

# Finland

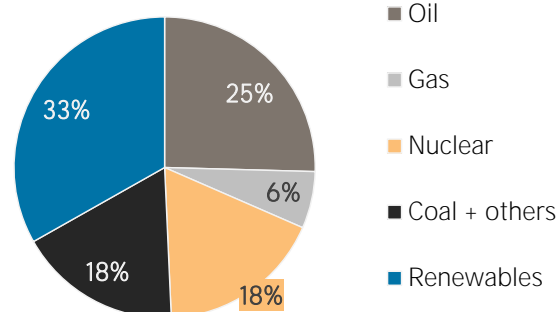
## Sustainable Development Goal 7.2: Energy Indicators (2016)

Renewable energy (% of TFEC)	42.0	Access to electricity (% of population)	100.0
Energy efficiency (MJ per \$1 of GDP)	6.5	Access to clean cooking (% of population)	>95

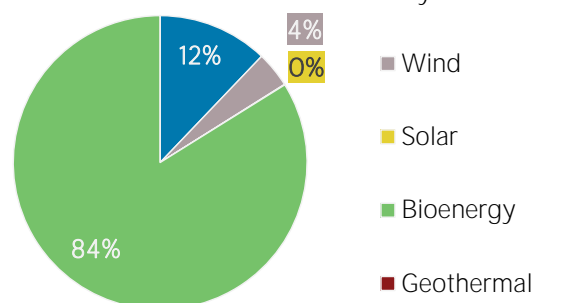
### TOTAL PRIMARY ENERGY SUPPLY (TPES)

TPES	2011	2016
Non-renewable (TJ)	1 068 766	943 368
Renewable (TJ)	410 306	468 446
Total (TJ)	1 479 072	1 411 814
Renewable share (%)	28	33
Growth in TPES	2011-16	2015-16
Non-renewable (%)	-11.7	+5.5
Renewable (%)	+14.2	+2.9
Total (%)	-4.5	+4.6
Primary energy trade	2011	2016
Imports (TJ)	1 131 773	1 058 631
Exports (TJ)	330 668	398 362
Net trade (TJ)	- 801 105	- 660 269
Imports (% of supply)	77	75
Exports (% of production)	45	54
Energy self-sufficiency (%)	49	52
Net trade (USD million)	- 10 711	- 3 356
Net trade (% of GDP)	-3.9	-1.4

### Total primary energy supply in 2016



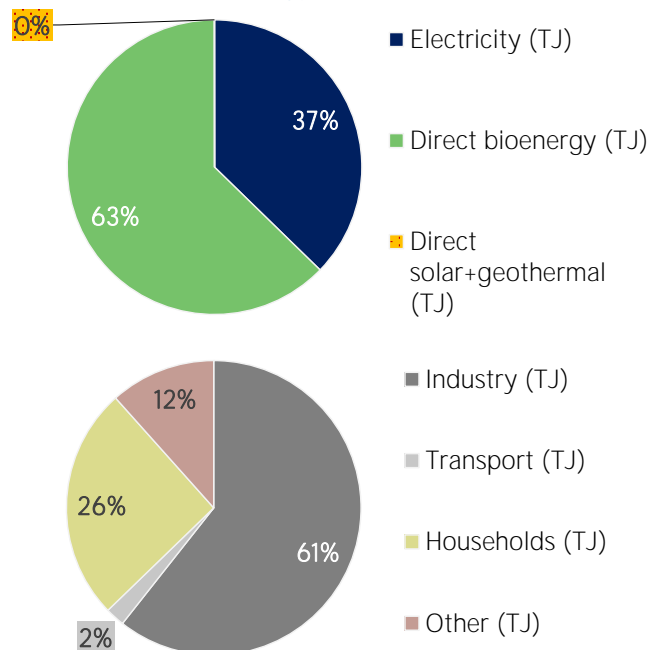
### Renewable energy supply in 2016



### RENEWABLE ENERGY CONSUMPTION

Consumption by source	2011	2016
Electricity (TJ)	111 748	133 292
Direct bioenergy (TJ)	198 433	224 103
Direct solar+geothermal (TJ)	43	69
<b>Total (TJ)</b>	<b>310 224</b>	<b>357 464</b>
Electricity share (%)	36	37
Consumption growth	2011-16	2015-16
Renewable electricity (%)	+19.3	+6.0
Other renewables (%)	+12.9	+0.7
<b>Total (%)</b>	<b>+15.2</b>	<b>+2.6</b>
Consumption by sector	2011	2016
Industry (TJ)	182 686	216 751
Transport (TJ)	8 540	7 586
Households (TJ)	83 165	91 640
Other (TJ)	35 833	41 487
Renewable share of TFEC	35.3	42.0

