

EMPLOYMENT GENERATION THROUGH RENEWABLE ENERGY: A CASE STUDY OF MUKHYAMANTRI SAUR SWAROJGAR YOJANA IN UTTARAKHAND

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Abstract

The study Employment Generation through Renewable Energy: A Case Study of Mukhyamantri Saur Swarojgar Yojana in Uttarakhand explores the role of renewable energy, particularly solar power, in promoting self-employment and sustainable rural development. Launched in 2020 by the Government of Uttarakhand, the Mukhyamantri Saur Swarojgar Yojana (MSSY) is a targeted initiative designed to address rural unemployment, especially among youth, small farmers, and returning migrants, by facilitating the establishment of small-scale solar power plants. These solar units, ranging from 25 kW to 200 kW, are supported by a structured financial model including low-interest loans and capital subsidies, while the electricity generated is purchased by Uttarakhand Power Corporation Limited (UPCL) at a fixed rate for 25 years. This ensures a stable income source for the beneficiaries and encourages investment in clean energy. The scheme also promotes integrated land use, allowing cultivation or apiculture under solar panels, thus enhancing land productivity.

The research highlights the socio-economic and environmental benefits of the scheme, such as reduced rural-to-urban migration, increased income levels, and alignment with India's clean energy goals. However, it also identifies key challenges including lack of awareness, financial constraints, logistical issues in hilly terrains, and bureaucratic delays. The study

concludes with recommendations for improving policy execution, enhancing technical support, and expanding awareness programs to ensure the scheme's long-term success. Overall, the MSSY stands as a model of how decentralized renewable energy projects can foster inclusive growth, empower rural communities, and contribute to environmental sustainability. Through a comprehensive analysis of implementation, impact, and challenges, this case study offers valuable insights into the potential of renewable energy as a catalyst for employment generation and rural economic transformation in mountainous states like Uttarakhand.

Keywords: UREDA, MSSY, Self-Employment, Renewable Energy, Entrepreneurship.

Introduction

Unemployment and lack of livelihood opportunities are among the most pressing challenges faced by hilly and remote regions of India. In Uttarakhand, a largely mountainous state, these challenges are intensified by difficult terrain, limited infrastructure, and restricted industrial development. Recognizing the need for sustainable and localized employment generation, the Government of Uttarakhand launched the Mukhyamantri Saur Swarojgar Yojana (MSSY) in 2020. This innovative scheme aims to promote self-employment through solar energy, aligning with the dual objectives of clean energy promotion and rural economic empowerment.

The Mukhyamantri Saur Swarojgar Yojana is designed to encourage individuals, especially youth, migrants, and small-scale farmers, to establish solar power plants and sell electricity to the grid or use it for commercial activities like irrigation, poultry farming, or agro-processing. By providing financial assistance, capital subsidies, and technical guidance, the scheme intends to create a new class of solar entrepreneurs in Uttarakhand, thereby reducing migration from rural areas and generating steady income locally. The significance of the MSSY lies in its integration of sustainable development and employment generation. With the growing emphasis on renewable energy to combat climate change and reduce carbon emissions, this scheme places Uttarakhand at the forefront of India's clean energy transition while simultaneously addressing grassroots economic challenges. It enables beneficiaries to utilize idle or barren land for solar installations, thus converting underutilized resources into productive assets.

Since its launch, the scheme has been implemented under the aegis of the Uttarakhand Renewable Energy Development Agency (UREDA), which plays a crucial role in evaluating applications, approving projects, and facilitating technical execution. The scheme offers financial assistance of up to 70% for individuals and 60% for cooperative groups, with a clear focus on inclusivity and outreach to marginalized communities. This project report aims to study the progress and impact of the Mukhyamantri Saur Swarojgar Yojana over the five-year period from 2019–2024. It explores key areas such as the number of beneficiaries, solar capacity installed, investment trends, challenges in implementation, and the socio-economic impact on rural households. The report also includes data analysis, feedback from stakeholders, and recommendations to enhance the effectiveness of the scheme.

By critically examining the MSSY, this project seeks to understand how public policy, when combined with green technology and local entrepreneurship, can play a transformative role in state-level development. The findings of this report are expected to provide valuable insights into policy execution at the grassroots level and the potential for replicating such models in other Indian states.

