Electrical capacity for wind and solar photovoltaic power - statistics

Statistics Explained

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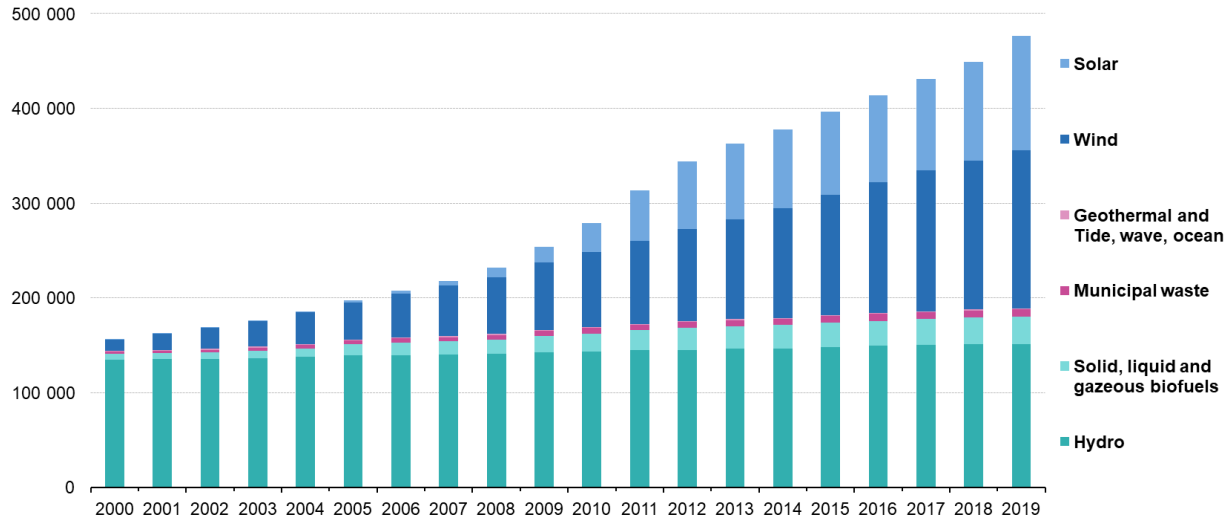
Authors: Audrey Errard, Fernando Diaz-Alonso and Michael Goll

" Electrical capacity for renewables in the EU was three times higher in 2019 than in 2000. "

" Electrical capacity for wind was 14 times higher in 2019 than in 2000. "

" Electrical capacity for solar was 700 times higher in 2019 than in 2000. "

Evolution of net maximum electrical capacity for renewables and renewable waste in EU-27 (MW), 2000-2019



Source: Eurostat (nrg_inf_epcrw)

eurostat

Evolution of net maximum electrical capacity for renewables and renewable waste in EU-27 (MW), 2000-2019
Source: Eurostat (nrg_inf_epc)

The EU is working to increase its share of renewable resources in gross final energy consumption in line with the European Green Deal and the EU's ambition to become climate neutral by 2050. The Commission has pledged to make existing legislation fit for 55% emission reduction by 2030. This includes the renewable energy target.

The share of renewable energy in the EU almost doubled between 2004 and 2019. Wind and hydropower are the main sources of renewables for gross electricity generation . However, while hydropower has been relatively stable over the past decades, wind and solar photovoltaic have seen a significant growth and are expected to lead

electricity production from renewables in the future.

To produce more electricity, it is necessary to increase and/or improve the electricity production capacity of infrastructures. This article focuses on the evolution of **electricity production capacities** for wind and solar photovoltaic in the EU.

The graphs in this article provide information on:

