Switch On

Mini Solar Pumps for Women Farmers or MSP4WF under IWMI-SDC SoLAR

Project Objectives

- Empowerment of small and marginal women farmers in West Bengal's districts by creating solar assets in their name while enhancing income generation through crop and livelihood diversification.
- Replace diesel/grid powered irrigation pumps with solar powered irrigation solutions through clean and cost-effective water solutions.
- Develop replication potential by engaging stakeholders - financial institutions, policy makers and end-users.

Women Farmers with their Solar Asset.

Solution Implemented

- Identified 20 women farmers, by carrying out detailed study and baseline survey of 11 districts in the 5 identified agro-climate zones.
- Arrangement with bank for the loan component and use of IF grant as a collateral security. Water Users Group formation and creation of innovative solar water pumps financing solution (FLDG Model).
- Training and capacity building to manage projects locally.

Fish pond and solar

Project Impact

- Availability of timely and affordable water helped farmers to diversify crop patterns throughout the year. Increased economic independence of women farmers and asset creation for them.
- Reduction of CO_2 emissions through replacement of diesel and electric pump sets.
- Development of a financial ecosystem support mechanism for scaling up solar-powered irrigation, First Loan Default Guarantee (FLDG) Model: A support during challenging times for women farmers.

Women Farmers at their vegetable field

Reflections from the Project

- Women-led water user associations as platforms of change. Promotes community water management system and knowledge sharing to help other farmers.
- Need to identify and integrate livelihoods avenues for women farmers in next phases.
- IF grant was instrumental to create a financial eco-system, which is the backbone for success of the project.

URMUL
Solar Powered Hydroponic Fodder Station

Project Objectives

- To provide a consistent and nutritious source of green fodder for livestock in the Thar Desert, Rajasthan.
- To reduce the environmental impact of fodder production through water-efficient hydroponic systems.
- To enhance livestock health, productivity, and overall farm profitability.

Hydroponic Fodder System and green fodder

Solution Implemented

- Given the low probabilities of ground-based agriculture in the region, low-cost customized hydroponics proved to be a viable solution.
- DRE based innovations to promote better availability of green fodder throughout the year in the desert landscape.
- Grow high quality green fodder without soil and maximize space utilization with vertical farming techniques.

Eco-system

Project Impact

- Project has demonstrated a functional net-zero dairy model. More than 1,000 farmers are impacted positively.
- Improved access to nutrition fodder positively impacted the health and well-being of livestock, helped community and enhanced income of farmers.
- Adaptation of hydroponic fodder solution helped in reduction of water usage and carbon footprints.

Reflections from the Project

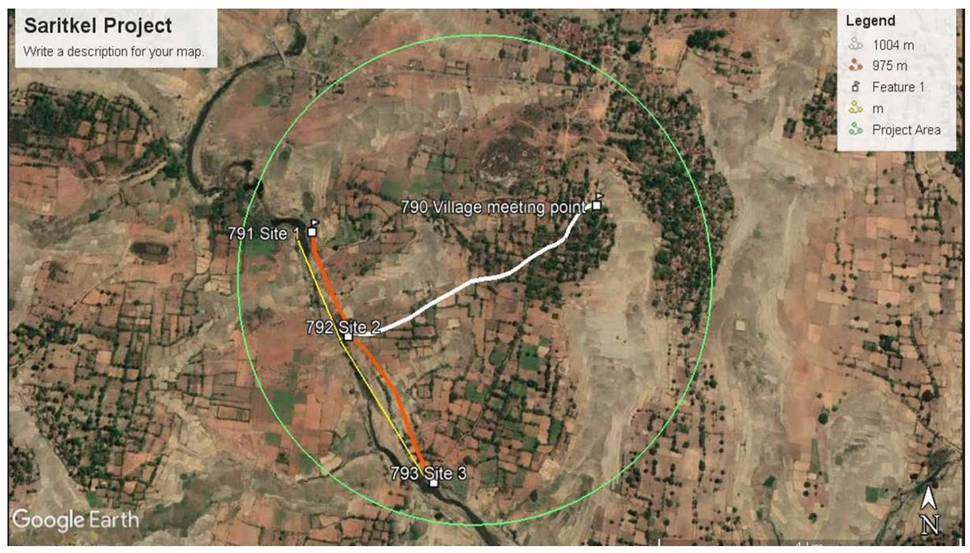
- Fodder cultivated hydroponically exhibits remarkable growth rates compared to traditional soil-based methods.
- Water Efficiency and nutrient rich fodder. Quality Control is crucial for faster growth.
- IF Grant was a great enabling instrument to showcase a successful model and will help to replicate the model elsewhere.

