

Appendix 8.A: Lifetimes, Radiative Efficiencies and Metric Values

Table 8.A.1 | Radiative efficiencies (REs), lifetimes/adjustment times, AGWP and GWP values for 20 and 100 years, and AGTP and GTP values for 20, 50 and 100 years. Climate–carbon feedbacks are included for CO₂ while no climate feedbacks are included for the other components (see discussion in Sections 8.7.1.4 and 8.7.2.1, Supplementary Material and notes below the table; Supplementary Material Table 8.SM.16 gives analogous values including climate–carbon feedbacks for non-CO₂ emissions). For a complete list of chemical names and CAS numbers, and for accurate replications of metric values, see Supplementary Material Section 8.SM.13 and references therein.

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
Carbon dioxide	CO ₂	see*	1.37e-5	2.49e-14	1	9.17e-14	1	6.84e-16	1	6.17e-16	1	5.47e-16	1
Methane	CH ₄	12.4 [†]	3.63e-4	2.09e-12	84	2.61e-12	28	4.62e-14	67	8.69e-15	14	2.34e-15	4
Fossil methane‡	CH ₄	12.4 [†]	3.63e-4	2.11e-12	85	2.73e-12	30	4.68e-14	68	9.55e-15	15	3.11e-15	6
Nitrous Oxide	N ₂ O	121 [†]	3.00e-3	6.58e-12	264	2.43e-11	265	1.89e-13	277	1.74e-13	282	1.28e-13	234
Chlorofluorocarbons													
CFC-11	CCl ₃ F	45.0	0.26	1.72e-10	6900	4.28e-10	4660	4.71e-12	6890	3.01e-12	4890	1.28e-12	2340
CFC-12	CCl ₂ F ₂	100.0	0.32	2.69e-10	10,800	9.39e-10	10,200	7.71e-12	11,300	6.75e-12	11,000	4.62e-12	8450
CFC-13	CClF ₃	640.0	0.25	2.71e-10	10,900	1.27e-09	13,900	7.99e-12	11,700	8.77e-12	14,200	8.71e-12	15,900
CFC-113	CCl ₂ FCF ₂	85.0	0.30	1.62e-10	6490	5.34e-10	5820	4.60e-12	6730	3.85e-12	6250	2.45e-12	4470
CFC-114	CClF ₂ CClF ₂	190.0	0.31	1.92e-10	7710	7.88e-10	8590	5.60e-12	8190	5.56e-12	9020	4.68e-12	8550
CFC-115	CClF ₂ CF ₃	1,020.0	0.20	1.46e-10	5860	7.03e-10	7670	4.32e-12	6310	4.81e-12	7810	4.91e-12	8980
Hydrochlorofluorocarbons													
HCFC-21	CHCl ₂ F	1.7	0.15	1.35e-11	543	1.35e-11	148	1.31e-13	192	1.59e-14	26	1.12e-14	20
HCFC-22	CHClF ₂	11.9	0.21	1.32e-10	5280	1.62e-10	1760	2.87e-12	4200	5.13e-13	832	1.43e-13	262
HCFC-122	CHCl ₂ CF ₂ Cl	1.0	0.17	5.43e-12	218	5.43e-12	59	4.81e-14	70	6.25e-15	10	4.47e-15	8
HCFC-122a	CHFClCFCl ₂	3.4	0.21	2.36e-11	945	2.37e-11	258	2.91e-13	426	2.99e-14	48	1.96e-14	36
HCFC-123	CHCl ₂ CF ₃	1.3	0.15	7.28e-12	292	7.28e-12	79	6.71e-14	98	8.45e-15	14	6.00e-15	11
HCFC-123a	CHClF ₂ CF ₂ Cl	4.0	0.23	3.37e-11	1350	3.39e-11	370	4.51e-13	659	4.44e-14	72	2.81e-14	51
HCFC-124	CHClF ₂ CF ₃	5.9	0.20	4.67e-11	1870	4.83e-11	527	7.63e-13	1120	7.46e-14	121	4.03e-14	74
HCFC-132c	CH ₂ FCFCl ₂	4.3	0.17	3.07e-11	1230	3.10e-11	338	4.27e-13	624	4.14e-14	67	2.58e-14	47
HCFC-141b	CH ₃ CCl ₂ F	9.2	0.16	6.36e-11	2550	7.17e-11	782	1.27e-12	1850	1.67e-13	271	6.09e-14	111
HCFC-142b	CH ₃ CClF ₂	17.2	0.19	1.25e-10	5020	1.82e-10	1980	3.01e-12	4390	8.46e-13	1370	1.95e-13	356
HCFC-225ca	CHCl ₂ CF ₂ CF ₃	1.9	0.22	1.17e-11	469	1.17e-11	127	1.17e-13	170	1.38e-14	22	9.65e-15	18
HCFC-225cb	CHClF ₂ CF ₂ CF ₃	5.9	0.29	4.65e-11	1860	4.81e-11	525	7.61e-13	1110	7.43e-14	120	4.01e-14	73
(E)-1-Chloro-3,3,3-trifluoroprop-1-ene	trans-CF ₃ CH=CHCl	26.0 days	0.04	1.37e-13	5	1.37e-13	1	1.09e-15	2	1.54e-16	<1	1.12e-16	<1

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Table 8.A.1 (continued)

