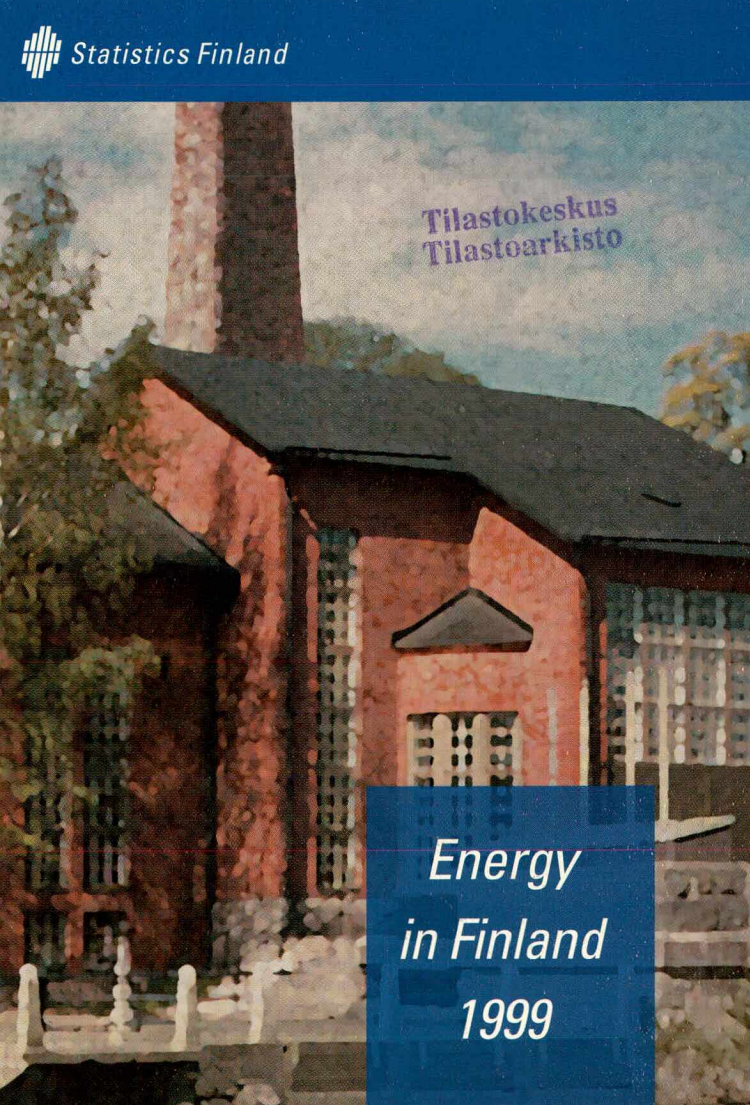


A painting of a large, red-brick building with a dark, gabled roof. A tall, dark chimney rises from the left side of the building. The painting has a textured, almost impressionistic style. In the foreground, there are some white, classical-style balustrades. The sky is a mix of blue and white, suggesting a cloudy day. The overall tone is somewhat somber and historical.

Tilastokeskus
Tilastoarkisto

*Energy
in Finland
1999*

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Paino-Center Oy, Sipoo 2000

Finland in Brief

Area

Situated in northern Europe with an area of 338 145 km² of which 68% forest, 10% water, 6% cultivated land.

Population

5,2 million, with average density of 17 persons per square kilometre. More than two-thirds of the population reside in the southern third of the country.

Average Temperatures

Town	Degree of Latitude	January	July
Helsinki (south)	60°	-5,7°C	+17,0°C
Rovaniemi (north)	66°	-14,5°C	+14,7°C

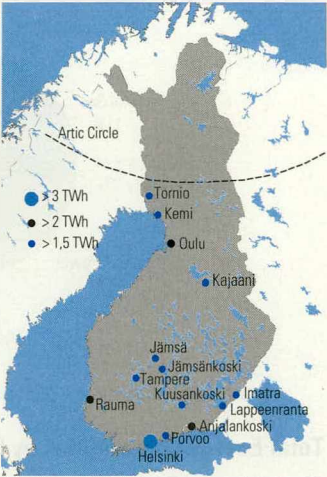
Economy in 1999

GDP totalled 724 FIM bil. (129,7 USD bil.), i.e. 139 929 FIM/capita (25 082 USD/capita), of which services 63,5 %, secondary production 32,8 % and primary production 3,7 %.

Structure of Industry in 1999, Value Added Gross in Production

	FIM bil.	%
Total Industry	168,6	100
Mining and Quarrying	1,7	1
Forest Industry	34,2	20
Chemical Industry	17,3	10
Metal Industry	15,0	9
Machinery and Equipment	15,8	9
Electrical Equipment	35,9	21
Other Manufacturing Ind.	36,3	22
Electricity, Gas and Water Industry	12,3	7

Municipalities with High Electricity Consumption 1999



Natural Resources

Productive forestland is the most valuable natural resource of Finland. The only indigenous energy resources in the country are hydro power, wood and peat. Finland also has some rich deposits of metallic ores from which copper, zinc, iron, and nickel are extracted.

Total Energy Consumption in 1999

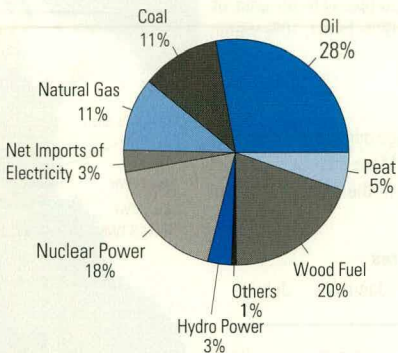
1 313 PJ (31 Mtoe)
253,9 GJ/capita (6,06 toe/capita)
1 815 GJ/FIM million (43,34 toe/FIM mil.)

Electricity Consumption in 1999

77,8 TWh
15 041 kWh/capita

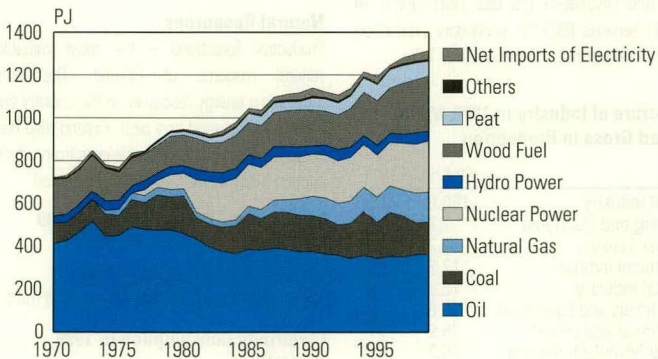
Total Energy Consumption

Total Energy Consumption by Energy Source 1999



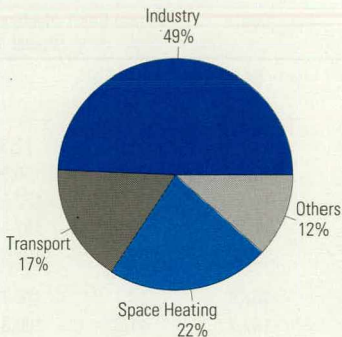
Total energy consumption in 1999 was 1 313PJ.

Total Energy Consumption by Energy Source 1970–1999



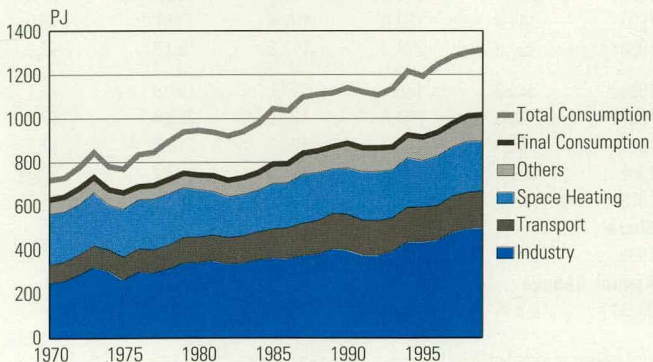
Total Energy Consumption

Final Energy Consumption by End-Use Sector 1999



Final energy consumption in 1999 was 1 016 PJ.

