

Table 1 Production and atmospheric Release
CFC-11 (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative																	
	Annual		Total			Refrigeration hermetic			Refrigeration NON-hermetic			Blowing Agents Closed Cell Foam			Open Cell Foam, Aerosols & Others			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1931	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1932	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1933	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1934	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1935	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
1936	0.1	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	
1937	0.1	0.0	0.3	0.1	0.3	0.0	0.0	0.0	0.3	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
1938	0.1	0.1	0.4	0.1	0.3	0.0	0.0	0.0	0.4	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
1939	0.1	0.1	0.5	0.2	0.3	0.0	0.0	0.0	0.5	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
1940	0.2	0.1	0.7	0.3	0.4	0.0	0.0	0.0	0.7	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	
1941	0.3	0.1	1.0	0.4	0.6	0.0	0.0	0.0	1.0	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	
1942	0.3	0.1	1.3	0.5	0.8	0.0	0.0	0.0	1.3	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	
1943	0.4	0.2	1.7	0.7	1.0	0.0	0.0	0.0	1.7	0.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	
1944	0.4	0.2	2.1	1.0	1.1	0.0	0.0	0.0	2.0	0.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	
1945	0.4	0.3	2.4	1.2	1.2	0.0	0.0	0.0	2.4	1.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	
1946	0.7	0.6	3.2	1.9	1.3	0.0	0.0	0.0	2.5	1.5	1.0	0.0	0.0	0.0	0.7	0.4	0.3	
1947	1.3	1.3	4.5	3.1	1.4	0.0	0.0	0.0	2.5	1.8	0.8	0.0	0.0	0.0	2.0	1.4	0.6	
1948	3.0	2.3	7.6	5.5	2.1	0.0	0.0	0.0	2.7	2.1	0.7	0.0	0.0	0.0	4.8	3.4	1.4	
1949	4.6	3.8	12.1	9.3	2.8	0.0	0.0	0.0	3.0	2.3	0.7	0.0	0.0	0.0	9.1	7.0	2.1	
1950	6.7	5.5	18.8	14.8	4.1	0.0	0.0	0.0	3.5	2.5	0.9	0.1	0.0	0.1	15.3	12.2	3.1	
1951	9.2	7.6	28.0	22.4	5.6	0.0	0.0	0.0	4.0	2.8	1.3	0.2	0.0	0.2	23.8	19.6	4.2	
1952	13.8	11.0	41.8	33.4	8.4	0.0	0.0	0.0	4.9	3.1	1.8	0.4	0.1	0.3	36.5	30.2	6.3	
1953	17.5	15.0	59.3	48.3	11.0	0.0	0.0	0.0	6.0	3.5	2.5	0.7	0.1	0.5	52.7	44.7	8.0	
1954	21.2	18.6	80.6	66.9	13.7	0.0	0.0	0.0	7.4	4.1	3.3	0.9	0.2	0.7	72.3	62.6	9.6	
1955	26.7	23.0	107.2	89.9	17.3	0.0	0.0	0.0	9.0	4.9	4.2	1.3	0.3	1.0	96.9	84.8	12.1	
1956	33.0	28.7	140.2	118.6	21.5	0.0	0.0	0.0	11.1	5.9	5.2	1.8	0.4	1.3	127.3	112.3	15.0	
1957	34.4	32.2	174.6	150.8	23.8	0.0	0.0	0.0	14.1	7.2	6.9	2.4	0.6	1.8	158.2	143.0	15.2	
1958	30.0	30.2	204.6	181.0	23.6	0.0	0.0	0.0	17.7	8.9	8.8	3.0	0.8	2.2	183.9	171.3	12.6	
1959	36.1	30.9	240.7	211.9	28.8	0.0	0.0	0.0	21.7	11.0	10.6	3.9	1.1	2.9	215.1	199.8	15.3	
1960	50.5	40.5	291.2	252.4	38.8	0.0	0.0	0.0	26.6	13.7	12.9	6.0	1.6	4.5	258.5	237.2	21.3	
1961	61.4	52.1	352.5	304.5	48.0	0.0	0.0	0.0	32.4	16.9	15.5	8.8	2.2	6.6	311.4	285.4	26.0	
1962	79.3	65.4	431.8	369.9	61.9	0.0	0.0	0.0	38.5	20.8	17.8	14.5	3.5	11.0	378.8	345.7	33.1	
1963	94.7	80.0	526.5	449.9	76.6	0.0	0.0	0.0	45.4	25.3	20.1	22.7	5.3	17.4	458.4	419.3	39.1	
1964	112.8	95.0	639.3	544.9	94.3	0.0	0.0	0.0	52.5	30.5	22.1	33.9	8.0	25.9	552.8	506.5	46.4	
1965	124.7	108.3	763.9	653.2	110.7	0.0	0.0	0.0	60.4	36.3	24.2	47.3	11.5	35.8	656.2	605.4	50.8	
1966	143.1	121.3	907.1	774.5	132.6	0.0	0.0	0.0	70.1	42.8	27.3	64.1	16.1	48.0	772.9	715.6	57.3	
1967	162.2	137.6	1069.2	912.2	157.1	0.0	0.0	0.0	80.1	49.9	30.1	83.9	21.9	61.9	905.3	840.3	65.0	
1968	185.9	156.8	1255.1	1068.9	186.1	0.0	0.0	0.0	90.6	57.8	32.7	109.3	29.5	79.8	1055.3	981.7	73.6	
1969	220.5	181.9	1475.6	1250.8	224.8	0.0	0.0	0.0	102.8	66.5	36.3	140.9	39.1	101.9	1231.9	1145.2	86.7	
1970	241.7	206.6	1717.3	1457.4	259.9	0.0	0.0	0.0	116.1	76.2	39.9	175.1	50.4	124.7	1426.2	1330.8	95.3	
1971	267.1	226.9	1984.5	1684.3	300.1	0.0	0.0	0.0	130.9	86.7	44.2	217.6	64.6	153.0	1635.9	1533.0	102.9	
1972	311.5	255.8	2295.9	1940.1	355.8	0.0	0.0	0.0	147.8	98.5	49.4	269.3	82.0	187.3	1878.7	1759.6	119.1	
1973	354.3	292.4	2650.2	2232.5	417.7	0.0	0.0	0.0	167.3	111.5	55.8	331.4	103.2	228.1	2151.5	2017.7	133.8	
1974	375.3	321.4	3025.5	2554.0	471.5	0.0	0.0	0.0	187.9	126.0	61.8	393.3	127.2	266.1	2444.3	2300.7	143.6	
1975	318.8	310.9	3344.3	2864.9	479.4	0.0	0.0	0.0	204.5	141.8	62.7	448.8	153.0	295.8	2691.0	2570.0	121.0	
1976	344.9	316.7	3689.2	3181.5	507.7	0.0	0.0	0.0	231.4	159.4	72.0	500.9	180.8	320.1	2957.0	2841.4	115.6	
1977	325.3	303.9	4014.5	3485.5	529.0	0.0	0.0	0.0	256.1	178.4	77.7	566.1	212.8	353.2	3192.3	3094.2	98.1	
1978	313.5	283.6	4328.0	3769.1	558.9	0.0	0.0	0.0	283.3	199.1	84.3	632.2	247.8	384.4	3412.5	3322.2	90.2	
1979	293.8	263.7	4621.8	4032.8	589.0	0.0	0.0	0.0	313.8	221.5	92.3	712.3	287.9	424.4	3595.7	3523.3	72.4	
1980	294.0	250.8	4915.8	4283.6	632.1	0.0	0.0	0.0	342.8	245.8	97.0	796.3	331.9	464.4	3776.6	3705.9	70.7	
1981	291.2	248.2	5207.0	4531.8	675.2	0.0	0.0	0.0	370.5	271.7	98.8	894.0	381.8	512.2	3942.5	3878.4	64.1	
1982	275.5	239.5	5482.5	4771.3	711.2	0.0	0.0	0.0	394.8	298.5	96.3	989.0	435.1	553.8	4098.7	4037.7	61.0	
1983	296.1	252.8	5778.6	5024.1	754.5	0.0	0.0	0.0	420.6	325.9	94.6	1087.0	493.0	593.9	4271.1	4205.1	66.0	

