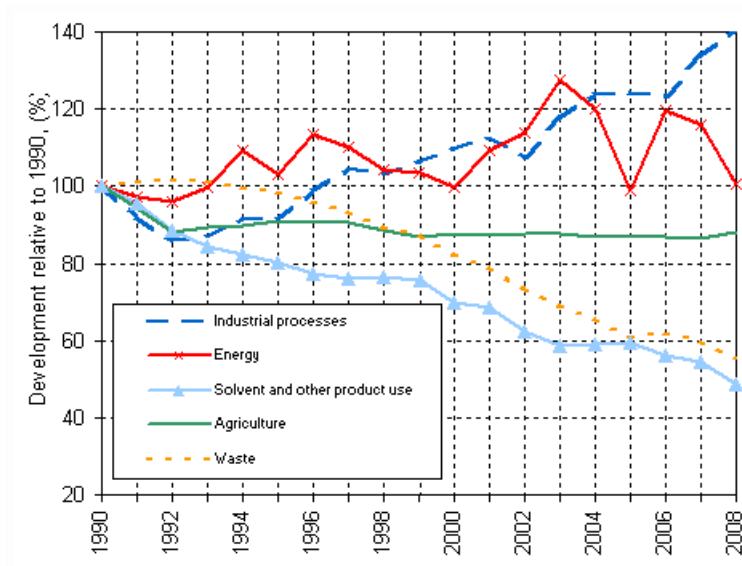


Greenhouse gases 2008

Emissions below the Kyoto Protocol target level

According to Statistics Finland, Finland's greenhouse gas emissions were 1.2 per cent below the Kyoto Protocol target level in 2008. Emissions amounted to 70.1 million tonnes of carbon dioxide equivalent (Mt CO₂ eq.), or 10 per cent less than in the previous year. These data derive from the greenhouse gas inventory Finland submitted to the UNFCCC on 15 April. The trend in the emissions and factors affecting it, as well as the monitoring of the commitments under the Kyoto Protocol are described in detail in the recent Finnish-language publication [Suomen kasvihuonekaasupäästöt vuosina 1990–2008](#).

Figure 1. Development of greenhouse gas emissions by sector in Finland 1990-2008



The aforementioned greenhouse gas emissions in Finland agree with the preliminary data released on 4 December 2009. Emissions from the energy sector accounted for 78 per cent of total emissions in 2008. Emissions from the energy industry (-21%), manufacturing and construction (-6%) and other energy sector emissions (-6%) decreased significantly from 2007. Emissions from transport (-4%) and the waste sector (-7%) were also lower than in the previous year. By contrast, emissions from industrial processes (+5%), F-gas emissions (+10%) and emissions from agriculture (+2%) went up from the year before.

In 2008, the net removals of the Land Use, Land-Use Change and Forestry (LULUCF) sector amounted to 35.4 Mt of carbon dioxide equivalent, which was approximately 15 per cent more than in the year before. The increase was mainly due to reduced volumes of fellings from the previous year. The LULUCF sector is not included in full amounts in the emission reduction commitment under the Kyoto Protocol. Only the emissions and sinks of deforestation, afforestation/reforestation and forest management are taken into account in Finland's commitment. These activities ease Finland's emission reduction burden annually by 0.58 Mt CO₂ eq. However, the compensation is not received until after the commitment period has ended.

Table 1. Finland's greenhouse gas emissions exclusive of land use, land-use change and forestry sector (see Table 2). Emissions as amounts corresponding to million tonnes of CO₂

