CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
David Mariscal

Project Number
J1029

Project Title
How Temperature, Angle, and Distance Affect Solar Cell Wattage

Abstract

Objectives/Goals
The goal of this project is to investigate how changes in temperature, angle and exposure to the sun affect the wattage output of a solar cell.

Methods/Materials
This project involved three tests: 1) Solar Cell Temperature Test, 2) Distance/Cloud Cover Test, and 3) Angle/Sun Position Test. All three tests required the use of a 150 watt portable lamp, solar cell panel, and multimeter that measured voltage and current. The Solar Cell Temperature Test included a digital thermometer and a temperature-controlled enclosure. Measurements of voltage and current were taken at "cool", "warm" and "hot" temperature levels (Test 1), different distances between the solar cell and lamp (Test 2), and at various solar cell angles (Test 3). The voltage and current readings were multiplied to calculate solar cell wattage produced for each test.

Results
The Solar Cell Temperature Test findings followed Ohm's Law - as the temperature rose by 10.5 C, the solar cell wattage decreased by almost 50% due to increased resistance. The Distance/Cloud Cover Test findings followed Newton's Inverse-Square Law - the solar cell wattage decreased inversely proportional as the distance (proxy for cloud cover) increased between the solar panel and the lamp. The Angle/Sun Position Test demonstrated that the production of solar cell wattage is directly tied to the solar cell's angle to the lamp.

Conclusions/Discussion
My conclusion is that the best place to locate an efficient solar photovoltaic generation plant would be near Denver, Colorado because it is about a mile above sea level, has cool temperatures, and gets reasonable amounts of sunshine. I would recommend that any photovoltaic solar system have a tracking device that follows the sun's angle/position in order to maximize solar cell wattage production.

Summary Statement
My project investigates how temperature, angle and distance affects solar cell wattage.

Help Received
Parents helped type report and organize board; used Ribet science department lab equipment under supervision of Mr. Shirajian.