

Photo Description



This photo shows many dark blue and black rectangles on top of a building's roof. These rectangles are called solar panels. They catch sunlight and turn it into energy that helps power buildings. In the background, you can see a neighborhood with houses, trees, and a city skyline far away.

Scientific Phenomena

Anchoring Phenomenon: Solar panels capture sunlight and convert it into usable electrical energy.

Why This Happens (Scientific Explanation for Teachers): Solar panels contain photovoltaic cells made of semiconductor materials (typically silicon). When photons from sunlight strike these cells, they excite electrons, creating an electric current through the photovoltaic effect. This direct conversion of light energy into electrical energy allows buildings to power lights, appliances, and equipment without burning fossil fuels. This is a renewable energy source because the sun continuously provides energy.

Core Science Concepts

1. **Energy Transfer:** The sun's light energy is transformed into electrical energy that people can use.
2. **Light as a Form of Energy:** Sunlight is a type of energy that can be captured and used to do work (like powering a light bulb or refrigerator).
3. **Renewable Resources:** The sun provides energy continuously every day, making it a resource that doesn't run out like coal or oil.
4. **Heat and Light Relationship:** Solar panels work best on sunny, bright days when more light reaches the panels.

Pedagogical Tip:

For First Grade, focus on the simple cause-and-effect relationship: "Sun shines on the panels !" panels make electricity !" electricity powers things in the building." Avoid complex details about electrons or circuits. Use concrete examples of things the electricity can power: lights, computers, refrigerators. Consider having students trace the sun's path across the sky during the day to build understanding of sunlight availability.

UDL Suggestions:

Universal Design for Learning Approach: Provide multiple means of representation by using visual aids (pictures of sunny days vs. cloudy days), tactile exploration (letting students hold a small solar-powered toy or flashlight), and kinesthetic activities (students act as "photons" moving toward and hitting panels). Allow students to respond through drawing, speaking, or dramatization rather than written responses only.

Zoom In / Zoom Out

Zoom In: Microscopic Level

At the smallest level, sunlight is made of tiny particles called photons. When photons hit the silicon atoms inside a solar panel cell, they give energy to electrons, causing them to move and create electricity. This happens billions of times per second on each panel!

Zoom Out: Planetary System

Solar panels are part of a global effort to use the sun's renewable energy instead of fossil fuels. Across entire cities and countries, rooftop solar panels, solar farms, and solar power plants work together to reduce pollution and provide clean energy for millions of people. This connects to Earth's climate system because using solar energy instead of coal or gas helps protect our atmosphere.

Discussion Questions

1. "What do you think happens to the sunlight when it hits the solar panels? Where does it go?" (Bloom's: Understand | DOK: 1)
2. "Why do you think the panels are dark blue instead of white or red? What color might catch the most sunlight?" (Bloom's: Analyze | DOK: 2)
3. "Compare a sunny day and a rainy day. When would the solar panels make more electricity? Why?" (Bloom's: Compare | DOK: 2)
4. "What things in your home use electricity? Could solar panels help power them?" (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "Solar panels need to be hot to work."
 - Clarification: Solar panels work better on cool, sunny days. They convert light energy, not heat energy. (Cold, bright days work great; hot, cloudy days work poorly.)
2. Misconception: "Solar panels only work when it's super sunny and hot outside."
 - Clarification: Solar panels work on cloudy days too, just not as well. As long as there is some daylight, the panels catch some light and make some electricity.
3. Misconception: "The sun creates electricity inside the panel."
 - Clarification: The sun gives light energy. The panel's special materials change that light energy into electrical energy. The sun doesn't make electricity; the panel does!

Extension Activities

1. Solar Cooking Experiment: On a sunny day, place a graham cracker and chocolate in a small ziplock bag. Seal it and place it on a sunny windowsill or outside for 15–20 minutes. Watch as the sun's heat melts the chocolate. Discuss: "The sun gave energy to melt the chocolate. Solar panels catch this same sunlight and turn it into electricity!"
2. Build a Solar Panel Model: Give each student a piece of black construction paper and a small solar-powered toy (solar calculator, solar-powered fan, or solar car). Place the toy on the paper in sunlight. Have students observe and draw what happens. Move it to shade and observe again. Ask: "When does the toy work better?"

3. Sunshine Tracking Chart: Over one week, create a simple picture chart showing sunrise, noon, and sunset. Have students draw the sun's position at different times of day. Discuss: "When does the sun give the most light? That's when solar panels make the most electricity!"

Cross-Curricular Ideas

1. Math: Create a simple bar graph showing "Sunny Days vs. Cloudy Days" in your local area for one month. Count and compare which type of day is more common. Discuss how this affects solar panel energy production.
2. ELA - Writing: Have students draw and label a picture of the sun powering a solar panel. Write or dictate a simple sentence: "The sun gives light. The panel makes electricity." Create a class book of solar energy stories.
3. Social Studies - Community Helpers: Invite a local electrician or solar panel installer to visit the classroom (virtually or in person) to talk about their job. Students can ask: "How do solar panels help our community?" This builds awareness of renewable energy careers.
4. Art - Light and Shadow: Use flashlights and paper to create shadow art. Discuss: "Light gives us energy to see. Solar panels use light energy to make electricity." Students can paint or draw pictures of sunny days and the things powered by solar energy.

STEM Career Connection

1. Solar Panel Installer: This person puts solar panels on roofs and buildings to help people use clean energy from the sun. They measure, climb, and attach the panels carefully. Average Salary: \$50,000–\$65,000 per year.
2. Electrical Engineer: An electrical engineer designs and tests systems that use electricity from solar panels. They figure out how to make electricity safe and useful. Average Salary: \$105,000–\$120,000 per year.
3. Environmental Scientist: This person studies how solar energy helps protect the Earth by reducing pollution. They measure how much clean energy solar panels make. Average Salary: \$68,000–\$85,000 per year.

NGSS Connections

Performance Expectation:

1-PS4-3: Plan and conduct investigations to provide evidence that vibrations make sound and that vibrations can make materials move.

Disciplinary Core Ideas:

- 1-PS4.A Sound can make matter vibrate, and vibrating matter can make sound.
- 1-ESS1.A Patterns of the sun, moon, and stars can be observed, described, and predicted.

Crosscutting Concepts:

- Energy and Matter Energy can be transferred in various forms—in this case, light energy becomes electrical energy.
- Patterns The sun's light follows a pattern: bright during the day, dim in evening, and absent at night.

Note: While this image most directly connects to energy concepts, First Grade NGSS standards emphasize observable patterns and basic energy awareness rather than detailed energy transformations. Adapt connections based on your state's specific standards.

Science Vocabulary

- * Solar Panel: A flat, dark rectangle that catches sunlight and turns it into electricity.
- * Electricity: A type of energy that powers lights, computers, and many other things in our homes and buildings.
- * Sunlight: Light and energy that comes from the sun.
- * Energy: The power to make things work, move, or change.
- * Renewable: A resource (like sunlight) that we can use again and again without running out.
- * Power: The ability to make things work; electricity gives power to machines and lights.

External Resources

Children's Books:

The Sun* by Shelley Rotner and Sheila Kelly (Picture book about the sun and its role in our world)

What Makes Day and Night* by Franklyn M. Branley (Explains sunlight and Earth's rotation in simple terms)

Click, Clack, Moo: Cows That Type* by Doreen Cronin (While humorous fiction, can spark discussions about energy and work)

End of Lesson Guide