CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

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Project Number

22227

Project Title

Got The Right Angle: Electricity from Solar Panels

Abstract

Objectives/Goals

To find out what angle a solar panel should be at get the most energy (in watts) from the sun during one day in December.

Methods/Materials

Test Fixture (Pine boards screwed together); Solar Panel, 1.5 Watts with output wires attached; Voltage/amp meter; Computer with Excel spreadsheet; Record logs on paper; Pencil; Protractor; Compass; Watch

Methods:

1. Set up test fixture on table facing south.
2. Place the solar panel on the fixture. Start measurements at 12 pm.
3. Use the Voltage/ Amp meter to take 100 measurements each at 45°, second at 35°, and the final measurement lying flat on table.
4. Enter data into an electronic spreadsheet.
5. Calculate the average wattage of the measurements for each angle.
6. Analyze the data compared to the hypothesis.

Results

The hypothesis stated that the 35° angle would put out the most wattage with an average of 1.90 watts. That was untrue; the 45° angle put out the most wattage at 2.04 watts. The flat panel (0° angle) put out an average of 1.24 watts. The 35° put out an average of 1.9 watts. So, the 45° angle put out a 7.4% greater wattage than the 35° angle with a 10° difference in angle. The 35° angle put out 53% more wattage than the flat panel. The voltage of the three angles remained relatively the same. The amperage is what varied with the different angles. Since the wattage is the product of the voltage and the amperage, the wattage therefore varied with the angle and the change in current (amperage).

Conclusions/Discussion

The experimenter concludes that the hypothesis was partially correct. The solar panel at the 45° angle did better than the 35° angle. This is due to the season that the experimenter ran the experiment. In the northern hemisphere (where San Diego is located) the sun is at its lowest angle in the winter. This experiment was conducted in December. So, this explains why the 45° angle yielded more wattage. So, the experimenter hypothesizes that in the summer, when the sun is at a greater angle, the wattage will be greater when the panel is at a lower angle between 0° and 35°.

Summary Statement

The wattage output of a solar panel will vary with the angle of it to the sun.

Help Received

Father helped build text fixture and look over paper; Mother helped put board together.

Preliminary