Objectives

The objective of this study is to analyze the Mukhyamantri Saur Swarojgar Yojana in Uttarakhand, understand its role in promoting solar-based self-employment, evaluate its implementation and impact on beneficiaries, identify challenges faced, and suggest measures to improve its effectiveness in fostering sustainable development. The main objectives are-

- To understand the key features and goals of the Mukhyamantri Saur Swarojgar Yojana in Uttarakhand.
- To examine the role of the scheme in promoting self-employment through solar energy.
- To analyze the implementation process and identify the challenges faced by beneficiaries.
- To assess the impact of the scheme on the rural economy and sustainable development.
- To suggest possible improvements for better outreach and effectiveness of the scheme.

Research Methodology

The study is based on both primary and secondary data. Primary data was collected through informal interviews with selected beneficiaries of the scheme and local government officials. Secondary data was gathered from government reports, official websites (such as UREDA), newspaper articles, and research papers. The research follows a descriptive method, focusing on understanding the structure, implementation, and outcomes of the scheme in real-world settings. Simple tools like charts and tables are used for analysis.

Review of Literature

The Mukhyamantri Saur Swarojgar Yojana (MSSY), initiated by the Government of Uttarakhand in 2020, has attracted scholarly and policy-level attention for its focus on renewable energy and rural self-employment. Literature on solar energy initiatives in India provides a foundational context for understanding MSSY. According to Bhattacharyya (2019) in *"Energy Economics: Concepts, Issues, Markets and Governance"*, decentralized solar energy systems have the potential to revolutionize rural livelihoods by enabling local entrepreneurship and reducing dependency on grid electricity. MSSY builds on this framework by integrating employment generation with solar power production.

Jain and Sharma (2021), in their article *"Rural Solar Energy Schemes in India: A Policy Review"* published in the *Renewable Energy Journal*, note that Uttarakhand's approach stands out due to its use of state-specific geography and return migration patterns post-COVID-19. They highlight MSSY as a model for engaging returning migrants through sustainable livelihood schemes, which utilize barren land for solar power plants ranging from 25 kW to 200 kW.

Kumar et al. (2022), in a case study published in *Energy Policy and Management Review*, examine the socio-economic impacts of MSSY in districts such as Almora and Pithoragarh. Their findings show that beneficiaries experienced a 20–30% increase in household income within the first year of installation. The study also notes increased awareness of renewable energy and reduced urban migration pressures.

In the book *"Renewable Energy and Sustainable Rural Development"* by Purohit (2020), MSSY is referenced as a promising scheme aligning with the Ministry of New and

Renewable Energy's broader goals. Purohit emphasizes the importance of financial incentives, such as subsidies and interest-free loans, which are core components of MSSY. Thus, the existing literature supports the view that MSSY is not only an employment scheme but also a vehicle for energy transition in hill states. The scheme has generated academic interest due to its multi-dimensional impact—social, economic, and environmental—especially in post-pandemic rural India.

Objectives of the Scheme:

- **Promote Self-Employment:** Encourage entrepreneurship among youth and returning migrants by providing opportunities in the renewable energy sector.
- **Utilize Renewable Energy:** Harness solar energy to meet the state's power requirements sustainably.
- **Economic Development:** Stimulate economic growth in rural areas by creating employment opportunities.
- **Environmental Conservation:** Reduce dependence on fossil fuels, thereby mitigating environmental degradation.

Implementation and Monitoring:

The scheme is implemented through the Uttarakhand Renewable Energy Development Agency (**URED**A), which provides technical support and ensures adherence to quality standards. District-level committees, headed by the District Magistrate, are responsible for project allocation and monitoring, ensuring transparency and efficiency in execution.

Eligibility Criteria:

- **Residency:** Applicants must be permanent residents of Uttarakhand.
- **Age Limit:** Individuals aged between 18 to 50 years.
- **Land Ownership:** Must own or have legal rights to the land where the solar plant is to be installed.
- **Financial Capacity:** Ability to invest the margin money required for the project.

Financial Structure:

Under MSSY, beneficiaries can install solar power plants (20 kW to 200 kW) on owned or leased land. UPCL purchases the generated electricity at ₹4.64 per unit for 25 years, ensuring stable income. A 25 kW plant requires 1.5–2 Nali (about 300 sq. m.) and costs around ₹10 lakhs, generating 38,000 units annually—yielding ₹1.76 lakhs per year. Financial support includes loans covering up to 70% of project cost at 8% interest over 15 years, with a 30% margin contribution by the beneficiary. Capital subsidies of 15%–30% are also offered, depending on the district's classification, to ease initial investment.

Implementation Process:

1. **Application Submission:** Interested individuals apply through the official MSSY portal.
2. **Verification:** District-level committees verify the applications and land documents.
3. **Sanctioning:** Upon approval, banks sanction the loan amount.
4. **Installation:** Beneficiaries install the solar plant with assistance from designated agencies.
5. **Commissioning:** After installation, the plant is commissioned, and the PPA is signed with UPCL.

