

## ABSTRACT

*The need for electricity in Indonesia in 2015 reached 19.5-20 trillion kWh. However, the contribution of primary energy sources classified as oil and natural gas is only 12.4 trillion kWh. To meet the needs of electrical energy, alternative energy is developed which is described as new and renewable energy. Based on the potential of solar energy in Indonesia, the use of solar panels is precisely applied in Indonesia. However, the power produced by solar panels is fluctuating due to weather factors. To find out the estimated power that could have been generated from solar panels and the maximum power of solar panels that can be transmitted to the load, a simulation experiment was conducted using Simulink contained in the Matlab software. The experiment was carried out by applying the Kalman estimator as a predictor of solar panel power and PID control applying the Constant Voltage (CV) method which acts as the Maximum Power Point Tracking (MPPT) using a buck-boost converter. The results obtained from the Kalman estimator simulation experiments on solar panel power prediction simulations can improve the power that solar panels should produce when irradiated at  $900 \text{ W/m}^2$ , large power with the Kalman estimator at 1.19 watts, at irradiation at  $1000 \text{ W/m}^2$ , the magnitude of the power with the Kalman estimator is 1.44 watts, and when the irradiation is  $1100 \text{ W/m}^2$ , the large power with the Kalman estimator is 1.76 watts. The best maximum Power Efficiency (MPPT) that can be generated is when irradiated at  $1000 \text{ W/m}^2$ , which is 98.04%.*

**Keywords:** *Photovoltaic Cell, Buck-Boost Converter, Maximum Power Point Tracking, Constant Voltage, PID, Kalman Estimator*