Statistics Finland

Energy in Finland
2022

Contents

Statistics Finland

The data in this pocketbook are based on the Preliminary Energy Statistics 2021 figures.

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Cover design and layout: Oy SEK Ab

Finland in brief

Area

Situated in northern Europe with an area of 338 462 km^2 of which 75% forest, 10% water, 7% cultivated land.

Source: Statistics Finland, Natural Resources Institute Finland

Population

5.5 million, with average density of 18 persons per square kilometre. More than two-thirds of the population reside in the southern third of the country.

Source: Statistics Finland

Average temperatures in 2021

Town	Latitude	January	July
Helsinki	60°	–3.5°C	21.4°C
Sodankylä	67°	–14.3°C	16.9°C

Source: Finnish Meteorological Institute

Economy

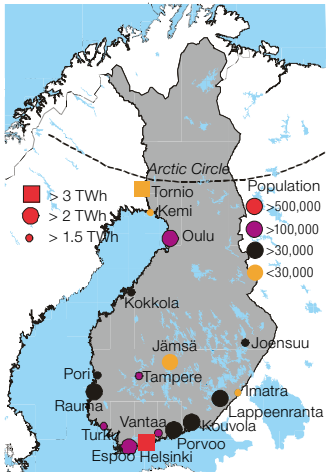
In 2021* GDP totalled € 251.4 bil., i.e. € 45 376/capita. In 2021* services were 69.0%, secondary production 28.4% and primary production 2.6% of the GDP.

Structure of industry, Value added gross in production in 2021*

	bil. €	%
Total industry	45.0	100
Mining and quarrying	1.0	2
Forest industry	5.1	11
Chemical industry	6.0	13
Metal industry	20.5	46
Basic metals and metal prod.	5.0	11
Electrical and electronics ind.	6.9	15
Other metal industry	8.6	19
Other manufacturing ind.	5.4	12
Energy supply	4.4	11
Water supply and waste management	2.0	4

Source: Statistics Finland

Municipalities with high electricity consumption 2020



Source: Statistics Finland, Finnish Energy

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

Total energy consumption in 2021*

1 356 PJ (32.4 Mtoe)
245 GJ/capita (5.8 toe/capita)

Source: Statistics Finland

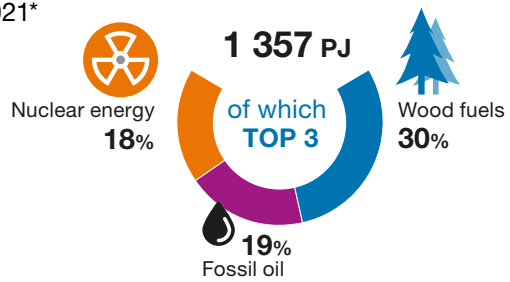
CO_2 emissions in energy sector in 2021*

34.0 million t CO_2

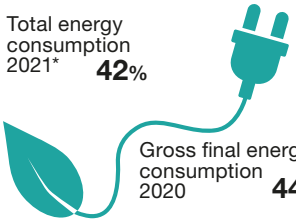
Source: Statistics Finland

Total energy consumption

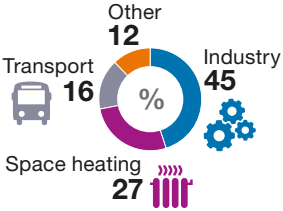
Total energy consumption 2021*



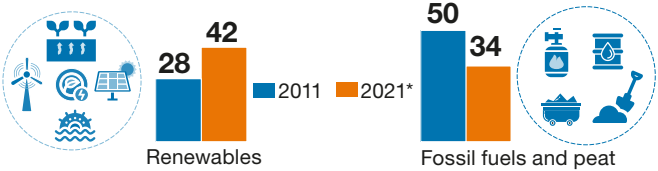
Renewable energy



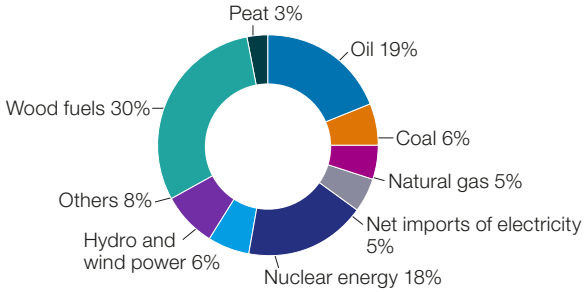
Final energy consumption 2021*



Shares in total energy consumption, %

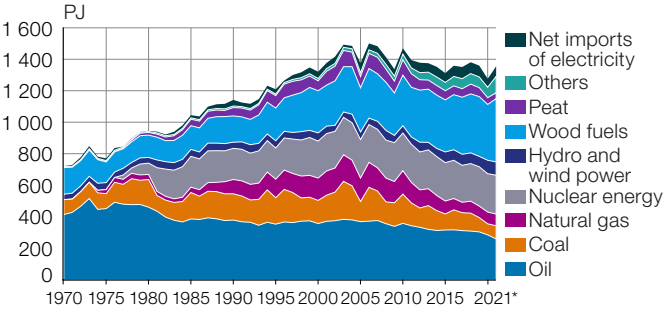


Total energy consumption by energy source in 2021*, %



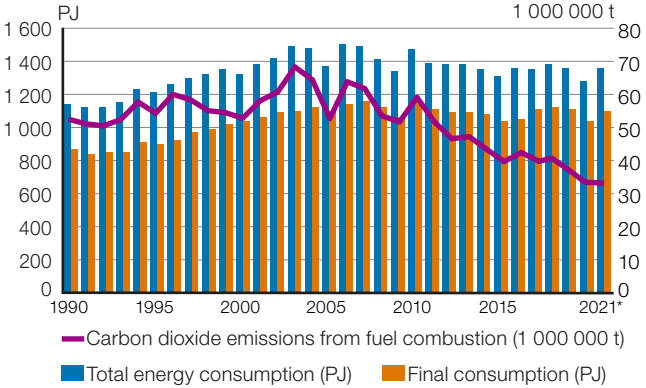
Total energy consumption in 2021* was 1 356 PJ.

Total energy consumption by energy source 1970–2021*, PJ

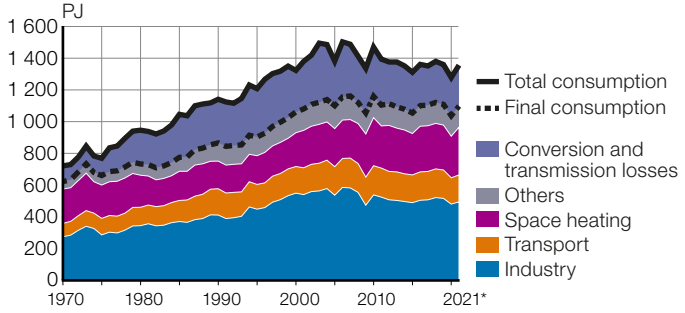


Oil includes transport biofuels.

Energy consumption and carbon dioxide emissions from fuel combustion 1990–2021*, PJ and 1 000 000 t



Total energy consumption and final energy consumption by sector 1970–2021*, PJ



Primary energy consumption in EU27, PJ

	1990	1995	2000	2005	2010	2015	2019	2020
Germany	13 927	13 287	13 278	13 465	13 195	12 390	11 942	10 983
France	8 919	9 384	10 010	10 927	10 659	10 232	9 849	8 725
Italy	5 766	6 339	6 955	7 571	7 004	6 244	6 108	5 540
Spain	3 450	3 963	4 795	5 696	5 150	4 947	5 051	4 397
Poland	4 150	4 022	3 552	3 683	4 043	3 770	4 195	4 055
Netherlands	2 449	2 736	2 803	2 935	3 003	2 675	2 659	2 446
Belgium	1 910	2 020	2 195	2 161	2 234	1 912	2 027	1 837
Sweden	1 901	2 026	1 924	2 051	2 024	1 835	1 917	1 747
Czechia	2 018	1 651	1 639	1 780	1 781	1 651	1 664	1 569
Romania	2 611	1 907	1 460	1 510	1 379	1 287	1 343	1 294
Finland	**1 139**	**1 175**	**1 324**	**1 405**	**1 484**	**1 306**	**1 343**	**1 253**
Austria	993	1 085	1 151	1 370	1 376	1 326	1 351	1 245
Hungary	1 147	1 022	990	1 103	1 031	975	1 029	1 000
Portugal	633	780	961	1 040	948	906	923	818
Greece	901	963	1 137	1 268	1 140	979	933	806
Bulgaria	1 121	927	739	805	728	752	763	720
Denmark	737	825	800	814	836	704	703	641
Slovakia	823	705	685	729	697	637	669	635
Ireland	404	429	573	626	616	586	615	562
Croatia	374	297	326	383	371	333	344	325
Lithuania	642	345	274	337	258	243	263	261
Slovenia	240	250	265	304	294	266	273	257
Estonia	439	229	191	221	244	199	196	181
Latvia	330	192	159	188	191	179	191	179
Luxembourg	146	137	151	200	193	173	189	165
Cyprus	66	80	98	104	112	95	106	92
Malta	32	33	34	38	39	31	37	31
EU 27	**57 268**	**56 810**	**58 469**	**62 712**	**61 032**	**56 635**	**56 682**	**51 763**

Source: Eurostat

Total energy consumption by energy source, PJ

	Oil	Coal	Natural gas	Nuclear energy	Hydro power	Wind 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	–
1985	385.3	167.8	34.1	196.1	44.0	–
1990	377.8	167.4	90.8	197.8	38.7	0.0
1995	352.0	167.6	117.6	197.8	46.0	0.0
2000	355.9	146.7	141.9	235.4	52.0	0.3
2001	370.0	165.8	153.9	238.4	46.9	0.3
2002	373.9	182.3	152.9	233.4	38.2	0.2
2003	382.7	241.4	169.2	238.1	34.0	0.3
2004	378.6	217.4	163.0	238.0	53.5	0.4
2005	368.4	127.7	149.1	243.9	48.3	0.6
2006	371.3	214.6	159.4	240.0	40.7	0.6
2007	375.3	188.1	147.5	245.5	50.4	0.7
2008	354.6	139.3	150.8	240.5	60.9	0.9
2009	338.3	150.1	134.6	246.6	45.3	1.0
2010	357.1	186.3	148.7	238.8	45.9	1.1
2011	341.4	145.2	130.0	242.9	44.2	1.7
2012	331.2	122.7	115.0	240.7	60.0	1.8
2013	319.0	151.3	106.9	247.3	45.6	2.8
2014	311.1	126.2	95.6	247.0	47.7	4.0
2015	314.7	101.9	82.4	243.6	59.7	8.4
2016	315.6	127.0	72.3	243.1	56.3	11.0
2017	311.2	114.1	66.0	235.4	52.6	17.3
2018	307.7	114.1	75.6	238.7	47.3	21.0
2019	303.1	91.1	73.2	250.0	44.1	21.7
2020	284.2	70.4	74.6	243.9	56.4	28.6
2021*	258.3	84.1	73.5	247.1	56.0	29.3
Share						
2021*	19%	6%	5%	18%	4%	2%
Annual Change						
20/21*	–9%	20%	–1%	1%	–1%	3%

Oil includes transport biofuels.

