Statistics Finland

Suomen virallinen tilasto
Finlands officiella statistik
Official Statistics of Finland

Environment and Natural Resources 2008

Greenhouse gases 2006

Official greenhouse gas inventory in 2008 to the UNFCCC

In 2006 the amount of Finland's greenhouse gas emissions corresponded to 80.3 Mt of CO2. These data derive from Statistics Finland’s greenhouse gas inventory delivered to the United Nations Framework Convention on Climate Change (UNFCCC).

Statistics Finland’s emission data reported in April are used to monitor the fulfilment of the commitments under the Kyoto Protocol. The fulfilment of the commitments will be determined in 2014. At that time the emissions generated during the first commitment period under the Kyoto Protocol, that is the years 2008-2012, will be summed up. The sum of emissions decreases when the net removals of greenhouse gases from the atmosphere resulting from afforestation/reforestation, deforestation and forest management are taken into account. In addition, emission units acquired under Kyoto mechanisms can be deducted from the emissions. Such units can be acquired by emissions trading or by carrying out projects that decrease emissions in other industrial or developing countries. The end result is compared to Finland’s assigned amount for the first commitment period, which corresponds to 355,017,545 tonnes of carbon dioxide (CO2) (on average some 71.0 Mt per year).

Finland’s greenhouse gas emissions typically show quite large annual fluctuations. In the years 1990-2006 the average fluctuation amounted to 5 Mt and resulted mainly from changes in the emissions of the energy sector (Figure 1). The emissions of the energy sector are, for the most part, included in emissions trading, which facilitates the avoidance of a possible exceeding of the emissions targets in 2008-2012.

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Figure 1. Finland's greenhouse gas emissions 1990-2006. All man-made emissions of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and F-gases are counted as greenhouse gas emissions. Land use, land-use change and the forestry sector (not included in Figure 1) acts as net sink in Finland. This means that the sector binds more emissions to i.a. the growing tree stock than it releases into the atmosphere. In 2006 the net removals of the sector amounted to some 33 Mt of CO2. Only a part of the net removals can be utilised in the fulfilment of the commitments under the Kyoto Protocol.

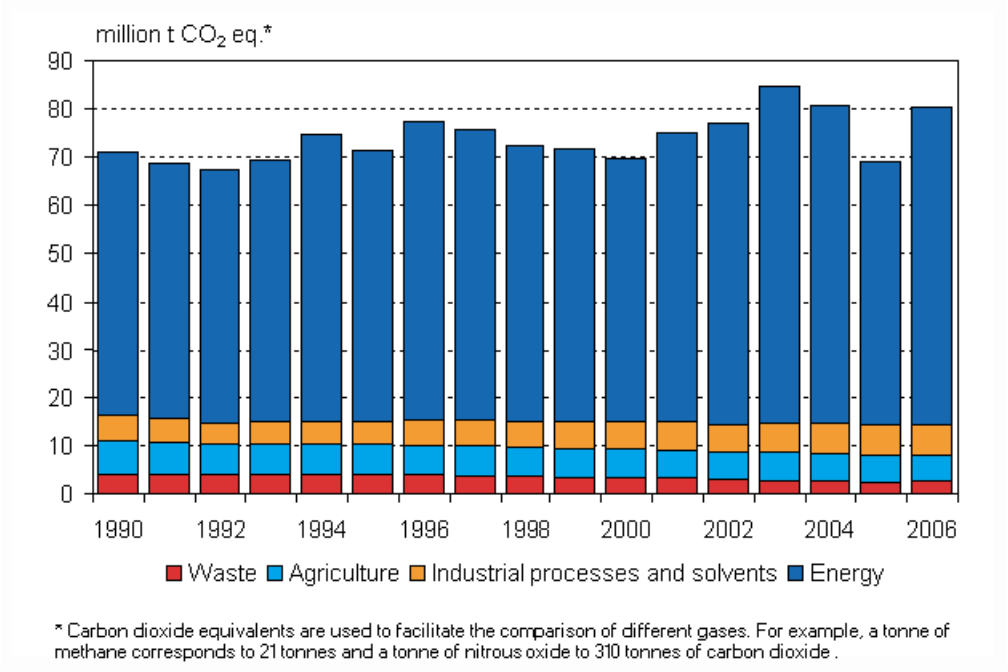


Table 1. Finland's greenhouse gas emissions (million t) exclusive of land use, land-use change and forestry sector (see Table 2). Emissions as amounts corresponding to CO2 tonnes.

