ABSTRACK

Renewable energy sources are a solution in solving the problem of dependence on fossil fuels. However, with some of these energy constraints it cannot be used optimally. One of them is the fluctuating characteristics of renewable energy and energy storage systems. Energy storage systems can be utilized when energy cannot be produced to meet load requirements. With the very high potential of renewable energy in Indonesia, it can be optimized for use with optimal energy storage system performance.

In this study, a simulation of the control design of a battery and thermal storage system on a solar panel source will be designed. By utilizing resources from solar panels, the energy output in the form of power will be utilized by a battery and thermal energy storage system. The battery utilizes the power output for the charging process by maximizing the State of Charge (SoC) parameter on the battery using the Constant Current Constant Voltage (CCCV) method. Furthermore, the battery undergoes a discharge (discharge) with a power load flowing. The high energy potential is reused with the existence of a energy storage system by utilizing the thermal stratification system in the water tank as a water heater whose energy can be used occasionally. This backup energy storage system can maximize storage system performance by maximizing power output so as not to cause overcharging of the battery. The results of this study are a simulation of the control design of a battery and thermal hybrid energy storage system using Simulink Matlab with the aim of maximizing the operation of solar panels with energy storage systems in order to obtain a stable output value to meet the specified power load.

***Keywords**: Solar Panel, Energy Storage, Battery, Thermal*