

ENERGY IN FINLAND 2005

Finland in Brief

Area

Situated in northern Europe with an area of 338,145 km² of which 68% forest, 10% water, 8% cultivated land.

Population

5.3 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.

Natural Resources

Average Temperatures

Town	Latitude	January	July
Helsinki	60°	-4.2°C	+17.2°C
Rovaniemi	66°	-11.7°C	+14.9°C

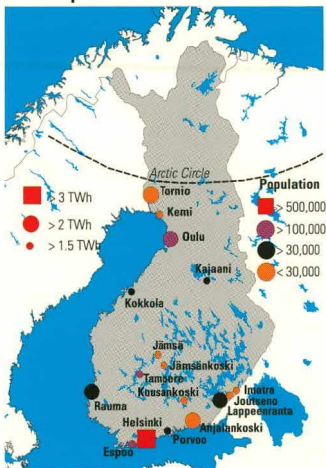
Economy in 2005

GDP totalled € 150 bil., i.e. € 30,005/capita, of which services 65.8%, secondary production 31.3% and primary production 2.9%.

Structure of Industry in 2005, Value Added Gross in Production

	bil. €	%
Total industry	34.7	100
Mining and quarrying	0.4	1
Wood and paper industry	5.0	14
Chemical industry	3.9	11
Metal industry	16.2	46
Machinery and equipment	4.6	13
Electrical equipment	7.6	22
Other metal industry	4.0	12
Other manufacturing ind.	6.5	19
Electricity, gas and water ind.	2.7	8

Municipalities with High Electricity Consumption 2004



Productive forestland is the most valuable natural resource of Finland. The 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 2005

1,362 PJ (32.5 Mtoe)
259.6 GJ/capita (6.2 toe/capita)

Electricity Consumption in 2005

84.9 TWh
16,174 kWh/capita

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The data for fossil fuels in this pocketbook are based on the Preliminary Energy Statistics 2005 figures. The renewable and recovered fuel figures have been updated.

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= Energy

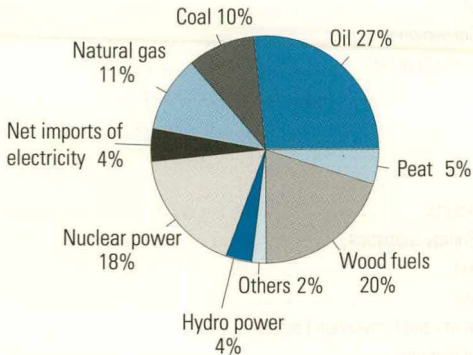
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Vammalan Kirjapaino Oy, Helsinki 2006

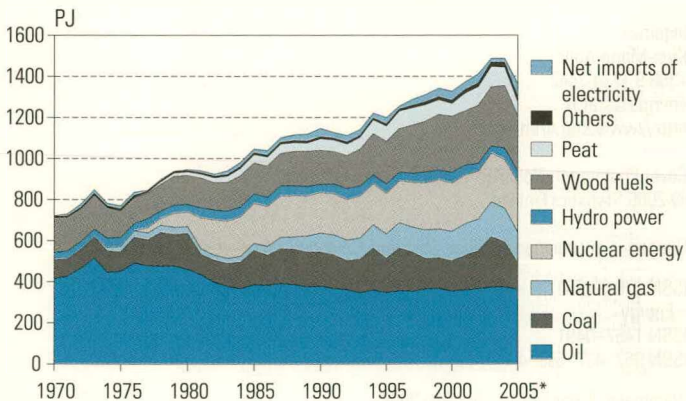
Total Energy Consumption

Total Energy Consumption by Energy Source 2005

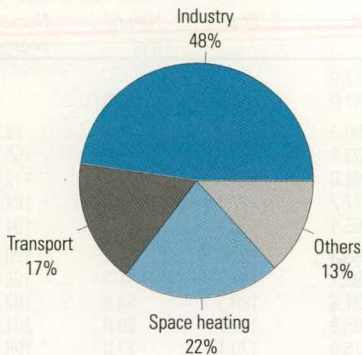


Total energy consumption in 2005* was 1 362 PJ.

Total Energy Consumption by Energy Source 1970–2005

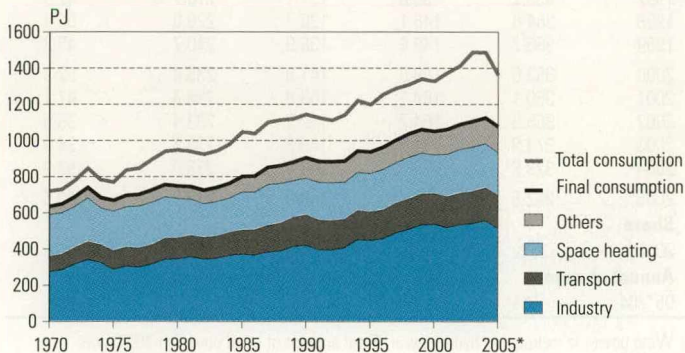


Final Energy Consumption by Sector 2005



Final energy consumption in 2005* was 1 077 PJ.

Total Energy Consumption and Final Energy Consumption by Sector 1970–2005



Total Energy Consumption

Total Energy Consumption by Energy Source, PJ

	Oil	Coal	Natural gas	Nuclear energy	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	377.8	166.8	90.8	197.8	38.7
1991	367.4	164.0	95.7	200.8	47.0
1992	361.1	141.6	99.3	198.2	53.9
1993	345.8	163.8	102.6	205.1	48.0
1994	359.2	204.7	113.3	199.9	42.0
1995	347.1	166.6	117.6	197.8	46.1
1996	356.3	207.6	123.1	203.8	42.2
1997	353.2	190.8	121.1	218.7	42.5
1998	364.6	148.1	138.7	228.8	53.3
1999	366.7	149.6	138.9	240.7	45.3
2000	353.6	149.0	141.9	235.4	52.3
2001	360.1	168.1	153.9	238.4	47.1
2002	365.5	184.7	152.9	233.4	38.5
2003	373.9	244.6	169.2	238.1	34.4
2004	373.8	220.4	163.0	238.0	53.9
2005*	362.5	129.7	148.9	243.6	49.5
Share					
2005*	27%	10%	11%	18%	4%
Annual change					
05*/04	-3%	-41%	-9%	2%	-8%

Wind power is included in hydro power. Total amount of wind power in 2005 was 0.607 PJ.

