

# Solar in Rural Areas

## Sustainable and Inclusive Energy Transition on the Way to Climate Neutrality in India

### Context

India's energy consumption has more than doubled since 2000 driven by its growing population, dynamic economy and improved standard of living. India's greenhouse gas emissions per capita are low, but as the world's most populous country, India is still the world's third largest emitter in absolute terms. Rural areas, home to over 60% of the population, are important for mitigating climate change due to the large agricultural sector. The energy consumption of India's agricultural sector is considered the highest in the world, with a substantial share still reliant on fossil fuels. India's rural economy, which includes approximately 119 million farmers and 34 million micro-enterprises, is impacted by unreliable electricity supply. This lack of dependable energy infrastructure limits livelihood opportunities, particularly for women.

According to the Annual Periodic Labour Force Survey (PLFS) 2023–24, the agricultural sector has the highest estimated percentage of female workforce. Around 80 % of women in rural areas work in agriculture and allied sectors. Despite their central role in the agricultural economy, women often face limited access to resources such as land ownership, credit, education, as well as reliable and affordable energy. The promotion of gender equity is of high priority for the Government of India. However, the programmes for solarising agriculture, which have the potential to significantly increase the non-fossil power generation capacity, usually do not focus on incorporating concrete measures to address gender inequality.

### Objective

The project aims to enhance livelihood opportunities for women through the solarisation of rural areas. To achieve this goal, a deeper understanding of the gender-energy nexus in rural India is needed. This needs to be backed by comprehensive data to inform policy-making processes. Responsible government departments will thus be supported with relevant intersectoral data linking gender and energy. This will help them in planning and implementing gender-responsive decentralised solar energy programmes that meet the needs of both women and men.

Project name	Solar in Rural Areas (SiRA)
Commissioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project regions	Jharkhand, Assam, Odisha, Bihar
Lead executing agency	Ministry for New and Renewable Energy (MNRE), Government of India
Duration	2024-2027

Similarly, agricultural service providers require better insights into the specific needs of women to design targeted capacity development measures. Moreover, financial service providers need to be equipped with the relevant skillset to develop financing mechanisms that are tailored to the unique challenges faced by women in rural areas. The project will support these efforts to improve women's livelihood opportunities by promoting the productive use of solar energy systems.

### Key Target Groups

The project focuses on supporting three target groups directly:

- (1) Government officials at the national and state level who are responsible for promoting decentralised solar energy in rural areas;
- (2) Organisations that work in rural communities, such as farmers' cooperatives (like Farmers Producer Organisations), agricultural advisory services, and NGOs supporting women to enhance their livelihoods (e.g. through workshops, training, consultation, and mentoring);
- (3) Banks and other financial service providers that develop a financing product specifically designed to help rural women afford decentralised solar systems.

These three groups benefit from better access to data, analyses and lessons learnt related to how energy and gender are interrelated. They will also receive support to strengthen their technical and methodological skills, processes and strategies to act as gender-responsive intermediaries in the above-described rural context.

Although the project works directly through these groups, its main goal is to support women in rural areas. The women benefit from having access to solar energy systems which enhance their livelihood opportunities. Small and marginal women farmers, who are often organised in self-help groups, will benefit more from customised knowledge and better access to solar energy systems that reduce their workload and free up time for education and recreation.

## Approach

Based on a gender needs analysis and consultations with the Ministry of New and Renewable Energy (MNRE), the project adopts a holistic approach. It focuses on:

- Supporting the design of gender-responsive policies to promote solar systems for improved livelihood opportunities;
- Providing gender-responsive capacity development programmes for rural women;
- Increasing the use of financing products for decentralised solar systems tailored to the requirements of rural women.

Key achievements of the project will include:

- Access to empirical impact data on the energy-gender nexus;
- Empowered government officials, experts and managers with the knowledge to design gender-responsive solar energy policies and initiatives;
- Improved access for women to capacity development programmes;
- Financial service providers equipped with mechanisms to finance solar applications for women.

The project aims to empirically analyse the relationship between solar energy applications and gender in rural India. Data on how solar energy systems can enhance female livelihoods will be monitored through a database. In addition, the project will collect and evaluate innovative and effective approaches for promoting decentralised solar systems. This will facilitate the formulation of policy recommendations that consider women-specific needs and interests. Similarly, existing trainings on the maintenance and operation of solar systems and related business models will be reviewed. Adapting these to the logistic and didactic requirements of women will ensure that women have better access to relevant skills and knowledge. Finally, women self-help groups will be connected to agricultural extension services and financial service providers. These financial service providers will receive assistance to develop women-friendly financing products and a customised credit enhancement mechanism for solar systems in rural areas. This will make solar energy and its benefits more accessible for rural women.

## Gender Equality in the Energy Sector

The energy sector is considered to be largely gender-neutral. This project is expected to set a precedent on the means to include women-specific requirements in the state measures for solar energy promotion, capacity development on solar applications and financial product design for rural women.

Access to solar energy systems tailored to the needs of women is a key step toward achieving gender equality in rural India. In turn, gender equality is essential for a truly inclusive energy transition. The project works in the intersection of the promotion of renewable energy and agriculture, aiming to improve the livelihoods of rural women. The solar systems serve as a means to improve livelihood opportunities for women, support the shift to climate-friendly technologies by reducing reliance on fossil fuels, and enhance food security through value-added agricultural products. Increased income of women often leads to better education for their children and improved nutrition within the family. Therefore, the project aims at the promotion of solar systems as a powerful tool for reaching the larger goal of women empowerment.



Picture 1: A female farmer is watering her field in Jharkhand. Her water pump is powered by solar panels visible in the background.



Picture 2: A solar-powered aerator helps fish farmers in Assam to increase the oxygen levels of their ponds. This increases fish and shrimp yield.

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Picture 1: GIZ India;  
Picture 2: Kalong Kapili

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