

A New Micro-Credit System for Solar Panels in Remote Villages, Nepal

Themes

- ★ Renewable energy
- ❖ Financing mechanisms and private sector involvement
- ❖ Technical capacity development
- ❖ Institutional capacity development
- * Poverty alleviation (MDG 1)

PROJECT DATA

Name: Solar Village Electrification Demonstration Project (SOVED), and Paper and Power Project, part of the Home Employment and Lighting Package (HELPTM)

Implementing Organization: Himalayan Light Foundation (NGO)

Location: District of Baglung, Nepal

SGP Contribution: \$50,000 (SOVED), \$49,000 (Paper and Power Project)

Start Date: December 1999 (SOVED), September 2001 (Paper and Power Project)

ENERGY OVERVIEW

Energy Resource: solar

Technology: individual photovoltaic systems

Application: indoor lighting

Sector: domestic

Cost of each system: \$342. The first 75 systems received a government subsidy of approximately \$150 each, and beneficiaries paid \$192. Current subsidy rates for these solar home systems are now \$93, so villagers must cover a higher proportion.

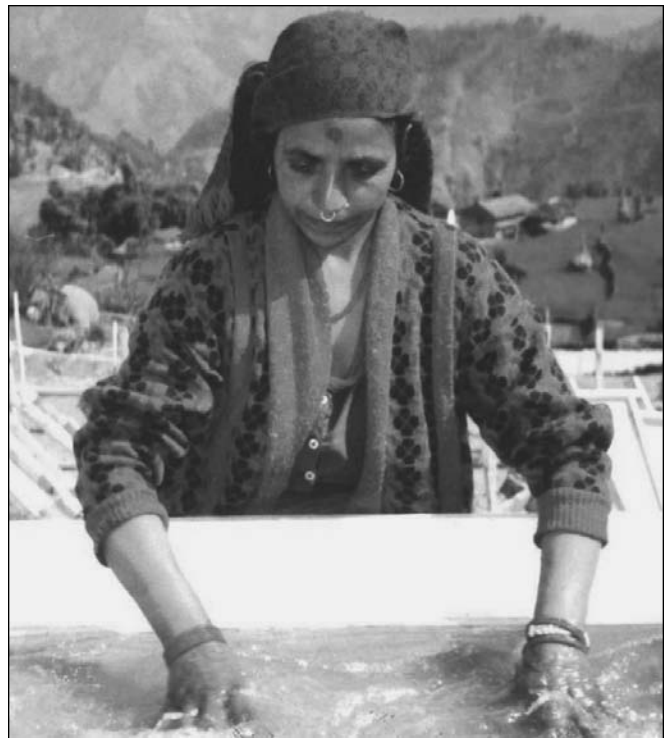
Total power provided: 3.4 kW (198 panels of 20Wp each)

Households Served: 198

BACKGROUND

Nepal is a mountainous and predominantly rural country in which only about 3% of the rural population has access to modern energy services. Extending the electricity grid is expensive, costing between \$10,000 and \$30,000 per kilometer due to the rugged terrain. On the other hand, most areas in Nepal receive high levels of sunlight throughout the year. Thus, individual solar photovoltaic panels are well adapted to meet rural energy needs. In 1996, the government established the Alternative Energy Promotion Centre (AEPIC), which provides subsidies covering up to 50% of the cost of a solar home system. Between January 2001 and November 2002, AEPIC committed approximately \$1.8 million for such subsidies. There are more than 20 private companies supplying solar home systems in Nepal. These suppliers import panels and batteries and manufacture control boxes other solar home system components domestically.

However, even with the subsidy – for which demand far exceeds supply – the poorest villagers do not have the cash to



A woman makes paper products to generate income and pay for solar panels (Nepal).

pay for the rest of the panel's cost, and do not have collateral to obtain a loan. Only the most well-off villagers can access loans, and therefore they obtain the subsidies as well. The poorest have little option but to continue buying and hauling kerosene, which must be imported using precious foreign exchange. Kerosene contributes to the global problem of climate change, and creates serious local air quality problems. Households also purchase dry cell batteries to power radios and flashlights, which are generally not disposed of properly. The purchase of kerosene and batteries accounts for about 20% of a village household's income. Villagers in project areas also harvest and use diyalo, a highly resinous fat wood, for lighting – at the rate of four trees per family per year. Diyalo sticks are stuck in the floors of homes and lit up, producing a dim and extremely sooty flame which causes respiratory and eye problems for villagers.

PROJECT DESCRIPTION

Overview

This project primarily addresses the financial barriers to renewable energy. It demonstrates a flexible credit scheme that enables the poorest members of Nepalese villages, who have little cash and no collateral, to obtain solar photovoltaic panels and enjoy their benefits. At the same time, the project creates a source of long-term income by building the skills and capacity of villagers to produce handicraft goods for sale.

