Wind Turbines

Earth & Space Science | Lesson Guide

2nd Grade

Photo Description

This image shows several tall white machines called wind turbines standing in a large, flat field. Each turbine has three long blades that spin around like a pinwheel. The turbines are connected by power lines that carry electricity to homes and schools. The sky is bright and clear, which is perfect weather for the wind to turn the blades.

Scientific Phenomena

Anchoring Phenomenon: Wind turbines convert moving air (wind) into electrical energy that people can use.

Scientific Explanation: Wind is moving air that has energy. When wind pushes on the blades of a turbine, it causes them to spin very fast. This spinning motion is connected to a generator inside the turbine that creates electricity. This is an example of energy transfer—wind energy becomes electrical energy. The stronger the wind blows, the faster the blades spin, and the more electricity gets made. This is a renewable energy source because wind naturally occurs and won't run out.

Core Science Concepts

* Wind as a Force: Wind is moving air that can push and move objects. In this case, it pushes the turbine blades and causes them to rotate.

* Energy and Energy Transfer: Wind turbines show how one type of energy (wind/kinetic energy) can be changed into another type (electrical energy) that people use in their homes.

* Patterns in Nature: Wind patterns are predictable in many locations, which makes wind farms reliable sources of energy. Weather and seasons affect how much wind blows.

* Human Uses of Natural Resources: People design and build wind turbines to use wind energy in useful ways, showing how humans interact with and depend on natural resources.

Pedagogical Tip:

For second graders, use the phrase "moving air" instead of "kinetic energy." Connect turbines to things they know—compare the spinning blades to a pinwheel toy they can hold and spin with their own breath. This makes the abstract concept of wind energy concrete and relatable.

UDL Suggestions:

Representation: Provide images of turbine blades from multiple angles and close-up photos. Create a simple labeled diagram showing wind !' spinning blades !' electricity.

Action & Expression: Allow students to demonstrate understanding through multiple modalities: drawing turbines, building models with craft materials, acting out how blades spin, or creating a song about wind energy.

Engagement: Connect to students' own experiences with wind (kites, pinwheels, feeling wind on their faces). Ask about wind they've observed during recess or outdoor play to build personal relevance.

Discussion Questions

1. What do you think would happen if there was no wind? Why? (Bloom's: Predict | DOK: 2)
2. How is a wind turbine similar to a pinwheel you might blow with your mouth? (Bloom's: Compare | DOK: 2)
3. Why do you think people build wind turbines in fields instead of in forests? (Bloom's: Analyze | DOK: 3)
4. Where does the electricity from this turbine go after it's made? (Bloom's: Understand | DOK: 1)

Extension Activities

Activity 1: Pinwheel Spin
Have students create pinwheels from paper and straws. Take them outside to feel the wind and watch their pinwheels spin. Ask: "How is your pinwheel like a wind turbine?" This connects the abstract concept to something they can physically control and observe.

Activity 2: Wind Hunt
Take students on a "wind hunt" around the school grounds or classroom. Have them observe and record what the wind moves (leaves, flags, hair, clothing). Create a class chart showing all the things wind can push. Discuss: "How is wind a force?"

Activity 3: Build a Model Turbine
Provide craft materials (paper cups, straws, paper, tape) for students to build a simple turbine model. Have them test it by blowing on it or using a fan. Encourage them to modify their design to make it spin faster. This hands-on engineering task develops both scientific thinking and problem-solving skills.

NGSS Connections

Performance Expectation:
2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Disciplinary Core Ideas:
* 2-PS3.A - Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
* K-ESS2.E - Wind and water (moving air and water) can move things from one place to another.
* 2-ESS1.C - Some sources of energy come from the Sun; wind energy comes from the Sun because wind is caused by uneven heating of Earth's surface.

Crosscutting Concepts:
* Energy and Matter - Energy can be transferred in various ways.
* Cause and Effect - Pushing or pulling a force on an object changes its motion; wind is a force that spins the turbine blades.
* Systems and System Models - Wind turbines are part of a larger system that generates and distributes electricity.

Science Vocabulary

* Turbine: A machine with blades that spin around when pushed by wind or water.

* Wind: Moving air that we can feel and see pushing things around.

* Electricity: A type of energy that powers lights, toys, and machines in our homes.

* Blade: One of the long, flat pieces that stick out from the center of a turbine and catch the wind.

* Energy: The power to make things move or work.

* Renewable: Something that won't run out because nature keeps making more of it, like wind.

External Resources

Children's Books:
Wind Power* by Rebecca Olien (Capstone Press) – A simple, illustrated introduction to how wind makes energy.
The Wind Blew* by Pat Hutchins – A fun, rhythmic story about wind moving objects; great for building vocabulary around wind and motion.
What Makes Wind?* by Christianne C. Jones (Capstone Press) – An easy-to-read explanation of weather and wind for early readers.

YouTube Videos:
* "How Do Wind Turbines Work?" - National Geographic Kids (2:14 minutes)
https://www.youtube.com/watch?v=Ia4SEz0-tEE
Clear, colorful animation showing how wind turbines generate electricity in language young children can understand.

* "Wind Energy for Kids" - Crash Course Kids (4:20 minutes)
https://www.youtube.com/watch?v=tpJVx1sFCOw
Friendly introduction to renewable energy with real turbine footage and accessible explanations.