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
Hydrofluorocarbons													
HFC-23	CHF ₃	222.0	0.18	2.70e-10	10,800	1.14e-09	12,400	7.88e-12	11,500	7.99e-12	13,000	6.95e-12	12,700
HFC-32	CH ₂ F ₂	5.2	0.11	6.07e-11	2430	6.21e-11	677	9.32e-13	1360	8.93e-14	145	5.17e-14	94
HFC-41	CH ₃ F	2.8	0.02	1.07e-11	427	1.07e-11	116	1.21e-13	177	1.31e-14	21	8.82e-15	16
HFC-125	CHF ₂ CF ₃	28.2	0.23	1.52e-10	6090	2.91e-10	3170	3.97e-12	5800	1.84e-12	2980	5.29e-13	967
HFC-134	CHF ₂ CHF ₂	9.7	0.19	8.93e-11	3580	1.02e-10	1120	1.82e-12	2660	2.54e-13	412	8.73e-14	160
HFC-134a	CH ₂ FCF ₃	13.4	0.16	9.26e-11	3710	1.19e-10	1300	2.09e-12	3050	4.33e-13	703	1.10e-13	201
HFC-143	CH ₂ FCHF ₂	3.5	0.13	3.00e-11	1200	3.01e-11	328	3.76e-13	549	3.82e-14	62	2.49e-14	46
HFC-143a	CH ₃ CF ₃	47.1	0.16	1.73e-10	6940	4.41e-10	4800	4.76e-12	6960	3.12e-12	5060	1.37e-12	2500
HFC-152	CH ₂ FCH ₂ F	0.4	0.04	1.51e-12	60	1.51e-12	16	1.25e-14	18	1.71e-15	3	1.24e-15	2
HFC-152a	CH ₃ CHF ₂	1.5	0.10	1.26e-11	506	1.26e-11	138	1.19e-13	174	1.47e-14	24	1.04e-14	19
HFC-161	CH ₃ CH ₂ F	66.0 days	0.02	3.33e-13	13	3.33e-13	4	2.70e-15	4	3.76e-16	<1	2.74e-16	<1
HFC-227ca	CF ₃ CF ₂ CHF ₂	28.2	0.27	1.27e-10	5080	2.42e-10	2640	3.31e-12	4830	1.53e-12	2480	4.41e-13	806
HFC-227ea	CF ₃ CHFCF ₃	38.9	0.26	1.34e-10	5360	3.07e-10	3350	3.61e-12	5280	2.12e-12	3440	7.98e-13	1460
HFC-236cb	CH ₂ FCF ₂ CF ₃	13.1	0.23	8.67e-11	3480	1.11e-10	1210	1.94e-12	2840	3.92e-13	636	1.01e-13	185
HFC-236ea	CHF ₂ CHFCF ₃	11.0	0.30 ^a	1.03e-10	4110	1.22e-10	1330	2.18e-12	3190	3.53e-13	573	1.06e-13	195
HFC-236fa	CF ₃ CH ₂ CF ₃	242.0	0.24	1.73e-10	6940	7.39e-10	8060	5.06e-12	7400	5.18e-12	8400	4.58e-12	8380
HFC-245ca	CH ₂ FCF ₂ CHF ₂	6.5	0.24 ^b	6.26e-11	2510	6.56e-11	716	1.07e-12	1570	1.09e-13	176	5.49e-14	100
HFC-245cb	CF ₃ CF ₂ CH ₃	47.1	0.24	1.67e-10	6680	4.24e-10	4620	4.58e-12	6690	3.00e-12	4870	1.32e-12	2410
HFC-245ea	CHF ₂ CHFCF ₂	3.2	0.16 ^c	2.15e-11	863	2.16e-11	235	2.59e-13	378	2.70e-14	44	1.79e-14	33
HFC-245eb	CH ₂ FCHFCF ₃	3.1	0.20 ^c	2.66e-11	1070	2.66e-11	290	3.15e-13	460	3.31e-14	54	2.20e-14	40
HFC-245fa	CHF ₂ CH ₂ CF ₃	7.7	0.24	7.29e-11	2920	7.87e-11	858	1.35e-12	1970	1.51e-13	245	6.62e-14	121
HFC-263fb	CH ₃ CH ₂ CF ₃	1.2	0.10 ^c	6.93e-12	278	6.93e-12	76	6.31e-14	92	8.02e-15	13	5.70e-15	10
HFC-272ca	CH ₃ CF ₂ CH ₃	2.6	0.07	1.32e-11	530	1.32e-11	144	1.46e-13	213	1.61e-14	26	1.09e-14	20
HFC-329p	CHF ₂ CF ₂ CF ₂ CF ₃	28.4	0.31	1.13e-10	4510	2.16e-10	2360	2.94e-12	4290	1.37e-12	2220	3.96e-13	725
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	8.7	0.22	6.64e-11	2660	7.38e-11	804	1.30e-12	1890	1.62e-13	262	6.24e-14	114
HFC-43-10mee	CF ₃ CHFCF ₂ CF ₃	16.1	0.42 ^b	1.08e-10	4310	1.51e-10	1650	2.54e-12	3720	6.62e-13	1070	1.54e-13	281
HFC-1132a	CH ₂ =CF ₂	4.0 days	0.004 ^d	3.87e-15	<1	3.87e-15	<1	3.08e-17	<1	4.35e-18	<1	3.18e-18	<1
HFC-1141	CH ₂ =CHF	2.1 days	0.002 ^d	1.54e-15	<1	1.54e-15	<1	1.23e-17	<1	1.73e-18	<1	1.27e-18	<1
(Z)-HFC-1225ye	CF ₃ CF=CHF(Z)	8.5 days	0.02	2.14e-14	<1	2.14e-14	<1	1.70e-16	<1	2.40e-17	<1	1.76e-17	<1
(E)-HFC-1225ye	CF ₃ CF=CHF(E)	4.9 days	0.01	7.25e-15	<1	7.25e-15	<1	5.77e-17	<1	8.14e-18	<1	5.95e-18	<1
(Z)-HFC-1234ze	CF ₃ CH=CHF(Z)	10.0 days	0.02	2.61e-14	1	2.61e-14	<1	2.08e-16	<1	2.93e-17	<1	2.14e-17	<1
HFC-1234yf	CF ₃ CF=CH ₂	10.5 days	0.02	3.22e-14	1	3.22e-14	<1	2.57e-16	<1	3.62e-17	<1	2.65e-17	<1
(E)-HFC-1234ze	trans-CF ₃ CH=CHF	16.4 days	0.04	8.74e-14	4	8.74e-14	<1	6.98e-16	<1	9.82e-17	<1	7.18e-17	<1
(Z)-HFC-1336	CF ₃ CH=CHCF ₃ (Z)	22.0 days	0.07 ^d	1.54e-13	6	1.54e-13	2	1.23e-15	2	1.73e-16	<1	1.26e-16	<1

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Table 8.A.1 (continued)

