

***Design and Construction of a PLN Hybrid Solar Power System for Lighting
Small-Scale Day Old Chick (DOC) Coops***

Siti Diah Ayu Febriani, S.Si., M.Si. (Pembimbing Skripsi)

Ananda Rayhan Putra Santoso
Study Program of Renewable Energy Engineering
Departement of Engineering

ABSTRACT

The poultry industry's reliance on conventional grid electricity (PLN) for lighting Day Old Chick (DOC) coops contributes to high operational costs. This study aims to design and construct a PLN-hybrid Solar Power Plant (PLTS) system using simple components to reduce energy expenses and ensure power supply continuity. Conducted at Politeknik Negeri Jember, this research utilized the Research and Development method. The system configuration consists of a 200 Wp solar panel, a PWM Solar Charge Controller (SCC), a 12V 100 Ah VRLA GEL battery, a Low Voltage Disconnect (LVD), and an 8-pin relay acting as an automatic switch to replace commercial ATS systems. The connected electrical load comprises six 5-Watt DC lamps, totaling a daily requirement of 300 Wh over 10 hours of operation. Testing results revealed that the solar panel generated a peak power of 130.3 W under maximum irradiation of 915–922 W/m². The total daily energy stored in the battery during 5 hours of charging ranged from 538.2 Wh to 556.2 Wh. During discharging, the battery capacity decreased consistently by 8.25 Ah per night while maintaining a stable voltage. The integration of the relay and LVD functioned 100% automatically in switching the load supply to the PLN grid when the battery weakened. In conclusion, this hybrid PLTS system is highly feasible for implementation as its daily energy production can independently fulfill 100% of the DOC coop's load demands under optimal weather conditions.

Keywords: *DOC Poultry Coop, Hybrid PLTS, LVD, Relay, VRLA Battery*