Year	Energy				Industrial processes		Solvents and other product use	Agriculture	Waste	Total
	Energy industries	Manufacturing industries and construction	Transport	Other energy	Industrial processes (excl. F-gases)	F-gases				
1990	19.19	13.36	12.79	9.18	4.98	0.09	0.18	6.62	3.97	70.36
1991	18.96	12.83	12.43	8.85	4.61	0.07	0.17	6.23	4.01	68.17
1992	18.73	12.30	12.35	8.97	4.35	0.04	0.16	5.82	4.03	66.75
1993	21.47	12.41	11.88	8.55	4.42	0.03	0.15	5.91	4.02	68.85
1994	26.40	12.70	12.23	8.22	4.60	0.04	0.15	5.94	3.97	74.24
1995	24.12	12.14	12.02	7.78	4.54	0.10	0.14	6.02	3.91	70.78
1996	29.83	12.00	12.00	7.92	4.71	0.15	0.14	6.01	3.82	76.58
1997	27.44	12.28	12.59	7.87	4.92	0.24	0.14	5.99	3.72	75.18
1998	24.18	11.94	12.74	8.14	4.85	0.30	0.14	5.85	3.55	71.69
1999	23.66	11.92	12.94	7.85	4.92	0.40	0.14	5.74	3.48	71.04
2000	22.12	11.94	12.84	7.49	4.94	0.57	0.12	5.81	3.27	69.11
2001	27.51	11.49	12.96	7.72	4.92	0.72	0.12	5.77	3.14	74.36
2002	30.26	11.17	13.14	7.66	4.86	0.53	0.11	5.81	2.92	76.48
2003	37.21	11.54	13.35	7.60	5.17	0.72	0.10	5.81	2.75	84.25
2004	32.97	11.64	13.69	7.28	5.45	0.74	0.11	5.74	2.61	80.21
2005	21.92	11.34	13.72	6.98	5.30	0.91	0.11	5.74	2.41	68.43
2006	32.88	11.63	13.90	6.80	5.35	0.80	0.10	5.73	2.46	79.65
2007	30.82	11.45	14.26	6.64	5.74	0.95	0.10	5.72	2.38	78.07
2008	24.28	10.80	13.63	6.28	5.99	1.05	0.09	5.83	2.20	70.14

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

Year	Forest land	Cropland	Grassland	Peat production areas	Harvested wood products	Total
1990	-21.57	5.78	-0.26	1.01	-0.95	-15.99
1991	-35.77	5.15	-0.25	1.03	0.31	-29.53
1992	-28.21	4.93	-0.24	1.07	-0.22	-22.67
1993	-26.13	5.16	-0.23	1.09	-0.09	-20.21
1994	-18.01	5.11	-0.22	1.12	-0.76	-12.75
1995	-19.49	5.39	-0.22	1.14	-0.87	-14.06
1996	-29.28	5.39	-0.21	1.17	-1.05	-23.98
1997	-24.60	5.46	-0.21	1.20	-2.12	-20.27
1998	-23.06	5.36	-0.21	1.24	-1.77	-18.44
1999	-25.66	5.29	-0.19	1.26	-2.04	-21.34
2000	-27.67	5.24	-0.17	1.28	-1.27	-22.59
2001	-32.38	5.30	-0.16	1.28	-0.31	-26.27
2002	-32.89	5.33	-0.13	1.26	-0.44	-26.87
2003	-32.87	5.15	-0.11	1.27	-0.89	-27.44
2004	-34.55	5.21	-0.08	1.33	-0.83	-28.92
2005	-39.02	5.28	-0.05	1.31	-0.34	-32.82
2006	-44.08	5.38	-0.03	1.31	-0.45	-37.85
2007	-36.10	5.35	0.00	1.31	-1.21	-30.65
2008	-41.93	5.32	0.00	1.31	-0.09	-35.39

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Tables

Table 1. Greenhouse gas emissions in Finland 1990–2008 (million t CO₂ eq.) by emission category

	Energy	Industrial processes	Solvents and other product use	Agriculture	Waste	Land use, land-use change and forestry (LULUCF) ¹⁾	Total	Total excluding LULUCF
1990	54,52	5,07	0,18	6,62	3,97	-15,99	54,37	70,36
1991	53,08	4,68	0,17	6,23	4,01	-29,53	38,63	68,17
1992	52,35	4,38	0,16	5,82	4,03	-22,67	44,07	66,75
1993	54,31	4,46	0,15	5,91	4,02	-20,21	48,64	68,85
1994	59,55	4,64	0,15	5,94	3,97	-12,75	61,49	74,24
1995	56,07	4,64	0,14	6,02	3,91	-14,06	56,72	70,78
1996	61,75	4,86	0,14	6,01	3,82	-23,98	52,60	76,58
1997	60,17	5,16	0,14	5,99	3,72	-20,27	54,91	75,18
1998	57,00	5,15	0,14	5,85	3,55	-18,44	53,24	71,69
1999	56,38	5,31	0,14	5,74	3,48	-21,34	49,70	71,04
2000	54,40	5,50	0,12	5,81	3,27	-22,59	46,51	69,11
2001	59,68	5,65	0,12	5,77	3,14	-26,27	48,09	74,36
2002	62,24	5,39	0,11	5,81	2,92	-26,87	49,61	76,48
2003	69,70	5,89	0,10	5,81	2,75	-27,44	56,80	84,25
2004	65,57	6,19	0,11	5,74	2,61	-28,92	51,30	80,21
2005	53,96	6,21	0,11	5,74	2,41	-32,82	35,60	68,43
2006	65,20	6,16	0,10	5,73	2,46	-37,85	41,80	79,65
2007	63,18	6,69	0,10	5,72	2,38	-30,65	47,42	78,07
2008	54,99	7,03	0,09	5,83	2,20	-35,39	34,74	70,14

