

Wind power is a very clean source of energy

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The terms "wind energy" and "wind power" both describe the process by which the ...

Distributed wind energy has the potential to diversity local energy sources to help ...

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Wind power is a type of renewable energy that harnesses the kinetic power of wind for electricity generation. As one of the largest sources of sustainable and clean energy, wind power is essential to the journey towards net zero emissions.

Humans have used wind energy for mechanical purposes since antiquity, using simple windmills to pump water. Today, wind power generation relies on wind turbines to catch energy from the wind. Wind turbines operate on both a small (single home) to large (wind farm) scale and can be built on land or offshore--such as in lakes or oceans.

Alongside solar power, wind power is considered to have the greatest potential for increasing renewable capacity growth around the globe: in 2023, the top five markets for new wind power installations were China, the United States, the European Union, India and Brazil.¹ Innovation to evolve offshore wind capabilities, decrease production costs and improve wind turbine power generation efficiency is under way to encourage industry growth.

Some of the earliest mechanical uses of wind power date back to 200 BC, when people in the Middle East used windmills to grind grain and in China to pump water. Later, as early as the 12th century, windmills were utilized for industrial purposes, like draining lakes and ponds in Europe.

By the 19th century, wind energy had become a source of electricity generation. James Blyth, an electrical engineer from the United Kingdom, is credited with building the first wind turbine in 1887. He was closely followed by wind energy pioneers American Charles Brush and Dane Poul la Cour, who used wind energy to power individual buildings.²

It wasn't until the late 20th century, however, that commercial wind power generation emerged as a viable energy option. The first utility-scale wind farms (projects containing a group of wind turbines) were installed in the 1980s in America. The industry has grown rapidly since 2000--global installed wind generation capacity has increased by a factor of 98 in the past two decades.³ Today, wind turbines around the world produce more than 2,100 terawatt hours (TWh) of electricity each year.⁴



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Modern wind turbines have propellor-like blades (or rotor blades) which turn a rotor when they are force spun by the wind. The rotor spins a generator, which sits inside a box-like container at the heart of the turbine called the nacelle. The rotor's spinning creates clean electricity that can be fed to the electrical grid or power individual homes. This process can also be described as kinetic energy being converted into rotational energy, which is then converted into electrical energy.

How much electric power is generated from the wind depends on turbine size and blade length. Wind turbines can reach heights upwards of 700 feet with blade rotor diameters extending more that 530 feet. These mammoth turbines can produce up to 9.5 megawatts of power. However, most wind turbines are roughly 260 feet tall with blades 130 feet long. They produce up to 1.8 megawatts of power.⁵

There are three major applications of wind power: land-based, distributed and offshore.

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