Total Energy Consumption and Final Energy Consumption by End-Use Sector 1970–1999



Total Energy Consumption

Total Energy Consumption by Energy Source, PJ

	Oil	Coal	Natural Gas	Nuclear Power	Hydro Power
1970	412,9	94,8	—	—	33,9
1975	451,0	94,8	26,5	—	43,5
1980	460,3	176,2	32,2	72,3	36,4
1981	433,9	100,0	25,6	150,9	48,7
1982	396,6	108,5	24,2	172,6	46,6
1983	377,2	112,7	23,5	182,4	48,4
1984	365,9	130,1	26,9	194,2	47,2
1985	385,3	167,8	34,1	196,1	44,0
1986	382,1	147,7	41,3	196,3	44,2
1987	391,6	168,5	54,6	202,2	49,2
1988	385,9	172,7	58,8	201,2	47,6
1989	375,0	170,1	77,0	196,5	46,4
1990	375,5	166,8	90,8	197,8	38,7
1991	365,3	164,0	95,7	200,8	47,0
1992	359,7	141,6	99,3	198,2	53,9
1993	344,0	163,8	102,6	205,1	48,0
1994	357,8	204,7	112,8	199,9	42,0
1995	345,2	166,6	117,2	197,8	46,1
1996	354,5	204,8	122,5	203,8	42,2
1997	351,5	190,8	120,3	218,7	42,5
1998	362,8	148,1	138,0	228,8	53,3
1999	364,6	149,8	138,0	240,7	45,3
Share					
1999	27,8 %	11,4 %	10,5 %	18,3 %	3,5 %
Annual Change					
99/98	0,5 %	1,2 %	0,1 %	5,2 %	-14,9 %

Wind power is included in hydro power. Total wind power in 1999 was 0,176 PJ.

Total Energy Consumption

Wood Fuel	Peat	Others	Net Imports of Electricity	Total	
170,1	0,9	6,0	1,9	720,5	1970
130,7	1,7	7,2	14,4	769,8	1975
142,1	17,1	5,6	4,4	946,5	1980
145,1	18,8	6,9	8,1	938,0	1981
133,7	23,3	7,4	8,3	921,3	1982
141,3	30,4	7,4	17,2	940,5	1983
153,2	34,7	7,5	18,8	978,4	1984
151,3	41,1	7,7	17,0	1 044,5	1985
152,5	43,3	7,8	20,9	1 036,1	1986
158,4	45,4	7,6	20,1	1 097,7	1987
167,7	41,5	8,3	26,6	1 110,2	1988
172,0	39,5	8,5	31,9	1 117,0	1989
167,2	55,9	8,4	38,7	1 139,6	1990
158,6	56,4	7,4	25,9	1 121,0	1991
161,2	55,3	8,1	29,6	1 106,8	1992
180,5	58,4	7,1	27,1	1 136,7	1993
201,8	66,7	7,1	21,9	1 214,7	1994
207,5	74,3	7,4	30,3	1 192,3	1995
212,8	84,8	7,8	13,2	1 246,2	1996
237,2	83,3	8,8	27,6	1 280,6	1997
247,9	79,6	8,4	33,5	1 300,3	1998
256,4	70,0	8,2	40,0	1 313,2	1999
					Share
19,5 %	5,3 %	0,6 %	3,0 %	100,0 %	1999
					Annual Change
3,5 %	-12,0 %	-2,3 %	19,5 %	1,0 %	99/98

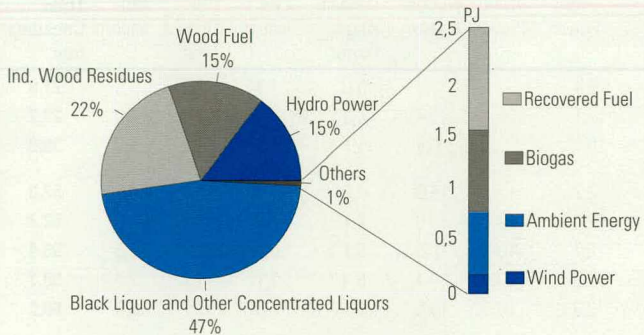
Renewable Energy Sources

Consumption of Renewable Energy Sources, PJ

	Hydro Power	Ind. Wood Residues and By- Products	Black Liquor and Others	Small Combustion of Wood	Others	Total	Peat	Total
1970	33,9	20,2	57,7	92,2	..	204,0	0,9	204,9
1975	43,5	14,8	48,3	67,6	..	174,3	1,7	176,0
1980	36,4	31,1	67,4	43,6	..	178,5	17,1	195,5
1981	48,7	33,1	68,2	43,7	..	193,7	18,8	212,5
1982	46,6	29,4	60,5	43,8	..	180,4	23,3	203,6
1983	48,4	30,7	66,6	44,0	..	189,7	30,4	220,1
1984	47,2	34,4	74,7	44,0	..	200,4	34,7	235,1
1985	44,0	31,6	75,5	44,1	..	195,2	41,1	236,4
1986	44,2	31,1	77,2	44,2	..	196,7	43,3	240,0
1987	49,2	32,4	81,6	44,4	..	207,6	45,4	253,0
1988	47,6	35,0	88,1	44,5	..	215,3	41,5	256,8
1989	46,4	36,3	91,1	44,6	..	218,5	39,5	257,9
1990	38,7	36,5	86,1	44,7	..	205,9	55,9	261,8
1991	47,0	32,9	80,9	44,8	..	205,7	56,4	262,0
1992	53,8	32,8	83,5	44,9	..	215,0	55,3	270,3
1993	48,0	<u>40,4</u>	95,1	45,0	..	228,5	58,4	286,9
1994	42,0	52,4	104,4	45,0	..	243,7	66,7	310,4
1995	46,0	53,9	109,0	44,7	<u>1,8</u>	255,4	74,3	329,7
1996	42,1	56,2	109,6	46,9	2,2	257,1	84,8	341,9
1997	42,5	61,6	128,5	47,0	2,3	281,9	83,3	365,2
1998	53,2	64,9	135,4	47,6	2,3	303,4	79,6	383,0
1999	45,2	67,3	142,6	46,6	2,5	304,1	70,0	374,2

Renewable Energy Sources

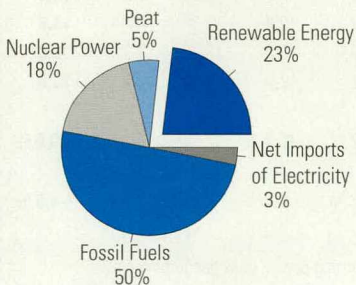
Consumption of Renewable Energy Sources 1999



The total consumption of renewable energy sources in 1999 was 304 PJ which is 23 % of total energy consumption.

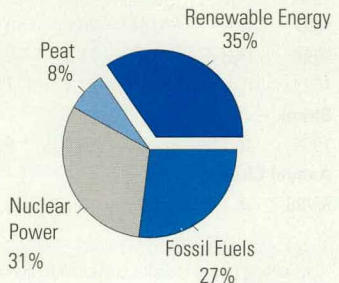
Share of Renewable Energy 1999

In Total Energy Consumption



Total 1 313 PJ

In Electricity Generation



Total 67 TWh

Electricity

Supplies and Total Consumption of Electricity, TWh

	Hydro Power	Wind Power	Nuclear Power	Conden- sing Power ¹⁾	CHP Industry	CHP District Heat	Net Imports	Total Consump- tion
1970	9,4	—	—	5,9	4,9	1,0	0,5	21,8
1975	12,1	—	—	6,3	4,8	2,1	4,0	29,2
1980	10,1	—	6,6	11,1	6,6	4,2	1,2	39,9
1985	12,2	—	18,0	4,9	6,4	5,9	4,7	52,0
1986	12,3	0,000	18,0	4,1	6,3	6,2	5,8	52,7
1987	13,7	0,000	18,5	5,1	6,8	6,8	5,6	56,4
1988	13,2	0,000	18,4	5,4	7,1	7,1	7,4	58,7
1989	12,9	0,000	18,0	5,1	7,5	7,7	8,9	60,0
1990	10,8	0,000	18,1	6,6	7,7	8,5	10,7	62,3
1991	13,1	0,001	18,4	7,0	7,3	9,3	7,2	62,3
1992	15,0	0,002	18,2	4,6	7,7	9,5	8,2	63,2
1993	13,3	0,004	18,8	7,4	8,7	9,8	7,5	65,5
1994	11,7	0,007	18,3	12,0	9,5	10,7	6,1	68,3
1995	12,8	0,011	18,1	8,9	9,5	11,3	8,4	68,9
1996	11,7	0,011	18,7	13,8	9,7	12,5	3,7	70,0
1997	11,8	0,017	20,1	10,9	10,9	12,3	7,7	73,6
1998	14,8	0,023	21,0	6,3	12,0	13,2	9,3	76,6
1999	12,5	0,049	22,1	7,2	12,0	12,8	11,1	77,8

Share

1999	16,1 %	0,06 %	28,4 %	9,2 %	15,4 %	16,5 %	14,3 %	100,0 %
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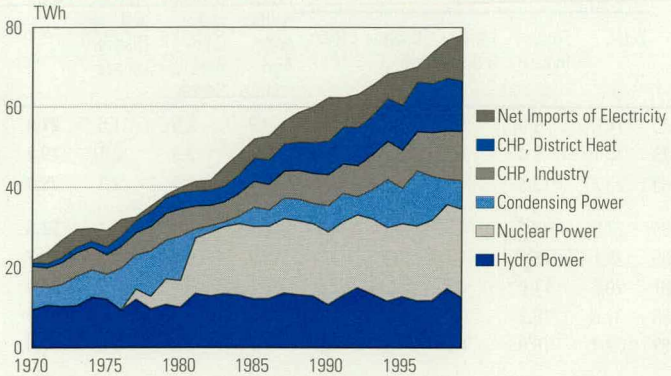
Annual Change

99/98	-15,1 %	113,0 %	5,2 %	13,2 %	0,5 %	-3,3 %	19,5 %	1,5 %
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¹⁾ Condensing power includes conventional condensing power, peak gas turbine power and gas engines.