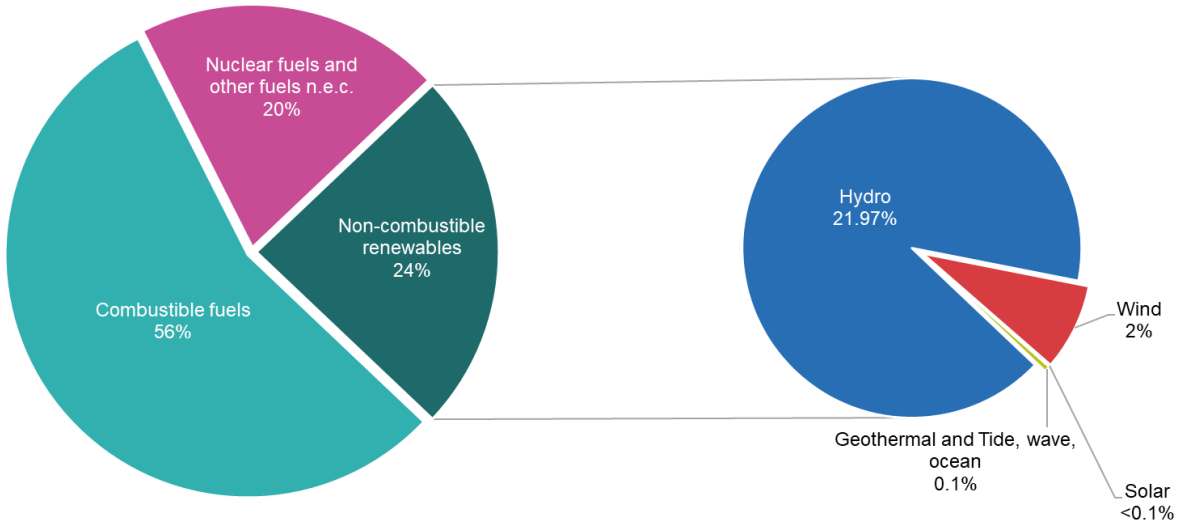
• **Electrical capacity** : it describes how much electricity could be generated using a certain technology and is reported as x MWelectric for each power plant. Normally, power plants do not run at full capacity all the time. The production of electricity is adjusted to the needs of consumers, for instance it is increased at peak hours usually around lunchtime and between 4 p.m. and 8 p.m. when most people arrive home and switch on household appliances (TVs, lights, heating or air conditioners).

• The **net maximum electrical capacity** refers to the maximum amount of electricity which can be produced in a year for one given resource; assuming that all plants produce electricity at maximum capacity 24h/24h 365 days per year.

Evolution of electricity production capacity by main fuel groups

In 2000, the capacity for producing electricity from renewables represented 24 % of the total capacity and hydro was almost the only source (see Figure 1). The share of non-combustible renewables increased significantly between 2019 and 2020. In 2019, the electricity production capacity from non-combustible renewables reached 46 % of the total capacity. Wind (17 %) and solar (13 %) contributed to a similar extent as hydro (16% of the total electricity production capacity using non-combustible renewables; see Figure 2).

Electricity production capacity by main fuel groups in EU-27 in 2000 (%)

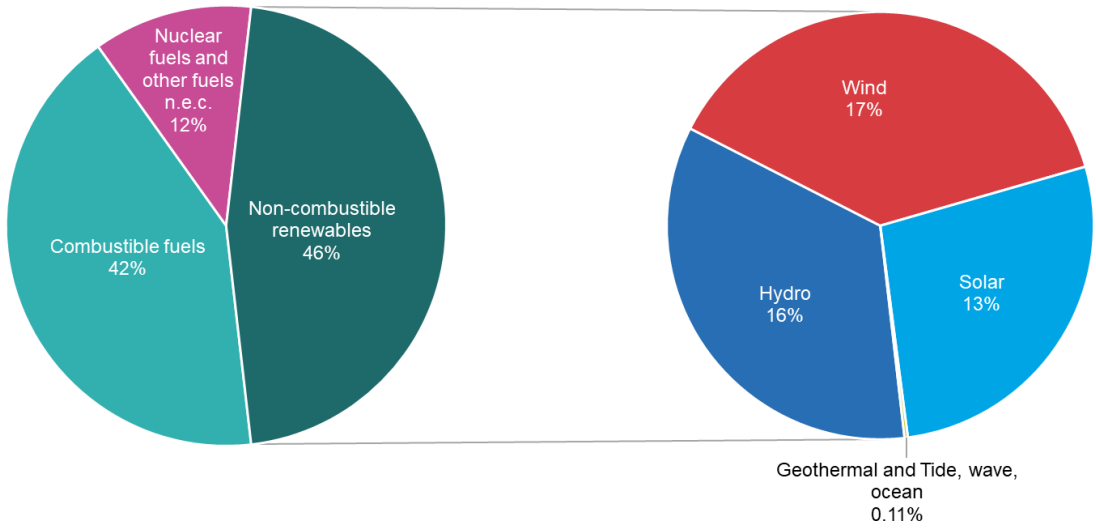


Source: Eurostat (nrg_inf_epc)

eurostat

Figure 1: Electricity production capacity by main fuel groups in EU-27 in 2000 (%) Source: Eurostat (nrg_inf_epc)

