



Final Report:

**Micro-Business and
Female Small-Scale Farmers in Rural India**
Innovation through Sustainable Energy Technology



Author(s):

Eva Schuepbach, Andrea Vezzini and Urs Muntwyler
Bern University of Applied Sciences, Institute for Energy and Mobility (IEM)
Burgdorf/Biel, Switzerland

Co-Author:

Tharun Anto
Thitali Low Carbon Solutions Pvt Ltd.
Kochi, India

Date of the Report: 30 June 2015	Contract Number: 2011.25
Institution: Bern University of Appl. Sciences	Country: Switzerland

Prepared by:

PD Dr. Eva Schuepbach

Bern University of Applied Sciences BFH

Department of Engineering and Information Technology (BFH-TI)

Institute for Energy and Mobility (IEM)

Photovoltaic Laboratory (PV LAB)

Jlcoweg 1, CH-3400 Burgdorf / Switzerland

Tel: +41 (0)34 426 68 29, Fax: +41 (0)34 426 68 13

eva.schuepbach@bfh.ch / www.ti.bfh.ch/elektro / www.pvtest.ch



Berner Fachhochschule
Haute école spécialisée bernoise
Bern University of Applied Sciences

With the support of:

REPIC Platform

C/o NET Nowak Energy & Technology AG

Waldweg 8, CH-1717 St. Ursen / Switzerland

Tel: +41(0)26 494 00 30, Fax: +41(0)26 494 00 34, info@repic.ch / www.repic.ch

The REPIC Platform is a mandate issued by the:

Swiss State Secretariat for Economic Affairs SECO

Swiss Agency for Development and Cooperation SDC

Swiss Federal Office of Energy SFOE

The author(s) are solely responsible for the content and conclusions of this report.

Summary

One billion people worldwide have access only to unreliable electricity networks and 1.2 billion have no access to electricity. In such under-electrified or even non-electrified regions, renewable energy and especially solar technology offer a particularly great potential. In agriculture, harnessing solar energy to drive photovoltaic water pumps can facilitate irrigation and crop production during the dry season, open the door for additional sources of income and thus contribute to rural development.

In India, around 300 million people lack access to electricity, and there is currently an under-served demand for solar water pumps. This pilot project hence addressed the deployment of solar water pumps in India. The solar water pump introduced was a photovoltaic water pump system ("sunlight pump") developed at the Institute for Energy and Mobility Research (IEM), Bern University of Applied Sciences BFH in Switzerland and now locally manufactured in India. Collaboration partners were both local non-profit organisations and local businesses in southern India.

Female farmers were targeted as deployment partners, as Indian women play a predominant role in earning a livelihood for their families, and to avoid the old trap of widening the gaps in a class system. In order to minimize the costs for installation, monitoring and service line set up during the "sunlight pump" field tests, female farmers close to the manufacturer (Bangalore, Karnataka) were selected. The main implementation partner was the female farmers' association of Kudumbashree in Kerala, where "sunlight pumps" were installed as part of an extended irrigation system with water tanks, drip irrigation kits and sprinkler systems. The female farmers of Kudumbashree can take advantage of a relatively high grid-connectivity in Kerala, in addition to subsidised electricity and hence, there was stiff competition for the "sunlight pump" from electric water pumps in this pilot project.

Nevertheless, training of the female farmers by Swiss engineers, jointly with the elected bodies of the local self-government in rural India (Panchayats) and in association with local village offices and the local project manager of this pilot project in India created considerable awareness for operations and maintenance of the "sunlight pump". Preliminary business models established with Kudumbashree show that using the "sunlight pump" for irrigation might be attractive to the organisation, when additional applications are adopted (e.g., the use of the "sunlight pump" for domestic water supply as demonstrated in this pilot project). Multiplication includes the deployment of the "sunlight pump" to urban farming, which currently is an explosive trend in the nearby city of Kochi, Kerala.

As a replication, the Solar Pump Association Switzerland (SoPAS) will, jointly with Caritas, install ten "sunlight pumps" in Bihar (northern India) in September 2015, where supplemental irrigation is needed over a longer period than in the state of Kerala. In regions with lower or no grid-connectivity, the "sunlight pump" could even be attached to a battery to offer additional advantages like powering solar lights or charging cell phones.

In conclusion, deployment of solar irrigation technology like the "sunlight pump", combined with an efficient use of water in irrigation (through water tanks and drip irrigation kits/sprinkler systems), can potentially offer new perspectives to female farmers and enhance the safety of farming village women (avoid overnight irrigation).

It is recommended that the female farmers of Kudumbashree install and use the deployed irrigation system again during the next dry seasons to gain a better understanding of all technologies. The local project manager in India and some experts of the Swiss project team could then follow up with the organisation to ensure that the "sunlight pumps", drip irrigation kits and sprinkler systems are to the full benefit of Kudumbashree in the future. In this way, this pilot project conducted by Bern University of Applied Sciences BFH, Switzerland, will continue paving the way towards women empowerment in modern solar irrigation technology among female farmers in Kerala, India.