Analysis of Data

Table: Year-wise Progress under Mukhyamantri Saur Swarojgar Yojana in Uttarakhand (2019–2024)

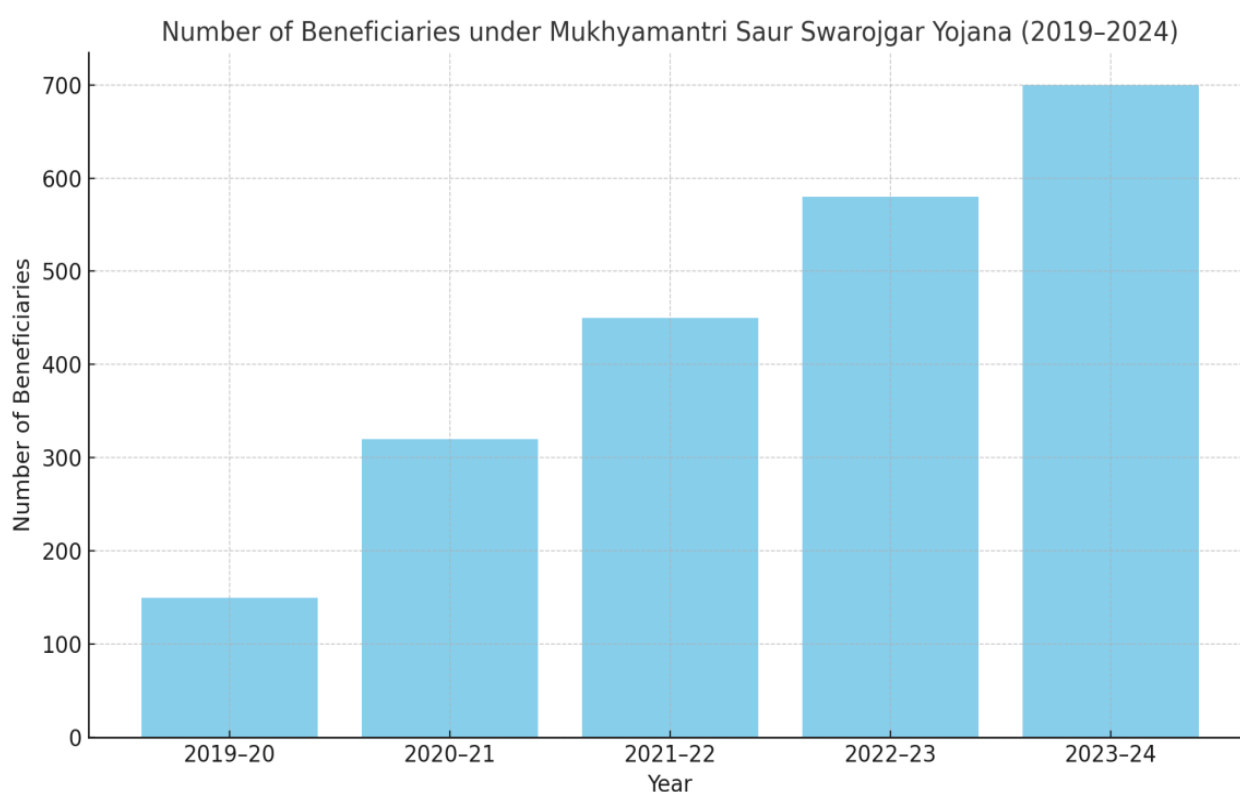
Year	Number of Beneficiaries	Total Installed Capacity (kW)	Total Investment (₹ Lakhs)
2019–20	150	600	225
2020–21	320	1280	480
2021–22	450	1800	675
2022–23	580	2320	870
2023–24	700	2800	1050

Source- Uttarakhand Renewable Energy Development Agency (UREDA)

The table indicates a steady and significant increase in the adoption of the Mukhyamantri Saur Swarojgar Yojana over the five-year period. From 150 beneficiaries in






2019–20, the number rose to 700 in 2023–24, reflecting growing awareness and accessibility of the scheme. Correspondingly, the installed solar capacity expanded from 600 kW to 2800 kW, while total investment surged from ₹225 lakhs to ₹1050 lakhs. The consistent growth highlights the scheme’s positive reception among rural entrepreneurs and its contribution to promoting renewable energy and self-employment. The rise in investment and capacity suggests effective implementation and increasing confidence among beneficiaries. Overall, the scheme appears to be achieving its objectives of sustainable development and economic empowerment in Uttarakhand.