Year	Emission category									
	Energy industries	Manufacturing industries and construction	Transport	Other energy	Industrial processes (excl. F-gases)	F-gases	Solvents and other product use	Agriculture	Waste	Total
1990	19.2	13.4	12.8	9.2	5.0	0.1	0.2	7.1	4.0	70.9
1991	19.0	12.9	12.5	8.9	4.6	0.1	0.2	6.7	4.0	68.7
1992	18.7	12.4	12.4	9.0	4.3	0.0	0.2	6.2	4.0	67.3
1993	21.5	12.5	12.0	8.6	4.3	0.0	0.2	6.2	4.0	69.3
1994	26.4	12.8	12.4	8.2	4.5	0.0	0.1	6.2	4.0	74.7
1995	24.1	12.3	12.2	7.8	4.5	0.1	0.1	6.3	3.9	71.3
1996	29.8	12.2	12.2	7.9	4.8	0.1	0.1	6.2	3.8	77.3
1997	27.4	12.4	12.8	7.9	5.0	0.2	0.1	6.2	3.7	75.8
1998	24.2	12.1	13.0	8.2	4.9	0.3	0.1	6.1	3.6	72.3
1999	23.7	12.1	13.2	7.9	5.0	0.4	0.1	5.9	3.5	71.7
2000	22.1	12.1	13.1	7.5	5.0	0.6	0.1	6.0	3.3	69.8
2001	27.5	11.6	13.3	7.7	5.0	0.7	0.1	5.8	3.2	75.0
2002	30.3	11.3	13.5	7.6	4.9	0.5	0.1	5.8	2.9	77.1
2003	37.2	11.7	13.7	7.6	5.2	0.7	0.1	5.7	2.8	84.8
2004	32.9	11.8	14.1	7.3	5.5	0.7	0.1	5.6	2.6	80.8
2005	22.0	11.5	14.1	7.1	5.3	0.9	0.1	5.6	2.4	69.0
2006	32.9	11.7	14.4	7.0	5.3	0.8	0.1	5.6	2.5	80.3

Table 2. Emissions and removals (million t) of the land use, land-use change and forestry sector in Finland. Emissions and sinks as amounts corresponding to CO2 tonnes.

Year	Emission category					
	Forest land	Cropland	Grassland	Peat extraction areas	Harvested wood products	Total
1990	-23.0	7.4	-2.5	0.6	-0.9	-18.4
1991	-37.6	5.6	-1.2	0.6	0.3	-32.2
1992	-31.4	5.4	-1.4	0.6	-0.2	-27.0
1993	-30.1	5.4	-1.0	0.6	-0.1	-25.1
1994	-22.9	5.2	-0.5	0.7	-0.8	-18.2
1995	-23.2	6.9	-1.0	0.7	-0.9	-17.5
1996	-32.2	7.1	-1.3	0.7	-1.0	-26.8
1997	-25.2	6.7	-1.0	0.7	-2.1	-20.9
1998	-22.7	6.1	-0.4	0.7	-1.8	-18.0
1999	-25.1	5.8	0.5	0.7	-2.0	-20.1
2000	-26.6	5.3	1.4	0.7	-1.3	-20.5
2001	-31.4	5.1	1.9	0.7	-0.3	-24.0
2002	-31.9	4.6	1.7	0.7	-0.4	-25.4
2003	-32.0	4.2	2.2	0.7	-0.9	-25.8
2004	-33.3	3.9	2.6	0.7	-0.8	-27.0
2005	-38.5	3.6	3.0	0.7	-0.3	-31.5
2006	-40.8	3.2	3.8	0.7	-0.4	-33.4

- Emissions are positive figures, removals negative.

