Design of an Off-Grid Solar Power Plant (PLTS) on the Rooftop of a Fish Auction Building at Brondong Nusantara Fisheries Port
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ABSTRACT

Pelabuhan Perikanan Nusantara (PPN) Brondong is one of the major fisheries activity centers that requires a reliable electricity supply to support the daily operation of the fish auction building. This study aims to design an off-grid solar power plant (PLTS) installed on the rooftop of the fish auction building at PPN Brondong as an effort to provide an independent and sustainable energy supply. The research methodology includes literature review, site survey, electrical load data collection, calculation of PLTS component capacities, and technical system design using OpenSolar and AutoCAD software.The design results indicate that the total daily electrical energy demand reaches approximately 192.49 kWh/day with a peak power of ±16.45 kW. The PLTS system is designed using 98 units of 650 Wp solar panels with a total installed capacity of approximately 63.7 kWp, 7 MPPT units, 2 units of 48 V inverters with a capacity of 12 kW each, and 33 units of 48 V 200 Ah lithium batteries. The estimated initial investment cost of the off-grid PLTS system is IDR 2,494,676,418. Based on the economic analysis, the system has a payback period of approximately 25 years; therefore, its implementation is primarily intended to achieve long-term operational cost savings and support environmental sustainability. The results of this study are expected to serve as a technical reference and a pilot model for the application of renewable energy in coastal areas, particularly in the fisheries sector.

***Key words**: PLTS Off-grid, Solar Energy, PPN Brondong, System Design.*