1984	317.0	271.1	6095.7	5295.2	800.5	0.0	0.0	0.0	444.5	353.1	91.4	1197.6	556.5	641.1	4453.6	4385.6	68.0
1985	331.7	280.8	6427.4	5576.0	851.4	0.0	0.0	0.0	471.4	379.8	91.6	1314.9	625.5	689.5	4641.1	4570.7	70.3
1986	355.4	295.1	6782.8	5871.1	911.7	0.0	0.0	0.0	497.3	405.8	91.4	1444.6	700.6	744.0	4841.0	4764.6	76.3
1987	387.8	310.6	7170.6	6181.6	988.9	0.0	0.0	0.0	524.9	431.7	93.2	1604.6	785.3	819.4	5041.0	4964.6	76.4
1988	381.6	314.5	7552.2	6496.2	1056.0	0.0	0.0	0.0	556.0	457.9	98.1	1770.6	876.7	893.9	5225.5	5161.5	64.0
1989	307.0	265.2	7859.2	6761.3	1097.9	0.0	0.0	0.0	583.0	484.4	98.6	1934.8	974.2	960.6	5341.4	5302.7	38.7
1990	236.4	216.0	8095.6	6977.4	1118.3	0.0	0.0	0.0	603.3	511.1	92.1	2079.3	1074.4	1004.9	5413.1	5391.8	21.3
1991	216.7	188.3	8312.3	7165.7	1146.7	0.0	0.0	0.0	623.3	537.6	85.6	2227.3	1179.9	1047.4	5461.8	5448.1	13.6
1992	189.2	171.1	8501.5	7336.8	1164.7	0.0	0.0	0.0	641.0	563.1	77.9	2365.3	1288.0	1077.2	5495.3	5485.7	9.6
1993	149.3	157.9	8650.9	7494.7	1156.1	0.0	0.0	0.0	657.9	586.8	71.1	2472.0	1395.0	1077.0	5521.0	5512.9	8.1
1994	61.1	78.7	8712.0	7573.4	1138.6	0.0	0.0	0.0	670.4	608.2	62.1	2507.2	1434.5	1072.7	5534.5	5530.7	3.8
1995	33.2	68.7	8745.2	7642.1	1103.1	0.0	0.0	0.0	679.6	627.3	52.4	2521.4	1473.7	1047.7	5544.2	5541.1	3.1
1996	22.5	65.5	8767.6	7707.6	1060.0	0.0	0.0	0.0	686.5	643.8	42.8	2525.6	1512.1	1013.5	5555.5	5551.7	3.8
1997	18.9	58.7	8786.5	7766.3	1020.2	0.0	0.0	0.0	692.7	657.8	34.9	2532.4	1549.2	983.2	5561.4	5559.3	2.0
1998	14.8	52.4	8801.3	7818.7	982.6	0.0	0.0	0.0	696.5	669.4	27.1	2539.2	1585.2	954.0	5565.6	5564.1	1.5
1999	13.1	48.3	8814.4	7867.0	947.4	0.0	0.0	0.0	697.4	678.6	18.8	2547.0	1620.1	926.9	5570.0	5568.3	1.7
2000	10.0	44.8	8824.4	7911.8	912.6	0.0	0.0	0.0	697.7	685.5	12.2	2553.1	1654.1	899.1	5573.6	5572.2	1.4
2001	8.4	41.1	8832.9	7952.9	880.0	0.0	0.0	0.0	698.0	690.5	7.6	2558.2	1687.0	871.2	5576.6	5575.4	1.2
2002	6.9	37.4	8839.8	7990.3	849.5	0.0	0.0	0.0	698.5	693.8	4.6	2562.9	1718.9	844.0	5578.5	5577.6	0.9
2003	3.2	34.5	8843.0	8024.8	818.2	0.0	0.0	0.0	698.7	695.9	2.8	2564.6	1749.8	814.8	5579.7	5579.1	0.6

Notes

The total CFC production in 2003 represented 16% of global CFC production and is falling. From now on emissions of CFC-11 will not be calculated.

Emissions are calculated from production and categorised sales using "emission functions".

The emission function for "Blowing Agents - Closed Cell Foam" was changed from previous compilations in 2001 in view of the results of a survey commissioned by AFEAS: (Ashford P., 1999, Development of a global emission function for blowing agents used in closed cell foam, Final Report to AFEAS and McCulloch A., P. Ashford and P.M. Midgley, Historic Emissions of fluorotrichloromethane (CFC-11) based on a market survey, Atmospheric Environment, 35, 4387-4397, 2001)

This showed that, from 1994 onwards, the emission function from closed cell foam was best represented by a constant rate of loss (3.66%/yr) from the accumulated bank in such foams. This results in a step change in the emissions from foams that is unlikely to be real year-by-year but will give a true picture in the longer term.

Within the time-frame of the mid 1990s, the transition from higher to lower emissions is clear from atmospheric measurements and statements about industrial practices.

The assumption of a function to smooth the transition would have been largely subjective and has not been adopted here.

Columns affected by this change are shaded pale green/blue.

The emission function for non-hermetic refrigeration is the same as in previous reports (a 10 year emission time approximately normally distributed about a 4.5 year mean).

The emission function for "Open Cell Foam, Aerosols and others" is the same as in previous reports (50% in the year of manufacture and the rest in the year following, for aerosols and others, and 83% in the year of manufacture for open cell foams).

In previous compilations, fugitive emissions of CFC-11 arising during production were counted and reported in the *Open Cell Foam, Aerosols & Others* category and in *Annual and Total Released*. However, the reported *Production* did not include this quantity of material. This has now been rectified and, in this compilation, the *Annual and Cumulative Production* reported for all years includes the quantities released from the production process. **This does not affect the historical record of releases.**

Table 2 Production and atmospheric Release
CFC-12 (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative																	
	Annual			Total			Refrigeration HERMETIC			Refrigeration NON Hermetic			Blowing Agents Closed Cell Foam			Open Cell Foam, Aerosols & Others		
	Production	Released		Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased
1931	0.6	0.1		0.6	0.1	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
1932	0.1	0.1		0.7	0.1	0.6	0.0	0.0	0.0	0.7	0.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0
1933	0.3	0.1		1.0	0.2	0.8	0.0	0.0	0.0	1.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0
1934	0.7	0.2		1.7	0.4	1.3	0.1	0.0	0.1	1.6	0.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0
1935	1.0	0.3		2.7	0.8	2.0	0.1	0.0	0.1	2.6	0.7	1.9	0.0	0.0	0.0	0.1	0.1	0.0
1936	1.8	0.5		4.5	1.3	3.2	0.2	0.0	0.1	4.2	1.2	3.1	0.0	0.0	0.0	0.1	0.1	0.0
1937	3.2	0.8		7.7	2.1	5.6	0.3	0.0	0.3	7.2	1.9	5.3	0.0	0.0	0.0	0.2	0.2	0.0
1938	2.9	1.2		10.6	3.3	7.3	0.4	0.0	0.3	9.9	3.0	6.9	0.0	0.0	0.0	0.3	0.3	0.0
1939	4.0	1.7		14.6	5.0	9.6	0.5	0.0	0.5	13.7	4.6	9.1	0.0	0.0	0.0	0.4	0.4	0.0
1940	4.6	2.3		19.2	7.3	12.0	0.7	0.0	0.6	18.1	6.8	11.4	0.0	0.0	0.0	0.5	0.5	0.0
1941	6.4	3.0		25.7	10.3	15.4	0.9	0.0	0.8	24.2	9.6	14.6	0.0	0.0	0.0	0.6	0.6	0.0
1942	6.1	3.7		31.8	13.9	17.8	1.1	0.1	1.0	29.9	13.1	16.8	0.0	0.0	0.0	0.8	0.8	0.0
1943	8.4	4.5		40.2	18.5	21.7	1.4	0.1	1.3	37.8	17.4	20.4	0.0	0.0	0.0	1.0	1.0	0.0
1944	17.2	6.1		57.3	24.6	32.7	2.0	0.1	1.8	54.0	23.1	30.9	0.0	0.0	0.0	1.4	1.4	0.0
1945	20.6	8.0		77.9	32.6	45.3	2.7	0.2	2.5	73.4	30.5	42.9	0.0	0.0	0.0	1.9	1.9	0.0
1946	17.1	13.9		95.0	46.5	48.5	2.9	0.3	2.7	80.4	39.3	41.1	0.0	0.0	0.0	11.7	7.0	4.7
1947	20.6	21.3		115.6	67.9	47.8	3.2	0.4	2.9	88.9	49.6	39.2	0.0	0.0	0.0	23.5	17.9	5.7
1948	25.4	24.8		141.0	92.6	48.4	3.6	0.5	3.1	99.3	61.0	38.3	0.0	0.0	0.0	38.1	31.1	7.0
1949	26.8	26.6		167.8	119.2	48.6	4.0	0.6	3.4	110.3	72.5	37.8	0.0	0.0	0.0	53.5	46.1	7.4
1950	35.4	29.5		203.2	148.7	54.5	4.5	0.8	3.8	124.9	83.9	41.0	0.0	0.0	0.0	73.8	64.1	9.7
1951	37.1	32.4		240.4	181.1	59.2	5.1	1.0	4.1	140.2	95.3	44.9	0.0	0.0	0.0	95.1	84.9	10.2
1952	38.2	33.7		278.5	214.8	63.7	5.7	1.2	4.5	155.9	107.1	48.8	0.0	0.0	0.0	117.0	106.5	10.5
1953	47.7	37.9		326.2	252.7	73.5	6.4	1.5	4.9	175.5	120.0	55.5	0.0	0.0	0.0	144.3	131.3	13.1
1954	50.4	42.9		376.5	295.6	81.0	7.1	1.8	5.4	196.2	134.4	61.8	0.0	0.0	0.0	173.2	159.4	13.8
1955	59.0	48.2		435.6	343.7	91.9	8.0	2.1	5.9	220.4	150.7	69.7	0.1	0.1	0.0	207.1	190.9	16.2
1956	70.4	56.1		506.0	399.9	106.1	9.1	2.5	6.6	249.4	169.2	80.2	0.1	0.1	0.0	247.4	228.1	19.3
1957	76.0	63.8		582.0	463.7	118.3	10.1	2.9	7.2	279.3	189.8	89.5	0.2	0.2	0.0	292.3	270.8	21.5
1958	75.3	66.9		657.3	530.6	126.6	11.3	3.3	8.0	311.8	213.0	98.8	0.3	0.3	0.0	333.9	314.0	19.8
1959	89.8	74.8		747.1	605.4	141.6	12.5	3.8	8.7	345.3	238.8	106.5	0.5	0.4	0.1	388.8	362.4	26.4
1960	101.9	89.1		849.0	694.5	154.5	13.8	4.3	9.5	380.7	267.1	113.6	0.8	0.6	0.1	453.7	422.5	31.2
1961	111.2	99.8		960.2	794.3	165.9	15.2	4.9	10.3	418.9	297.8	121.1	1.1	0.9	0.2	525.1	490.7	34.3
1962	131.3	114.5		1091.5	908.7	182.7	16.6	5.5	11.2	458.7	330.5	128.2	1.6	1.3	0.3	614.6	571.4	43.2
1963	150.1	133.9		1241.6	1042.7	198.9	18.2	6.1	12.0	500.7	365.3	135.5	2.8	2.2	0.6	719.9	669.1	50.8
1964	174.3	155.5		1415.9	1198.2	217.7	19.8	6.9	12.9	544.5	402.0	142.5	5.1	3.9	1.2	846.6	785.3	61.2
1965	194.8	175.4		1610.7	1373.6	237.2	21.6	7.7	13.9	596.0	441.1	154.9	7.3	6.2	1.1	985.8	918.6	67.2
1966	221.6	195.0		1832.3	1568.5	263.8	23.7	8.6	15.1	653.3	483.0	170.3	10.1	8.7	1.4	1145.2	1068.2	77.0
1967	248.8	219.9		2081.1	1788.5	292.7	26.0	9.5	16.4	715.4	528.3	187.1	12.9	11.5	1.4	1326.9	1239.1	87.8
1968	274.2	246.5		2355.3	2034.9	320.4	28.3	10.6	17.7	780.0	577.6	202.4	16.3	14.6	1.7	1530.8	1432.2	98.6
1969	304.7	274.3		2660.0	2309.2	350.8	30.9	11.7	19.2	851.5	631.5	220.1	20.9	18.6	2.3	1756.7	1647.4	109.2
1970	329.1	299.9		2989.1	2609.1	380.0	33.7	12.9	20.8	929.2	690.2	239.0	26.0	23.5	2.5	2000.3	1882.5	117.8
1971	350.1	321.8		3339.2	2930.9	408.4	36.7	14.3	22.5	1012.1	754.0	258.1	31.3	28.6	2.7	2259.1	2134.0	125.1
1972	389.4	349.9		3728.6	3280.8	447.9	40.1	15.7	24.4	1105.0	823.4	281.7	38.6	35.0	3.6	2544.9	2406.8	138.2
1973	433.9	387.3		4162.5	3668.0	494.5	43.9	17.2	26.6	1208.9	898.8	310.0	47.3	43.0	4.4	2862.5	2709.0	153.5
1974	453.9	418.6		4616.4	4086.7	529.8	47.7	18.9	28.8	1315.5	980.7	334.8	57.2	52.3	4.9	3196.0	3034.8	161.2
1975	390.5	404.1		5006.9	4490.8	516.1	51.3	20.7	30.7	1415.4	1068.7	346.7	66.7	61.9	4.7	3473.5	3339.5	134.0
1976	421.0	390.4		5427.9	4881.2	546.7	55.8	22.6	33.2	1538.7	1163.8	374.9	73.1	69.9	3.2	3760.3	3624.9	135.4
1977	392.4	371.2		5820.3	5252.4	567.9	61.3	24.7	36.6	1689.3	1267.0	422.3	83.3	78.2	5.1	3986.4	3882.5	104.0
1978	381.4	341.3		6201.7	5593.7	608.0	66.9	27.0	39.9	1843.2	1378.6	464.7	101.4	92.3	9.0	4190.2	4095.8	94.5
1979	366.1	337.5		6567.8	5931.2	636.6	72.6	29.5	43.1	2002.3	1500.0	502.3	119.4	110.4	9.0	4373.4	4291.3	82.2
1980	359.0	332.5		6926.8	6263.7	663.1	78.3	32.2	46.2	2158.9	1631.9	527.0	143.3	131.3	11.9	4546.3	4468.3	78.0
1981	360.1	340.7		7286.8	6604.4	682.5	84.2	35.0	49.1	2320.1	1773.6	546.5	164.6	153.9	10.7	4718.0	4641.8	76.2
1982	336.2	337.4		7623.1	6941.7	681.4	89.6	38.2	51.5	2470.5	1922.2	548.3	187.3	176.0	11.4	4875.7	4805.5	70.3
1983	364.2	343.3		7987.3	7285.0	702.3	95.8	41.5	54.2	2640.0	2076.5	563.6	213.5	200.4	13.1	5038.0	4966.7	71.4