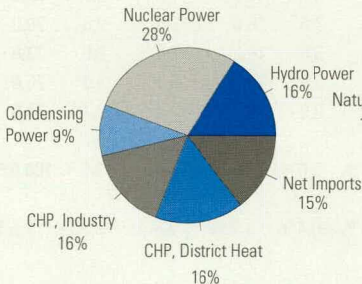
Source: Adato Energia Oy

Electricity Supplies 1970–1999

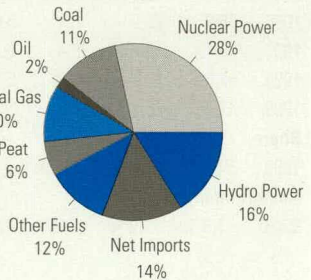


Electricity Supply 1999

By Mode of Production



By Sources



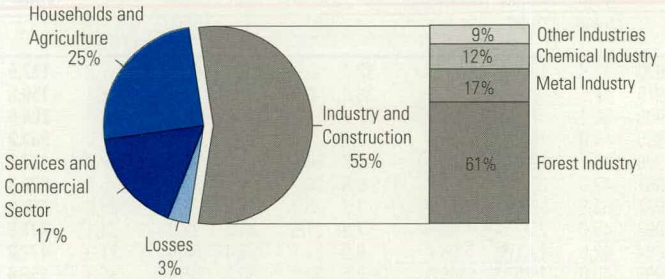
Total electricity supply in 1999 was 77,8 TWh.

Electricity Consumption by End-Use Sector, TWh

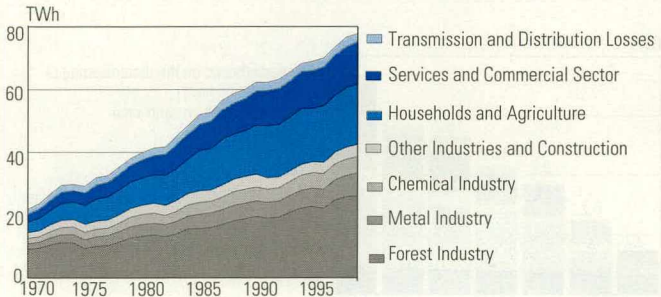
	Industry and Construction					Households and Agriculture	Services and Commercial Sector	Transm. and Distrib. Losses	Total
	Total	Forest Industry	Metal Industry	Chemical Industry	Others				
1970	14,5	9,0	1,8	1,8	1,9	3,3	2,5	1,5	21,8
1975	17,1	9,4	2,8	2,3	2,6	6,0	3,9	2,1	29,2
1980	23,2	13,3	3,7	3,2	3,0	8,6	5,7	2,3	39,9
1985	27,8	15,7	4,6	3,7	3,8	12,8	8,4	3,1	52,0
1986	28,1	16,1	4,7	3,7	3,7	13,2	8,6	2,8	52,7
1987	29,6	17,0	4,7	4,0	3,9	14,5	9,4	3,0	56,4
1988	31,5	18,2	4,9	4,4	4,0	14,4	9,8	3,0	58,7
1989	32,4	18,8	4,9	4,5	4,2	14,5	10,2	2,9	60,0
1990	33,0	19,5	5,0	4,4	4,1	15,6	10,8	2,9	62,3
1991	31,9	19,0	5,0	4,2	3,7	16,5	11,2	2,7	62,3
1992	32,2	19,2	5,2	4,3	3,5	16,7	11,4	2,9	63,2
1993	34,2	20,8	5,4	4,5	3,5	17,2	11,5	2,7	65,5
1994	36,2	22,2	5,6	4,8	3,5	17,8	11,7	2,6	68,3
1995	37,0	22,7	5,8	5,0	3,5	17,0	11,9	3,0	68,9
1996	36,8	22,2	6,1	5,0	3,6	18,0	12,4	2,8	70,0
1997	40,1	24,8	6,4	5,1	3,8	18,2	12,6	2,6	73,6
1998	41,6	25,8	6,8	5,1	3,9	19,0	13,1	3,0	76,6
1999	42,4	26,1	7,2	5,2	3,9	19,3	13,4	2,7	77,8
Share									
1999	54,5 %	33,6 %	9,2 %	6,7 %	5,0 %	24,8 %	17,2 %	3,5 %	100,0 %
Annual Change									
99/98	1,9 %	1,2 %	5,8 %	1,8 %	-0,4 %	1,7 %	2,6 %	-9,3 %	1,5 %

Sources: Adato Energia Oy, Confederation of Finnish Industry and Employers, Statistics Finland/Statistics on the Structure of Industry.

Electricity Consumption by End-Use Sector 1999



Electricity Consumption by End-Use Sector 1970–1999



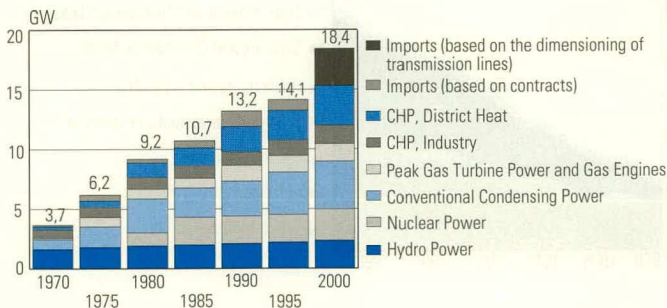
Energy Sources in Electricity Generation, PJ

	Hydro Power	Nuclear Power	Hard Coal	Oil	Natural Gas	Peat	Other Fuels	Net Imports of Electr.	Total
1970	33,9	—	41,8	32,1	—	..	17,9	1,9	127,6
1975	43,5	—	40,2	38,2	8,9	..	14,6	14,4	159,8
1980	36,4	72,3	102,7	26,8	12,6	..	29,2	4,4	284,4
1985	44,0	196,1	60,9	7,7	9,7	8,9	22,7	17,0	367,2
1990	38,7	197,8	61,3	9,7	24,8	17,2	29,1	38,7	417,3
1991	47,0	200,8	59,7	6,9	26,4	24,8	28,8	25,9	420,3
1992	53,8	198,2	43,9	7,3	25,2	21,8	28,1	29,6	408,0
1993	48,0	205,1	62,5	7,3	27,6	26,2	33,9	27,1	437,8
1994	42,0	199,9	96,2	8,9	34,1	32,4	36,6	21,9	472,2
1995	46,0	197,8	65,0	7,5	37,1	36,3	36,6	30,3	456,6
1996	42,1	203,8	106,1	8,7	40,4	40,8	38,1	13,2	493,2
1997	42,5	218,7	90,3	6,8	33,2	36,6	44,6	27,6	500,2
1998	53,2	228,8	53,0	8,2	37,2	32,9	48,9	33,5	495,9
1999	45,2	240,7	62,3	8,9	37,3	31,2	50,1	40,0	515,8

