

Wind Power

History

Wind power is a renewable energy resource, which means that unlike fossil fuels, it can never run out. Wind is a product of the sun heating the earth unevenly. When a warm patch of air meets a cool patch of air, it creates wind.

People have been harnessing the power of wind since the first sailboat. The exact date of this invention is unknown, but it is pictured by the ancient Egyptians around 3200 BCE. Wind power helped Persians pump water and grind grain between 500 and 900 B.C. As cultures harnessed the power that wind offered, the use of windmills spread from Persia to the surrounding areas in the Middle East, where windmills were used extensively in food production. Eventually, around 1,000 A.D., wind power technology spread north to European countries such as The Netherlands, which used windmills to help drain lakes and marshes.

The first electricity-generating windmill was built in Scotland in 1887 by Prof James Blyth. Throughout the 20th century, small wind plants, suitable for farms and residences, and larger utility-scale wind farms that could be connected to electricity grids were developed. During World War II, the largest wind turbine known in the 1940s, a 1.25-megawatt turbine that sat on a Vermont hilltop known as Grandpa's Knob, fed electric power to the local utility network.

The oil shortages of the 1970s created an interest in alternative energy sources. From 1974 through the mid-1980s, the U.S. government worked with industry to advance the technology and enable development and deployment of large commercial wind turbines. Large-scale research wind turbines were developed under a program overseen by NASA to create a utility-scale wind turbine industry in the United States. This research and development program pioneered many of the multi-megawatt turbine technologies now in use. Today, wind-powered generators operate in every size range, from small turbines for battery charging at isolated residences to large, near-gigawatt-size offshore wind farms.

Pros and Cons

Wind energy is a renewable resource which we tend to think of as being better than non-renewable types of energy that use fossil fuels. However, like any other resources, hydro-electric power has both pros and cons.

Pros:

- ❖ Wind energy is considered a clean fuel source because there are no emissions associated with energy production.
- ❖ It is a domestic fuel source and has the potential to provide more than 20 times the energy the entire human population needs.
- ❖ Wind energy is sustainable since wind is a product of the sun.
- ❖ Wind power is cost effective thanks to increases in demand, leading to advances in technology.

Cons:

- ❖ Wind energy is intermittent, since wind is not constant, so it must be combined with other energy sources or stored.
- ❖ A certain amount of wind is required for turbines to be effective. This often means that wind turbines must be in remote locations.
- ❖ Manufacturing and installation require heavy equipment and a large initial investment.
- ❖ Wind turbines can be a threat to wildlife, and people who live near turbines complain about the noise and the aesthetics (the look) of the turbines.

How It Becomes Usable Energy

Producing energy from wind is fairly simple. Wind moves the blades of a wind turbine, which turns a shaft inside the casing. The shaft is connected to a series of gears that speeds up the rotations of a second shaft. This second shaft is connected to a generator that produces electricity. For many other energy resources – especially fossil fuels – steam created by water, heated by the burning fuel source is used to turn turbines to create electricity. The path of wind energy is much more direct. For an overview of this process, visit National Geographic's [interactive wind turbine](#). For a more in-depth video, visit the [U.S. Department of Energy's Website](#).

Wind Energy in West Virginia Wind Turbines need a certain amount of wind to produce enough energy to be cost effective. In West Virginia, the regions that meet wind speed requirements run along the Alleghany Mountains in the northern part of the state. According to the [U.S. Department of Energy](#), potential wind energy production in the areas that meet requirements and are a likely to be developed (their estimates exclude public lands, water features and urban areas) could reach 5,820 GWh annually. This is enough electricity to cover 20% of West Virginia's annual energy needs ([Energy Efficient West Virginia](#)) Currently, West Virginia is ranked 23rd in wind energy production ([American Wind Energy Association](#)) and creates 2% of its electricity using wind power ([Energy Efficient West Virginia](#)).

Cool Facts

- ❖ The inventor of the first electricity-generating windmill, Professor James Blyth, offered to share his electricity with his town, but they refused, believing it to be “the work of the devil.”
- ❖ Wind power is currently the fastest growing renewable energy production source in the world.
- ❖ Wind turbines come in lots of sizes. Heights can range from residential turbines that average 80 feet tall (about twice as tall as a telephone pole), to large commercial, offshore turbines that measure up to 720 feet tall!

Activities

[Where would you put a wind farm?](#)

[Wind-powered Pinwheel Lab](#)

[DIY Windsock](#)