

## **What is Wind power?**

Wind power is the conversion of wind energy into electricity, using wind turbines. Most modern wind power electricity is generated by wind blowing against the propeller blades of a turbine and causing them to turn. The rotation of turbine blades is converted into electrical current by means of an electrical generator. In windmills (a much older, but still useful, technology), wind energy is used to turn mechanical machinery to do physical work, such as crushing grain or pumping water. Wind power is used in large scale wind farms for national electrical grids as well as in small individual turbines for providing electricity to rural residences or grid-isolated locations. Turbines can be placed on land (terrestrial) or in the ocean (offshore).

### **Advantages**

Wind energy is renewable because it depends only on the presence of the sun and it also does not reduce the earth's supply of fossil fuels. It is plentiful and widely distributed. Terrestrial wind generally blows harder and more consistently over the mid-continental plains, such as the Great Plains of North America or the steppes of Russia. Since humans concentrate along coasts, there is a lot of interest in placing wind turbines a few miles offshore to capture the energy in the oceanic winds, where wind is stronger and more consistent than over land. Wind energy is clean---it does not produce carbon dioxide, sulfur dioxide, mercury, particulates, or any other type of air pollution, as do conventional fossil fuel power sources. If wind is used to generate electricity instead of fossil fuels, it will reduce toxic atmospheric and greenhouse gas emissions. Wind-generated electricity is a technology that is already well developed and its cost is competitive with energy derived from fossil fuels. Thus it holds the promise to significantly displace CO<sub>2</sub> emitting fuels now—it will not require years of development.

Because it uses energy already present in the atmosphere, and can displace fossil-fuel generated electricity (with its accompanying carbon dioxide emissions), wind power decreases global warming. While wind turbines might kill some bird and bat species, conventionally fueled power plants also have the potential to affect other species through climate changes, acid rain, and pollution. Unlike fossil fuel and nuclear power generation, which require large amounts of water for cooling, wind turbines do not need water to generate electricity.

### **Disadvantages**

There are several disadvantages to both terrestrial and offshore wind power generation. A major disadvantage is that the wind power "farms" are expensive to install and maintenance costs are high. Offshore installation involves unique problems. The laws regulating these farms are unclear and not well developed, for example, are they regulated by international, federal or state laws? The technology is not yet optimized for water locations, and we don't know enough yet about where to best place the turbines to utilize the resource. Other problems include the variability of wind and the fact that oceanic wind speeds vary with latitude, with weaker winds near the equator and strongest

oceanic winds from the polar air masses through the mid latitudes. There is an environmental impact—although we don't yet know how big that impact may be, it is clear that turbines in the path of migrating birds will kill thousands. Since the offshore installations must be anchored to the sea bottom, the effect of the below-surface structures on fish and marine life may be significant. Studies have shown that many people object to how wind farms look. Recently, a proposed wind generation farm in Long Island Sound was effectively killed because people that owned property along the coastline said to their legislators, "not on my ocean view!"