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	6.0	4.4	946.9	1980
151.3	41.1	9.1	17.0	1 045.8	1985
167.2	53.3	9.8	38.7	1 141.4	1990
208.0	79.4	9.8	30.3	1 208.6	1995
268.9	63.3	15.4	42.8	1 322.6	2000
263.4	88.0	17.2	35.9	1 379.7	2001
283.8	93.4	17.9	42.9	1 419.0	2002
289.7	102.7	20.0	17.5	1 495.7	2003
304.3	91.8	21.7	17.5	1 486.2	2004
285.8	70.9	23.5	61.3	1 379.5	2005
316.4	95.5	23.1	41.0	1 502.8	2006
305.4	104.8	25.5	45.2	1 488.2	2007
305.9	84.1	30.2	46.0	1 413.2	2008
269.9	74.8	32.2	43.5	1 336.3	2009
321.2	97.8	35.3	37.8	1 469.9	2010
316.4	85.6	36.7	49.9	1 394.1	2011
330.5	66.4	44.6	62.8	1 375.6	2012
338.5	57.6	50.0	56.6	1 375.7	2013
339.4	61.1	53.8	64.7	1 350.6	2014
330.9	58.0	53.0	58.8	1 311.3	2015
350.1	56.3	60.3	68.2	1 360.2	2016
362.8	53.9	64.2	73.5	1 350.8	2017
374.7	61.9	66.8	71.8	1 379.6	2018
380.0	56.7	67.7	72.2	1 359.7	2019
355.4	43.1	66.2	54.4	1 277.0	2020
402.0	37.3	104.3	64.0	1355.8	2021*
					Share
30%	3%	8%	5%	100%	2021*
					Annual Change
13%	–14%	58%	18%	6	20/21*

Joint EU climate and energy targets for 2020 and 2030

	2020 target	2020 According to statistics	2030 target[1)]
Reduction in greenhouse gas emissions	↓ –20% of the 1990 level	–31%* ✓	At least ↓ –40%[2)] of the 1990 level
Share of energy from renewable sources	↑ to 20% of gross final consumption	22% ✓	At least ↑ to 32% of gross final consumption
Improvement in energy efficiency	↑ 20% compared to trajectory estimated in 2007	Primary energy consumption 24.6% Final energy consumption 24.3% ✓	At least ↑ 32.5% compared to trajectory estimated in 2007

1) The EU is committed to reduce greenhouse gas emissions by at least 55% of the 1990 level by 2030. In July 2021, the European Commission proposed a legislative package which will help the EU to reach this target. Proposed targets for emission reductions are 61% for the EU ETS and 40% for the non-ETS emission by 2030 compared with 2005. The package also seeks to extend emission trading to new sectors. It also aims to increase the renewable energy target to at least 40% and the energy efficiency-target to 36% by 2030. Negotiations on the legislation are ongoing.

2) EU Emissions Trading System (ETS) –43%, Non-ETS –30% of the 2005 level.

* Estimate based on proxy estimates of emissions in 2020.

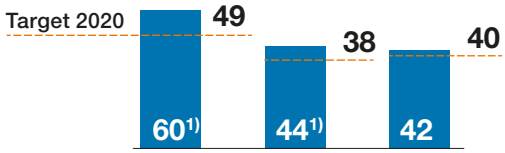
Sources: EEA, Eurostat

Objective of the European Climate Law (2021): Climate neutrality in the European Union by 2050.

Renewable energy

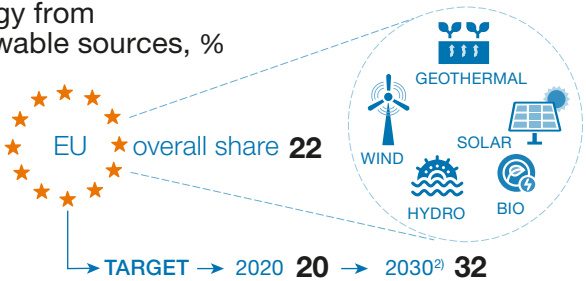
Overall RES share, % 2020

EU TOP3



1) Statistical transfers are included.

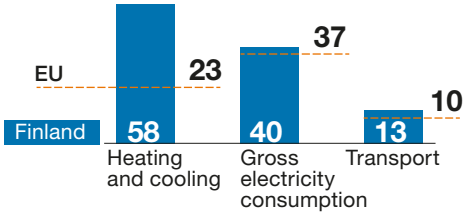
Energy from renewable sources, % 2020



2) The target for 2030 does not take into account the most recent proposal by the European Commission (July 2021) which seeks to further raise the EU-level target for renewable energy sources.

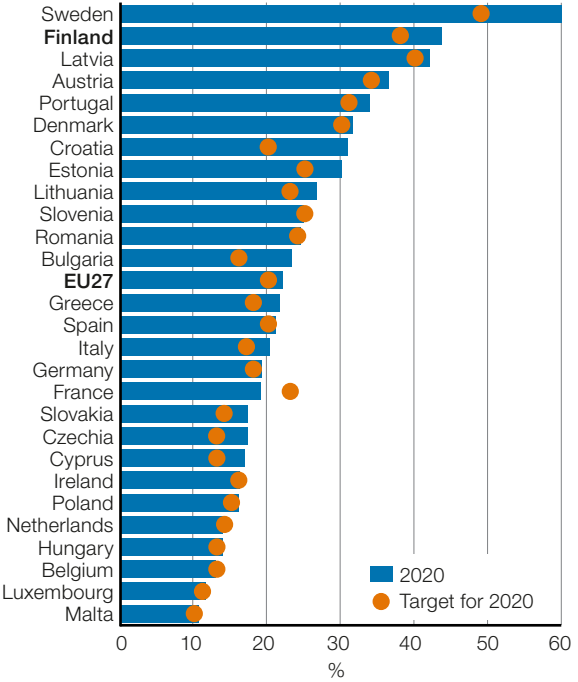
Sectoral RES shares, % 2020

Share of RES



Source: Eurostat/Shares, Statistics Finland

Shares of renewable energy in gross final energy consumption in 2020 and the country-specific EU targets for 2020, %



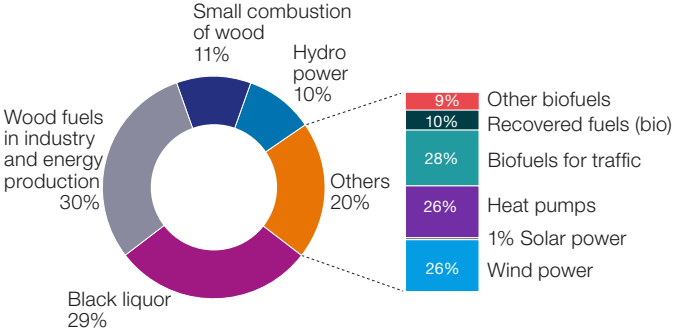
This indicator is calculated on the basis of data covered by Regulation (EC) No 1099/2008 on energy statistics. Reporting countries provide additional information on renewable source not covered by the Regulation. This indicator may be considered an estimate of the indicator described in Directive 2009/28/EC because statistical systems in some countries are not yet fully developed to meet all the requirements of this Directive.

Source: Eurostat

Renewable energy in Finland, PJ

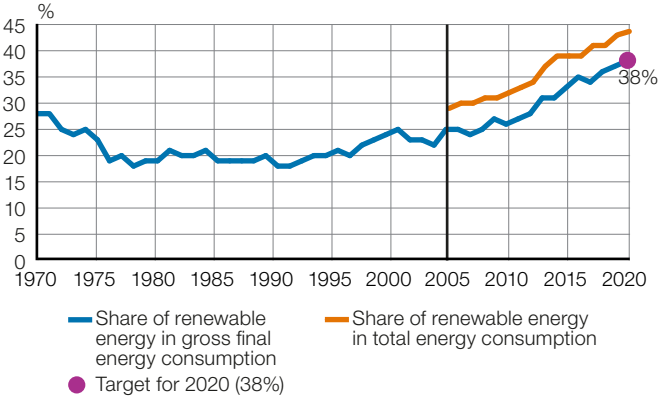
	Hydro power	Wind power	Wood fuels in industry and energy production	Black liquor	Small combustion of wood	Heat pumps	Others	Total	Share of total energy consumption (%)
1980	36.4	–	31.1	67.4	43.6	0.4	..	178.9	19
1990	38.7	0.0	36.5	86.1	44.7	1.2	0.3	207.4	18
2000	52.0	0.3	84.7	137.9	46.3	1.5	3.5	326.2	25
2010	45.9	1.1	116.4	135.7	69.2	10.4	17.3	395.8	27
2015	59.7	8.4	130.5	142.1	58.4	17.3	38.3	454.6	35
2016	56.3	11.0	140.3	146.3	63.5	21.3	27.3	466.0	34
2017	52.6	17.3	145.7	154.8	62.4	23.0	37.3	493.0	36
2018	47.3	21.0	146.2	167.0	61.4	23.8	37.6	504.5	37
2019	44.1	21.7	149.8	169.7	60.4	25.1	40.1	511.0	38
2020	56.4	28.6	140.9	158.1	56.4	23.7	38.4	502.5	39
2021*	56.0	29.3	171.0	167.2	63.8	29.7	53.8	570.7	42

Renewable energy in 2021*, %



The divisions of the group Others are partly based on data for 2021. The total consumption of renewable energy in 2021* was 571 PJ which is 42% of total energy consumption. The figure differs from the EU target, which is calculated from gross final energy consumption.

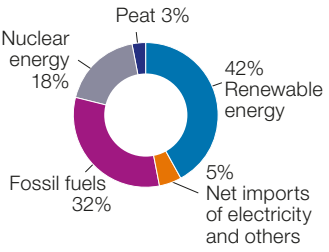
Share of renewable energy in total energy consumption (1970–2020) and gross final energy consumption (2005–2020) and target for 2020, %



Share of renewable energy in gross final energy consumption in 2020 was 44%.