1984	391.7	359.4	8379.0	7644.5	734.5	102.3	45.1	57.2	2821.0	2234.8	586.2	244.2	228.8	15.3	5211.5	5135.7	75.8
1985	385.7	368.4	8764.7	8012.8	751.9	108.8	49.1	59.7	2999.5	2396.3	603.2	274.4	259.3	15.1	5382.0	5308.2	73.8
1986	408.3	376.6	9173.0	8389.4	783.6	115.7	53.2	62.5	3190.9	2562.5	628.4	312.5	293.4	19.0	5554.0	5480.2	73.7
1987	435.3	386.6	9608.4	8775.9	832.4	123.4	57.7	65.7	3402.2	2735.6	666.7	372.4	342.4	30.0	5710.4	5640.2	70.1
1988	431.5	392.8	10039.9	9168.7	871.2	131.7	62.5	69.2	3630.7	2917.7	713.0	431.8	402.1	29.7	5845.7	5786.5	59.3
1989	389.3	364.7	10429.2	9533.5	895.7	140.3	67.5	72.8	3867.1	3109.9	757.2	476.4	454.1	22.3	5945.4	5902.0	43.5
1990	236.7	310.5	10665.9	9843.9	822.0	145.9	72.8	73.2	4023.1	3307.5	715.6	499.4	487.9	11.5	5997.5	5975.8	21.7
1991	230.4	271.6	10896.3	10115.6	780.7	152.0	78.2	73.8	4192.0	3509.5	682.5	518.1	508.7	9.3	6034.2	6019.1	15.1
1992	221.6	255.4	11117.9	10370.9	747.0	158.3	84.0	74.3	4363.2	3709.7	653.5	531.8	524.9	6.9	6064.7	6052.4	12.4
1993	220.0	237.8	11338.0	10608.7	729.2	164.9	89.9	75.0	4545.6	3903.9	641.7	539.5	535.6	3.8	6088.0	6079.3	8.7
1994	136.9	211.5	11474.9	10820.3	654.7	169.0	96.0	73.1	4660.5	4085.9	574.5	542.7	541.1	1.6	6102.7	6097.2	5.4
1995	84.9	188.6	11559.8	11008.9	550.9	171.5	102.2	69.3	4729.2	4253.1	476.1	543.8	543.3	0.5	6115.3	6110.2	5.1
1996	50.1	166.1	11609.9	11174.9	435.0	173.0	108.6	64.3	4768.9	4401.7	367.2	544.4	544.1	0.3	6123.6	6120.4	3.2
1997	33.7	140.1	11643.6	11315.0	328.6	173.8	115.1	58.7	4792.9	4526.7	266.2	545.0	544.7	0.3	6131.8	6128.4	3.4
1998	34.1	114.1	11677.7	11429.1	248.6	174.8	121.6	53.2	4818.9	4626.4	192.4	545.6	545.3	0.3	6138.5	6135.8	2.7
1999	27.8	87.4	11705.5	11516.6	188.9	175.5	128.1	47.4	4839.2	4700.6	138.7	546.1	545.8	0.2	6144.7	6142.1	2.6
2000	25.2	65.6	11730.7	11582.2	148.5	176.2	134.4	41.8	4857.7	4753.6	104.1	546.6	546.3	0.2	6150.3	6147.9	2.4
2001	21.4	48.2	11752.1	11630.5	121.6	176.8	140.5	36.2	4873.3	4790.1	83.2	547.0	546.8	0.2	6155.0	6153.0	2.0
2002	20.7	37.6	11772.8	11668.1	104.7	177.4	146.3	31.1	4889.8	4817.7	72.1	547.0	547.0	0.0	6158.7	6157.1	1.6
2003	12.8	30.7	11785.6	11698.8	86.8	177.7	151.6	26.1	4899.6	4840.0	59.5	547.0	547.0	0.0	6161.4	6160.2	1.2

Notes

The total CFC production in 2003 represented 16% of global CFC production and is falling. From now on emissions of CFC-12 will not be calculated.

Emissions are calculated from production and categorised sales using "emission functions".

The emission functions for CFC-12 remain the same as in previous AFEAS compilations:

Releases from hermetic refrigeration are normally distributed about an average of 10 years, giving a total service lifetime of 20 years.

The emission function for non-hermetic refrigeration is the same as in previous reports (complete emission in 10 years approximately normally distributed about a 4.5 year mean).

(McCulloch A., P.M. Midgley and P. Ashford, Releases of Refrigerant Gases (CFC-12, HCFC-22 and HFC-134a) to the Atmosphere, Atmos. Environ., 37, 889-902, 2003)

Due to the nature of the plastic foam matrices, half of the material used in closed cell foam is emitted in the year of manufacture and half in the following year.

The emission function for "Open Cell Foam, Aerosols and others" is the same as in previous reports (50% in the year of manufacture and the rest in the year following, for aerosols and others, and 83% in the year of manufacture for open cell foams).

In previous compilations, fugitive emissions of CFC-12 arising during production were counted and reported in the *Open Cell Foam, Aerosols & Others* category and in *Annual and Total Released*.

However, the reported *Production* did not include this quantity of material. This has now been rectified and, in this compilation, the *Annual and Cumulative Production* reported for all years includes the quantities released from the production process. **This does not affect the historical record of releases.**

