

**Asia-Pacific Environmental Innovation Strategies (APEIS)
Research on Innovative and Strategic Policy Options (RISPO)
Good Practices Inventory**

Financing solar photovoltaic systems through rural finance institutions

Summary of the Practice

Keywords: financing, solar photovoltaic systems

Strategy: Innovative financing for renewable energy development

Environmental areas: Climate change

Critical instruments: Awareness/capacity building, Economic instruments, Partnerships

Country: India

Location: Southern Indian states of Karnataka, Kerala and Andhra Pradesh

Participants: SELCO-India, rural financial institutions

Duration: 1995 - ongoing

Funding: over U.S.\$550,000 representing private investment, loans, and conditional grants

Background:

India represents a large solar market, with a population of roughly 1 billion, of which 40% have no electricity. India receives about 300 clear sunny days in a year. This is equal to over 5,000 trillion kWh/year, which is far more than the total energy consumption of the country in a year. The daily average solar energy incident over India varies from 4 to 7 kWh/m², depending upon location. Solar photovoltaic (SPV) systems have found applications in households, agriculture, telecommunications, defense, and railways among others. In the last two decades, the cost of PV has gone down by more than 10 times, increasing accessibility for dispersed rural applications. About 65 MW aggregate capacity (about 800,000 systems) in stand-alone PV systems have been installed for various applications in India, and systems with a total 18 MW of capacity have been exported.

A national SPV programme to develop cost-effective PV technology and its applications for large-scale diffusion in different sectors, especially in rural and remote areas, has been under implementation by the Ministry of Non-conventional Energy Sources (MNES). In 1992 the MNES announced a new strategy and action plan to replace subsidy-driven programmes with commercialization. However, it revealed that in rural areas such as those of West Bengal, Rajasthan, hilly regions of Uttar Pradesh, Ladakh, Lakshadweep, Andaman and the Nicobar Islands, which are prominent regions where SPV home lighting systems are in demand, traditional approaches to commercialisation of SPV systems have not been successful in achieving wide penetration.

Objectives:

While SPV systems offer a good alternative for electrification in rural parts of Southern India, the high up-front capital costs for the average rural dweller, coupled with the absence of government subsidy programmes make financing a key barrier to commercialization. The objective of the business model is to increase the affordability of SPV systems by rural households through innovative rural financing schemes that reduce transaction costs and ensure repayment.

Description of the activity:

The business model of SELCO-India, a solar energy service company operating in Southern India since 1995, aims to develop an innovative consumer finance scheme through rural credit institutions with loans available from local banks and cooperatives, along with a sales, installation, and maintenance network in the villages. Since most end-users in rural areas cannot afford to buy a SPV system up-front, the SELCO business model was able to break the cost barriers into staggered payments over a three-to-five year period, with loans provided by rural financial institutions. The financing scheme succeeded in responding to consumer willingness to pay for better lighting services by providing door-step financing adapted to the repayment capability of rural people. Central to the approach was the successful

partnership developed with rural financing institutions and local solar entrepreneurs and technicians. This built confidence both on the side of lenders as well as borrowers on the viability of the technology and its business profitability.

Critical Instruments

Overview

The SELCO business model is a combination of economic instruments in the form of micro-credit loans, awareness and capacity-building of local stakeholders relevant to the promotion of the emerging technology, and partnerships with rural financial institutions, local entrepreneurs and technicians.

Awareness/capacity building

Getting financial institutions be aware of the viability and profitability of the technology

Even in rural areas, financial institutions are able to provide consumer financing for SPV, but lack of information on the viability of the technology, coupled with the fact that a SPV as such is not directly associated with revenue generation, restrained financial institutions from venturing into the solar lighting business. The approach included convincing financial institutions of the viability of the SPV by installing demonstration systems in the banks and their local branches. This led rural banks and financial institutions to venture into providing SPV consumer credit lines.

