

ABSTRACT

Hydroponics is a way of cultivating plants without using soil by optimizing the fulfillment of plant nutrients in water as the growing medium. There are several types of plant cultivation techniques using hydroponics. The type of hydroponics used in this research is the Deep Flow Technique (DFT) technology system which flows plant nutrient solutions continuously. To ensure that the supply of nutrients to hydroponic plants is met, some hydroponic systems use a monitoring system to ensure that the level of available nutrients meets needs, which requires continuous electrical energy which can have an impact on the high electricity costs.

This capstone design research aims to design a hybrid Solar Power Plant system that uses a combination of solar energy, batteries and PLN which is useful for powering a hydroponic system that requires sustainable electrical energy to run electronic components and IoT. In the hybrid Solar Power Plant system there is a monitoring system to find out the energy produced by the Solar Power Plant and data on hydroponic plants from the Solar Power Plant system to the hydroponic system. The data will be displayed on the LCD and on a application.

The main source of electrical energy in the system is Solar Power Plant with ATS which can regulate the transfer of energy sources automatically. When Solar Power Plant cannot power the load, ATS will change the electrical energy source to PLN, but when Solar Power Plant can power the load, ATS will immediately move the energy source to Solar Power Plant. The results of the research that has been carried out show that this hybrid system is capable of transferring energy automatically and smoothly. When the battery power drops below 11.4 V, the system seamlessly switches to using energy from PLN, and vice versa, the system switches back to the battery when the battery power exceeds 12.4 V. In terms of cost, this system proves to be more expensive in the long term, with the cost per kWh produced by solar panels around IDR 2,963.34 per kWh, compared by the PLN tariff for 900 VA power which is IDR 1,467.28 per kWh. However, this is comparable to the benefits obtained for users in terms of solar PV and hydroponic data monitoring features, so that it saves time and effort.

Keywords: Solar Panels, Hydroponics, Solar Power Plant, IoT.