

Germany

Sustainable Development Goal 7.2: Energy Indicators (2016)

Renewable energy (% of TFEC)	14.2	Access to electricity (% of population)	100.0
Energy efficiency (MJ per \$1 of GDP)	3.6	Access to clean cooking (% of population)	>95

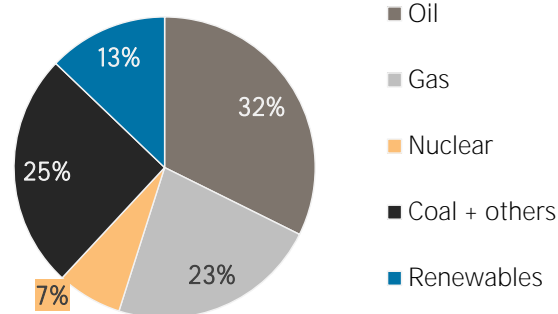
TOTAL PRIMARY ENERGY SUPPLY (TPES)

TPES	2011	2016
Non-renewable (TJ)	11 694 758	11 365 285
Renewable (TJ)	1 272 802	1 676 813
Total (TJ)	12 967 560	13 042 097
Renewable share (%)	10	13

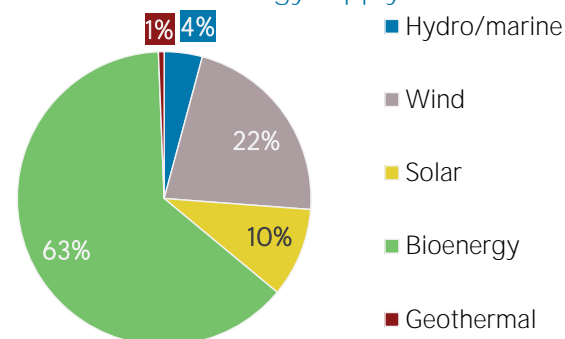
Growth in TPES	2011-16	2015-16
Non-renewable (%)	-2.8	+0.4
Renewable (%)	+31.7	+7.7
Total (%)	+0.6	+1.3

Primary energy trade	2011	2016
Imports (TJ)	10 001 982	10 744 301
Exports (TJ)	1 694 386	2 174 132
Net trade (TJ)	-8 307 596	-8 570 169
Imports (% of supply)	77	82
Exports (% of production)	33	44
Energy self-sufficiency (%)	40	38
Net trade (USD million)	- 132 244	- 49 210
Net trade (% of GDP)	-3.5	-1.4

Total primary energy supply in 2016



Renewable energy supply in 2016



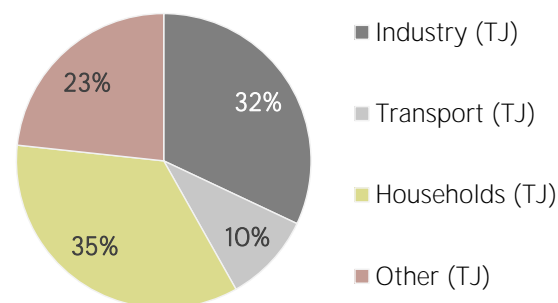
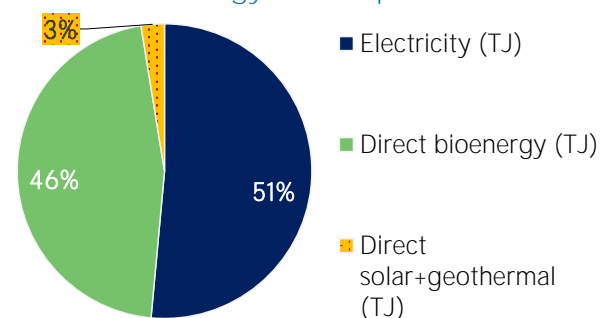
RENEWABLE ENERGY CONSUMPTION

Consumption by source	2011	2016
Electricity (TJ)	449 282	632 592
Direct bioenergy (TJ)	484 977	565 189
Direct solar+geothermal (TJ)	25 661	31 473
Total (TJ)	959 920	1 229 254
Electricity share (%)	47	51

Consumption growth	2011-16	2015-16
Renewable electricity (%)	+40.8	+16.1
Other renewables (%)	+16.7	+2.2
Total (%)	+28.0	+8.9

Consumption by sector	2011	2016
Industry (TJ)	294 117	393 410
Transport (TJ)	127 943	120 911
Households (TJ)	364 375	428 526
Other (TJ)	173 486	286 406
Renewable share of TFEC	11.4	14.2

