

ABSTRAK

Nama : Muhammad Rasul Ja'fari
Program Studi : Teknik Elektro
Judul : Perencanaan PLTS atap gedung kelas dan laboratorium terpadu kampus 1 Universitas Siliwangi

Kebutuhan energi listrik di Indonesia semakin meningkat, sementara ketergantungan pada energi fosil masih dominan. Salah satu alternatif yang potensial adalah pemanfaatan energi surya melalui Pembangkit Listrik Tenaga Surya (PLTS) atap. Penelitian ini bertujuan untuk merencanakan sistem PLTS atap pada Gedung Kelas dan Laboratorium Terpadu Kampus 1 Universitas Siliwangi dengan pendekatan teknis dan ekonomis. Metode penelitian meliputi pengumpulan data profil beban dan potensi radiasi matahari, perancangan kapasitas sistem, pemilihan komponen utama, serta simulasi menggunakan perangkat lunak PVsyst untuk memperoleh estimasi produksi energi dan kinerja sistem. Hasil perencanaan menunjukkan kapasitas rancangan sebesar 71.107 Wp dengan konfigurasi 118 panel surya berkapasitas 600 Wp, yang menghasilkan produksi energi sekitar 299–318 kWh per hari atau setara 109–116 MWh per tahun. Simulasi PVsyst menghasilkan nilai Performance Ratio rata-rata sekitar 80%, yang termasuk kategori baik. Namun, analisis ekonomi menggunakan metode Net Present Value (NPV) menunjukkan nilai negatif (−996.310.000), sehingga proyek ini belum layak secara finansial jika diterapkan dalam skenario off-grid penuh. Kesimpulannya, penerapan PLTS atap di Gedung Kelas dan Laboratorium Terpadu Kampus 1 Universitas Siliwangi layak secara teknis, tetapi belum layak secara finansial pada kondisi saat ini. Oleh karena itu, disarankan penerapan skenario hybrid atau on-grid, serta analisis sensitivitas tarif listrik untuk meningkatkan kelayakan ekonomi..

Kata Kunci: PLTS atap, PVsyst, Analisis ekonomi.

ABSTRACT

Name : Muhammad Rasul Ja'fari
Major : Electrical Engineering
Title : Planning of rooftop solar power plants for integrated classroom and laboratory buildings, siliwangi university campus 1

The need for electrical energy in Indonesia is increasing, while dependence on fossil fuels remains dominant. One potential alternative is the utilization of solar energy through rooftop Solar Power Plants (PLTS). This study aims to design a rooftop PLTS system in the Integrated Classroom and Laboratory Building, Campus 1, Siliwangi University with a technical and economic approach. The research method includes collecting data on load profiles and potential solar radiation, designing system capacity, selecting main components, and simulating using PVSyst software to obtain estimates of energy production and system performance. The planning results show a design capacity of 71,107 Wp with a configuration of 118 solar panels with a capacity of 600 Wp, which produces energy production of around 299–318 kWh per day or equivalent to 109–116 MWh per year. The PVSyst simulation produces an average Performance Ratio value of around 80%, which is in the good category. However, the economic analysis using the Net Present Value (NPV) method shows a negative value (−996,310,000), so this project is not yet financially feasible if implemented in a fully off-grid scenario. In conclusion, the implementation of rooftop solar power plants in the Integrated Classroom and Laboratory Building, Campus 1, Siliwangi University is technically feasible, but not yet financially feasible under current conditions. Therefore, it is recommended to implement a hybrid or on-grid scenario, as well as an electricity tariff sensitivity analysis to increase economic feasibility.

Keywords: Rooftop Solar Power Plants, Pvsyst, economyc analysis.