ABSTRACT

Electrical energy is a necessity that is quite important for people's daily lives. Almost every day humans today use electronics as a tool in every activity. To make energy savings because of the many users of electronic devices that need power supplies as a source, it is necessary to have alternative energy sources that are environmentally friendly to facilitate the activities.

One way to overcome this problem on a household scale needs to make a house with a hybrid power system with photovoltaic and wind turbine as the main source of power used. The aim is to reduce the cost of electricity used in order to get a relatively affordable cost.

The workings of the "Hybrid Resource Balancing System (Solar and Wind)" has two energy sources (photovoltaic and wind turbine). Energy produced by photovoltaic and wind turbine is flowed into storage, because the output produced by wind turbine is AC current, so it requires inverter to convert AC current to DC current.

The purpose of this system is to get the lowest cost to find out how much PV, wind turbine, and storage is needed to meet the electricity energy needs of the village of Ciheras. With this system it is expected to overcome the problems that occur in saving energy that is environmentally friendly.

In addition to analyzing the system and calculating costs using the Hybrid Optimization Model for Electric Renewables (HOMER) program, the authors also make a prototype as a comparison between prototypes and non-prototypes in terms of voltage, power, and current generated.

Based on the analysis results of hybrid design of Photovoltaic and Wind Turbine systems with HOMER application in Ciheras village with a large load of 3.39 kWh per day produces system optimization, with the best system breakdown based on NPC (Net Present Cost) 1 Photovoltaic, 1 Wind Turbine, and 7 1000 Ah OpzV batteries. The system produces 7,887 kWh per year or 21.60 kWh per day with an initial cost of building a Capital Cost of Rp 36,090,716, a Net Present Cost of Rp 129,817,300 and a Cost of Energy of Rp 2,445 per kWh.

The prototype produces average voltage, current, and power from 3 hours of PV data collection of 5.2705 V, 0.49625 A, 2.759963 Watt and wind turbine 1.81425 V, 0.2275 A, 0.416025 Watt.

Keywords: *solar panel, hybrid power.*