CInI

Excess Energy Accumulation and Redistribution Network (EARN)

Project Objectives

- To setup a network that will allow aggregation and transfer of excess energy of selected 3 solar pumps installed in selected location in Khunti, Jharkhand.
- To use excess energy generated from 3 Nos of 5 hp solar irrigation system in Khunti to run productive equipment such as flour mills/chaff cutters/paddy threshers, etc.
- Connecting solar systems and monetizing excess solar energy in real time.



Project Location

Solution Implemented

- Developed a solution design (technologies, business models, operation models, funding models and implementation roadmap) to tap excess energy.
- Three irrigation pumps in different locations were tapped and a single cable brought to a facility center to operate rice mill, flour mill and oil expeller.
- Trained operator manages the facility center and center has created avenue for income generation in the village.

-Effort to be given on marketing of system
-Energy cost –Rs 8/unit to pump groups
-Every day 20 customers doing business of Rs. 2,000
-Considering expenses of manpower, Energy costs, advertisement and machine maintenance costs.

Business Scenarios

Total HHs- 400 Nos

Flour Mill (3 HP)		
Demand		
No of HHs	100	
Per HH demand	20	kg/ month
Total demand	2,000	kg/month

Rice Huller (3 HP)		
Demand		
No of HHs	100	
Per HH demand	50	kg/ month
Total demand	5,000	kg/month

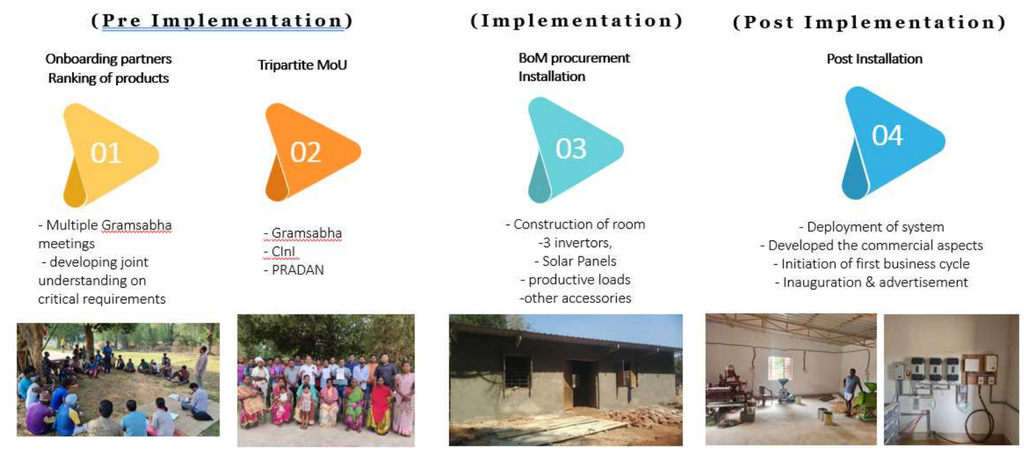
Oil Expeller (5 HP)		
Demand		
No of HHs	100	
Per HH demand	4	liters/ month
Total demand	400	liters/month

