CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
34638

Project Title
Climate vs. Energy Output: The Effect of Temperature on the Productivity of Solar Panels

Abstract

Objectives/Goals
The objective of this project was to find how temperature affects the power produced by solar panels. The purpose was to see if panels in different climates have varying results. For example, one could see whether it is smarter to place a solar array in the arctic versus the desert. Also, companies that provide solar for houses could more accurately calculate the number of panels needed to power homes in different climates. The hypothesis was that a cold panel would work best.

Methods/Materials
For this experiment, three photovoltaic panels were set up in three environments consisting of a plastic tub and an acrylic cover. One received heat from a heat gun, one was cooled by dry ice, and another was left alone to be tested as a control. The panels were left out in direct sunlight and results were tested for each panel by a multimeter in intervals of thirty minutes. The cold environment was kept at a temperature of 0 degrees Celsius, the hot one was constant at 40 degrees Celsius, and the normal was kept at 25 degrees Celsius.

Results
The average wattage for the cold panel was 0.2164 watts, the hot one was 0.1531 watts, and the control was 0.1751 watts. The P-value of these results was 0.014, making a definite difference in the amount of wattage produced by each panel. The cooled panel worked about 40% better than the heated panel.

Conclusions/Discussion
Through the experimentation the null hypothesis is rejected. Therefore, the results support the alternate hypothesis: the cooled panel works the best. The solar panels in a cold climate work the most efficiently.

Summary Statement
Solar panels produce different amounts of energy at different temperatures, and this information could lead to smarter placement and calculation of photovoltaic cells.

Help Received
Father helped design display.