



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Forrest D. Csulak	Project Number S0204
Project Title H2O & Solar2Go: Using Various Water Temperatures to Determine the Electrical Energy Output of a Solar/Fuel Cell Car	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my experiment was to determine if a correlation exists between the use of various water temperatures in a solar/fuel cell car and the amount of electrical energy it produces as observed by the vehicle's operating duration, distance traveled and speed of the car.</p> <p>Methods/Materials To test my experiment, I constructed the car, connected all appropriate wires in parallel and elevated the wheels. I poured 80 ml of near-frozen, distilled water into the tank and siphoned remaining gases from the fuel cell system. The light energy from a 300 W incandescent light bulb burning for 90 seconds 4 cm away from a photovoltaic cell was converted into electrical energy to electrolyze the water. The electrical energy produced by the fusion of the hydrogen and oxygen gases within the fuel cell kept the car's motor operating. The electrical energy was observed through the mechanical energy of the gears. This energy output was measured by the car's operating duration (the length of time the car's motor operated); distance traveled (calculated by measuring the wheel's circumference multiplied by the wheel's revolutions as observed by video); and speed (calculated by distance traveled divided by duration). This was repeated with water at room temp and near-boiling respectively. Each trial was repeated 9 times.</p> <p>Results The results show a small difference in the electrical energy output with the differing water temps. The trend shows a very slight increase of these measurements as the water temp increases. The results of the cold, room, and hot water temps showed the room temp water produced the least amount of electrical energy while the hot water produced the greatest.</p> <p>Conclusions/Discussion I hypothesized that higher water temps would produce more electrical energy than the lower temps shown by a longer operating duration, a greater distance traveled, and a higher speed of the car's motor. Because higher temps contain more energy than cooler temps, I believed it would take less electrical energy to electrolyze the water using the higher water temps and requiring a shorter time for electrolysis to occur. My hypothesis was correct based on the trend extrapolated from the data; the amount of electrical energy observed increased as the water temperature increased. I believe, though, that further testing is needed to determine the reason for the room temperature water producing the least amount of electrical energy.</p>	
Summary Statement This experiment was conducted to determine if the temperature of water used by a solar/fuel cell vehicle would have effect on the electrical energy as measured by the car's operating duration, distance traveled, and speed.	
Help Received My mom purchased the materials, assisted in the construction of the board, and took pictures during the experiment. My grandma permitted me to utilize her computer for preparing the report and her house for a suitable testing environment.	