1) Emissions are positive figures, removals negative

Table 2: Carbon dioxide emissions in Finland 1990, 1995–2008 (million t CO₂ eq.) by emission category

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Public electricity and heat production	16,45	21,05	26,52	24,35	20,92	20,34	19,00	24,38	26,86	33,66	29,43	18,65	29,44	27,34	20,86
Oil refineries	2,26	2,56	2,77	2,51	2,64	2,68	2,55	2,53	2,73	2,80	2,79	2,59	2,68	2,76	2,76
Manufacturing of solid fuels and other energy industries	0,35	0,32	0,30	0,34	0,38	0,42	0,35	0,32	0,36	0,39	0,42	0,39	0,40	0,35	0,33
Manufacturing industries and construction	13,17	11,96	11,82	12,08	11,74	11,72	11,74	11,29	10,99	11,35	11,44	11,16	11,45	11,28	10,63
Transport	12,52	11,77	11,74	12,33	12,48	12,68	12,59	12,71	12,89	13,11	13,45	13,48	13,67	14,04	13,41
Heating of buildings, other fuel use in agriculture, forestry and fisheries	7,04	5,70	5,82	5,83	5,92	5,83	5,46	5,66	5,60	5,51	5,35	5,13	4,94	4,83	4,47
Industrial processes	3,22	3,07	3,24	3,47	3,46	3,56	3,56	3,62	3,52	3,75	3,94	3,67	3,91	4,26	4,42

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Fugitive emissions from fuels	0,22	0,17	0,15	0,20	0,14	0,13	0,13	0,12	0,12	0,12	0,11	0,13	0,11	0,13	0,14
Solvents and other products use	0,12	0,08	0,08	0,07	0,07	0,07	0,07	0,07	0,07	0,06	0,06	0,06	0,06	0,06	0,05
Other fuel use	1,19	1,20	1,22	1,13	1,38	1,23	1,27	1,26	1,26	1,28	1,15	1,09	1,09	1,05	1,07
Land use, land-use change and forestry (LULUCF) ¹⁾	-16,11	-14,17	-24,09	-20,39	-18,57	-21,47	-22,72	-26,40	-27,00	-27,57	-29,05	-32,96	-38,00	-30,79	-35,55
Total	40,52	43,69	39,58	41,91	40,58	37,18	34,00	35,57	37,40	44,45	39,09	23,41	29,75	35,32	22,60
Total excluding LULUCF	56,62	57,86	63,65	62,30	59,15	58,65	56,72	61,96	64,40	72,03	68,14	56,37	67,75	66,12	58,15

1) Positive figures are emissions, negative removals

Table 3. Methane emissions in Finland 1990, 1995–2008 (1000 t) by emission category

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	1.1	1.0
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	0.7	0.6
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	2.1	1.9
Enteric fermentation	91.4	80.1	80.3	81.3	79.3	78.1	78.3	77.3	78.0	77.1	76.2	75.7	75.7	74.7	74.1
Manure management	11.0	12.0	12.1	12.9	12.6	12.4	12.7	12.3	12.8	13.2	13.1	13.5	13.5	13.5	13.7
Solid waste disposal	173.1	169.8	165.4	160.7	153.1	149.5	139.7	133.3	122.8	114.3	107.7	97.6	100.4	95.8	88.2
Sewage treatment	7.3	7.0	6.8	6.7	6.6	6.4	6.3	6.2	6.4	6.4	6.3	6.2	6.2	6.2	6.0
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	0.3	0.3
Residential heating	7.8	8.1	8.5	8.5	8.6	8.4	8.2	9.2	9.4	9.5	9.5	9.6	9.8	9.9	9.7
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	0.5	0.5
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	2.4	2.3
Industrial processes	0.2	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4
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	0.1	0.1
Land use, land-use change and forestry (LULUCF)	1.6	1.7	1.7	1.8	1.7	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8
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	3.3	2.8
Total	300.9	290.6	287.0	283.5	273.8	267.7	257.8	251.7	242.6	234.0	225.9	215.8	218.6	212.9	203.6

Table 4. Nitrous oxide emissions in Finland 1990, 1995–2008 (1000 t) by emission category