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
HFC-1243zf	CF ₃ CH=CH ₂	7.0 days	0.01	1.37e-14	1	1.37e-14	<1	1.09e-16	<1	1.53e-17	<1	1.12e-17	<1
HFC-1345zfc	C ₂ F ₅ CH=CH ₂	7.6 days	0.01	1.15e-14	<1	1.15e-14	<1	9.19e-17	<1	1.30e-17	<1	9.48e-18	<1
3,3,4,4,5,5,6,6,6-Nonafluorohex-1-ene	C ₄ F ₉ CH=CH ₂	7.6 days	0.03	1.25e-14	<1	1.25e-14	<1	9.92e-17	<1	1.40e-17	<1	1.02e-17	<1
3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooct-1-ene	C ₆ F ₁₃ CH=CH ₂	7.6 days	0.03	9.89e-15	<1	9.89e-15	<1	7.87e-17	<1	1.11e-17	<1	8.12e-18	<1
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Hep-tadecafluorodec-1-ene	C ₈ F ₁₇ CH=CH ₂	7.6 days	0.03	8.52e-15	<1	8.52e-15	<1	6.79e-17	<1	9.57e-18	<1	7.00e-18	<1
Chlorocarbons and Hydrochlorocarbons													
Methyl chloroform	CH ₃ CCl ₃	5.0	0.07	1.44e-11	578	1.47e-11	160	2.17e-13	317	2.07e-14	34	1.22e-14	22
Carbon tetrachloride	CCl ₄	26.0	0.17	8.69e-11	3480	1.59e-10	1730	2.24e-12	3280	9.68e-13	1570	2.62e-13	479
Methyl chloride	CH ₃ Cl	1.0	0.01 ^a	1.12e-12	45	1.12e-12	12	9.93e-15	15	1.29e-15	2	9.20e-16	2
Methylene chloride	CH ₂ Cl ₂	0.4	0.03 ^b	8.18e-13	33	8.18e-13	9	6.78e-15	10	9.26e-16	2	6.72e-16	1
Chloroform	CHCl ₃	0.4	0.08	1.50e-12	60	1.50e-12	16	1.25e-14	18	1.70e-15	3	1.24e-15	2
1,2-Dichloroethane	CH ₂ ClCH ₂ Cl	65.0 days	0.01	8.24e-14	3	8.24e-14	<1	6.67e-16	<1	9.29e-17	<1	6.77e-17	<1
Bromocarbons, Hydrobromocarbons and Halons													
Methyl bromide	CH ₃ Br	0.8	0.004	2.16e-13	9	2.16e-13	2	1.87e-15	3	2.47e-16	<1	1.78e-16	<1
Methylene bromide	CH ₂ Br ₂	0.3	0.01	9.31e-14	4	9.31e-14	1	7.66e-16	1	1.05e-16	<1	7.65e-17	<1
Halon-1201	CHBrF ₂	5.2	0.15	3.37e-11	1350	3.45e-11	376	5.17e-13	756	4.96e-14	80	2.87e-14	52
Halon-1202	CBBrF ₂	2.9	0.27	2.12e-11	848	2.12e-11	231	2.43e-13	356	2.61e-14	42	1.75e-14	32
Halon-1211	CBrClF ₂	16.0	0.29	1.15e-10	4590	1.60e-10	1750	2.70e-12	3950	6.98e-13	1130	1.62e-13	297
Halon-1301	CBrF ₃	65.0	0.30	1.95e-10	7800	5.77e-10	6290	5.46e-12	7990	4.16e-12	6750	2.28e-12	4170
Halon-2301	CH ₂ BrCF ₃	3.4	0.14	1.59e-11	635	1.59e-11	173	1.96e-13	286	2.01e-14	33	1.32e-14	24
Halon-2311 / Halothane	CHBrClCF ₃	1.0	0.13	3.77e-12	151	3.77e-12	41	3.35e-14	49	4.34e-15	7	3.10e-15	6
Halon-2401	CHFBrCF ₃	2.9	0.19	1.68e-11	674	1.68e-11	184	1.94e-13	283	2.07e-14	34	1.39e-14	25
Halon-2402	CBrF ₂ CBBrF ₂	20.0	0.31	8.59e-11	3440	1.35e-10	1470	2.12e-12	3100	7.08e-13	1150	1.66e-13	304
Fully Fluorinated Species													
Nitrogen trifluoride	NF ₃	500.0	0.20	3.19e-10	12,800	1.47e-09	16,100	9.39e-12	13,700	1.02e-11	16,500	9.91e-12	18,100
Sulphur hexafluoride	SF ₆	3,200.0	0.57	4.37e-10	17,500	2.16e-09	23,500	1.29e-11	18,900	1.47e-11	23,800	1.54e-11	28,200
(Trifluoromethyl) sulphur pentafluoride	SF ₅ CF ₃	800.0	0.59	3.36e-10	13,500	1.60e-09	17,400	9.93e-12	14,500	1.10e-11	17,800	1.11e-11	20,200
Sulphuryl fluoride	SO ₂ F ₂	36.0	0.20	1.71e-10	6840	3.76e-10	4090	4.58e-12	6690	2.55e-12	4140	9.01e-13	1650
PFC-14	CF ₄	50,000.0	0.09	1.22e-10	4880	6.08e-10	6630	3.61e-12	5270	4.12e-12	6690	4.40e-12	8040
PFC-116	C ₂ F ₆	10,000.0	0.25	2.05e-10	8210	1.02e-09	11,100	6.07e-12	8880	6.93e-12	11,200	7.36e-12	13,500
PFC-c216	c-C ₃ F ₆	3,000.0	0.23 ^c	1.71e-10	6850	8.44e-10	9200	5.06e-12	7400	5.74e-12	9310	6.03e-12	11,000
PFC-218	C ₃ F ₈	2,600.0	0.28	1.66e-10	6640	8.16e-10	8900	4.91e-12	7180	5.56e-12	9010	5.83e-12	10,700
PFC-318	c-C ₄ F ₈	3,200.0	0.32	1.77e-10	7110	8.75e-10	9540	5.25e-12	7680	5.96e-12	9660	6.27e-12	11,500

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Table 8.A.1 (continued)

