 56409-56410. Revised emission factors for selected fuels: Federal Register (2010) EPA; 40 CFR Part 98; Mandatory Reporting of Greenhouse Gases; Final Rule, 17Dect0, 81 pp. With Amendments from Memo: Table of Final 2013 Revisions to the Greenhouse Gas Reporting Rule (PDF) to 40 CFR part 98; subpart C.—Default CO2 Emission Factors and High Heat Values for Various Types of Fuel and Table C-2 to Subpart C—Default CH4 and V20 Emission Factors for Various Types of Fuel

Steam and Hot Water: EPA (2008) Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance - Indirect Emissions from Purchases/Sales of Electricity and Steam. Assumption: 80% boiler efficiency and fuel type assumed natural gas. Factors are per mmBtu of steam or hot water purchased.

http://www.epa.gov/ghgreporting/documents/pdf/2013/documents/memo-2013-technical-revisions.pdf http://www.epa.gov/ghgreporting/reporters/subpart/c.html

Table 2 Mobile Combustion CO₂ Emission Factors

Fuel Type	kg CO ₂ per unit	Unit
Aviation Gasoline	8.31	gallon
Biodiesel (100%)	9.45	gallon
Compressed Natural Gas (CNG)	0.0545	scf
Diesel Fuel	10.21	gallon
Ethane	4.05	gallon
Ethanol (100%)	5.75	gallon
Jet Fuel (kerosene type)	9.75	gallon
Liquefied Natural Gas (LNG)	4.46	gallon
Liquefied Petroleum Gases (LPG)	5.68	gallon
Methanol	4.10	gallon
Motor Gasoline	8.78	gallon
Propane	5.72	gallon
Residual Fuel Oil	11.27	gallon

Source:

Federal Register (2009) EPA; 40 CFR Parts 86, 87, 89 et al; Mandatory Reporting of Greenhouse Gases; Final Rule, 30Oct09, 261 pp. Tables C-1 and C-2. Table of Final 2013 Revisions to the Greenhouse Gas LNG sourced from: EPA (2008) Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance - Direct Emissions from Mobile Combustion Sources, Table B-5.

Methanol sourced from: The Climate Registry (2013); General Reporting Protocol for the Voluntary Reporting Program Version 2.0, Default Emission Factors, Table 13.1 US Default CO₂ Emission Factors for Transport Fuels.

Table 3 Mobile Combustion CH₄ and N₂O Emission Factors for On-road Gasoline Vehicles

1976-77 0.1406 0 1978-79 0.1389 0 1980 0.1326 0 1981 0.0802 0 1982 0.0795 0 1982 0.0795 0 1983 0.0762 0 1984-93 0.0704 0 1994 0.0531 0 1995 0.0358 0 1996 0.0272 0 1997 0.0268 0 1998 0.0246 0 1998 0.0246 0 1998 0.0216 0 2000 0.0178 0 2001 0.0110 0 2002 0.0107 0 2003 0.0114 0 2004 0.0145 0 2005 0.0147 0	0197 0443 0458 0473 0499 0626 0627 0630 0447 0560 0473 0426 0422 0422 0423 0158 0153 0135 0083 0079 0057 0041 0038 0038
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1984-93 0.0704 0 1994 0.0531 0 1995 0.0358 0 1996 0.0272 0 1997 0.0268 0 1998 0.0249 0 1999 0.0216 0 2000 0.0178 0 2001 0.0110 0 2002 0.0107 0 2003 0.0114 0 2004 0.0145 0 2005 0.0147 0 2006 0.0161 0	0647 0560 0473 0426 0422 0393 0337 0273 0158 0153 00135 0083 0079 0057 0041 0038
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1998 0.0249 0 1999 0.0216 0 2000 0.0178 0 2001 0.0110 0 2002 0.0107 0 2003 0.0114 0 2004 0.0145 0 2005 0.0147 0 2006 0.0161 0	0393 0337 0273 0158 0153 0135 0083 0079 0057 0041 0038 0036
1999 0.0216 0.0200 2000 0.0178 0.01078 2001 0.0110 0.0107 2002 0.0107 0.0203 2003 0.0114 0.0145 2004 0.0145 0.0147 2005 0.0147 0.006 2006 0.0161 0.0161	0337 0273 0158 0153 0135 0083 0079 0057 0041 0038 0036
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	0041 0038 0036
	0038 0036
	0036
	0218
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1977-78 0.1614 0.	0534
	0555
	0660
	0681
	0722
	0764 0806
	0848
	1035
	0982
	0908
	0871
1997 0.0452 0.	0871
	0728
	0564
	0621
	0164
	0228
	0132
	0101
	0089
2007 0.0161 0.	0079
	0066
	0497
	0538
	0515
	0849 0933
	1142
	1680
	1726
	1693
	1435
	1092
	1235
	1307
	1240
	0285 0177
	0171
	0153
2008-present 0.0333 0	0134

