

Commercializing renewable energy in India

Background

The Commercializing Renewable Energy in India (CREI) project is aimed at strengthening local entrepreneurial capacity for sustained commercial operation of rural energy enterprises that harness renewable energy technologies to service productive use applications in selected areas of southern Andhra Pradesh (AP), India. The distinguishing feature of this project is that it links the commercialization of enterprises that match renewable energy technology to productive use applications with the substantial ongoing efforts to develop enterprise capacity in rural areas of India by the rural development trusts of two major national banks, Syndicate Bank and Canara Bank, and with the ongoing efforts of the United Kingdom's Department for International Development (DFID, UK) to promote sustainable rural livelihoods in Andhra Pradesh.

The project is structured so as to expand the enterprise incubation services offered under the rural development programmes offered by DFID, Canara Bank and Syndicate Bank to include assistance to entrepreneurs in designing and developing renewable energy enterprises/projects that create opportunities for income generation activities and help to establish capital and service chain linkages involving local private sector entities, non-governmental organizations (NGOs), technology suppliers and financing institutions.

The project is catalysing market development for renewable energy systems linked to productive applications; providing enterprise incubation services, training inputs covering all aspects of the commercialization chain, and initial small investments of seed capital; facilitating community involvement; and interfacing with ongoing rural development activities at the local level. Thus, the project is paving the way for sustained rural energy services at the local level through the entrepreneurial approach.

One of the biggest challenges facing Indian development planners is provision of reliable energy for small-scale household or "cottage" industries, agriculture enterprises, and other firms and NGOs implementing productive use applications in the rural areas of the country. Until now, most of the rural energy needs have been met by biomass burning, of which the preferred fuel is firewood, while animal dung and crop residues are also widely used. Commercial fuels, such as kerosene and LPG, have not penetrated the rural areas due in most part to the low purchasing power of the majority of the rural population and poor rural infrastructure. Though electricity grid extension has covered nearly 87 per cent of the 570,000 villages, the number of households having access remains below 30 per cent. Even in geographical areas with extensive rural household electrification, erratic and poor-quality supply of electricity remains a critical problem.

Continued dependence on biomass fuels has resulted in serious environmental problems of resource degradation and pollution with local as well as global manifestations. Also, quality of life remains poor, particularly that of women who are the primary collectors, processors and users of biomass. The increase in demand for energy, stemming from both population and income growth, coupled with the limited impact so far of demand reduction and efficiency-enhancing interventions such as improved cookstoves and biogas, continues to intensify the challenge of rural energy.

Lack of an organized efficient supply of energy to the rural areas also has a hidden cost. Energy is a prime mover in economic development. Per capita energy consumption is directly correlated to the overall quality of life of the

person. Lack of energy is among the key retarding forces preventing economic development and consequently slowing down poverty alleviation and growth of the rural sector. The severity of the problem continues to rise and calls for a re-look, to learn from previous experiences and develop a fresh attempt to accelerate the process of providing reliable energy to India's rural areas.

Renewable energy technologies (RETs) have long been recognized for their potential as environment-friendly, versatile and sustainable energy alternatives for rural areas of India. However, despite efforts by the Ministry of Non-conventional Energy Sources (MNES) and the India Renewable Energy Development Agency (IREDA), RETs have not yet succeeded as a major alternative source of energy in rural India. The programmes of MNES and IREDA designed to support small-scale distributed systems have relied on heavily subsidized credit, technology training and consumer awareness activities to stimulate the market for end-user finance for renewable energy systems (solar and biogas) for domestic use and a tiered set of capital and interest rate subsidies for water pumping in the agriculture sector. While end-users in some rural areas now have access to solar-powered lanterns or lights and biogas systems for their home, and agricultural operations are taking advantage of remarkable capital subsidies for solar energy to use for water pumping, the control of the credit and resources by an agent in the centre with limited reach in rural areas, the use of heavy capital and interest rate subsidies, and the focus on domestic use rather than on matching renewable energy technology applications with income enhancement opportunities have tied the success of these programmes to government budgets and political cycles limiting both the breadth and depth of development/penetration of projects that harness renewable energy resources.

