

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

**Expanded Data**

**Reporting Companies only**

(thousand metric tonnes)

	<b>Annual</b>		<b>Total</b>			<b>Refrigeration hermetic</b>			<b>Refrigeration NON-hermetic</b>			<b>Blowing Agents Closed Cell Foam</b>			<b>Open Cell Foam, Aerosols &amp; Others</b>			
	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	0.1	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1937	0.1	0.0	0.3	0.1	0.2	0.0	0.0	0.0	0.3	0.1	0.2	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	0.6	0.7	0.0	0.0	0.0	1.3	0.5	0.7	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	2.0	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	3.1	1.9	1.3	0.0	0.0	0.0	2.5	1.5	0.9	0.0	0.0	0.0	0.7	0.4	0.3	0.3
1947	1.3	1.3	4.4	3.2	1.4	0.0	0.0	0.0	2.5	1.8	0.7	0.0	0.0	0.0	2.0	1.4	0.6	0.6
1948	3.0	2.3	7.4	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	1.4
1949	4.5	3.8	11.9	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	2.1
1950	6.6	5.5	18.6	14.8	4.0	0.0	0.0	0.0	3.5	2.5	0.9	0.1	0.0	0.1	15.3	12.2	3.1	3.1
1951	9.1	7.6	27.6	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	4.2
1952	13.6	11.0	41.2	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	6.3
1953	17.3	15.0	58.5	48.4	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	8.0
1954	20.9	18.6	79.4	66.9	13.6	0.0	0.0	0.0	7.4	4.1	3.3	0.9	0.2	0.7	72.3	62.6	9.6	9.6
1955	26.3	23.0	105.6	90.0	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	12.1
1956	32.5	28.7	138.1	118.7	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	15.0
1957	33.9	32.2	172.0	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	15.2
1958	29.5	30.2	201.6	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	12.6
1959	35.6	30.9	237.1	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	15.3
1960	49.7	40.5	286.9	252.4	38.7	0.0	0.0	0.0	26.6	13.7	12.9	6.0	1.6	4.5	258.5	237.2	21.3	21.3
1961	60.5	52.1	347.3	304.6	48.0	0.0	0.0	0.0	32.4	16.9	15.4	8.8	2.2	6.6	311.4	285.4	26.0	26.0
1962	78.1	65.4	425.4	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	33.1
1963	93.3	80.0	518.7	450.0	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	39.1
1964	111.1	95.0	629.8	545.0	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	46.4
1965	122.8	108.3	752.6	653.3	110.7	0.0	0.0	0.0	60.4	36.3	24.1	47.3	11.5	35.8	656.2	605.4	50.8	50.8
1966	141.0	121.3	893.7	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	57.3
1967	159.8	137.6	1053.4	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	65.0
1968	183.1	156.8	1236.5	1069.0	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	73.6
1969	217.3	181.9	1453.8	1250.8	224.8	0.0	0.0	0.0	102.8	66.6	36.2	140.9	39.1	101.9	1231.9	1145.2	86.7	86.7
1970	238.1	206.6	1692.0	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	95.3
1971	263.2	226.9	1955.1	1684.4	300.1	0.0	0.0	0.0	130.9	86.8	44.2	217.6	64.6	153.0	1635.9	1533.0	102.9	102.9
1972	306.9	255.8	2262.0	1940.1	355.8	0.0	0.0	0.0	147.8	98.5	49.3	269.3	82.0	187.3	1878.7	1759.6	119.1	119.1
1973	349.1	292.4	2611.1	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	133.8

1974	369.7	321.4	2980.8	2554.0	471.5	0.0	0.0	0.0	187.9	126.1	61.8	393.3	127.2	266.1	2444.3	2300.7	143.6
1975	314.1	310.9	3294.9	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	339.8	316.7	3634.7	3181.6	507.6	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	320.5	303.9	3955.2	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	308.9	283.6	4264.0	3769.1	558.8	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	289.5	263.7	4553.5	4032.8	589.0	0.0	0.0	0.0	313.8	221.6	92.2	712.3	287.9	424.4	3595.7	3523.3	72.4
1980	289.6	250.8	4843.1	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	286.9	248.2	5130.1	4531.9	675.1	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	271.4	239.5	5401.5	4771.4	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	291.7	252.8	5693.2	5024.1	754.5	0.0	0.0	0.0	420.6	326.0	94.6	1087.0	493.0	593.9	4271.1	4205.1	66.0
1984	312.4	271.1	6005.6	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	326.8	280.8	6332.4	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	350.1	295.1	6682.5	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	382.1	310.6	7064.6	6181.7	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	376.0	314.5	7440.6	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	302.5	265.2	7743.1	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	232.9	216.0	7976.0	6977.4	1118.2	0.0	0.0	0.0	603.3	511.2	92.1	2079.3	1074.4	1004.9	5413.1	5391.8	21.3
1991	213.5	188.3	8189.5	7165.7	1146.6	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	186.4	171.1	8375.9	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	147.1	157.9	8523.0	7494.8	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	60.2	78.7	8583.3	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	32.7	68.7	8615.9	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	22.1	65.5	8638.1	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	18.6	58.7	8656.6	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	14.6	52.4	8671.2	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	12.9	48.3	8684.1	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	9.9	44.8	8694.0	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

## Notes

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

The emission function for "Blowing Agents - Closed Cell Foam" has been changed from previous compilations 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)

These 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 (normally distributed about a 4.5 year service lifetime).

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).