Total Energy Consumption

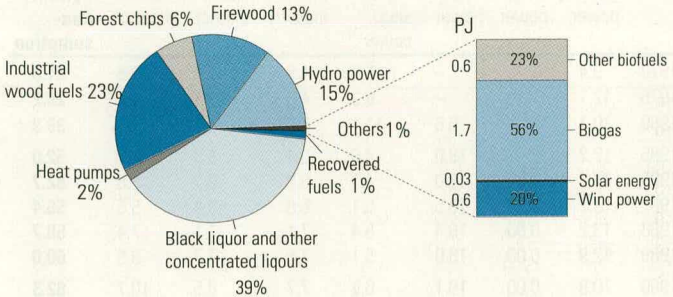
Wood fuels	Peat	Others	Net imports of electricity	Total	
170.1	0.9	6.0	1.9	720.5	1970
130.7	1.7	7.2	14.4	769.8	1975
142.1	17.1	6.3	4.4	947.2	1980
145.1	18.8	8.0	8.1	939.1	1981
133.7	23.3	8.8	8.3	922.7	1982
141.3	30.4	9.1	17.2	942.2	1983
153.2	34.7	9.5	18.8	980.4	1984
151.3	41.1	10.3	17.0	1 047.0	1985
152.5	43.3	10.1	20.9	1 038.5	1986
158.4	45.4	10.2	20.1	1 100.3	1987
167.7	41.5	10.6	26.6	1 112.5	1988
172.0	39.5	10.5	31.9	1 119.0	1989
167.2	55.9	10.8	38.7	1 144.3	1990
158.6	56.4	10.1	25.9	1 125.8	1991
161.2	55.3	10.7	29.6	1 110.9	1992
180.5	58.4	9.9	27.1	1 141.3	1993
201.8	66.7	10.0	21.9	1 219.4	1994
207.5	74.3	10.7	30.3	1 198.0	1995
212.8	84.8	10.9	13.2	1 254.6	1996
237.2	83.3	13.2	27.6	1 287.6	1997
247.6	79.6	15.2	33.5	1 309.4	1998
273.2	70.5	15.6	40.0	1 340.5	1999
273.8	61.9	16.0	42.8	1 326.6	2000
265.4	85.9	18.2	35.9	1 373.1	2001
283.9	89.7	19.3	42.9	1 410.8	2002
289.4	99.2	21.7	17.5	1 487.9	2003
306.1	88.8	24.6	17.5	1 486.2	2004
273.3	66.0	26.8	61.2	1 361.5	2005*
				Share	
20%	5%	2%	5%	100%	2005*
				Annual change	
-11%	-26%	8%	249%	-8%	05*/04

Renewable Energy Sources

Renewable Energy, PJ

	Hydro power	Wood fuels in industry and energy production	Black liquor and others	Small scale combustion of wood	Recovered fuels (bio fraction)	Heat pumps	Others	Total	Share of total energy consumption
1970	33.9	20.2	57.7	92.2	..	..	..	204.0	28%
1975	43.5	14.8	48.3	67.6	..	..	..	174.3	23%
1980	36.4	31.1	67.4	43.6	..	0.7	..	179.2	19%
1981	48.7	33.1	68.2	43.7	..	1.1	..	194.8	21%
1982	46.6	29.4	60.5	43.8	..	1.4	..	181.8	20%
1983	48.4	30.7	66.6	44.0	..	1.7	..	191.5	20%
1984	47.2	34.4	74.7	44.0	..	2.0	..	202.4	21%
1985	44.0	31.6	75.5	44.1	..	2.6	..	197.8	19%
1986	44.2	31.1	77.2	44.2	..	2.3	..	199.0	19%
1987	49.2	32.4	81.6	44.4	..	2.6	..	210.1	19%
1988	47.6	35.0	88.1	44.5	..	2.3	0.0	217.6	20%
1989	46.4	36.3	91.1	44.6	..	2.0	0.0	220.5	20%
1990	38.7	36.5	86.1	44.7	0.2	2.2	0.0	208.3	18%
1991	47.0	32.9	80.9	44.8	0.2	2.4	0.0	208.3	19%
1992	53.8	32.8	83.5	44.9	0.3	2.4	0.0	217.7	20%
1993	48.0	40.4	95.1	45.0	0.3	2.5	0.0	231.3	20%
1994	42.0	52.4	104.4	45.0	0.2	2.6	0.0	246.6	20%
1995	46.0	53.9	109.0	44.7	0.2	2.5	0.7	257.0	21%
1996	42.1	56.2	109.6	46.9	0.2	2.7	0.7	258.6	21%
1997	42.5	61.6	128.5	47.0	0.4	2.8	0.9	283.6	22%
1998	53.2	64.7	135.4	47.6	1.0	3.0	0.9	305.8	23%
1999	45.2	84.0	142.6	46.6	1.3	3.1	1.1	323.8	24%
2000	52.0	84.9	143.5	45.3	1.8	2.9	1.4	331.9	25%
2001	46.9	83.9	133.7	47.8	2.5	3.7	1.2	319.7	23%
2002	38.2	89.6	145.6	48.7	2.3	4.1	1.4	330.0	23%
2003	34.0	93.7	147.0	48.7	3.1	4.6	1.9	333.0	22%
2004	53.5	100.5	157.1	48.5	3.8	5.5	2.5	371.5	25%
2005*	48.9	94.7	131.7	46.9	4.5	6.5	3.0	336.3	25%

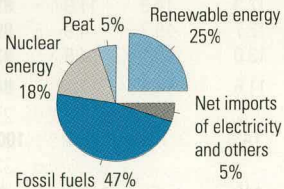
Renewable Energy 2005



The total consumption of renewable energy in 2005* was 336 PJ which is 25% of total energy consumption.

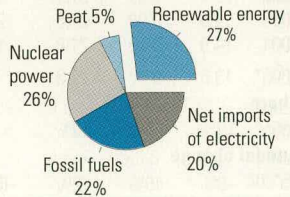
Renewable Energy 2005

In Total Energy Consumption



Total* 1 361 PJ

In Electricity Supply



Total* 85 TWh

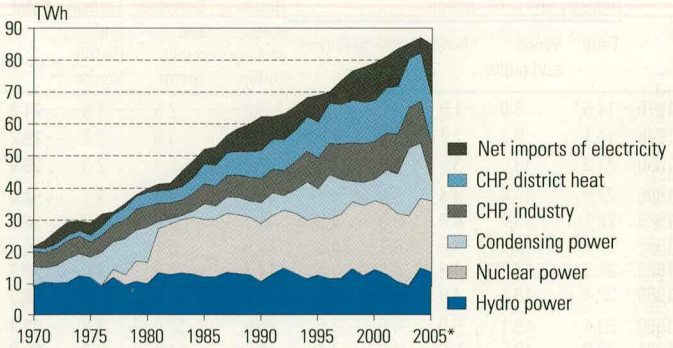
Supply and Total Consumption of Electricity, TWh

	Hydro power	Wind power	Nuclear power	Condensing power ¹⁾	CHP industry	CHP district heat	Net imports	Total consumption
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	0.00	18.0	4.1	6.3	6.2	5.8	52.7
1987	13.7	0.00	18.5	5.1	6.8	6.8	5.6	56.4
1988	13.2	0.00	18.4	5.4	7.1	7.1	7.4	58.7
1989	12.9	0.00	18.0	5.1	7.5	7.7	8.9	60.0
1990	10.8	0.00	18.1	6.6	7.7	8.5	10.7	62.3
1991	13.1	0.00	18.4	7.0	7.3	9.3	7.2	62.3
1992	15.0	0.00	18.2	4.6	7.7	9.5	8.2	63.2
1993	13.3	0.00	18.8	7.4	8.7	9.8	7.5	65.5
1994	11.7	0.01	18.3	12.0	9.5	10.7	6.1	68.3
1995	12.8	0.01	18.1	8.9	9.5	11.3	8.4	68.9
1996	11.7	0.01	18.7	13.8	9.7	12.5	3.7	70.0
1997	11.8	0.02	20.1	10.9	10.9	12.3	7.7	73.6
1998	14.8	0.02	21.0	6.3	12.0	13.2	9.3	76.6
1999	12.5	0.05	22.1	7.2	12.0	12.8	11.1	77.8
2000	14.5	0.08	21.6	6.7	11.7	12.7	11.9	79.2
2001	13.0	0.07	21.9	10.6	11.6	14.1	10.0	81.2
2002	10.6	0.06	21.4	12.4	12.3	14.9	11.9	83.5
2003	9.5	0.09	21.8	21.0	12.7	15.3	4.9	85.2
2004	14.9	0.12	21.8	17.2	13.0	15.1	4.9	87.0
2005*	13.6	0.17	22.3	5.7	11.6	14.4	17.0	84.9
Share								
2005*	16%	0%	26%	7%	14%	17%	20%	100%
Annual change								
05*/04	–9%	40%	2%	–67%	–11%	–5%	249%	–2%

¹⁾ Condensing power includes conventional condensing power, peak gas turbine power and gas engines.