In order to fully understand the barriers to the development of renewable energy enterprises/projects in rural India and to design a programme that helps address these barriers, we must first briefly review a few of the key characteristics of investments in renewable energy projects.

First, investments in renewable energy projects are relatively information and capital-intensive. The greater information intensity arises primarily from the need for more upfront information regarding the energy resource compared to conventional power projects. Renewable energy resource assessments, in most cases, need to be site-specific and preferably with data for a significant period of time. Renewable energy technologies are also more capital-intensive than conventional hydrocarbon ones because of the large upfront investment cost in generation equipment (per kWh or BTU of output) needed to utilize a "free" or low-cost energy source. Due to the capital intensity, the financial viability of such investments and projects is often more dependent on longer-term financing structures available at the outset of the project.

Second, individual renewable energy investments are generally smaller than those made in conventional power generation projects due to constraints on local resource availability. Local resource availability is in turn limited by the low energy density of renewable energy resources. As extensive time and resources are necessary to catalogue the site-specific resource availability before financing can be considered, the technical and managerial know-how requirements and associated costs that occur prior to the project often represent a much larger percentage of project costs than in the case of conventional power projects.

Third, entrepreneurs developing small-scale renewable energy projects face the same *business* and *financial* risks associated with any enterprise. Business risk involves the variability in earnings resulting from the operations of the enterprise in a given business environment. Financial risk, on the other hand, involves the variability of earnings (and thus variability in returns to the equity investors) resulting primarily from the financial performance, capital structure and financial flexibility of the enterprise. Business and financial

risks are also affected by the enterprise team and its philosophies, strategies and policies. The viability of any enterprise depends on its ability to build a business based on solid concepts and competences in sound contexts that mitigate those risks.

Considering the aforementioned characteristics, the key barriers to development of small-scale renewable energy projects are fourfold. First, rural entrepreneurs do not usually have the knowledge and expertise necessary to write business plans for enterprises/projects that link renewable energy technologies with productive use applications, assess the rewards and risks of the project and estimate the costs to mitigate the associated risks. Specifically, entrepreneurs may have difficulty evaluating risks in one or more of the following areas: harnessing the natural resources, designing the technical approach for linking renewable energy technologies to productive use applications, securing fuel supply contracts or arrangements and permits to build and operate a project, designing the technology construct to source the renewable fuel and service the application in the most efficient manner, quantifying customers' ability to pay, pulling together a viable project team, contracting suppliers, and estimating revenues, capital costs and operating costs — all of which are necessary inputs before a project is presented to a financier for investment. In addition, the negotiations with financiers may be complex, involving concepts and approaches that are not familiar to the entrepreneur.

Second, the paperwork and soft costs associated with identifying and obtaining access to financing for small- and medium-scale projects is high relative to the financing needs. Without critical first-stage financing, most of the entrepreneurs interested in developing renewable energy projects will not be able to take the time away from normal business operations to implement renewable energy projects. Third, many of the renewable energy technologies are still relatively new to the market, so the commercial chains, networks, marketing and financial links, and other institutional structures that service traditional energy technologies are not in place to assist the entrepreneur even if she/he has the skills, know-how and capital. Fourth, given the “newness”, there is a limited availability of investment capital to finance the high upfront costs associated with the initial stages of developing a renewable energy project.

The CREI project — jointly developed by UNDESA, Winrock International (WI) and Winrock International India (WII) — offers an innovative approach to overcoming the barriers to developing and mainstreaming a set of renewable energy enterprises/projects in rural India. The CREI team's approach is anchored to the proven concept of stimulating private investment in the development of renewable energy projects/enterprises by helping entrepreneurs develop projects/enterprises that link renewable energy technologies with productive use applications that generate positive cash flows. The team's upstream enterprise incubation, seed capital investment and financial facilitation services are designed to assist entrepreneurs in designing, structuring and developing such projects and complement the downstream investment interests of Syndicate Bank, Canara Bank, Infrastructure Development and Finance Corporation, and other financial institutions seeking a sound portfolio of well-prepared renewable energy projects/enterprises.

