

# Wind Power



Like many other emerging technologies, wind power has become more mainstream in recent years. New technologies have decreased the cost of producing electricity from wind, and growth in wind power has been encouraged by the implementation of incentives for renewable energy products.

## **What is wind power?**

The power of the wind is harnessed and transformed into electrical energy through the use of wind turbines. These turbines function very similarly to the childhood pinwheel toy: wind blows over the blades of the wheel creating lift and causing them to turn. The blades are connected to a shaft which is connected to and turns an electric generator, thus converting kinetic energy into electric energy.

Wind power can provide electricity in a variety of different situations. Large-scale operations are used to provide power for the utility electrical grid. Wind power systems can also provide a supplemental power source for grid-connected industrial, commercial, and residential locations. Stand-alone systems provide electricity for remote homes and businesses that are not serviced by the utility grid.

## **Residential Wind Power**

Now that residential wind power systems are readily available, more homeowners are considering an investment in this technology. Many see it as a method of insulating themselves from fluctuating electricity costs and also reducing their home's carbon footprint. There are, however, a number of aspects to think about before deciding to install a wind power application for your home:

- Is there enough wind in your area? An average annual wind speed of at least 10 miles per hour is considered necessary to make a small wind system economical.
- Make sure your local building codes and zoning ordinances allow for wind turbine installations.
- Check with your utility company to determine the requirements and cost for connecting your system to the grid.
- Determine your household electricity needs and purchase a correctly-sized wind turbine.

## **Wind Farms**

In large scale wind power operations, wind turbines are often grouped together into a single wind power plant, known as a wind farm, and generate bulk electrical power. Electricity from these turbines is fed into a utility grid and distributed to customers.



# Wind Power



## **General Safety Considerations**

- Break-down of materials - Turbines are only built to withstand certain strengths of wind. If subjected to winds in excess of those it was built for, the materials may begin to break down, resulting in portions of the blade flying great distances and posing the threat of harm.
- Fire – Lighting is one of the main causes behind turbine fires. Electrical malfunction, paired with the presence of combustible materials, such as insulation and lubricants, can also present serious fire hazards.
- Ice – Since large wind turbines operate at higher altitudes, the colder temperatures can cause ice to form on the blades when it rains. This ice can then be flung great distances as the blades spin, creating a safety hazard.
- Overhead power lines – People working in and around wind farms need to pay careful attention to overhead power lines. To prevent electrocution, all employees, tools and equipment should maintain a distance of at least ten feet from power lines, which carry extremely high voltage.
- Wildlife – Not only do wind farms take up habitat space for some species, they also can interfere with the migratory routes of birds and bats and pose physical danger to them if they fly into the turbines' paths.

## **The Intermittency Issue**

For power grids that are dependent on wind, power outages will not occur in the event that the wind is not blowing. On a calm day, the turbines won't be able to produce power, but electricity will still be available from other power sources. Conversely, wind turbines typically don't produce electricity when wind speed exceeds a certain threshold, and have a device that prevents the blades from turning when the wind exceeds the limit of the turbine.

## **Did you know?**

In 2010, wind turbines generated enough electricity to power about 8.7 million U.S. households for a year.