

Learning from solar micro-grid exercises in Gujarat

The SoLAR-SA project in Nepal is planning to implement a Micro Grid (MG)-connected Solar Irrigation Pump (SIP) pilot in 2022. The Indian state of Gujarat, which has an impressive renewable energy portfolio, has already carried out similar projects on a much bigger scale. Thereby, a Nepal delegation of 13 members embarked on an exposure visit from March 22 to 26, 2022 to learn from projects such as the Dhundi Saur Urja Utpadak Sahakari Mandali (DSUUSM) and Suryashakti Kisan Yojana (SKY) in the state. The visit aimed to better understand the schemes' business and technical modalities, and allow engagement with farmers and utility service providers to provide lessons for Nepal's pilot exercise. The delegation had representation from the local government where the micro-grid in Nepal is to be based, farmers from the site of the pilot, the Nepal Electricity Authority (NEA), the Alternative Energy Promotion Centre (AEPIC), and the IWMI-Nepal Office. The diverse group was able to inquire about several different aspects of each site and project, including technical, socio-economic, and policy considerations.

DSUUSM, a research pilot by the IWMI-Tata Water Policy Program (ITP), introduced SIPs to the village of Dhundi, an area notably dependent on diesel pumps. The scheme enabled farmers to generate solar energy for irrigation, and sell excess energy to the grid (CKDN, 2020)¹. Based on the success of the Dhundi scheme, the Government of Gujarat then unveiled SKY – a grid-connected solar irrigation scheme launched in 2018, which also allowed for farmers to both be energy consumers and sellers of excess energy (GPRD, 2019)².

The delegation visited five sites: the pilot at Dhundi was implemented under the DSUUSM model, and the one at Mujkuva village was implemented under a similar model. The sites in Ozarala, Ishnav, and Laljipur were implemented under the SKY scheme.

The team got to kick off its visit with an introduction to the MG pilot exercise by Dr. Tushaar Shah, an economist and public policy specialist, and Scientist Emeritus at IWMI. Dr. Shah provided a background on the water market in Gujarat and noted that water lay at the center of the politics in the state. He spoke at length about the Dhundi solar project which had managed to create the world's first solar cooperative where farmers not only consumed solar energy for their pumps but sold excess energy to the Madhya Gujarat Vidyut Company (MGVCL), facilitated by a 25-year power purchase agreement (PPA). The team then got to interact at Dhundi with the solar cooperative itself, where each farmer now receives an income not just from their farm produce, but also from selling irrigation water and exporting energy to the grid. The sale of water and energy accounts for a combined INR 60,000 – 70,000 total per month for all members of the cooperative.

A similar model in Mujkuva village was also visited, where 11 farmers have given up the right to the subsidized agricultural feeder. Farmers earn nearly INR 30,000 annually from the sales of electricity alone. Initially, they needed to invest INR 50,000. The system has been operational for 4 years. Women are active members of a sub-cooperative that is focused on a bio-gas scheme.



A DHUNDI COOPERATIVE FARMER EXPLAINS THE DHUNDI SOLAR PILOT

SKY feeders in several sites in Gujarat were also visited. The Ozarala village in Kheda saw farmers receive 12 hours of electricity alternatively on day and night through a dedicated agriculture feeder. Thereby, farmers were forced to irrigate their crops at night as well. With the SKY feeder, they receive daytime energy for their irrigation needs. As per the scheme's business model, 80% of farmers in the feeder first need to agree to be part of the scheme. Farmers then receive an on-grid solar PV system, and the sizing of the solar is done per their load demand (pump size) and water table specifications. The farmer pays a 5% cost upfront and received a 35% subsidy from the government. The remaining 60% is a loan that is paid by the sale of excess energy to the grid. Very few women farmers, however, are connected to the scheme, accounting for only 5 out of the total 60 connections.



THE NEPAL DELEGATION IN FRONT OF THE SOLAR ARRAY AT OZARALA

Similar interactions took place at the Ishnav and Laljipur feeders. Some farmers at the Ishnav feeder, however, noted some issues with the scheme. The net metering billing system was complex and difficult to comprehend, and the scheme seemed not to have been well communicated to the farmers from the onset. It seems over-consumption at the end of the farmers was also contributing to their excess energy bills. In Laljipur, more light was shed on the technical and financial processes of the SKY scheme by DISCOM engineers. Overall, 5% comes from the farmer, 30%-35% is central state subsidy, and for the remaining 60% - a NABARD (National Bank for Agriculture and Rural Development) loan is taken out at a 6% interest rate. The loan is awarded to DISCOM, not the farmer – so no land documentation had to be presented by the farmers.

An interactive event between GUVNL (Gujarat Urja Vikas Nigam), GERMI (Gujarat Energy Research and Management Institute), SDC (Swiss Development Cooperation), MGVCL (Madhya Gujarat Vij Company Ltd), and the Nepal Delegation also took place towards the end of the visit that helped better understand Gujarat's renewable energy portfolio, ongoing and upcoming solarization schemes, and technical and social parameters of designs they implemented and oversaw.

The short trip enabled the Nepal team to have a much better sense of what could be expected with their own SoLAR MG exercise that is currently taking shape. Many lessons, on technical designs and the social engineering aspect of the MG, will be brought on board when realizing the pilot project in Nepal.