### Renewable energy consumption in 2016

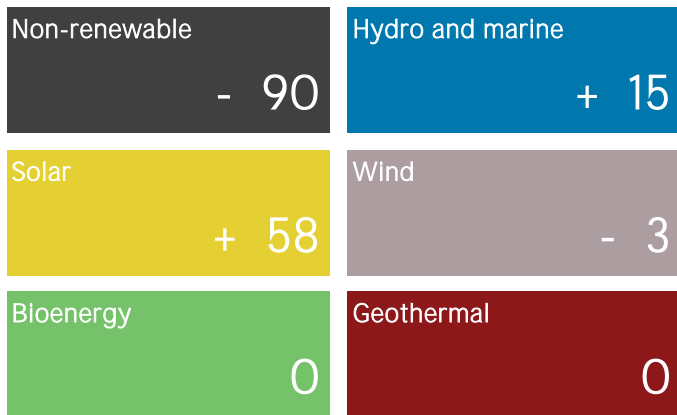


# ELECTRICITY CAPACITY AND GENERATION

Capacity in 2018	MW	%
<b>Non-renewable</b>	<b>9 868</b>	<b>56</b>
<b>Renewable</b>	<b>7 698</b>	<b>44</b>
Hydro/marine	3 287	19
Solar	140	1
Wind	2 041	12
Bioenergy	2 230	13
Geothermal	0	0
<b>Total</b>	<b>17 565</b>	<b>100</b>

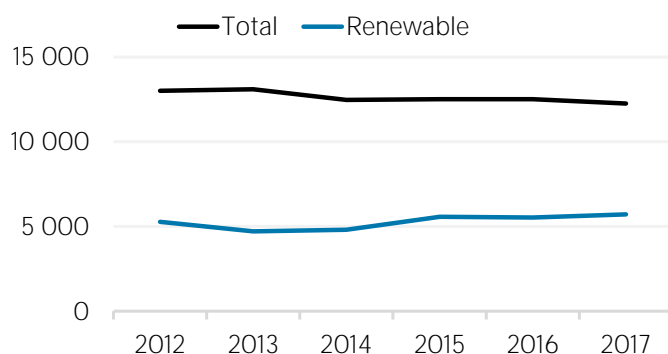
Capacity change (%)	2013-18	2017-18
<b>Non-renewable</b>	<b>- 13</b>	<b>- 0.9</b>
<b>Renewable</b>	<b>+ 37</b>	<b>+ 0.9</b>
Hydro/marine	+ 2	+ 0.4
Solar	+ 1 456	+ 70.7
Wind	+ 357	- 0.1
Bioenergy	+ 14	0.0
Geothermal	0	0.0
<b>Total</b>	<b>+ 4</b>	<b>- 0.1</b>

## Net capacity change in 2018 (MW)

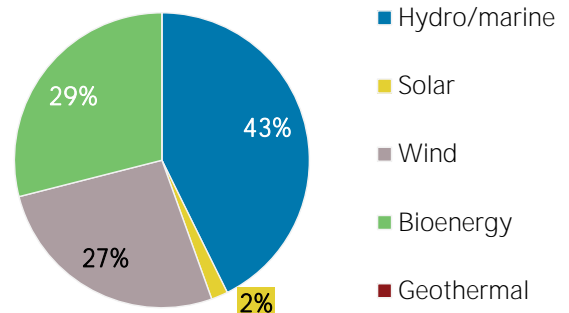


Generation in 2017	GWh	%
<b>Non-renewable</b>	<b>36 046</b>	<b>53</b>
<b>Renewable</b>	<b>31 477</b>	<b>47</b>
Hydro and marine	14 771	22
Solar	49	0
Wind	4 795	7
Bioenergy	11 862	18
Geothermal	0	0
<b>Total</b>	<b>67 523</b>	<b>100</b>