Renewable energy consumption in 2016

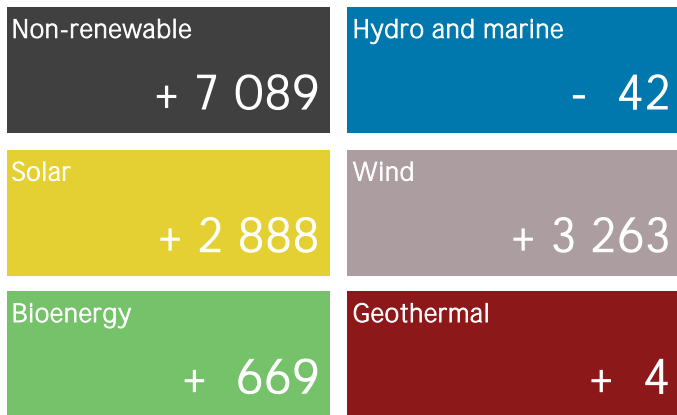


ELECTRICITY CAPACITY AND GENERATION

Capacity in 2018	MW	%
Non-renewable	109 901	48
Renewable	119 296	52
Hydro/marine	5 585	2
Solar	45 181	20
Wind	58 843	26
Bioenergy	9 651	4
Geothermal	36	0
Total	229 197	100

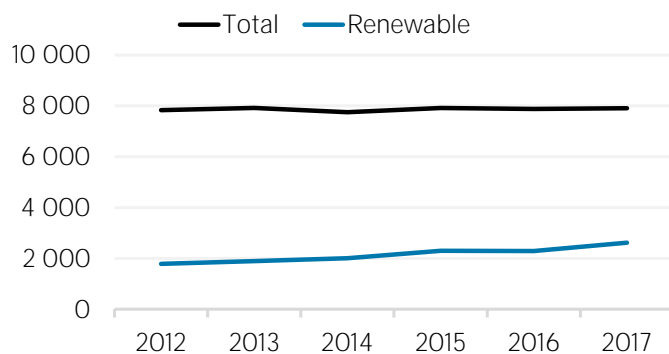
Capacity change (%)	2013-18	2017-18
Non-renewable	+ 8	+ 6.9
Renewable	+ 42	+ 6.0
Hydro/marine	- 0	- 0.7
Solar	+ 23	+ 6.8
Wind	+ 76	+ 5.9
Bioenergy	+ 21	+ 7.4
Geothermal	+ 38	+ 12.5
Total	+ 24	+ 6.4

Net capacity change in 2018 (MW)

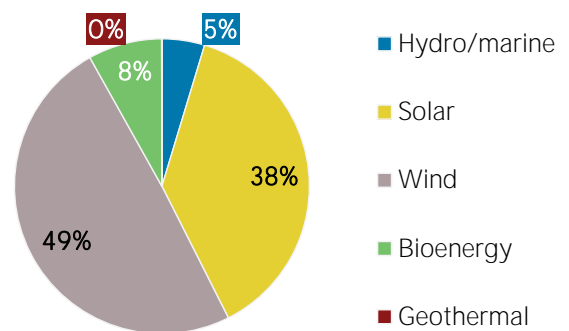


Generation in 2017	GWh	%
Non-renewable	437 401	67
Renewable	216 336	33
Hydro and marine	20 150	3
Solar	39 401	6
Wind	105 693	16
Bioenergy	50 929	8
Geothermal	163	0
Total	653 737	100

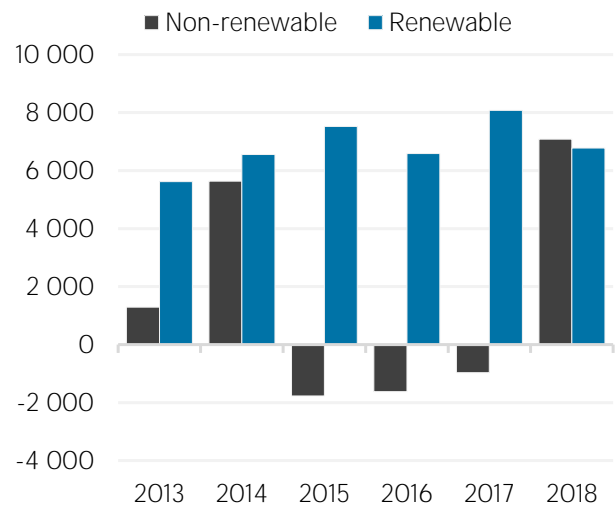
Per capita electricity generation (kWh)