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
PFC-31-10	C ₄ F ₁₀	2,600.0	0.36	1.71e-10	6870	8.44e-10	9200	5.08e-12	7420	5.75e-12	9320	6.02e-12	11,000
Perfluorocyclopentene	c-C ₅ F ₈	31.0 days	0.08 ^f	1.71e-13	7	1.71e-13	2	1.37e-15	2	1.92e-16	<1	1.40e-16	<1
PFC-41-12	n-C ₅ F ₁₂	4,100.0	0.41	1.58e-10	6350	7.84e-10	8550	4.69e-12	6860	5.33e-12	8650	5.62e-12	10,300
PFC-51-14	n-C ₆ F ₁₄	3,100.0	0.44	1.47e-10	5890	7.26e-10	7910	4.35e-12	6370	4.94e-12	8010	5.19e-12	9490
PFC-61-16	n-C ₇ F ₁₆	3,000.0	0.50	1.45e-10	5830	7.17e-10	7820	4.31e-12	6290	4.88e-12	7920	5.13e-12	9380
PFC-71-18	C ₈ F ₁₈	3,000.0	0.55	1.42e-10	5680	6.99e-10	7620	4.20e-12	6130	4.76e-12	7710	5.00e-12	9140
PFC-91-18	C ₁₀ F ₁₈	2,000.0	0.55	1.34e-10	5390	6.59e-10	7190	3.98e-12	5820	4.49e-12	7290	4.68e-12	8570
Perfluorodecalin (cis)	Z-C ₁₀ F ₁₈	2,000.0	0.56	1.35e-10	5430	6.64e-10	7240	4.01e-12	5860	4.52e-12	7340	4.72e-12	8630
Perfluorodecalin (trans)	E-C ₁₀ F ₁₈	2,000.0	0.48	1.18e-10	4720	5.77e-10	6290	3.48e-12	5090	3.93e-12	6380	4.10e-12	7500
PFC-1114	CF ₂ =CF ₂	1.1 days	0.002	2.68e-16	<1	2.68e-16	<1	2.13e-18	<1	3.00e-19	<1	2.20e-19	<1
PFC-1216	CF ₃ CF=CF ₂	4.9 days	0.01	6.42e-15	<1	6.42e-15	<1	5.11e-17	<1	7.21e-18	<1	5.27e-18	<1
Perfluorobuta-1,3-diene	CF ₂ =CFCF=CF ₂	1.1 days	0.003	3.29e-16	<1	3.29e-16	<1	2.61e-18	<1	3.69e-19	<1	2.70e-19	<1
Perfluorobut-1-ene	CF ₃ CF ₂ CF=CF ₂	6.0 days	0.02	8.38e-15	<1	8.38e-15	<1	6.67e-17	<1	9.41e-18	<1	6.88e-18	<1
Perfluorobut-2-ene	CF ₃ CF=CFCF ₃	31.0 days	0.07	1.62e-13	6	1.62e-13	2	1.30e-15	2	1.82e-16	<1	1.33e-16	<1
Halogenated Alcohols and Ethers													
HFE-125	CHF ₂ OCF ₃	119.0	0.41	3.10e-10	12,400	1.14e-09	12,400	8.91e-12	13,000	8.14e-12	13,200	5.97e-12	10,900
HFE-134 (HG-00)	CHF ₂ OCHF ₂	24.4	0.44	2.90e-10	11,600	5.10e-10	5560	7.42e-12	10,800	3.02e-12	4900	7.83e-13	1430
HFE-143a	CH ₃ OCF ₃	4.8	0.18	4.72e-11	1890	4.80e-11	523	6.95e-13	1020	6.66e-14	108	3.99e-14	73
HFE-227ea	CF ₃ CHFOCF ₃	51.6	0.44	2.22e-10	8900	5.92e-10	6450	6.15e-12	8980	4.22e-12	6850	1.98e-12	3630
HCFE-235ca2 (enflurane)	CHF ₂ OCF ₂ CHFCI	4.3	0.41	5.30e-11	2120	5.35e-11	583	7.36e-13	1080	7.14e-14	116	4.44e-14	81
HCFE-235da2 (isoflurane)	CHF ₂ OCHCICF ₃	3.5	0.42	4.49e-11	1800	4.50e-11	491	5.62e-13	822	5.72e-14	93	3.73e-14	68
HFE-236ca	CHF ₂ OCF ₂ CHF ₂	20.8	0.56 ^g	2.42e-10	9710	3.89e-10	4240	6.03e-12	8820	2.10e-12	3400	4.98e-13	912
HFE-236ea2 (desflurane)	CHF ₂ OCHF ₂ CF ₃	10.8	0.45	1.39e-10	5550	1.64e-10	1790	2.93e-12	4280	4.64e-13	753	1.42e-13	260
HFE-236fa	CF ₃ CH ₂ OCF ₃	7.5	0.36	8.35e-11	3350	8.98e-11	979	1.53e-12	2240	1.68e-13	273	7.54e-14	138
HFE-245cb2	CF ₃ CF ₂ OCH ₃	4.9	0.33	5.90e-11	2360	6.00e-11	654	8.77e-13	1280	8.40e-14	136	4.99e-14	91
HFE-245fa1	CHF ₂ CH ₂ OCF ₃	6.6	0.31	7.22e-11	2900	7.59e-11	828	1.25e-12	1820	1.27e-13	206	6.35e-14	116
HFE-245fa2	CHF ₂ OCH ₂ CF ₃	5.5	0.36	7.25e-11	2910	7.45e-11	812	1.15e-12	1670	1.10e-13	179	6.21e-14	114
2,2,3,3,3-Pentafluoropropan-1-ol	CF ₃ CF ₂ CH ₂ OH	0.3	0.14	1.72e-12	69	1.72e-12	19	1.42e-14	21	1.95e-15	3	1.42e-15	3
HFE-254cb1	CH ₃ OCF ₂ CHF ₂	2.5	0.26	2.76e-11	1110	2.76e-11	301	2.99e-13	438	3.34e-14	54	2.28e-14	42
HFE-263fb2	CF ₃ CH ₂ OCH ₃	23.0 days	0.04	1.22e-13	5	1.22e-13	1	9.72e-16	1	1.37e-16	<1	9.98e-17	<1
HFE-263m1	CF ₃ OCH ₂ CH ₃	0.4	0.13	2.70e-12	108	2.70e-12	29	2.25e-14	33	3.06e-15	5	2.22e-15	4
3,3,3-Trifluoropropan-1-ol	CF ₃ CH ₂ CH ₂ OH	12.0 days	0.02	3.57e-14	1	3.57e-14	<1	2.85e-16	<1	4.01e-17	<1	2.93e-17	<1
HFE-329mcc2	CHF ₂ CF ₂ OCF ₂ CF ₃	22.5	0.53	1.68e-10	6720	2.81e-10	3070	4.23e-12	6180	1.59e-12	2580	3.93e-13	718
HFE-338mmz1	(CF ₃) ₂ CHOCHF ₂	21.2	0.44	1.48e-10	5940	2.40e-10	2620	3.70e-12	5410	1.31e-12	2130	3.14e-13	575

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Table 8.A.1 (continued)

