

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

Expanded Data

Reporting Companies only

(thousand metric tonnes)

	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
	Cumulative																
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

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