

Optimizing Solar Panel Efficiency for Residential Use

Problem Statement- The efficiency of solar panels is a critical factor in the widespread adoption of solar energy for residential use. Current solar panel technologies face challenges such as energy loss due to shading, dirt accumulation, and suboptimal orientation. The goal of this project is to identify and implement solutions that can residential settings make solar energy a more viable and cost-effective option for ~~homeowners~~ homeowners.

Summary- The primary objective of this project is to investigate and propose methods to optimize the efficiency of solar panels installed on residential properties. This will involve examining various factors that affect solar panel performance and exploring innovative solutions to mitigate

Methodology:

- 1) **Literature Review-** Conduct a comprehensive review of existing research on solar panel efficiency focussing on the factors that influence performance, such as shading, dirt and orientation.
- 2) **Data Collection-** Gather data on solar panel performance from residential installations, including energy output, shading patterns and maintenance records.

3] **Simulation and modeling** - Use simulation software to model the impact of different variables on solar panel efficiency. This will include testing various configurations, orientation, and cleaning schedules.

4] **Proposed Solutions** - Based on the data and simulation results, propose practical solutions to improve solar panel efficiency. They may include recommending optimal installation practices, developing automated cleaning systems or suggesting advanced materials for panel construction.

5] **Implementation and testing** - If feasible, implement the proposed solutions on a small scale and monitor the performance improvement over time.

Objective - The main objectives of this project are:

- 1) Identify the key factors that affect the efficiency of solar panels in residential environments
- 2) Develop and test methods to mitigate the impact of these factors
- 3) Provide practical recommendations for home owners and solar panel installers to optimize the performance of residential solar energy systems

Scope- The project will focus on residential solar panel installations and will include the following activities

- 1] conducting a literature review on solar panel efficiency and factors affecting performance
- 2] collecting data from existing residential solar panel installations
- 3] using simulation tools to model the impact of different variables on solar panel efficiency
- 4] proposing and testing solutions to improve efficiency
- 5] Documenting findings and providing recommendations