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Future Scope Of Solar Energy In Kerala: An Awareness Study

[1]Jiju Varghese, [2]Dr. P. Saritha Kumari & [3]Dr. F. Cleedin

[1] Research Scholar, Reg. No. 22213231011001, PG & Research Department of Commerce, St.Jude's College, Thoothoor, Affiliated to Manonmaniam Sundaranar University, Thirunelveli-627012, Tamil Nadu, India

[2] , Assistant Professor, PG Department of Commerce Sree Devi Kumari Women's College, Kuzhithurai, Affiliated to Manonmaniam Sundaranar University, Thirunelveli-627012, Tamil Nadu, India

[3] Assistant Professor, PG & Research Department of Commerce, St. Jude's College, Thoothoor, Affiliated to Manonmaniam Sundaranar University, Thirunelveli-627012, Tamil Nadu, India

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Abstract

The research employs Analysis of Variance (ANOVA) to examine customer awareness with rooftop solar systems across different education levels. Data from 200 consumers from Kottayam District were analyzed, focusing on six factors: carbon footprint, government subsidy, reduced electricity bill, maintenance, installation and warranty. The results show a significant correlation between awareness levels and education categories. Highly educated groups find the government subsidy, reduced electricity bill, maintenance and warranty of rooftop solar systems more aware of. Meanwhile, carbon footprint and installation seem to be independent of educational status. The study suggests that education significantly affects consumer awareness with rooftop solar systems. SPSS was used for the analysis. The report concludes that tailored strategies are needed to enhance consumer awareness across all education levels and ensure equitable distribution of the benefits of rooftop solar systems.

Keywords: Solar energy, Kerala, Sustainable energy, Renewable energy, Rooftop solar, Energy independence, Environmental benefits, Policy framework

Introduction

Kerala, a southern Indian state known for its lush greenery and abundant rainfall, is also blessed with ample sunlight. This natural resource presents a significant opportunity for the state to harness solar energy and transition towards a sustainable and energy-independent future. As the demand for electricity continues to rise, Kerala's dependence on traditional fossil fuels poses environmental and economic challenges. Solar energy, a clean and renewable source of power, offers a viable solution to address these issues.

This paper explores the potential of solar energy in Kerala, analyzing the current status of rooftop solar installations and the challenges and opportunities associated with the widespread adoption of solar energy in Kerala and proposes recommendations for policy makers and stakeholders to accelerate its growth. By understanding the future scope of solar energy in Kerala, policymakers can develop effective strategies to promote its adoption and contribute to the state's sustainable development goals.

Current Electrical Consumption Scenario in Kerala

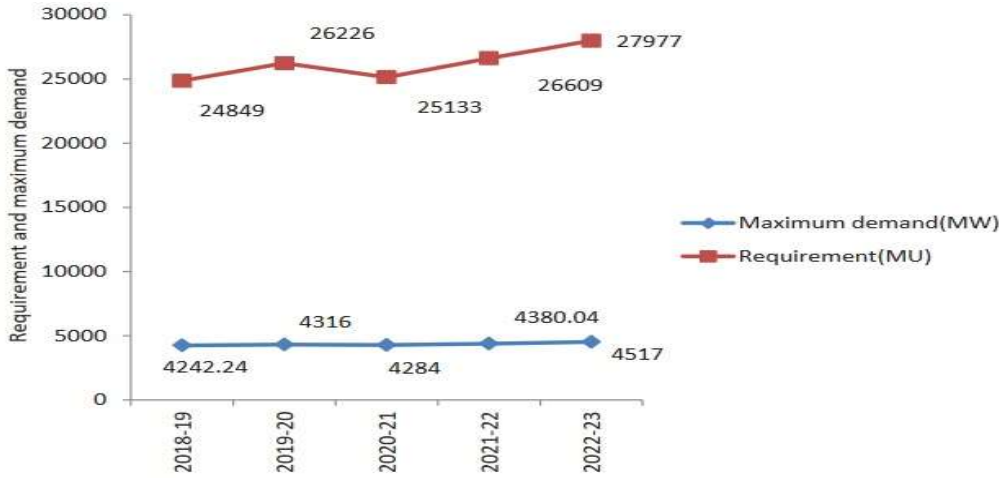
Kerala, a state in southern India, has been experiencing a steady increase in electricity consumption over the years. This growth is driven by factors such as economic development, urbanization, and rising living standards. The primary source of electricity in Kerala is hydroelectricity, followed by thermal power plants. However, the state's dependence on hydropower has been a concern due to its vulnerability to climate change and seasonal variations.

