

DESIGN OF AUTOMATIC CONTROL SYSTEM OF UNDERWATER SOLAR PANELS

Meilana Siswanto, ST, M.Sc (Thesis Supervisor)

Maulana Malik Aljailani
Study Program of Renewable Energy Engineering
Department of Engineering

ABSTRACT

Semi-conductor devices used to convert solar energy into electricity are solar panels. Improving the performance of solar panels can be done by reducing the occurrence of power loss due to the conversion process to changing the material that makes up the cells. Several previous studies have shown the effect of increasing efficiency by reducing temperature drift, reflection and spectral response. The method used by previous researchers was to submerge solar panels in shallow water (4cm depth), the increase in efficiency can reach 15% to 21.6% when compared to dry solar panels, but this method is not effective when the irradiation value is less than 600 W/m^2 . Based on this, the author makes an automatic control system for underwater solar panels to improve its performance. This control system can determine the condition of solar irradiation and water level, so that when the irradiation value is low, the solar panel will be at 1 cm above the water surface, while when the irradiation value is high, the solar panel will be at a depth of 4 cm below the water surface. This method can increase efficiency up to 18.9% with an average of 10.2% and can reduce the panel surface temperature up to 17.1°C . The control system consumes external electrical energy of 21 Wh or 51.8% of the total electrical energy production of 10 Wp polycrystalline solar panels, so this system is more suitable for larger scale PV grid applications.

Key words: *control system, underwater solar panels, efficiency improvement*