Contents

Tables

Table 1: Greenhouse gas emissions in Finland (million t CO2-eq.) by gas, emission category and year

Gas	Emission category	Year												
		1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Carbon dioxide	Total without LULUCF-sector	56.7	58.0	64.0	62.6	59.4	58.9	57.0	62.2	64.7	72.3	68.5	56.7	68.1
	Total	38.2	40.4	37.2	41.7	41.3	38.7	36.5	38.2	39.3	46.5	41.5	25.2	34.6
	Energy industries	19.1	23.9	29.6	27.2	23.9	23.4	21.9	27.2	29.9	36.8	32.6	21.7	32.5
	Manufacturing and construction	13.2	12.1	12.0	12.2	11.9	11.9	11.9	11.5	11.2	11.5	11.6	11.3	11.5
	Transport	12.6	11.8	11.8	12.4	12.5	12.7	12.6	12.7	13.0	13.1	13.5	13.5	13.7
	Heating of buildings, other fuel use in agriculture, forestry and fisheries	7.0	5.7	5.8	5.8	5.9	5.8	5.5	5.7	5.6	5.4	5.4	5.2	5.0
	Industrial processes	3.3	3.0	3.3	3.6	3.5	3.6	3.6	3.6	3.5	3.8	3.9	3.7	3.9
	Solvents and other product use	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Fugitive emissions from fuels	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Other fuel use	1.2	1.2	1.2	1.2	1.4	1.3	1.3	1.3	1.3	1.4	1.2	1.2	1.3
	LULUCF-sector	-18.5	-17.6	-26.8	-20.9	-18.0	-20.2	-20.5	-24.0	-25.4	-25.9	-27.0	-31.5	-33.5
Methane	Total	6.3	6.1	6.0	5.9	5.7	5.6	5.4	5.3	5.1	4.9	4.7	4.5	4.5
	Energy industries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Manufacturing and construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Transport	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
	Heating of buildings, other fuel use in agriculture, forestry and fisheries	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Industrial processes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Enteric fermentation	1.9	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6
	Manure management	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Waste	3.8	3.7	3.7	3.6	3.4	3.3	3.1	3.0	2.8	2.6	2.5	2.3	2.3
	Fugitive emissions from fuels	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Other fuel use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	LULUCF-sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitrous oxide	Total	7.9	7.2	7.1	7.1	6.9	6.8	6.9	6.8	6.8	6.9	6.9	7.0	6.9
	Energy industries	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3
	Manufacturing and construction	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Transport	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6
	Heating of buildings, other fuel use in agriculture, forestry and fisheries	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Industrial processes	1.7	1.5	1.5	1.4	1.4	1.3	1.4	1.3	1.3	1.4	1.5	1.6	1.4
	Solvents and other product use	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Manure management	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5
	Agricultural soils	4.3	3.8	3.7	3.6	3.5	3.4	3.5	3.4	3.4	3.3	3.3	3.2	3.2
	Waste	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Fugitive emissions from fuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other fuel use	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	LULUCF-sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PFCs	Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Industrial processes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulphur hexafluoride	Total	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	Industrial processes	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
HFCs	Total	0.0	0.0	0.1	0.2	0.2	0.3	0.5	0.7	0.5	0.7	0.7	0.9	0.7
	Industrial processes	0.0	0.0	0.1	0.2	0.2	0.3	0.5	0.7	0.5	0.7	0.7	0.9	0.7