Source: EPA (2014) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012. All values are calculated from Tables A-101 through A-105.

Table 4 Mobile Combustion CH₄ and N₂O Emission Factors for On-road Diesel and Alternative Fuel Vehicles

Vehicle Type	Vehicle Year	CH₄ Factor (g / mile)	N₂O Factor (g / mile)
	1960-1982	0.0006	0.0012
Diesel Passenger Cars	1983-1995	0.0005	0.0010
	1996-present	0.0005	0.0010
	1960-1982	0.0011	0.0017
Diesel Light-duty Trucks	1983-1995	0.0009	0.0014
	1996-present	0.0010	0.0015
Diesel Medium- and Heavy-duty Vehicles	1960-present	0.0051	0.0048
Gasoline Motorcycles	1960-1995	0.0899	0.0087
Casoniie Motorcycles	1996-present	0.0672	0.0069
CNG Light-duty Vehicles		0.7370	0.0500
CNG Heavy-duty Vehicles		1.9660	0.1750
CNG Buses		1.9660	0.1750
LPG Light-duty Vehicles		0.0370	0.0670
LPG Heavy-duty Vehicles		0.0660	0.1750
LNG Heavy-duty Vehicles		1.9660	0.1750
Ethanol Light-duty Vehicles		0.0550	0.0670
Ethanol Heavy-duty Vehicles		0.1970	0.1750
Ethanol Buses		0.1970	0.1750

Source: EPA (2014) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012. All values are calculated from Tables A-104 through A-106.

Table 5 Mobile Combustion CH₄ and N₂O Emission Factors for Non-road Vehicles

Vehicle Type	CH₄ Factor (g / gallon)	N₂O Factor (g / gallon)
LPG Non-Highway Vehicles	0.50	0.22
Residual Oil Ships and Boats	0.11	0.57
Diesel Ships and Boats	0.06	0.45
Gasoline Ships and Boats	0.64	0.22
Diesel Locomotives	0.80	0.26
Gasoline Agricultural Equip.	1.26	0.22
Diesel Agricultural Equip.	1.44	0.26
Gasoline Construction Equip.	0.50	0.22
Diesel Construction Equip.	0.57	0.26
Jet Fuel Aircraft	0.00	0.30
Aviation Gasoline Aircraft	7.06	0.11
Biodiesel Vehicles	0.57	0.26
Other Diesel Sources	0.57	0.26
Other Gasoline Sources	0.50	0.22

Source: EPA (2014) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012. All values are calculated from Table A-107.

Note: LPG non-highway vehicles assumed equal to other gasoline sources. Biodiesel vehicles assumed equal to other diesel sources.