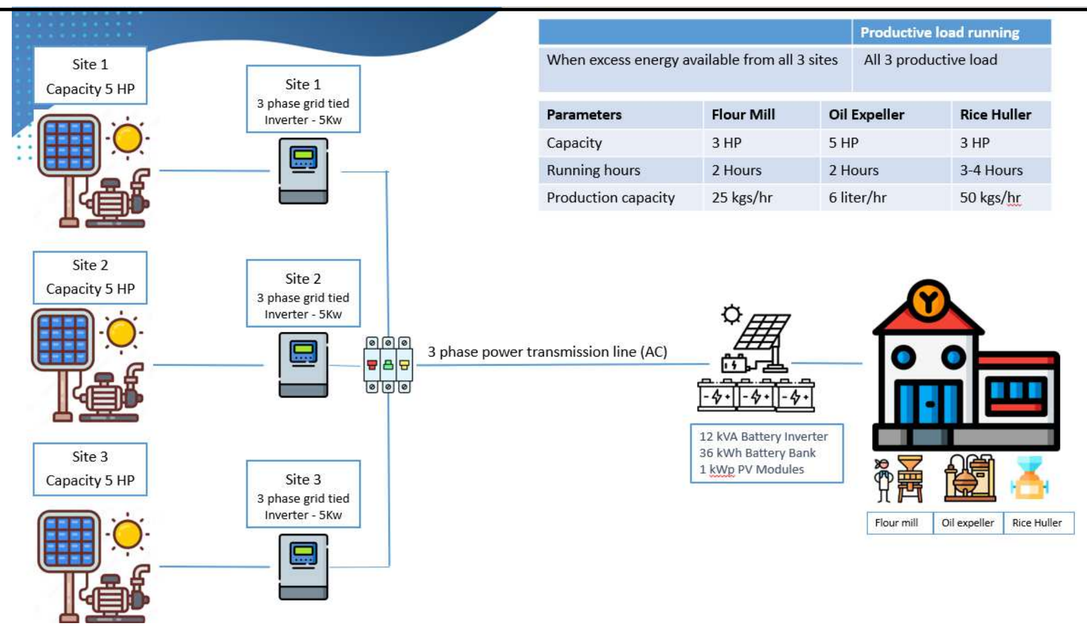
Business Scenarios

Project Impact

- An integrated innovative approach to deploy solutions and services in rural areas.
- Job creation in the village. Villagers are now able to get facility within the village, which saves them time and money.
- CO2 savings by use of DRE.

Stages of Implementation





	Productive load running
When excess energy available from all 3 sites	All 3 productive load

Parameters	Flour Mill	Oil Expeller	Rice Huller
Capacity	3 HP	5 HP	3 HP
Running hours	2 Hours	2 Hours	3-4 Hours
Production capacity	25 kgs/hr	6 liter/hr	50 kgs/hr

Reflections from the Project

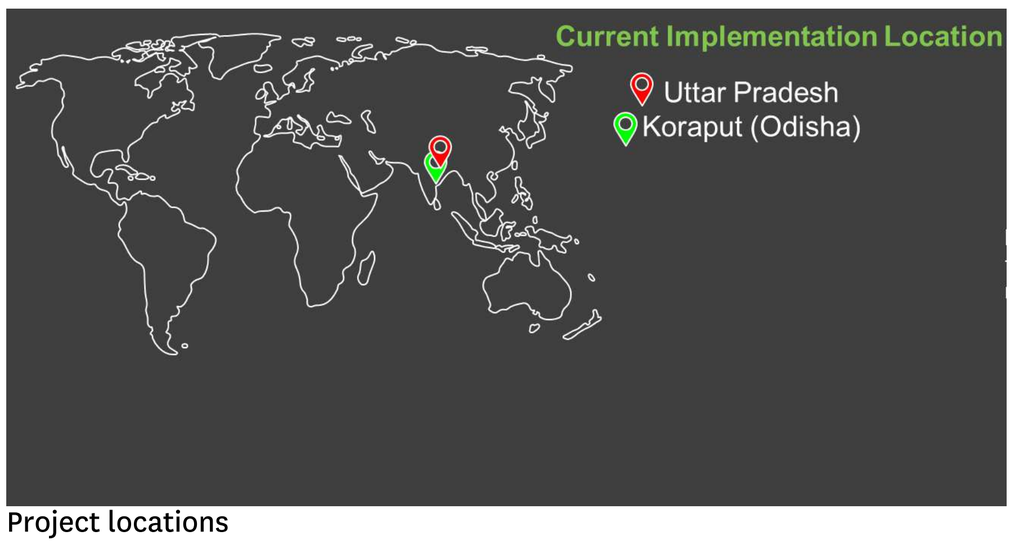
- Onboarding Gram Sabha and local institutions is critical.
- Identifying and capacity building of local entrepreneur ensuring adequate market linkages are present.
- IF grant helped to prove the concept on ground to create large scale replication.

KARMA

Mobile URJA- Scalable Solar Power with Innovations beyond Silicon Technology

Project Objectives

- To develop mobile solar power (mobile URJA) units that will deliver affordable and sustainable energy for irrigation with universal charging option resulting in a simplified rental model having multiple uses.
- Field testing of mobile URJA using flexible and fixed solar panels for irrigation with IoT devices
- Use of mobile URJA in other activities such as rice mill, flour mill, aerator for fish farming.



Project locations

Solution Implemented

- KARMA has developed mobile pumping solution using two types of solar panels: a) Copper Indium Gallium Selenide (CIGS) based lightweight and flexible solar panels and b) Poly crystalline panels.
- Mostly farmers use 2 or 3HP water pumps but they are often oversized. To tackle the optimum use of energy and water, KARMA introduced the first solar micro-pump of below 1HP in India certified by the Ministry of New and Renewable Energy (MNRE), India.
- The Mobile Urja will not only be used for irrigation by multiple farmers but will also power other electrical loads.


Solar mobile pump and usage

Project Impact

- Mobile Urja has created opportunity for farmers to irrigate remote areas where access to water was a problem.
- Easy to move from place to place. Plug-and-play system and theft proof.
- Multiple farmers can use one system and easy to maintain.