Implementation

The grantee, the Himalayan Light Foundation (HLF) developed a flexible payment scheme to enable villagers to access solar panels through the production and sale of handicraft products

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sold over the Internet. This concept, called the Home Employment and Lighting Package (HELP, was developed with the support of a private solar panel distributor, Lotus Energy, Ltd. SGP provided support for HLF to initiate the Solar Village Electrification Demonstration Project (SOVED), which is based on the HELP model.

In SOVED, women commit to knitting one traditionally designed bag per month to pay off the loan for the solar panel. Participants in the program are also granted access to the AEPC subsidy. After knitting 24 bags over two years, the loan is paid off, and income from the sale of bags returns directly to the household. Until the Internet accessible E-shop on the Himalayan Light Foundation's website became operational in mid-2003, the bags were sold via conventional means in Nepal. Now, international sales are possible via the E-shop (<http://www.hlf.org.np>). The funds from sales are placed in a revolving fund under the control of the villagers, called the Revolving Electrification and Income Enterprise Fund (RELIEF). Once the fund is large enough, villagers who don't have solar panels yet can borrow from the fund and pay the loan back by producing bags. Through a separate program run by the Himalayan Light Foundation called the Solar Sisters, the local health post has also received solar lighting. This program brings in volunteer donors from abroad to fund and help install solar panels for specific buildings. Finally, HLF has started a new project, called the "Paper and Power Project," also funded by SGP. This project is located near a forest where raw materials for paper products grow. The management of the forest is being transferred to the villagers, who will sustainably harvest these raw materials. They have been trained in making paper products, and will produce them for sale in order to repay loans for solar panels. These paper products are also sold via the E-shop, along with the bags.

Environmental benefits

Global: A total of 106 solar panels have been installed in the village that produces knitted bags. In the "paper and power" village, 92 solar panels have been installed. Carbon emissions have been reduced since the panels replace kerosene as the primary lighting source.

Local: Dry cell batteries are no longer used in the village. Instead, villagers use a small Ni-Cad battery recharged via their solar panel. Thus, any local ecosystem impacts from improper battery disposal have been substantially reduced.

Local Livelihood benefits

Health: The elimination of kerosene use in the home greatly reduced the incidence of respiratory and eye problems. In Bongadovan, the health worker also reports reduced incidences of bronchitis and pneumonia, as well as reduced drinking. (Drinking is banned in the village, and now it is harder to hide the practice since there is better light at home.) In addition, the health clinic now has better lighting via the panels installed by the Solar Sisters. On the negative side, more women have complained of sore fingers from the knitting, although this problem reportedly has since declined.

Poverty alleviation: First, households no longer need to purchase kerosene or batteries. This saves as much as 20% of their income. Second, once the loans are paid off for the solar panels, the income from the sale of bags returns to the women themselves, providing an average supplemental income of \$110. The additional light provides extra time in the evenings for productive activities, and the HELP program has provided micro-enterprise training to local villagers to enable them make use of the better light to increase their incomes.

Education: Evening activities are now possible; children can study in the evenings, and women are now pursuing evening literacy classes at the newly-lit health post.

Reduced drudgery: Villagers no longer need to haul heavy loads of kerosene to their homes. In addition, the improved lighting makes daily tasks – like sorting rice – easier. However, it should be noted that making the bags to pay off the solar panel loan adds to women's work, since each bag takes 70 hours to complete.

Improved local opportunities: The village economy is very minimal; agriculture, herb collection and making paper do not provide sufficient income. Therefore, most young people have left the villages for the cities, hoping for greater economic opportunities there. This project helps bring new economic opportunities to the village, hopefully re-opening the option for young people to stay.

National benefits

Reduced dependency upon imported kerosene: In the early 1990s, about 24% of Nepal's foreign exchange was used to import fossil fuels. Increased use of solar energy reduced the need to import kerosene, thereby saving foreign exchange for other purposes. However, foreign exchange is also necessary to import solar panels and batteries, so it is unclear how much foreign exchange is actually saved. In any event, reduced dependence on fossil fuels should decrease the impact of fuel price shocks on the Nepalese economy.

Capacity Development

Technical: All recipients of solar panels were trained in their proper use. In addition, two technicians were given in-depth training to enable them to maintain and repair the panels.

Micro-enterprise: The project leader for the community attended a micro-enterprise training organized by the Peace Corps.

Social Mobilization: Two social mobilizers, both women, attended this training.