Table 6 Electricity Emission Factors

	Total	Total output emission factors			Non-baseload emission factors			
eGRID Subregion	CO₂ Factor	CH₄ Factor	N₂O Factor	CO ₂ Factor	CH₄ Factor	N₂O Factor		
222	(lb CO ₂ /MWh)	(lb CH ₄ /MWh)	(lb N ₂ O /MWh)	(lb CO ₂ /MWh)	(lb CH₄/MWh)	(lb N ₂ O/MWh)		
AKGD (ASCC Alaska Grid)	1,256.87	0.02608	0.00718	1,387.37	0.03405	0.00693		
AKMS (ASCC Miscellaneous)	448.57	0.01874	0.00368	1,427.76	0.05997	0.01180		
AZNM (WECC Southwest)	1,177.61	0.01921	0.01572	1,210.44	0.02188	0.00986		
CAMX (WECC California)	610.82	0.02849	0.00603	932.82	0.03591	0.00455		
ERCT (ERCOT AII)	1,218.17	0.01685	0.01407	1,181.70	0.02012	0.00763		
FRCC (FRCC All)	1,196.71	0.03891	0.01375	1,277.42	0.03873	0.01083		
HIMS (HICC Miscellaneous)	1,330.16	0.07398	0.01388	1,690.72	0.10405	0.01912		
HIOA (HICC Oahu)	1,621.86	0.09930	0.02241	1,588.23	0.11948	0.02010		
MROE (MRO East)	1,610.80	0.02429	0.02752	1,755.66	0.03153	0.02799		
MROW (MRO West)	1,536.36	0.02853	0.02629	2,054.55	0.05986	0.03553		
NEWE (NPCC New England)	722.07	0.07176	0.01298	1,106.82	0.06155	0.01207		
NWPP (WECC Northwest)	842.58	0.01605	0.01307	1,340.34	0.04138	0.01784		
NYCW (NPCC NYC/Westchester)	622.42	0.02381	0.00280	1,131.63	0.02358	0.00244		
NYLI (NPCC Long Island)	1,336.11	0.08149	0.01028	1,445.94	0.03403	0.00391		
NYUP (NPCC Upstate NY)	545.79	0.01630	0.00724	1,253.77	0.03683	0.01367		
RFCE (RFC East)	1,001.72	0.02707	0.01533	1,562.72	0.03593	0.02002		
RFCM (RFC Michigan)	1,629.38	0.03046	0.02684	1,744.52	0.03231	0.02600		
RFCW (RFC West)	1,503.47	0.01820	0.02475	1,982.87	0.02450	0.03107		
RMPA (WECC Rockies)	1,896.74	0.02266	0.02921	1,808.03	0.02456	0.02289		
SPNO (SPP North)	1,799.45	0.02081	0.02862	1,951.83	0.02515	0.02690		
SPSO (SPP South)	1,580.60	0.02320	0.02085	1,436.29	0.02794	0.01210		
SRMV (SERC Mississippi Valley)	1,029.82	0.02066	0.01076	1,222.40	0.02771	0.00663		
SRMW (SERC Midwest)	1,810.83	0.02048	0.02957	1,964.98	0.02393	0.02965		
SRSO (SERC South)	1,354.09	0.02282	0.02089	1,574.37	0.02652	0.02149		
SRTV (SERC Tennessee Valley)	1,389.20	0.01770	0.02241	1,873.83	0.02499	0.02888		
SRVC (SERC Virginia/Carolina)	1,073.65	0.02169	0.01764	1,624.71	0.03642	0.02306		
US Average	1,232.35	0.02414	0.01826	1,520.20	0.03127	0.01834		

Source: EPA Year 2010 eGRID 9th edition Version 1.0 February 2014.

Note: Total output emission factors are used for quantifying emissions from purchased electricity. Non-baseload emission factors are used for quantifying the emission reductions from purchased green power.



This is a representational map; many of the boundaries shown on this map are approximate because they are based on companies, not on strictly geographical boundaries.

Source: EPA Year 2010 eGRID 9th edition Version 1.0 February 2014.

Table 7 Business Travel Emission Factors

Vehicle Type	CO ₂ Factor (kg / unit)	CH₄ Factor (g / unit)	N ₂ O Factor (g / unit)	Units
Passenger Car ^A	0.368	0.018	0.013	vehicle-mile
Light-duty Truck ^B	0.501	0.024	0.019	vehicle-mile
Motorcycle	0.197	0.070	0.007	vehicle-mile
Intercity Rail (i.e. Amtrak) C	0.144	0.0085	0.0032	passenger-mile
Commuter Rail D	0.174	0.0084	0.0035	passenger-mile
Transit Rail (i.e. Subway, Tram) E	0.133	0.0026	0.0020	passenger-mile
Bus	0.058	0.0007	0.0004	passenger-mile
Air Travel - Short Haul (< 300 miles)	0.275	0.0091	0.0087	passenger-mile
Air Travel - Medium Haul (>= 300 miles,				
< 2300 miles)	0.162	0.0008	0.0052	passenger-mile
Air Travel - Long Haul (>= 2300 miles)	0.191	0.0008	0.0060	passenger-mile

Source: CO₂, CH₄, and N₂O emissions data for highway vehicles are from Table 2-15 of the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Vehicle-miles and passenger-miles data for highway vehicles are from Table VM-1 of the Federal Highway Administration Highway Statistics 2012. Fluel consumption data and passenger-miles data for rail are from Tables A.14 to A.16 and 9.10 to 9.12 of the Transportation Energy Data Book: Edition 32. Fuel consumption was converted to emissions by using fuel and electricity emission factors presented in the tables above.

