



C3S CLIMATE & ENERGY EDUCATION DEMONSTRATOR VARIABLE FACT SHEET

WIND ENERGY

Historical & Projected 1971-2065

WHAT IS WIND ENERGY?

Wind energy is produced by wind turning the blades of a wind turbine, which converts the kinetic energy into electrical energy. It is a type of renewable energy source meaning it can be used over and over without running out as it is constantly being replaced by nature. A collection of wind turbines is called a *wind farm*.



HOW IS IT MEASURED?



The power produced by a wind turbine or farm is measured in watts (W) and kilowatts (kW - one-thousand watts). The windier it is, the power produced is higher, although most turbines stop to protect themselves during stormy conditions. The amount of energy that is produced over time is measured in kilowatt hours (kWh). For example, on a windy day, in 2 hours a 50kW turbine could produce 100kWh of energy (2 hours x 50kW).

DID YOU KNOW?



The use of wind to power our machines and help us do work is not a new or modern idea. For thousands of years we've used wind to power ships to sail across the sea, and by the 11th century people in the Middle East were using wind pumps for food production. When Europe, particularly the Dutch, began to develop this idea themselves, we were given the iconic windmills, now often tourist attractions rather than grain or water pumps.



GLOSSARY

ENERGY STORAGE The capture of energy produced at one time for use at a later time, most commonly by use of batteries. Given the variability and seasonality of renewable energy, energy storage is thought to be an important way to maximise the benefits of it e.g. storing wind energy produced during windy periods and then using during calmer weather.

INSTALLED CAPACITY The amount of energy that a power station is able to produce. For example, a wind turbine might have an installed capacity of 50kW, but may only actually produce this much power during a windy day.

RENEWABLE ENERGY Often referred to as 'clean' or 'green' energy, this comes from natural sources or processes that are constantly replenished on a human time-scale. Examples are sunlight, wind, rain (hydro), tides, waves, and geothermal heat.

KEY MESSAGES FROM THE DATA

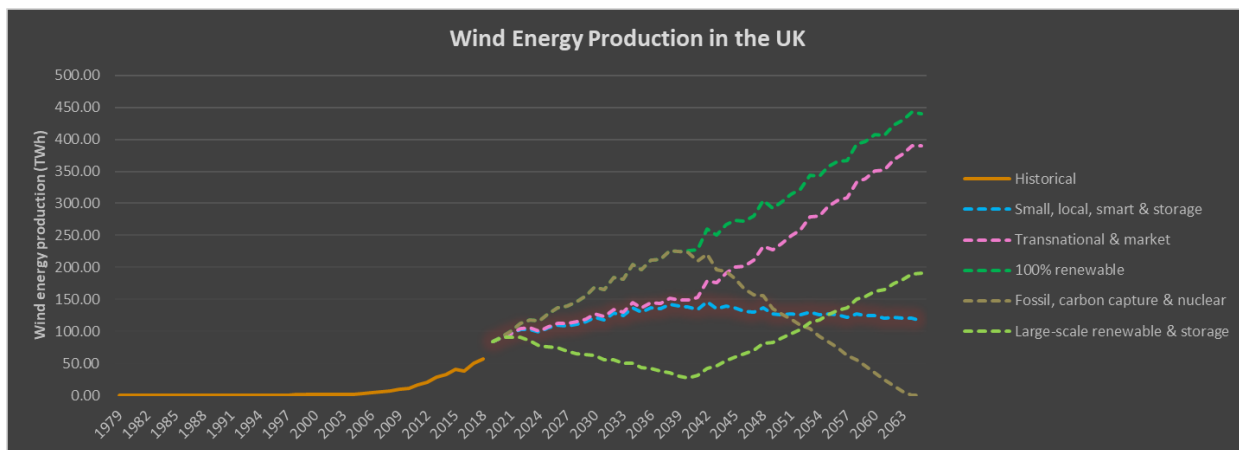
- Wind energy production has seen a **rapid, almost exponential, increase across Europe** particularly **since the mid-2000s**, with **Germany** and **the UK** leading the way as the top wind energy producing countries.
- By **2065**, wind energy is **projected to be a significant contributor** to Europe's electricity demand, **around 14%** according to the 'large-scale renewable & storage' energy model. This varies between countries (e.g. Denmark 73% and UK 61% compared to Switzerland 0.1%)



CASE STUDY: OFFSHORE WIND IN THE UK

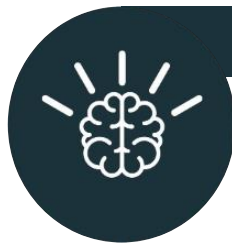


By the end of 2019, nine of the world's biggest twenty operational offshore wind farms were situated in the waters of the United Kingdom. The top 3, *Hornsea 1*, *Walney Extension* and the *London Array* (pictured) have a combined installed capacity of 2507MW. With 40% of Europe's natural wind resource, the UK is projected to be the number 1 producer of wind energy under most energy scenarios by 2065.



i FOR MORE DETAILS AND ACTIVITIES, AND FOR OTHER CASE STUDIES, SEE THE "RESOURCES" SECTION VIA THE MENU.

BE DATA SMART



There are many ways to measure energy production, and the variable nature of wind energy makes it more important to be mindful of this. For example, it may appear that a country's wind energy production went down for a year despite increasing the amount of installed capacity (see glossary). This could be due to that particular year being not as windy as previous years.

The [Copernicus Climate Change Service \(C3S\)](#) is one of the European Union's Copernicus Earth Observation Programme services and is operated by the European Centre for Medium-Range Weather Forecast (ECMWF) on behalf of the European Commission.

SEE THE 'REFERENCES & SOURCES' SHEET FOR SOURCES OF INFORMATION. FOR TECHNICAL INFORMATION, LICENSE CONDITIONS, LINEAGE STATEMENT ETC SEE THE EUROPEAN CLIMATIC ENERGY MIXES (ECEM) VARIABLE FACT SHEET E04: http://ecem.wemcouncil.org/pdf/ECEM_VFS_E04_WPG_20180209.pdf

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