Source: Adato Energia Oy

Capacity of Electricity Supply 1970–2000

Simultaneously Available Capacity of Power Stations at Beginning of Year

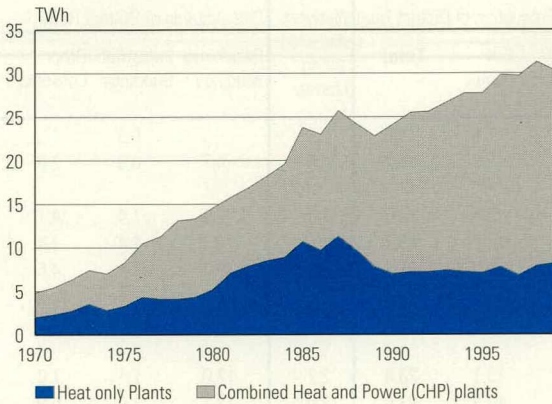


Production and Consumption of District Heat, TWh

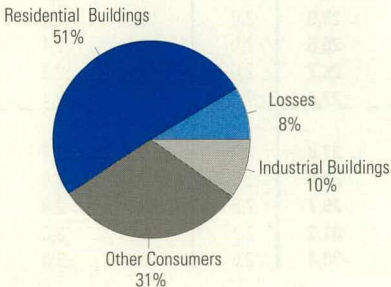
	Net Production of District Heat			Network and Measuring Losses	Consumption of District Heat			
	Heat only Plants	CHP Plants	Total		Residential Buildings	Industrial Buildings	Other Consumers	Total
1970	2,0	2,8	4,8	0,3	..	0,6	..	4,5
1975	3,3	5,0	8,2	0,6	4,7	0,9	2,0	7,7
1980	5,2	9,4	14,6	1,3	7,8	1,4	4,1	13,3
1981	7,1	8,7	15,7	1,5	8,5	1,4	4,4	14,3
1982	7,9	9,0	16,9	1,8	9,2	1,4	4,5	15,1
1983	8,5	9,7	18,2	2,0	9,6	1,5	5,1	16,2
1984	8,9	10,7	19,6	2,1	10,3	1,6	5,5	17,5
1985	10,7	13,1	23,8	2,2	12,6	2,1	7,0	21,7
1986	9,7	13,3	23,0	2,0	12,1	1,9	6,9	21,0
1987	11,3	14,4	25,7	2,1	13,5	2,2	7,8	23,6
1988	9,7	14,5	24,2	2,0	12,8	2,1	7,4	22,2
1989	7,8	15,0	22,8	2,0	11,9	1,9	7,0	20,9
1990	7,0	17,1	24,1	1,9	12,5	2,0	7,7	22,3
1991	7,2	18,3	25,5	2,0	13,0	2,1	8,4	23,5
1992	7,2	18,4	25,6	2,0	13,1	2,1	8,4	23,6
1993	7,4	19,3	26,7	2,0	13,9	2,3	8,5	24,6
1994	7,2	20,5	27,6	2,3	14,0	2,4	8,9	25,3
1995	7,2	20,6	27,8	2,4	14,3	2,7	8,4	25,4
1996	8,0	22,1	30,0	2,5	15,3	2,9	9,4	27,6
1997	6,8	22,9	29,7	2,6	15,1	2,9	9,1	27,1
1998	7,9	23,4	31,3	2,7	15,6	3,0	9,9	28,5
1999	8,2	22,1	30,4	2,6	15,4	3,0	9,5	27,8

Sources: Finnish District Heating Association and and since 1995 also Association of Finnish Local and Regional Authorities.

Production of District Heat 1970–1999

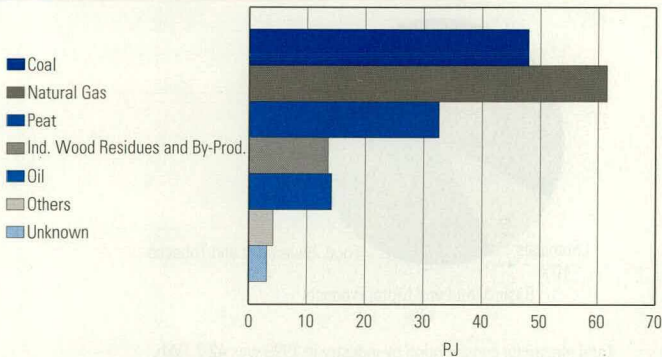


District Heat use 1999



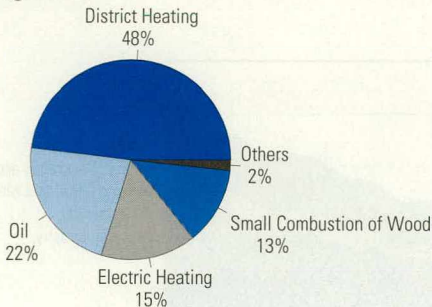
District heat use in 1999 was 30,4 TWh.

Fuel Consumption in Production of District Heat and Combined Production of District Heat and Electricity 1999



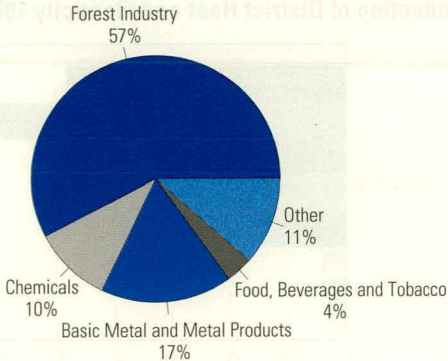
Total fuel consumption in production of district heat and combined production of district heat and electricity in 1999 was 177 PJ (49 TWh).

Heating Energy of Residential, Commercial and Public Buildings 1999



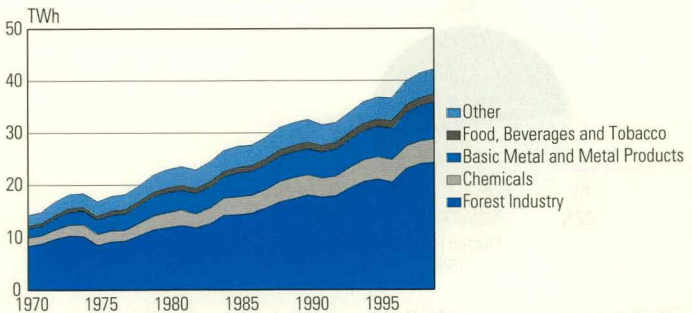
Total heating energy was 51,5 TWh. Heating energy for buildings was calculated by subtracting boiler losses from fuels according to their default efficiencies (see page 38).

Electricity Consumption by Branch of Industry 1999



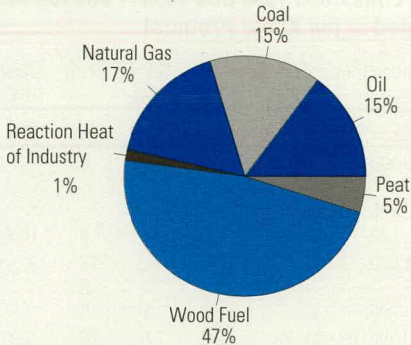
Total electricity consumption by industry in 1999 was 42,2 TWh.

Electricity Consumption by Branch of Industry 1970–1999



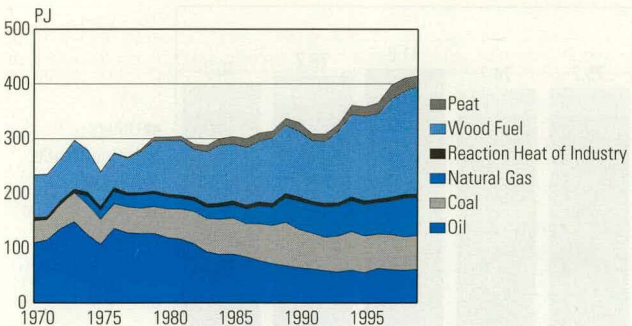
Industry

Fuel Consumption in Industry 1999



Total fuel consumption in industry in 1999 was 415 PJ.