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
HFE-338mcf2	CF ₃ CH ₂ OCF ₂ CF ₃	7.5	0.44	7.93e-11	3180	8.52e-11	929	1.45e-12	2120	1.60e-13	259	7.16e-14	131
Sevoflurane (HFE-347mmz1)	(CF ₃) ₂ CHOCH ₂ F	2.2	0.32	1.98e-11	795	1.98e-11	216	2.06e-13	302	2.37e-14	38	1.64e-14	30
HFE-347mcc3 (HFE-7000)	CH ₃ OCF ₂ CF ₂ CF ₃	5.0	0.35	4.78e-11	1910	4.86e-11	530	7.18e-13	1050	6.87e-14	111	4.05e-14	74
HFE-347mcf2	CHF ₂ CH ₂ OCF ₂ CF ₃	6.6	0.42	7.45e-11	2990	7.83e-11	854	1.29e-12	1880	1.31e-13	212	6.55e-14	120
HFE-347pcf2	CHF ₂ CF ₂ OCH ₂ CF ₃	6.0	0.48 ^h	7.86e-11	3150	8.15e-11	889	1.30e-12	1900	1.27e-13	206	6.81e-14	124
HFE-347mmy1	(CF ₃) ₂ CFOCH ₃	3.7	0.32	3.32e-11	1330	3.33e-11	363	4.27e-13	624	4.28e-14	69	2.76e-14	51
HFE-356mec3	CH ₃ OCF ₂ CHF ₂ CF ₃	3.8	0.30	3.53e-11	1410	3.55e-11	387	4.60e-13	673	4.58e-14	74	2.94e-14	54
HFE-356mf2	CF ₃ CH ₂ OCH ₂ CF ₃	105.0 days	0.17	1.54e-12	62	1.54e-12	17	1.26e-14	18	1.74e-15	3	1.26e-15	2
HFE-356pcf2	CHF ₂ CH ₂ OCF ₂ CHF ₂	5.7	0.37	6.40e-11	2560	6.59e-11	719	1.03e-12	1500	9.97e-14	162	5.50e-14	101
HFE-356pcf3	CHF ₂ OCH ₂ CF ₂ CHF ₂	3.5	0.38	4.08e-11	1640	4.09e-11	446	5.11e-13	747	5.20e-14	84	3.39e-14	62
HFE-356pcc3	CH ₃ OCF ₂ CF ₂ CHF ₂	3.8	0.32	3.77e-11	1510	3.79e-11	413	4.91e-13	718	4.89e-14	79	3.14e-14	57
HFE-356mmz1	(CF ₃) ₂ CHOCH ₃	97.1 days	0.15	1.25e-12	50	1.25e-12	14	1.02e-14	15	1.41e-15	2	1.02e-15	2
HFE-365mcf3	CF ₃ CF ₂ CH ₂ OCH ₃	19.3 days	0.05	8.51e-14	3	8.51e-14	<1	6.80e-16	<1	9.56e-17	<1	6.99e-17	<1
HFE-365mcf2	CF ₃ CF ₂ OCH ₂ CH ₃	0.6	0.26 ⁱ	5.35e-12	215	5.35e-12	58	4.53e-14	66	6.10e-15	10	4.40e-15	8
HFE-374pc2	CHF ₂ CF ₂ OCH ₂ CH ₃	5.0	0.30	5.65e-11	2260	5.75e-11	627	8.48e-13	1240	8.12e-14	132	4.79e-14	88
4,4,4-Trifluorobutan-1-ol	CF ₃ (CH ₂) ₃ CH ₂ OH	4.0 days	0.01	1.73e-15	<1	1.73e-15	<1	1.38e-17	<1	1.94e-18	<1	1.42e-18	<1
2,2,3,3,4,4,5,5-Octafluorocyclopentanol	-(CF ₂) ₄ CH(OH)-	0.3	0.16	1.18e-12	47	1.18e-12	13	9.67e-15	14	1.33e-15	2	9.69e-16	2
HFE-43-10pccc124 (H-Galden 1040x, HG-11)	CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂	13.5	1.02	2.00e-10	8010	2.58e-10	2820	4.52e-12	6600	9.46e-13	1530	2.38e-13	436
HFE-449s1 (HFE-7100)	C ₄ F ₉ OCH ₃	4.7	0.36	3.80e-11	1530	3.86e-11	421	5.54e-13	809	5.32e-14	86	3.21e-14	59
n-HFE-7100	n-C ₄ F ₉ OCH ₃	4.7	0.42	4.39e-11	1760	4.45e-11	486	6.39e-13	934	6.14e-14	99	3.70e-14	68
i-HFE-7100	i-C ₄ F ₉ OCH ₃	4.7	0.35	3.68e-11	1480	3.73e-11	407	5.35e-13	783	5.14e-14	83	3.10e-14	57
HFE-569sf2 (HFE-7200)	C ₄ F ₉ OC ₂ H ₅	0.8	0.30	5.21e-12	209	5.21e-12	57	4.52e-14	66	5.97e-15	10	4.29e-15	8
n-HFE-7200	n-C ₄ F ₉ OC ₂ H ₅	0.8	0.35 ⁱ	5.92e-12	237	5.92e-12	65	5.14e-14	75	6.78e-15	11	4.87e-15	9
i-HFE-7200	i-C ₄ F ₉ OC ₂ H ₅	0.8	0.24	4.06e-12	163	4.06e-12	44	3.52e-14	52	4.65e-15	8	3.34e-15	6
HFE-236ca12 (HG-10)	CHF ₂ OCF ₂ OCHF ₂	25.0	0.65	2.75e-10	11,000	4.91e-10	5350	7.06e-12	10,300	2.94e-12	4770	7.75e-13	1420
HFE-338pcc13 (HG-01)	CHF ₂ OCF ₂ CF ₂ OCHF ₂	12.9	0.86	2.10e-10	8430	2.67e-10	2910	4.69e-12	6860	9.28e-13	1500	2.42e-13	442
1,1,1,3,3,3-Hexafluoropropan-2-ol	(CF ₃) ₂ CHOH	1.9	0.26	1.67e-11	668	1.67e-11	182	1.66e-13	243	1.97e-14	32	1.38e-14	25
HG-02	HF ₂ C-(OCF ₂ CF ₂) ₂ -OCF ₂ H	12.9	1.24 ⁱ	1.97e-10	7900	2.50e-10	2730	4.40e-12	6430	8.70e-13	1410	2.27e-13	415
HG-03	HF ₂ C-(OCF ₂ CF ₂) ₃ -OCF ₂ H	12.9	1.76 ⁱ	2.06e-10	8270	2.62e-10	2850	4.60e-12	6730	9.10e-13	1480	2.37e-13	434
HG-20	HF ₂ C-(OCF ₂) ₂ -OCF ₂ H	25.0	0.92 ⁱ	2.73e-10	10,900	4.86e-10	5300	7.00e-12	10,200	2.91e-12	4730	7.68e-13	1400
HG-21	HF ₂ C-OCF ₂ CF ₂ OCF ₂ OCF ₂ O-CF ₂ H	13.5	1.71 ⁱ	2.76e-10	11,100	3.57e-10	3890	6.23e-12	9110	1.31e-12	2120	3.29e-13	602

Table 8.A.1 (continued)

