

Global Warming Potential Values

The following table includes the 100-year time horizon global warming potentials (GWP) relative to CO₂. This table is adapted from the IPCC Fifth Assessment Report, 2014 (AR5)ⁱ. The AR5 values are the most recent, but the second assessment report (1995) and fourth assessment report (2007) values are also listed because they are sometimes used for inventory and reporting purposes. For more information, please see the IPCC website (www.ipcc.ch). The use of the latest (AR5) values is recommended. Please note that the GWP values provided here from the AR5 for non-CO₂ gases do not include climate-carbon feedbacks.

Global warming potential (GWP) values relative to CO₂

Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon		
		Second Assessment Report (SAR)	Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)
Carbon dioxide	CO ₂	1	1	1
Methane	CH ₄	21	25	28
Nitrous oxide	N ₂ O	310	298	265

Substances controlled by the Montreal Protocol

CFC-11	CCl ₃ F	3,800	4,750	4,660
CFC-12	CCl ₂ F ₂	8,100	10,900	10,200
CFC-13	CClF ₃		14,400	13,900
CFC-113	CCl ₂ FCF ₂	4,800	6,130	5,820
CFC-114	CClF ₂ CClF ₂		10,000	8,590
CFC-115	CClF ₂ CF ₃		7,370	7,670
Halon-1301	CBrF ₃	5,400	7,140	6,290
Halon-1211	CBrClF ₂		1,890	1,750
Halon-2402	CBrF ₂ CBrF ₂		1,640	1,470
Carbon tetrachloride	CCl ₄	1,400	1,400	1,730
Methyl bromide	CH ₃ Br		5	2
Methyl chloroform	CH ₃ CCl ₃	100	146	160

Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon		
		Second assessment report (SAR)	Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)
HCFC-21	CHCl ₂ F			148
HCFC-22	CHClF ₂	1,500	1,810	1,760
HCFC-123	CHCl ₂ CF ₃	90	77	79
HCFC-124	CHClFCF ₃	470	609	527
HCFC-141b	CH ₃ CCl ₂ F	600	725	782
HCFC-142b	CH ₃ CCIF ₂	1,800	2,310	1,980
HCFC-225ca	CHCl ₂ CF ₂ CF ₃		122	127
HCFC-225cb	CHClFCF ₂ CCIF ₂		595	525
Hydrofluorocarbons (HFCs)				
HFC-23	CHF ₃	11,700	14,800	12,400
HFC-32	CH ₂ F ₂	650	675	677
HFC-41	CH ₃ F ₂	150		116
HFC-125	CHF ₂ CF ₃	2,800	3,500	3,170
HFC-134	CHF ₂ CHF ₂	1000		1,120
HFC-134a	CH ₂ FCF ₃	1,300	1,430	1,300
HFC-143	CH ₂ FCHF ₂	300		328
HFC-143a	CH ₃ CF ₃	3,800	4,470	4,800
HFC-152	CH ₂ FCH ₂ F			16
HFC-152a	CH ₃ CHF ₂	140	124	138
HFC-161	CH ₃ CH ₂ F			4
HFC-227ea	CF ₃ CHFCF ₃	2,900	3,220	3,350
HFC-236cb	CH ₂ FCF ₂ CF ₃			1,210
HFC-236ea	CHF ₂ CHFCF ₃			1,330
HFC-236fa	CF ₃ CH ₂ CF ₃	6,300	9,810	8,060
HFC-245ca	CH ₂ FCF ₂ CHF ₂	560		716
HFC-245fa	CHF ₂ CH ₂ CF ₃		1,030	858
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃		794	804
HFC-43-10mee	CF ₃ CHFCHFCF ₂ CF ₃	1,300	1,640	1,650

Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon		
		Second assessment report (SAR)	Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)
Perfluorinated compounds				
Sulfur hexafluoride	SF ₆	23,900	22,800	23,500
Nitrogen trifluoride	NF ₃		17,200	16,100
PFC-14	CF ₄	6,500	7,390	6,630
PFC-116	C ₂ F ₆	9,200	12,200	11,100
PFC-218	C ₃ F ₈	7,000	8,830	8,900
PFC-318	c-C ₄ F ₈	8,700	10,300	9,540
PFC-31-10	C ₄ F ₁₀	7,000	8,860	9,200
PFC-41-12	C ₅ F ₁₂	7,500	9,160	8,550
PFC-51-14	C ₆ F ₁₄	7,400	9,300	7,910
PCF-91-18	C ₁₀ F ₁₈		>7,500	7,190
Trifluoromethyl sulfur pentafluoride	SF ₅ CF ₃		17,700	17,400
Perfluorocyclopropane	c-C ₃ F ₆			9,200
Fluorinated ethers				
HFE-125	CHF ₂ OCF ₃		14,900	12,400
HFE-134	CHF ₂ OCHF ₂		6,320	5,560
HFE-143a	CH ₃ OCF ₃		756	523
HCFE-235da2	CHF ₂ OCHClCF ₃		350	491
HFE-245cb2	CH ₃ OCF ₂ CF ₃		708	654
HFE-245fa2	CHF ₂ OCH ₂ CF ₃		659	812
HFE-347mcc3	CH3OCF2CF2CF3		575	530
HFE-347pcf2	CHF2CF2OCH2CF3		580	889
HFE-356pcc3	CH3OCF2CF2CHF2		110	413
HFE-449sl (HFE-7100)	C4F9OCH3		297	421
HFE-569sf2 (HFE-7200)	C4F9OC2H5		59	57
HFE-43-10pccc124 (H-Galden 1040x)	CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂		1,870	2,820
HFE-236ca12 (HG-10)	CHF2OCF2OCHF2		2,800	5,350

Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon		
		Second assessment report (SAR)	Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)
HFE-338pcc13 (HG-01)	CHF ₂ OCF ₂ CF ₂ OCHF ₂		1,500	2,910
HFE-227ea	CF ₃ CHFOCF ₃			6,450
HFE-236ea2	CHF ₂ OCHF ₂ CF ₃			1,790
HFE-236fa	CF ₃ CH ₂ OCF ₃			979
HFE-245fa1	CHF ₂ CH ₂ OCF ₃			828
HFE 263fb2	CF ₃ CH ₂ OCH ₃			1
HFE-329mcc2	CHF ₂ CF ₂ OCF ₂ CF ₃			3,070
HFE-338mcf2	CF ₃ CH ₂ OCF ₂ CF ₃			929
HFE-347mcf2	CHF ₂ CH ₂ OCF ₂ CF ₃			854
HFE-356mec3	CH ₃ OCF ₂ CHFCF ₃			387
HFE-356pcf2	CHF ₂ CH ₂ OCF ₂ CHF ₂			719
HFE-356pcf3	CHF ₂ OCH ₂ CF ₂ CHF ₂			446
HFE 365mcf3	CF ₃ CF ₂ CH ₂ OCH ₃			<1
HFE-374pc2	CHF ₂ CF ₂ OCH ₂ CH ₃			627

Perfluoropolyethers

PFPME	CF ₃ OCF(CF ₃)CF ₂ OCF ₂ OCF ₃		10,300	9,710
-------	--	--	--------	-------

Hydrocarbons and other compounds - direct effects

Chloroform	CHCl ₃	4		16
Methylene chloride	CH ₂ Cl ₂	9	8.7	9
Methyl chloride	CH ₃ Cl		13	12
Halon-1201	CHBrF ₂			376

IPCC data sources for more information:

- AR4 values: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html
- AR5 values: https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf (p. 73-79)

ⁱ Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestad, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura and H. Zhang, 2013: Anthropogenic and Natural Radiative Forcing. In: 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.