

EFFECTS OF THE TEMPERATURE ON THE OUTPUT VOLTAGE OF MONO-CRYSTALLINE AND POLY-CRYSTALLINE SOLAR PANELS

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Abstract -- People can make solar energy alternative energy by employing solar panels to generate electricity. The utilization of solar energy on a solar panel to generate electricity is affected by the weather and the duration of the radiation, and they will affect the solar panel's temperature. There are various types of solar panels that can be found on the market today, including Mono-Crystalline and Poly-Crystalline. The difference in the material used needs to be observed in terms of temperature changes in the solar module. Our study's findings showed that a change in the temperature would impact the solar panel's output voltage, and the solar panel's output voltage would change when it was connected to the load, although the measured temperatures were almost the same.

Keywords: Solar Energy; Solar panel; Temperature; Voltage

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INTRODUCTION

Electricity is now a primary need, and will increasingly feel its importance when it is gone (for instance, when a power outage occurs). Many researchers have conducted studies on how to maintain the availability of electricity [1, 2, 3, 4]. Likewise, to maintain the system security from various kinds of interference [5, 6, 7], in order that the sustainability of electricity supply to consumers can be enhanced. To increase the consumers' electricity supply, the producers are required to add the power supply to the system. The installed energy capacity can be increased by adding more power plants. Meanwhile, power can also be increased by optimizing the available power plants.

For the past 15 years, the new and renewable sectors have continued to rise [8, 9, 10]. People always do the best to increase the installed power capacity, and the net installed power capacity. Indonesia has such a huge solar energy potential. Since Indonesia is

located on the equatorial line, Indonesia needs to take advantage of its solar energy potential [11, 12, 13]. Not only is solar panel efficiency determined by its materials [14, 15, 16], it is also determined by the sunlight's direction [17] [18], and the solar panel's temperature [19] [20]. The electricity generation on a solar panel can be optimized by improving one of those three factors. Various researchers have done their best to find the best materials in order to generate a higher efficiency [14] [15].

On the other hand, people try to get the sunlight to illuminate the solar panel perpendicularly [21]. A solar panel method with the help of a solar tracker is usually suitable to be applied in a small capacity [22, 23, 24]. If a solar panel is utilized in a centralized system, one will face difficulty in overcoming a problem of shadow appearing on the solar panel.

The effects of temperature on the solar panel's performance were already studied by [20] [25]. Chander et al. [26] compared the series and parallel circuits on the characteristics of I-V P-V curves on a mono-crystalline solar panel [26]. Meanwhile, other