

Lesson 7: The Sun Can do “Watt”?

Adapted/ Revised From

New Mexico Solar Energy Association, Idaho National Laboratory, Wisconsin K-12 Energy Education Program

Grade Level

6-12

Objectives

- Measure the energy produced by a small PV panel with a multimeter
- Construct a motor with a propeller attached and run it using solar energy
- Measure the energy from the solar panel and utilized by the motor driving a propeller
- Discuss the findings with their classmates

Overview

Through a simple hands on demonstration student will be able to describe how sunlight becomes energy to power things.

Materials (per group)

- Small PV panel
- Small motor
- Small propeller made from cardstock, balsa wood or any other material
- Multimeter

Estimated Cost of Materials

\$20 per group

Computer Required?

No

Duration

1 class period

Primer References

1.1 Forms of Energy
1.5 Energy Conversion
3.1 Solar

Related Articles

N/A

Engagement

1. Why is energy important?
2. How do we know if the sun gives off energy or not?
3. How can we take sunlight and turn it into something useful?
4. What would be the benefits of using solar energy?
5. What might be the drawbacks?

Investigation

1. Divide students into small groups with the materials listed.
2. Students should construct a small propeller, pinwheel, or similar and attach it to the drive shaft of the motor.
3. Mount the motor to something stable by taping it to a piece of wood or cardboard.
4. Place the PV solar panel in direct sunlight with no shade, connect it to a multimeter and record how many volts are registered.
5. Detach the multimeter from the solar panel and connect it to the motor, connecting red wire to red wire and black wire to black or blue wire. (Often the wire from a motor is blue not black, but it is still the negative lead.)
6. Place the solar PV panel in direct sunlight with no shade. While the propeller is rotating, touch the multimeter test probes to the corresponding terminal on the motor itself, again red to red, black to black or blue wires. Record the voltage reading.

Class Review

1. Have the class share their findings and discuss what their findings might mean.

Elaboration

1. Have students read the Primer References and discuss the following questions.
2. Is the PV Solar Panel by itself potential or kinetic energy?
3. If energy is neither created nor destroyed as it changes form, how do you explain why the voltage reading on the motor is different from the voltage reading with just the PV solar panel by itself?
4. Using the formula (efficiency = useful energy output / energy input) and using your data collection, determine how energy efficient the solar power activity performed is.

Instructor Notes

- The motor terminals are located on the motor where the wires have been soldered to the motor.

Extensions and Variations

- Build a small model solar powered house and work to decrease the amount to energy lost. For lesson plan go to, <http://www.talkingscience.org/2011/03/building-a-solar-house/>

References/For More Information

Wisconsin K-12 Energy Education Program- Energy Rules!

<http://www.uwsp.edu/cnr/wcee/keep/Mod1/Rules/EnConversion.htm>

The Sun Can Do Watt?

Voltage of Solar PV Panel	Voltage of Motor attached to PV Panel

Questions

1. Using the formula below, what is the energy efficiency of the conversion from the solar PV cell to the motor:

Useful Energy Output (of motor)/ Energy Input (of solar PV cell) = Energy Efficiency

2. List the energy forms associated with the transfer of energy from its source at the sun to the motor run by the PV panel.

3. What are some ways the motors could be powered by more volts?