Fuel Consumption in Industry 1970–1999

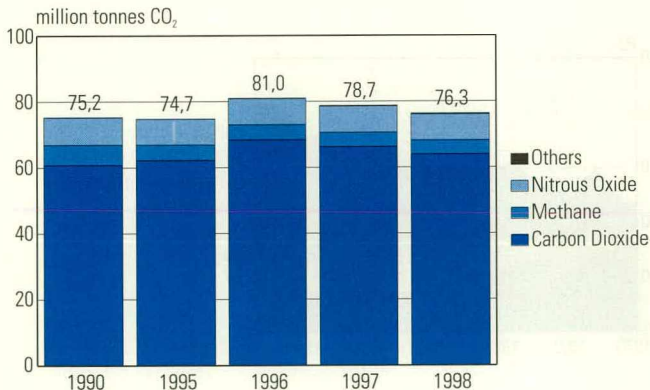


Air Emissions

Greenhouse Gas Emissions 1990 and 1998 (1 000 tonnes) The Gases Included in the Kyoto Protocol

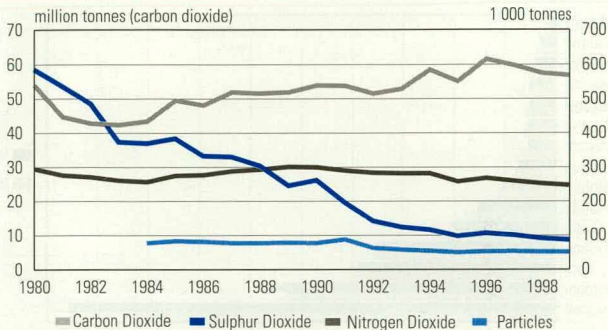
	Carbon Dioxide (CO ₂)		Methane (CH ₄)		Nitrous Oxide (N ₂ O)		Others (HFC, PFC, SF ₆)	
	1990	1998	1990	1998	1990	1998	1990	1998
Fuel Combustion	53 900	57 400	19	22	6	8	—	—
Fugitive Emissions from Fuels	3 500	3 500	1	1	—	—	—	—
Industrial Processes	1 100	900	4	5	5	4	0,002	0,2
Agriculture	1 600	1 400	92	81	15	13	—	—
Waste	—	—	175	89	0	0	—	—
Other	600	700	—	—	0	0	—	—
Total	60 800	63 900	291	198	27	26	0.002	0.2
Emissions, million tonnes CO ₂ equivalent	60,8	63,9	6,1	4,1	8,3	7,9	0,05	0,3

Greenhouse Gas Emissions 1990 and 1995–1998



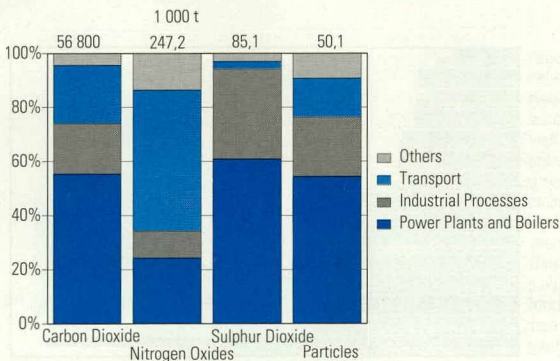
Air Emissions

Emissions from Energy Production and Consumption 1980–1999



Sulphur dioxide and particles include also emissions from processes. The left-hand side scale is for carbon dioxide.

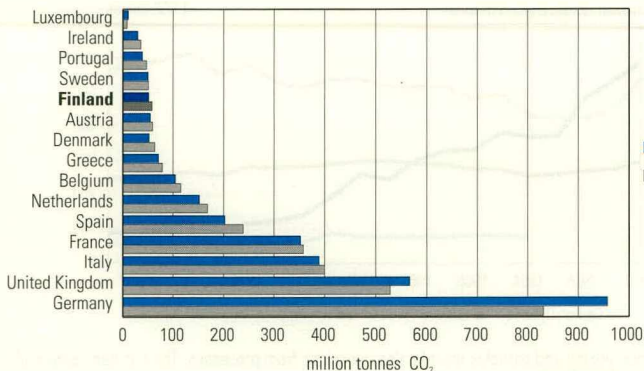
Air Emissions by sector 1999*



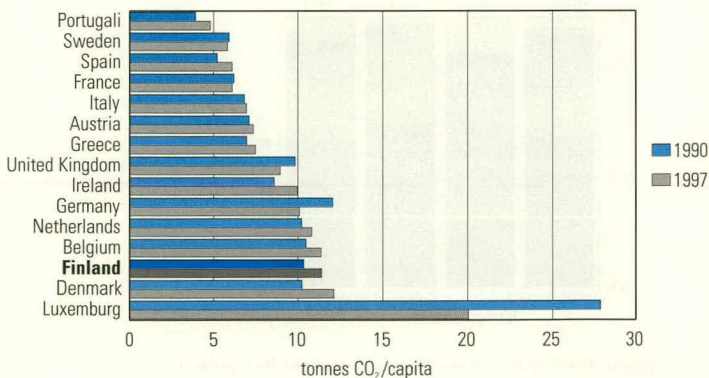
Sulphur dioxide and particles include also emissions from processes.

Air Emissions

Carbon Dioxide Emissions in EU Countries in 1990 and 1997

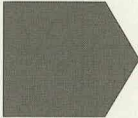


Carbon Dioxide Emissions per Capita in EU Countries 1990 and 1997



Imports and Exports

Imports and Exports of Energy and Energy Technology 1999

	Imports	Exports
Coal	 689 FIM mil. 2 855 000 t	1 FIM mil. 3 000 t 
Natural Gas	 1 466 FIM mil. ..	
Crude Oil	 8 178 FIM mil. 11 181 000 t	
Other Petroleum Products	 3 298 FIM mil. 3 807 000 t	5 510 FIM mil 4 934 000 t 
Nuclear Fuel	 382 FIM. mil. 148 t	
Electricity	 1 131 FIM mil. 9 668 GWh	14 FIM mil. 168 GWh 
Others	 71 FIM mil.	73 FIM mil. 
Total	15 215 FIM mil.	5 598 FIM mil.
Energy Technology	 11 959 FIM mil.	14 421 FIM mil. 

Energy Imports 1999

							Total	
		Russia	Norway	Denmark	Sweden	EU15 OECD	Amount	Value FIM mil.
Hard Coal	1 000 t	1 311	—	—	1	33 905	2 351	416
Coke	1 000 t	—	—	—	—	0 98	504	273
Natural Gas	mill. m ³	..	—	—	—	— —	..	1 466
Crude Oil	1 000 t	4 941	2 765	2 437	—	3 153 5 918	11 181	8 178
Motor Gasoline	mill. l	0	274	0	29	29 303	303	361
Middle Distillates	1 000 t	848	19	0	125	220 360	1 231	1 109
Heavy Fuel Oil	1 000 t	374	58	64	482	546 604	979	560
LPG	1 000 t	27	65	—	8	8 73	100	93
Other Petroleum Prod.	1 000 t	891	35	9	112	252 329	1 226	1 115
Methanol	1 000 t	100	34	—	—	6 40	140	70
MTBE	1 000 t	8	0	10	6	37 37	45	60
Peat	1 000 t	—	0	—	9	9 9	9	1
Nuclear Fuel	t	26	—	—	—	123 123	148	382
Electricity	GWh	5 204	5	—	4 459	4 459 4 464	9 668	1 131
Value	Mmk	7 447	2 646	1 841	1 128	5 314 5 497	15 215	

Source: Board of Customs/ Foreign Trade Statistics

In addition, energy technology imports totalled FIM 11 959 million in 1998.

Source: Etlatieto Oy

Energy Exports 1999

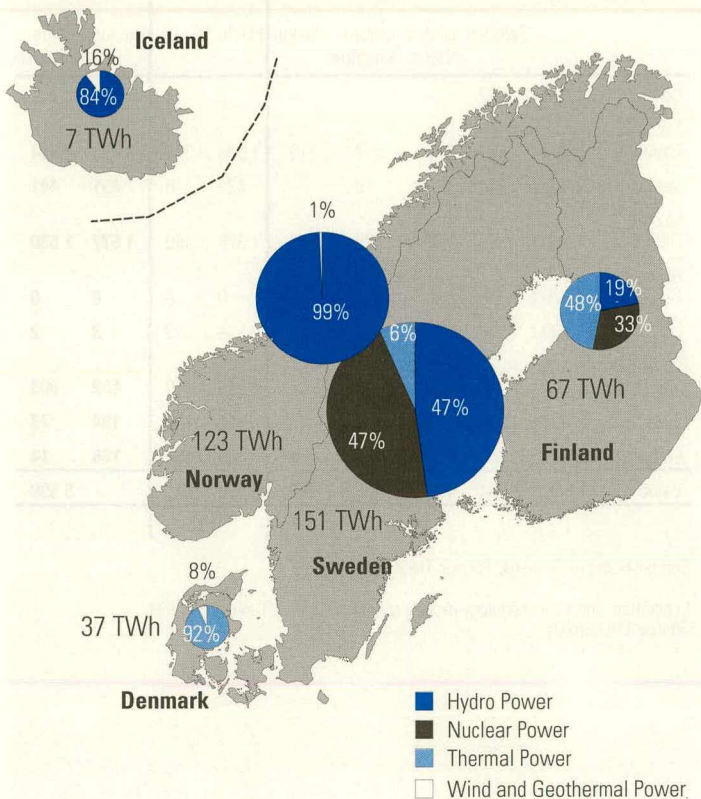
								Total	
		Sweden	United States	United Kingdom	Poland	EU15	OECD	Amount	Value FIM mil.
Coke	1 000 t	2	—	—	—	2	3	3	1
Motor Gasoline	mill. l	961	985	217	315	1 595	2 976	3 335	2 684
Jet Fuel	1 000 t	352	—	19	—	429	448	451	441
Middle Distillates	1 000 t	935	36	176	38	1 375	1 449	1 577	1 580
Heavy Fuel Oil	1 000 t	0	—	—	—	0	0	0	0
LPG	1 000 t	—	—	—	3	—	3	3	2
Other Petroleum Prod.	1 000 t	70	20	32	67	248	349	402	803
Peat	1 000 t	78	0	16	2	170	180	184	73
Electricity	GWh	166	—	—	—	166	166	168	14
Value	Mmk	2 324	795	406	346	3 760	4 931	5 598	

