

Wind power

Did you know that wind is considered an indirect form of solar energy? This is because the wind is driven mainly by temperature differences on the surface of the earth that are caused by sunshine.

For centuries, the wind has been used to sail ships, grind grain, and pump water. Now, people use the wind to generate electricity. The windmills built long ago had many blades, but today's *wind turbines* usually have just two or three blades that turn when the wind blows. But the blades on wind turbines are much longer than those you might see on a windmill.

The blades drive a generator that produces electricity, much like steam turbines. The longer the blades and the faster the wind speed, the more electricity the turbine generates. Wind turbines are placed on towers because the wind blows harder and more steadily above the ground.

To produce the most electricity, wind turbines need to be located in areas where the wind blows at a constant speed, which it does not do in all parts of the world.

Large groups of wind turbines, called wind farms or wind plants, are connected to electric utility power lines and provide electricity to many people. New turbine designs now take advantage of less windy areas by using better blades, more electronic controls, and other improvements. Some new turbines can also operate efficiently over a wide range of wind speeds.

An advantage of wind turbines over some forms of renewable energy is that they can produce electricity whenever the wind blows (at night and also during the day). In theory, wind systems can produce electricity 24 hours every day, unlike PV systems that can't make power at night. However, even in the windiest places, the wind does not blow all the time. So, while wind farms don't need batteries for backup storage of electricity, small wind systems do need backup batteries. And, we're still learning about local wind patterns and how they affect wind turbines and blades.