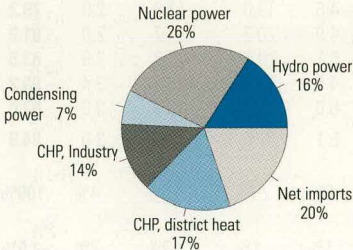
Source: Adato Energia Oy.

Electricity Supply 1970–2005

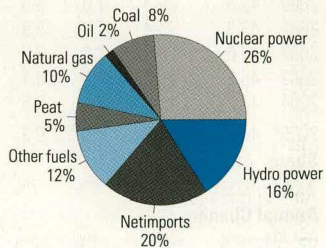


Electricity Supply 2005

By Mode of Production



By Source



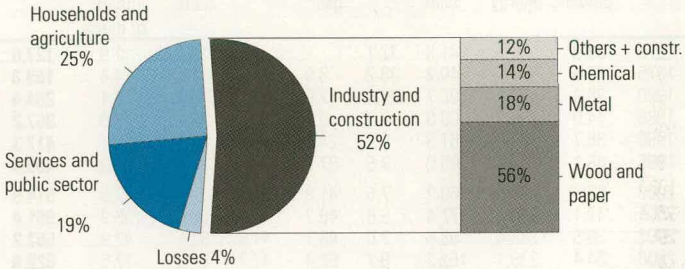
Total electricity supply in 2005* was 84.9 TWh.

Electricity Consumption by Sector, TWh

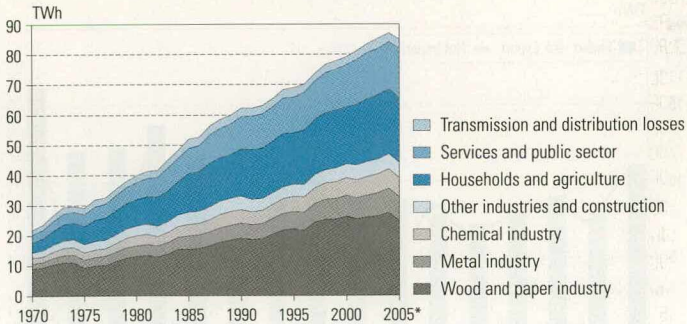
	Industry and construction					House- holds and agri- culture	Services and public sector	Transm. and distrib. losses	Total
	Total	Wood and paper	Metal	Chemical	Others				
1970	14.5	9.0	1.8	1.8	1.9	3.3	2.5	1.5	21.8
1975	17.1	9.2	2.7	2.4	2.7	6.0	3.9	2.2	29.2
1980	23.3	13.0	3.6	3.4	3.3	8.6	5.7	2.3	39.9
1985	27.8	15.4	4.4	3.8	4.1	12.8	8.4	3.1	52.0
1986	28.1	15.7	4.5	3.8	4.0	13.2	8.6	2.8	52.7
1987	29.6	16.6	4.6	4.1	4.3	14.5	9.4	3.0	56.4
1988	31.5	17.8	4.8	4.5	4.4	14.4	9.8	3.0	58.7
1989	32.4	18.5	4.9	4.6	4.5	14.5	10.2	2.9	60.0
1990	33.1	19.1	5.0	4.5	4.5	15.6	10.8	2.8	62.3
1991	32.0	18.6	5.0	4.2	4.1	16.5	11.2	2.6	62.3
1992	32.3	18.9	5.1	4.4	4.0	16.7	11.4	2.8	63.2
1993	34.2	20.5	5.3	4.6	3.8	17.2	11.5	2.7	65.5
1994	36.2	21.8	5.5	4.9	3.9	17.8	11.7	2.6	68.3
1995	37.0	22.2	5.7	5.0	4.1	17.1	11.9	3.0	68.9
1996	36.9	21.7	6.0	5.1	4.2	18.0	12.4	2.7	70.0
1997	40.2	24.4	6.2	5.2	4.4	18.2	12.6	2.5	73.6
1998	41.8	25.3	6.7	5.4	4.4	19.0	13.1	2.8	76.6
1999	42.3	25.4	6.8	5.6	4.5	19.3	13.4	2.8	77.8
2000	43.8	26.3	7.0	5.9	4.6	19.0	13.8	2.6	79.2
2001	43.3	25.4	7.0	5.9	4.9	20.2	14.7	2.9	81.2
2002	44.6	26.1	7.2	6.2	5.1	20.8	15.2	2.9	83.5
2003	45.2	26.4	7.7	6.4	4.9	21.3	15.3	3.4	85.2
2004	47.1	27.5	8.0	6.5	5.0	21.2	15.8	3.0	87.0
2005*	44.2	24.8	7.9	6.3	5.1	21.5	16.2	3.0	84.9
Share									
2005*	52%	29%	9%	7%	6%	25%	19%	4%	100%
Annual Change									
05*/04	-6%	-10%	-1%	-2%	1%	1%	3%	2%	-2.5%

Sources: Adato Energia Oy; Statistics Finland/Environment and energy

Electricity Consumption by Sector 2005



Electricity Consumption by Sector 1970–2005

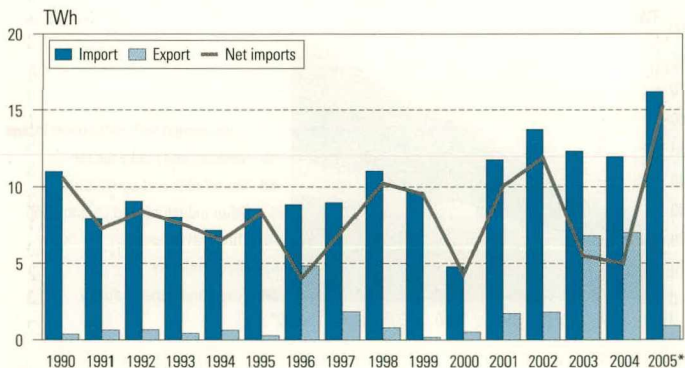


Energy Sources in Electricity Generation, PJ

	Hydro power	Nuclear energy	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
1995	46.1	197.8	65.0	7.5	37.1	36.3	36.6	30.3	456.6
2000	52.3	235.4	60.2	7.5	41.3	21.7	53.7	42.8	514.9
2001	47.1	238.4	77.4	6.6	48.2	41.1	56.6	35.9	551.4
2002	38.5	233.4	93.6	7.0	48.1	41.6	62.1	42.9	567.2
2003	34.4	238.1	152.2	8.7	62.4	47.7	67.3	17.5	628.4
2004	53.9	238.0	136.3	10.8	51.2	46.3	62.4	17.5	616.3
2005*	49.6	243.6	44.4	8.4	41.7	29.4	56.4	61.2	534.7