Source: Board of Customs/ Foreign Trade Statistics

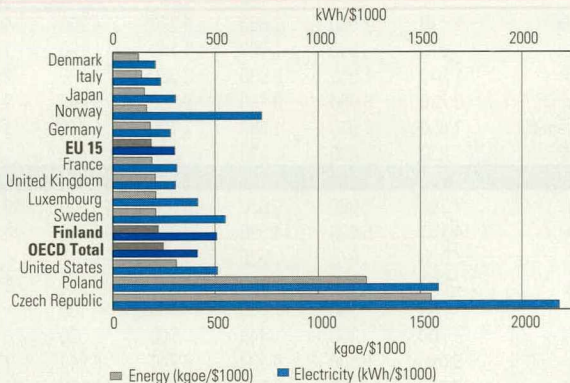
In addition, energy technology exports totalled FIM 14 421 million in 1999.

Source: Etlatieto Oy

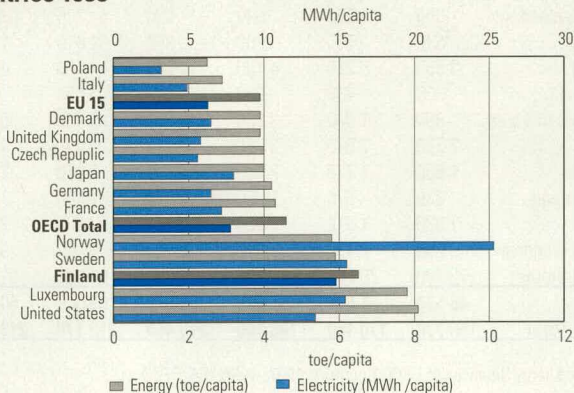
Electricity Generation in Nordic Countries, 1999



Consumption of Energy and Electricity per GDP-Unit in Some OECD Countries 1998



Consumption of Energy and Electricity per Capita in Some OECD Countries 1998



Total Consumption of Energy in OECD Countries, PJ

	1973	1980	1990	1996	1997	1998
Australia	2 410	2 950	3 650	4 230	4 260	4 400
Austria	910	980	1 080	1 140	1 160	1 210
Belgium	1 940	1 930	2 030	2 360	2 390	2 430
Canada	6 740	8 080	8 780	9 840	9 960	9 810
Czech Republic	1 900	1 960	1 880	1 720	1 700	1 720
Denmark	830	830	770	960	880	880
Finland	890	1 060	1 210	1 340	1 380	1 380
France	7 390	7 960	9 530	10 650	10 360	10 720
Germany	14 150	15 090	14 890	14 710	14 540	14 420
Greece	520	670	920	1 040	1 070	1 130
Hungary	890	1 210	1 190	1 080	1 060	1 050
Iceland	50	60	90	100	100	130
Ireland	300	360	440	500	520	540
Italy	5 380	5 800	6 420	6 740	6 840	7 030
Japan	13 550	14 510	18 370	21 370	21 560	21 360
Luxembourg	190	150	150	140	140	130
Mexico	2 310	4 140	5 200	5 730	5 930	6 190
Netherlands	2 610	2 720	2 790	3 180	3 140	3 120
New Zealand	350	390	590	690	700	720
Norway	630	790	900	990	1 010	1 050
Poland	3 950	5 230	4 190	4 540	4 400	4 020
Portugal	300	430	690	800	850	920
Republic of Korea	880	1 830	3 830	6 860	7 380	6 840
Spain	2 220	2 870	3 790	4 280	4 490	4 730
Sweden	1 650	1 720	2 000	2 210	2 170	2 180
Switzerland	830	870	1 050	1 070	1 100	1 130
Turkey	1 020	1 310	2 200	2 830	2 980	3 060
United Kingdom	9 240	8 430	8 920	9 760	9 550	9 750
United States	72 700	75 850	80 620	89 600	90 530	91 350
EU 15	48 530	51 000	55 620	59 810	59 500	60 570
OECD Total	156 730	170 180	188 160	210 450	212 170	213 380

Source: Energy Balances of OECD Countries 1997–1998, IEA/OECD

Electricity Consumption in OECD Countries, TWh

	1973	1980	1990	1996	1997	1998
Australia	52,5	82,1	134,3	155,2	160,4	170,3
Austria	25,9	33,7	44,0	49,0	49,8	50,8
Belgium	35,8	44,9	59,1	71,4	73,3	75,5
Canada	223,2	307,5	431,0	474,5	480,4	477,5
Czech Republic	34,1	43,1	53,0	54,1	53,2	52,2
Denmark	16,1	22,0	29,5	32,6	32,5	32,5
Finland	27,2	37,6	59,5	67,2	71,2	73,6
France	160,0	231,7	323,3	384,2	381,6	393,3
Germany	337,6	419,2	481,0	479,7	482,9	487,5
Greece	13,0	20,3	29,7	37,2	38,9	41,0
Hungary	18,6	26,9	33,0	29,8	29,8	30,1
Iceland	2,1	2,9	3,9	4,4	4,9	5,6
Ireland	6,2	8,7	12,0	15,9	16,8	17,8
Italy	125,8	163,6	218,8	246,0	253,7	260,8
Japan	421,7	520,2	765,1	901,7	924,3	936,6
Luxembourg	3,0	3,6	4,1	4,9	5,1	5,3
Mexico	31,6	57,2	100,2	131,3	143,0	147,7
Netherlands	46,1	58,9	75,5	88,8	92,0	95,6
New Zealand	15,9	19,5	27,8	31,1	31,4	31,5
Norway	61,0	75,1	97,4	104,0	104,7	109,9
Poland	69,0	99,7	112,5	107,3	108,9	108,7
Portugal	8,3	14,6	24,0	30,7	32,4	34,4
Republic of Korea	12,8	32,7	94,4	202,6	223,0	208,8
Spain	60,7	92,0	129,2	151,5	163,4	169,7
Sweden	69,4	86,1	130,7	128,3	127,5	128,5
Switzerland	29,0	35,3	47,0	48,9	48,8	49,6
Turkey	10,4	20,4	46,8	74,2	81,9	87,7
United Kingdom	242,5	243,3	284,4	314,3	317,5	323,2
United States	1 715,9	2 099,8	2 712,6	3 221,3	3 270,6	3 347,8
EU 15	1 177,7	1 480,2	1 904,6	2 101,6	2 138,6	2 189,5
OECD Total	3 875,6	4 902,6	6 563,7	7 642,1	7 803,8	7 953,3

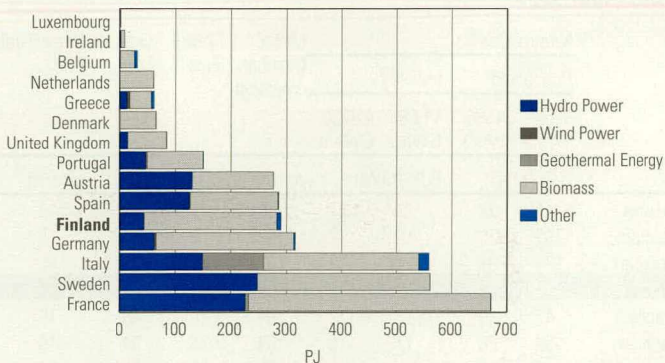
Sources: Electricity Information 1992,1994,1996, 1997 and 1998 and Energy Statistics of OECD countries 1996-1997, IEA/OECD.