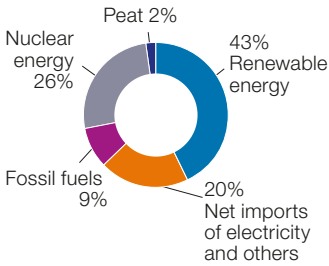
Shares of renewable energy in 2021*, %

In total energy consumption



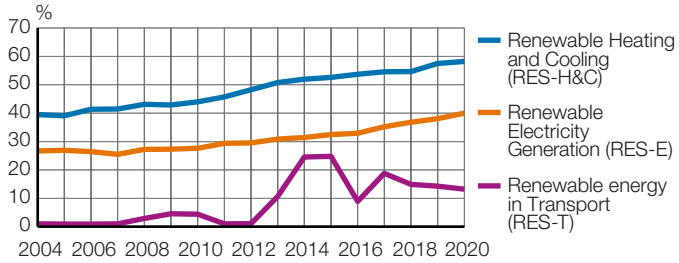
Total 1 356 PJ

In electricity supply

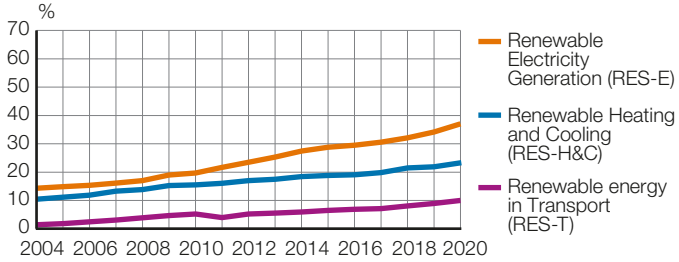


Total 87 TWh

Renewable energy indicators: Share of renewable energy by sectors 2004–2020 in Finland, %, [1)]



Renewable energy indicators: Share of renewable energy by sectors 2004–2020 in EU27, %, [1)]



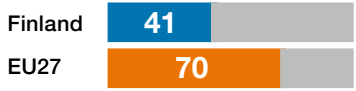
1) This indicator is based on the definitions included in the Directive 2009/28/EC (Renewable Energy Directive) on the promotion of the use of energy from renewable sources.

Source: European Commission

Renewable energy surpassed fossil fuels and peat in total energy consumption in Finland in 2020.

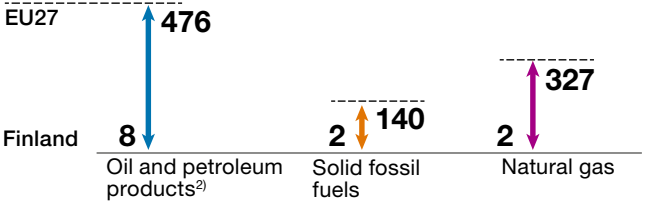
Fossil fuels

Gross available energy[1], % 2020



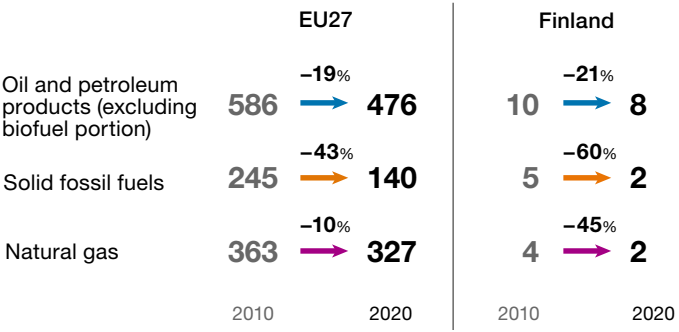
1) Includes peat

Consumption 2020 Mtoe



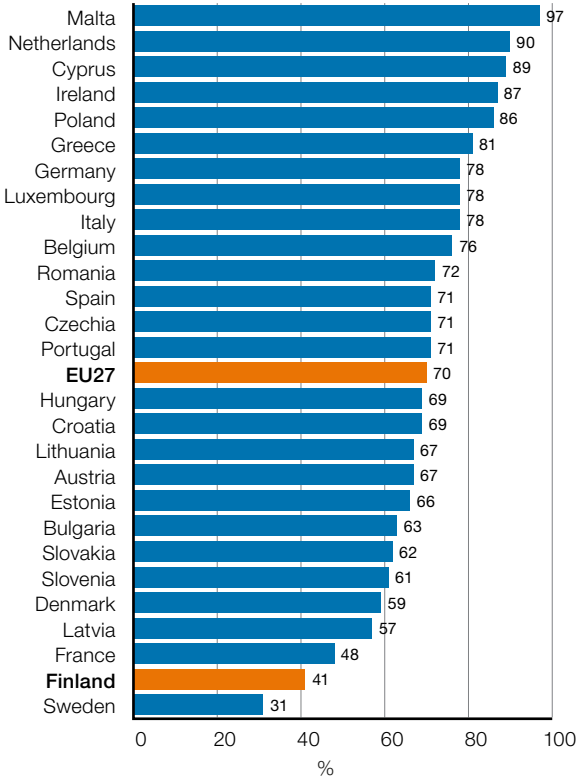
2) excluding biofuel portion

Gross available energy, Mtoe



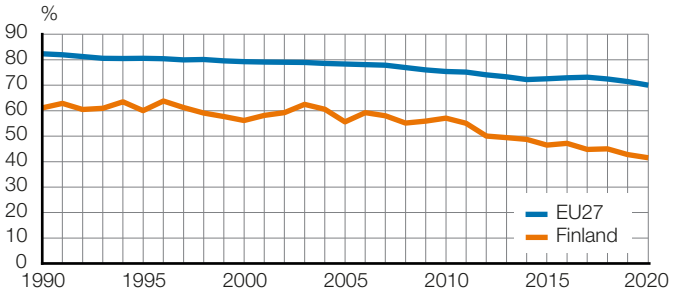
Source: Eurostat

Share of fossil fuels in gross available energy in 2020, %



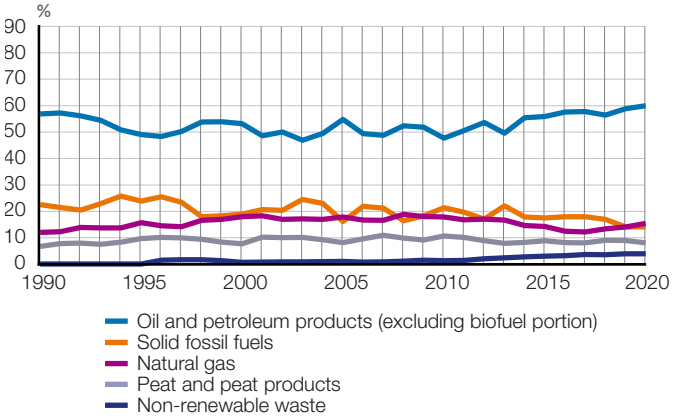
Source: Eurostat

Share of fossil fuels in gross available energy 1990-2020, %



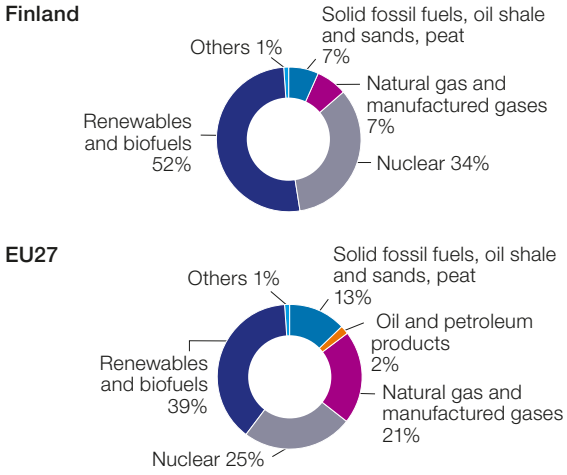
Source: Eurostat

Share of fossil fuels in gross available energy in Finland 1990–2020, %



Source: Eurostat

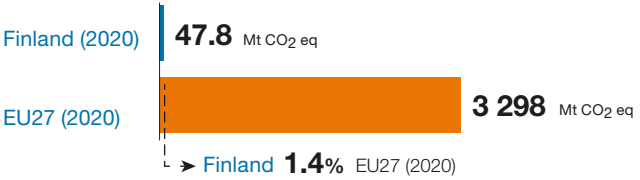
Electricity production by fuel source in 2020, %



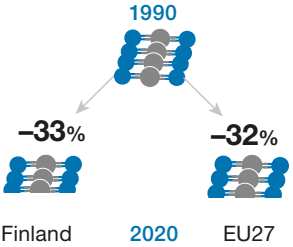
Source: European Commission

Greenhouse gases

Total emissions[1)]

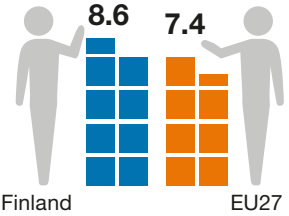


Total emissions[1)] between 1990 and 2020

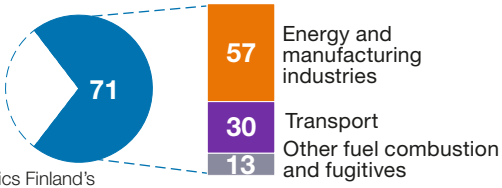


Total emissions[1)] per capita 2020

tonnes



Energy sector emissions of total emissions[1)] in Finland, % 2021*



*According to Statistics Finland's instant preliminary data

1) Without LULUCF

Source: EEA and Statistics Finland

Greenhouse gas emissions 1990–2021*

Gases included in the greenhouse gas inventory are converted in to a common measure, i.e. carbon dioxide equivalent, using Global Warming Potential (GWP) values from the IPCC´s Fifth Assessment Report.

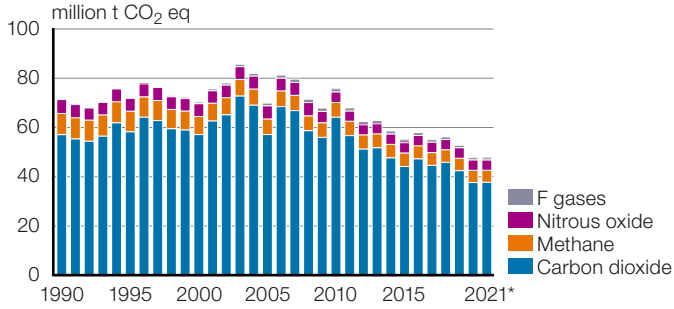
	1990	1995	2000	2005	2010	2015	2019	2020	2021*
	million tonnes of CO_2 equivalent								
Energy	53.4	55.3	53.7	53.7	60.2	40.6	38.9	34.3	34.0
Industrial prosesses and product use	5.2	4.9	5.8	6.6	6.1	5.6	5.3	5.1	5.4
Agriculture	7.4	6.6	6.5	6.4	6.5	6.5	6.5	6.4	6.4
Waste	5.2	5.1	4.3	2.8	2.8	2.3	2.0	1.9	1.8
Indirect CO_2 emissions	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total emission without land use, land use change and forestry	**71.4**	**72.0**	**70.4**	**69.9**	**75.7**	**55.0**	**52.8**	**47.8**	**47.7**
Land use, land use change and forestry	–13.5	–13.3	–15.1	–20.6	–21.8	–18.9	–13.7	–17.4	2.1

* Finland's instant preliminary data

Emissions to the atmosphere are positive and removals negative in the table.