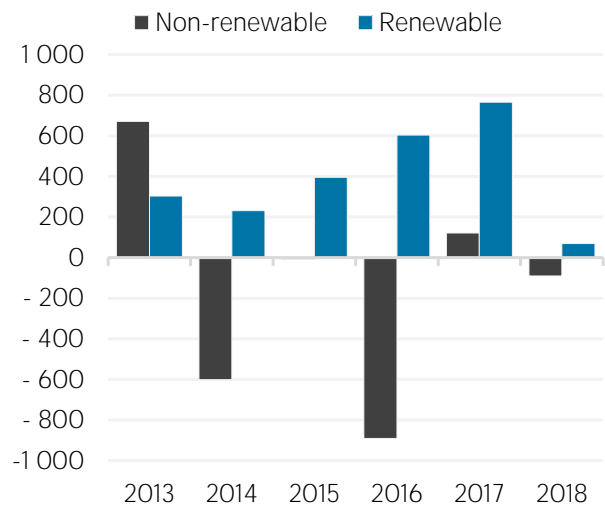
## Per capita electricity generation (kWh)



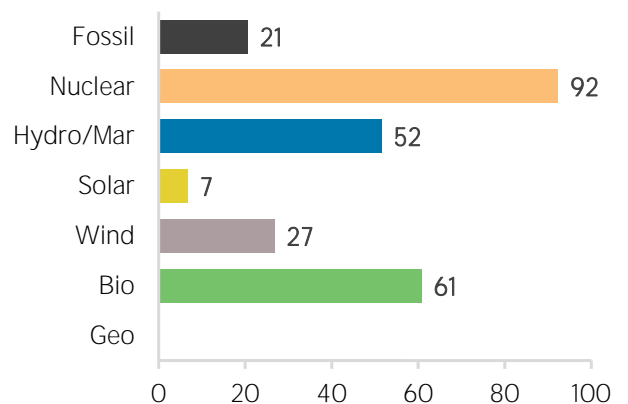
## Renewable capacity in 2018



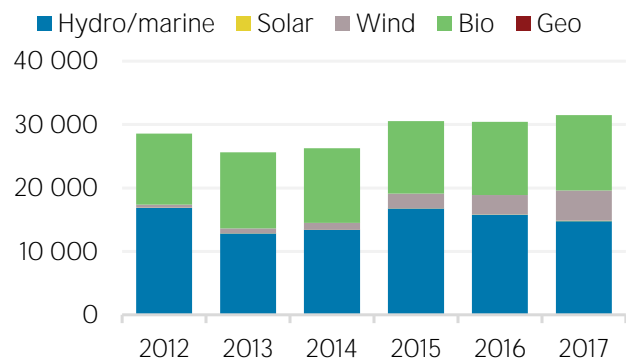
## Net capacity change (MW)



## Capacity utilisation in 2017 (%)



## Renewable generation (GWh)



## TARGETS, POLICIES AND MEASURES

### Most immediate clean energy targets & NDCs

	year	target	unit
<b>Renewable energy:</b>	2020	38	%
Renewable electricity:	2020	33	%
Renewable capacity:			
Renewable transport:	2020	20	%
Liquid Biofuel blending mandate:			
Other transport targets:			
Renewable heating/cooling:	2020	47	%
Renewable Hydropower			
Off-grid renewable technologies:			
Energy efficiency (Energy):			
Energy efficiency (Electricity):			

### Latest policies, programmes and legislation

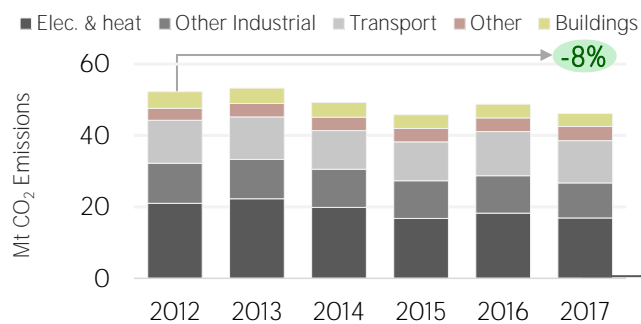
1 National Energy and Climate Strategy of Finland for 2030	2016
2 Feed-in Tariffs for electricity from wind, biogas and wood chip	2010
3 National Renewable Energy Action Plan (NREAP)	2010
4 Finland - Methane to Markets Partnership	2008
5 BioRefine Technology Programme for New Biomass Products	2007