Renewable Energy Sources in EU Countries 1997, TJ Production

	Hydro Power	Wind Power	Solar Energy	Geothermal Energy	Biomass	Other	Total
Austria	129 560	0	0	0	146 860	0	276 420
Belgium	1 100	30	40	80	26 080	4 390	31 720
Denmark	70	6 960	280	50	64 530	0	71 890
Finland	44 070	60	0	0	238 570	7 210	289 910
France	226 040	0	680	5 500	438 490	0	670 710
Germany	62 470	10 920	2 850	410	247 150	0	323 810
Greece	13 980	130	4 750	100	38 150	0	57 110
Ireland	2 440	180	0	0	6 800	0	9 430
Italy	149 770	420	300	109 330	281 430	17 900	559 160
Luxembourg	290	10	0	0	1 660	0	1 960
Netherlands	330	1 710	220	0	60 190	0	62 450
Portugal	47 180	130	680	1 880	100 720	0	150 590
Spain	124 570	1 310	1 060	270	158 590	0	285 810
Sweden	248 480	760	190	0	312 260	0	561 680
United Kingdom	14 860	2 390	260	30	68 570	0	86 130
EU 15	1 065 210	25 020	11 330	117 660	2 190 060	29 510	3 438 780

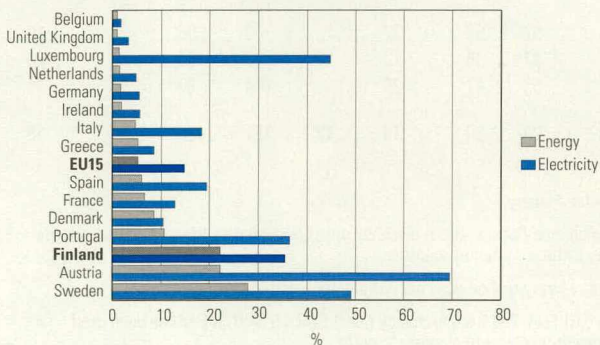
Source: Energy in Europe 1999 – Annual Energy Review, EU Commission (CD-ROM)

Production of Renewable Energy in EU Countries 1997



Renewable Energy in EU Countries 1997

Share in Primary Energy Supply and Electricity Generation



Includes energy produced from waste.

Source: Energy Balances of OECD Countries 1996–1998, IEA/OECD

Consumer Prices of Fuel in Some European Countries in December 1999

	Natural Gas ¹⁾				Motor	Diesel	Light	Heavy Fuel
	Household	Industry			Gasoline	Fuel ²⁾	Fuel	Oil ³⁾
	4652	34890	11,63	116,30	unleaded		Oil	
	kWh/a	kWh/a	GWh/a	GWh/a				
	EUR /MWh		EUR /MWh		cent/l ⁴⁾	cent/l ⁴⁾	cent/l ⁴⁾	cent/kg ⁴⁾
Austria	41	38	23	21	88	72	39	16
Belgium	53	28	15	12	98	73	25	14
Denmark	124	91	14	12	102	79	69	45
Finland	..	..	13	11	108	79	36	21
France	47	29	15	12	104	79	40	16
Germany	50	28	17	16	94	74	34	15
Greece	..	..	..	..	70	61	28	20
Ireland	58	28	12	..	81	74	32	20
Italy	44	58	15	13	101	83	80	18
Luxembourg	39	20	18	14	76	62	28	15
Netherlands	37	30	15	11	107	78	47	20
Norway	..	..	..	..	122	112	57	..
Portugal	57	57	22	..	80	55	..	19
Spain	47	36	12	11	75	62	36	20
Sweden	53	41	20	..	104	86	57	41
United Kingdom	28	20	14	13	121	125	27	18

¹⁾ Price on 1st January

²⁾ The considerable fluctuations in diesel oil prices depend on different taxation systems for heavy traffic in different countries.

³⁾ The price of heavy fuel oil does not include value added tax or sales tax if any.

⁴⁾ 1 cent = 0,01 EUR. The fixed exchange rate 1 EUR = 5,945730 FIM has been used when converting prices from marks to euros.

Sources: Finnish Oil and Gas Federation and Energy prices 1980–1999, Eurostat

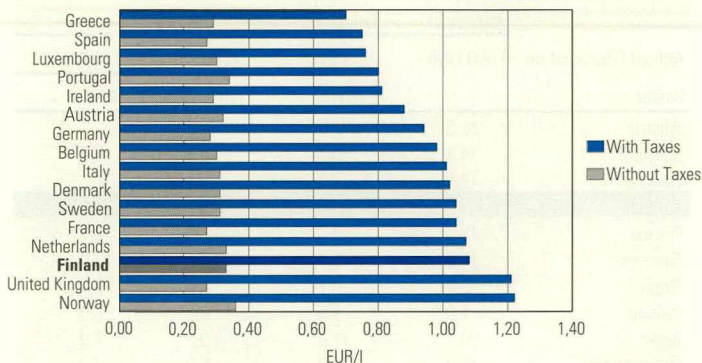
Consumer Prices of Electricity in Some European Countries 2000, cent /kWh

	Household	Industry		
Annual Consumption	3 500 kWh	1,25 GWh	10 GWh	24 GWh
Power		0,5 MW	2,5 MW	4 MW
Austria	12,3	..	..	..
Belgium	14,3	10,4	8,1	6,7
Denmark	18,0	9,1	..	..
Finland	8,7	5,8	5,1	4,6
France	12,0	7,7	6,6	5,7
Germany	14,9	7,7	6,1	5,0
Greece	6,1	6,7	6,2	5,2
Ireland	8,9	9,1	7,0	6,0
Italy	20,1	11,6	9,5	7,9
Luxembourg	11,2	8,9	5,8	4,7
Netherlands	13,9	6,2	..	..
Norway	10,2	5,1	3,8	3,0
Portugal	12,6	7,6	6,8	5,5
Spain	10,9	8,4	7,3	6,5
Sweden	10,2	5,7	4,0	3,5
United Kingdom	11,0	..	..	..

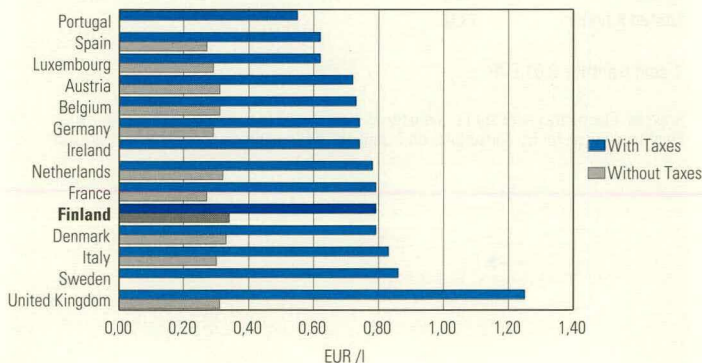
1 cent (senti) = 0,01 EUR

Sources: Electricity prices for EU industry on 1 January 2000: downward trend, Eurostat,
Electricity prices for EU households on 1 January 2000: slight downward trend, Eurostat.

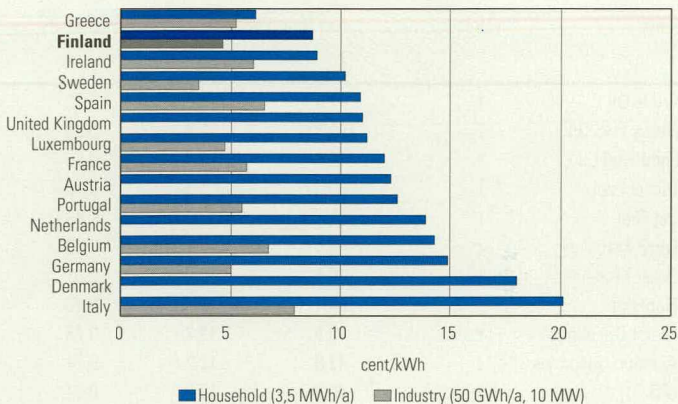
Consumer Prices of Unleaded Petrol in Some European Countries in December 1999



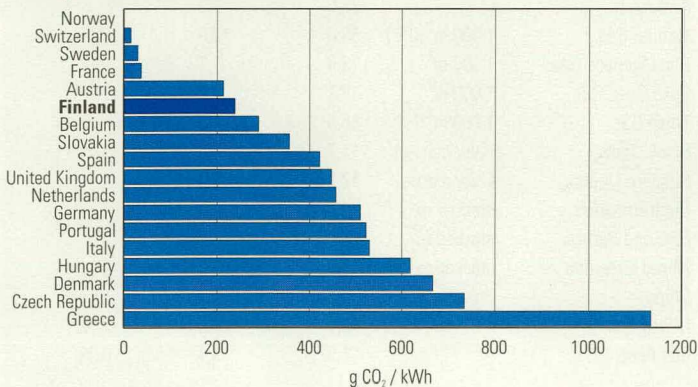
Consumer Prices of Diesel Fuel in Some European Countries in December 1999