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Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
HG-30	HF ₂ C-(OCF ₂) ₃ -OCF ₂ H	25.0	1.65 ⁱ	3.77e-10	15,100	6.73e-10	7330	9.68e-12	14,100	4.03e-12	6530	1.06e-12	1940
1-Ethoxy-1,1,2,2,3,3,3-heptafluoropropane	CF ₃ CF ₂ CF ₂ OCH ₂ CH ₃	0.8	0.28 ⁱ	5.56e-12	223	5.56e-12	61	4.80e-14	70	6.36e-15	10	4.57e-15	8
Fluoroxene	CF ₃ CH ₂ OCH=CH ₂	3.6 days	0.01 ⁱ	4.97e-15	<1	4.97e-15	<1	3.95e-17	<1	5.58e-18	<1	4.08e-18	<1
1,1,2,2-Tetrafluoro-1-(fluoromethoxy)ethane	CH ₂ FOCF ₂ CF ₂ H	6.2	0.34 ⁱ	7.68e-11	3080	7.99e-11	871	1.29e-12	1880	1.28e-13	207	6.68e-14	122
2-Ethoxy-3,3,4,4,5-pentafluorotetrahydro-2,5-bis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-furan	C ₁₂ H ₅ F ₁₉ O ₂	1.0	0.49 ⁱ	5.09e-12	204	5.09e-12	56	4.53e-14	66	5.86e-15	10	4.19e-15	8
Fluoro(methoxy)methane	CH ₃ OCH ₂ F	73.0 days	0.07 ^g	1.15e-12	46	1.15e-12	13	9.34e-15	14	1.30e-15	2	9.46e-16	2
Difluoro(methoxy)methane	CH ₃ OCHF ₂	1.1	0.17 ^g	1.32e-11	528	1.32e-11	144	1.18e-13	173	1.52e-14	25	1.08e-14	20
Fluoro(fluoromethoxy)methane	CH ₂ FOCH ₂ F	0.9	0.19 ^g	1.20e-11	479	1.20e-11	130	1.05e-13	153	1.37e-14	22	9.84e-15	18
Difluoro(fluoromethoxy)methane	CH ₂ FOCHF ₂	3.3	0.30 ^g	5.65e-11	2260	5.66e-11	617	6.88e-13	1010	7.11e-14	115	4.69e-14	86
Trifluoro(fluoromethoxy)methane	CH ₂ FOCF ₃	4.4	0.33 ^g	6.82e-11	2730	6.89e-11	751	9.59e-13	1400	9.27e-14	150	5.72e-14	105
HG ⁻ -01	CH ₃ OCF ₂ CF ₂ OCH ₃	2.0	0.29	2.03e-11	815	2.03e-11	222	2.06e-13	301	2.42e-14	39	1.68e-14	31
HG ⁻ -02	CH ₃ O(CF ₂ CF ₂ O) ₂ CH ₃	2.0	0.56	2.16e-11	868	2.16e-11	236	2.19e-13	320	2.57e-14	42	1.79e-14	33
HG ⁻ -03	CH ₃ O(CF ₂ CF ₂ O) ₃ CH ₃	2.0	0.76	2.03e-11	812	2.03e-11	221	2.05e-13	299	2.41e-14	39	1.67e-14	31
HFE-329me3	CF ₃ CFHCF ₂ OCF ₃	40.0	0.48	1.79e-10	7170	4.17e-10	4550	4.85e-12	7090	2.89e-12	4690	1.12e-12	2040
3,3,4,4,5,5,6,6,7,7,7-Undecafluoroheptan-1-ol	CF ₃ (CF ₂) ₄ CH ₂ CH ₂ OH	20.0 days	0.06	3.91e-14	2	3.91e-14	<1	3.12e-16	<1	4.39e-17	<1	3.21e-17	<1
3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-Pentadecafluorononan-1-ol	CF ₃ (CF ₂) ₆ CH ₂ CH ₂ OH	20.0 days	0.07	3.00e-14	1	3.00e-14	<1	2.40e-16	<1	3.37e-17	<1	2.46e-17	<1
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-Nonadecafluoroundecan-1-ol	CF ₃ (CF ₂) ₈ CH ₂ CH ₂ OH	20.0 days	0.05	1.72e-14	<1	1.72e-14	<1	1.37e-16	<1	1.93e-17	<1	1.41e-17	<1
2-Chloro-1,1,2-trifluoro-1-methoxyethane	CH ₃ OCF ₂ CHFCI	1.4	0.21	1.12e-11	449	1.12e-11	122	1.05e-13	153	1.31e-14	21	9.24e-15	17
PPFMIE (perfluoropolymethylisopropyl ether)	CF ₃ OCF(CF ₃) CF ₂ OCF ₂ OCF ₃	800.0	0.65	1.87e-10	7500	8.90e-10	9710	5.52e-12	8070	6.11e-12	9910	6.15e-12	11,300
HFE-216	CF ₃ OCF=CF ₂	8.4 days	0.02	1.92e-14	<1	1.92e-14	<1	1.53e-16	<1	2.15e-17	<1	1.58e-17	<1
Trifluoromethyl formate	HCOOCF ₃	3.5	0.31 ⁱ	5.37e-11	2150	5.39e-11	588	6.73e-13	984	6.85e-14	111	4.47e-14	82
Perfluoroethyl formate	HCOOCF ₂ CF ₃	3.5	0.44 ⁱ	5.30e-11	2130	5.32e-11	580	6.64e-13	971	6.76e-14	110	4.41e-14	81
Perfluoropropyl formate	HCOOCF ₂ CF ₂ CF ₃	2.6	0.50 ⁱ	3.45e-11	1380	3.45e-11	376	3.80e-13	555	4.19e-14	68	2.85e-14	52
Perfluorobutyl formate	HCOOCF ₂ CF ₂ CF ₂ CF ₃	3.0	0.56 ⁱ	3.59e-11	1440	3.59e-11	392	4.19e-13	613	4.45e-14	72	2.97e-14	54
2,2,2-Trifluoroethyl formate	HCOOCH ₂ CF ₃	0.4	0.16 ⁱ	3.07e-12	123	3.07e-12	33	2.55e-14	37	3.48e-15	6	2.52e-15	5
3,3,3-Trifluoropropyl formate	HCOOCH ₂ CH ₂ CF ₃	0.3	0.13 ⁱ	1.60e-12	64	1.60e-12	17	1.31e-14	19	1.80e-15	3	1.31e-15	2
1,2,2,2-Tetrafluoroethyl formate	HCOOCHFCF ₃	3.2	0.35 ⁱ	4.30e-11	1720	4.31e-11	470	5.17e-13	755	5.39e-14	87	3.57e-14	65
1,1,1,3,3,3-Hexafluoropropan-2-yl formate	HCOOCH(CF ₃) ₂	3.2	0.33 ⁱ	3.05e-11	1220	3.05e-11	333	3.66e-13	535	3.81e-14	62	2.53e-14	46
Perfluorobutyl acetate	CH ₃ COOCF ₂ CF ₂ CF ₂ CF ₃	21.9 days	0.12 ⁱ	1.52e-13	6	1.52e-13	2	1.21e-15	2	1.71e-16	<1	1.25e-16	<1
Perfluoropropyl acetate	CH ₃ COOCF ₂ CF ₂ CF ₃	21.9 days	0.11 ⁱ	1.59e-13	6	1.59e-13	2	1.27e-15	2	1.78e-16	<1	1.30e-16	<1
Perfluoroethyl acetate	CH ₃ COOCF ₂ CF ₃	21.9 days	0.10 ⁱ	1.89e-13	8	1.89e-13	2	1.51e-15	2	2.12e-16	<1	1.55e-16	<1
Trifluoromethyl acetate	CH ₃ COOCF ₃	21.9 days	0.07 ⁱ	1.90e-13	8	1.90e-13	2	1.52e-15	2	2.14e-16	<1	1.56e-16	<1

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Table 8.A.1 (continued)

