



SOLAR ENERGY FOR THE CLASSROOM



Provided by Pierce Cedar Creek Institute
www.cedarcreekinstitute.org

Powering Household Appliances With Solar Energy

Activity Overview

Grade Level: 6-8

General Description

Students will construct a simple photovoltaic system using a solar cell, motor, and propellers to determine if solar energy can be used to power household appliances.

Learning Outcome

Students will learn how a PV cell generates electricity that can be used to power appliances.

Science Content Standards

Content Area: Constructing New Scientific Knowledge (C) I.1.1

Standard: All students will generate scientific questions about the world based on observation.

Content Area: Constructing New Scientific Knowledge (C) I.1.2

Standard: All students will design and conduct scientific investigations.

Content Area: Constructing New Scientific Knowledge (C) I.1.3

Standard: All students will use tools and equipment appropriate to scientific investigations.

Content Area: Matter and Energy (PME) IV.1.5

Standard: All students will conduct simple circuits and explain how they work....

Content Area: Matter and Energy (PME) IV.1.6

Standard: All students will investigate electrical devices and explain how they work.....

Content Area: Changes in Matter (PCM) IV.2.4

Standard: All students will describe common energy transformations in every day situations.

Content Area: Waves and Vibrations (PWV) IV.4.4

Standard: All students will describe ways in which light interacts with matter.

Background

Photovoltaic or solar cells are made of silicon (sand). The silicon is heated to extreme temperatures. It is doped with chemicals, usually boron and phosphorus. This sets up an unstable environment within the solar cell. When light strikes the cell, electrons are dislodged and travel along wires placed within the cell. The electrons follow the wire and power whatever load is attached, such as a motor or light. This flow of electrons is electricity. Photovoltaic cells or solar cells use light to produce electricity. Solar electricity is quiet, clean, and non-polluting.

Materials

- photovoltaic cells (PV cells)
- wire or alligator clips
- propellers
- motor
- data sheet

Methods

1. Discuss what a PV (solar) cell is made of and how it works.
2. Attach the propellers to the motor.
3. Attach the solar cell wires to the motor wires, red to red, black to black.
4. Place solar energy system in the sunlight and observe.

Discussion/Assessment

- See attached data sheet
- If time permits, and based on students' understanding of the propeller photovoltaic system, have students design a small, low-voltage toy that could be operated using the same PV cells.

Source: This activity was adapted from a Watts on Your Mind Activity: Photovoltaic Energy Systems



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Name(s): _____

Date: _____

"Powering Household Appliances with Solar Energy"

Problem: Can sunlight power small household appliances?

Hypothesis: I think _____ (will happen)

because _____

Data/Results:

1. What happens when the panel is turned over away from the light?
2. Observe the rotation of the propeller blades. Which way are they turning?
3. What happens to the propeller when the wires are attached red to black?
4. Does the angle of the cell in relation to the sun make a difference in how fast the propeller turns?
5. What would happen if several cells were hooked together?
6. Describe how one could power larger household appliances using solar energy.

Conclusion: My hypothesis was correct () incorrect ()

because _____

Analysis: Was this a FAIR TEST? _____ Why or why not?
