



Inquiry Approaches

Initial Inquiry

In what ways have humans exploited windpower?

Wind has been used to power sailboats and windmills and to predict the weather (with weather vanes).

What is needed for a windmill to function?

All windmills must have a turbine, a tower and a source of wind. The turbine has either two, three, or four blades. Wind blowing over the blades cause the blades to lift and rotate, leading to the production of energy. The tower is necessary to reach strong and steady wind speeds. Wind provides the kinetic energy necessary to turn the blades.

Experimental Procedure Inquiry

What do nuclear, hydro and wind power all have in common?

Electric generators are required to convert nuclear, hydro or wind power into electricity. Generators are used to convert one form of energy into electricity.

In-Depth Inquiry

What is wind and how is it created in the environment?

Wind is moving air caused by differences in air pressure within the atmosphere. Air under high pressure moves toward areas of low pressure. The greater the difference in pressure, the faster the air flows.

How do windmills generate electricity?

Windmills equipped with generators are able to convert kinetic energy into electrical energy. Wind has kinetic energy and when it blows against the blades of the turbine it causes them to rotate. This action converts the kinetic energy into mechanical energy. Inside the windmill, there is a shaft that connects the turbine to the generator. The generator is the device that converts the mechanical energy from the turbine into electrical energy.

What are some advantages and disadvantages of wind power?

Advantages of wind power are it is free or very cheap after the initial investment of building the windmill; windmills will keep turning anytime there is wind—unlike solar panels, power can be harvested at night; there is no waste product. Wind power is a great alternative to fossil fuels and is considered a viable renewable resource.

Disadvantages of wind power are the operation of the turbine depends upon the speed and force of the wind (a light wind makes the turbine turn slowly and does not produce much energy); it is difficult to store the electricity generated by the windmill; windmills are very noisy to operate; there is no way to increase electricity during peak demand. Often an ideal spot for a windmill is in a remote location, making installation and maintenance difficult.



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What factors are involved in selecting the location of a wind power generator?

Various geographic features can affect wind flow patterns. Hills and plateaus can provide a high ground for windmills—typically, higher wind speeds can be achieved at higher altitudes. Water sources affect the distribution of surface heat. Large bodies of water can provide a predictable wind pattern and higher average wind speeds can be achieved along shorelines. Windmill placement cannot be too remote, as it must be possible to transport the energy to the people who are using it.