

Design and Simulation of Smart Home Base Based on Hybrid Solar Power Plant on Residential Scale

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ABSTRACT

Renewable energy is increasingly becoming a major concern in efforts to address challenges faced by the global energy sector, including climate change and limited fossil energy resources. Based on data from Kementerian Energi dan Sumber Daya Mineral (ESDM), total domestic energy consumption reached 909.24 million barrels of oil equivalent (BOE) in 2021, up slightly 0.4% from the previous year of 905.6 million barrels. The provision of renewable energy in Indonesia has quite good prospects, considering that geographically Indonesia is a tropical country. That is, Indonesia always gets solar irradiation throughout the year. The potential of solar energy in Indonesia is very large, which is around 4.8 KWh/m² or equivalent to 112,000 GWp, However what has been utilized is only around 10 MWp. This study aims to simulate the results of the Smart Home Base Design concept on a residential scale with rooftop system solar using Pvsyst 7.2 software to determine the potential for energy production of Hybrid rooftop solar based on the electronics that commonly used in household in Indonesia. The identification and data collection in this study were taken based on the IoT-Based Smart Home Base Design Concept for Residential Scale, then a 3D design was carried out using SketchUp software before being simulated using PvSyst 7.2 software. The simulation results show the potential for PLTS electrical energy production of 1,813 MWh/Year, these results can meet 90.38% of the total home electrical energy needs of 2,006 MWh/Year. The battery as a storage of electrical energy can be used up to a lifetime of 5 years with a maximum battery usage rate of State of Wear of 80%. The results of the simulation also showed that hybrid solar power plants had a performance ratio of 76.7% in a one-year period.

Keywords: Renewable Energy, Solar Rooftop Hybrid, PvSyst 7.2, Smart Home Base