Table 3 Production and atmospheric Release
CFC-113 (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Long Banking Times			Other			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1934	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1935	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1936	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1937	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1938	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1939	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1940	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1941	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1942	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1943	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1944	0.8	0.4	0.8	0.4	0.4	0.8	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	
1945	0.9	0.9	1.7	1.3	0.5	1.7	1.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	
1946	1.0	1.0	2.7	2.2	0.5	2.7	2.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	
1947	1.2	1.1	4.0	3.4	0.6	3.9	3.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	
1948	1.3	1.3	5.3	4.6	0.7	5.2	4.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	
1949	1.5	1.4	6.8	6.0	0.8	6.7	6.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	
1950	1.8	1.7	8.6	7.7	0.9	8.5	7.6	0.9	0.0	0.0	0.0	0.0	0.0	0.0	
1951	2.0	1.9	10.6	9.6	1.0	10.5	9.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	
1952	2.3	2.2	13.0	11.8	1.2	12.8	11.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0	
1953	2.6	2.5	15.6	14.3	1.3	15.4	14.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	
1954	3.0	2.8	18.6	17.1	1.5	18.4	16.9	1.5	0.0	0.0	0.0	0.0	0.0	0.0	
1955	3.5	3.3	22.2	20.4	1.8	21.9	20.2	1.8	0.0	0.0	0.0	0.0	0.0	0.0	
1956	4.1	3.8	26.2	24.2	2.0	25.9	23.9	2.0	0.0	0.0	0.0	0.0	0.0	0.0	
1957	4.6	4.3	30.8	28.5	2.3	30.4	28.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0	
1958	5.3	4.9	36.1	33.5	2.6	35.6	33.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	
1959	6.1	5.7	42.1	39.1	3.0	41.6	38.6	3.0	0.0	0.0	0.0	0.0	0.0	0.0	
1960	6.9	6.5	49.1	45.6	3.4	48.4	45.0	3.4	0.1	0.0	0.0	0.0	0.0	0.0	
1961	7.9	7.4	57.0	53.0	4.0	56.1	52.2	3.8	0.2	0.0	0.2	0.0	0.0	0.0	
1962	9.1	8.4	66.1	61.4	4.7	65.0	60.5	4.4	0.3	0.0	0.3	0.0	0.0	0.0	
1963	10.4	9.7	76.5	71.0	5.5	75.1	70.1	5.1	0.4	0.0	0.4	0.0	0.0	0.0	
1964	12.0	11.1	88.5	82.1	6.4	86.8	81.0	5.8	0.6	0.0	0.6	0.0	0.0	0.0	
1965	13.7	12.7	102.2	94.8	7.4	100.1	93.4	6.7	0.7	0.0	0.7	0.0	0.0	0.0	
1966	15.7	14.5	117.9	109.3	8.6	115.4	107.7	7.6	1.0	0.0	0.9	0.0	0.0	0.0	
1967	17.9	16.6	135.8	125.9	9.9	132.9	124.1	8.7	1.2	0.1	1.1	0.0	0.0	0.0	
1968	20.6	19.0	156.4	145.0	11.4	152.9	142.9	10.0	1.5	0.1	1.4	0.0	0.0	0.0	
1969	23.5	21.8	179.9	166.8	13.1	175.8	164.3	11.4	1.8	0.1	1.6	0.0	0.0	0.0	
1970	26.9	25.0	206.8	191.7	15.1	202.0	188.9	13.1	2.1	0.2	1.9	0.0	0.0	0.0	
1971	30.9	28.6	237.7	220.4	17.3	232.1	217.1	15.0	2.5	0.3	2.3	0.0	0.0	0.0	
1972	35.5	32.9	273.2	253.2	19.9	266.7	249.4	17.3	3.0	0.3	2.6	0.0	0.0	0.0	
1973	40.5	37.6	313.7	290.9	22.8	306.1	286.4	19.7	3.5	0.5	3.1	0.0	0.0	0.0	
1974	46.5	43.1	360.2	334.0	26.2	351.4	328.8	22.6	4.1	0.6	3.5	0.0	0.0	0.0	
1975	53.3	49.4	413.5	383.4	30.0	403.3	377.4	25.9	4.8	0.8	4.1	0.0	0.0	0.0	
1976	61.0	56.6	474.4	440.1	34.4	462.7	433.0	29.7	5.6	1.0	4.7	0.0	0.0	0.0	
1977	69.9	64.9	544.3	504.9	39.4	530.8	496.8	34.0	6.6	1.2	5.4	0.0	0.0	0.0	
1978	80.0	74.3	624.4	579.2	45.1	608.7	569.8	39.0	7.6	1.5	6.2	0.0	0.0	0.0	
1979	91.7	85.1	716.0	664.3	51.7	698.0	653.4	44.6	8.8	1.8	7.1	0.0	0.0	0.0	
1980	105.0	97.5	821.1	761.8	59.2	800.3	749.2	51.1	10.2	2.1	8.1	0.0	0.0	0.0	
1981	109.9	106.4	931.0	868.3	62.7	907.3	853.8	53.5	11.8	2.5	9.2	0.0	0.0	0.0	
1982	114.5	111.1	1045.5	979.3	66.1	1018.6	962.9	55.6	13.5	3.0	10.5	0.0	0.0	0.0	
1983	134.5	123.3	1179.9	1102.6	77.3	1149.3	1083.9	65.4	15.5	3.5	12.0	0.0	0.0	0.0	
1984	173.3	152.5	1353.3	1255.1	98.2	1317.9	1233.6	84.3	18.0	4.1	13.9	0.0	0.0	0.0	
1985	189.4	179.8	1542.7	1434.9	107.8	1502.7	1410.3	92.4	20.2	4.8	15.4	0.0	0.0	0.0	
1986	199.2	193.1	1741.9	1628.0	113.9	1697.4	1600.0	97.4	22.1	5.6	16.6	0.0	0.0	0.0	

1987	228.7	213.1	1970.6	1841.0	129.6	1921.2	1809.3	111.9	24.2	6.4	17.7	0.0	0.0	0.0
1988	250.7	238.7	2221.3	2079.7	141.6	2166.3	2043.7	122.6	26.5	7.4	19.0	0.0	0.0	0.0
1989	254.6	251.5	2475.9	2331.2	144.7	2415.5	2290.9	124.6	28.6	8.5	20.1	0.0	0.0	0.0
1990	177.1	214.7	2653.0	2546.0	107.0	2588.8	2502.1	86.7	30.1	9.8	20.4	0.0	0.0	0.0
1991	149.5	163.1	2802.5	2709.1	93.4	2735.2	2662.0	73.2	31.4	11.1	20.2	0.0	0.0	0.0
1992	108.9	128.3	2911.4	2837.4	74.0	2839.6	2787.4	52.3	34.4	12.6	21.8	0.0	0.0	0.0
1993	48.7	78.0	2960.1	2915.4	44.6	2886.8	2863.2	23.6	35.3	14.2	21.1	0.0	0.0	0.0
1994	29.9	40.2	2990.0	2955.6	34.4	2915.8	2901.3	14.5	35.8	15.9	19.9	0.0	0.0	0.0
1995	23.6	28.1	3013.6	2983.7	29.9	2938.9	2927.3	11.5	36.1	17.7	18.4	0.0	0.0	0.0
1996	6.1	16.2	3019.7	3000.0	19.8	2944.4	2941.7	2.8	36.5	19.5	17.0	0.0	0.0	0.0
1997	3.0	6.2	3022.8	3006.1	16.6	2947.4	2945.9	1.5	36.5	21.4	15.1	0.0	0.0	0.0
1998	1.6	4.2	3024.4	3010.3	14.1	2949.0	2948.2	0.8	36.5	23.2	13.3	0.0	0.0	0.0
1999	1.0	3.1	3025.4	3013.4	12.0	2950.0	2949.5	0.5	36.5	25.1	11.5	0.0	0.0	0.0
2000	1.0	2.7	3026.3	3016.1	10.2	2950.9	2950.5	0.4	36.6	26.8	9.8	0.0	0.0	0.0
2001	0.8	2.5	3027.1	3018.6	8.5	2951.7	2951.3	0.4	36.6	28.5	8.1	0.0	0.0	0.0
2002	0.9	2.4	3028.1	3021.0	7.1	2952.6	2952.1	0.5	36.6	30.0	6.6	0.0	0.0	0.0
2003	0.6	2.1	3028.7	3023.1	5.5	2953.2	2952.9	0.3	36.6	31.4	5.2	0.0	0.0	0.0

Notes

The total CFC production in 2003 represented 16% of global CFC production and is falling. From now on emissions of CFC-113 will not be calculated.

Emissions are calculated from production and categorised sales using "emission functions".

The emission functions for CFC-113 remain the same as in previous AFEAS compilations:

Of the sales into "Short Banking Times" (mainly solvents) and "Other", half are released in the year of manufacture and half in the year following.

Releases from "Long Banking Times" (predominantly heat pumps and similar enclosed systems) are distributed normally about a 10 year mean, with a total service lifetime of 20 years.

In previous compilations, fugitive emissions of CFC-113 arising during production were counted and reported in the *Short Banking Times* category and in *Annual and Total Released*.

However, the reported *Production* did not include this quantity of material. This has now been rectified and, in this compilation, the *Annual and Cumulative Production* reported for all years includes the quantities released from the production process. **This does not affect the historical record of releases.**

