

ABSTRAK

UJI KINERJA PLTS DITINJAU DARI PENGARUH KAPASITAS *WATT PEAK* DAN INTENSITAS CAHAYA MATAHARI PADA SISTEM *OFF GRID 12 VOLT*

(Muhammad Hafiz Adhitya Rachman, 2025, 52 Halaman, 13 Tabel, 18 Gambar, 3 Lampiran)

Penelitian ini bertujuan untuk mengevaluasi kinerja sistem Pembangkit Listrik Tenaga Surya (PLTS) *off-grid* 12V dengan memeriksa efek kapasitas panel surya dan intensitas sinar matahari pada efisiensi dan kinerja sistem. Metodologi yang digunakan meliputi pengukuran tegangan, arus, daya, dan efisiensi komponen utama seperti panel surya, inverter, dan baterai selama periode penelitian di Laboratorium Teknik Energi Politeknik Negeri Sriwijaya selama lima hingga enam bulan. Data yang diperoleh dianalisis untuk memahami hubungan antara variabel kapasitas panel, intensitas cahaya, dan efisiensi sistem secara keseluruhan. Hasilnya menunjukkan bahwa peningkatan kapasitas panel dan intensitas cahaya secara signifikan meningkatkan efisiensi konversi energi, dengan efisiensi tertinggi yang dicapai pada kapasitas 400 WP dan intensitas cahaya yang optimal (>1194 lux). Faktor utama yang mempengaruhi kinerja sistem termasuk kualitas komponen dan posisi pemasangan panel. Kesimpulan dari penelitian ini menekankan pentingnya optimalisasi kapasitas panel dan posisi pemasangan untuk meningkatkan efisiensi dan stabilitas sistem PLTS *off-grid* di Indonesia, serta memberikan rekomendasi untuk pengembangan teknologi tenaga surya yang lebih efisien dan berkelanjutan.

Kata Kunci : Sistem PLTS *Off-Grid*, Kapasitas Panel, Intensitas Cahaya Matahari, Efisiensi Konversi Energi, Energi Terbarukan, Optimalisasi Panel Surya

ABSTRACT

THE SOLAR POWER PLANT PERFORMANCE TEST IS REVIEWED FROM THE INFLUENCE OF WATT PEAK CAPACITY AND SUNLIGHT INTENSITY OF THE 12 VOLT OFF GRID SYSTEM

(Muhammad Hafiz Adhitya Rachman, 2025, 52 Pages, 13 Tables, 3 Appendixs)

This research aims to evaluate the performance of the 12V off-grid Solar Power Generation (PLTS) system by examining the effect of solar panel capacity and sunlight intensity on the efficiency and performance of the system. The methodology used includes the measurement of voltage, current, power, and efficiency of major components such as solar panels, inverters, and batteries during the research period at the Sriwijaya State Polytechnic Chemical Engineering Laboratory for five to six months. The data obtained is analyzed to understand the relationship between panel capacity variables, light intensity, and overall system efficiency. The results show that increased panel capacity and light intensity significantly increase energy conversion efficiency, with the highest efficiency achieved at 400 WP capacity and optimal light intensity (>1194 lux). The main factors that affect system performance include the quality of components and panel installation position. The conclusion of this study emphasizes the importance of panel capacity optimization and installation position to increase the efficiency and stability of the off-grid PLTS system in Indonesia, as well as providing recommendations for the development of more efficient and sustainable solar power technology.

Keywords : *Off-grid Solar Power Generation System, Watt Peak Capacity, Solar Light Intensity, Energy Conversion Efficiency, Renewable Energy, Solar Panel Optimization*