Key points regarding the current electrical consumption scenario in Kerala:

- Increasing demand: Kerala's electricity demand has been steadily rising, primarily due to economic growth and urbanization.
- Hydropower dependence: Hydroelectricity remains the dominant source of power generation in Kerala, but its dependence on seasonal rainfall poses challenges.
- Thermal power plants: Thermal power plants, fueled by coal and natural gas, play a crucial role in meeting peak demand and ensuring energy security.
- Renewable energy: While Kerala has potential for renewable energy sources like solar and wind power, their penetration in the energy mix is still relatively low.
- Energy efficiency: Efforts are being made to promote energy efficiency and reduce electricity consumption through various initiatives.

In 2023, Kerala's electricity consumption was 24,906 GWh, which is an increase from 2022's 23,931 GWh. This is an all-time high for the state. Peak demand of the State during 2022-23 was 4517 MW (on March 28, 2023), indicating 3.12 per cent increase from 4380.04 MW in 2021-22. Morning peak demand was 3611 MW and day peak demand was 4096 MW for 2022-23. The energy requirement and maximum demand for energy during the last five years.

Requirement and Maximum Demand for Energy during the Last Five Years



Review of Literature

Naveen Kumar Sharma et al. (2011) The research paper "Solar Energy in India: Strategies, Policies, Perspectives, and Future Potential" offers a comprehensive examination of the current state, tactics, perspectives, promotional policies, significant accomplishments, and future prospects of solar energy in India. It underscores the significant electricity deficit in India and the importance of a significant increase in capacity to sustain its rapid economic development. Solar energy can enhance energy security by stabilizing fuel prices, diversifying the energy balance, and reducing dependence on imports due to its local, decentralized, and cost-effective incremental generation. Ganesh Hegde et al. (2012): “Scope for solar energy in Kerala and Karnataka”. Karnataka and Kerala states are dependent mainly on conventional energy source such as diesel, coal, gas and hydro energy. Only 4 % of total installed plant capacity is based on renewable energy sources in Kerala and 24% in Karnataka. However, both the states get very good solar insolation solar energy utilization is not

remarkable. Subsequently both states facing the electricity defect problem. Solar energy harvesting could lead to the solution. Ehsanul Kabir et al. (2018): "Solar energy: potential and future prospects" is an article that discusses the technical challenges that affect renewable energy, as well as the advantages and disadvantages of solar energy technologies. It also underscores the research and the advantageous interaction between regulatory policies and their potential impact. To this end, they offer a global perspective on solar energy technologies, including their potential, current capabilities, prospects, constraints, and policies. This assisted them in enhancing their comprehension of the extent to which they can rely on solar energy to satisfy an increasing energy demand in the future.

Objectives of the study

- To identify the awareness of roof top solar system among residents of Kottayam district in Kerala

Hypothesis

H0: There is no significant difference in awareness level among individuals with different education levels.

H1: There is a significant difference in awareness level among individuals with different education levels.

Research Methodology

The study employed a mixed-method approach, integrating both qualitative and quantitative research methods, to thoroughly explore the public perception of rooftop solar systems in Kottayam district. Data collection was primarily through surveys and analysis of secondary data. Structured questionnaires were distributed to a representative sample of households in Kottayam to gather quantitative data on the awareness and adoption rates of rooftop solar systems. These questionnaires probed into educational background, demographics, and specific knowledge and expertise in rooftop solar systems. The data collection process utilized a stratified random sampling technique to encompass the five taluks of Kottayam District: Kottayam, Vaikom, Meenachil, Kanjirapally, and Changanassery. From each taluk, forty individuals, totaling 200 participants, were randomly selected for the survey. The sample size was determined based on the desired confidence level and population size. SPSS software facilitated the processing and coding of quantitative data. Once coded, the data was analyzed statistically in SPSS, and respondents' demographic details were summarized using percentage. Finally, satisfaction levels with rooftop solar systems across five income brackets were compared using ANOVA at a significance level of 0.05.

