Solar Thermal Solutions II

Castagna, Christine
Frangos, Matthew

The purpose of the experiment was to design and construct a solar thermal system that had two components; the first component was a panel that heated air by drawing it through porous copper that was heated by the sun, and the second was a heat exchanger that was designed to transfer the heat from the air to water. Therefore, the system could heat two mediums. Once constructed, the homemade system comprised of a panel constructed of porous copper and polycarbonate, a fin-tube heat exchanger with baffles, a water reservoir with tubing and various duct work for the circulating mediums. The panel was designed with hinges to fold up to enhance portability; the entire system was designed so that it condensed into one unit for easy transportation. The water heating portion of our system was designed to utilize thermo-siphoning, meaning that the water would circulate without relying on electricity to power a pump. According to the data, our panel heated air up to 145°F and had an average efficiency of 60% and the highest temperature from the water component was 95°F with an average efficiency of 30%. Most solar thermal systems are industrial-scale and overly expensive, so many people cannot implement these systems in their own lives. We designed the system with the overall application in mind of making hot air and water for comfort and hygiene from solar thermal energy accessible to low-income areas, temporary and disaster relief houses, and other areas that normally could not afford the typical systems.

Awards Won: