

ABSTRAK

Dharma Dwi Prastya. 2026. Analisis Kinerja Plts Rooftop 87,4 Kwp Sebagai Suplai Hydrogen Plant Berdasarkan Performance Ratio (PR) Di PT Pln Nusantara Power Up Pacitan. Skripsi. Program Studi Teknik Elektro, Fakultas Teknik, Universitas PGRI Madiun. Pembimbing (I) Irna Tri Yuniahastuti, S.Pd., M.Pd., (II) Ina Sunaryatiningsih S.T., S.Pd., M.T.

Penelitian ini bertujuan untuk menganalisis kinerja Pembangkit Listrik Tenaga Surya (PLTS) rooftop berkapasitas 87,4 kWp sebagai suplai energi H₂ Plant di PT PLN Nusantara Power UP Pacitan. Metode penelitian yang digunakan adalah metode kuantitatif deskriptif dengan pendekatan analisis performa sistem fotovoltaiik berdasarkan data operasional aktual selama periode Juni–Oktober 2025. Evaluasi kinerja dilakukan menggunakan parameter Reference Yield (YR), Final Yield (YF), dan Performance Ratio (PR) sesuai standar IEC 61724, serta dibandingkan dengan hasil simulasi menggunakan perangkat lunak PVsyst 7.4.8. Hasil penelitian menunjukkan bahwa sistem PLTS mampu mendukung kebutuhan energi H₂ Plant dengan rata-rata energi yang dihasilkan sebesar 316,11 kWh per bulan dan rata-rata ekspor energi ke jaringan sebesar 182,90 kWh per bulan. Nilai rata-rata YR riil, YF riil, dan PR riil masing-masing sebesar 159,81 kWh/kW, 109,68 kWh/kWp, dan 69,75%, sedangkan hasil simulasi PVsyst menunjukkan nilai sebesar 183,03 kWh/kW, 156,27 kWh/kWp, dan 85,42%. Perbedaan antara hasil aktual dan simulasi dipengaruhi oleh variasi irradiansi, temperatur lingkungan, kondisi cuaca, serta rugi-rugi sistem. Secara keseluruhan, PLTS rooftop 87,4 kWp di PT PLN Nusantara Power UP Pacitan memiliki kinerja yang baik dan layak digunakan sebagai sumber energi pendukung operasional H₂ Plant.

Kata kunci—PLTS rooftop, H₂ Plant, PVsyst, final yield, performance ratio.

ABSTRACT

Dharma Dwi Prastya. 2026. *Analysis of the Performance of 87.4 kWp Solar Power Plants as the Supply of H₂ Plant PT PLN NP UP Pacitan*. Undergraduate Thesis. Study Program of Electrical Engineering, Faculty of Engineering, Universitas PGRI Madiun.. Advisors: (I) Irna Tri Yuniahastuti, S.Pd., M.Pd., (II) Ina Sunaryatiningsih S.T., S.Pd., M.T.

This study aims to analyze the performance of the rooftop Solar Power Plant (PLTS) with a capacity of 87.4 kWp as the energy supply of the H₂ Plant at PT PLN Nusantara Power UP Pacitan. The research method used is a descriptive quantitative method with an approach to analyze the performance of the photovoltaic system based on actual operational data during the period June–October 2025. Performance evaluation was carried out using Reference Yield (YR), Final Yield (YF), and Performance Ratio (PR) parameters according to IEC 61724 standard, and compared with simulation results using PVsyst 7.4.8 software. The results of the study show that the solar PV system is able to support the energy needs of H₂ Plants with an average energy output of 316.11 kWh per month and an average energy export to the grid of 182.90 kWh per month. The average values of real YR, real YF, and real PR were 159.81 kWh/kW, 109.68 kWh/kWp, and 69.75%, respectively, while PVsyst simulation results showed values of 183.03 kWh/kW, 156.27 kWh/kWp, and 85.42%. The difference between actual and simulated results is influenced by variations in irradiance, environmental temperature, weather conditions, and system losses. Overall, the 87.4 kWp rooftop solar power plant at PT PLN Nusantara Power UP Pacitan has good performance and is suitable for use as an energy source to support the H₂ Plant's operations.

Keywords: Rooftop PV System, Hydrogen Plant, PVsyst, Final Yield, Performance Ratio