Gas	Emission category	Year												
		1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total	Total without LULUCF-sector	70.9	71.3	77.3	75.8	72.3	71.7	69.8	75.0	77.1	84.8	80.8	69.0	80.3
	Total	52.5	53.8	50.5	54.9	54.3	51.6	49.3	51.0	51.7	59.0	53.8	37.6	46.8
	Energy industries	19.2	24.1	29.8	27.4	24.2	23.7	22.1	27.5	30.3	37.2	32.9	22.0	32.9
	Manufacturing and construction	13.4	12.3	12.2	12.4	12.1	12.1	12.1	11.6	11.3	11.7	11.8	11.5	11.7
	Transport	12.8	12.2	12.2	12.8	13.0	13.2	13.1	13.3	13.5	13.7	14.1	14.1	14.4
	Heating of buildings, other fuel use in agriculture, forestry and fisheries	7.3	6.0	6.1	6.1	6.2	6.1	5.7	5.9	5.9	5.7	5.6	5.4	5.3
	Industrial processes	5.1	4.6	5.0	5.3	5.2	5.4	5.5	5.7	5.4	5.9	6.2	6.2	6.1
	Solvents and other product use	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Enteric fermentation	1.9	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6
	Manure management	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	Agricultural soils	4.3	3.8	3.7	3.6	3.5	3.4	3.5	3.4	3.4	3.3	3.3	3.2	3.2
	Waste	4.0	3.9	3.8	3.7	3.6	3.5	3.3	3.2	2.9	2.8	2.6	2.4	2.5
	Fugitive emissions from fuels	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Other fuel use	1.6	1.6	1.6	1.5	1.7	1.6	1.6	1.6	1.6	1.7	1.5	1.4	1.5
	LULUCF-sector	-18.4	-17.5	-26.8	-20.9	-18.0	-20.1	-20.5	-24.0	-25.4	-25.8	-27.0	-31.5	-33.4

- Notation 0.0 means that the value of the quantity is less than half of the unit of measurement used. LULUCF is the land use, land-use change and forestry sector.

Table 2: Carbon dioxide emissions in Finland (million t CO2-eq.) by emission category and year

Emission category	Year												
	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total without LULUCF-sector	56.7	58.0	64.0	62.6	59.4	58.9	57.0	62.2	64.7	72.3	68.5	56.7	68.1
Total	38.2	40.4	37.2	41.7	41.3	38.7	36.5	38.2	39.3	46.5	41.5	25.2	34.6
Public electricity and heat production	16.4	21.0	26.5	24.3	20.9	20.3	19.0	24.4	26.9	33.6	29.4	18.7	29.4
Transport	12.6	11.8	11.8	12.4	12.5	12.7	12.6	12.7	13.0	13.1	13.5	13.5	13.7
Manufacturing industries and construction	13.2	12.1	12.0	12.2	11.9	11.9	11.9	11.5	11.2	11.5	11.6	11.3	11.5
Heating of buildings, other fuel use in agriculture, forestry and fisheries	7.0	5.7	5.8	5.8	5.9	5.8	5.5	5.7	5.6	5.4	5.4	5.2	5.0
Industrial processes	3.3	3.0	3.3	3.6	3.5	3.6	3.6	3.6	3.5	3.8	3.9	3.7	3.9
Oil refineries	2.3	2.6	2.8	2.5	2.6	2.7	2.5	2.5	2.7	2.8	2.8	2.6	2.7
Other fuel use	1.2	1.2	1.2	1.2	1.4	1.3	1.3	1.3	1.3	1.4	1.2	1.2	1.3
Manufacturing of solid fuels and other energy industries	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4
Fugitive emissions from fuels	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Solvents and other products use	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LULUCF-sector	-18.5	-17.6	-26.8	-20.9	-18.0	-20.2	-20.5	-24.0	-25.4	-25.9	-27.0	-31.5	-33.5

- LULUCF is the land use, land-use change and forestry sector.