Data Analysis

The socio- economic profile of the Respondents:

The socio-economic profile of the respondents provides a comprehensive understanding of their demographic, socio-economic, and financial characteristics, which is essential for analyzing their awareness and adoption of the Rooftop Solar System. This profile offers a snapshot of the respondents' age, gender, marital status, education, occupation, income and residence among other factors. By examining these characteristics, this study aims to identify the socio-economic factors that influence the awareness and adoption of the system, and to understand how these factors impact their decision process. The socio-economic profile of the respondents is a crucial component of this study, as it provides valuable insights into the needs, preferences, and behavior of the respondents.

Table- 1

Sl no.	Socio- Economic Variables		Respondents	Percentage
1.	**Gender**	Male	145	72.5
		Female	55	27.5
		18-35 years	25	12.5

2.	**Age Group**	36-45 years	44	22
		46- 55 years	58	29
		55 and above	73	36.5
3.	**Education**	Below SSLC	36	18
		SSLC	38	19
		HSC	65	32.5
		Graduate	29	14.5
		PG and Professional	32	16
4.	**Occupation**	Agriculture	07	3.5
		Govt. Employee	48	24
		Business	61	30.5
		Private Employee	53	26.5
		Others	31	15.5
5.	**Annual Income**	Less than 100000	12	6
		100000-300000	37	18.5
		300000-500000	49	24.5
		500000-700000	57	28.5
		Above 700000	45	22.5

Source: Primary Data

2. Awareness and Education Level

Table -2

ANOVA				
	Sum of Squares	**Mean Square**	**F**	**Sig.**
Usage of rooftop solar systems reduces the carbon footprint.	389.995	5.019	2.646	.035
Government provides several incentives and subsidies for promoting rooftop solar system.	81.680	.578	1.420	.229
Installing rooftop solar system significantly reduces electricity bill over time.	177.995	.817	.912	.458
Maintenance cost of rooftop solar system is minimal.	224.000	.963	.853	.493

Installation of rooftop solar system is hassle free	347.195	4.289	2.534	.042
Rooftop solar system panel get more than 10 years warranty	129.795	.560	.855	.492

Source: Computed Data

Interpretation

To test the null Hypothesis Analysis of Variance (ANOVA) is used. Six factors are used to identify the level of awareness are carbon footprint, government subsidy, reduced electricity bill, maintenance, installation and warranty. The ANOVA test shows that four factors such as government subsidy, reduced electricity bill, maintenance and warranty have calculated value is more than 0.05 (critical value) it means that education level have significant impact on awareness level of respondents. Out of the six factors, two factors carbon footprint and installation shows calculated value 0.035 and 0.042 which is less than the critical value (0.05) shows that there is a significant difference in awareness level among respondents with different education levels.

Conclusion

Rooftop solar systems offer a sustainable solution to the growing energy demands and environmental concerns. However, the adoption rate is often hindered by a lack of awareness and understanding among potential users. This study examined public awareness of rooftop solar system among different education levels, revealing significant disparities in awareness levels. Highly educated respondents reported greater awareness, likely due to better access to knowledge and information. In contrast, lower education level respondents lack overall awareness with rooftop solar. These findings underscore the importance of awareness among different education levels for the better adoption of rooftop solar among public. Increased awareness can lead to higher acceptance and satisfaction among households, as they become more informed about the environmental and economic advantages of solar energy. Effective awareness campaigns should target diverse demographic groups, addressing specific concerns and highlighting the long-term savings and sustainability benefits.

Continued research is essential to investigate the factors that affect awareness and the adoption of rooftop solar systems. Gaining such insights will be crucial for refining the program and ensuring it addresses the varied requirements of all stakeholders.

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