A tale of sun and shade

Anchoring the Agrivoltaics Approach in the Indian Solar Energy Sector

Commissioned by: Federal Ministry for Economic Cooperation and Development (BMZ)

Project partners: Sunseed APV, Kanoda

Project timeline: September 2024 - September 2027

Budget: EUR 3.1 million

Locations: Parbhani, Maharashtra & Nashik, Maharashtra

SDGs addressed:

On this farm, electricity is cultivated on solar panels and crops are cultivated beneath.

In the sleepy, district of Parbhani, Maharashtra, the world's first solar integrated shade-house project is quietly covering new ground. As India's agricultural land decreases by 75,000 acres every year, this 5 acre farm is combining solar energy generation with crop cultivation to give countries a sustainable model for improved energy, water and food security.

Since 2023, scientists from Sunseed and technical experts from GIZ have been working to turn a barren solar park into a lush agricultural haven, by using a combination of sun and shade.

At the 1.5 MW ReNew Agro Photovoltaic (APV) Park, while solar panels soak up the sun to generate electricity, plants like capsicum, cherry tomatoes, cucumbers, muskmelons, watermelons, spinach, coriander, chrysanthemums thrive.

However, this park was not always a farm. “I remember hearing about this job and being incredulous,” says Govind Baliram Rasvi, a farmhand at the APV park.

“I didn’t think it would be possible to turn this rocky, weed-infested land into a fertile farm under those solar panels.” Nevertheless, Govind applied for the job, which required farming knowledge and the ability to operate farm machinery.

“I used to drive a tractor for my parents, who are tenant farmers, so I thought I could supplement our income by working here for a few hours every day. Little did I know that solar and agriculture go hand in hand, and the two would help each other thrive.”

Govind was right. While transpiration by the plants helps in keeping the solar panels cool, aiding in their maintenance, the plants are irrigated through solar water pumps. Planted in the shade of the solar panels, these plants also require less water since not too much is lost to evaporation.

The drip irrigation system, triggered by soil moisture sensors, ensures that water is most efficiently used. Technologies like these play an indisputable role in establishing the ecological significance of projects like these. With special robots to clean the solar panels and active temperature, humidity and radiation control, technology looks after both electricity generation and crop cultivation.

One particular and unique technology that supports this ideological handshake are the retractable shade nets that cover a section of the facility. Fully automated, these nets have resulted in a 5-10% increase in solar energy generation, while reducing water lost to evaporation.

As climate change and its effects begin to be seen more sharply in the agricultural sector, there is a need for an emphasis not only on water, food and energy security, but also on its repercussions for farmers and other stakeholders. By employing farmers like Govind, and women from the neighbouring villages, the project demonstrates how such initiatives can generate employment for those most in need. Shivkanya Baliram Rasvi from the village states, “we come here for a few hours every day and are paid according to the wage fixed under the MGNREGA scheme. This ‘extra’ money has been very useful in the education of my children. We have paid back our loans and this job gives us hope.”

At the ReNew Agri PV project, scientists are studying which crops thrive in the shade, how the effectiveness of retractable shade nets can be increased, and how technology can be further used to improve productivity in a manner that is sustainable for all. These studies are being documented and promoted so that all stakeholders, developers, government, private sector and public sector, may be quick on the uptake. Agri PV projects like these are paving the way for a future that is sustainable, come sun or shade.