Table 3: Methane emissions in Finland (1000 t) by emission category and year

Emission category	Year												
	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total	300.0	289.6	286.2	282.6	273.3	267.0	256.6	250.8	241.4	232.1	224.1	213.9	216.4
Solid waste disposal	173.3	169.8	165.4	160.9	153.4	149.6	139.9	134.4	123.9	115.4	108.9	99.0	101.9
Enteric fermentation	91.3	80.4	80.8	81.7	79.9	78.7	78.6	77.5	77.9	76.6	75.6	75.0	74.4
Manure management	10.9	11.7	11.8	12.5	12.3	12.2	12.3	12.0	12.6	12.9	12.9	13.2	13.4
Residential heating	7.8	8.1	8.5	8.5	8.6	8.4	8.2	8.5	8.6	8.6	8.5	8.4	8.6
Sewage treatment	7.3	7.0	6.8	6.7	6.6	6.4	6.3	6.2	6.4	6.3	6.4	6.2	6.3
Compost production	1.0	1.7	1.9	1.9	2.0	2.2	2.3	2.4	2.5	2.6	2.7	3.0	3.0
Fugitive emissions from fuels	0.5	3.8	3.9	3.4	3.5	2.8	2.6	3.2	2.7	2.9	2.6	3.1	2.6
Transport	4.7	3.9	3.7	3.6	3.5	3.4	3.2	3.0	2.9	2.8	2.6	2.4	2.2
Energy industries	0.4	0.6	0.7	0.8	0.8	0.8	0.7	0.9	1.2	1.3	1.2	1.0	1.2
Industrial processes	0.4	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7
Manufacturing industry and construction	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Fuel use in agriculture, forestry and fisheries	0.6	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
LULUCF-sector	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.4	0.5
Heating of institutional and commercial buildings	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Other fuel use	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

- LULUCF is the land use, land-use change and forestry sector.

Table 4: Nitrous oxide emissions in Finland (1000 t) by emission category and year

Emission category	Year												
	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total	25.4	23.1	23.0	22.9	22.4	22.0	22.2	21.9	22.0	22.4	22.3	22.5	22.2
Agricultural soils	13.9	12.3	11.9	11.7	11.4	11.1	11.3	11.1	10.9	10.8	10.5	10.4	10.3
Industrial processes	5.3	4.7	4.7	4.7	4.4	4.3	4.4	4.2	4.3	4.5	4.8	5.2	4.6
Transport	0.6	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.0
Manure management	2.1	1.8	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.7
Energy industries	0.4	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.1	1.0	0.8	1.1
Other fuel use	1.4	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.1	1.0	0.9	1.0
Waste	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Manufacturing and construction	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5
Heating of buildings, other fuel use in agriculture, forestry and fisheries	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Solvents and other product use	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1
LULUCF-sector	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Fugitive emissions from fuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

- Notation 0.0 means that the value of the quantity is less than half of the unit of measurement used. LULUCF is the land use, land-use change and forestry sector.

Table 5: Emissions of F-gases in Finland (1000 t CO2-eq.) by year and gas

Year	Gas			
	HFCs	PFCs	Sulphur hexafluoride	Total
1990	0.0	0.1	94.4	94.5
1991	0.1	0.1	67.3	67.5
1992	0.1	0.1	36.6	36.8
1993	0.1	0.1	33.6	33.8
1994	6.5	0.1	34.9	41.5
1995	29.3	0.1	68.5	98.0
1996	77.3	0.2	72.2	149.7
1997	167.8	0.2	76.0	243.9
1998	245.2	0.2	53.2	298.6
1999	318.6	28.0	52.0	398.5
2000	501.7	22.5	51.5	575.7
2001	656.9	20.1	55.0	732.0
2002	463.4	13.4	51.3	528.1
2003	652.1	14.9	41.7	708.6
2004	695.1	12.2	23.2	730.5
2005	863.8	9.9	19.6	893.2
2006	747.7	15.4	40.4	803.5

- Notation 0.0 means that the value of the quantity is less than half of the unit of measurement used.

