

Solar Energy

AP Environmental Science · Unit 6: Energy Resources and Consumption

The Teaching Analogy

"Think about a plant leaf. Chlorophyll inside it captures photons from the sun and converts that energy into food. A PV cell does almost the exact same thing — but instead of sugar, it pushes out electricity. Every rooftop solar panel is basically a silicon leaf."

Key Concept

Photovoltaic (PV) cells convert sunlight directly into electricity. Silicon atoms in the cell absorb incoming photons, which knock electrons loose — that flow of electrons is electrical current. Unlike fossil fuels, PV cells have no moving parts, produce zero emissions during operation, and are limited primarily by sunlight availability.

Guided Practice

1. In the leaf analogy, chlorophyll converts photons into sugar. What does silicon in a PV cell convert photons into, and why is this useful for powering homes?
2. A student claims solar panels are "just like burning coal — both use energy from the sun." Use the leaf analogy to explain one key difference in how each process works and what it produces.
3. The sun only shines part of the day. Using the leaf analogy, what challenge does this create for solar energy as a primary power source, and how might it be addressed?

Extension Activity

Have students design a "solar leaf building": sketch a school or home that uses both passive solar design (south-facing windows as the "leaves") and rooftop PV panels. They must label which parts act like chlorophyll (capturing photons) and which act like the plant's vascular system (distributing energy). Compare designs to identify trade-offs between passive and active solar strategies.