



# CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

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<b>Project Title</b> Photovoltaic Cells vs. Concentrated Solar Power in Work Produced	
<b>Objectives/Goals</b> The objective of this experiment is to compare the amount of work produced by two types of solar-harnessing technologies: concentrated solar power and photovoltaic cells. <b>Abstract</b> <b>Methods/Materials</b> In this experiment, a concentrated solar power array is constructed using plywood, screws, mirror pieces, and silicone glue. The mirrors are adjusted to reflect sunlight at a single point on a beaker of water. By measuring the rise in temperature of the water, one can use the specific heat equation to calculate the amount of joules that the water absorbed from the focused beam of sunlight. In order to allow for direct comparison, the number of joules absorbed is divided by the time between the measurements. At the same time, a solar panel is trained towards the sun and the amount of volts and amps generated by the panel is recorded by a multimeter. This data can be translated into watts through the formula: Watts = Volts X Amps. Watts, by definition, is a measurement of Joules per second. Surface area is also factored in by dividing each result by the surface area of their respective arrays. Using this method, one can perform a direct comparison between the joules per second per square centimeter generated by the solar panel and the concentrated solar power array. <b>Results</b> Overall, the solar panel was able to generate about 10% more energy than the concentrated solar panel array. However, it should be noted that at different parts of the day, there were times at which concentrated solar power was more efficient. Under direct sunlight, such as at noon, photovoltaic cells performed better than the array. On the other hand, under the diffused light of the rising and setting sun, the concentrated solar power array produced more joules than solar cells did. <b>Conclusions/Discussion</b> The results of this project may be used to indicate that in areas with constant, direct sunlight, such as in the desert, it may be more beneficial to implement a solar panel based system; while in areas that may be cloudy in the winter, one may consider using a concentrating solar power array instead. In general, however, solar panels are still the more efficient and convenient method to harness the energy of the sun.	
<b>Summary Statement</b> This project compares two up-and-coming methods of harnessing solar power: photovoltaic cells and concentrated solar power.	
<b>Help Received</b> I received help from my parents in buying the many materials needed to conduct this experiment as well as the assembling of the backboard. My teachers, Mr. Hunt and Mrs. Corbett, helped by verifying my ideas and equations used in the experiment.	