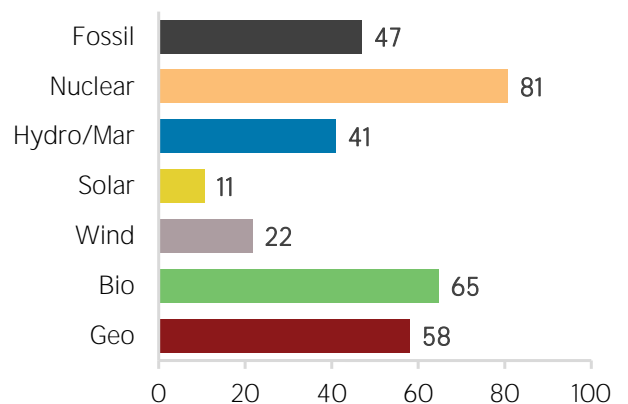
Renewable capacity in 2018



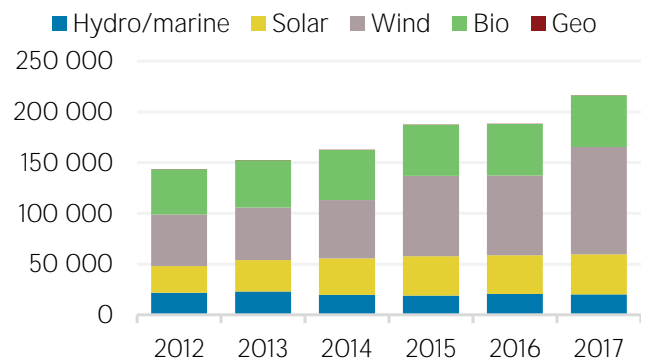
Net capacity change (MW)



Capacity utilisation in 2017 (%)



Renewable generation (GWh)



Most immediate clean energy targets & NDCs

	year	target	unit
Renewable energy:	2020	20	%
Renewable electricity:	2020	39	%
Renewable capacity:			
Renewable transport:	2020	13	%
Liquid Biofuel blending mandate:			
Other transport targets:			
Renewable heating/cooling:	2020	16	%
Renewable Hydropower			
Off-grid renewable technologies:			

Energy efficiency (Energy):

Energy efficiency (Electricity):

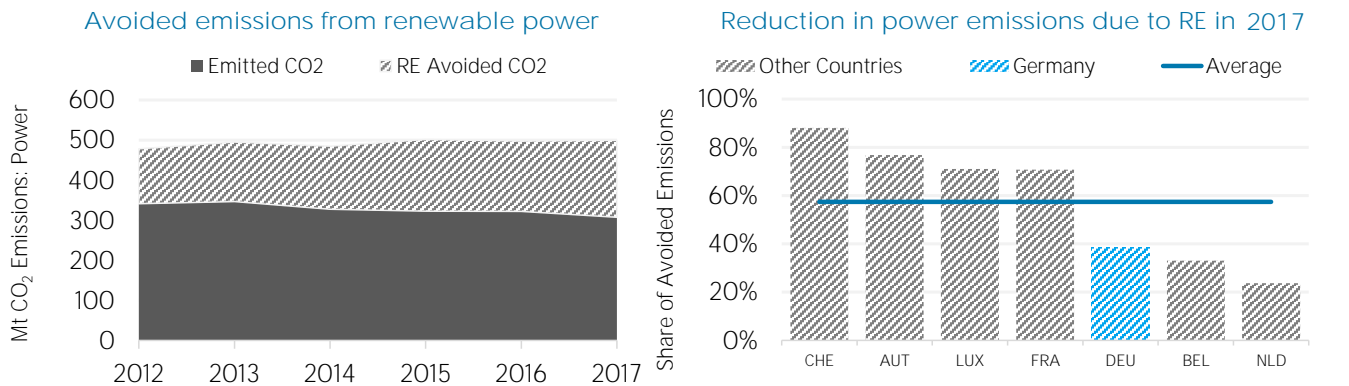
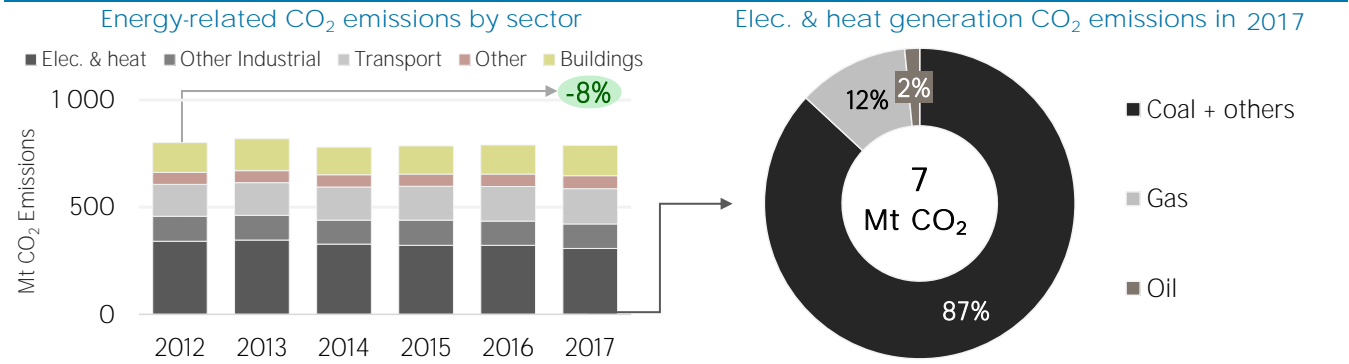
Latest policies, programmes and legislation

