



Wind energy



Wind power is generated from the kinetic energy of the air, which ultimately originates from solar energy. Humans have used wind energy for millennia, with windmills and sailing vessels being the most familiar examples. A more recent application of the conversion of wind energy into electricity involves mounting an electric generator at the end of a shaft that is driven by rotating windmill blades.

Modern wind turbines range from very small ones (1 metre or less) to very large versions that are connected

directly to the electricity grid either individually or in clusters known as wind farms.

The cost of wind-generated electricity is not much higher than that of energy produced in thermal power plants. There are a number of technical challenges and considerations involved in designing wind turbines, which include:

- the number of blades (three being the optimum for balancing the rotor);
- the length of the blades (finding a balance between stability and power output); and
- the positioning of the blades with respect to the shaft (which affects generator stability and noise output).

Although wind power currently accounts for just over 1 percent of generated electricity worldwide, it represents approximately 19 percent of electricity production in Denmark, 9 percent in Spain and Portugal, and 6 percent in Germany and the Republic of Ireland. Globally, wind power generation more than quadrupled between 2000 and 2006.

Wind turbines do not pollute the air with toxic emissions, but they can cause noise pollution. The concentration of many turbines in one place is profitable from an economic point of view, but some people believe that it has a negative visual impact. Turbine yields are higher in strong winds, although severe storms and hurricanes can damage facilities.

Small turbines are used for battery-charging systems or to provide power for homes, schools or community halls. These generators are usually between 1 and 15 metres tall, and produce between 100 watts and 5 kilowatts of electricity. Optimal output for a normal house is between 1 and 2.5 kilowatts. These turbines are often attached to the buildings they power. A community-scale system of 5 kilowatts can be used to provide power to a school, office or hall. These larger generators are usually placed at some distance from the buildings they power.