Electricity production capacity by main fuel groups in EU-27 in 2019 (%)



Source: Eurostat (nrg_inf_epc)

eurostat

Figure 2: Electricity production capacity by main fuel groups in EU-27 in 2019 (%) Source: Eurostat (nrg_inf_epc)

Increasing capacity for wind and solar over the last decades

The following figures show the year-on-year change in capacity figures for certain technologies or fuels (e.g. of a sustainable nature). These figures reflect how substantial the investments were and how much effort was made (e.g. in moving to a more sustainable electricity provision) at country and EU level.

While the electricity production capacity from hydro and other renewables such as geothermal or biofuels has remained relatively stable, capacity for wind and solar have significantly increased over the past decade in the EU (see Figure 3).

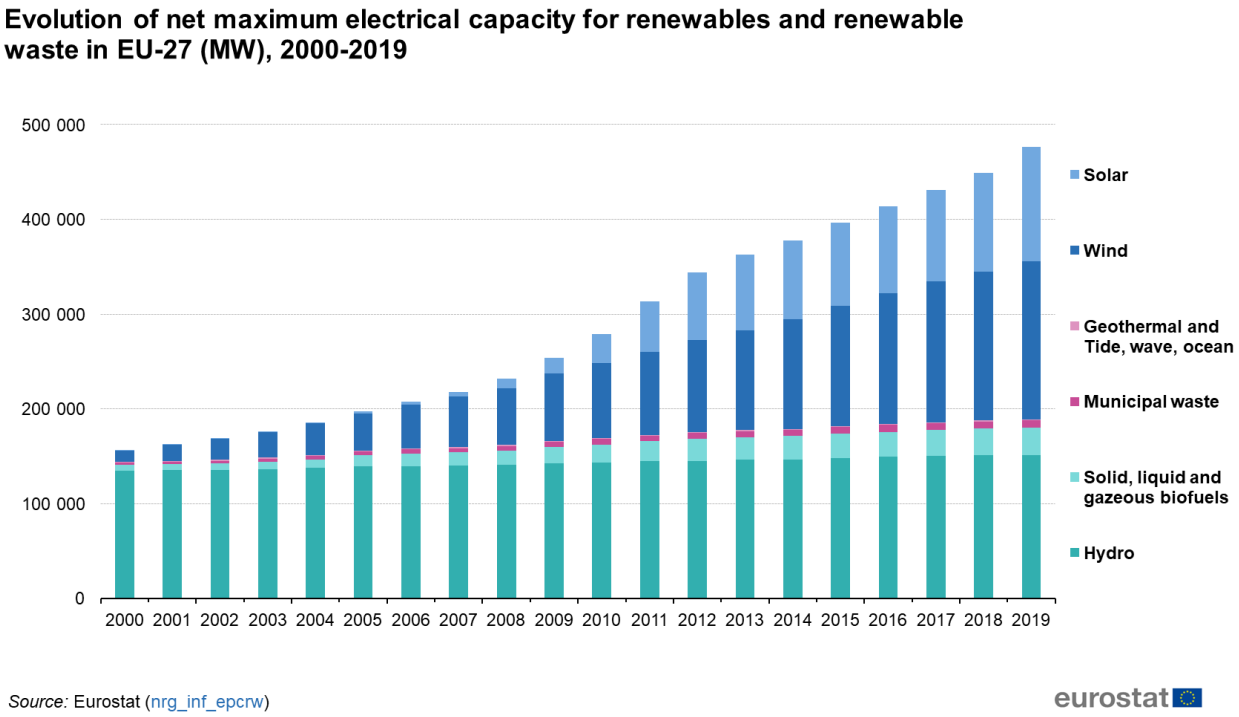


Figure 3: Evolution of net maximum electrical capacity for renewables and renewable waste in EU-27 (MW), 2000-2019 Source: Eurostat (nrg_inf_epc)

For wind, the net maximum electrical capacity increased 14 times between 2000 and 2019 as it increased from 12 300 to 167 000 MW between 2000 and 2019. For solar, the net maximum electrical capacity increased 700 times as it increased from 176 MW to 120 000 MW between 2000 and 2019 (see Figure 3).

