WINDMILLS

Understanding How Wind is Used to Produce Energy, Kinetic Energy and Wind Turbines




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INSTRUCTOR BACKGROUND

National Standards for Science

Grades K-4 Standard B - Wind power involves turning energy from the wind into other forms of useful energy. This can be used if speaking about wind turbines.

Learning Objectives

Students will attain a basic understanding of how wind can be used to produce energy. They will understand what kinetic energy is, and receive an overview on how windmills use turbines to produce electricity. Students should be encouraged to think of other sources of kinetic energy, and explore how turbines can be used to convert kinetic energy in to electricity.

Introduction to Classroom

It is important for us to always be thinking of renewable and natural ways we can produce energy. The great thing about renewable energy is that we do not have to worry about running out of it. It comes from sources that are naturally replenished, such as the sun, water, or wind. Wind is an example of kinetic energy, which means that it is energy in motion. Since wind is always in motion, it is a wonderful, natural source for us to use in generating electricity.

Electricity from wind is generated through the use of a turbine (generator) inside of a windmill. A turbine is a device that produces continuous power by revolving quickly due to the flow of water, steam, gas, or air flowing through it to propel it in to motion. They are typically shaped like a wheel or rotor and have blades. Wind turbines move when wind turns the blades of a windmill. This causes the turbine inside the windmill to spin rapidly. When this happens electricity is created. Windmills can be used to produce electricity for single homes, or they can be connected to an electric grid so the electricity can be spread over a wide distance.

Activity Description

While the windmills in this activity do not use a generator to make electricity, they are a simple demonstration of how windmills work. When students blow on the windmills, the blades will turn. Students should also take their windmills outside to see how they perform in wind.

Material List

1. *Construction paper*
2. *Scissors*
3. *Pin tacks*
4. *Beads*
5. *Pencil*
6. *Sipping straws*
7. *Markers (optional)*

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Instructions

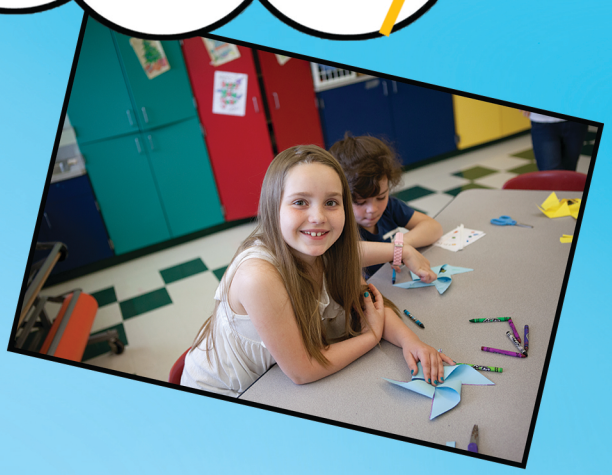
1. Cut a 14 cm square from one piece of construction paper

2. Draw diagonal lines from corner-to-corner on the square

3. Starting at each corner, cut in 5 cm towards the center of the square

4. Fold every other point towards the center of the square and pin down

5. Affix the windmill to the straw with a push -pin and fasten an earring back to the tip of the push-pin



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Follow-Up Suggestions

1. Have students use different size squares to make their windmills, and have them cut in more than five centimeters. Have them test the size that seems best for making their windmills turn fast.

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2. For a more in depth look at how windmills operate, share information on the following website with students. http://energy.gov/eere/wind/how-does-wind-turbine-work

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3. Teach students about other forms of natural kinetic energy, such as solar and water. Discuss how energy from these natural, renewable sources creates electricity for human consumption. Talk about how kinetic energy is all around us, and any time we move, we are engaging in kinetic energy. The planets moving in the solar system is an example of kinetic energy. Tossing a ball or riding a skateboard is an example of kinetic energy.

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4. Discuss with students machines other than windmills that require a turbine to operate. This can include modern day locomotives, airplanes, coal-fired power plants, army tanks, helicopters, etc. Here is a list of fun things that use turbines to operate: http://jalopnik.com/the-ten-greatest-non-aircraft-things-powered-by-turbine-1698389327

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Student Worksheet

Windmills - Understanding How Wind is Used to Produce Energy, Kinetic Energy and Wind Turbines

What did I know about renewable energy before this lesson?

What are other forms of natural, renewable energy that humans can use to make electricity?

In your words, explain how a turbine operates. What are other machines and devices you can think of that require a turbine to operate?

Explain what kinetic energy is. List examples of kinetic energy you see every day.

