

ABSTRACT

The need for electrical energy as the backbone of daily activities is increasingly urgent, especially in remote areas. In order to overcome the constraints of electricity access in these areas, a study was conducted to develop a Hybrid Power Plant (PLTH) simulation model. This model integrates Microhydro Power Plant (MHP) and Solar Power Plant (SPP) with the use of batteries as energy storage. This research uses MATLAB/SIMULINK to design and analyse the simulation model.

This research aims to increase the capacity of energy that can be generated and distributed from renewable energy power generation systems in remote areas, based on real cases of electrical energy supply shortages in several villages in the archipelago. Through the simulation method, this research tries to introduce, explain, and assist in the understanding of a larger scale form. The results show that the MHP produces a power output of 18 kW to 25 kW because there is a ripple in the rotor speed so that the power produced is less stable, PV produces an output power of 5 kW. The battery can charge and discharge well according to the test on the battery conservation sub-system, with this shows that Hybrids can be an effective solution to meet electricity needs in remote areas, although the challenge of electrical power instability from weather factors needs to be overcome.

However, the system integration results show that the power distribution is not as expected, mainly due to the voltage and current differences between the MHP and the Solar. This difference may affect the overall system efficiency. Therefore, this study shows that although MHP has the potential to fulfil the electricity demand in remote areas, further research needs to be done to overcome technical challenges such as power instability and efficient system integration.

Keywords: Hybrid, MHP, Solar, Matlab/Simulink, Battery