Electrical capacity from wind is dominated by onshore infrastructures

Electricity production capacity from wind mainly relies on onshore infrastructure. Electricity production capacity from wind has continuously increased, in particular since 2003, representing 155 000 MW in the EU in 2019. Offshore capacity represented 12 000 GW in the EU in 2019 (see Figure 4).

Offshore electricity production capacity represented a minor proportion compared with onshore capacity (see Figure 4). Only a few Member States relied on offshore wind production in 2019. For instance 40 % of Belgium's electrical capacity was located offshore, 28 % for Denmark, 21 % for the Netherlands, 12 % for Germany, 3 % for Finland and 2 % for Sweden (see Figure 5).

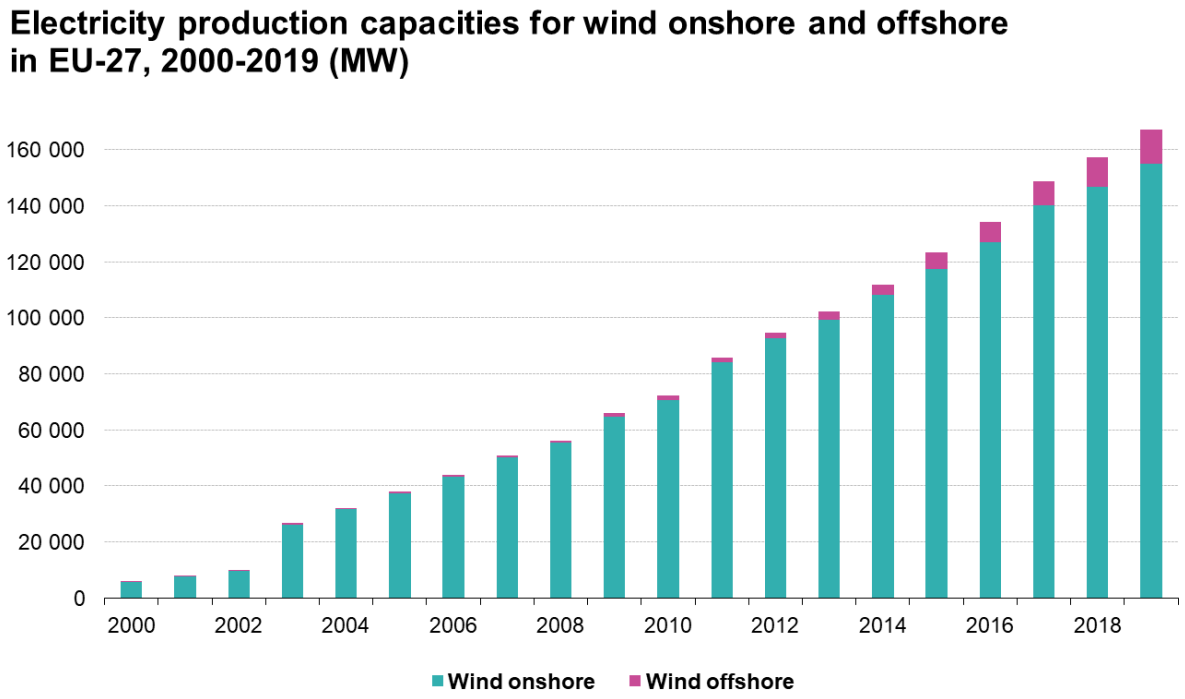


Figure 4: Electricity production capacities for wind onshore and offshore in EU-27, 2000-2019 (MW) Source: Eurostat (nrg_inf_epcrw)