Source: Adato Enerjia Oyj

Imports and Exports of Electricity 1990–2005



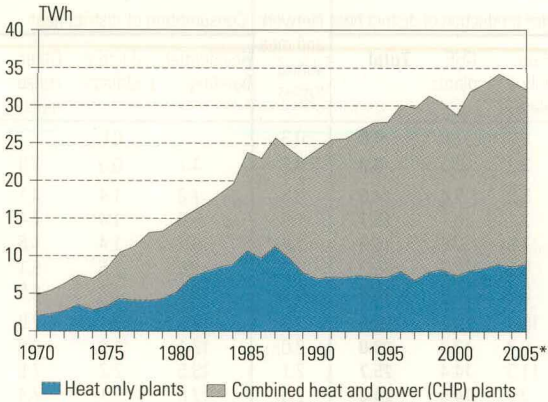
Source: National Board of Customs

Production and Consumption of District Heat, TWh

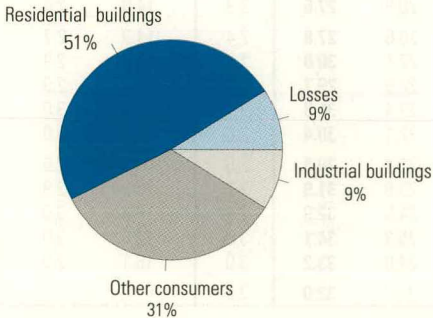
	Net production of district heat			Network and measuring losses	Consumption of district heat			
	Heat only plants	CHP plants	Total		Residential buildings	Industrial buildings	Other consumers	Total
1970	2.0	2.8	4.8	0.3	..	0.6	..	4.5
1975	3.3	5.0	8.2	0.6	4.7	0.9	2.0	7.7
1980	5.2	9.4	14.6	1.3	7.8	1.4	4.1	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
2000	7.4	21.4	28.8	2.5	14.9	2.6	8.8	26.3
2001	8.1	23.8	31.9	2.7	16.2	2.9	10.1	29.1
2002	8.4	24.5	32.9	2.9	16.6	3.0	10.4	30.0
2003	8.9	25.3	34.1	3.0	17.4	3.0	10.9	31.2
2004	8.6	24.6	33.2	3.0	16.1	2.9	11.2	30.3
2005*	8.9	23.2	32.0	2.8	..	..	..	29.2

Sources: Finnish Energy Industries/District heating and since 1995 also Association of Finnish Local and Regional Authorities.

Production of District Heat 1970–2005

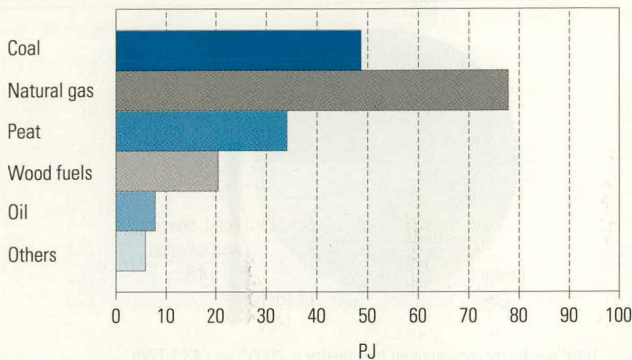


District Heat Use 2005

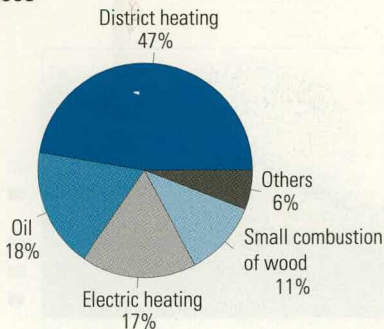


District heat use in 2005 was 32.2 TWh.

Fuel Consumption in Production of District Heat and Combined Production of District Heat and Electricity 2005

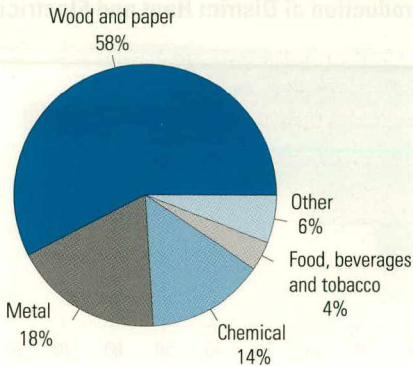


Heating of Residential, Commercial and Public Buildings 2005



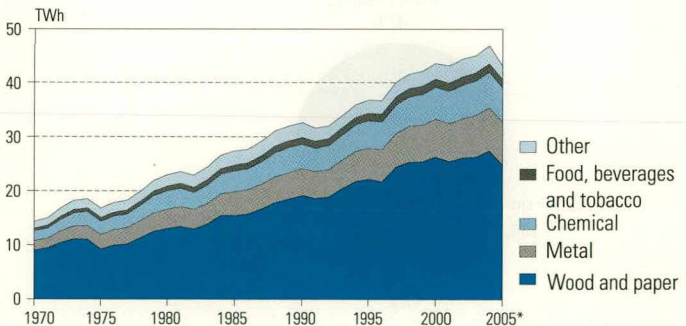
Heating energy for buildings is calculated by subtracting boiler losses from fuels according to their default efficiencies (see page 36).

Electricity Consumption by Branch of Industry 2005

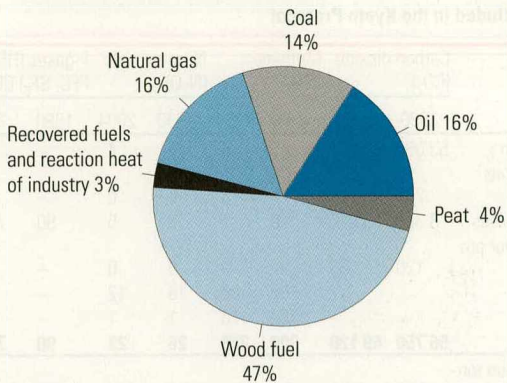


Total electricity consumption by industry in 2005* was 43.1 TWh.

Electricity Consumption by Branch of Industry 1970–2005

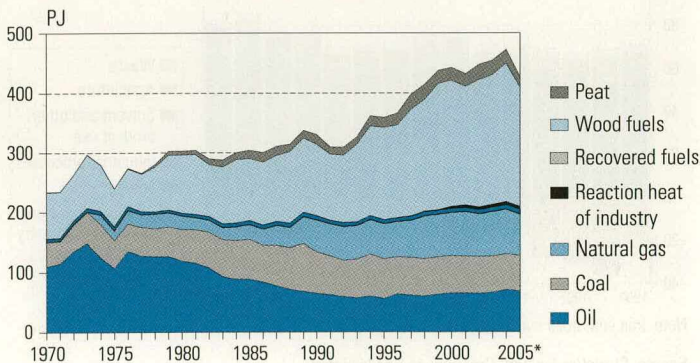


Fuel Consumption in Industry 2005



Total fuel consumption in industry in 2005* was 427 PJ.