Source: Statistics Finland, Greenhouse Gas Inventory

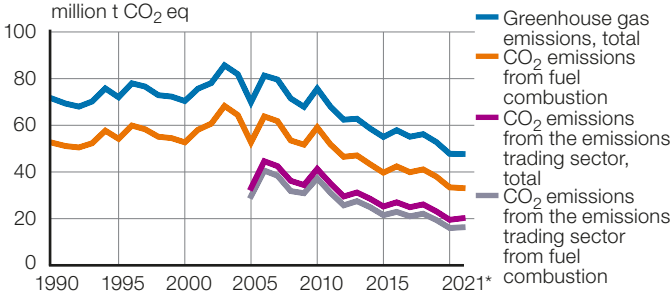
Greenhouse gas emissions by gases 1990–2021*



* Finland's instant preliminary data

Source: Statistics Finland, Greenhouse Gas Inventory

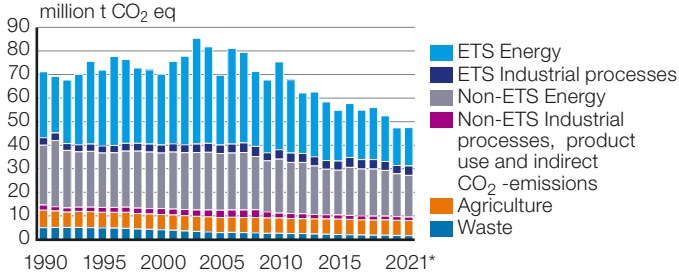
Finland's greenhouse gas emissions 1990–2021*



The EU's emissions trading started in 2005.

Source: Statistics Finland, Greenhouse Gas Inventory

Emissions of the emissions trading sector and emissions not included in the EU ETS 1990–2021*

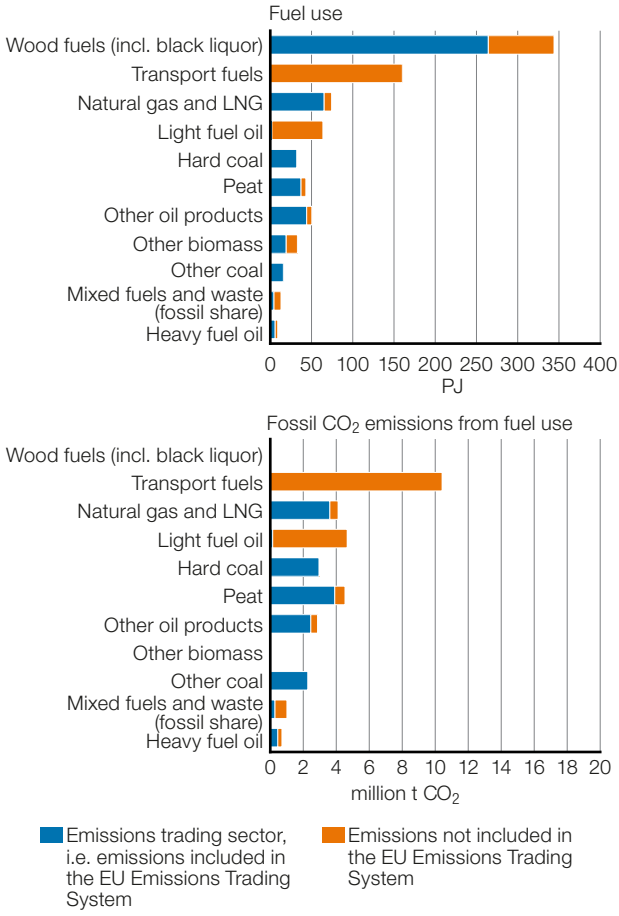


ETS = Emissions Trading System emissions,
Non-ETS = emissions not included in the EU ETS

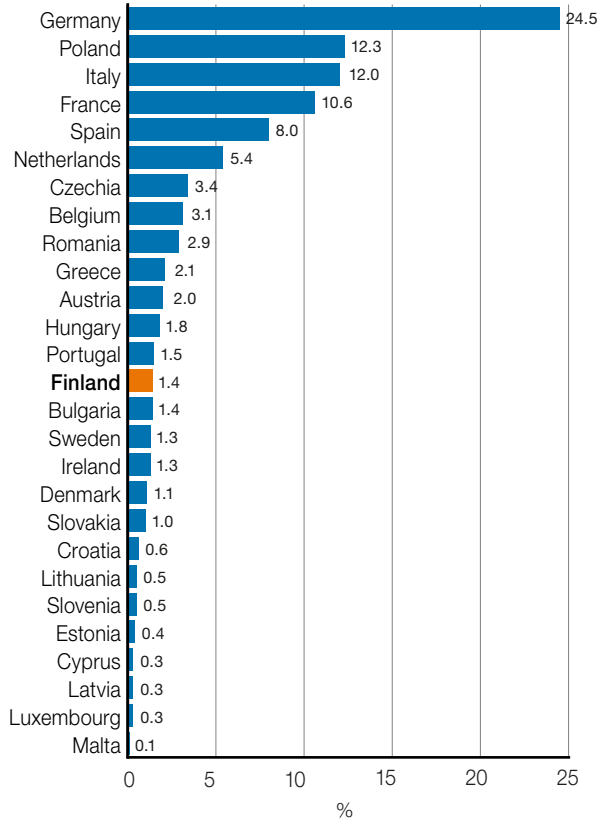
Total emissions in 1990 to 2004 have been divided into emissions in the EU Emissions Trading System (EU ETS) and emissions not included in the EU Emissions Trading System (EU ETS) according to the coverage used in the emissions trading period 2005 to 2007.

* According to Statistics Finland's instant preliminary data.

Fuel use and emissions of the emissions trading sector and emissions not included in the EU ETS by fuel type in 2020



Share in the EU's energy sector greenhouse gas emissions in 2020

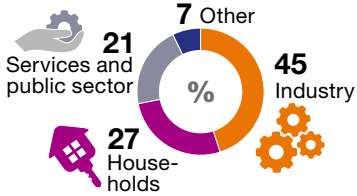


Source: European Environment Agency

Electricity

Total electricity consumption 2020

81 573 GWh → Of which



Total electricity consumption increase 1980–2021*

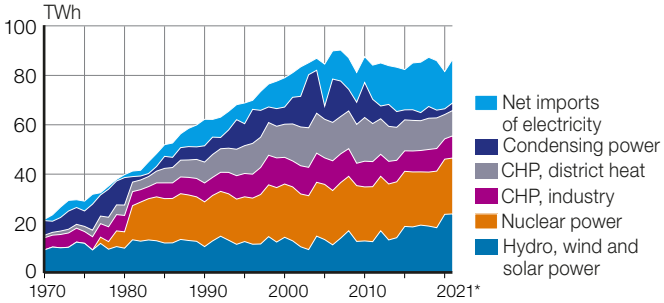
Total electricity generation 2021*

Combined heat and power **28%**

Electricity production 2021*

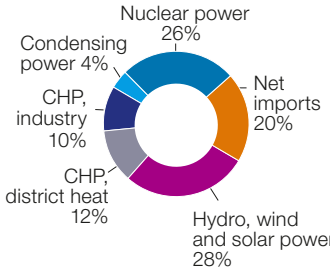
TOP3

Electricity supply 1970–2021*, TWh

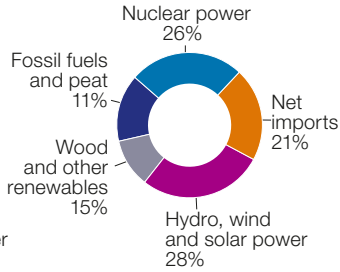


Electricity supply in 2021*, %

By mode of production



By source



Total electricity supply in 2021* was 86.8 TWh

Sources: Statistics Finland, Finnish Energy, VTT Technical Research Centre of Finland (wind power until 2011)

Supply and total consumption of electricity, TWh

	Hydro power	Wind power[1)]	Nuclear power	Condensing power[2)]	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**
1990	10.8	0.0	18.1	6.6	7.7	8.5	10.7	**62.3**
1995	12.8	0.0	18.1	8.9	9.5	11.3	8.4	**68.9**
2000	14.5	0.1	21.6	6.9	10.8	13.4	11.9	**79.2**
2005	13.4	0.2	22.4	5.3	10.7	15.6	17.0	**84.7**
2006	11.3	0.2	22.0	17.6	12.0	15.5	11.4	**90.0**
2007	14.0	0.2	22.5	14.4	11.6	15.1	12.6	**90.4**
2008	16.9	0.3	22.0	8.8	11.2	15.3	12.8	**87.3**
2009	12.6	0.3	22.6	9.0	9.0	15.8	12.1	**81.3**
2010	12.7	0.3	21.9	14.2	10.4	17.7	10.5	**87.7**
2011	12.3	0.5	22.3	9.8	10.1	15.4	13.9	**84.3**
2012	16.7	0.5	22.1	5.2	8.9	14.4	17.4	**85.2**
2013	12.7	0.8	22.7	8.9	9.1	14.2	15.7	**84.1**
2014	13.2	1.1	22.6	6.4	8.7	13.4	18.0	**83.4**
2015	16.6	2.3	22.3	4.1	8.3	12.5	16.3	**82.5**
2016	15.6	3.1	22.3	4.3	8.5	12.4	19.0	**85.2**
2017	14.6	4.8	21.6	3.3	8.6	12.1	20.4	**85.5**
2018	13.1	5.9	21.9	4.7	9.2	12.7	19.9	**87.5**
2019	12.2	6.2	22.9	3.1	9.2	12.4	20.0	**86.1**
2020	15.7	8.2	22.4	2.3	8.2	9.9	15.1	**81.7**
2021*	15.6	8.4	22.6	3.1	9.0	10.3	17.8	**86.8**
Share								
2021*	18%	10%	26%	4%	10%	12%	20%	**100%**
Annual Change								
20/21*	–1%	3%	1%	34%	9%	4%	18%	**6%**

1) Wind power also includes the production of solar power.
2) Condensing power includes conventional condensing power, peak gas turbine power and gas engines.

