# Where are wind farms located

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A wind farm or wind park, or wind power plant,[1] is a group of wind turbines in the same location used to produce electricity. Wind farms vary in size from a small number of turbines to several hundred wind turbines covering an extensive area. Wind farms can be either onshore or offshore.

Location is critical to the overall success of a wind farm. Additional conditions contributing to a successful wind farm location include: wind conditions, access to electric transmission, physical access, and local electricity prices.

The faster the average wind speed, the more electricity the wind turbine will generate, so faster winds are generally economically better for wind farm developments.[7] The balancing factor is that strong gusts and high turbulence require stronger more expensive turbines, otherwise there is a risk of damage. The average power in the wind is not proportional to the average wind speed. For this reason, the ideal wind conditions would be strong but consistent winds with low turbulence coming from a single direction.

The wind blows faster at higher altitudes because of the reduced influence of drag. The increase in velocity with altitude is most dramatic near the surface and is affected by topography, surface roughness, and upwind obstacles such as trees or buildings. At altitudes of thousands of feet/hundreds of metres above sea level, the power in the wind decreases proportional to the decrease in air density.[13]

Closer spacing is possible depending on the turbine model, the conditions at the site, and how the site will be operated.[citation needed] Airflows slow as they approach an obstacle, known as the "blockage effect", reducing available wind power by 2% for the turbines in front of other turbines.[17][18]

The capacity of the world"s first wind farm was 0.6 MW, produced by 20 wind turbines rated at 30 kilowatts each, installed on the shoulder of Crotched Mountain in southern New Hampshire in December 1980.[19][20]

Onshore turbine installations in hilly or mountainous regions tend to be on ridges generally three kilometres or more inland from the nearest shoreline. This is done to exploit the topographic acceleration as the wind accelerates over a ridge. The additional wind speeds gained in this way can increase energy produced because more wind goes through the turbines. The exact position of each turbine matters, because a difference of 30 metres could potentially double output. This careful placement is referred to as "micro-siting".

As of 2017[update], The Walney Wind Farm in the United Kingdom is the largest offshore wind farm in the world at 659 MW, followed by the London Array (630 MW) also in the UK.

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Offshore wind turbines are less obtrusive than turbines on land, as their apparent size and noise is mitigated by distance. Because water has less surface roughness than land (especially deeper water), the average wind speed is usually considerably higher over open water. Capacity factors (utilisation rates) are considerably higher than for onshore locations.[39]

Airborne wind farms have been envisaged. Such wind farms are a group of airborne wind energy systems located close to each other connected to the grid at the same point.[64]

Wind farms consisting of diverse wind turbines have been proposed in order to efficiently use wider ranges of wind speeds. Such wind farms are proposed to be projected under two criteria: maximization of the energy produced by the farm and minimization of its costs.[65]

The Australian Greens have been significant supporters of Australian wind farms, however the party"s previous leader Bob Brown and former leader Richard Di Natale have now both expressed concerns about environmental aspects of wind turbines, particularly the potential danger they impose for birds.[66][67]

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