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	1.1	1.0
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	0.5	0.5
Transport	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
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	4.8	5.0
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	0.1	0.1
Manure management	1.6	1.4	1.5	1.5	1.5	1.4	1.4	1.3	1.4	1.4	1.4	1.4	1.3	1.3	1.4
Agricultural soils	12.8	11.7	11.7	11.4	11.2	10.9	11.2	11.2	11.2	11.2	11.1	11.1	11.1	11.1	11.5
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	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	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2
Fugitive emissions from fuels ¹⁾	0.0	0.0	0.0	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	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	0.9	0.8
Land use, land-use change and forestry (LULUCF)	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
Total	24.0	22.0	22.1	21.9	21.3	20.9	21.1	21.0	21.2	21.7	21.7	21.8	21.5	21.5	22.0

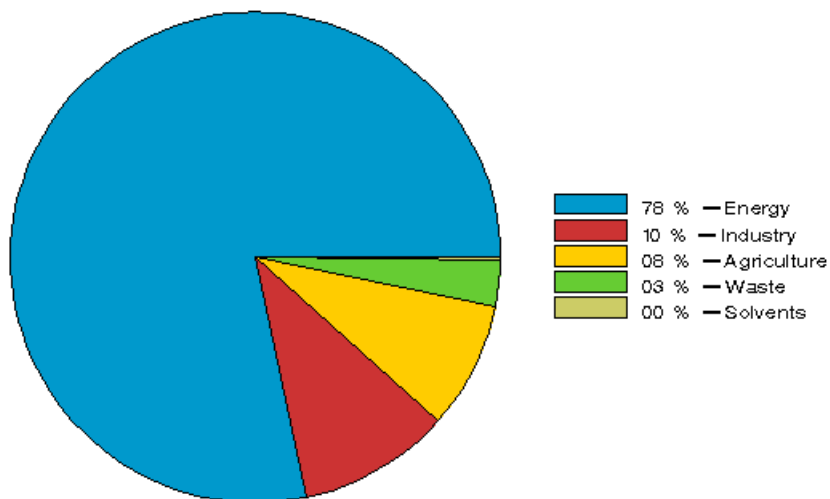
1) Notation 0.0 means that the value of the quantity is less than 0.05

Table 5. Emissions of F-gases in Finland 1990–2008 (1000 t CO₂ eq.)

Year	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	97.9
1996	77.3	0.2	72.2	149.7
1997	167.8	0.2	76.0	244.0
1998	245.2	0.2	53.2	298.6
1999	318.6	28.0	52.0	398.6
2000	494.1	22.5	51.5	568.1
2001	648.0	20.1	55.0	723.1
2002	464.1	13.4	51.3	528.8
2003	652.2	14.9	48.1	715.2
2004	695.3	12.2	33.8	741.3
2005	864.0	9.9	32.7	906.6
2006	747.8	15.4	40.2	803.4
2007	904.1	8.4	36.0	948.5
2008	994.0	11.2	40.4	1045.6

Figures

Figure 1: Greenhouse gas emissions in Finland by sectors in 2008 (%)



A zero means that contribution to the total is less than half percent

Figure 2: Greenhouse gas emissions in Finland in 1990 - 2008 (million t CO2 eq.)

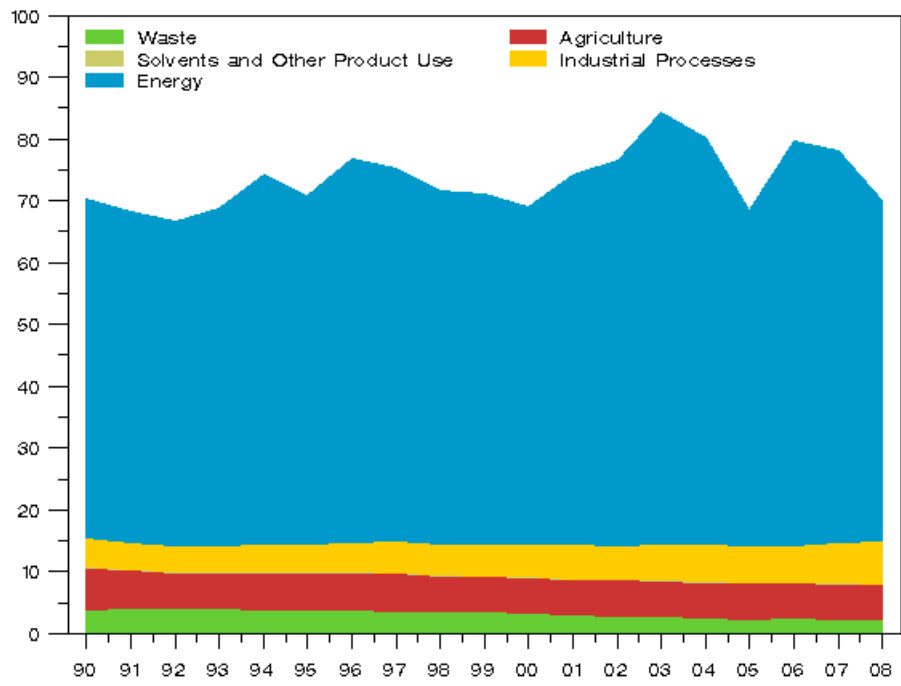


Figure 3: Development of emissions in Finland in the energy sector in 1990 - 2008 (million t CO2 eq.)