Fuel Consumption in Industry 1970–2005



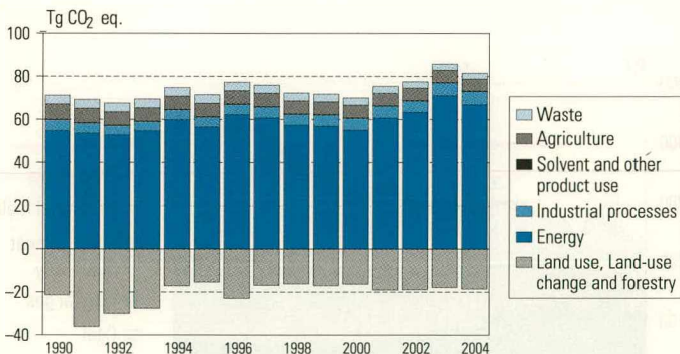
Greenhouse Gas Emissions 1990 and 2004 (1 000 tonnes)

The Gases Included in the Kyoto Protocol

	Carbon dioxide (CO ₂)		Methane (CH ₄)		Nitrous oxide (N ₂ O)		F-gases (HFC, PFC, SF ₆) CO ₂ eq.	
	1990	2004	1990	2004	1990	2004	1990	2004
Fuel combustion	53 090	64 970	16	15	3	4	–	–
Fugitive emissions from fuels	230	120	0	3	0	0	–	–
Industrial processes	3 320	3 970	0	1	5	5	90	730
Solvent and other product use	120	60	–	–	0	0	–	–
Agriculture*	..	..	102	88	16	12	–	–
Waste	–	–	182	118	1	1	–	–
Total	56 750	69 120	300	223	26	22	90	730
Emissions, million tonnes of CO ₂ equivalent	56.8	69.1	6.3	4.7	7.9	6.9	0.09	0.7

* CO₂ emissions from agricultural soils are reported in land use, land use change and forestry.

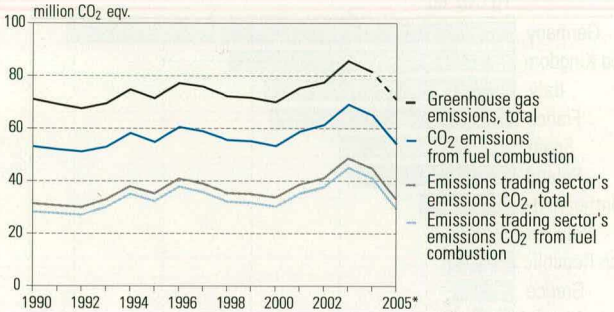
Greenhouse Gas Emissions 1990–2004



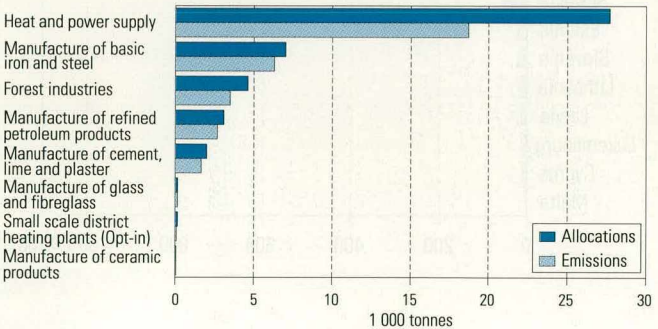
Note, that emissions from energy sector for the years 1991–2003 are not yet updated in this figure.

Source: Statistics Finland, Greenhouse Gas Inventory

Finland's Greenhouse Gas Emissions 1990–2005

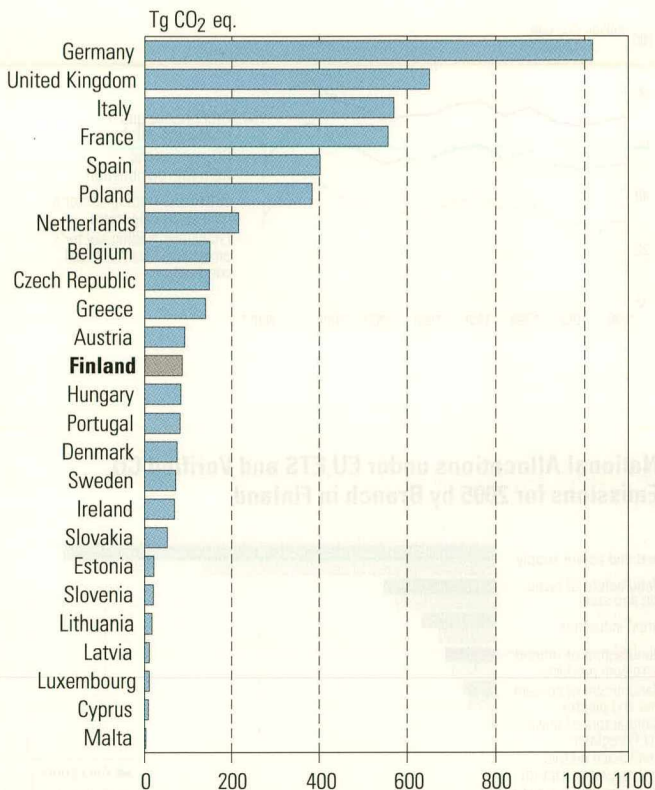


National Allocations under EU ETS and Verified CO₂ Emissions for 2005 by Branch in Finland



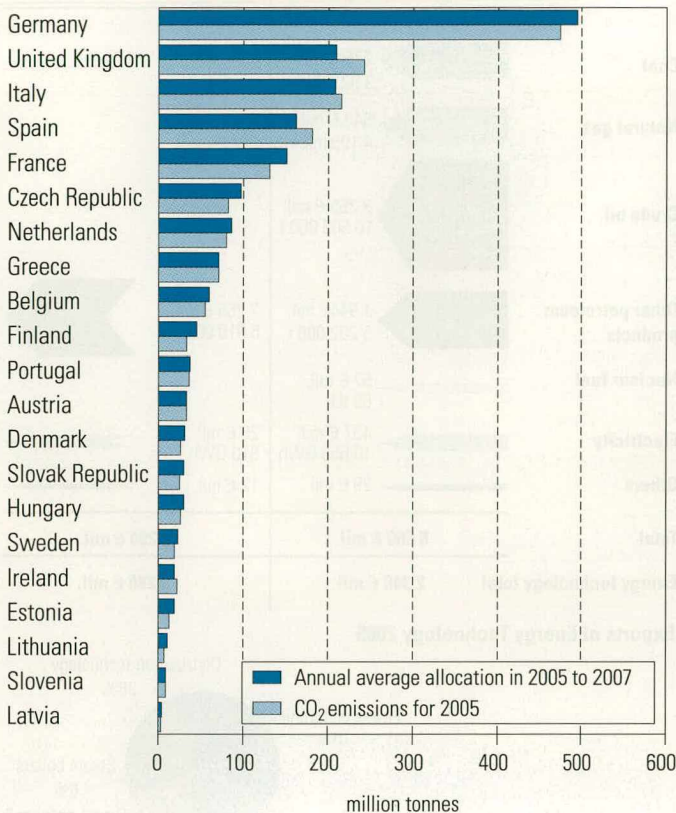
ETS: Emissions Trading System
 Source: Energy Market Authority

Greenhouse Gas Emissions in EU25 Countries 2004



Source: European Environment Agency

Allowances of Emissions under EU ETS and Verified CO₂ Emissions for 2005 in the EU



ETS: Emission Trading System

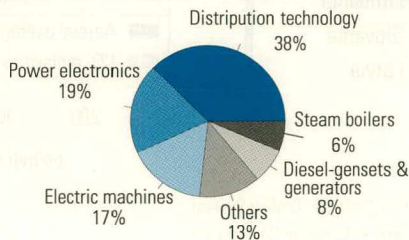
Source: European Commission

Import and Export

Imports and Exports of Energy and Energy Technology 2005

	Imports	Exports
Coal	275 € mil. 3 827 000 t	0.5 € mil. 2 000 t
Natural gas	543 € mil. 4 195 mil.m ³	
Crude oil	3 255 € mil. 10 603 000 t	
Other petroleum products	1 944 € mil. 5 202 000 t	2 256 € mil. 5 019 000 t
Nuclear fuel	57 € mil. 69 tU	
Electricity	457 € mil. 16 558 GWh	26 € mil. 910 GWh
Others	29 € mil.	12 € mil.
Total	6 560 € mil.	2 294 € mil.
Energy technology total	2 346 € mil.	3 288 € mil.

