

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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0
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	0.0

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	Production	Released	Production	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	Sales	Released	Unreleased	
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 reported to AFEAS 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.**