1	2017 Amendment of the Renewable Energy Sources Act (EEG 2017)	2017
2	Subsidy for solar PV with storage installations (Programm zur Förderung von PV-Batteriespeichern)	2016
3	Ground-mounted PV Auction Ordinance	2015
4	2014 Amendment of the Renewable Energy Sources Act (EEG 2014)	2014
5	CHP Agreements with Industry (Vereinbarung zwischen der Regierung der Bundesrepublik Deutschland und der deutschen Wirtschaft zur Steigerung der Energieeffizienz)	2012

References to sustainable energy in Nationally Determined Contribution (NDC)

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

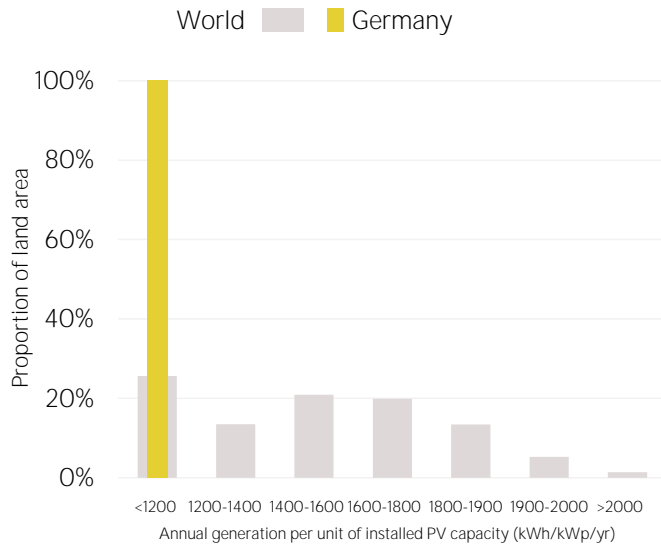
ENERGY AND EMISSIONS



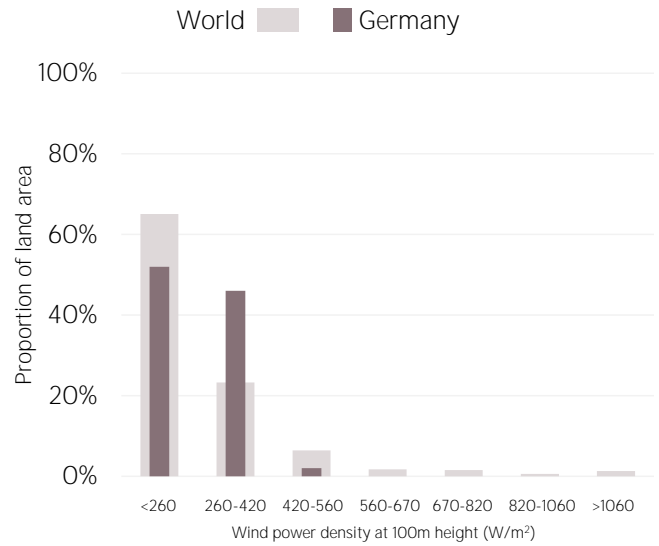
Avoided emissions based on fossil fuel mix used for power

Reduction is RE Avoided divided by sum of avoided and emitted

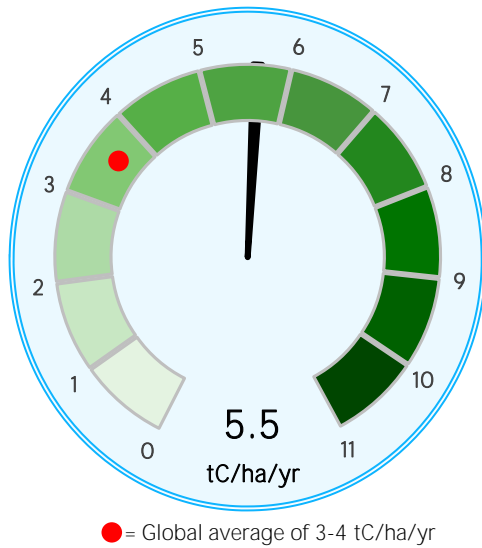
Distribution of solar potential



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.

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