

Photo Description



This image shows tall wind turbines standing in a flat farm field under a blue sky. The turbines have three long blades that spin in the wind to make electricity. You can see power lines running across the landscape, connecting the turbines together.

Scientific Phenomena

Anchoring Phenomenon: Wind turbines harvest energy from moving air to generate electricity.

Why it happens scientifically: Wind is moving air caused by uneven heating of Earth's surface by the sun. When the sun warms some areas more than others, air moves from cooler to warmer places, creating wind. Wind turbines are designed to capture this moving air—a natural resource—and convert its energy into electrical power. This demonstrates how the sun's energy drives Earth's weather systems and how humans can use natural resources to meet their needs.

Core Science Concepts

1. **Wind as Moving Air:** Wind is the movement of air in Earth's atmosphere. It is caused by the sun heating different parts of Earth unevenly, which makes air move from place to place.
2. **Weather and Natural Resources:** Wind is a natural resource that exists in our environment. Just like water, soil, and plants, wind is something nature provides that people can use—in this case, to make electricity.
3. **Earth's Systems and Energy:** The sun provides energy that warms Earth's surface. This energy creates wind patterns. Wind turbines show how Earth's natural systems can power human activities.
4. **Observable Patterns in Weather:** Wind strength and direction change with the seasons and time of day. Wind turbines are built in areas where wind is strong and predictable enough to generate power regularly.

Pedagogical Tip:

For First Graders, focus on the observable phenomenon first: "What do you see moving?" (the blades) and "What makes them move?" (the wind/air). Avoid abstract concepts about electricity generation. Instead, ask students to feel wind on their faces and make connections: "The wind moves the blades, just like it moves your hair!" This builds from direct sensory experience to understanding.

UDL Suggestions:

Multiple Means of Engagement: Create a wind corner in your classroom with a fan, lightweight scarves, and pinwheels. Let students experiment with wind firsthand to build background knowledge before discussing turbines.

Multiple Means of Representation: Use video clips of turbine blades spinning (even 10-15 seconds) paired with static images. Many First Graders learn better when they see motion, not just still photographs.

Multiple Means of Action/Expression: Allow students to show understanding through movement (spinning like turbine blades), drawing, or building with craft materials, not just verbal responses.

Zoom In / Zoom Out

Zoom In: Molecular Level

At a very small scale, wind is trillions of tiny air molecules moving together. When air molecules move fast (strong wind), they have more energy. The turbine blades catch these moving molecules and spin, turning that motion energy into electricity. Students cannot see individual air molecules, but they can feel their movement!

Zoom Out: Earth's Weather System

Zooming out, wind turbines are part of Earth's larger system. The sun heats oceans, land, and air unevenly. This creates global wind patterns that blow across continents and oceans. Wind turbines in one location are tapping into this planet-wide system of moving air. The wind that spins turbines in Kansas might have started over the Atlantic Ocean thousands of miles away!

Discussion Questions

1. "What do you think makes the wind that spins these turbine blades?" (Bloom's: Remember | DOK: 1)
2. "How would the turbines spin differently on a very windy day versus a calm day? Why would that happen?" (Bloom's: Analyze | DOK: 2)
3. "If the sun didn't heat Earth, would there be wind? What would change?" (Bloom's: Evaluate | DOK: 3)
4. "Where does the wind that moves these turbines come from? Can you trace it back to the sun?" (Bloom's: Understand | DOK: 2)

Potential Student Misconceptions

1. Misconception: "The turbines make the wind blow."
 - Clarification: Wind is made by the sun heating Earth and is not created by turbines. The turbines use wind that already exists; they don't create it. The sun is what makes the wind.
2. Misconception: "The turbines are just fans."
 - Clarification: Turbines look like fans but work in reverse. A fan uses electricity to make blades spin and push air. A turbine uses moving air (wind) to spin blades and make electricity. It's the opposite direction of energy flow.
3. Misconception: "Turbines can make wind blow when we need it."
 - Clarification: We cannot control when or how much wind blows. Wind is a natural resource that depends on weather patterns and seasons. Turbines only work when it's windy; we cannot make wind happen on purpose.

Extension Activities

1. Pinwheel Wind Exploration: Give each student a simple paper pinwheel. Take them outside and have them observe how the pinwheel spins in different locations (windy spot, sheltered spot, etc.). Compare speeds and ask why some places are windier. Connect back to turbines doing the same thing but on a much larger scale.
2. "Feel the Wind" Sensory Walk: During a breezy day, take students on a walk around the playground or school grounds with scarves and lightweight ribbons. Have them feel the wind, notice how it moves their scarves, and identify which direction it's blowing. Discuss: "Is the wind stronger here or there? The sun warmed the earth differently in different places, making the wind stronger in some spots!"

