Wind Turbines

Earth & Space Science | Lesson Guide

Kindergarten

Photo Description

This picture shows tall white machines called wind turbines in a big, flat field. The turbines have long arms that spin around and around in the wind. There are power lines connecting them together, and the sky is very blue and clear.

Scientific Phenomena

Anchoring Phenomenon: Wind turbines convert invisible moving air (wind) into electricity that powers homes and schools.

Why This Happens: Wind is moving air that has energy. When wind pushes the long blades of a turbine, they spin very fast. Inside the turbine, this spinning motion turns a generator that creates electricity—the same electricity that lights our classrooms and homes. This is a renewable energy source because wind keeps blowing and we never run out of it.

Core Science Concepts

1. Wind as a Force: Wind is moving air that can push and move things. It has energy that we can use.

2. Energy Transformation: The wind's energy is changed into electrical energy through the spinning blades and generator.

3. Patterns in Nature: Wind blows regularly and patterns of wind can be predicted in certain locations, making turbines reliable energy producers.

4. Human Relationships with Earth Systems: People design and build turbines to use natural resources (wind) in ways that help us without creating pollution.

Pedagogical Tip:

For Kindergarteners, avoid overly technical explanations about generators and electricity flow. Instead, focus on the observable action: wind pushes the blades, blades spin, spinning makes electricity. Use repetitive, multi-sensory language and allow students to physically act out the spinning motion to internalize the concept.

UDL Suggestions:

Multiple Means of Representation: Provide both visual images and physical demonstrations. Show the turbine photo, then use a small pinwheel or fan to demonstrate how air movement causes spinning. Create a simple diagram with arrows showing wind pushing the blades.

Multiple Means of Action & Expression: Allow students to show understanding through movement (spinning like turbine blades), drawing, or verbally describing what they see. Offer both group discussions and individual think-time.

Multiple Means of Engagement: Connect to student interests by explaining that turbines help power their favorite devices (lights, videos, games). Use enthusiasm and wonder to build intrinsic motivation about renewable energy.

Discussion Questions

1. What do you think makes the blades of the wind turbine spin? (Bloom's: Understand | DOK: 1)

2. Why might we build wind turbines on farms and open fields instead of in the middle of cities with lots of buildings? (Bloom's: Analyze | DOK: 2)

3. Can you think of other things that spin when wind pushes them? What energy do they make? (Bloom's: Apply | DOK: 2)

4. How is a wind turbine different from a fan in your classroom? (Bloom's: Compare | DOK: 2)

Extension Activities

1. Pinwheel Experiment: Provide students with paper pinwheel templates. Help them create simple pinwheels, then take them outside to observe how wind makes them spin. Students can walk in different directions to find where the wind is strongest and discuss their observations.

2. Wind Turbine Dance: Play upbeat music and have students move like wind (flowing, swaying) and then like turbine blades (spinning in one spot). This kinesthetic activity helps them embody the cause-and-effect relationship between wind and spinning motion.

3. Draw Your Own Turbine: Provide large paper and crayons. Ask students to draw a wind turbine and label the parts they remember (blades, tower, base). Display their artwork and discuss similarities and differences in their drawings.

NGSS Connections

Relevant Performance Expectation:
K-PS3-1: Make observations to determine the effect of sunlight on Earth's surface.
(Note: While this PE focuses on sunlight, wind turbines relate to K-PS3.A - energy sources and use)

Disciplinary Core Ideas:
- K-PS3.A - Energy can be used in many ways.
- K-ESS2.E - Wind and water are examples of things in nature that people use as energy resources.
- K-ETS1.A - Humans design solutions to problems.

Crosscutting Concepts:
- Energy and Matter - Energy can be transformed and transferred.
- Cause and Effect - Wind (cause) spins the blades (effect).
- Systems and System Models - A turbine is a system where different parts work together.

Science Vocabulary

* Wind: Moving air that we can feel but cannot see.
* Turbine: A machine with spinning blades that turns the energy from wind into electricity.
* Blade: One of the long arms on a turbine that catches the wind.
* Energy: The power to make things move or work.
* Electricity: A type of energy that powers lights, computers, and other things we use every day.
* Renewable: Something we can use again and again without running out.

External Resources

Children's Books:
- What Is Wind? by Kathryn Lay (illustrated by Cecilia Rebora) – Simple, age-appropriate introduction to wind and its effects.
- The Wind Blew by Pat Hutchins – A playful story about wind that helps students understand wind's power.
- Energy All Around Us by Harriet Ziefert (illustrated by Amanda Haley) – Introduces different types of energy in kid-friendly language.

YouTube Videos:
- "How Do Wind Turbines Work? | National Geographic Kids" – A 3-minute animated video explaining turbines in simple language. Visit: https://www.youtube.com/results?search_query=national+geographic+kids+wind+turbines (Search for exact title)
- "Renewable Energy for Kids - Wind Power" by KidsAcademy – A bright, engaging 2-minute video about wind energy with clear visuals. Visit: https://www.youtube.com/results?search_query=renewable+energy+for+kids+wind+power (Search for exact title)

Teacher Tip: This lesson works best as part of a broader unit on energy sources. Consider pairing it with activities about sunlight and water to show diverse ways we generate power naturally.