

Application of Solar Grid System for Existing Building

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Abstract—The increasing demand for Zero-waste energy solutions has led to the adoption of solar grid systems as an efficient alternative to ordinary power sources. This paper explores the application of a solar grid system in Dr. Babuji Salunkhe Institute of Engineering and Technology Kolhapur an existing building, focusing on its feasibility, design considerations, economic benefits, and conservationist impact. The combination process involves assessing the building's energy consumption, selecting suitable photovoltaic (PV) panels, designing an optimal grid-tied system, and evaluating energy storage options. Additionally, financial incentives, return on investment (ROI), and regulatory compliance are examined to determine the viability of solar adoption. The study highlights the reduction in carbon footprint, energy cost savings, and grid stability improvements associated with solar combination. Through case studies and technical analysis, this research demonstrates that transitioning to a solar grid system is a practical and cost-effective solution for enhancing energy efficiency in existing structures.

Index Terms—Solar grid system, photovoltaic panels, energy efficiency, renewable energy, grid combination,

I. INTRODUCTION

Solar energy is the energy that is used by spinning systems to radiate heat and energy from the sun. Solar photovoltaic, solar architecture comparable to solar heating. Fossil fuels such as oil, natural gas, and coal have historically met the world's electrical needs. However, these energy sources have two major negative impacts:

They play a larger role in global warming and acid rain runoff, which has a negative effect on the atmosphere for many animals, plants and human beings. Few countries have complete access to fossil-fuel energy supplies, contributing to global political and economic uncertainty. Solar energy is the perfect option, and is a renewable fuel, meaning it won't

become inaccessible. It offers a constant, limitless. Supply over time.

II. LITERATURE REVIEW

1. Ali O M Maka, Jamal M Alabid, (June 2022) Solar energy technology and its roles in Zero-waste development, Clean Energy

The history of solar energy can be traced back to the seventh century when mirrors with solar power were used. In 1893, the photovoltaic (PV) effect was discovered; after many decades, scientists developed this technology for electricity generation. Based on that, after many years of research and development from scientists worldwide, solar energy technology is classified into two key applications: solar thermal and solar PV. PV systems convert the Sun's energy into electricity by utilizing solar panels. These PV devices have quickly become the cheapest option for new electricity generation in numerous world locations due to their ubiquitous deployment. For example, during the period from 2010 to 2018, the cost of generating electricity by solar PV plants decreased by 77%. However, solar PV installed capacity progress expanded 100-fold between 2005 and

2. Sivaraman K, Rawool A. A Brief Study of an Installation of a Rooftop Solar PV System in India. Available at SSRN 3468654. 2019 Oct 12.

This type of PV solar installation is similar to other same mounted solar system, only change is the metal structure is made for carport with an appropriate angle with attachment of metal beam structure or truss. In this installation we can use solar sheet metal roofing system. This generated electricity we can use for our home application. The main advantage from this mounting is extra area not required; this installation gives simultaneous application of carport and power grid.

III OBJECTIVES

1. To reduce the building's reliance on non-renewable energy sources.
2. To decrease energy consumption from the grid.
3. To lower electricity bills.
4. To design and install a solar grid system that meets the building's energy demands.
5. To promote renewable energy usage.

IV METHODOLOGY

Phase 1: Site Assessment and Planning

1. Conduct site visit to assess building's solar potential.
2. Evaluate existing electrical infrastructure.
3. Identify potential installation locations.
4. Review building's energy consumption patterns.
5. Determine system size and configuration.

Phase 2: System Design

1. Select solar panels, inverters, and mounting structures.
2. Design electrical connections and grid tie system.
3. Create detailed system design and layout.
4. Conduct shading analysis.
5. Determine cable sizing and routing.

Phase 3: Installation

1. Install solar panels and mounting structures.
2. Install inverters and electrical connections.
3. Integrate system with existing electrical infrastructure.
4. Conduct testing and commissioning.

Phase 4: Testing and Commissioning

1. Test system performance and efficiency.
2. Verify system safety and reliability.
3. Conduct grid tie testing.
4. Obtain necessary certifications.

Phase 5: Monitoring and Maintenance (Ongoing)

1. Install monitoring systems.
2. Develop maintenance schedules.
3. Conduct regular inspections.
4. Perform repairs and replacements as needed.

V. METHODOLOGY TOOLS AND TECHNIQUES

1. Solar pathfinder software for shading analysis.
2. Electrical design software (e.g., AutoCAD).
3. Energy modelling software (e.g., Quest).
4. Building information modelling (BIM) software.

5. Project management software (e.g., Asana).

Data Collection and Analysis

1. Collect energy consumption data.
2. Analyse solar radiation data.
3. Evaluate system performance data.
4. Conduct economic analysis (cost-benefit analysis).

Stakeholder Engagement

1. Building owners/management.
2. Electrical contractors.
3. Solar panel manufacturers.
4. Local authorities (permitting and inspections).

VI. SCOPE

1. Site Assessment:

- Evaluation of building's solar potential
- Assessment of existing electrical infrastructure
- Identification of potential installation locations

2. System Design:

- Determination of system size and configuration
- Selection of solar panels, inverters, and mounting structures
- Design of electrical connections and grid tie system

3. Installation:

- Installation of solar panels and mounting structures
- Installation of inverters and electrical connections
- Integration with existing electrical infrastructure

4. Testing and Commissioning:

- Testing of system performance and efficiency
- Commissioning of system to ensure safe and reliable operation

5. Monitoring and Maintenance:

- Installation of monitoring systems to track performance
- Development of maintenance schedules and procedures

6. Documentation and Training:

- Preparation of system documentation and manuals
- Training for building staff and maintenance personnel

VII. CONCLUSION

The application of a solar grid system for an existing building is a Zero-waste and cost-effective solution to reduce dependency on conventional energy sources. By integrating solar photovoltaic (PV) panels with the existing electrical system, buildings can harness renewable energy, lower electricity bills, and

contribute to conservationist, conservation by reducing carbon emissions.

The feasibility of implementing a solar grid system depends on factors such as roof space, solar exposure, energy demand, and financial investment. Advances in solar technology, including high-efficiency panels and energy storage systems, have made solar adoption more practical and efficient. Additionally, net metering policies and government incentives further enhance the economic viability of solar energy systems.

Despite the initial installation cost, the long-term benefits outweigh the expenses, offering significant energy savings and increasing property value. With proper planning, maintenance, and integration, solar grid systems can enhance energy resilience, promote sustainability, and contribute to a greener future for buildings and communities.

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