Handicraft Product Training: All beneficiaries attended this training, which is essential for quality production. During the training, beneficiaries learned the type, style, colors and size of products acceptable for paying off the loan. In addition, beneficiaries and project leaders mutually agreed upon the number and price of products required to pay off the loan.

Beneficiaries

Women are the primary beneficiaries, since they work most in

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the home, but everyone in the household benefits from improved air quality and better lighting.

Partners

The Himalayan Light Foundation collaborates closely with the community, government and private solar home system companies.

Government: The Alternative Energy Promotion Centre (AEPCC) makes the subsidy for purchase of the solar panel available to participants in the bag-selling scheme. HLF negotiated this arrangement directly with AEPCC.

Community: Nepal has very strong community involvement in a decentralized scheme of government. The Village Development Committee (VDC) of Bongadovan and the District Development Committee of Baglung were critical partners in the program, as they provided a local infrastructure for organizing the work. For example, a Solar Development Committee (SDC) within the VDC was created to make decisions about the implementation of the solar project.

Private sector: The project purchased the solar home systems via Lotus Energy Systems, a local private supplier in Nepal. The company also provided installation and training assistance.

LESSONS LEARNED

Environmental management

This project illustrates the potential for solar photovoltaic panels to meet energy needs in remote and sparsely populated areas. Since electricity grid extension to these areas may indeed be very costly, sustainable methods for disseminating solar panels in these areas is one possible solution. However, as this project demonstrates, creative ways of lowering financial barriers need to be found if this approach is to be viable.

In addition, very careful training of users and technicians is critical if decentralized energy systems such as these are to be successful. This project has heavily emphasized training. Even prior to the arrival of the equipment, HLF provided preliminary training, including an overview of how solar panels work and how they are maintained. They also alerted participants that they would need to have a few items ready for the installation: a pole for mounting the panel, a hole in the ground, and coal and salt for grounding. When the company providing the panels, Lotus Energy Pvt. Ltd., arrived to install them, the beneficiaries were involved in the process, helping to mount and wire the panels.

Another training was held during installation, and yet another after the installation, reiterating proper handling and maintenance. The two local technicians participated in these trainings, and in addition traveled to Kathmandu to receive in-depth training on maintenance and repair at the company's office. All of this training helps to ensure that the solar home systems last as long as possible.

Barrier Removal

Financial: Despite the fact that the Nepal Government offers

subsidies to individual villagers acquiring solar home systems, the subsidy has only reached the rich members of the society who can pay cash for the balance of the system cost after the subsidy, or who qualify for government loans due to landholding status or other substantial collateral. The poor members, who are the majority of the potential market for solar home systems, cannot enjoy the benefits of the subsidy, as they cannot raise the balance.

This project is designed to overcome this barrier: HLF offers villagers access government subsidized solar panels, accepting as collateral the promise to produce a certain amount and quality of products.

The approach shows that flexible payment schemes can make a big difference in the ability of the poorest members of a village to access solar technology and its benefits. However, such systems must be carefully planned in order to be effective. This project has chosen Internet sales as its method of turning goods into cash. Some critical elements of HELP's strategy are:

Close involvement of an NGO or a company able to make the upfront investment in the solar panels. This organization must assume the responsibility of selling the products and recouping the funds over a long period of time. In this case, the Himalayan Light Foundation is responsible for selling the products, and it takes two years to recoup the funds from each solar panel. HLF has plans to transfer this activity to a private company; a memorandum of understanding has been drafted between HLF and the Organic Village, a Nepalese company.

Careful study of market demand for the items made for sale. The HLF conducted a feasibility study before launching HELP, which determined the actual and potential demand for handicraft items from developing countries, particularly Nepal. The study identified bags and paper products as having significant worldwide market potential. The choice of products must also take into consideration whether the raw materials are readily available in the villages. The study also sought future partners that could eventually take product sales to a scale that will help propel various HELP program start-ups in remote villages through market forces.

Means for marketing and distributing the products. If the product being produced does not have a local market, provision must be made for advertising the products, transporting them and receiving funds for their purchase. In this case, HELP is making use of the Internet to access the world market. HLF contracted with the College of Software Engineering to develop the software and the website for selling handbags. After many months of development and testing, the E-shop is now operational. However, this took a significant investment of time and effort. HLF hopes to use this same web site for other HELP program products throughout the South Asia region.

