

***Design and Techno-Economic Analysis of On-Grid Rooftop Solar Power Plant
at SDS Integral Luqman Al Hakim Situbondo Using SAM Software System
Advisor Model (SAM)***

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ABSTRACT

The implementation of the Solar Power Plant (PLTS) system at SDS Integral Luqman Al Hakim Situbondo is carried out to reduce electricity consumption and simultaneously lower carbon emissions. The planning process includes simulations using SAM software, which facilitates the design of the system and estimates the potential energy production. Additionally, calculations of component requirements for the PLTS system and technical-economic feasibility analyses were conducted to evaluate whether the investment in the PLTS development would be profitable and to determine the payback period. The research method used is quantitative, focusing on the analysis of system planning and its techno-economic aspects. Based on the planning results, the system requires 60 solar modules with a capacity of 540 Wp each, using AE Solar AE540-144 modules, and one Huawei SUN2000-30KTL-M3 inverter. Simulation results using SAM indicate that the PLTS system can generate approximately 61,543 kWh of electricity in the first year, with a performance ratio of 85%. The initial investment cost is Rp397,510,400, with estimated total savings over 25 years reaching Rp2,082,092,175.73. The investment feasibility analysis shows that the project yields a Net Present Value (NPV) of Rp693,435,506.21, a Benefit-Cost Ratio (BCR) of 4.41, a payback period of 5 years and 3 months, and an Internal Rate of Return (IRR) of 14.52%. Based on these results, the PLTS planning is considered feasible for implementation.

Keywords: *On-Grid, PLTS, SAM, Techno-Economic.*