

Feasibility and Optimization of a 5kW Photovoltaic System for Residential Energy Needs in Turkey

Authors : Faiz Benzaiabak

Abstract : The integration of solar energy systems has emerged as a pivotal solution in addressing global energy needs, offering sustainability and reducing reliance on traditional power sources. This study explores the feasibility of implementing a solar panel system in Turkey, where solar irradiance presents a promising opportunity for harnessing renewable energy. Specifically, we aim to achieve a total capacity of 5 kW using 250W solar panels, with an average sunshine duration of 7.2 hours per day. Through detailed calculations and analysis, the optimal configuration for achieving the desired energy output is determined, contributing to sustainable energy practices in the region. The simulation evaluates the performance of a 5kW photovoltaic (PV) system for residential use, powering essential household loads such as lighting for two rooms, a refrigerator, a laptop, LED light bulbs, and mobile devices. This research highlights the feasibility and effectiveness of solar energy in meeting the energy demands of typical residential appliances, paving the way for broader adoption of renewable energy solutions.

Keywords : solar energy, photovoltaic system, feasibility study, renewable energy, residential energy, turkey

Conference Title : ICEHTE 2025 : International Conference on Energy and Heat Transfer Engineering

Conference Location : Sydney, Australia

Conference Dates : August 28-29, 2025