Exports of Energy Technology 2005



Import and Export

Energy Imports 2005

		Russia	Sweden	Den- mark	Norway	EU25	OECD	Total	
								Amount	Value mil. €
Hard coal	1 000 t	2 736	1	–	–	586	555	3 322	166
Coke	1 000 t	..	..	..	..	..	..	505	108
Natural gas	mil. m ³	4 195	–	–	–	–	–	4 195	543
Crude oil	1 000 t	8 548	–	1 060	208	1 461	1 669	10 603	3 255
Motor gasoline	1 000 t	0	29	–	287	48	335	335	151
Middle distillates	1 000 t	2 017	99	20	136	186	365	2 492	957
Heavy fuel oil	1 000 t	17	461	170	19	754	773	805	196
LPG	1 000 t	11	9	0	152	12	164	219	79
Other petro- leum prod.	1 000 t	670	42	1	39	396	482	1 197	473
Methanol	1 000 t	153	0	–	–	0	0	153	27
MTBE	1 000 t	123	0	–	–	31	31	154	88
Peat	1 000 t	2	20	0	0	24	22	26	1
Nuclear fuel	tU	16	20	–	–	53	53	69	57
Electricity	GWh	9 705	6 361	–	492	6 361	6 853	16 558	457
Value	mil. €	4 607	407	368	350	1 269	1 627	6 560	

Import of wood fuels is excluded.

Source: Board of Customs /Foreign Trade Statistics

In addition, energy technology imports totalled 2 346 million euros in 2005.

Energy Exports 2005

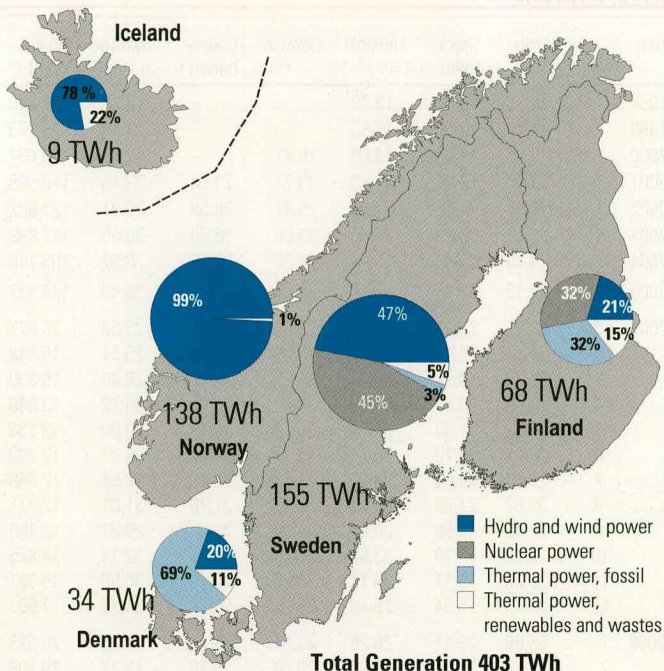
		Sweden	Germany	United States	Canada	EU25	OECD	Total	
								Amount	Value mil. €
Coke	1 000 t	–	–	–	–	0	2	2	0
Motor gasoline	1 000 t	660	322	653	392	1 144	2 275	2 383	1 002
Jet fuel	1 000 t	44	–	–	–	44	44	44	19
Middle distillates	1 000 t	819	517	–	–	1 777	1 839	1 839	825
Heavy fuel oil	1 000 t	2	3	–	–	67	67	67	14
LPG	1 000 t	0	–	–	–	0	0	0	0
Other petroleum prod.	1 000 t	158	51	0	0	573	560	686	396
Peat	1 000 t	32	27	1	0	125	133	140	12
Electricity	GWh	906	–	–	–	906	907	910	26
Value	mil. €	756	398	262	167	1 619	2 101	2 294	

Export of wood fuels is excluded.

Source: Board of Customs /Foreign Trade Statistics

In addition, energy technology exports totalled 3 288 million euros in 2005.

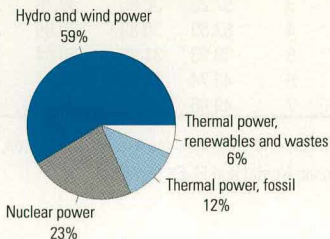
Electricity Generation in Nordic Countries 2005



Electricity Consumption in Nordic Countries 2005, TWh

Sweden	147
Norway	126
Finland	85
Denmark	36
Iceland	9
Total	403

Source: Nordel Annual Report 2005



Spot Prices of the Nordic Power Exchange NordPool by Price Area, €/MWh

Year	Month	Oslo	Stockholm	Helsinki	Odense	Copenhagen	System ¹⁾	Volume (GWh)
1998	1-12	13.73	13.54	13.78	–	–	13.78	57 240
1999	1-12	13.10	13.58	13.65	–	–	13.46	75 373
2000	1-12	12.06	14.24	14.88	16.41	–	12.75	95 687
2001	1-12	23.08	22.86	22.83	23.74	23.54	23.15	110 589
2002	1-12	26.57	27.62	27.28	25.47	28.59	26.91	123 622
2003	1-12	37.11	36.49	35.30	33.68	36.80	36.69	117 899
2004	1-12	29.40	28.08	27.68	28.80	28.35	28.92	165 748
2005	1-12	29.13	29.76	30.53	37.23	33.80	29.33	174 937
2005	1	22.91	23.17	26.26	25.54	25.48	25.53	16 677
	2	24.57	25.41	25.59	26.08	26.75	25.11	15 543
	3	28.75	30.85	30.76	31.22	38.16	29.46	16 390
	4	30.69	30.89	30.89	34.50	30.93	30.72	13 846
	5	30.53	31.35	30.64	36.13	31.73	30.90	13 133
	6	26.11	26.79	26.74	44.17	28.78	26.27	12 269
	7	28.66	29.09	29.99	42.52	29.10	28.84	12 348
	8	30.82	31.20	35.07	38.30	31.79	31.01	12 771
	9	29.43	29.50	29.97	44.98	31.93	29.37	13 458
	10	32.22	32.28	33.86	42.70	36.75	32.14	14 875
	11	30.25	28.17	28.13	28.28	28.18	30.50	15 937
	12	34.13	25.54	25.48	25.53	26.24	34.26	17 691
2006	1	38.88	23.17	26.26	25.54	25.48	40.32	20 993
	2	42.67	25.41	25.59	26.08	26.75	43.37	19 108
	3	52.23	30.85	30.76	31.22	38.16	52.39	20 444
	4	53.63	30.89	30.89	34.50	30.93	51.73	20 582
	5	39.93	31.35	30.64	36.13	31.73	37.62	18 935
	6	43.74	26.79	26.74	44.17	28.78	44.07	18 537
	7	49.96	29.09	29.99	42.52	29.10	49.52	18 286