Notes:

- Notes:

 A Passenger car: includes passenger cars, minivans, SUVs, and small pickup trucks (vehicles with wheelbase less than 121 inches).

 Light-duty truck: includes full-size pickup trucks, full-size vans, and extended-length SUVs (vehicles with wheelbase greater than 121 inches).

 Intercity rait: long-distance rail between major cities, such as Amtrak

 Commuter rail: rail are wrice between a central city and adjacent suburbs (also called regional rail or suburban rail)

 Transit rail: rail typically within an urban center, such as subways, elevated railways, metropolitan railways (metro), streetcars, trolley cars, and tramways.

Table 8 Product Transport Emission Factors

Vehicle Type	CO ₂ Factor (kg / unit)	CH₄ Factor (g / unit)	N₂O Factor (g / unit)	Units
Medium- and Heavy-duty Truck	1.456	0.018	0.011	vehicle-mile
Passenger Car ^A	0.368	0.018	0.013	vehicle-mile
Light-duty Truck ^B	0.501	0.024	0.019	vehicle-mile
Medium- and Heavy-duty Truck	0.296	0.0036	0.0022	ton-mile
Rail	0.026	0.0020	0.0007	ton-mile
Waterborne Craft	0.042	0.0004	0.0027	ton-mile
Aircraft	1.301	0.0000	0.0400	ton-mile

Source:

CO₂, CH_e, and N₂O emissions data for highway vehicles are from Table 2-15 of the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Vehicle-miles and passenger-miles data for highway vehicles are from Table VM-1 of the Federal Highway Administration Highway Statistics 2012.

CO₂, emissions data for non-highway vehicles are from Table A-116 of the U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Vehicle-miles and passenger-miles data for highway vehicles are from Table A-116 of the U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Which are distributed into CO₂, CH_e, and N₂O emissions based on fuel/vehicle emission factors. Freight ton-mile data for non-highway vehicles are from Table 1-50 of the Bureau of Transportation Statistics for 2012.

Notes:

Vehicle-mile factors are appropriate to use when the entire vehicle is dedicated to transporting the reporting company's product. Ton-mile factors are appropriate when the vehicle is shared with products from other companies.

Apassenger car: includes passenger cars, minivans, SUVs, and small pickup trucks (vehicles with wheelbase less than 121 inches).

B Light-duty truck: includes full-size pickup trucks, full-size vans, and extended-length SUVs (vehicles with wheelbase greater than 121 inches).

Table 9 Global Warming Potentials (GWPs)

Gas	100-year GWP
CO ₂	1
CH ₄	25
N ₂ O	298
HFC-23	14,800
HFC-32	675
HFC-41	92
HFC-125	3,500
HFC-134	1,100
HFC-134a	1,430
HFC-143	353
HFC-143a	4,470
HFC-152	53
HFC-152a	124
HFC-161	12
HFC-227ea	3,220
HFC-236cb	1,340
HFC-236ea	1,370
HFC-236fa	9,810
HFC-245ca	693
HFC-245fa	1,030
HFC-365mfc	794
HFC-43-10mee	1,640
SF ₆	22,800
NF ₃	17,200
CF ₄	7,390
C ₂ F ₆	12,200
C ₃ F ₈	8,830
c-C₄F ₈	10,300
C ₄ F ₁₀	8,860
C ₅ F ₁₂	9,160
C ₆ F ₁₄	9,300
C ₁₀ F ₁₈	>7,500

Source:
100-year GWPs from IPCC Fourth Assessment Report (AR4), 2007. IPCC AR4 was published in 2007 and is among the most current and comprehensive peer-reviewed assessments of climate change. AR4 provides revised GWPs of several GHGs relative to the values provided in previous assessment reports, following advances in scientific knowledge on the radiative efficiencies and atmospheric lifetimes of these GHGs and of CO₂. Because the GWPs provided in AR4 reflect an improved scientific understanding of the radiative effects of these gases in the atmosphere, the values provided are more appropriate for supporting the overall goal of organizational GHG reporting than the Second Assessment Report (AR5) GWPs values previously used in the Emission Factors Hub.
While EPA recognizes that Fifth Assessment Report (AR5) GWPs have been published, in an effort to ensure consistency and comparability of GHG data between EPA's voluntary and non-voluntary GHG reporting programs (e.g. GHG Reporting Programs And Sational Inventory). EPA's recommends the use of AR4 GWPs. The United States and other device countries to the UNFCCC have agreed to submit annual inventorings in 2015 and future years to the UNFCCC busing GWP values from AR4, which will replace the current use of SAR GWP values. Unliking AR4 GWPs improves EPA's ability to analyze corporate, national, and sub-national GHG data consistently, enhances communication of GHG information between programs, and gives outside stakeholders a consistent, predictable set of GWPs to avoid confusion and additional burden.