Economic instruments

Breaking SPV systems up-front costs into staggered payments through rural door-step financing

Since most end-users in rural areas cannot afford to buy a SPV up-front, breaking of first cost barriers through staggered payments is necessary, in addition to finding financial institutions to provide loans. SELCO offers a 'lease to own' scheme wherein the consumer pays one-quarter of the system cost as an upfront payment and the rest is given to him by the financial institution as a loan at 12.5% interest per annum. An important and effective part of its strategy has been to make tie-ups with financial institutions like the Syndicate Bank to provide loans for SPV systems. One such partner is the Malaprabha Grameen Bank (MGB), a rural development bank with 200 branches in Dharwad and Belgaum districts of Karnataka, known for its innovative micro-credit schemes. The Solar Lighting scheme of these banks offers three-to-five-year loans to consumers for 90% of the solar system cost at an interest rate of 12 to 12.5% (priority sector lending rate, the lowest interest rates in the country). Where no other type of financing is available, SELCO has set up its own financing arm using loans at low interest rate with IREDA re-financing 2.5% p.a. (World Bank Line of Credit). As rural customers are at the lowest level of the financing ladder, door-step financing through rural financial institutions (registered farmers' co-operative societies or cooperative banks) contributes to reducing the borrowing transaction costs, thus increasing affordability to rural customers.

Partnerships

Partnering with financial institutions, local entrepreneurs and local technicians

In addition to collaboration with rural banks, cooperative societies or cooperative banks, the availability of local entrepreneurs ensures a link between the SPV manufacturers, the supplier and local customers. This essential link provided customers with information on the technology, and schemes for system finance, in terms that local people understood. The collaboration with local technicians for door-step PVS instalment and maintenance through solar service centres set up in target villages raised the confidence of lenders, as the proper functioning of systems leads to proper payments to the banks by the borrowers. These technicians, all hired locally, are trained and work for SELCO on an income-cum-commission basis. They provide quick after-sale service and conduct regular collection of loan instalments.

Impacts

Under this door-step approach to financing and service, over 12,000 solar home lighting systems had been installed as of late 2002, without any default on loans. The widespread introduction of PVS has financial, economic (employment generation, extension of productive working hours), environmental (reduction in CO₂ emissions) and social (positive impact on health as compared to kerosene lighting) benefits. Of particular importance with regard to the financing of renewable energy development is the financial impact of introducing SPV systems in off-grid rural areas. The comparative power costs of a solar photovoltaic over an off-grid non-SPV household indicates that the total lifetime cost of kerosene lighting, which is most common in the rural areas, amounts to U.S.\$2,825 (including kerosene, dry cells, battery recharging and battery replacement) whereas the cost of grid extension to utilities is estimated at U.S.\$3,000 per household. The SPV household cost is estimated at U.S.\$1,687 (including system price, light replacement, battery replacement and maintenance). In financial terms, the net gain to the customer over the lifetime of a SPV is U.S.\$1,138 (kerosene versus SPV) or U.S.\$1,362 (grid versus SPV).

Lessons Learned

The SELCO experience established that the distribution of SPV systems via commercial channels can be workable in rural areas if adequate financing schemes are put in place, in addition to technical support, awareness-raising, and strong business and community partnerships. The business model indicates that:

- Commercialization of SPV systems in rural areas needs strong collaboration with local existing financial institutions. However, due to the limited information available locally on the technology itself, and concern about the profitability of lending for SPV systems, coupled with the perception of the high risk of venturing into an unknown area, convincing financial institutions of the merits of SPV on these issues is essential for getting them to establish credit lines.
- Making credit available at a reasonable interest rate and an expanded time for repayment would enable prospective SPV users to get around the problem of high capital cost of SPV devices, which is normally the biggest hindrance in their promotion, especially in rural areas.
- Creating a local infrastructure for repair and maintenance able to provide quick and effective service in case of any technical faults with the system is crucial in assuring financial institutions about loan repayments as well as obtaining consumer confidence in the technology.
- Promoting local entrepreneurs that go between the SPV module manufacturers and customers contributes to the rapid penetration of the technology as small businesses grow.

Potential for Application

The SELCO business model in India is being applied by the same solar energy service company in Vietnam and Sri-Lanka. SELCO Vietnam Limited, a subsidiary of the Solar Electric Light Company, was founded in 1997 to serve the rural market in Vietnam, where 60% of the rural population remains without electricity. SELCO Vietnam Ltd. is the first 100% foreign-owned company licensed to operate in Vietnam, and has installed over 3,000 solar home systems in the country. SELCO-Sri Lanka, originally founded as RESCO Asia Limited in 1997, draws on long experience by its founders in bringing solar rural electrification to Sri Lanka. Today, the company operates a network of solar service centres island-wide.

The SELCO approach to financing renewable energy can be emulated in other parts of the world with similar needs, if a network of rural financing and micro-credit institutions exists. As the SELCO approach indicates, a decentralized system of management, after-sale service and maintenance are essential elements, in addition to financing.

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