



Wind Energy Fact Sheet

Wind energy is a form of solar energy, created by circulation patterns in the Earth's atmosphere that are driven by heat from the sun.

People have made use of wind energy for thousands of years, fashioning sails and attaching them to boats for transportation or to wind mills to grind grain. The energy that the wind contains can either be used directly, as in these examples, or it can be converted into that high-value, highly flexible and useful form of energy we call electricity.

Perhaps the simplest way to describe a wind-electric turbine generator (or "wind turbine," as it is usually called) is to say it works just like a hydroelectric generator. At hydropower stations throughout the U.S. and the world, the energy contained in falling or flowing water is used to spin the rotor of a turbine (a rotor that looks quite a bit like an everyday electric fan), and the turbine rotor drives the shaft of a generator to produce electricity.

Wind energy actually works in very similar fashion, especially similar to "run-of-the river" hydro stations that make use of the flowing water in a river or stream. In the case of wind, of course, the "river" is an invisible one made of air, but the principle is the same. As the air flows past the rotor of a wind turbine (a rotor that looks a lot like an airplane propeller), the rotor spins and drives the shaft of an electric generator.

Wind energy is readily available over about one-third of the U.S. An area stretching from Minnesota to Texas to Wyoming has enough wind almost everywhere to generate electricity economically, and there are many hills and passes in other states that are windy enough as well. Altogether, 46 of the 50 states have some wind resources that could be developed.

Wind energy is a particularly appealing way to generate electricity because it is essentially pollution-free. More than half of all the electricity used in the U.S. is generated from burning coal, and in the process, large amounts of toxic metals, air pollutants, and greenhouse gases are emitted into the atmosphere.

Development of 10% of the wind potential in the 10 windiest U.S. states would provide more than enough energy to displace emissions from the nation's coal-fired power plants and eliminate the nation's major source of acid rain; reduce total U.S. emissions of carbon dioxide (the most important greenhouse gas) by almost a third and world emissions of CO₂ by 4%. If wind energy were to provide 20% of the nation's electricity—a very realistic and achievable goal with the current technology—it could displace more than a third of the emissions from coal-fired power plants, or all of the radioactive waste and water pollution from nuclear power plants.

Wind farms can also revitalize the economy of rural communities, providing steady income through lease or royalty payments to farmers and other landowners. Although leasing arrangements can vary widely, a reasonable estimate for income to a landowner from a single utility-scale turbine is about \$2,000 a year or more, depending on the wind resource, the size of the turbine, and other factors.

Greater use of wind energy means a cleaner environment with healthier air, and more income to landowners and economically depressed counties and communities in the Great Plains. It means relying more on an energy source whose "fuel" is free and renewable because it will never be exhausted or embargoed.

Northwestern Electric, along with 18 other distribution cooperatives, currently uses energy produced from three environmentally friendly wind farms – Blue Canyon, Buffalo Bear and Red Hills.