Sources: Statistics Finland, Finnish Energy, VTT Technical Research Centre of Finland (wind power until 2011)

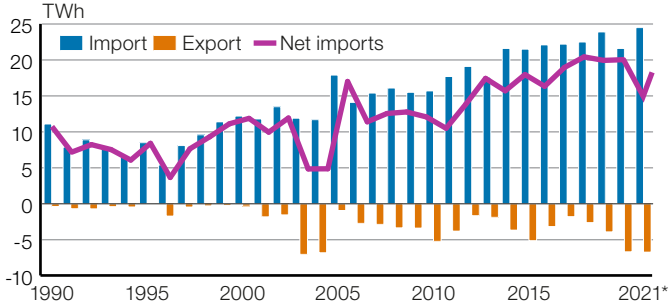
Energy sources in electricity generation, PJ

	Hydro and wind power	Nuclear energy	Hard coal	Oil	Natural gas	Peat	Other fuels	Net imports of electr.	Total	CO_2 emissions (Mt)
1970	33.9	–	41.8	32.1	–	..	17.9	1.9	**127.6**	
1980	36.4	72.3	102.7	26.8	12.6	..	29.2	4.4	**284.4**	14
1990	38.7	197.8	61.3	9.7	24.8	17.2	29.1	38.7	**417.3**	11
2000	52.3	235.4	55.4	3.3	43.2	21.5	50.4	42.8	**504.2**	12
2010	47.0	238.8	103.2	2.7	46.9	38.5	66.0	37.8	**580.9**	18
2011	46.0	242.9	64.6	2.6	39.9	33.6	70.1	49.9	**549.6**	13
2012	61.8	240.7	41.8	2.2	27.8	19.5	64.8	62.8	**521.5**	9
2013	48.4	247.3	72.3	1.7	27.8	17.6	70.1	56.6	**541.8**	11
2014	51.7	247.0	49.6	1.7	22.4	18.8	67.8	64.7	**523.7**	9
2015	68.1	243.6	28.7	1.4	20.8	16.3	65.6	58.8	**503.3**	7
2016	67.4	243.1	38.7	1.4	15.1	14.8	65.6	68.2	**514.3**	8
2017	70.0	235.4	29.7	1.2	13.3	13.7	68.9	73.5	**505.6**	7
2018	68.6	238.7	31.1	1.7	17.3	19.1	77.0	71.8	**525.3**	8
2019	66.3	250.0	20.6	1.9	16.0	15.5	74.8	72.2	**517.3**	6
2020	85.8	243.9	11.8	1.3	16.6	10.4	66.2	53.9	**489.9**	5
2021*	86.4	247.1	18.7	1.5	16.1	8.3	78.3	64.0	**520.2**	4

Solar power is included in hydro and wind power.

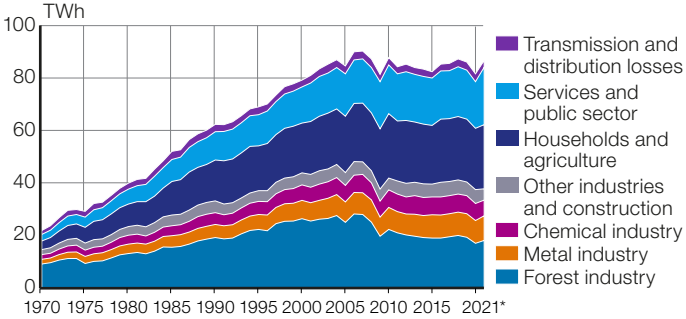
Sources: Statistics Finland, Finnish Energy and Technical Research Centre of Finland VTT (wind power until 2011)

Imports and exports of electricity 1990–2021*

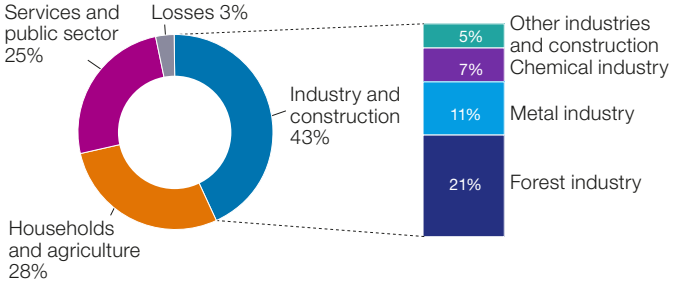


Source: Finnish Energy

Electricity consumption by sector 1970–2021*



Electricity consumption by sector in 2021*



Sources: Finnish Energy and Statistics Finland

All-time record for the highest electricity consumption was 15,105 MWh on 7 January 2016 between 5 pm and 6 pm.

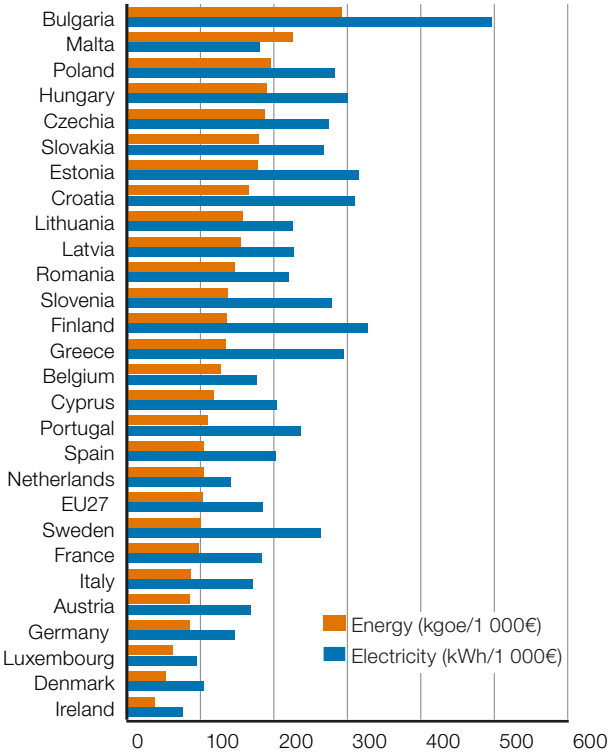
Source: Fingrid

Electricity consumption by sector, TWh

	Industry and construction					Households and agriculture	Services and public 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	9.2	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**
1990	33.1	19.1	5.0	4.5	4.5	15.6	10.8	2.8	**62.3**
1995	37.0	22.2	5.7	5.0	4.1	17.1	11.9	3.0	**68.9**
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	**83.6**
2003	45.2	26.4	7.7	6.3	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	**87.1**
2005	44.0	24.9	7.8	6.3	4.9	21.5	16.2	3.0	**84.7**
2006	48.1	28.1	8.2	6.6	5.2	22.2	16.6	3.1	**90.0**
2007	48.0	27.9	8.3	7.0	4.8	22.4	16.9	3.0	**90.4**
2008	44.6	25.0	8.5	6.5	4.6	22.1	17.3	3.3	**87.3**
2009	37.6	19.6	7.3	6.1	4.6	23.0	18.0	2.8	**81.3**
2010	41.8	22.2	8.4	6.7	4.5	24.6	18.6	2.8	**87.7**
2011	40.7	20.9	8.1	6.7	5.0	22.9	18.0	2.7	**84.3**
2012	39.7	20.1	8.0	6.5	5.2	24.0	18.6	2.9	**85.2**
2013	40.2	19.6	8.4	7.1	5.1	23.0	18.2	2.6	**84.1**
2014	39.7	19.1	8.4	6.9	5.2	22.8	18.2	2.8	**83.4**
2015	39.5	18.9	8.9	6.8	4.9	22.4	18.1	2.4	**82.5**
2016	40.1	18.9	8.8	6.9	5.6	24.1	18.4	2.6	**85.2**
2017	40.4	19.4	8.8	6.9	5.4	24.0	18.3	2.8	**85.5**
2018	41.2	19.9	8.9	6.9	5.4	24.2	19.0	3.0	**87.5**
2019	40.3	19.2	9.0	6.9	5.2	24.0	18.7	3.1	**86.1**
2020	37.3	16.9	8.7	6.5	5.3	23.4	17.8	3.0	**81.6**
2021*	37.7	18.0	9.4	6.0	4.3	24.5	21.9	2.6	**86.8**
Share									
2021*	43%	21%	11%	7%	5%	28%	25%	3%	**100%**
Annual Change									
20/21*	1%	7%	8%	–7%	–19%	5%	23%	–13%	**6%**

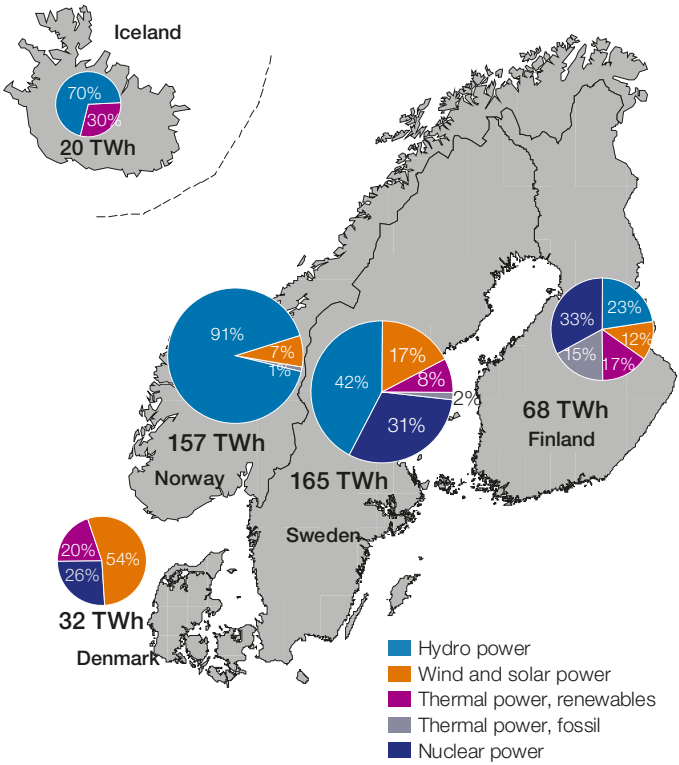
Sources: Statistics Finland, Finnish Energy

Consumption of energy and electricity per GDP-unit in EU countries 2020



Source: Eurostat

Electricity generation in the Nordic countries 2021*



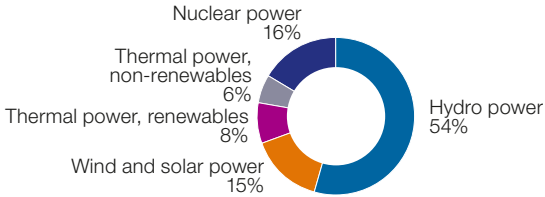
Source: Eurostat

Electricity consumption in the Nordic countries, Estonia and EU27 2021*, TWh

	2020	2021*	Change-%
Sweden	134	140	4%
Norway	134	140	4%
Finland	81	86	6%
Denmark	34	37	8%
Iceland	19	20	3%
Nordic countries total	**401**	**421**	**5%**
Estonia	9	8	–3%
EU27 countries	2 625	2 728	4%

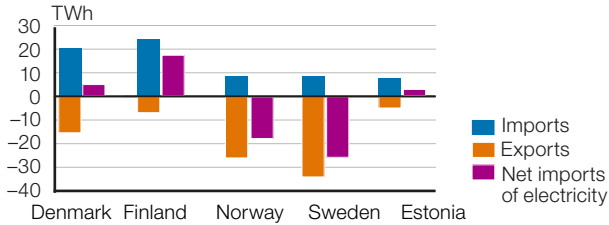
Source: Eurostat Monthly Statistics 2021

