The Effect of Liquid Cooling on the Energy Efficiency of Solar Panels

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This experiment focused on determining the effect of water cooling on the efficiency of solar panels. This experiment also analyzed the cost effectiveness of using a municipal water supply to thermodynamically increase the power produced by a home solar panel system. It was hypothesized that when adding liquid cooling agent to the solar panels through the form of water droplets, the surface temperature would be cooled to increase the electrical efficiency of the system. It was also hypothesized that through the use of a programmed water dispensing timer, the price of water and the gain of electrical output would make the water-cooled solar panels more financially efficient. With a micro-controller, electric valve, and water dispersal unit, cooling intervals were varied in order to measure both the energy efficiency and cost effectiveness of the cooling method. Through an analysis of the costs of water and of the gains of increased electrical output, it was determined that water cooling solar panels through a municipal water supply increases energy efficiency while having a monetary net loss for every procedure. The procedures that used the least amount of water were the most cost efficient due to the high price of municipal water. This experiment is very applicable in a real-world consumer-based setting, as solar panels have become one of the front runner solutions for climate change and sustainability. If provided with a recyclable water source or system, it can be concluded that water cooling solar panels is both more energy efficient and cost efficient.

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