



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> Riley Stickney	<b>Project Number</b> <b>J0222</b>
<b>Project Title</b> <b>How Does Temperature Affect the Voltage Output of Solar Panels?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of this project is to determine how temperature affects the voltage output of solar panels. <b>Methods/Materials</b> A 10 watt solar panel placed in a Styrofoam ice chest with a full spectrum LED bulb placed above it. Wires were fed through the Styrofoam ice chest to connect the solar panel to a multimeter. LED light was turned on and the amperage of the solar panel was recorded at room temperature.  Dry ice was introduced, voltage output on the multimeter was recorded at 15 minute intervals after the LED light was turned on; temperature inside the cooler was measured with an infrared thermometer when the light was turned off at each interval. This was done in a span of 3 hours.  Next, a blow dryer was used to heat the inside of the cooler at incremental degrees of heat (as measured by the infrared thermometer). The LED bulb was lit at those incremental heat temperatures to measure the amperage output. These measurements were completed in 10 minutes. <b>Results</b> The solar panel produced more volts when cold than when hot. As the temperature increased, the voltage decreased in a near linear fashion. So, the voltage was inversely proportional to the temperature. <b>Conclusions/Discussion</b> My hypothesis was incorrect. Voltage decreased as temperature increased. Cold, but sunny environments will produce more volts than solar panels in sunny, hot environments.  Solar panels would be great to use in sunny, mountainous regions like the Colorado Mountains. In the future, it would be interesting to test if the altitude and thinner atmosphere of the mountains would increase the efficiency of the solar panels. The reason for this may be that the solar panels would be exposed to more direct sun rays and hence more photons that are not filtered out by the atmosphere. Placement of solar farms may need to be reconsidered because solar panels are one of the most promising technologies of green energy.	
<b>Summary Statement</b> I demonstrated that solar panels have higher voltage output at cooler temperatures.	
<b>Help Received</b> I designed the experiment by myself. I used internet seaches to compile and understand the data.	