Total electricity generation in the Nordic countries 2021*



Total generation 448 TWh

Imports and exports of electricity in the Nordic countries and Estonia 2021*



Source: Eurostat

Electricity consumption in EU, TWh

	1990	1995	2000	2005	2010	2015	2018	2019	2020
Germany	481	473	501	539	547	528	522	508	490
France	323	368	410	451	472	448	449	445	422
Italy	219	243	279	310	310	297	303	302	284
Spain	129	146	195	248	251	239	246	243	228
Poland	109	104	109	116	129	139	151	152	148
Sweden	131	127	131	133	135	128	131	127	126
Netherlands	75	85	100	108	112	109	113	114	113
Belgium	59	70	79	83	86	83	84	83	81
Finland	**59**	**66**	**76**	**82**	**85**	**80**	**84**	**83**	**78**
Austria	44	48	53	60	62	64	66	66	64
Czechia	53	52	52	58	58	59	61	61	59
Greece	30	36	45	53	55	52	51	52	49
Romania	60	46	41	47	46	47	50	50	48
Portugal	24	29	39	47	51	47	49	49	47
Hungary	33	29	31	36	36	38	41	41	41
Denmark	29	32	33	34	33	32	32	32	33
Bulgaria	36	31	25	27	28	30	31	31	31
Ireland	12	15	20	24	26	26	28	28	29
Slovakia	25	23	23	24	25	25	27	26	25
Croatia	14	10	12	15	16	16	17	17	16
Slovenia	9	9	11	13	12	13	14	14	13
Lithuania	13	7	7	9	9	10	11	11	11
Estonia	7	5	5	6	7	7	8	8	8
Latvia	8	4	4	6	6	6	7	7	7
Luxembourg	4	5	6	6	7	6	6	6	6
Cyprus	2	2	3	4	5	4	5	5	4
Malta	1	1	2	2	2	2	2	2	2
EU 27	**1 990**	**2 066**	**2 293**	**2 541**	**2 611**	**2 535**	**2 590**	**2 563**	**2 462**

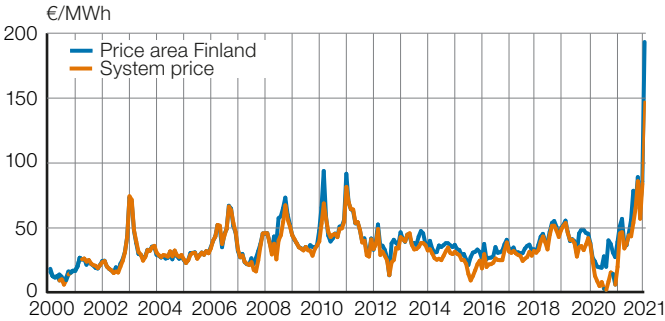
Source: Eurostat

Electricity spot prices of the nordic power exchange Nord Pool by price area, €/MWh

Year	Oslo	Stockholm	Helsinki	Copenhagen	Tallinn	System
2014	27.33	31.62	36.02	32.15	37.61	29.61
2015	19.85	22.00	29.66	24.49	31.08	20.98
2016	26.17	29.23	32.45	29.40	33.06	26.91
2017	29.04	31.24	33.19	31.97	33.20	29.41
2018	43.65	44.54	46.80	46.20	47.07	43.99
2019	39.29	38.36	44.04	39.84	45.86	38.94
2020	9.29	21.19	28.02	28.41	33.69	10.93
2021	74.68	66.00	72.34	87.91	86.72	62.31

Source: Nord Pool, https://nordpoolgroup.com

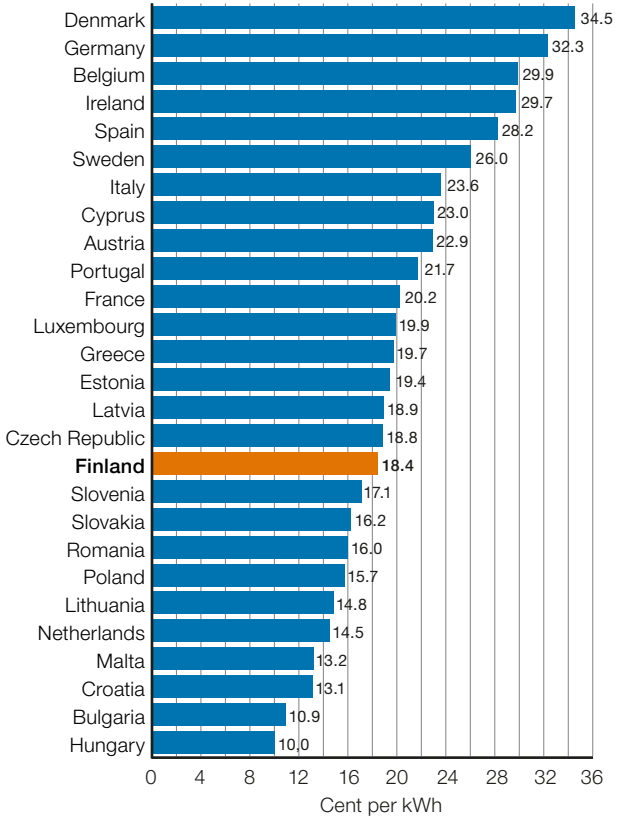
Development of spot prices prices on Nord Pool 2000–2021



The system price is the price calculated on the basis of all bids and offers at the Power Exchange, in which possible restrictions caused by the electricity transmission capacity are not taken into account.

Source: Nord Pool, https://nordpoolgroup.com

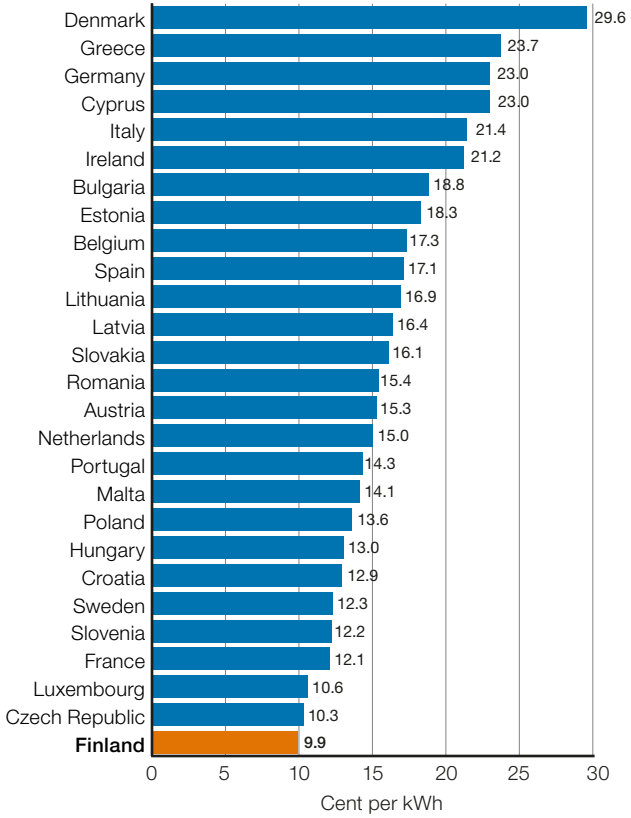
Electricity prices for households on the 2nd half of 2021



Households annual consumption of 2 500–5 000 kWh. Prices include taxes.

Source: Eurostat

Electricity prices for industry on the 2nd half of 2021



Electricity prices to industrial consumers with annual consumption of 500–2 000 MWh. Prices include taxes.

Source: Eurostat

Electricity network information

	1990	2000	2015	2019	2020
Transformer substations, number					
High voltage substations	715	591	944	990	1008
Distribution substations	114 019	124 851	136 417	143 503	144 804
Lengths of low voltage lines (0.4 kV–1 kV), km					
Overhead lines	162 076	158 576	139 243	122 157	117 142
Cables (inc. sea cable)	45 705	63 327	102 746	129 175	137 122
Cabling rate	22%	29%	42%	51%	54%
Lengths of medium voltage lines (over 1 kV–70 kV), km					
Overhead lines	122 329	121 754	115 967	98 270	98 270
Cables (inc. sea cable)	10 586	12 116	27 144	54 655	54 655
Cabling rate	8%	9%	19%	36%	36%
Lengths of high voltage lines (110 kV–400 kV), km					
110 kV	14 000	15 050	16 231	16 482	16 512
220 kV	2 471	2 510	2 092	1 290	1 290
400 kV	3 164	3 926	5 191	5 463	5 463

Source: Energy Authority

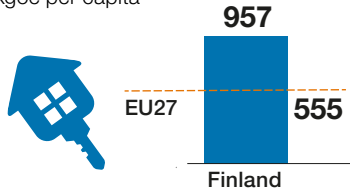
”Olkiluoto 3's reactor started up in December 2021 for the first time. Regular electricity production is planned to start in December 2022 at full 1600 MW”

Source: TVO Nuclear Services

Heating and cooling

Final energy consumption in households 2020

kgoe per capita

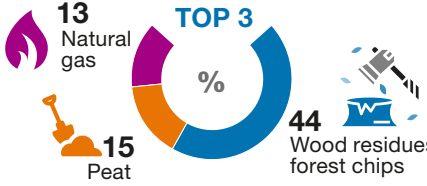


Source: Eurostat

Energy consumption in households, % 2020

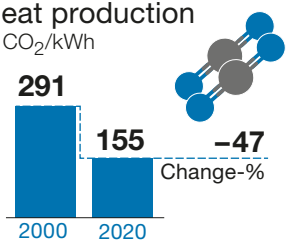
Finland **81** EU27 **78**

Fuel consumption in production of district heat 2020

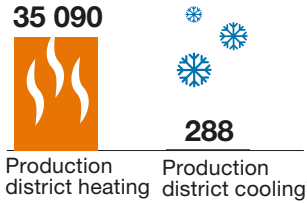


Specific carbon dioxide emissions of district heat production

g CO_2/kWh



District heating and cooling, GWh 2020



1) Source: Finnish Energy

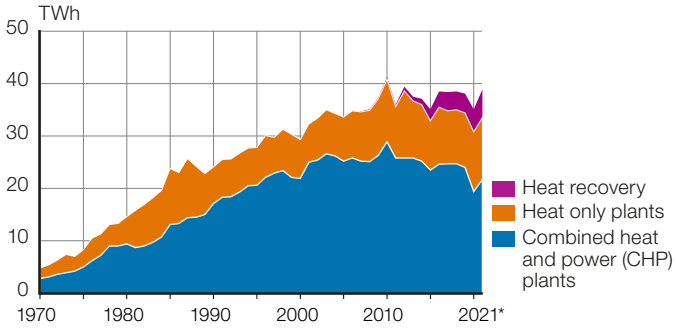
Production and consumption of district heat, TWh

