



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Christopher D. Isozaki	Project Number J1016
Project Title Reducing Energy Used by Computers Utilizing Green Technologies	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my experiment was to reduce the amount of electrical energy used by computers by using green technologies such as thermoelectric and solar technologies.</p> <p>Methods/Materials To achieve this goal I created my own cooling system that did not use power from the computers power supply. The electrical energy I used for the cooling system was gathered from thermoelectric generators and a solar cell. The first part of the experiment was to utilize various materials and structural forms so I placed an aluminum slab on the CPU with an aluminum box on top to hold water. This was done to maximize the heat transfer away from the CPU using a solid with a high thermal conductivity coefficient and to move it away from the slab as an intermediate step using water. I used the aluminum from the box and connected it to aluminum sheet metal heat fins to maximize the surface area and the heat transfer to the air. The second part of the experiment was to harvest and utilize the heat generated by the CPU. I placed the TEGs on the aluminum box. I decided to place another thermoelectric device, a TEC, against the aluminum box and by supplying the electricity from the TEGs, was able to create a refrigeration effect to cool the box and water and to transfer more heat away from the CPU. I added a solar cell to give the system more power and flexibility.</p> <p>Results The results of the experiment proved my hypothesis correct. When I used the control cooling system consisting of fans and a heat sink, the computer consumed approximately 125 watts. When I used the cooling system I created, the computer used approximately 85 watts which was an energy savings of about 32%.</p> <p>Conclusions/Discussion My hope for this project was to show that computers could use significantly less energy derived from environmentally harmful materials and processes (e.g. oil, coal, nuclear). My results have shown that using my cooling system resulted in a 32% energy savings. If we extrapolated this result to the millions of computers currently in use, it would make a significant difference in energy utilization.</p>	
Summary Statement Reducing the amount of electrical energy used by a computer by utilizing physics principles and green technologies	
Help Received Parents helped with constructing the display board, father helped with some of the testing and product assembly, friend donated computer equipment	