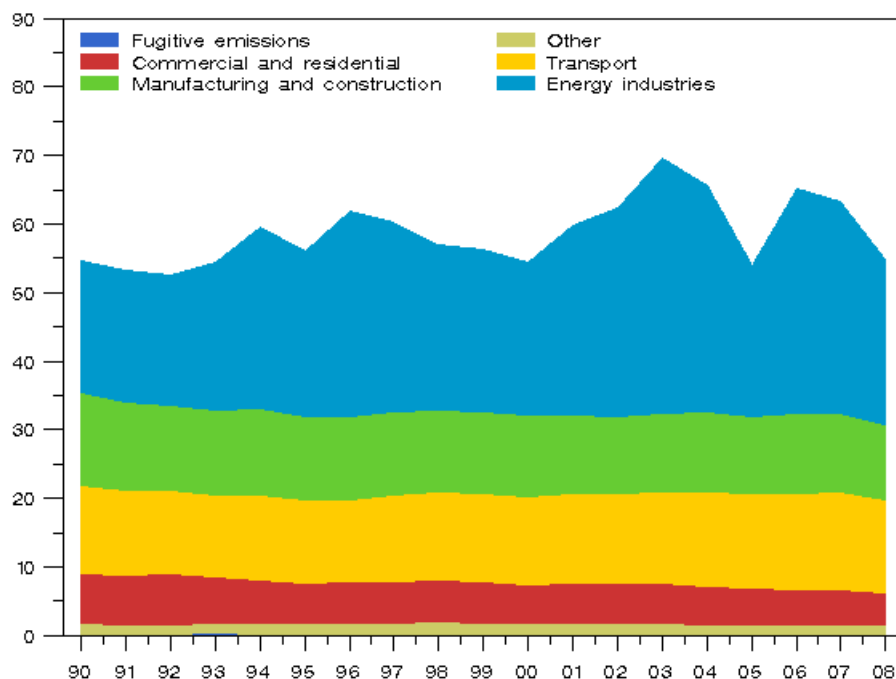
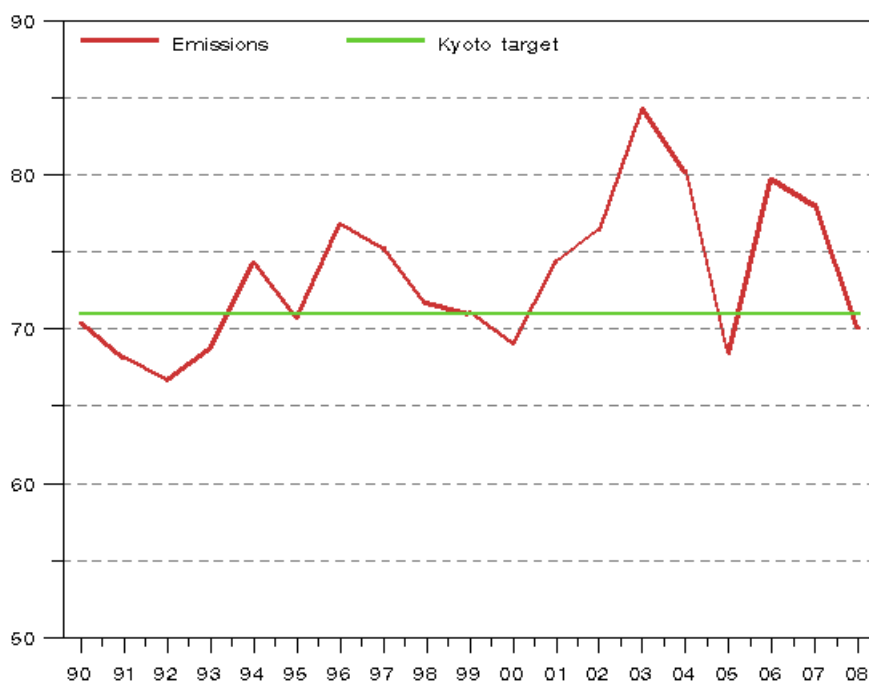


Figure 4: Greenhouse gas emission in Finland in 1990 - 2008 in relation to the Kyoto target level (million t CO2 eq.)



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