**Table 4 Production and atmospheric Release
CFC-114** (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Long Banking Times			Other			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1934	2.7	0.1	2.7	0.1	2.6	0.0	0.0	0.0	2.6	0.1	2.6	0.0	0.0	0.0	
1935	2.8	0.1	5.5	0.2	5.3	0.0	0.0	0.0	5.4	0.1	5.3	0.0	0.0	0.0	
1936	2.9	0.1	8.4	0.3	8.1	0.0	0.0	0.0	8.2	0.2	8.1	0.0	0.0	0.0	
1937	3.0	0.2	11.3	0.4	10.9	0.0	0.0	0.0	11.2	0.3	10.9	0.0	0.0	0.0	
1938	3.1	0.2	14.4	0.7	13.8	0.0	0.0	0.0	14.2	0.5	13.8	0.0	0.0	0.0	
1939	3.2	0.3	17.6	0.9	16.7	0.0	0.0	0.0	17.4	0.7	16.7	0.0	0.0	0.0	
1940	3.4	0.4	21.0	1.3	19.7	0.0	0.0	0.0	20.7	1.0	19.7	0.0	0.0	0.0	
1941	3.5	0.5	24.5	1.9	22.6	0.0	0.0	0.0	24.2	1.5	22.6	0.0	0.0	0.0	
1942	3.6	0.7	28.1	2.6	25.5	0.0	0.0	0.0	27.7	2.2	25.5	0.0	0.0	0.0	
1943	3.8	1.0	31.9	3.6	28.3	0.0	0.0	0.0	31.5	3.2	28.3	0.0	0.0	0.0	
1944	3.9	1.3	35.8	4.8	31.0	0.0	0.0	0.0	35.3	4.4	31.0	0.0	0.0	0.0	
1945	4.1	3.3	39.8	8.1	31.7	3.6	1.8	1.8	35.7	5.8	29.9	0.0	0.0	0.0	
1946	4.2	5.4	44.0	13.6	30.4	7.3	5.4	1.8	36.2	7.6	28.6	0.0	0.0	0.0	
1947	4.4	5.9	48.4	19.4	28.9	11.1	9.2	1.9	36.6	9.6	27.0	0.0	0.0	0.0	
1948	4.5	6.2	52.8	25.7	27.1	15.1	13.1	2.0	37.0	11.9	25.2	0.0	0.0	0.0	
1949	4.7	6.6	57.5	32.2	25.2	19.2	17.1	2.1	37.5	14.3	23.2	0.0	0.0	0.0	
1950	4.9	6.9	62.3	39.1	23.2	23.5	21.4	2.2	38.0	17.0	21.0	0.0	0.0	0.0	
1951	5.1	7.1	67.4	46.3	21.1	28.0	25.8	2.2	38.5	19.7	18.9	0.0	0.0	0.0	
1952	5.3	7.3	72.7	53.6	19.1	32.7	30.3	2.3	39.1	22.3	16.7	0.0	0.0	0.0	
1953	5.5	7.5	78.1	61.1	17.1	37.5	35.1	2.4	39.6	25.0	14.6	0.0	0.0	0.0	
1954	5.7	7.5	83.8	68.5	15.3	42.6	40.0	2.5	40.2	27.4	12.8	0.0	0.0	0.0	
1955	5.9	7.4	89.7	76.0	13.7	47.8	45.2	2.6	40.8	29.6	11.1	0.0	0.0	0.0	
1956	6.1	7.3	95.8	83.3	12.5	53.1	50.5	2.7	41.4	31.6	9.8	0.0	0.0	0.0	
1957	6.4	7.3	102.1	90.6	11.6	58.8	56.0	2.8	42.0	33.3	8.8	0.0	0.0	0.0	
1958	6.6	7.2	108.7	97.8	10.9	64.6	61.7	2.9	42.7	34.7	8.0	0.0	0.0	0.0	
1959	6.8	7.2	115.5	105.0	10.5	70.7	67.6	3.0	43.4	35.8	7.5	0.0	0.0	0.0	
1960	7.1	7.2	122.6	112.2	10.4	76.9	73.8	3.1	44.1	36.8	7.2	0.0	0.0	0.0	
1961	7.4	7.3	130.0	119.6	10.4	83.5	80.2	3.3	44.8	37.7	7.2	0.0	0.0	0.0	
1962	7.7	7.5	137.7	127.1	10.6	90.3	86.9	3.4	45.6	38.4	7.2	0.0	0.0	0.0	
1963	7.9	7.7	145.6	134.8	10.8	97.3	93.8	3.5	46.4	39.1	7.3	0.0	0.0	0.0	
1964	8.2	7.8	153.8	142.6	11.2	104.6	101.0	3.6	47.2	39.6	7.6	0.0	0.0	0.0	
1965	8.5	8.1	162.3	150.7	11.7	112.1	108.4	3.8	48.1	40.2	7.9	0.0	0.0	0.0	
1966	8.9	8.4	171.2	159.1	12.1	120.0	116.1	4.0	49.0	40.8	8.2	0.0	0.0	0.0	
1967	9.2	8.8	180.4	167.9	12.6	128.2	124.1	4.1	49.9	41.4	8.5	0.0	0.0	0.0	
1968	9.6	9.1	190.1	177.0	13.1	136.7	132.5	4.3	50.9	42.1	8.8	0.0	0.0	0.0	
1969	10.0	9.5	200.1	186.5	13.6	145.6	141.2	4.4	51.9	42.7	9.2	0.0	0.0	0.0	
1970	10.3	9.8	210.4	196.3	14.1	154.8	150.2	4.6	53.0	43.4	9.5	0.0	0.0	0.0	
1971	10.7	10.2	221.2	206.5	14.7	164.3	159.5	4.8	54.0	44.1	9.9	0.0	0.0	0.0	
1972	11.2	10.6	232.4	217.1	15.3	174.3	169.3	5.0	55.2	44.9	10.3	0.0	0.0	0.0	
1973	11.6	11.1	244.1	228.2	15.9	184.6	179.4	5.2	56.4	45.7	10.7	0.0	0.0	0.0	
1974	12.1	11.5	256.1	239.7	16.4	195.3	189.9	5.3	57.6	46.5	11.1	0.0	0.0	0.0	
1975	12.6	11.9	268.7	251.6	17.1	206.4	200.8	5.6	58.8	47.3	11.5	0.0	0.0	0.0	
1976	13.1	12.4	281.7	264.0	17.8	218.0	212.2	5.8	60.2	48.2	12.0	0.0	0.0	0.0	
1977	13.6	12.9	295.3	276.8	18.5	230.0	224.0	6.0	61.5	49.1	12.5	0.0	0.0	0.0	
1978	14.1	13.4	309.4	290.2	19.2	242.5	236.2	6.2	62.9	50.0	12.9	0.0	0.0	0.0	
1979	14.6	13.9	324.0	304.1	19.9	255.4	248.9	6.5	64.4	51.0	13.4	0.0	0.0	0.0	
1980	15.2	14.4	339.2	318.5	20.7	268.9	262.1	6.7	66.0	52.0	14.0	0.0	0.0	0.0	
1981	14.2	14.2	353.4	332.7	20.7	281.4	275.2	6.3	67.4	53.0	14.4	0.0	0.0	0.0	
1982	13.8	13.7	367.1	346.4	20.7	293.7	287.6	6.1	68.7	54.1	14.6	0.0	0.0	0.0	
1983	15.0	14.1	382.1	360.5	21.6	307.0	300.3	6.6	70.2	55.2	15.0	0.0	0.0	0.0	
1984	15.8	15.1	397.9	375.6	22.3	321.1	314.1	7.1	71.6	56.4	15.2	0.0	0.0	0.0	
1985	17.3	16.2	415.2	391.7	23.5	336.4	328.8	7.6	73.4	57.6	15.8	0.0	0.0	0.0	
1986	19.3	18.0	434.5	409.7	24.8	354.1	345.3	8.9	74.8	58.9	16.0	0.0	0.0	0.0	

1987	17.3	18.2	451.9	427.9	23.9	369.8	362.0	7.8	76.2	60.2	16.1	0.0	0.0	0.0
1988	16.7	16.2	468.5	444.2	24.4	383.5	376.6	6.8	79.1	61.5	17.6	0.0	0.0	0.0
1989	15.2	14.5	483.7	458.6	25.1	395.6	389.5	6.1	81.9	62.9	19.0	0.0	0.0	0.0
1990	8.4	10.3	492.1	468.9	23.2	400.9	398.3	2.7	84.9	64.3	20.6	0.0	0.0	0.0
1991	6.7	6.3	498.9	475.2	23.6	405.2	403.1	2.2	87.3	65.8	21.5	0.0	0.0	0.0
1992	4.8	5.2	503.6	480.4	23.2	408.2	406.7	1.5	89.0	67.2	21.7	0.0	0.0	0.0
1993	4.6	4.6	508.3	485.0	23.3	411.2	409.6	1.5	90.6	68.8	21.8	0.0	0.0	0.0
1994	3.2	4.0	511.5	489.0	22.5	413.0	412.0	0.9	92.0	70.4	21.6	0.0	0.0	0.0
1995	3.2	3.1	514.7	492.1	22.6	414.0	413.4	0.5	94.1	72.0	22.1	0.0	0.0	0.0
1996	0.7	2.4	515.4	494.5	20.9	414.4	414.1	0.2	94.4	73.7	20.7	0.0	0.0	0.0
1997	1.2	2.3	516.6	496.8	19.8	415.0	414.7	0.3	95.0	75.5	19.5	0.0	0.0	0.0
1998	1.2	2.7	517.8	499.5	18.3	416.1	415.5	0.6	95.0	77.3	17.7	0.0	0.0	0.0
1999	0.3	2.6	518.1	502.1	16.0	416.4	416.3	0.1	95.1	79.2	15.9	0.0	0.0	0.0
2000	0.5	2.3	518.6	504.4	14.2	416.9	416.6	0.2	95.1	81.1	14.0	0.0	0.0	0.0
2001	0.3	2.3	518.9	506.7	12.2	417.1	417.0	0.1	95.1	83.1	12.1	0.0	0.0	0.0
2002	0.6	2.2	519.5	509.0	10.6	417.6	417.4	0.2	95.3	84.9	10.3	0.0	0.0	0.0
2003	0.3	2.2	519.9	511.1	8.8	417.9	417.8	0.2	95.3	86.7	8.6	0.0	0.0	0.0

Notes

The total CFC production in 2003 represented 16% of global CFC production and is falling. From now on emissions of CFC-114 will not be calculated.

Emissions are calculated from production and categorised sales using "emission functions".

The emission functions for CFC-114 remain the same as in previous AFEAS compilations:

Of the sales into "Short Banking Times" (mainly aerosols) and "Other", half are released in the year of manufacture and half in the year following.

Releases from "Long Banking Times" (predominantly heat pumps and similar enclosed systems) are distributed normally about a 10 year mean, with a total service lifetime of 20 years.

In previous compilations, fugitive emissions of CFC-114 arising during production were counted and reported in the *Short Banking Times* category and in *Annual and Total Released*.