Specifically, under the CREI project the team has trained for-profit and not-for-profit entrepreneurs in the business and technical skills necessary to identify and evaluate opportunities to generate cash flow from renewable energy projects/enterprises by harnessing the energy for productive use applications as well as in organizing, preparing and presenting business plans to financial institutions, thus addressing the capacity barriers. The CREI team also provided initial seed capital investments to cover the costs of working through the business planning stage and facilitate entrepreneurs' access to and negotiations of financing by linking

them with existing credit facilities and other financial institutions as well as innovative financial mechanisms to address the issue of high front-end investment requirements and the need for patient debt and equity, thus addressing the financial barrier.

The project is being carried out in five districts in Andhra Pradesh (AP): Mehboobnagar, Kurnool, Nalgonda, Prakasam and Anantpur. This region, having nearly 5,680 villages with over 12.2 million people, falls in the semi-arid tropics of central India. This region is the subject of a US\$ 40 million rural livelihoods project of the government of AP and DFID, and boasts of considerable institutional development by way of watershed development groups, women's self-help groups, and NGOs such as the rural development trusts of Canara Bank and Syndicate Bank.

Project objectives and components

The overall objectives of the project are threefold:

- First, to create an energy infrastructure in the rural areas of Andhra Pradesh that would directly address the alleviation of poverty through income generation and other means in an economically viable and environmentally sustainable fashion so as to improve the overall quality of life, especially among the poorer and marginalized sections of society;
- Secondly, to generate local entrepreneurial capacity for sustained commercial operation of rural energy service companies with primary emphasis on renewable energy and on creating opportunities for income generation activities in selected areas of rural Andhra Pradesh;
- Finally, to introduce climate-friendly solutions to meeting rural energy needs in a manner in keeping with India's national commitment to sustainable development.

The principal components of the project include:

- Entrepreneurial support to manufacturing and service providers;
- Entrepreneurial support to rural areas;
- Finance and credit support;
- Village electrification using renewable energy sources;
- Institutional capacity-building.

Entrepreneurial support to manufacturing and service providers

CREI has been instrumental in facilitating finance for three companies for their business expansion and promotion plans. With financial assistance from the project, two of these companies (whose core business is based on sale of solar PV products) were able to expand their dealership network in the rural areas by adding four new dealers. These two companies were also able to fund training programmes for their sales and marketing force geared towards the rural areas. One of them is developing small entrepreneurs as expert technicians for their products in rural areas by assembling a technician kit and supplying such kits to the qualified small entrepreneurs.

Further, three business plans for renewable energy manufacturing companies to strengthen their existing businesses are in the formulation stage. A brief description of these plans is given below:

- Andromeda Energy Technologies (AET): A leading manufacturer of solar products and related equipment with plans of expansion in rural areas of Andhra Pradesh. CREI is formulating business plans to support the

expansion of dealer networks, technicians and carriers and forwarding agents in rural AP. AET has already identified these small entrepreneurs and is at the advanced stage of finalizing the business logistics. AET's sales team will supplement the dealer network's sales and marketing efforts in rural areas. Among other things, the CREI project has plans to provide seed capital support for the dealers and support AET's training initiatives (technical as well as business-oriented) by leveraging services from rural training institutes in this area. Such training resource centres have been identified and discussions for training support have been initiated;

- **Aditya Solar Shop ("Aditya"):** a subsidiary business unit of the local chapter of MNES located in various districts of AP, giving direct access to rural markets in the SPV sector. "Aditya", situated in the Prakasam district in AP, has business plans and has identified 20-25 potential candidates as dealers. Assessment of the potential market for the SPV products covering 52 mandals in the Prakasam district has been done by "Aditya". CREI plans to lend support through seed capital for small enterprise incubation and necessary training in the areas of sales and marketing;
- **SCA Green Technologies:** a manufacturer dealing with SPV and wind-related products and equipment. The manufacturer is keen to make forays in the niche areas of solar dryers. CREI plans to promote this entrepreneur as a manufacturer of solar dryers in the project area. The manufacturer has demonstrated sufficient technical know-how and has the necessary production process in place. CREI also plans to lend support for the various aspects of design through a workshop involving an expert on the subject matter. The logistics of the support arrangement are being worked out.