Sufficient training for villagers who make the products to ensure that consistent standards of quality and style are met. HELP has provided "Handicraft Product Training" for all beneficiaries, and also has arranged for additional training through the Small Cottage Industry Development Board, to help participants organize themselves to produce quality products in large

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er numbers while meeting deadlines. This aspect is also being scaled up as HLF is developing relations with the Forward Leap Foundation, a U.S.-based NGO, and The Organic Village to develop a large marketing campaign for HELP product sales. Strong relationships between the NGO handling the project and villagers receiving solar panels and making products for sale. As with any micro-credit scheme, "social collateral" is crucial. Each household must somehow be held accountable for making a bag per month for the next two years. Each bag initially takes 70 hours to make, although production time decreases with proficiency. Thus, the women of the household must invest a relatively large amount of time on top of their already very long working day. Participants must therefore be strongly motivated to participate. The Himalayan Light Foundation's project officer had to work hard to establish the trust of the villagers, ensuring that they actually did produce the required bags. Solar panels, which are durable items, can be removed from households who do not keep their end of the bargain. This, fortunately, has not happened, but the knowledge that this is possible may help motivate villagers to cooperate.

Financial barriers still remain for villages in Nepal to access solar panels. The current scheme depends upon a subsidy funded by AEPIC, which lowers the cost to users by about \$100 and therefore reduces the number of bags that must be completed to pay off the loan. However, the subsidy funds are finite, and are reduced in size each year. Without them villagers would have to produce a greater number of bags, or make items that can be sold for a higher price. Requiring the production of one bag per month for two years is already a heavy commitment for the hard-working women in this village. Suggestions that men take on some of the work that women used to do has met with a great deal of resistance from the men. However, according to the HLF, the men have in fact taken on several tasks which they normally did not do in order to increase the women's available time for making handicraft products. Thus, financial and cultural barriers are intertwined.

Institutional/cultural: Collaborating with and strengthening local institutions, such as the Village Development Committee in this project, is crucial to success. Staff from the Himalayan Light Foundation helped build the village's capacity to take on group projects, such as the solar panel installation. A Solar Development Committee (SDC) was formed within the VDC to be responsible for decision-making and organization of the project. However, this capacity building – how to manage projects and finances – seems to have spilled over into other development projects. The village has started to organize itself to build a new toilet in the health compound, and has received training on building smokeless stoves. Thus, while this project seeks to demonstrate the potential for spreading solar panels to other villages, it also seems to have reduced institutional barriers to implementing other projects to improve livelihoods and the environment. The start of the SDC also catalyzed several other village works such as a road building and sanitary facility construction.

Cultural and gender barriers proved to be the most challenging for this project. The divisions of labor between men and women seem sacrosanct, at least so far. Perhaps these simply take longer to change; over time, the improved lighting, and new economic opportunities associated with it, may result in a greater re-distribution of labor.

Scaling Up

This project is being scaled up through several avenues. After SOVED, SGP funded the Paper and Power Project. SGP and HLF are also working together to put together a proposal for a GEF medium-sized proposal. In addition, HLF is creating a regional NGO consortium to scale up the model regionally. So far, members include the Sewalanka Foundation in Sri Lanka and the Tarayana Foundation in Bhutan.

The Internet marketing capability is also key to scaling up this project. Once the E-shop exists, it becomes easy to add new products, as HLF has done by adding the paper products being produced by the Paper and Power Project. HLF also believes "energy branding" is important: that is, if purchasers know that the product is contributing to energy access in Nepal, they may be willing to pay more. This is one of the reasons why HLF has trademarked the names of its programs: HELP, RELIEF and Solar Sisters. HLF hopes these names will come to be associated with clean energy and improved livelihoods, and in addition will signal a willingness to commercialize its efforts in the hope that eventually a private company could take over the enterprise.

Essentially, an E-shop cannot be expected to demonstrate major market draw without an adequate variety of quality controlled products, so product diversification from several village is essential for healthy web-based sales. In addition to the knitted bags and the paper products, Thangkas (Buddhist scroll paintings) have also been added to the E-shop. These Thangkas originate from another HELP village in Ko-Timal which received support from Himalayan Light Foundation, the Solar Development Fund, and the Japan Virtual Foundation. Solar systems for the advanced students from the village Thangka painting school called the Tri Ratna Buddhist Arts School are being paid for using Thangkas rather than cash.

A general barrier related to scaling up is the relatively high cost of solar panels, and the administrative costs for operating the program. Staff at the Himalayan Light Foundation forecast that by expanding the number of villages in Nepal participating in the program, they will be able to purchase the solar panels for less, thereby reducing the burden upon women. Although in some circumstances increased demand might cause prices to increase rather than decrease, in this case there are a relatively large number of solar panel suppliers in Nepal, so there is not a supply bottleneck. In addition, as the installation density increases, the per system cost for things like training and installation decreases, thereby lowering the cost to the user. Moreover, by developing partnerships for scale-up, the costs for reaching remote villages (the primary cost of the HELP program) will decrease by using the infrastructure and field presence of existing similar NGO efforts.

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