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Vocabulary List

Windmills – Understanding How Wind is Used to Produce Energy, Kinetic Energy and Wind Turbines

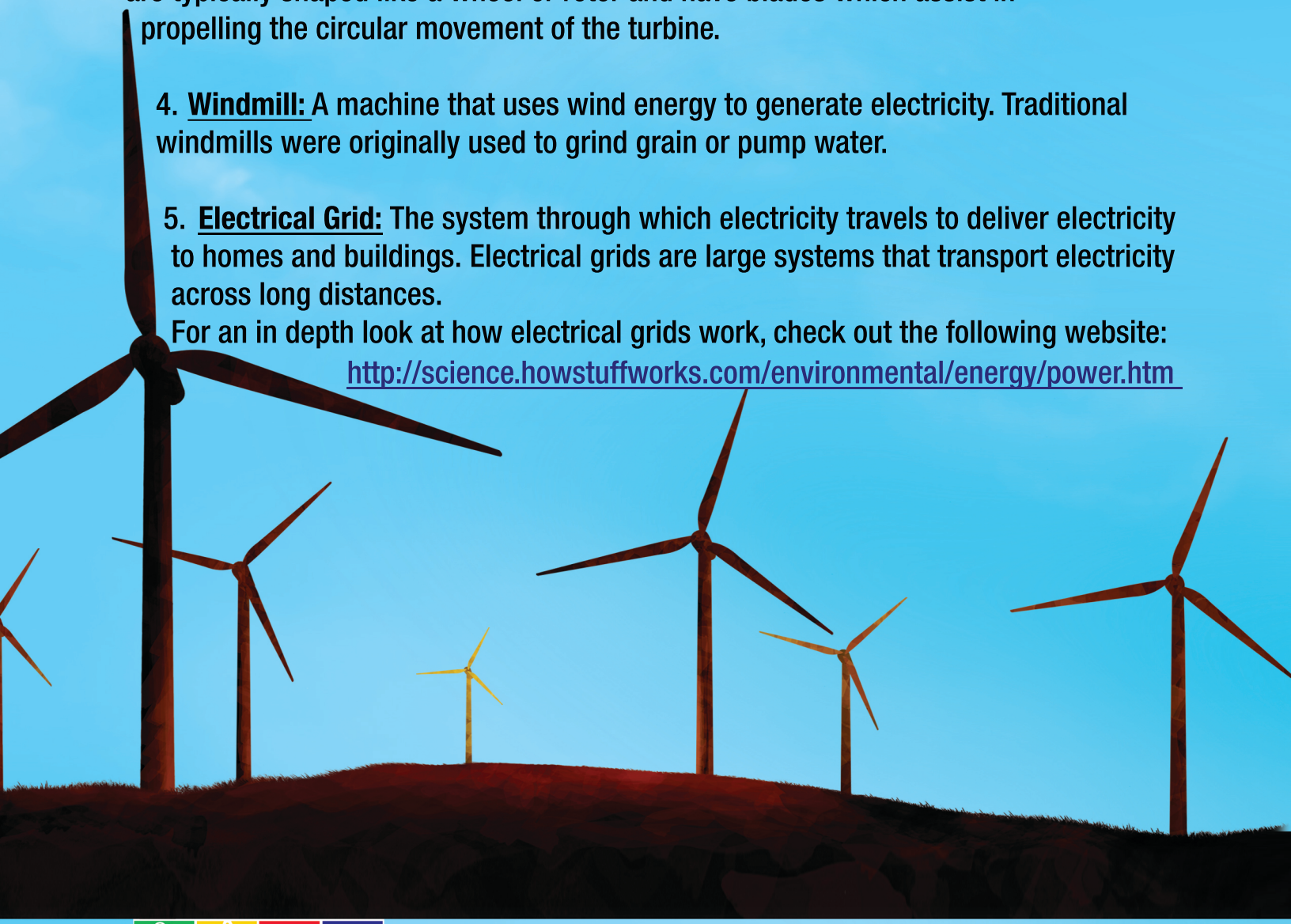
1. **Renewable Energy:** Energy that comes from sources that are naturally replenished, such as sunlight, wind and rain.

2. **Kinetic Energy:** Energy that is in motion, such as moving wind, or even chewing food.

3. **Turbine:** A device that produces continuous power by revolving quickly due to the flow of water, steam, gas or air flowing through it to propel it in to motion. They are typically shaped like a wheel or rotor and have blades which assist in propelling the circular movement of the turbine.

4. **Windmill:** A machine that uses wind energy to generate electricity. Traditional windmills were originally used to grind grain or pump water.

5. **Electrical Grid:** The system through which electricity travels to deliver electricity to homes and buildings. Electrical grids are large systems that transport electricity across long distances.
For an in depth look at how electrical grids work, check out the following website:
http://science.howstuffworks.com/environmental/energy/power.htm



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