The main approach of the project has been to identify local groups and organizations that could take up enterprise activities. The project region has a strong track record of promoting self-help groups, women's thrift organizations and non-governmental agencies. The project team focused on these groups to carry out enterprise development.

Demonstration projects

CREI has been able to generate large-scale awareness of renewable energy products and their applications in the project area. Based on visits as well as demonstration of RET products available in the market, the communities were given a feel for the technologies available. The awareness creation programme also involved exposure visits by communities to locations where RETs are used, so that those models could be replicated in their habitations.

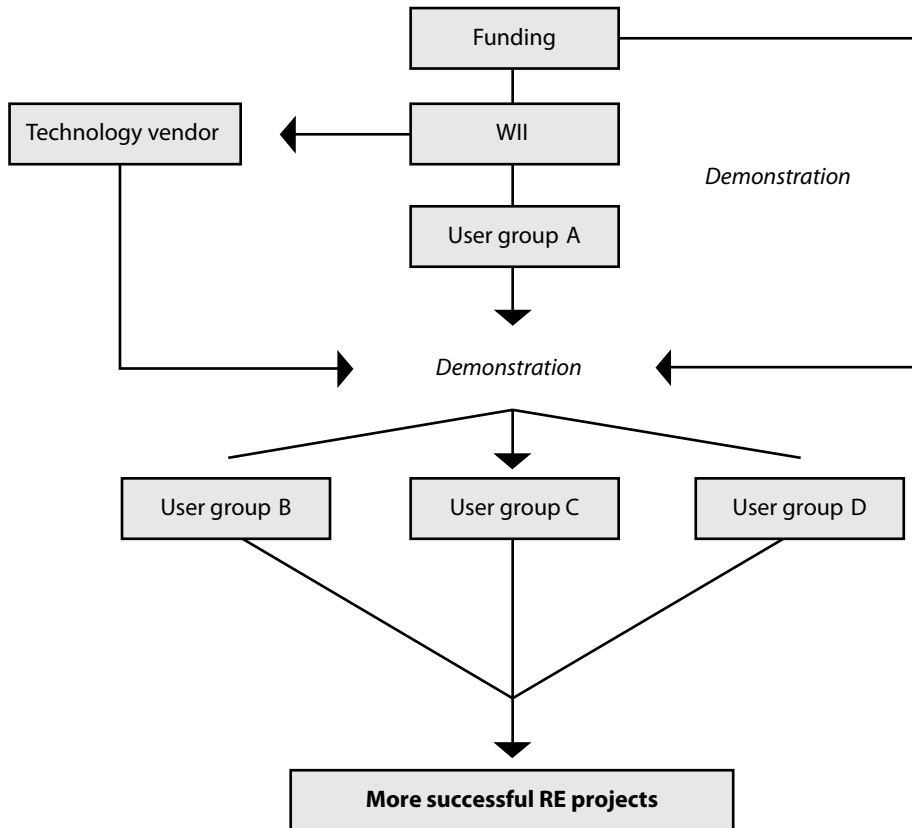
The flow diagram at the top of page 50 depicts how a successful demonstration project can spawn the development of many renewable energy projects.

CREI worked on the premise that setting up "demonstration" projects is key to earning the trust and confidence of all involved, especially of the people they are intended to help. While discussion forums and educational seminars on the applicability and use of technologies are necessary and helpful, it is the actual sight of such a system deployed and working that best convinces individuals to take the step themselves.

CREI is establishing similar demonstration projects for solar dryers and oil expellers.