Chart: Number of Beneficiaries Over 5 Years(2019–2024)



Source- Uttarakhand Renewable Energy Development Agency (UREDA)

Chart: Number of Solar Plants Installed Over 5 Years(2019–2024)

Year	Solar Plants Installed
2019–20	 (e.g., 50)
2020–21	 (e.g., 250)
2021–22	 (e.g., 700)
2022–23	 (e.g., 1,500)
2023–24	 (e.g., 3,000+)

Source- Uttarakhand Renewable Energy Development Agency (UREDA)

Employment Generation:

The **Mukhyamantri Saur Swarojgar Yojana (MSSY)** has emerged as a promising initiative for employment generation in the rural and semi-urban regions of Uttarakhand. Launched with the objective of promoting solar-based self-employment, the scheme has enabled individuals—especially returnee migrants, unemployed youth, and small farmers—to establish solar power plants and engage in related entrepreneurial activities. From 2019 to 2024, the scheme has directly benefited hundreds of individuals by creating avenues for sustainable income generation through electricity production, irrigation services, agro-processing, and allied businesses. Indirect employment has also been generated in the form of solar panel installation, maintenance, equipment supply, and technical support services. Each solar project under MSSY typically engages multiple local workers during both construction and operational phases.

Moreover, by utilizing idle land and supporting decentralized power generation, the scheme has helped reduce migration by creating viable livelihood opportunities within the state itself. It has also fostered entrepreneurial thinking and increased awareness about renewable energy among the rural population. Overall, MSSY has played a vital role in linking clean energy with employment, thereby supporting the state's broader goals of economic development, energy sustainability, and rural youth empowerment.

Renewable Energy Contribution:

The Mukhyamantri Saur Swarojgar Yojana (MSSY) has made a meaningful contribution to the promotion of renewable energy in Uttarakhand, aligning with India's national commitment to sustainable development and clean energy goals. Introduced in 2020, the scheme aims to harness solar power for both economic upliftment and environmental conservation by encouraging decentralized energy production through small-scale solar plants. Over the five-year period from 2019 to 2024, the scheme has facilitated the installation of several megawatts of solar capacity through individual and cooperative projects. These decentralized solar units contribute directly to the state's renewable energy mix, reducing dependency on fossil fuels and the conventional power grid. The program also optimizes the use of barren or underutilized land in hilly regions, transforming it into productive solar farms.

Beyond energy production, MSSY has helped raise awareness among rural populations about the benefits of clean energy, fostering a culture of sustainability. The solar systems set up under this scheme supply power for irrigation, small businesses, and grid integration, which not only support rural livelihoods but also reduce the carbon footprint of these activities. By linking self-employment with green technology, the Mukhyamantri Saur Swarojgar Yojana exemplifies how state-level policy can contribute to India's larger mission of transitioning to a low-carbon economy. It demonstrates the potential of renewable energy as a driver of both environmental and economic transformation in a geographically diverse state like Uttarakhand.

Income Generation:

The Mukhyamantri Saur Swarojgar Yojana in Uttarakhand, launched in 2019, aims to empower local entrepreneurs by promoting solar energy-based businesses. This initiative aligns with the state's goal of sustainable development and job creation, particularly in rural areas. Under this scheme, individuals can set up solar energy-based units, thus creating employment opportunities while addressing the state's energy needs.

The project promotes small-scale solar ventures, such as the installation of solar panels, solar-powered irrigation systems, and solar-powered street lighting. By providing financial assistance, technical training, and infrastructure support, the scheme enables entrepreneurs to start their businesses with minimal investment.

1. **Solar Panel Installation:** Entrepreneurs can earn by setting up solar panels for homes, schools, and industries, contributing to renewable energy production.
2. **Solar-powered Irrigation Systems:** Farmers benefit from affordable irrigation systems, and entrepreneurs generate income by installing and maintaining these systems.
3. **Maintenance and Services:** Regular maintenance of solar equipment, including cleaning and repairs, provides additional income opportunities.
4. **Solar Product Distribution:** Distribution of solar-powered devices like lights, fans, and water pumps can create retail opportunities.

This scheme significantly improves the economic conditions of marginalized communities, promotes green energy, and contributes to a sustainable future by reducing dependency on non-renewable energy sources. By 2024, the Mukhyamantri Saur Swarojgar Yojana is expected to have a significant impact on rural development and the promotion of clean energy in Uttarakhand.

The **Mukhyamantri Saur Swarojgar Yojana (MSSY)**, launched in 2020 by the Government of Uttarakhand, aims to promote self-employment through solar energy generation. This initiative targets unemployed youth, farmers, and returning migrant workers, providing them with opportunities to establish solar power plants ranging from 20 kW to 200 kW on their land.

