



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Sarah K. Hantke	Project Number J1013
Project Title Analyzing Solar Cell Efficiency When Using a Sun Tracker	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if a solar cell attached to a sun tracker is more efficient than a stationary solar cell perpendicular to the sun's rays at noon. The scientist believes that the sun tracking solar cell will be approximately 20% to 30% more efficient due to the fact that throughout the day the cell remains perpendicular to the sun's rays. Assuming the scientist's belief is accurate, a secondary objective is to determine the increased efficiency after considering the power required by the tracking apparatus.</p> <p>Methods/Materials A device that contained two solar cells was fabricated. The first cell was fixed in a position perpendicular to the sun's rays at noon. The second cell was attached perpendicular to a rotary table whose plane was parallel to the sun's rays. A tracking device rotated the table, thereby ensuring that the second cell directly faced the sun throughout the day. Each solar cell was attached to a 55 Ohm resistor and a data logger. Experiments were conducted over a ten day period. The data was then converted, through a series of equations, into power. In order to obtain meaningful results, measurements were made in different weather conditions. Separate measurements were also performed to determine the amount of power required by the tracking system.</p> <p>Results The results showed that the sun tracking solar cell was 76% more efficient than the stationary solar cell. When the power consumed by the tracking system was taken into consideration, the overall efficiency increase dropped to 54%.</p> <p>Conclusions/Discussion The scientist's hypothesis was supported by the results of the experiment. What was not anticipated was the degree to which the sun tracking cell's output improved. The scientist had expected an increase of about 20% to 30%. Solar energy production is already very popular. The results suggest that more emphasis might be appropriate for installing sun tracking solar arrays over the more commonly found fixed arrays. Additional research can determine if dual axis tracking systems yield even greater increases in efficiency.</p>	
Summary Statement This project is designed to measure the increased efficiency of a solar cell mounted on a sun tracking turntable versus a fixed solar cell positioned perpendicular to the sun's rays at noon.	
Help Received Father supervised me soldering, using a lathe, and during the fabrication process; father explained some equations	