Consumer Prices of Electricity in Some Countries, 2000



Carbon Dioxide Intensity in Power Generation in Some European Countries 1997



Source: Eurprog '99

Net Heat Contents of Energy Sources and Conversion Factors

Fuels	Unit	Net Heat Content		Density
		GJ	MWh	t/m ³
Crude Oil	t	41,8	11,6	0,86
Heavy Fuel Oil	t	41,1	11,4	0,98
Light Fuel Oil	t	42,5	11,8	0,85
Diesel Fuel	t	41,5	11,5	0,85
Jet Fuel	t	43,3	12,0	0,80
Lamp Kerosine	t	42,6	11,8	0,80
Other Kerosines	t	43,1	12,0	0,81
Naphtha	t	44,4	12,3	0,70
Motor Gasolines	t	43,8	12,2	0,75
Aviation Gasolines	t	43,8	12,2	0,71
LPG	t	46,3	12,9	0,51
Refinery Gases	t	51,9	14,4	
Hard Coal	t	25,5	7,1	
Coke	t	29,3	8,1	
Anthracite	t	33,5	9,3	
Natural Gas	1 000 m ³ (0°C)	36,0	10,0	
Blast Furnace Gas	1 000 m ³	3,8	1,1	
Coke Oven Gas	1 000 m ³	16,7	4,6	
Town Gas	1 000 m ³	15,5	4,3	
Black Liquor	t (dry matter)	11,7	3,3	
Sulphite Liquors	t (dry matter)	12,0	3,3	
Birch Firewood	stacked m ³	5,4	1,5	
Pine and Spruce	stacked m ³	4,4	1,2	
Mixed Firewood	stacked m ³	4,5	1,3	
Chips	loose m ³	3,3	0,9	
Milled Peat	t	10,1	2,8	0,32
Sod Peat	t	12,3	3,4	0,38

Conversion Factors between Energy Units

	toe	MWh	GJ	Gcal
toe	1	11,63	41,868	10
MWh	0,086	1	3,6	0,86
GJ	0,02388	0,2778	1	0,2388
Gcal	0,1	1,163	4,1868	1

Example: 1 toe = 11,63 MWh

Prefix

k = kilo	= 10^3	= 1 000
M = mega	= 10^6	= 1 000 000
G = giga	= 10^9	= 1 000 000 000
T = tera	= 10^{12}	= 1 000 000 000 000
P = peta	= 10^{15}	= 1 000 000 000 000 000

Carbon Cioxide Factors for Some Fuels

	g CO ₂ / MJ
Motor Gasoline	72,5
Diesel Fuel	73,5
Light Fuel Oil	74,1
Residual Fuel Oil	77,4
Jet Fuel	71,5
LPG	63,1
Other Fuels	60–77,4
Hard Coal	94,6
Coke	108
Natural Gas	56,1
Peat	106
Bark, Wood Fuel	109,6
Industrial Wood Residue	109,6
Black Liquor	110

Note

Hydro power, wind power and imported electricity have been made commensurate with fuels according to directly obtained electricity (at the efficiency ratio of 100 per cent) and nuclear power at the efficiency ratio of 33 per cent.

Calculation Method for Heating Energy

Net heating energy for buildings was calculated by subtracting boiler losses from fuels according to the following default efficiencies:

Small Combustion of Wood	55 %
Peat	60 %
Coal	60 %
Heavy Fuel Oil	83 %
Light Fuel Oil	78 %
Natural Gas	90 %
District Heating	100 %
Electric Heating	100 %

Source: Technical Research Centre of Finland (VTT) and Tampere University of Technology.

Conventions

- .. Data not available
- Magnitude zero
- 0 Magnitude less than half of unit employed
- * Preliminary
- — — Break in the time series

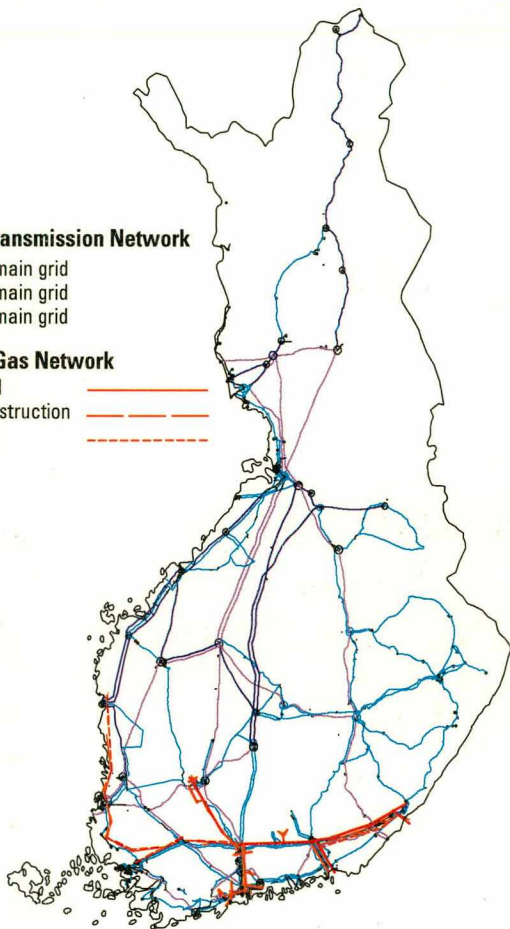
Power Transmission and Natural Gas Networks 2000

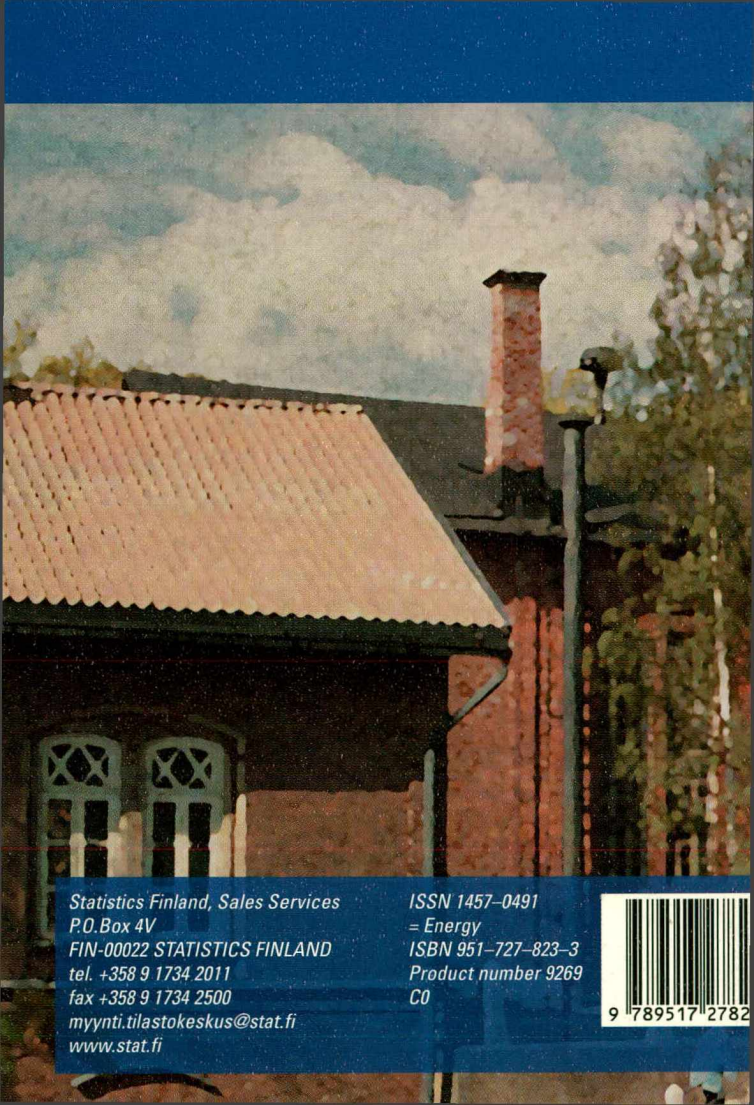
Power Transmission Network

- 400 kV main grid
- 220 kV main grid
- 110 kV main grid

Natural Gas Network

- completed
- under construction
- planned





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