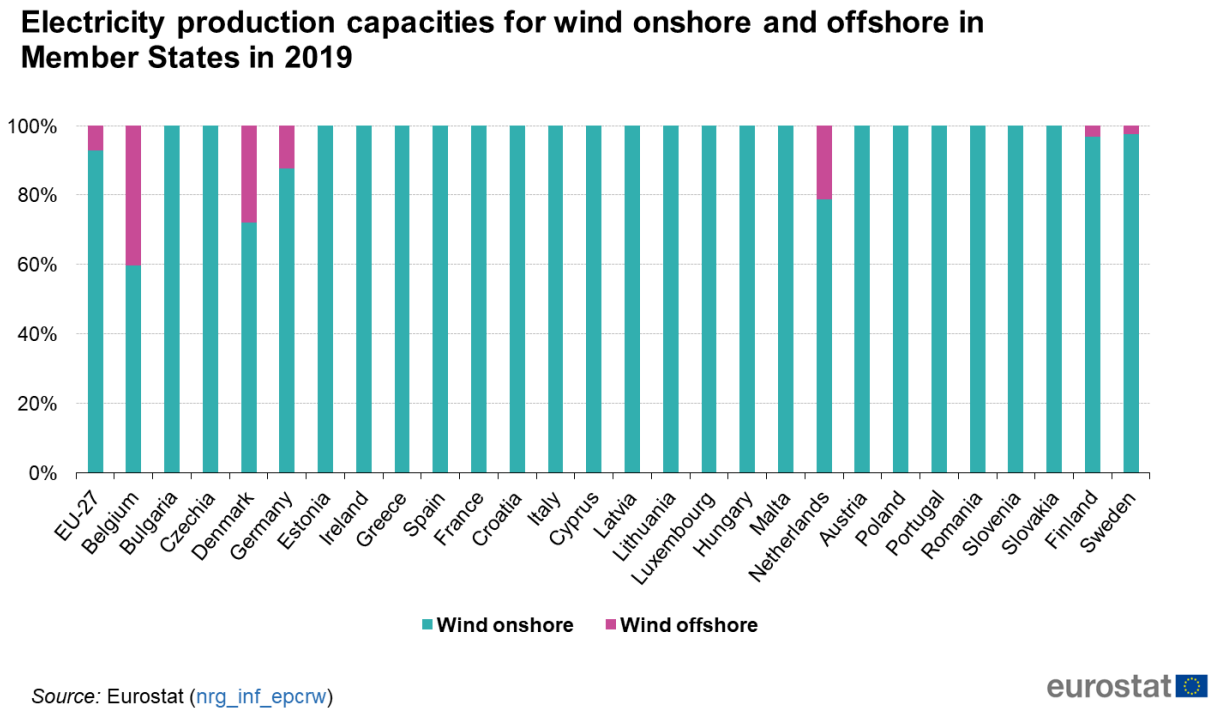


Figure 5: Electricity production capacities for wind onshore and offshore in Member States in 2019 Source: Eurostat (nrg_inf_epcrw)

Electricity production capacity from solar energy : photovoltaic was the most important technology

With regard to solar electricity production capacity, photovoltaic (direct conversion of the sunlight into electricity by the use of solar cells) has always been the major source (see Figure 6). In the EU only Spain produced electricity from solar thermal (where heat from solar radiation (sunlight) is used via mirrors or concentrating devices to produce high-pressure steam to move a turbine to produce electricity in solar thermal-electric plants) in more than 20 installations with 2 304 MW capacity in 2019.