1) Since 4.10.2005 includes a new bidding area, Kontek

Sources: Nordel and EL-EX NordPool

Total Energy Consumption of in EU and some of the OECD Countries, PJ

	1985	1990	1995	2000	2002	2003	2004
Austria	990	1 040	1 120	1 190	1 270	1 360	1 370
Belgium	1 840	1 980	2 110	2 390	2 200	2 340	2 300
Cyprus	..	..	80	100	100	110	100
Czech Republic	..	1 980	1 700	1 690	1 730	1 820	1 820
Denmark	820	750	850	820	830	860	840
Estonia	..	410	220	190	210	230	240
Finland	1 120	1 200	1 210	1 360	1 470	1 560	1 580
France	8 540	9 490	10 040	10 820	11 140	11 320	11 460
Germany	15 040	14 840	14 150	14 240	14 440	14 520	14 560
Greece	990	930	1 010	1 180	1 240	1 260	1 280
Hungary	..	1 200	1 080	1 050	1 080	1 110	1 100
Ireland	370	440	460	590	630	620	660
Italy	5 590	6 410	6 750	7 220	7 260	7 660	7 740
Latvia	..	330	200	160	180	180	190
Lithuania	..	670	360	300	360	380	380
Luxembourg	130	150	140	150	170	180	200
Malta	..	20	30	30	40	40	40
Netherlands	2 550	2 810	3 070	3 170	3 270	3 370	3 450
Poland	..	4 190	4 190	3 800	3 740	3 840	3 870
Portugal	520	710	820	1 010	1 090	1 060	1 100
Slovakia	..	880	740	730	790	780	760
Slovenia	..	230	250	270	300	300	300
Spain	3 170	3 740	4 280	5 140	5 440	5 620	5 870
Sweden	1 960	1 970	2 110	2 010	2 160	2 140	2 220
United Kingdom	8 530	8 840	9 130	9 640	9 480	9 650	9 720
EU 25	..	..	66 120	69 270	70 630	72 320	73 140
Canada	..	8 770	9 680	10 470	10 470	10 990	11 260
Japan	..	18 670	21 040	22 150	21 840	21 610	22 320
United States	..	80 710	87 440	96 470	95 810	95 500	97 380
OECD Total	..	189 490	..	222 920	223 890	226 040	230 600

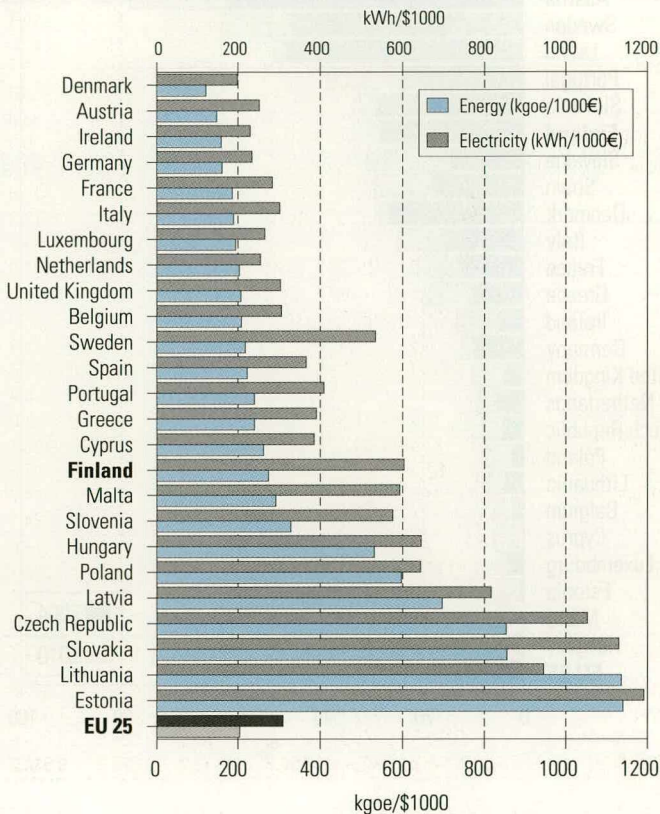
Source: Eurostat, IEA /Energy Balances of OECD Countries 2003–2004

Electricity Consumption in EU and some of the OECD Countries, TWh

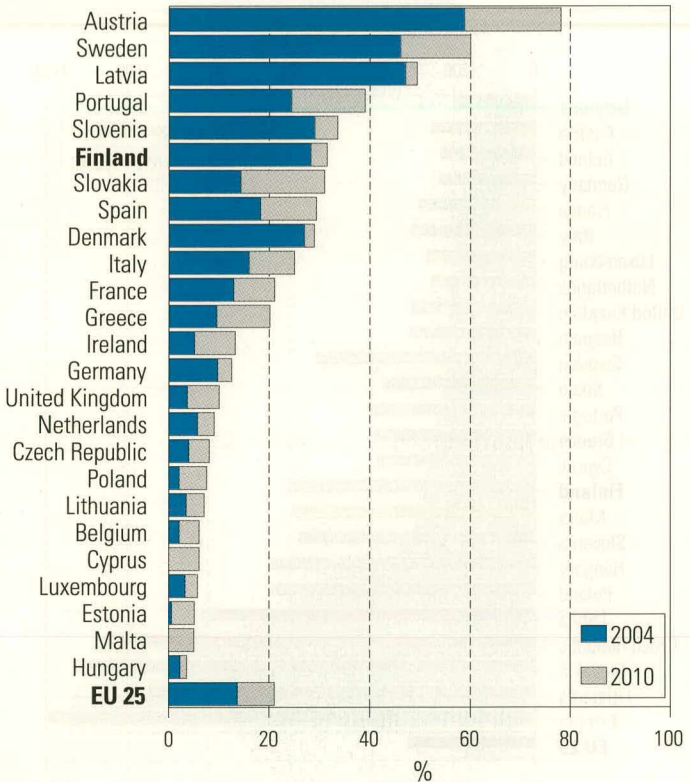
	1985	1990	1995	2000	2002	2003	2004
Austria	37.0	42.7	46.0	51.8	54.9	55.2	56.4
Belgium	48.4	58.0	68.4	77.5	78.4	79.7	80.6
Cyprus	..	1.8	2.2	3.0	3.4	3.6	3.7
Czech Republic	43.3	48.2	48.0	49.4	50.8	52.4	53.8
Denmark	25.4	29.3	31.2	32.5	32.5	32.4	33.0
Estonia	..	6.8	4.5	5.0	5.3	5.6	5.9
Finland	48.5	58.9	65.3	75.4	79.7	80.9	83.1
France	252.9	301.9	342.6	385.1	393.2	408.2	415.9
Germany	424.6	446.5	452.6	482.6	498.8	509.3	513.3
Greece	23.8	28.5	34.1	43.2	46.6	48.6	49.7
Hungary	30.2	31.6	27.7	29.4	31.5	31.4	31.8
Ireland	9.8	11.9	14.8	20.2	21.8	22.5	23.0
Italy	173.7	214.1	237.7	272.5	282.3	291.0	295.0
Latvia	..	8.3	4.4	4.4	4.8	5.2	5.4
Lithuania	..	12.0	6.3	6.2	6.7	7.1	7.6
Luxembourg	3.8	4.1	5.0	5.7	5.7	6.0	6.4
Malta	..	0.9	1.3	1.6	1.7	1.8	1.8
Netherlands	61.5	73.5	83.1	97.9	99.7	100.5	103.1
Poland	92.1	95.8	89.6	96.7	95.5	98.2	99.8
Portugal	17.4	23.5	28.8	38.4	41.5	43.2	44.7
Slovakia	21.5	23.4	21.7	22.0	22.7	23.0	24.0
Slovenia	..	9.7	9.4	10.5	11.8	12.0	12.6
Spain	102.8	125.8	140.9	188.5	206.5	220.0	230.7
Sweden	113.6	120.3	124.6	128.7	131.3	129.4	130.4
United Kingdom	242.1	274.4	293.9	329.5	333.3	337.4	340.0
EU 25	..	2 051.9	2 184.3	2 457.8	2 540.5	2 604.6	2 651.7
Canada	..	447.6	484.3	522.7	531.8	544.9	548.8
Japan	..	803.9	925.9	1 015.8	1 014.5	1 001.3	1 031.3
United States	..	2 923.9	3 371.0	3 857.3	3 785.1	3 854.8	3 920.6
OECD Total	..	7 056.7	7 949.4	9 050.7	9 173.9	9 335.3	9 548.2

