Perencanaan Pembangkit Listrik Tenaga Mikrohidro Dengan Memanfaatkan Aliran Air Pendingin Kondensor Pltu Unit 06 Paiton. *(Planning of a Microhydro Power Plant by Utilizing the Condenser Cooling Water Flow of the Paiton Unit 06 Steam Power Plant).* Supervised by : Dedy Eko Rahmanto,S.TP.,M,Si

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ABSTRACT

The advancement of modern times has increased the demand for electrical energy, which until now still relies heavily on non-renewable sources, making the development of New and Renewable Energy (NRE) such as hydropower an alternative solution. One potential that has not been optimally utilized is the condenser cooling water flow in large power plant installations. This study aims to assess the potential and design a Micro-hydro Power Plant (MHPP) by utilizing the condenser cooling water flow at Paiton CFPP Unit 06, as well as determining the most optimal turbine type based on the local hydrological characteristics. The method used in this research is an observational method through direct field measurements and secondary data analysis to determine water discharge and effective head. Based on technical data, the condenser cooling water flow has an average discharge of 116.25×10^3 *m^3/hr with an effective head of 5.39 m. The most optimal turbine type to be applied is a horizontal axis Kaplan turbine, which based on simulation results, achieves an efficiency of 93%. Through these parameters, the MHPP system is projected to generate an electrical power output of 1,219.75 kW with a total annual energy production reaching 9,616,494.30 kWh. Economic analysis indicates that the project requires an initial investment of IDR 1,963,500,000.00 with a remarkably low Levelized Cost of Electricity (LCOE/HPP) at IDR 30.63/kWh. Compared to the PLN industrial/business electricity tariff, utilizing this MHPP for internal needs can provide a potential energy cost saving of up to 98% or equivalent to IDR 13.89 Billion per year, yielding a very short payback period of 1 month and 21 days. The utilization of energy from this cooling water waste serves as a strategic effort to enhance operational efficiency while supporting the clean energy transition.*

Keywords: *MHPP, Condenser Cooling Water, Kaplan Turbine, Power Potential, Economic Analysis.*