Water pump in use

Reflections from the Project

- The IF grant enabled the first instance of integration of lightweight and flexible solar panels with solar pumping in the world.
- The high price of solar flexible panels and the challenge in collecting user fees in the rental model were the biggest challenges for scaling up. Digital payment system will be useful.
- KARMA is trying to create a culture of sharing model (read as uberization of irrigation) and/or an entrepreneur model.

Minergy

Solar Water Mini Grid with Smart Analog Meter for Optimization of Solar Irrigation Pumps and its Widespread Adoption among Small Landholding Farmers of Nepal

Objectives

- Introduction of a solar water mini-grid coupled with a digital payment system based on analog metering with monthly tariff reading, manual database and digital wallet-based payment system.
- Generate evidence of good practices of an institutional mechanism that will aggregate individual farmers as a shareholder in a cooperative model with a common SWMG Solar Irrigation Pump (SIP) system aiming at influencing subsidy policy

Project location

Solution Implemented

- The major objective of the project was to maximize the use of the irrigation system and increase the access of smallholder farmers to irrigation services by enabling more farmers to get connected to the solar irrigation system.
- An innovative project that was designed to improve access to SIP services, and to promote efficient and just distribution of ground water resources extracted through a community based irrigation facility.
- Meter reading based efficient water usage resulting in optimal usage


Fixing of meter in the pump

Project Impact

- This project aimed to increase the number of beneficiaries households from 36 to 53 households, but actual number of beneficiaries were 58 households.
- Solar irrigation system allows parallel irrigation of 3 land plots at once, small landholders now have a shorter waiting period to use solar PV for irrigation.
- With the help of extension of water pipeline, water efficiency has improved and covered land area from 7.3 ha to 11.4 ha resulted in increase in revenue.


Use of water pump

Reflections from the Project

- Solar IF grant was a great tool to demonstrate a successful project on ground.
- Projects linked with agriculture need to consider the users requests regarding harvest periods and implementation.
- Solar irrigation solution can work in on-grid or off-grid mode. Solar system is connected with the grid and/or use surplus power for other productive end uses such as cold storage, grinding mills, etc.

Gham Power

Off Grid Bazaar – Scaling the Deployment of Solar Irrigation Systems Using Digital Platform & Personalized Agri-advisory for the Farmers

Objectives

- To create an inclusive package allowing poor and marginalized farmers to access affordable and reliable solar water pumps that will help them increase their efficiency, productivity, and income.
- Demonstration of digital platform and data driven customized agri-advisory solution on site.

Women Farmer in Nawalparasi Nepal observing the NPK sensor incorporated with Gham Power Krishi Meter at SWPS site

Solution Implemented

- The project implemented a muti-faceted solution to address agricultural water management challenges and deployed 7 solar water pumping system with sensors and remote monitoring unit.
- To maximize impact, Gham Power developed the Off Grid Bazaar platform for system monitoring and provide the following services:

1. **Data-Driven Farming** (to help in yield improvement).
2. **Financial Inclusion** (Digital platform for easy farmer financing).
3. **Personalized Agri-Advisory** (Farm-specific crop recommendations for better efficiency).

Onsite Agri-Training being provided to the Farmers of Sunsari District of Nepal

Project Impact

- Improved overall economic condition of farmers with increased efficiency and income.
- Smart meters and sensors have helped track solar plant and crop performance on a regular basis, which has helped improve overall efficiency.
- Reduction of CO_2 emissions through replacement of diesel and electric pump sets.

Farmer showing the Super Krishak App on her Mobile Phone

Reflections from the Project

- SoLAR IF project provided valuable lessons in adaptability, partnership, and the power of data.
- Automation and digitalisation helped improve overall efficiency of the project. The importance of constant training and capacity building was proved.
- Large scale replication will require institutional support, as affordability remains a barrier for many farmers.