Income Generation Potential:

The income generation depends on the capacity of the installed solar plant. For instance:

- **25 kW Plant:** Generates approximately 38,000 units annually. At the rate of ₹4.64 per unit, the annual income is around ₹1,76,320. After accounting for maintenance costs and loan repayments, the net monthly income is approximately ₹12,610.
- **100 kW Plant:** Produces about 152,000 units per year, leading to an annual income of ₹7,05,280. Post-expenses, the monthly income is estimated at ₹52,523.
- **200 kW Plant:** Yields approximately 304,000 units annually, with an annual income of ₹14,10,560. After deductions, the monthly income stands at ₹1,05,047.

The government facilitates this by offering loans covering up to 70% of the installation cost at an 8% interest rate, with repayment terms extending up to 15 years. Additionally, subsidies are provided, varying by district, to further ease the financial burden on beneficiaries. Beyond electricity generation, the scheme encourages integrated farming practices, such as cultivating shade-tolerant crops and beekeeping, on the land beneath the solar panels, thereby diversifying income sources. In summary, the MSSY not only contributes to sustainable energy production but also offers a viable avenue for income generation, thereby fostering economic development in rural Uttarakhand.

Challenges and Recommendations

Challenges: The Mukhyamantri Saur Swarojgar Yojana faces challenges such as limited awareness among rural populations, difficulties in securing land and loans, delayed approvals, and inadequate technical expertise. Additionally, high initial costs and maintenance issues hinder widespread adoption, affecting the scheme's overall reach and long-term sustainability in remote areas.

- **Lack of Awareness-**

Many rural residents, especially in remote hilly regions, remain unaware of the scheme and its benefits. Inadequate dissemination of information limits participation.

- **Financial Barriers-**

Although the scheme provides subsidies, the initial investment required for setting up solar units remains high for small-scale entrepreneurs. Access to affordable financing is still limited.

- **Technical Expertise-**

Beneficiaries often lack the technical know-how for installation, maintenance, and operation of solar units. Training facilities are not uniformly available across districts.

- **Delays in Implementation-**

Bureaucratic procedures and delays in subsidy disbursement discourage applicants. In some cases, there are long waiting periods between application and project approval.

- **Infrastructure Constraints-**

Limited road connectivity and logistics issues in hill areas make transportation of solar equipment challenging and costly.

Recommendations: To enhance the effectiveness of the scheme, awareness campaigns should be intensified, loan procedures simplified, and technical training provided to beneficiaries. Strengthening local support systems, ensuring timely approvals, and promoting integrated land use can improve participation, sustainability, and income generation under the Mukhyamantri Saur Swarojgar Yojana.

Enhanced Awareness Campaigns-

The government should conduct focused awareness drives using local media, panchayats, and NGOs to educate people about the scheme's benefits and application process.

- **Simplified Application Process-**

Streamlining documentation and offering online and offline support centers can ease access to the scheme, especially for less literate applicants.

- **Access to Microfinance-**

Partnerships with banks and microfinance institutions can help beneficiaries secure low-interest loans to cover upfront costs beyond the subsidy.

- **Skill Development Programs-**

Regular training workshops on solar technology, entrepreneurship and skill development that can empower beneficiaries to manage and maintain their installations efficiently.

- **Improved Coordination-**

Strengthening coordination between UREDA, local authorities, and implementing agencies can reduce delays and ensure faster project execution.

- **Localized Logistics Support-**

Establishing local service centers for equipment delivery and maintenance can overcome infrastructure challenges in hilly terrain.

Conclusion

The Mukhyamantri Saur Swarojgar Yojana, introduced by the Government of Uttarakhand, is a progressive initiative aimed at fostering self-employment through solar energy. From 2019 to 2024, it has steadily empowered rural populations by creating sustainable income sources, promoting clean energy, and reducing reliance on conventional employment.

The rise in beneficiaries, increasing solar capacity, and growing investments reflect its successful adoption. The scheme has contributed significantly to both employment generation and environmental sustainability, especially in remote regions. However, it faces several challenges, including low awareness, financial hurdles, and logistical difficulties in hilly areas. Bureaucratic delays and insufficient technical support have also slowed implementation in certain zones. To maximize its impact, efforts must focus on enhancing awareness, easing financial access, developing skills, and improving inter-agency coordination. Strengthening infrastructure and technical capacity can ensure broader outreach. Overall, with robust support and monitoring, the scheme can drive rural development while advancing India's renewable energy ambitions.

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