

ABSTRAK

RANCANG BANGUN PEMBANGKIT LISTRIK TENAGA SURYA SISTEM OFF GRID SEBAGAI MEDIA PEMBELAJARAN

(2026: + 76 Halaman + 38 Gambar + 8 Tabel + 6 Lampiran)

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Penelitian ini bertujuan merancang dan membangun Pembangkit Listrik Tenaga Surya (PLTS) sistem off-grid sebagai media pembelajaran di Program Studi Teknik Listrik Politeknik Negeri Sriwijaya. Sistem terdiri dari panel surya 200 Wp, Solar Charge Controller (SCC), baterai 12 V 15 Ah, inverter 500 W, serta perangkat proteksi dan pengukuran. Metode penelitian meliputi perancangan, perakitan, pengujian, dan analisis kinerja sistem. Hasil pengujian menunjukkan bahwa PLTS off-grid dapat beroperasi dengan baik dalam menyuplai beban AC melalui inverter dan menyimpan energi pada baterai. Intensitas cahaya matahari berpengaruh terhadap tegangan, arus, dan daya keluaran panel surya. Daya tertinggi yang diperoleh sebesar 24,36 W pada intensitas cahaya 100.466 lux, sedangkan daya terendah sebesar 5,63 W pada intensitas cahaya 72.392 lux. Hasil penelitian menunjukkan bahwa alat yang dirancang dapat digunakan sebagai media pembelajaran untuk memahami prinsip kerja dan implementasi PLTS sistem off-grid.

Kata Kunci: Pembangkit Listrik, Off-Grid, Media, Pembelajaran, Energi.

ABSTRACT

Design and Development of an Off-Grid Solar Power Plant System as a Learning Medium

(2026: + 76 Pages + 38 of Tables + 8 of Figures + 6 of Appendices)

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Majoring of Electrical Engineering

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This study aims to design and develop an off-grid Solar Power Plant (PLTS) as a learning medium for students of the Electrical Engineering Study Program at Politeknik Negeri Sriwijaya. The system consists of a 200 Wp solar panel, a Solar Charge Controller (SCC), a 12 V 15 Ah battery, a 500 W inverter, and protection and measurement devices. The research method includes system design, assembly, testing, and performance analysis. The test results indicate that the off-grid solar power system operates effectively in supplying AC loads through the inverter and storing electrical energy in the battery. Solar irradiance significantly affects the voltage, current, and power output of the solar panel. The highest power output obtained was 24.36 W at a light intensity of 100,466 lux, while the lowest power output was 5.63 W at a light intensity of 72,392 lux. The results demonstrate that the developed system can be utilized as a learning medium to enhance understanding of the working principles and implementation of off-grid solar power systems.

Keywords: Power Plant, Off-Grid, Learning, Media, Energy.