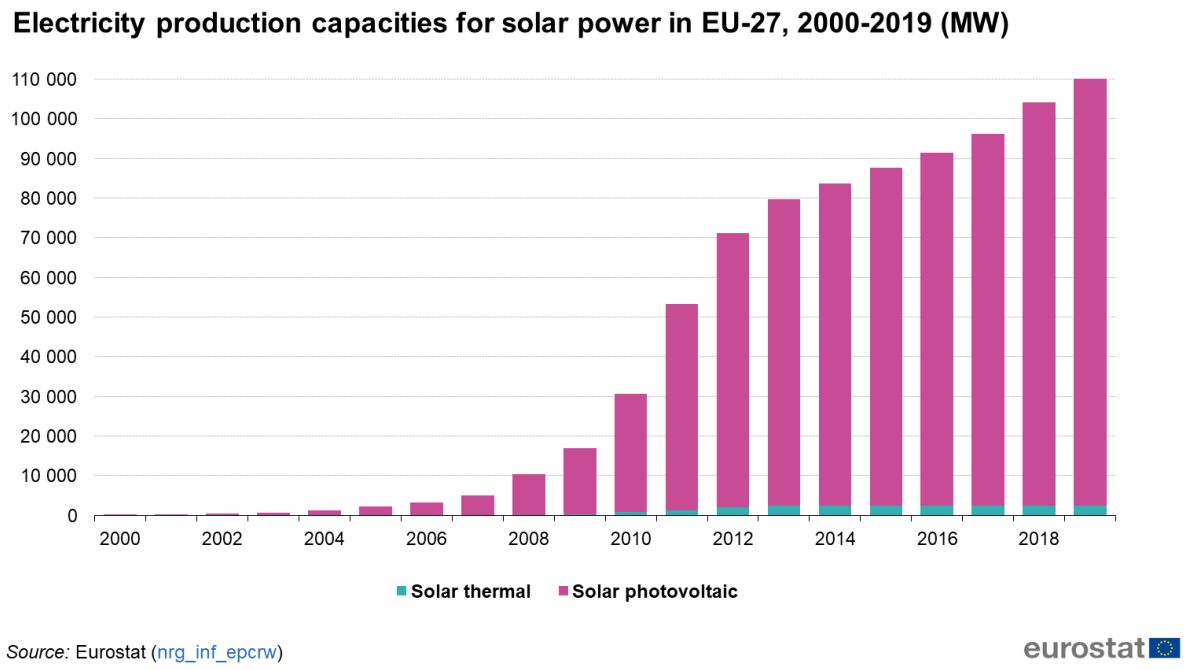


Figure 6: Electricity production capacities for solar power in EU-27, 2000-2019 (MW) Source: Eurostat (nrg_inf_epcrw)

Source data for tables and graphs

- Electrical capacity for wind and solar photovoltaic power - graphs and tables

Data sources

The gross electricity production and electrical capacity data are based on annual questionnaires of renewables and wastes and electricity and heat questionnaires.

Background and Notes

Two main groups of renewable sources to produce electricity

Renewable energy sources, also called renewables, are of particular interest since they replenish (or renew) themselves naturally. In this category, electricity can be produced either from the combustion of fuels such as wood, liquid biofuels and biogas or from non-combustible renewables including wind, hydro (pure, mixed and pumped hydro), solar (thermal and photovoltaic), geothermal, tide, wave and ocean.

Production versus Capacity

Since 2000, significant investment and effort has been made by the Member States to increase the capacity of production of electricity using renewable sources. Of note, having a large capacity does not necessarily mean

producing a lot of electricity. Plants based on a given technology do not run at maximum capacity the whole year (e.g. solar is inefficient at night, wind when it is calm), but without building and increasing the necessary infrastructure it will be impossible to reach agreed targets for renewables.

Context

Over the last decades, the effects of global warming caused relevant impacts in many sectors. Given the previsions, this tendency is expected to persist at least until the end of this century. Identifying climate-related impacts and assessing how important these impacts are is an important element of any effective strategy for managing future climate risks. Weather-related energy consumption for heating and cooling buildings indicators such as HDD and CDD can contribute to monitor energy demand for cooling and heating buildings under climate change.

The Energy statistics Regulation (EC) No 1099/2008 is the legal basis for the reporting of annual energy questionnaires.

Other articles

- Energy sources and other topics

Tables

- Energy - selected datasets (nrg) , see:

Energy Statistics - main indicators (t_nrg_indic)

Final energy consumption by product (ten00123)

Database

- Energy - detailed datasets (nrg) , see:

Energy statistics - quantities (nrg_quant)

Energy statistics - quantities, annual data (nrg_quanta)

Production of electricity and derived heat by type of fuel (nrg_bal_peh)

Energy infrastructures and capacities (nrg_inf)

Dedicated section

- Energy

Publications

- Energy, transport and environment indicators - 2017 edition
- Energy balance in MS Excel file format - 2019 edition

Questionnaires and methodology for data collection

Legislation

- Regulation (EC) No 1099/2008 of 22 October 2008 on energy statistics
- EUROPE 2020: A strategy for smart, sustainable and inclusive growth
- Summaries of EU legislation: Europe 2020: the European Union strategy for growth and employment
- Summaries of EU legislation: Common system for the production of energy statistics

Visualisations

- Sankey Diagrams_Energy Trade Statistics

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