International Water Management Institute

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

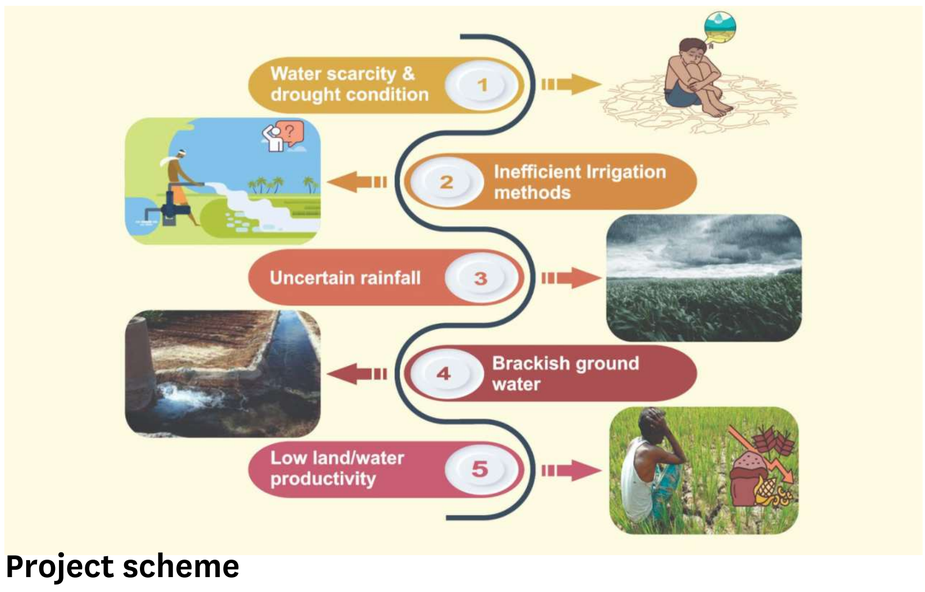
Swiss Agency for Development and Cooperation SDC

Pakistan Agricultural Research Council (PARC)

Livelihood Improvement of Dugwell Dependent Vulnerable Communities through Energy and Water Efficient Responsive Drip Irrigation Systems

Objectives

- To get experience of high value production system (horticulture and vegetables) of scarce water resource (dung well, bore, pond, etc.) through micro solar pumping system (energy efficient and irrigation with responsive drip system)
- Pilot and demonstration of the integrated innovation in different ecologies



Project scheme

Solution Implemented

A completely new but low-cost solution utilising optimized solar powered water pumping and water most efficient Responsive Drip Irrigation (RDI) has been tested and piloted in water scarce areas across diverse ecologies, including seven (07) research and demonstration sites and four (04) female farmers sites to enhance agricultural productivity and livelihood improvement under water shortages.

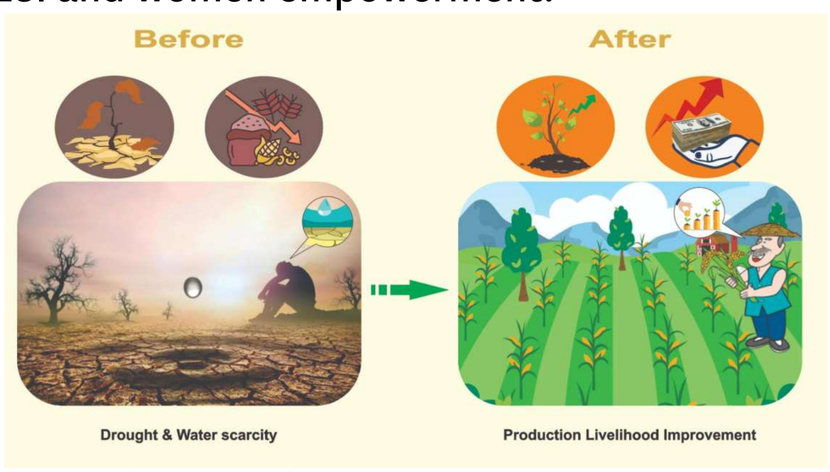
- A single push button solar pumping system facility enables the daily filling of an overhead water tank effortlessly.
- A gender friendly water energy smart irrigation system (solar based responsive drip irrigation) eliminates the need for manual irrigation scheduling.

Illustration of solution implemented

Project Impact

Based on results from single season outputs:

- Satisfactory acceptance of RDI integrated with optimised Solar Wate Pumping will be a great blessing for water scarce regions.
- RDI exhibits impressive water saving (67.69%) compared to flood irrigation.
- RDI outperforms SDI in water savings for both vegetables & fruits crops (24.69%) and cotton crops (19%). Also, continuous water availability helps in energy savings.
- Gender friendly solar based RDI system played its role for GESI and women empowerment.



Impact before and after

Reflections from the Project

- Integrating RDI with optimised solar pumping systems presents an innovative solution for water stressed regions. While initial costs may be higher, wider adoption by farmers and stakeholders is expected to drive down unit costs over time.
- Government interventions and subsidies are crucial in facilitating broader adoption by offsetting initial investment costs and incentivizing transitions to sustainable irrigation practices.
- The pilot sites developed under this project are becoming educational hubs, providing training and learning opportunities for professionals, students, farmers and other stakeholders.
- IF grant was a great support in the project.