### References to sustainable energy in Nationally Determined Contribution (NDC)

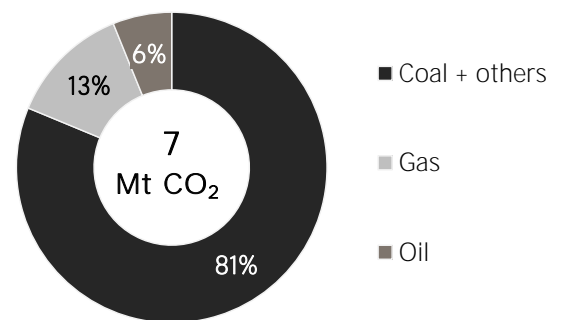
	Conditional	Unconditional	unit
- <b>Renewable energy</b>			
- electricity			
- transport			
- heating/cooling			
- Energy efficiency			

## ENERGY AND EMISSIONS

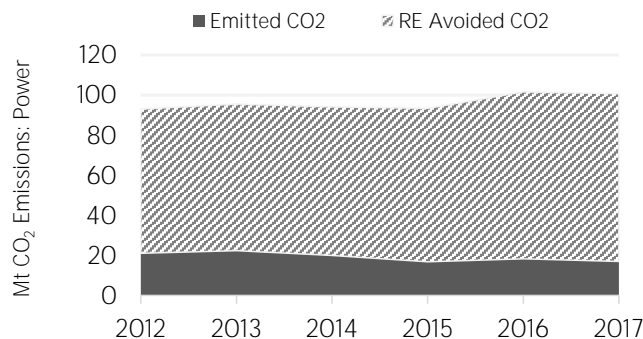
### Energy-related CO<sub>2</sub> emissions by sector



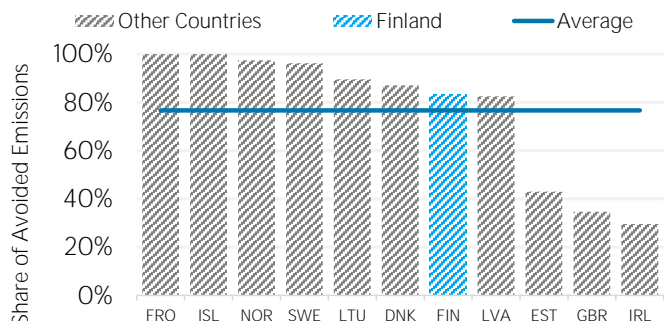
### Elec. & heat generation CO<sub>2</sub> emissions in 2017



### Avoided emissions from renewable power



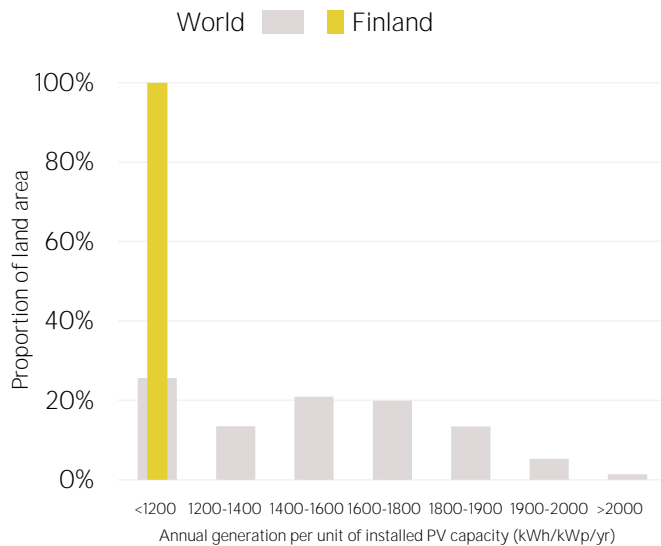
### Reduction in power emissions due to RE in 2017



