



# Power from renewable resources - wind power

## What is wind?

Wind is actually a form of energy converted from solar energy. The sun's radiation heats different parts of the earth at different rates—most notably during the day and night, but also when different surfaces (for example, water and land) absorb or reflect at different rates. This in turn causes portions of the atmosphere to warm differently. Hot air rises, reducing the atmospheric pressure at the earth's surface, and cooler air is drawn in to replace it. The result is wind. These conditions are why most wind turbines are located near large bodies of water, such as the Great Lakes, or on mountain ridges where there is a greater amount of wind.

Electricity is generated when the wind turns two or three propeller-like blades around a rotor that is connected to a tower and spins a generator. This unit is called a turbine. Wind turbines are usually mounted on a tower from 100 feet to 400 feet above ground so they can take advantage of faster and less turbulent wind.

The most economical application of wind electric turbines is in groups of large machines called "wind power plants" or "wind farms." For example, a 107 megawatt wind farm near the community of Lake Benton, Minn., consists of turbines situated far apart on farmland along the windy Buffalo Ridge. The wind farm generates electricity while agricultural use continues undisturbed.

Wind power plants are "modular," which means they consist of small individual modules (the turbines), that can easily be made larger or smaller as needed. Wind farms can range in size from a few megawatts to hundreds of megawatts in

capacity depending on whether they are producing electricity for a single home, a number of buildings or sending electricity to a grid for widespread distribution. Additional turbines can be added as electricity demand grows. Today, a 50-megawatt wind farm can be completed in 18 months to two years. Most of that time is needed to measure the wind and obtain construction permits. The wind farm itself can be built in less than six months.

## Ohio's current and future outlook

Currently Ohio has several wind turbines in place. The only wind farm is in Bowling Green, which has four turbines that generate electricity for about 2,000 homes. More turbines are planned that could increase the electric generating capacity to seven times what it is now by 2009.

A company from Spain is considering building up to 25 wind turbines in Bellefontaine. In central Ohio, a wind turbine was built at Glacier Ridge Metro Park to help educate Ohioans on the benefits of wind power. Additionally, Green Energy Ohio has built a tower that will measure the wind speeds off of Lake Erie. This 165 foot tower will collect data for two years. The data will be available on Green Energy Ohio's website at [www.greenenergyohio.org](http://www.greenenergyohio.org).



## National outlook

Europe is the world leader for wind power, generating almost 35,000 megawatts of power. Denmark is currently generating around 20 percent of its electricity from wind. The United States also is continuing to expand its efforts on wind power. An average household in the United States uses about 10,000 kilowatt-hours of electricity each year. Annually, between 2.4 million and 3 million kilowatt-hours are generated per one megawatt

*continued on other side >*

> *continued from other side*

of wind energy. Therefore, a megawatt of wind generates about as much electricity as 240 to 300 households use on average. If wind power is the only source of power for homes, a storage system is needed since the wind does not blow all the time. However, storage typically is not needed because wind generators make up only a portion of the power on a utility system, and other fuel sources are used when the wind is not blowing. Most of the wind turbines in use today are on land. However, there are two off-shore projects in the planning stages for New York and Massachusetts. There is hope that wind will provide at least 6 percent of the nation's electricity by 2020, which would be enough electricity for 25 million homes.

## **Pros and cons of wind power**

Wind is a free, renewable resource that does not generate any pollutants into the environment. As much as 5,000 tons of carbon dioxide can be prevented by a wind turbine each year. To absorb that much carbon dioxide, it would take 500 acres of forest.

Also, wind power can create additional jobs as a result of the need for more manufacturing plants to construct the turbine parts and for workers to build

the wind turbines. Ohio would stand to gain close to 12,000 jobs if investments for wind energy were strengthened nationally. Additionally, wind turbines can provide extra income for farmers. A farmer can make \$2,000 or more per year for each turbine leased on the land. The land around the turbine can continue to be used for growing crops.

One of the main issues with wind power is its variability, the need for constant wind to generate measurable amounts of electricity. Also many people do not want the wind turbines near their homes due to the visual impact that they have on the landscape. Lastly, there are reports each year of birds and bats being killed by flying into the rotor blades. However, in many cases, research is performed on migratory flight patterns before building the wind turbines in order to decrease the possibility of this occurring.

## **Additional resources**

For additional information on wind power, visit these websites:

[www.awea.org](http://www.awea.org)

[www.greenenergyohio.org](http://www.greenenergyohio.org)

[www.nrel.gov](http://www.nrel.gov)

[www.windpower.org/en/core.htm](http://www.windpower.org/en/core.htm)

The Office of the Ohio Consumers' Counsel (OCC), the residential utility consumer advocate, represents the interests of 4.5 million households in proceedings before state and federal regulators and in the courts. The state agency also educates consumers about electric, natural gas, telephone and water issues and resolves complaints from individuals. To receive utility information, brochures, schedule a presentation or file a utility complaint, residential consumers may call 1-877-PICKOCC (1-877-742-5622) toll free in Ohio or visit the OCC website at [www.pickocc.org](http://www.pickocc.org).

*The Office of the Ohio Consumers' Counsel is an equal opportunity employer and provider of services.*

**For additional information from the Office of the Ohio Consumers' Counsel:**

**Call: 1-877-PICKOCC (1-877-742-5622) toll free or (614) 466-8574**  
**Write: 10 West Broad Street, Suite 1800, Columbus, Ohio 43215-3485**  
**E-mail: [occ@occ.state.oh.us](mailto:occ@occ.state.oh.us) • Internet Address: [www.pickocc.org](http://www.pickocc.org)**