	Net production of district heat			Net-work and meas-uring losses	Consumption of district heat			
	Heat only plants[1)]	CHP plants	Total		Residential buildings	Industrial buildings	Other consum-ers	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**
1985	10.7	13.1	**23.8**	2.2	12.6	2.1	7.0	**21.7**
1990	7.0	17.1	**24.1**	1.9	12.5	2.0	7.7	**22.3**
1995	7.2	20.6	**27.8**	2.4	14.3	2.7	8.4	**25.4**
2000	7.4	21.9	**29.2**	3.0	14.9	2.6	8.8	**26.3**
2001	7.3	25.0	**32.3**	3.1	16.2	2.9	10.1	**29.2**
2002	8.0	25.4	**33.4**	3.4	16.6	3.0	10.4	**30.0**
2003	8.5	26.6	**35.0**	3.8	17.6	3.0	10.6	**31.2**
2004	8.1	26.2	**34.3**	4.0	17.0	2.9	10.3	**30.3**
2005	8.4	25.2	**33.6**	3.8	16.6	3.0	10.2	**29.8**
2006	9.0	25.8	**34.7**	4.1	17.1	3.1	10.5	**30.7**
2007	9.4	25.2	**34.6**	3.8	17.3	3.1	10.4	**30.8**
2008	10.0	25.1	**35.1**	4.4	17.2	3.0	10.6	**30.7**
2009	11.0	26.3	**37.4**	3.7	18.2	3.4	12.1	**33.7**
2010	12.3	28.9	**41.2**	4.1	20.2	3.7	13.2	**37.2**
2011	10.3	25.8	**36.0**	3.5	17.6	3.3	11.6	**32.5**
2012	13.6	25.8	**39.4**	3.9	19.3	3.6	12.5	**35.4**
2013	11.6	25.8	**37.4**	3.7	18.6	3.3	11.9	**33.8**
2014	11.9	25.2	**37.1**	3.8	18.3	3.3	11.8	**33.4**
2015	11.6	23.5	**35.1**	3.6	18.0	3.1	10.4	**31.5**
2016	13.9	24.6	**38.5**	3.9	19.6	3.4	11.6	**34.6**
2017	13.6	24.7	**38.3**	3.4	19.3	3.5	12.1	**34.9**
2018	13.8	24.7	**38.5**	3.7	18.7	3.4	12.7	**34.8**
2019	14.1	24.0	**38.1**	4.0	18.5	3.3	12.3	**34.2**
2020	15.7	19.4	**35.1**	3.9	17.0	3.0	11.2	**31.2**
2021*	17.2	21.7	**38.9**	3.8	19.1	3.4	12.6	**35.1**

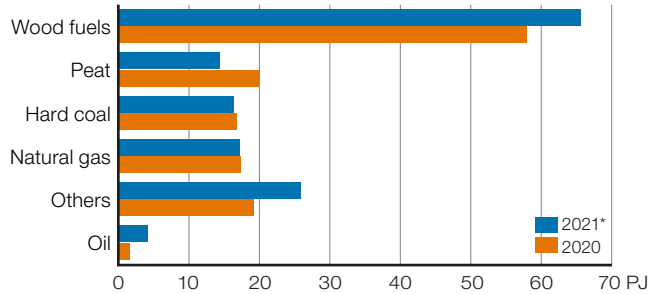
1) Heat only plants include fuel-powered heating plants and heat recovery for example from heat pumps, flue gas scrubbers and condensers. 14% of total heat production originates from heat recovery including heat pumps (2021).

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

Production of district heat 1970–2021*

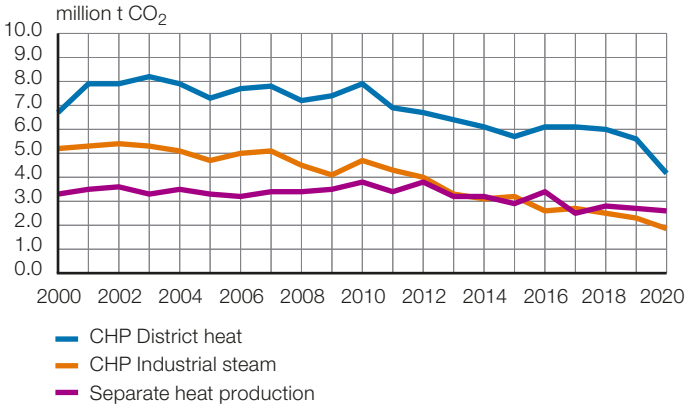


Fuel consumption in production of district heat 2020–2021*

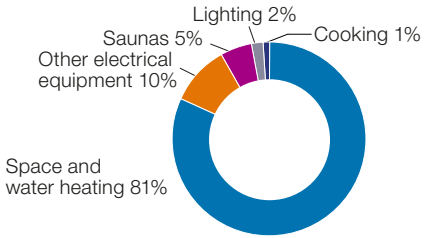


Sources: Statistics Finland, Finnish Energy

CO_2 emissions of heat production 2000–2020



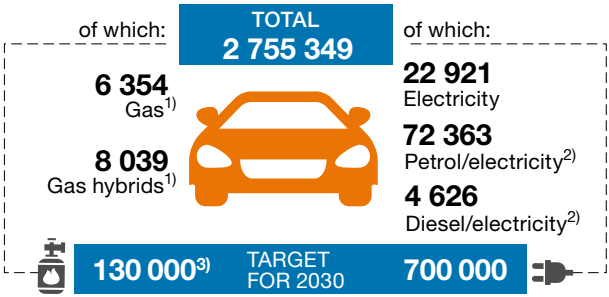
Energy consumption in households 2020



Energy consumption in households in 2020 was 220 PJ.

Transport

Passenger cars in traffic, the end of 2021



Source: Traficom

Traffic performance, times around the world

1 205 365

1) Does not include cars using liquefied petrol gas (LPG)
2) Plug-in hybrid 3) Includes passenger cars and vans

Total transport emissions 2021

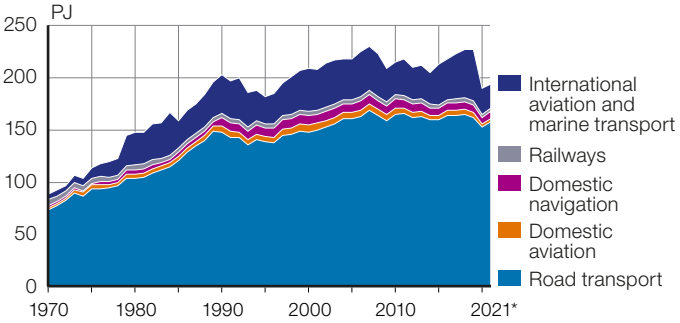
Road transport 94%
of which:

37% Heavy traffic

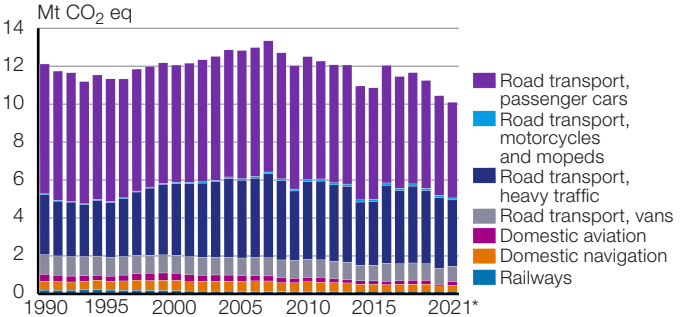
53% Passenger cars

10% Other road transport

Energy consumption in transport 1970–2021*



Emissions from transport 1990–2021*

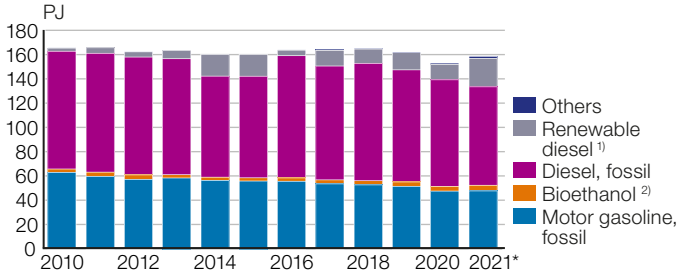


Includes emissions from fuels used in trasport.

* According to Statistics Finland's instant preliminary data.

Source: Emissions data by vehicle type: VTT Lipasto

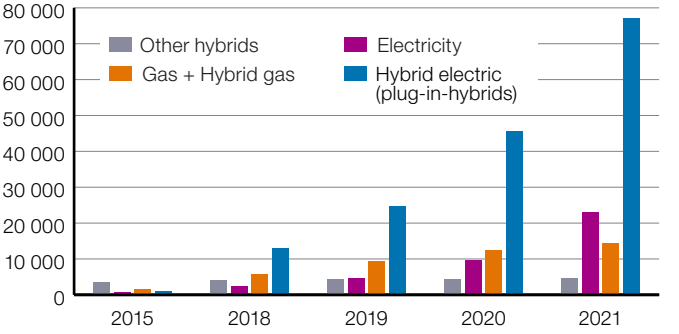
Fuel consumption in road transport 2010–2021*



1) Primarily 2nd generation biodiesel also known as renewable diesel. The value also contains small amounts of 1st generation FAME based biodiesel. Renewable diesel refers to Hydrotreated Vegetable Oils (HVO), which are produced via hydroprocessing of oils and fats. The fuel can be blended with fossil diesel or used in its pure form. Fatty acid methyl esters (FAME) are produced via esterification process. The maximum content of FAME in fossil diesel is generally limited to 7%.

2) Contains also other components i.e. bio ethers, bio esters and biogasoline.

Number of electric, hybrid and gas powered passenger cars in traffic 2015–2021



Total amount of passenger cars in traffic was 2 755 349 by the end of 2021.

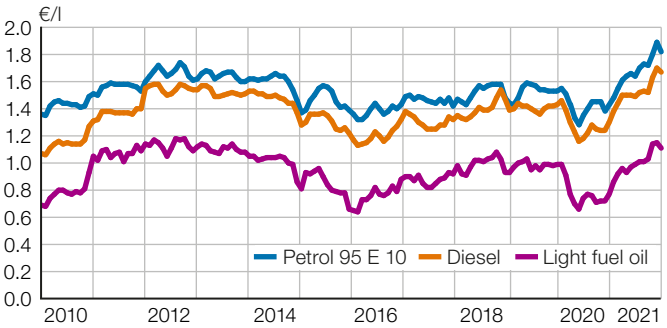
Source: Traficom

Average prices of liquid fuels in Finland, €/l

Year	Light fuel oil	Diesel	Petrol 95 E 10	Petrol 98 E 5
2010	0.78	1.14	1.43	1.47
2011	1.07	1.37	1.56	1.62
2012	1.13	1.55	1.67	1.72
2013	1.11	1.52	1.64	1.70
2014	1.02	1.48	1.61	1.67
2015	0.84	1.30	1.46	1.53
2016	0.76	1.19	1.38	1.46
2017	0.88	1.30	1.46	1.54
2018	1.00	1.40	1.52	1.61
2019	0.98	1.40	1.52	1.61
2020	0.76	1.27	1.41	1.50
2021	1.00	1.53	1.68	1.77

Source: Statistics Finland, Consumer Price Index

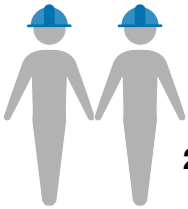
Development of liquid fuel prices in Finland 2010–2021



