

ABSTRACT

Renewable energy has become a crucial solution in the modern era to replace fossil fuels, which cause pollution and the greenhouse effect. One such example is solar electricity, which can be harnessed through photovoltaic power plants (PLTS) to meet household and industrial electricity demands. However, the performance of solar panels is highly influenced by operating temperature, where a temperature rise above 25°C can reduce their efficiency by up to 0.5% per °C.

To address this issue, active cooling using water proves to be an effective solution, as it can simultaneously lower temperature and clean the panel surface. This cooling system will be equipped with a microcontroller to automate the system. To determine if the system is functioning well or efficiently, a comparison is made between two solar panels—one using the water cooling system and the other without.

With the implementation of the water cooling system, the solar panel temperature can be reduced by approximately 7.15 °C, resulting in an efficiency increase of 0.43% per degree, and producing a total of 32.842 Wh of energy during a 5-hour testing period.

Keywords: *Efficiency, Solar Panel, Temperature, Irradiation, Energy*