

***Techno-Economic Analysis of Hybrid Solar Power Plants as Public Street Lighting at Miftahul Hasan Islamic Boarding School in Pakusari Jember***

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***ABSTRACT***

*Public street lighting plays an important role in supporting security and nighttime activities in the Miftahul Hasan Pakusari Jember Islamic Boarding School environment. This study aims to analyze the technical and economic feasibility of a Hybrid Solar Power Plant (PLTS) system as an energy source for public street lighting. The research method is carried out by collecting data on load requirements, component specifications, solar irradiation data, and investment costs. The techno-economic analysis uses the Life Cycle Cost (LCC), Levelized Cost of Energy (LCoE), Net Present Value (NPV), Benefit Cost Ratio (BCR), and Payback Period (PP) methods. The results show that the PLTS-Hybrid system is capable of producing energy of 642.4 kWh/year with a total production of 12,848.2 kWh for 20 years. The total initial investment is Rp8,497,509, the LCC value is Rp13,182,297, and the LCoE is Rp1,285/kWh. The system also provides electricity cost savings of Rp375,804 per year. Based on the NPV analysis value of -Rp7,076,445, BCR 0.17, and PP 37.3 years, the investment feasibility of the PLTS-Hybrid system is declared less feasible to be applied for public street lighting at the Miftahul Hasan Pakusari Jember Islamic Boarding School. The results show that the economic benefits obtained during the project life have not been able to cover the investment costs incurred. Although this investment has not met the economic feasibility criteria, the implementation of the PLTS-Hybrid system can still be considered as an effort to diversify energy sources and reduce dependence on PLN electricity supply.*

*Keywords: Hsolar power plant, investment feasibility, public street lighting, technoeconomics.*