Table 9b GWPs for Blended Refrigerants

ASHRAE #	100-year GWP	Blend Composition
R-401A	16	53% HCFC-22, 34% HCFC-124, 13% HFC-152a
R-401B	14	61% HCFC-22 , 28% HCFC-124 , 11% HFC-152a
R-401C	19	33% HCFC-22, 52% HCFC-124, 15% HFC-152a
R-402A	2,100	38% HCFC-22 , 6% HFC-125 , 2% propane
R-402B	1,330	6% HCFC-22 , 38% HFC-125 , 2% propane
R-403B	3,444	56% HCFC-22 , 39% PFC-218 , 5% propane
R-404A	3,922	44% HFC-125 , 4% HFC-134a , 52% HFC 143a
R-406A	0	55% HCFC-22 , 41% HCFC-142b , 4% isobutane
R-407A	2,107	20% HFC-32 , 40% HFC-125 , 40% HFC-134a
R-407B	2,804	10% HFC-32 , 70% HFC-125 , 20% HFC-134a
R-407C	1,774	23% HFC-32 , 25% HFC-125 , 52% HFC-134a
R-407D	1,627	15% HFC-32 , 15% HFC-125 , 70% HFC-134a
R-407E	1,552	25% HFC-32 , 15% HFC-125 , 60% HFC-134a
R-408A	2,301	47% HCFC-22 , 7% HFC-125 , 46% HFC 143a
R-409A	0	60% HCFC-22, 25% HCFC-124, 15% HCFC-142b
R-410A	2,088	50% HFC-32 , 50% HFC-125
R-410B	2,229	45% HFC-32 , 55% HFC-125
R-411A	14	87.5% HCFC-22 , 11 HFC-152a , 1.5% propylene
R-411B	4	94% HCFC-22, 3% HFC-152a, 3% propylene
R-413A	2,053	88% HFC-134a , 9% PFC-218 , 3% isobutane
R-414A	0	51% HCFC-22, 28.5% HCFC-124, 16.5% HCFC-142b
R-414B	0	5% HCFC-22, 39% HCFC-124, 9.5% HCFC-142b
R-417A	2,346	46.6% HFC-125 , 5% HFC-134a , 3.4% butane
R-422A	3,143	85.1% HFC-125 , 11.5% HFC-134a , 3.4% isobutane
R-422D	2,729	65.1% HFC-125 , 31.5% HFC-134a , 3.4% isobutane
R-423A	2,280	47.5% HFC-227ea , 52.5% HFC-134a ,
R-424A	2,440	50.5% HFC-125, 47% HFC-134a, 2.5% butane/pentane
R-426A	1,508	5.1% HFC-125, 93% HFC-134a, 1.9% butane/pentane
R-428A	3,607	77.5% HFC-125 , 2% HFC-143a , 1.9% isobutane
R-434A	3,245	63.2% HFC-125, 16% HFC-134a, 18% HFC-143a, 2.8% isobutane
R-500	32	73.8% CFC-12 , 26.2% HFC-152a , 48.8% HCFC-22
R-502	0	48.8% HCFC-22 , 51.2% CFC-115
R-504	325	48.2% HFC-32 , 51.8% CFC-115
R-507	3,985	5% HFC-125 , 5% HFC143a
R-508A	13,214	39% HFC-23, 61% PFC-116
R-508B	13,396	46% HFC-23 , 54% PFC-116

Source: 100-year GWPs from IPCC Fourth Assessment Report (AR4), 2007. See the source note to Table 9 for further explanation. GWPs of blended refrigerants are based on their HFC and PFC constituents, which are based on data from http://www.epa.gov/ozone/snap/refrigerants/refblend.html.