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year	AGTP 20-year (K kg ⁻¹)	GTP 20-year	AGTP 50-year (K kg ⁻¹)	GTP 50-year	AGTP 100-year (K kg ⁻¹)	GTP 100-year
Methyl carbonofluoridate	FCOOCH ₃	1.8	0.07 [†]	8.74e-12	350	8.74e-12	95	8.60e-14	126	1.03e-14	17	7.21e-15	13
1,1-Difluoroethyl carbonofluoridate	FCOOCF ₂ CH ₃	0.3	0.17 [†]	2.46e-12	99	2.46e-12	27	2.02e-14	30	2.78e-15	5	2.02e-15	4
1,1-Difluoroethyl 2,2,2-trifluoroacetate	CF ₃ COOCF ₂ CH ₃	0.3	0.27 [†]	2.83e-12	113	2.83e-12	31	2.33e-14	34	3.20e-15	5	2.32e-15	4
Ethyl 2,2,2-trifluoroacetate	CF ₃ COOCH ₂ CH ₃	21.9 days	0.05 [†]	1.26e-13	5	1.26e-13	1	1.00e-15	1	1.41e-16	<1	1.03e-16	<1
2,2,2-Trifluoroethyl 2,2,2-trifluoroacetate	CF ₃ COOCH ₂ CF ₃	54.8 days	0.15 [†]	6.27e-13	25	6.27e-13	7	5.06e-15	7	7.07e-16	1	5.15e-16	<1
Methyl 2,2,2-trifluoroacetate	CF ₃ COOCH ₃	0.6	0.18 [†]	4.80e-12	192	4.80e-12	52	4.08e-14	60	5.47e-15	9	3.95e-15	7
Methyl 2,2-difluoroacetate	HCF ₂ COOCH ₃	40.1 days	0.05 [†]	3.00e-13	12	3.00e-13	3	2.41e-15	4	3.38e-16	<1	2.47e-16	<1
Difluoromethyl 2,2,2-trifluoroacetate	CF ₂ COOCHF ₂	0.3	0.24 [†]	2.48e-12	99	2.48e-12	27	2.04e-14	30	2.81e-15	5	2.04e-15	4
2,2,3,3,4,4,4-Heptafluorobutan-1-ol	C ₃ F ₇ CH ₂ OH	0.6	0.20	3.10e-12	124	3.10e-12	34	2.61e-14	38	3.52e-15	6	2.55e-15	5
1,1,2-Trifluoro-2-(trifluoromethoxy)-ethane	CHF ₂ CHFOCF ₃	9.8	0.35	9.91e-11	3970	1.14e-10	1240	2.03e-12	2960	2.88e-13	467	9.74e-14	178
1-Ethoxy-1,1,2,3,3,3-hexafluoropropane	CF ₃ CHFCH ₂ OCH ₂ CH ₃	0.4	0.19	2.14e-12	86	2.14e-12	23	1.77e-14	26	2.43e-15	4	1.76e-15	3
1,1,1,2,2,3,3-Heptafluoro-3-(1,2,2,2-tetrafluoroethoxy)-propane	CF ₃ CF ₂ CF ₂ OCHFCF ₃	67.0	0.58	1.98e-10	7940	5.95e-10	6490	5.57e-12	8140	4.29e-12	6960	2.39e-12	4380
2,2,3,3-Tetrafluoro-1-propanol	CHF ₂ CF ₂ CH ₂ OH	91.3 days	0.11	1.19e-12	48	1.19e-12	13	9.72e-15	14	1.35e-15	2	9.79e-16	2
2,2,3,4,4,4-Hexafluoro-1-butanol	CF ₃ CHFCH ₂ CH ₂ OH	94.9 days	0.19	1.56e-12	63	1.56e-12	17	1.27e-14	19	1.76e-15	3	1.28e-15	2
2,2,3,3,4,4,4-Heptafluoro-1-butanol	CF ₃ CF ₂ CF ₂ CH ₂ OH	0.3	0.16	1.49e-12	60	1.49e-12	16	1.23e-14	18	1.69e-15	3	1.23e-15	2
1,1,2,2-Tetrafluoro-3-methoxy-propane	CHF ₂ CF ₂ CH ₂ OCH ₃	14.2 days	0.03	4.82e-14	2	4.82e-14	<1	3.84e-16	<1	5.41e-17	<1	3.96e-17	<1
perfluoro-2-methyl-3-pentanone	CF ₃ CF ₂ C(O)CF(CF ₃) ₂	7.0 days	0.03	9.14e-15	<1	9.14e-15	<1	7.27e-17	<1	1.03e-17	<1	7.51e-18	<1
3,3,3-Trifluoro-propanal	CF ₃ CH ₂ CHO	2.0 days	0.004	9.86e-16	<1	9.86e-16	<1	7.84e-18	<1	1.11e-18	<1	8.10e-19	<1
2-Fluoroethanol	CH ₂ FCH ₂ OH	20.4 days	0.02	8.07e-14	3	8.07e-14	<1	6.45e-16	<1	9.07e-17	<1	6.63e-17	<1
2,2-Difluoroethanol	CHF ₂ CH ₂ OH	40.0 days	0.04	2.78e-13	11	2.78e-13	3	2.23e-15	3	3.12e-16	<1	2.28e-16	<1
2,2,2-Trifluoroethanol	CF ₃ CH ₂ OH	0.3	0.10	1.83e-12	73	1.83e-12	20	1.50e-14	22	2.07e-15	3	1.50e-15	3
1,1'-Oxybis[2-(difluoromethoxy)-1,1,2,2-tetrafluoroethane	HCF ₂ O(CF ₂ CF ₂ O) ₂ CF ₂ H	26.0	1.15 ^k	2.47e-10	9910	4.51e-10	4920	6.38e-12	9320	2.75e-12	4460	7.45e-13	1360
1,1,3,3,4,4,6,6,7,7,9,9,10,10,12,12-hexadecafluoro-2,5,8,11-Tetraoxadodecane	HCF ₂ O(CF ₂ CF ₂ O) ₃ CF ₂ H	26.0	1.43 ^k	2.26e-10	9050	4.12e-10	4490	5.83e-12	8520	2.51e-12	4080	6.81e-13	1250
1,1,3,3,4,4,6,6,7,7,9,9,10,10,12,12,13,13,15,15-eicosafuoro-2,5,8,11,14-Pentaoxapentadecane	HCF ₂ O(CF ₂ CF ₂ O) ₄ CF ₂ H	26.0	1.46 ^k	1.83e-10	7320	3.33e-10	3630	4.71e-12	6880	2.03e-12	3300	5.50e-13	1010

Notes:

For CH₄ we estimate an uncertainty of ±30% and ±40% for 20- and 100-year time horizon, respectively (for 90% uncertainty range). The uncertainty is dominated by AGWP for CO₂ and indirect effects. The uncertainty in GWP for N₂O is estimated to ±20% and ±30% for 20- and 100-year time horizon, with the largest contributions from CO₂. The uncertainty in GWP for HFC-134a is estimated to ±25% and ±35% for 20- and 100-year time horizons while for CFC-11 the GWP the corresponding numbers are approximately ±20% and ±35% (not accounting for the indirect effects). For CFC-12 the corresponding numbers are ±20 and ±30. The uncertainties estimated for HFC-134a and CFC-11 are assessed as representative for most other gases with similar or longer lifetimes. For shorter-lived gases, the uncertainties will be larger. For GTP, few estimates are available in the literature. The uncertainty is assessed to be of the order of ±75% for the methane GTP₁₀₀.

