

DEVELOPMENT OF HYBRID PICOHYDRO AND SOLAR ENERGY SOURCES TO SUPPORT ENERGY INDEPENDENCE TOURISM AREA SUNGAI PELANG

by Nurhening Yuniarti, Moh. Khairudin, Toto Sukisno

ABSTRACT

The use of fossil fuels as an energy source both in the form of heat and electricity has a negative impact on the ecology and environment. The scarcity of fossil fuels is also another problem that will arise. Therefore, it is necessary to develop alternative renewable energy sources that are used together or replace fossil fuels.

Electricity demand is increasing, so is the Special Region of Yogyakarta (DIY) which is a tourist area and industrial area. At present the community depends on electricity for power from the power plant distributed by PLN. The electricity supply for the system is 568.5 MW which is supplied from the Java-Bali sea cable of 190 MW (34%) and the power plant is 378.5 MW (66%). The biggest unit is the Suralaya West Java power plant of 130 MW. Fulfillment of electrical energy is only 2046 GWh, so there is still a shortage of energy by 820 GWh. The abundant solar radiation in Yogyakarta which is around 4,739 kWh / m² due to its location around the equator is also a consideration for applying a hybrid electricity source when the river flow is decreasing. Therefore, extensification and diversification of alternative electric energy sources are needed with local wisdom but are reliable so that in particular the tourist areas can be energy independent without depending on the supply of PLN.

The objectives of this research are to: (1) develop a hybrid picohydro and solar power generation system as an effort to realize the independence of the electrical energy source of Pelang River tourism area. (2) development of automatic control systems in picohydro and solar hybrid power plants so that they can be adaptive to river conditions, continuity of electricity supply with zero PLN supply and environmentally friendly. (3) Testing the reliability and optimization level of the picohydro and solar hybrid power plants so that they are able to produce electricity for the Pelang River tourism area with a target of zero PLN supply.

The results are expected to be realized, (1) a unit of picohydro and solar hybrid power generation is obtained as an effort to realize the independence of the electrical energy source of Pelang River tourism area. (2) an automatic control system is obtained in the hybrid picohydro and solar power plants so that it can be adaptive to river conditions, continuity of electricity supply with zero PLN supply and environmentally friendly. (3) obtained the level of simplicity, safety and saving of electrical energy with zero PLN supply so that the energy independent region is realized. Besides filing patents, publishing articles to international journals is also a targeted achievement in this study.

Kata Kunci: *hybrid, automatic control, energy independent, energy source*