Source: Eurostat, IEA /Energy Statistics of OECD Countries 2003–2004

Consumption of Energy and Electricity per GDP-unit in EU Countries 2004

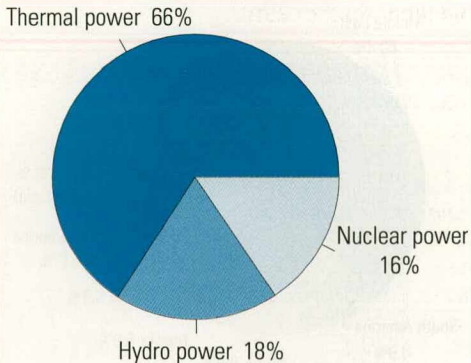


Renewable energy as a proportion of electricity consumption in 2004, and the target for 2010



Source: European Commission/DG TREN

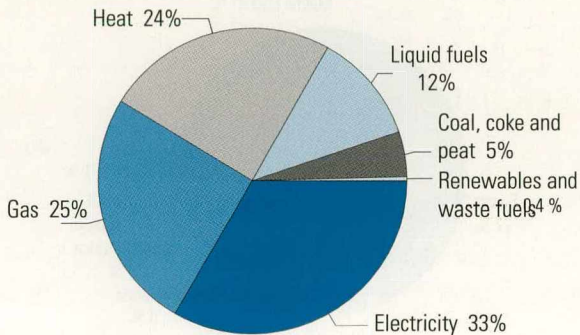
Electricity Generation in Russia in 2005



In Russian total production of electricity was 953 GWh in 2005.

Source: Federal State Statistical Service (Rosstat)

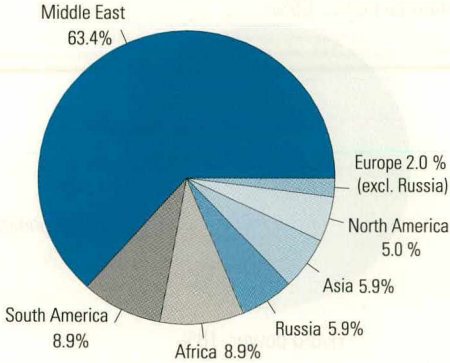
Final Energy Consumption in Russia in 2004



In Russia total energy consumption was 581,2 million toe in 2004

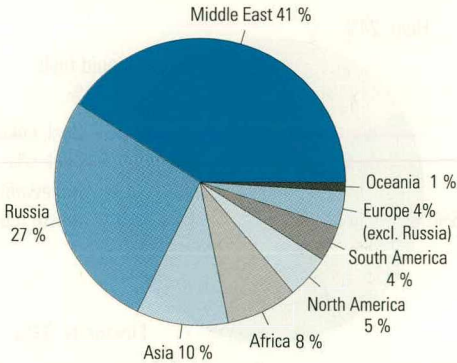
Source: Federal State Statistical Service (Rosstat)

World Oil Reserves by Region



Source: World Energy Council, 2004.

World Natural Gas Reserves by Region



Source: World Energy Council, 2004.

Net Heat Contents and Densities of Energy Sources

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	42.7	11.9	0.85
Diesel fuel	t	42.8	11.9	0.85
Jet fuel	t	43.3	12.0	0.80
Lamp kerosine	t	43.0	11.9	0.80
Other kerosines	t	43.1	12.0	0.81
Naphtha	t	44.3	12.3	0.70
Motor gasolines	t	43.0	11.9	0.75
Aviation gasolines	t	43.7	12.1	0.71
LPG	t	46.2	12.8	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 (tonne of oil equivalent) = 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 Dioxide Factors for Some Fuels

	g CO ₂ /MJ
Motor gasoline	72.9
Diesel fuel	73.6
Light fuel oil	74.1
Residual fuel oil	78.8
Jet fuel	73.2
LPG	65.0
Other fuels	71.3–78.8
Hard coal	94.6
Coke	108.0
Natural gas	55.04
Milled peat	105.9
Bark, wood fuel	109.6
Industrial wood residue	109.6
Black liquor	109.6

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 is 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%

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

Explanation of Symbols

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

Energy statistics by Statistics Finland

Preliminary Energy Statistics

(Energiäennakko)

Preliminary data on energy statistics.

Data published in March.

Energy Statistics publication and CD-ROM

(Energiatilasto ja Energia CD-ROM)

Annual publication containing detailed basic statistics on energy in Finland. Includes data on energy consumption and supply, consumption of electricity and district heat, foreign trade, energy prices and emissions etc.

Energy in Finland

Statistical pocketbook on energy statistics.

Internet www.stat.fi/energy

(www.tilastokeskus.fi/energia)

The updated statistics on consumption of hard coal, energy supply, consumption and prices as well as production of electricity and heat. Latest tables and figures.

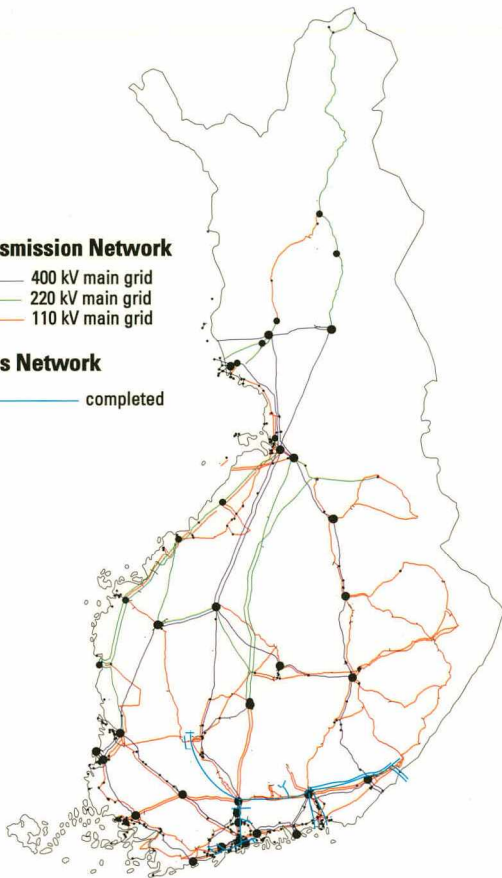
Power Transmission and Natural Gas Networks 2005

Power Transmission Network

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

Natural Gas Network

- completed



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