Figures

Figure 1: Greenhouse gas emissions by sectors in 2006 (%)

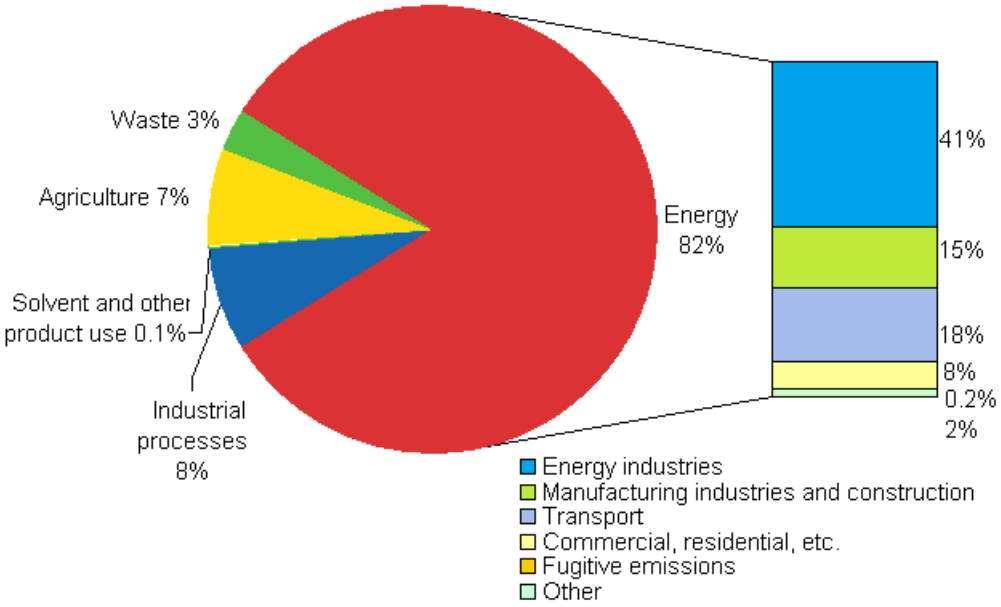


Figure 2: Greenhouse gas emissions in 1990 - 2006 (million t CO2 eq.)

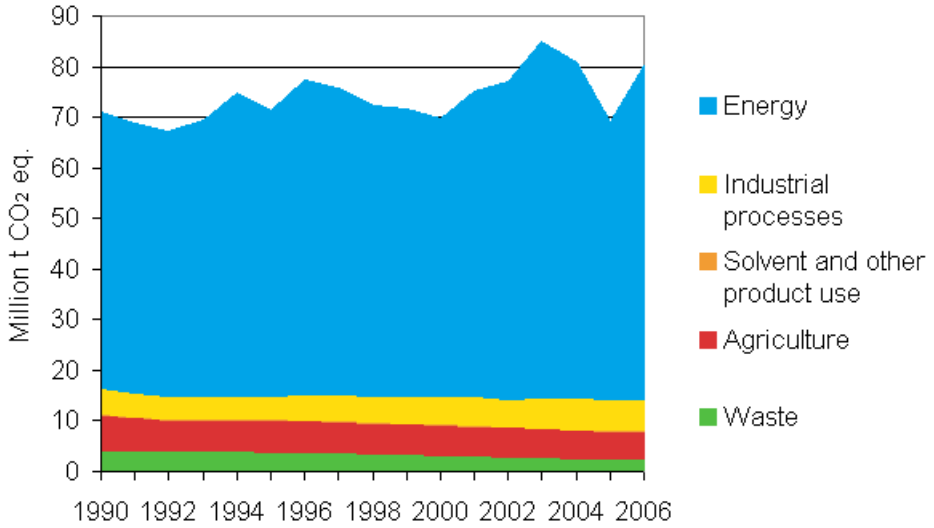


Figure 3: Development of emissions in the energy sector in 1990 - 2006 (million t CO2 eq.)