However, the reported *Production* did not include this quantity of material. This has now been rectified and, in this compilation, the *Annual and Cumulative Production* reported for all years includes the quantities released from the production process. **This does not affect the historical record of releases.**

Table 5 Production and atmospheric Release
CFC-115 (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Long Banking Times			Other			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1934	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1935	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1936	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1937	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1938	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1939	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1940	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1941	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1942	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1943	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1944	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1945	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1946	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1947	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1948	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1949	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1951	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1952	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1953	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1954	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1955	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1956	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1957	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1958	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1960	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1961	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1962	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1963	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1964	0.9	0.1	0.9	0.1	0.8	0.0	0.0	0.0	0.9	0.1	0.8	0.0	0.0	0.0	
1965	1.1	0.2	2.0	0.2	1.8	0.0	0.0	0.0	2.0	0.2	1.8	0.0	0.0	0.0	
1966	1.2	0.3	3.2	0.6	2.7	0.0	0.0	0.0	3.2	0.5	2.7	0.0	0.0	0.0	
1967	1.4	0.6	4.7	1.1	3.5	0.0	0.0	0.0	4.6	1.1	3.5	0.0	0.0	0.0	
1968	1.7	0.8	6.4	2.0	4.4	0.0	0.0	0.0	6.3	1.9	4.4	0.0	0.0	0.0	
1969	2.0	1.1	8.4	3.1	5.3	0.0	0.0	0.0	8.3	3.0	5.3	0.0	0.0	0.0	
1970	2.3	1.4	10.7	4.4	6.3	0.0	0.0	0.0	10.6	4.3	6.3	0.0	0.0	0.0	
1971	2.6	1.6	13.4	6.1	7.3	0.0	0.0	0.0	13.2	5.9	7.3	0.0	0.0	0.0	
1972	3.1	1.9	16.5	8.0	8.5	0.0	0.0	0.0	16.3	7.8	8.5	0.0	0.0	0.0	
1973	3.6	2.2	20.2	10.2	9.9	0.0	0.0	0.0	19.9	10.0	9.9	0.0	0.0	0.0	
1974	4.3	2.6	24.4	12.8	11.6	0.0	0.0	0.0	24.1	12.5	11.6	0.0	0.0	0.0	
1975	4.9	3.0	29.3	15.9	13.4	0.0	0.0	0.0	28.9	15.5	13.4	0.0	0.0	0.0	
1976	5.7	3.5	34.9	19.4	15.5	0.0	0.0	0.0	34.5	18.9	15.5	0.0	0.0	0.0	
1977	6.6	4.1	41.5	23.5	18.0	0.0	0.0	0.0	41.0	22.9	18.0	0.0	0.0	0.0	
1978	7.7	4.8	49.2	28.2	21.0	0.0	0.0	0.0	48.6	27.6	21.0	0.0	0.0	0.0	
1979	9.0	5.5	58.2	33.8	24.5	0.0	0.0	0.0	57.5	33.0	24.5	0.0	0.0	0.0	
1980	9.5	6.3	67.7	40.1	27.6	0.0	0.0	0.0	66.8	39.2	27.6	0.0	0.0	0.0	
1981	10.1	7.2	77.8	47.3	30.5	0.0	0.0	0.0	76.8	46.3	30.5	0.0	0.0	0.0	
1982	10.5	8.1	88.3	55.4	32.9	0.0	0.0	0.0	87.1	54.2	32.9	0.0	0.0	0.0	
1983	11.8	8.9	100.1	64.4	35.7	0.0	0.0	0.0	98.7	63.0	35.7	0.0	0.0	0.0	
1984	11.4	9.6	111.4	74.0	37.4	0.0	0.0	0.0	110.0	72.5	37.4	0.0	0.0	0.0	
1985	10.2	10.1	121.6	84.1	37.5	0.0	0.0	0.0	120.0	82.5	37.5	0.0	0.0	0.0	
1986	12.0	10.6	133.6	94.8	38.8	0.0	0.0	0.0	131.8	93.0	38.8	0.0	0.0	0.0	

1987	12.9	11.0	146.5	105.8	40.7	0.0	0.0	0.0	144.6	103.9	40.7	0.0	0.0	0.0
1988	13.7	11.4	160.2	117.2	43.0	0.0	0.0	0.0	158.1	115.1	43.0	0.0	0.0	0.0
1989	14.4	11.9	174.6	129.1	45.5	0.0	0.0	0.0	172.3	126.8	45.5	0.0	0.0	0.0
1990	11.5	12.2	186.1	141.3	44.8	0.0	0.0	0.0	183.7	138.9	44.8	0.0	0.0	0.0
1991	12.4	12.6	198.6	154.0	44.6	0.0	0.0	0.0	196.0	151.3	44.6	0.0	0.0	0.0
1992	10.9	12.7	209.4	166.7	42.7	0.0	0.0	0.0	206.7	163.9	42.8	0.0	0.0	0.0
1993	11.6	12.6	221.0	179.3	41.7	0.0	0.0	0.0	218.1	176.3	41.7	0.0	0.0	0.0
1994	6.9	11.9	227.9	191.2	36.7	0.0	0.0	0.0	224.9	188.2	36.7	0.0	0.0	0.0
1995	3.7	10.9	231.6	202.1	29.5	0.0	0.0	0.0	228.6	199.0	29.5	0.0	0.0	0.0
1996	2.0	9.5	233.6	211.6	22.0	0.0	0.0	0.0	230.6	208.5	22.1	0.0	0.0	0.0
1997	0.8	7.8	234.5	219.4	15.1	0.0	0.0	0.0	231.4	216.3	15.2	0.0	0.0	0.0
1998	0.9	6.0	235.4	225.3	10.1	0.0	0.0	0.0	232.3	222.2	10.1	0.0	0.0	0.0
1999	0.4	4.2	235.8	229.5	6.3	0.0	0.0	0.0	232.7	226.4	6.4	0.0	0.0	0.0
2000	0.2	2.7	236.0	232.2	3.8	0.0	0.0	0.0	233.0	229.1	3.9	0.0	0.0	0.0
2001	0.2	1.6	236.3	233.8	2.4	0.0	0.0	0.0	233.2	230.7	2.5	0.0	0.0	0.0
2002	0.1	1.0	236.4	234.8	1.6	0.0	0.0	0.0	233.3	231.7	1.6	0.0	0.0	0.0
2003	0.0	0.6	236.4	235.4	1.0	0.0	0.0	0.0	233.4	232.3	1.0	0.0	0.0	0.0

Notes

The total CFC production in 2003 represented 16% of global CFC production and is falling. From now on emissions of CFC-115 will not be calculated.

Emissions are calculated from production and categorised sales using "emission functions".

The emission functions for CFC-115 remain the same as in previous AFEAS compilations:

Half of the sales into "Short Banking Times" and "Others" are released in the year of manufacture and half in the year following;

Releases from "Long Banking Times" (predominantly refrigeration) are distributed normally about a 4.5 year mean, with a total service lifetime of 10 years.

In previous compilations, fugitive emissions of CFC-115 arising during production were counted and reported in the *Short Banking Times* category and in *Annual and Total Released*.

However, the reported *Production* did not include this quantity of material. This has now been rectified and, in this compilation, the *Annual and Cumulative Production* reported for all years includes the quantities released from the production process. **This does not affect the historical record of releases.**

