ABSTRACT

Photovoltaic (PV) is a device that can convert sunlight into electricity. However, PV has a weakness, namely when the sunlight received is low, the resulting current and voltage are also low. In addition, the performance of PV is also affected by temperatures where high temperatures can reduce the efficiency of the power generated by PV. Therefore, in this study, a concentrator in the form of a flat mirror (heliostat) is designed to increase the light received by the PV so that the resulting current and voltage increase. But the drawback is, the temperature received by PV also increases. To overcome this, a Thermoelectric Generator (TEG) is installed behind the PV to utilize and convert this wasted heat into electricity thereby increasing the voltage generated by the system. In this study, eight TEC1-12706 modules with cooling in the form of a heatsink were installed behind the 10 Wp PV which were placed upright (90°) to the ground and facing west. Four flat mirrors are placed parallel to the PV so that the PV can still receive the reflection of sunlight when the sun is behind PV. The INA219 sensor is used to read the current and voltage generated by the system. PV currents and voltages without TEG and concentrator were also measured for comparison. The three-day test results show that the current and voltage generated by the PV-TEG hybrid system with a heliostat concentrator produces an average current, voltage and power of 238.18 mA, 6.43 V and 1.90 W while the system without TEG is only 190.81 mA, 5.15 V and 1.23 W. The use of a concentrator and TEG is proven to increase the power generated by PV by 55%.

Keywords: *Hybrid System, Photovoltaic, Thermoelectric Generator, Heliostat Concentrator*