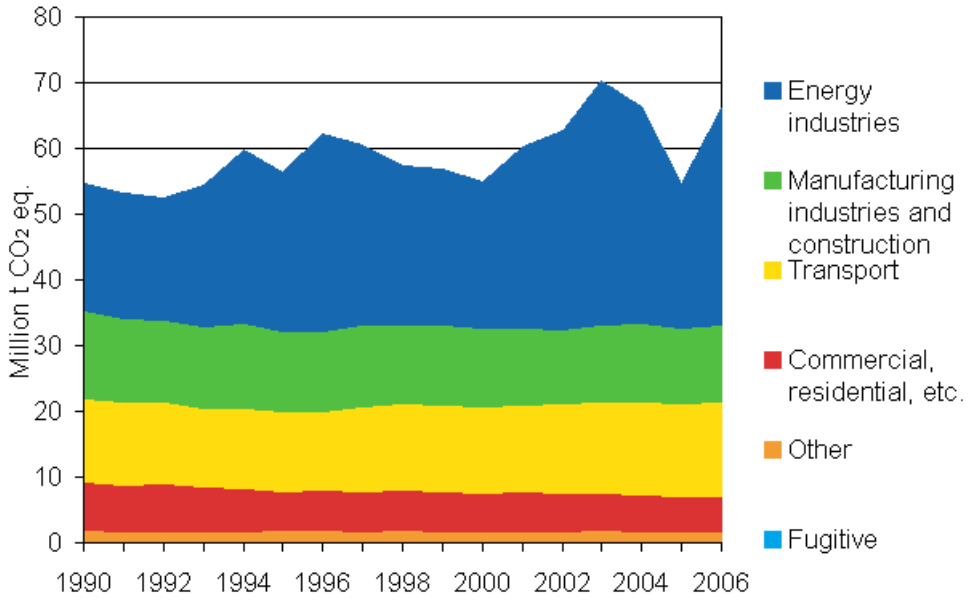
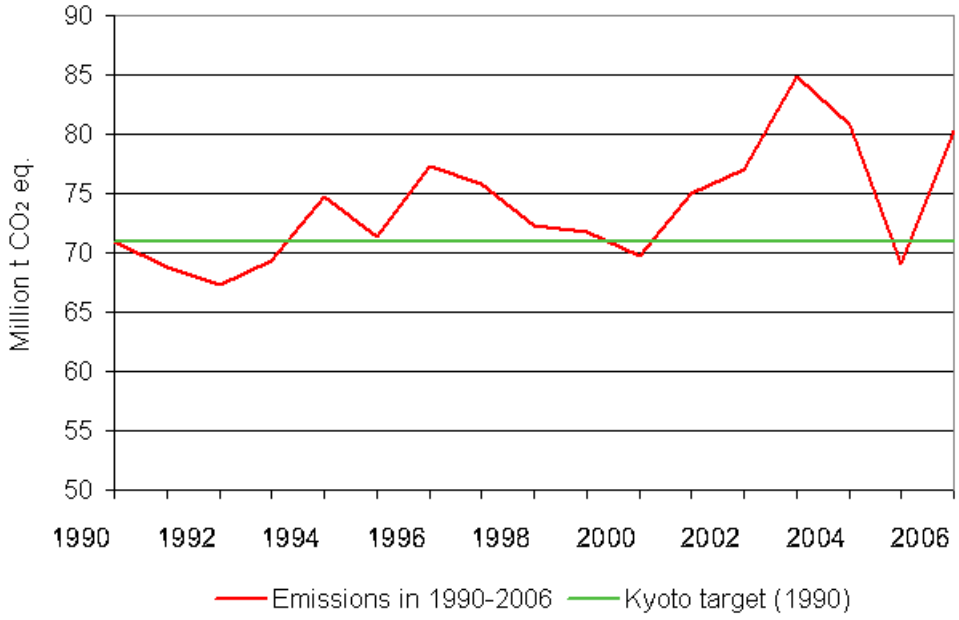


Figure 4: Greenhouse gas emission in Finland in 1990 - 2006 in relation to the Kyoto target level (million t CO2 eq.)



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