Table 6 Production and atmospheric Release
HCFC-22 (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Medium Banking Times			Long Banking Times			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1943	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	
1944	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	
1945	0.1	0.1	0.3	0.2	0.2	0.0	0.0	0.0	0.3	0.1	0.2	0.0	0.0	0.0	
1946	0.1	0.1	0.4	0.2	0.2	0.0	0.0	0.0	0.4	0.2	0.2	0.0	0.0	0.0	
1947	0.1	0.1	0.5	0.3	0.2	0.0	0.0	0.0	0.5	0.3	0.2	0.0	0.0	0.0	
1948	0.2	0.1	0.7	0.4	0.3	0.0	0.0	0.0	0.7	0.4	0.3	0.0	0.0	0.0	
1949	0.3	0.2	1.0	0.6	0.4	0.0	0.0	0.0	1.0	0.5	0.4	0.0	0.0	0.0	
1950	0.8	0.4	1.8	1.0	0.8	0.1	0.1	0.0	1.7	0.9	0.8	0.0	0.0	0.0	
1951	1.0	0.5	2.8	1.5	1.3	0.1	0.1	0.0	2.7	1.4	1.3	0.0	0.0	0.0	
1952	1.6	0.8	4.4	2.4	2.0	0.2	0.2	0.0	4.2	2.2	2.0	0.0	0.0	0.0	
1953	2.2	1.2	6.5	3.6	3.0	0.3	0.3	0.0	6.2	3.3	3.0	0.0	0.0	0.0	
1954	2.9	1.7	9.4	5.2	4.2	0.4	0.4	0.0	9.0	4.8	4.2	0.0	0.0	0.0	
1955	3.7	2.2	13.2	7.4	5.8	0.6	0.6	0.0	12.6	6.8	5.7	0.0	0.0	0.0	
1956	6.1	3.4	19.2	10.8	8.4	0.9	0.8	0.0	18.4	10.0	8.4	0.0	0.0	0.0	
1957	6.3	4.0	25.5	14.8	10.8	1.2	1.1	0.0	24.4	13.7	10.7	0.0	0.0	0.0	
1958	7.6	4.9	33.1	19.6	13.5	1.5	1.4	0.1	31.6	18.2	13.4	0.0	0.0	0.0	
1959	11.2	6.9	44.4	26.5	17.9	2.0	1.9	0.1	42.3	24.6	17.8	0.0	0.0	0.0	
1960	12.2	8.1	56.5	34.6	22.0	2.6	2.5	0.1	53.9	32.1	21.8	0.0	0.0	0.0	
1961	12.2	8.7	68.7	43.3	25.4	3.1	3.0	0.1	65.5	40.3	25.2	0.1	0.0	0.0	
1962	15.4	10.8	84.1	54.1	30.1	3.8	3.7	0.1	80.2	50.3	29.9	0.1	0.0	0.1	
1963	17.6	12.6	101.7	66.7	35.0	4.6	4.5	0.1	97.0	62.2	34.8	0.1	0.0	0.1	
1964	22.4	15.5	124.0	82.2	41.9	5.6	5.5	0.2	118.3	76.7	41.6	0.1	0.0	0.1	
1965	25.1	18.0	149.1	100.2	49.0	6.8	6.6	0.2	142.2	93.6	48.7	0.1	0.0	0.1	
1966	31.5	21.9	180.6	122.0	58.6	8.2	8.0	0.2	172.3	114.0	58.2	0.1	0.0	0.1	
1967	37.3	26.0	218.0	148.1	69.9	9.9	9.6	0.3	207.9	138.4	69.5	0.2	0.0	0.1	
1968	46.0	31.6	264.0	179.6	84.4	12.0	11.6	0.4	251.8	167.9	83.8	0.2	0.0	0.2	
1969	56.1	38.2	320.1	217.8	102.3	14.6	14.1	0.4	305.3	203.6	101.6	0.2	0.0	0.2	
1970	56.1	41.4	376.1	259.2	116.9	17.1	16.7	0.4	358.8	242.5	116.2	0.3	0.0	0.2	
1971	60.6	45.8	436.7	305.1	131.7	19.9	19.4	0.5	416.5	285.6	130.9	0.3	0.0	0.3	
1972	63.3	50.1	500.0	355.2	144.8	22.7	22.2	0.5	476.9	332.9	144.0	0.4	0.0	0.3	
1973	74.3	57.5	574.3	412.7	161.7	26.1	25.5	0.6	547.8	387.1	160.7	0.4	0.1	0.4	
1974	83.4	65.0	657.7	477.6	180.1	29.9	29.3	0.6	627.3	448.3	179.0	0.5	0.1	0.4	
1975	75.0	65.7	732.7	543.3	189.4	33.3	32.7	0.6	698.8	510.5	188.4	0.5	0.1	0.5	
1976	90.7	74.0	823.4	617.3	206.1	37.4	36.7	0.7	785.4	580.5	204.9	0.6	0.1	0.5	
1977	101.4	82.4	924.8	699.7	225.0	42.0	41.3	0.8	882.0	658.4	223.7	0.7	0.1	0.6	
1978	111.7	60.3	1036.4	760.1	276.4	47.1	46.3	0.9	988.6	713.7	274.9	0.8	0.1	0.6	
1979	117.9	62.2	1154.3	822.3	332.0	52.5	51.6	0.9	1101.0	770.6	330.4	0.8	0.1	0.7	
1980	126.3	75.1	1280.6	897.4	383.3	58.2	57.2	1.0	1221.5	840.0	381.5	0.9	0.2	0.8	
1981	130.8	87.5	1411.5	984.9	426.6	64.2	63.2	1.0	1346.2	921.5	424.7	1.0	0.2	0.9	
1982	123.6	100.4	1535.1	1085.2	449.8	70.0	69.0	1.0	1463.9	1016.1	447.9	1.2	0.2	1.0	
1983	143.9	114.0	1679.0	1199.3	479.7	76.8	75.6	1.2	1600.9	1123.5	477.4	1.3	0.2	1.1	
1984	152.4	120.2	1831.3	1319.5	511.8	84.5	83.2	1.3	1745.4	1236.0	509.3	1.4	0.2	1.2	
1985	153.4	120.8	1984.7	1440.3	544.4	93.1	91.6	1.5	1890.1	1348.4	541.7	1.6	0.3	1.3	
1986	165.0	123.6	2149.7	1563.9	585.8	102.0	100.5	1.5	2046.0	1463.1	582.9	1.7	0.3	1.4	
1987	173.3	128.9	2323.0	1692.8	630.2	111.9	110.2	1.7	2209.2	1582.2	627.0	1.9	0.4	1.6	
1988	203.5	141.4	2526.6	1834.2	692.4	127.9	125.2	2.7	2396.5	1708.6	687.9	2.2	0.4	1.8	
1989	219.5	157.4	2746.1	1991.6	754.5	153.1	148.8	4.3	2590.6	1842.4	748.2	2.5	0.4	2.0	
1990	213.7	171.2	2959.8	2162.8	797.0	184.1	178.8	5.3	2771.4	1983.5	788.0	4.3	0.5	3.8	
1991	236.8	177.5	3196.6	2340.3	856.3	211.2	206.6	4.6	2973.4	2133.0	840.4	12.0	0.8	11.3	
1992	245.7	187.8	3442.4	2528.2	914.2	241.5	236.4	5.1	3180.2	2290.6	889.5	20.7	1.2	19.5	
1993	240.6	189.4	3683.0	2717.6	965.4	264.3	260.4	3.9	3384.5	2455.3	929.2	34.2	1.9	32.4	
1994	239.4	195.5	3922.4	2913.1	1009.3	289.1	284.9	4.2	3592.0	2625.5	966.5	41.3	2.7	38.6	
1995	243.5	203.1	4165.9	3116.2	1049.7	316.9	312.2	4.7	3795.2	2800.2	995.0	53.8	3.8	50.0	

1996	267.5	209.6	4433.4	3325.7	1107.7	346.0	341.0	4.9	4025.6	2979.7	1045.9	61.9	5.0	56.9
1997	246.9	210.7	4680.4	3536.4	1143.9	373.2	368.6	4.6	4241.6	3161.5	1080.1	65.5	6.3	59.2
1998	272.0	208.5	4952.3	3745.0	1207.4	394.0	390.4	3.5	4482.1	3346.7	1135.4	76.3	7.8	68.5
1999	248.6	211.8	5200.9	3956.8	1244.1	417.4	413.4	4.0	4698.6	3533.8	1164.7	84.9	9.5	75.4
2000	239.2	218.7	5440.1	4175.4	1264.7	444.1	439.6	4.5	4903.2	3724.5	1178.8	92.7	11.4	81.3
2001	213.3	218.0	5653.4	4393.4	1260.0	467.8	463.7	4.0	5089.2	3916.3	1172.9	96.4	13.3	83.1
2002	194.0	240.8	5847.4	4634.2	1213.1	522.8	513.5	9.4	5221.0	4105.4	1115.6	103.5	15.4	88.1
2003	187.3	209.8	6034.6	4844.0	1190.6	537.0	534.6	2.4	5382.1	4291.7	1090.4	115.5	17.7	97.8

Notes

In previous reports, from 1996 to 2002 fugitive emissions were incorrectly calculated. This has now been rectified with small changes to the data for the years identified.

Emissions are calculated from production and categorised sales using "emission functions".

Of the sales into "Short Banking Times" (mainly open cell foam), 83% are released in the year of manufacture and the remainder in the year following.

Emission functions for releases from "Medium Banking Times" (predominantly refrigeration) are now recognised to have changed in time.

The functions used here are described in McCulloch, Midgley and Lindley, Recent Changes in the Production and Global Atmospheric Emissions of Chlorodifluoromethane (HCFC-22), *submitted to Atmospheric Environment, 2005*. They comprise:

Up to 1977: Zero use in hermetic systems and 100% use in systems with a rapid initial loss (30% of charge) and subsequent total loss of charge over 10 years

1978 to 1984: 10% hermetic, 10% use in systems with rapid initial loss

1985 to 1993: 20% hermetic, zero use in systems with rapid initial loss

1994 onwards: 30% hermetic, zero use in systems with rapid initial loss

Data affected are identified by green or blue shading.

Material in "Long Banking Times" applications is released at the rate of 2%/year.

(McCulloch A., P.M. Midgley and P. Ashford, Releases of Refrigerant Gases (CFC-12, HCFC-22 and HFC-134a) to the Atmosphere, Atmos. Environ., 37, 889-902, 2003)

**Table 7 Production and atmospheric Release
HCFC-124** (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Medium Banking Times			Long Banking Times			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1991	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1992	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1993	0.5	0.3	0.6	0.3	0.3	0.2	0.2	0.0	0.4	0.2	0.3	0.0	0.0	0.0	
1994	0.9	0.4	1.5	0.8	0.8	0.3	0.3	0.0	1.2	0.5	0.7	0.1	0.0	0.1	
1995	3.1	1.8	4.6	2.5	2.1	1.3	1.1	0.2	3.2	1.4	1.9	0.1	0.0	0.1	
1996	4.8	3.4	9.5	5.9	3.5	3.8	3.4	0.4	5.6	2.6	3.0	0.1	0.0	0.1	
1997	4.1	3.5	13.6	9.5	4.1	6.2	5.8	0.4	7.3	3.7	3.6	0.1	0.0	0.1	
1998	5.2	3.1	18.8	12.6	6.2	6.8	6.7	0.1	11.9	5.9	6.0	0.1	0.0	0.1	
1999	2.8	2.5	21.6	15.1	6.5	7.5	7.4	0.1	13.9	7.7	6.2	0.1	0.0	0.1	
2000	3.1	2.5	24.7	17.6	7.1	8.1	8.0	0.1	16.5	9.6	6.8	0.2	0.0	0.1	
2001	2.1	2.3	26.8	19.9	6.8	8.6	8.5	0.1	18.0	11.4	6.6	0.2	0.0	0.2	
2002	2.7	2.6	29.5	22.5	7.0	9.0	8.9	0.1	20.3	13.6	6.7	0.2	0.0	0.2	
2003	2.8	3.1	32.3	25.6	6.6	10.2	10.0	0.2	21.9	15.6	6.3	0.2	0.0	0.2	

Notes

In previous reports, from 1996 to 2002 fugitive emissions were incorrectly calculated. This has now been rectified with small changes to the data for the years identified.

Emissions are calculated from production and categorised sales using "emission functions".

The emission functions for HCFC-124 remain the same as in previous AFEAS compilations:

Of the sales into "Short Banking Times" (mainly open cell foam), 83% are released in the year of manufacture and the remainder in the year following.

Releases from "Medium Banking Times" (predominantly refrigeration) are complete within 10 years, distributed approximately normally about a 4.5 year mean following a 30% initial loss.

Material in "Long Banking Times" applications is released at the rate of 2%/year.