Source: Statistics Finland, Consumer Price Index

Industry and enterprises

Energy sector employees 2020

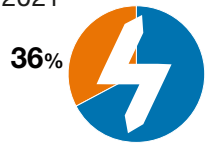


22 054

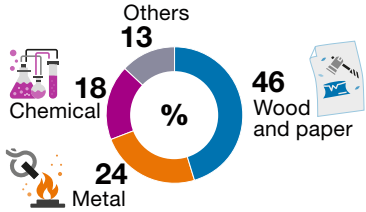
Turnover of the energy sector 2020

30 110
mil.€

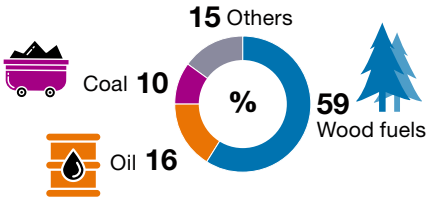
Industry of total energy consumption 2021*



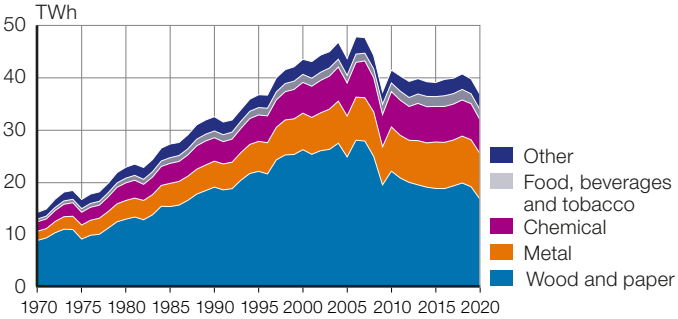
Industry electricity consumption 2020



Industry fuel consumption 2020

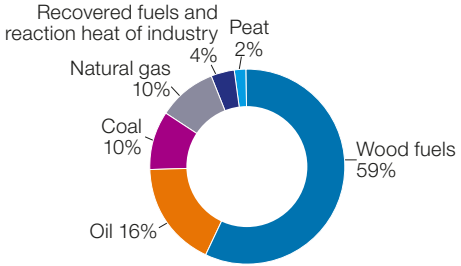


Electricity consumption by branch of industry 1970–2020



Source: Statistics Finland, Financial statements of enterprises

Fuel consumption in industry 2020



Total fuel consumption in industry in 2020 was 353 PJ.

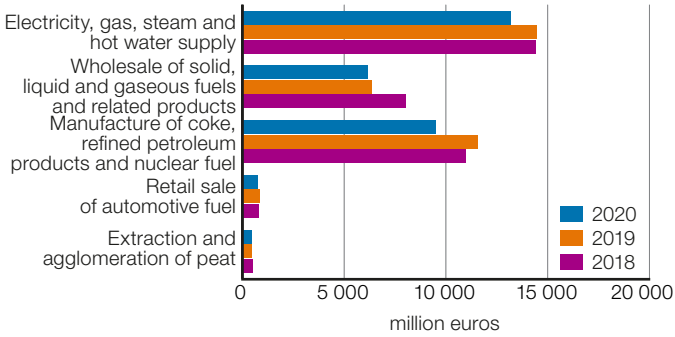
In manufacturing: Energy use was highest in South Karelia and total electricity use was highest in Lapland in 2020.

Enterprises in energy sector in 2020

	Turnover, EUR mil.	Staff expenses, EUR mil.	Number of enterprises	Employees
Electricity, gas, steam and hot water supply	13 202	904	960	12 879
Manufacture of coke, refined petroleum products and nuclear fuel	9 505	341	16	3 859
Wholesale of solid, liquid and gaseous fuels and related products	6 187	83	123	1 054
Retail sale of automotive fuel	755	101	601	2 945
Extraction and agglomeration of peat	461	60	433	1 316
Total	**30 110**	**1 489**	**2 133**	**22 054**

Source: Statistics Finland, Financial statements of enterprises

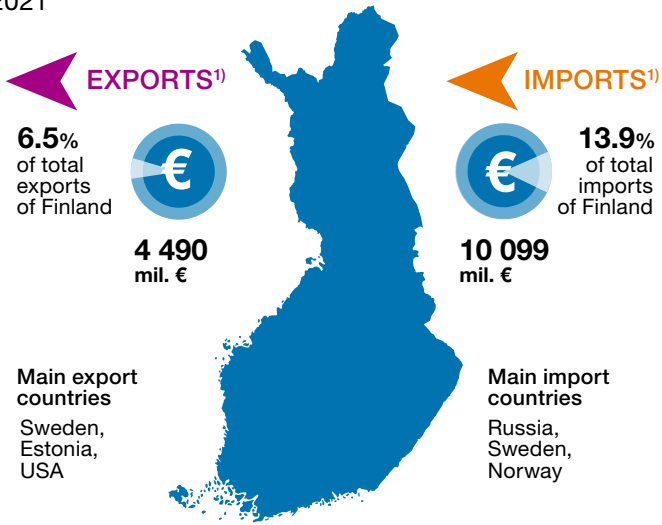
Turnover of enterprises in energy sector 2018–2020



Source: Statistics Finland, Financial statements of enterprises

Imports and exports

Total energy products 2021*



1) Source: Finnish Customs / Foreign Trade Statistics

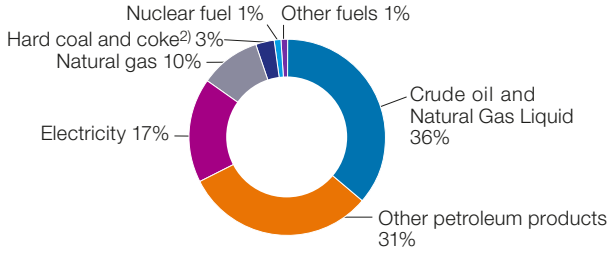
Energy dependence2) 2020

FINLAND **42%** while EU27 **57%**

2) Nuclear energy is counted as domestic energy.

Source: EU Commission, DG Energy

Value of energy imports in 2021* [1)]



1) excluding wood fuels
2) includes coking coal

Total imports of energy products were 10 099 million euros in 2021*
That was 13.86% of total imports to Finland.

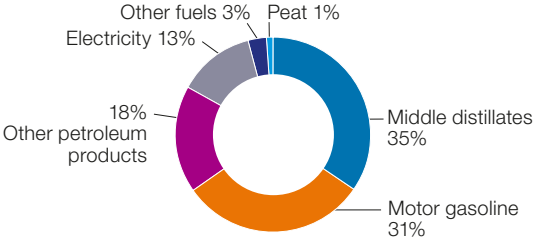
Energy imports in 2021*

	Unit	Russia	Sweden	Norway	Other countries	Total Amount	Total Value mil. €
Coal and coal products	1000 t	1 046	0	0	1 357	**2 403**	**345**
Natural gas	mil. m^3	1 878	0	6	629	**2 513**	**1 015**
Oil and petroleum products [1)]	1000 t	8 848	1 742	1 455	1 772	**13 816**	**6 856**
Peat	1000 t	26	5	0	4	**36**	**1**
Wood fuels [2)]	1000 t	14 623	..	..	6 796	**21 419**	..
Nuclear fuel	tU	21	18	–	61	**99**	**151**
Electricity	GWh	9 148	15 013	277	54	**24 492**	**1 730**
Value	**€ mil.**	**5 301**	**2 392**	**719**	**1 688**		**10 099**

1) Includes natural gas condensate
2) Includes wood pellets and other wood fuels

Source: Finnish Customs/ Foreign Trade Statistics

Value of energy exports in 2021* [1)]



1) excluding wood fuels

Total exports of energy products were 4 490 million euros in 2021*
That was 6.5% of total exports to Finland.

Energy exports in 2021*

	Unit	Sweden	Estonia	USA	Other countries	Total Amount	Total Value mil. €
Coal and coal products [1)]	1 000 t	..	..	..	74	**74**	**8**
Petroleum products	1 000 t	1 232	271	1 031	3 014	**5 549**	**3 892**
Peat	1 000 t	4	2	1	321	**327**	**24**
Wood fuels [2)]	1 000 t	..	..	..	..	**..**	**..**
Electricity	GWh	14	6 691	–	18	**6 724**	**567**
Value	**€ mil.**	**1 129**	**700**	**579**	**2 083**		**4 490**

1) Includes coke and coke tar
2) Includes wood pellets and other wood fuels

Source: Finnish Customs/Foreign Trade Statistics

Net heat contents and densities of energy sources

Fuels	Unit	Net heat content GJ	Net heat content MWh	Density t/m^3
Heavy fuel oil, sulphur content <1%	t	40.4	11.2	0.99
Heavy fuel oil, sulphur content ≥1%	t	40.2	11.2	1.00
Light fuel oil (Gasoil, sulphur-free and Gasoil, low sulphur)	t	43.1	12.0	0.83
Diesel oil	t	42.7	11.9	0.80
Kerosene (Jet fuel)	t	43.3	12.0	0.79
Other kerosenes	t	43.1	12.0	0.83
Naphtha	t	44.3	12.3	0.70
Motor gasoline	t	41.6	11.6	0.75
Aviation gasolines	t	43.7	12.1	0.71
LPG	t	46.3	12.9	0.52
Refinery gases	t	50.0	13.9	
Hard coal	t	24.8	6.9	
Coke	t	29.3	8.1	
Natural gas	1 000 m^3 (0°C)	36.5	10.1	
Coke oven gas	1 000 m^3	16.7	4.6	
Blast furnace gas	1 000 m^3	3.8	1.1	
Milled peat	t	10.1	2.8	0.32
Sod peat	t	12.3	3.4	0.38
Black liquor	t (dry matter)	11.5	3.2	
Chips from roundwood	t	9.5	2.6	
Forest residue chips	t	10.0	2.8	
Bark	t	7.5	2.1	
Saw dust	t	7.0	1.9	
Wood pellets	t	17.0	4.7	
Biogas[1]	1 000 m^3	17.0-23.0		

1) Excl. biomethane and synthetic biogas.

Source: Fuel classification 2022, Statistics Finland

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 gasolines	65.5	Default bio share 11.5%
Diesel fuel	54.6	Default bio share 26.0%
Light fuel oil	70.2	Default bio share 4.0%
Heavy fuel oil	76.1–79.2	
Kerosenes	73.2	
LPG	64.9	
Other oils	71.3–74.1	
Hard coal	93.1	
Coke	107.0	
Natural gas	55.3	
Milled peat	107.6	
Bark, wood fuel	112.0	
Industrial wood residue	112.0	
Black liquor	95.3	

Source: Statistics Finland/Fuel classification 2022
www.tilastokeskus.fi/polttoaineluokitus

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.

Due to rounding, the sum of percentages does not always add up to 100%.

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

Energy table service

The Energy table service provides information on the energy industry as an extensive compilation of Excel tables and statistical graphs. The service is available in Finnish, English or Swedish, and is updated annually. The Energy online service is available at https://pxhopea2.stat.fi/sahkoiset_julkaisut/energia2021/.

Energy in Finland

Statistical pocketbook on energy statistics.
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