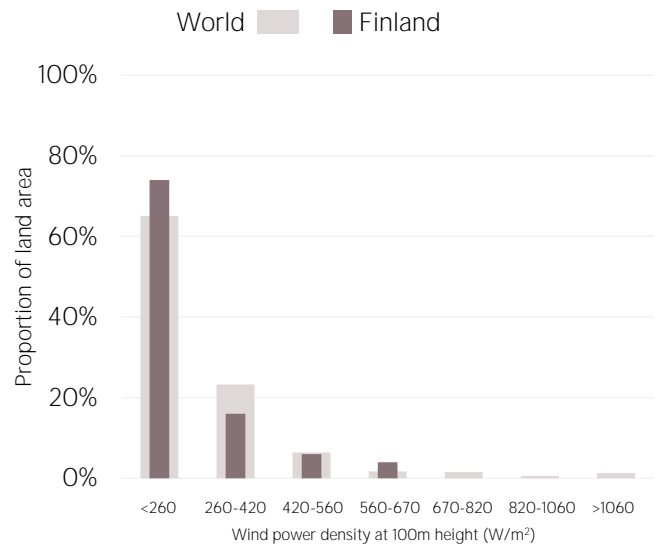
Avoided emissions based on fossil fuel mix used for power

Reduction is RE Avoided divided by sum of avoided and emitted

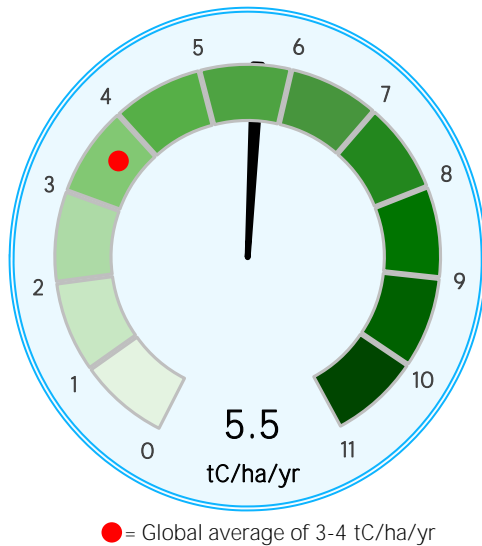
Distribution of solar potential



Distribution of wind potential



Biomass potential: net primary production



Indicators of renewable resource potential

**Solar PV:** Solar resource potential has been divided into seven classes, each representing a range of annual PV output per unit of capacity (kWh/kWp/yr). The bar chart shows the proportion of a country's land area in each of these classes and the global distribution of land area across the classes (for comparison).

**Onshore wind:** Potential wind power density ( $W/m^2$ ) is shown in the seven classes used by NREL, measured at a height of 100m. The bar chart shows the distribution of the country's land area in each of these classes compared to the global distribution of wind resources. Areas in the third class or above are considered to be a good wind resource.

**Biomass:** Net primary production (NPP) is the amount of carbon fixed by plants and accumulated as biomass each year. It is a basic measure of biomass productivity. The chart shows the average NPP in the country (tC/ha/yr), compared to the global average NPP of 3-4 tonnes of carbon per year.

**Sources:** IRENA statistics, plus data from the following sources: UN SDG Indicators Database (original sources: WHO; World Bank; IEA; IRENA; and UNSD); UNSD Energy Balances; UN COMTRADE; World Bank World Development Indicators; EDGAR; REN21 Global Status Report; IEA-IRENA Joint Policies and Measures Database; IRENA Global Atlas; and World Bank Global Solar Atlas and Global Wind Atlas.

**Additional notes:** Energy self-sufficiency has been defined as total primary energy production divided by total primary energy supply. The value of energy trade has been defined as including all commodities in Chapter 27 of the Harmonised System (HS). Capacity utilisation has been calculated as annual generation divided by capacity x 8,760. Avoided emissions from renewable power have been calculated as renewable generation divided by fossil fuel generation multiplied by reported emissions from the power sector. This assumes that, if renewable power did not exist, fossil fuels would be used in its place to generate the same amount of power and using the same mix of fossil fuels. In countries and years where no fossil fuel generation occurs, an average fossil fuel emission factor has been used to calculate the avoided emissions.

This note has been produced to provide policy makers with a brief overview of developments in renewable energy in a country. The IRENA statistics team would welcome comments and feedback on its structure and content, which can be sent to [statistics@irena.org](mailto:statistics@irena.org).

Last updated on: 26th May, 2020



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