**Table 8 Production and atmospheric Release
HCFC-141i** (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Medium Banking Times			Long Banking Times			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1990	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	
1991	1.5	0.4	1.6	0.4	1.2	0.3	0.2	0.0	0.0	0.0	0.0	1.3	0.2	1.1	
1992	13.3	3.9	14.9	4.4	10.5	3.0	2.5	0.5	0.1	0.0	0.0	11.9	1.8	10.0	
1993	43.3	13.1	58.2	17.4	40.7	11.1	9.7	1.4	0.5	0.2	0.3	46.5	7.5	39.0	
1994	81.2	24.8	139.4	42.3	97.1	24.5	22.2	2.3	1.1	0.5	0.6	113.8	19.6	94.2	
1995	113.2	36.6	252.5	78.9	173.6	42.4	39.4	3.0	2.0	0.9	1.1	208.1	38.6	169.5	
1996	121.1	42.9	373.6	121.9	251.8	56.1	53.7	2.3	15.8	6.3	9.5	301.8	61.8	240.0	
1997	122.4	44.4	496.0	166.3	329.7	68.8	66.6	2.2	16.4	8.2	8.2	410.9	91.5	319.3	
1998	129.0	50.8	625.0	217.1	407.9	83.7	81.2	2.5	16.9	9.3	7.7	524.4	126.7	397.7	
1999	130.4	55.3	755.4	272.5	483.0	96.4	94.3	2.2	16.9	10.5	6.5	642.1	167.7	474.4	
2000	132.5	59.0	887.9	331.4	556.5	107.0	105.2	1.8	16.9	11.7	5.3	763.9	214.5	549.4	
2001	121.8	63.7	1009.7	395.2	614.5	119.5	117.4	2.1	17.0	12.7	4.2	873.2	265.1	608.1	
2002	116.7	67.7	1126.3	462.8	663.5	130.7	128.8	1.9	17.0	14.2	2.8	978.7	319.9	658.8	
2003	74.6	63.2	1200.9	526.0	674.9	137.5	136.3	1.2	19.5	16.2	3.2	1044.0	373.5	670.5	

Notes

In previous reports, from 1996 to 2002 fugitive emissions were incorrectly calculated. This has now been rectified with small changes to the data for the years identified.

Emissions are calculated from production and categorised sales using "emission functions".
The emission functions for HCFC-141b remain the same as in previous AFEAS compilations:

Of the sales into "Short Banking Times" (mainly open cell foam), 83% are released in the year of manufacture and the remainder in the year following.

Releases from "Medium Banking Times" (predominantly refrigeration) have an initial loss of 30%, with the remainder normally distributed about a mean of 4.5 years and a total service lifetime of 10 years.

Material in "Long Banking Times" applications (mainly closed cell foams) is released at the rate of 10% in the first year and 4.5%/yr thereafter.

**Table 9 Production and atmospheric Release
HCFC-142i** (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Medium Banking Times			Long Banking Times			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1981	2.6	0.9	2.6	0.9	1.7	0.1	0.1	0.0	0.0	0.0	0.0	2.5	0.8	1.7	
1982	1.9	0.7	4.5	1.6	2.9	0.1	0.1	0.0	0.0	0.0	0.0	4.3	1.5	2.9	
1983	2.2	0.9	6.7	2.5	4.2	0.2	0.2	0.0	0.0	0.0	0.0	6.5	2.3	4.2	
1984	2.4	1.0	9.0	3.5	5.5	0.3	0.3	0.0	0.0	0.0	0.0	8.7	3.2	5.5	
1985	1.4	0.8	10.4	4.3	6.1	0.4	0.4	0.0	0.0	0.0	0.0	10.0	3.9	6.1	
1986	7.1	2.7	17.5	7.0	10.5	0.6	0.5	0.0	0.0	0.0	0.0	16.9	6.5	10.5	
1987	6.9	2.9	24.4	9.9	14.5	0.8	0.7	0.0	0.1	0.0	0.0	23.6	9.1	14.5	
1988	7.8	3.4	32.3	13.3	19.0	1.0	0.9	0.0	0.1	0.0	0.0	31.2	12.3	18.9	
1989	10.3	4.7	42.5	18.0	24.5	1.7	1.6	0.1	0.1	0.1	0.0	40.7	16.3	24.4	
1990	18.8	8.6	61.3	26.7	34.6	4.1	3.7	0.4	0.1	0.1	0.0	57.1	22.9	34.2	
1991	27.2	12.6	88.5	39.3	49.2	7.4	6.8	0.6	0.2	0.1	0.1	80.9	32.4	48.5	
1992	30.7	16.0	119.1	55.3	63.9	12.7	11.8	0.9	0.2	0.1	0.1	106.2	43.3	62.9	
1993	33.7	17.7	152.8	72.9	79.9	15.2	14.8	0.4	0.2	0.1	0.1	137.4	58.0	79.4	
1994	38.4	19.8	191.2	92.7	98.5	17.3	16.9	0.3	0.2	0.2	0.1	173.7	75.6	98.0	
1995	38.7	21.6	229.9	114.4	115.5	20.9	20.3	0.6	0.7	0.3	0.3	208.3	93.7	114.6	
1996	37.7	22.4	267.6	136.8	130.8	24.4	23.8	0.6	1.3	0.6	0.7	242.0	112.4	129.6	
1997	40.2	23.1	307.8	159.9	147.9	25.6	25.4	0.2	1.9	1.0	1.0	280.3	133.6	146.7	
1998	38.8	23.3	346.6	183.2	163.4	26.8	26.6	0.2	2.6	1.4	1.2	317.3	155.3	162.0	
1999	40.2	24.8	386.8	208.0	178.8	27.9	27.7	0.2	3.5	1.9	1.6	355.4	178.4	177.0	
2000	40.5	26.1	427.3	234.1	193.2	29.1	28.9	0.2	5.0	2.7	2.3	393.1	202.4	190.7	
2001	33.6	25.3	460.9	259.4	201.5	31.8	31.3	0.4	5.5	3.3	2.2	423.7	224.8	198.9	
2002	21.4	21.2	482.3	280.6	201.7	33.0	32.8	0.2	5.8	3.8	2.0	443.5	244.0	199.5	
2003	19.7	20.7	502.0	301.3	200.7	34.1	33.9	0.2	6.5	4.4	2.0	461.5	263.0	198.5	

Notes

In previous reports, from 1996 to 2002 fugitive emissions were incorrectly calculated. This has now been rectified with small changes to the data for the years identified.

Emissions are calculated from production and categorised sales using "emission functions".

The emission function for "Long" banking times was changed in 2001 in view of the results of a survey commissioned by AFEAS:

(Ashford P., 1999, Development of a global emission function for blowing agents used in closed cell foam, Final Report to AFEAS)

This showed that most (94%) of the HCFC-142b in closed cell foams was used to blow extruded polystyrene, the emission function for which comprises 32.5% loss in the year of manufacture and 3%/yr thereafter.

Columns affected by this change are shaded pale green/blue.

The emission function for "Short" banking time (e.g. open cell foam) is the same as in previous reports (83% emitted in the year of manufacture and 100% the year after).

The emission function for "Medium" banking time (mainly refrigeration) is the same as in previous reports (an initial loss of 30%, with the remainder normally distributed about a mean of 4.5 years, with a total service lifetime of 10 years).

**Table: 10 Production and atmospheric Release
HFC-134a** (thousand metric tonnes)

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	Cumulative														
	Annual		Total			Short Banking Times			Medium Banking Times			Long Banking Times			
	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
1990	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	
1991	2.2	0.2	2.4	0.3	2.1	0.2	0.1	0.0	2.2	0.2	2.0	0.0	0.0	0.0	
1992	6.4	0.8	8.8	1.1	7.7	0.5	0.3	0.2	8.2	0.8	7.4	0.1	0.0	0.1	
1993	26.5	3.6	35.3	4.7	30.6	2.2	1.4	0.9	32.7	3.2	29.4	0.4	0.1	0.3	
1994	50.4	9.1	85.7	13.8	71.9	5.1	3.6	1.4	78.7	9.5	69.2	1.9	0.6	1.3	
1995	73.8	19.8	159.5	33.6	125.9	15.5	10.3	5.2	140.0	21.9	118.0	4.0	1.4	2.6	
1996	83.7	32.4	243.2	65.9	177.2	26.4	20.9	5.4	210.1	42.6	167.5	6.7	2.3	4.4	
1997	97.9	42.3	341.1	108.3	232.8	34.7	30.5	4.2	296.0	74.0	222.0	10.4	3.7	6.6	
1998	112.2	54.3	453.3	162.6	290.7	42.3	38.5	3.8	391.5	117.0	274.5	19.5	7.0	12.5	
1999	131.8	69.7	585.1	232.3	352.8	57.6	50.0	7.6	500.0	172.1	327.8	27.5	10.2	17.3	
2000	129.8	84.6	714.8	316.9	398.0	73.9	65.7	8.1	607.8	238.3	369.5	33.1	12.8	20.3	
2001	134.0	96.4	848.8	413.3	435.5	87.4	80.6	6.8	714.9	314.6	400.4	46.5	18.1	28.3	
2002	157.0	105.9	1005.8	519.2	486.6	103.2	95.3	7.9	845.5	400.9	444.5	57.1	23.0	34.1	
2003	166.9	114.8	1172.7	634.0	538.7	115.6	109.4	6.2	989.7	496.6	493.1	67.4	28.0	39.4	

Notes

In previous reports, from 1997 to 2002 fugitive emissions were incorrectly calculated. This has now been rectified with small changes to the data for the years identified.

Emissions are calculated from production and categorised sales using "emission functions".

The emission function for "Long" banking times was changed in 2001 in view of the results of a survey commissioned by AFEAS:

(Ashford P., 1999, Development of a global emission function for blowing agents used in closed cell foam, Final Report to AFEAS and

McCulloch A., P.M. Midgley and P. Ashford, Releases of Refrigerant Gases (CFC-12, HCFC-22 and HFC-134a) to the Atmosphere, Atmos. Environ., 37, 889-902, 2003)

The survey showed that most (99%) of the HFC-134a in closed cell foams was used to blow expanded polystyrene, the emission function for which comprises

32.5% loss in the year of manufacture and 3%/yr thereafter.

Columns affected by this change are shaded pale green/blue.

The emission function for "Short" banking time (e.g. aerosols) is the same as in previous reports (50% emitted in the year of manufacture and 100% the year after).

The emission function for "Medium" banking time (predominantly refrigeration) is the same as in previous reports (normally distributed about a mean of 4.5 years, with a total service lifetime of 10 years).