* No single lifetime can be given. The impulse response function for CO₂ from Joos et al. (2013) has been used. See also Supplementary Material Section 8.SM.11.

† Perturbation lifetime is used in calculation of metrics, not the lifetime of the atmospheric burden.

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Table 8.A.1 Notes (continued)

- ‡ Metric values for CH₄ of fossil origin include the oxidation to CO₂ (based on Boucher et al., 2009). In applications of these values, inclusion of the CO₂ effect of fossil methane must be done with caution to avoid any double-counting because CO₂ emissions numbers are often based on total carbon content. Methane values without the CO₂ effect from fossil methane are thus appropriate for fossil methane sources for which the carbon has been accounted for elsewhere, or for biospheric methane sources for which there is abalance between CO₂ taken up by the biosphere and CO₂ produced from CH₄ oxidization. The addition effect on GWP and GTP represents lower limits from Boucher et al. (2009) and assume 50% of the carbon is deposited as formaldehyde to the surface and is then lost. The upper limit in Boucher et al. (2009) made the assumption that this deposited formaldehyde was subsequently further oxidized to CO₂.
- ^a RE is unchanged since AR4.
- ^b RE is unchanged since AR4 except the absolute forcing is increased by a factor of 1.04 to account for the change in the recommended RE of CFC-11.
- ^c Based on Rajakumar et al. (2006) (lifetime correction factor has been applied to account for non-homogeneous horizontal and vertical mixing).
- ^d Based on instantaneous RE from Baasandorj et al. (2010); Baasandorj et al. (2011) (correction factors have been applied to account for stratospheric temperature adjustment and non-homogeneous horizontal and vertical mixing).
- ^e Based on instantaneous RE from *ab initio* study of Bravo et al. (2010) (a factor 1.10 has been applied to account for stratospheric temperature adjustment).
- ^f Based on average instantaneous RE reported in literature (Vasekova et al., 2006; Bravo et al., 2010) (correction factors have been applied to account for stratospheric temperature adjustment and non-homogeneous horizontal and vertical mixing).
- ^g Based on instantaneous RE from *ab initio* studies of Blowers et al. (2007, 2008) (correction factors have been applied to account for stratospheric temperature adjustment and non-homogeneous horizontal and vertical mixing).
- ^h Based on instantaneous RE from Heathfield et al. (1998) (correction factors have been applied to account for stratospheric temperature adjustment and non-homogeneous horizontal and vertical mixing).
- ⁱ Note that calculation of RE is based on calculated (*ab initio*) absorption cross-section and uncertainties are therefore larger than for calculations using experimental absorption cross section.
- ^j Based on instantaneous RE from Javadi et al. (2007) (correction factors have been applied to account for stratospheric temperature adjustment and non-homogeneous horizontal and vertical mixing).
- ^k Based on instantaneous RE from Andersen et al. (2010) (correction factors have been applied to account for stratospheric temperature adjustment and non-homogeneous horizontal and vertical mixing).
- The GTP values are calculated with a temperature impulse response function taken from Boucher and Reddy (2008). See also Supplementary Material Section 8.SM.11.

Table 8.A.2 | Halocarbon indirect GWPs from ozone depletion using the EESC-based method described in WMO (2011), adapted from Daniel et al. (1995). A radiative forcing in year 2011 of -0.15 (-0.30 to 0.0) W m^{-2} relative to preindustrial times is used (see Section 8.3.3). Uncertainty on the indirect AGWPs due to the ozone forcing uncertainty is $\pm 100\%$.

Gas	GWP ₁₀₀
CFC-11	-2640
CFC-12	-2100
CFC-113	-2150
CFC-114	-914
CFC-115	-223
HCFC-22	-98
HCFC-123	-37
HCFC-124	-46
HCFC-141b	-261
HCFC-142b	-152
CH ₂ CCl ₃	-319
CCl ₄	-2110
CH ₃ Br	-1250
Halon-1211	-19,000
Halon-1301	-44,500
Halon-2402	-32,000
HCFC-225ca	-40
HCFC-225cb	-60

Table 8.A.3 | GWP and GTP for NO_x from surface sources for time horizons of 20 and 100 years from the literature. All values are on a per kilogram of nitrogen basis. Uncertainty for numbers from Fry et al. (2012) and Collins et al. (2013) refer to $1-\sigma$. For the reference gas CO₂, RE and IRF from AR4 are used in the calculations. The GWP₁₀₀ and GTP₁₀₀ values can be scaled by 0.94 and 0.92, respectively, to account for updated values for the reference gas CO₂. For 20 years the changes are negligible.

	GWP		GTP	
	H = 20	H = 100	H = 20	H = 100
NO _x East Asia ^a	6.4 (± 38.1)	-5.3 (± 11.5)	-55.6 (± 23.8)	-1.3 (± 2.1)
NO _x EU + North Africa ^a	-39.4 (± 17.5)	-15.6 (± 5.8)	-48.0 (± 14.9)	-2.5 (± 1.3)
NO _x North America ^a	-2.4 (± 30.3)	-8.2 (± 10.3)	-61.9 (± 27.8)	-1.7 (± 2.1)
NO _x South Asia ^a	-40.7 (± 88.3)	-25.3 (± 29.0)	-124.6 (± 67.4)	-4.6 (± 5.1)
NO _x four above regions ^a	-15.9 (± 32.7)	-11.6 (± 10.7)	-62.1 (± 26.2)	-2.2 (± 2.1)
Mid-latitude NO _x ^c	-43 to +23	-18 to +1.6	-55 to -37	-2.9 to -0.02
Tropical NO _x ^c	43 to 130	-28 to -10	-260 to -220	-6.6 to -5.4
NO _x global ^b	19	-11	-87	-2.9
NO _x global ^d	-108 \pm 35 -335 \pm 110 -560 \pm 279	-31 \pm 10 -95 \pm 31 -159 \pm 79		

Notes:

^a Fry et al. (2012) (updated by including stratospheric H₂O) and Collins et al. (2013).

^b Fuglestedt et al. (2010); based on Wild et al. (2001).

^c Fuglestedt et al. (2010).

^d Shindell et al. (2009). Three values are given: First, without aerosols, second, direct aerosol effect included (sulfate and nitrate), third, direct and indirect aerosol effects included. Uncertainty ranges from Shindell et al. (2009) are given for 95% confidence levels.