3. Sun and Wind Role-Play: Have students stand in a circle. One student is "the Sun" in the middle who slowly spins, gently pushing other students to move (this represents uneven heating creating wind). Other students move around the circle like wind being pushed by the sun's heat. This kinesthetic activity helps students understand cause and effect: sun's heat !' wind's movement.

Cross-Curricular Ideas

1. Mathematics - Measurement: Measure the height of a turbine tower using non-standard units (paper clips, sticks, student heights). Ask: "How many students tall is the turbine?" This builds understanding of scale and relative size in a concrete way.
2. English Language Arts - Descriptive Writing: Read a simple picture book about wind (see resources below). Have students draw a turbine in wind and write or dictate words that describe what they see: tall, spinning, fast, strong, big. Create a class word wall of wind and weather words.
3. Social Studies - Community Helpers and Jobs: Discuss that people work at wind farms to build, fix, and watch turbines. Show pictures of wind turbine workers. Connect to community helpers and jobs that use science (engineers, electricians, weather scientists). Discuss: "What job interests you? How does science help people do their jobs?"
4. Art - Movement and Motion: Students create turbine blades from paper strips and decorate them with colors, patterns, or drawings. Hang the blades from the ceiling or attach to a stick. Blow gently to make them spin. Students practice drawing curved, flowing lines (like wind) and spinning shapes to represent motion in art.

STEM Career Connection

1. Wind Turbine Technician: A person who builds, fixes, and keeps wind turbines working safely. They climb high up to check the blades and make sure everything spins smoothly. They use tools and science to solve problems. Average annual salary: \$56,000 USD
2. Weather Scientist (Meteorologist): A scientist who studies wind, storms, rain, and weather patterns. They help people understand when and where wind is strong enough to build turbines. They use special tools to measure wind speed and direction. Average annual salary: \$97,000 USD
3. Wind Farm Engineer: A person who designs where to put wind turbines and how many you need in one place. They use science and math to figure out the best locations where wind is strong and steady. They plan how to connect turbines to power lines so electricity reaches homes. Average annual salary: \$104,000 USD

NGSS Connections

Performance Expectations

- 1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- Connection: Students observe that the sun (visible in the clear sky in this image) creates wind through heating Earth's surface, which follows predictable patterns.
- 1-ESS1-2: Make observations at different times of year to relate the amount of daylight to the time of year.
- Connection: The amount of daylight and sun angle affect wind patterns. Students can observe that wind turbines might spin differently across seasons as sunlight intensity changes.

Disciplinary Core Ideas

- 1-ESS1.A: Patterns of the sun, moon, and stars can be observed, described, and predicted
- 1-ESS1.B: The sun warms Earth's land, air, and water

Crosscutting Concepts

- Patterns: Wind patterns follow predictable sequences related to the sun's heating
- Cause and Effect: The sun's heat causes wind; wind causes turbine blades to spin
- Energy and Matter: The sun's energy creates wind; wind energy is transformed into electricity
- Systems and System Models: Wind turbines are part of Earth's larger weather and energy systems

Science Vocabulary

- * Wind: Moving air that we can feel and see, but not hold in our hands.
- * Turbine: A machine with spinning blades that uses wind or water to make electricity for people to use.
- * Weather: What it is like outside—hot, cold, windy, rainy, or sunny—on any day.
- * Natural Resource: Something from nature that people can use, like wind, water, soil, or sunlight.
- * Energy: The power to make things move or change; the sun gives Earth energy that creates wind.
- * Blade: One of the three long, flat pieces of the turbine that spin around in the wind.

External Resources

Children's Books

- * "Wind" by Marion Dane Bauer (illustrated by John Wallace) — A simple picture book that explains what wind is, where it comes from, and what it can do. Perfect for First Grade, with beautiful illustrations of wind effects in nature.
- * "Feel the Wind" by Arthur Dorros (illustrated by Don Almquist) — An engaging exploration of wind with simple text and colorful pictures showing how wind moves things and helps people. Includes activities and observations students can do themselves.
- * "The Wind Blew" by Pat Hutchins — A rhythmic, fun picture book about wind blowing away people's belongings. Great for reading aloud and discussing what wind does, with engaging illustrations that First Graders love.

Teacher Note: This lesson anchors in the observable phenomenon of wind turbines and connects directly to the sun's role in creating weather patterns, a key First Grade earth and space science concept. Use the discussion questions and extension activities to help students move from simple observation to beginning understanding of cause and effect in Earth's systems.