Business plans

CREI developed 20 business plans, with inputs from the rural groups, after technology options, costs and economic feasibilities were studied. These business plans were strengthened to make them robust and sustainable



by conducting thorough research and analysts on technical, economic, financial and business aspects. As part of the efforts to strengthen and sustain the business plans formulated, the following tasks were undertaken:

- Participatory Rural Appraisals (PRAs) of the villages under the business plans with an energy focus were initiated. Information critical for the success of business plans, such as the matrix ranking of economic activities of the communities, energy needs and availability assessment, applicability and awareness of RETs for productive uses, resources mapping, economic status of the groups etc., was gathered in this exercise.
- Market outlets for product outputs, users of the products, and dealers and vendors involved in this activity were established.
- Market data collection through surveys and interaction with local groups concerning raw materials such as non-edible oil seeds and agro- and biogas products was undertaken.
- Financial analysis and cash flow statements were prepared with experimental and market data for each economic activity.
- A feasibility report on livelihood improvement through energy plantation (mainly *Pongamia pinnata* and *Jatropha curcas*) was prepared. Among other things, this report focused on the technical and financial parameters of the plantation activity, economics, case studies and government initiatives.
- Solar drying of agro-products was identified and evaluated as a viable business activity by the rural groups. In the present market conditions, the solar dryer meant for small-scale drying of agro-products is too expensive and is not economically viable for the business plans formulated. Work was done with an entrepreneur to develop a suitable business plan.

- The CREI project, with support from the rural groups, is setting up marketing organizations along the lines of a cooperative system for the rural groups. This organization would serve as an apex body that would be responsible for all matters pertaining to production, business development and finances. It is broadly envisioned that one such organization would be set up for every 4 to 6 villages, with a handful of representatives from each village group being chosen to represent the rest. The profits and other proceeds would be paid to the individual group members as dividends.

Business plans based on solar lanterns

Traditionally, when villages need artificial light, they rent kerosene lanterns. But such lanterns have several disadvantages. They are smoky and unreliable, even dangerous. They are also expensive to rent, and one has to travel far to obtain them.

Chaithanya Mahila Sangam, a local women's self-help group with 35 members, wanted to find a solution to the perennial problem of how to earn a steady income without leaving the village. They were also concerned about the inconvenience and expense of kerosene lanterns. How could both problems be solved?

The CREI project mounted an awareness campaign about using solar-powered lanterns to earn money. Village representatives, including the *sangam* president, were invited to a demonstration. Solar power, they were told, is clean, available and best of all *free*. Renting them to customers at a price competitive with that of kerosene lanterns would be a sure way to provide the *sangam* with a steady income without having to walk long distances to work as labourers. Winrock selected an appropriate manufacturer, supported the *sangams* with rural meetings and organized training sessions. Marketing, mostly by word of mouth, the fastest method of communication in rural settings, was supplemented by displays at malls, local fairs and panchayat meetings.

The villagers decided to purchase five solar lanterns from a domestic manufacturer at a reduced corporate rate of Rs 2,500 (\$60) each for a total of Rs 12,500 (\$300). CREI provided the *sangam's* 50 per cent share of the capital as a loan.

A three-day training session on best practices for both CREI staff and *sangam* members was organized. Also invited were some television and radio repairmen who were trained to repair switches and other movable parts. The *sangam* charges a rental fee of Rs 20 (\$0.50) per day for members, Rs 30 (\$0.70) for others. They make Rs 500-600 (\$12-14) every month — about Rs 7,000 (\$160) a year. Importantly, the lanterns provided immediate income, which meant that the *sangam* was able to begin repaying its loan right away.

Groups in 16 villages are now in the business of renting out solar lanterns. Each has five lanterns. The groups are legal entities; each one is registered as a cooperative society. They have bank accounts, they deal with tax issues — in short, they have a sense of empowerment they never knew before.

Business plans based on energy plantations

Energy plantation activity presents several challenges, as it must motivate and convince the farmer community and wasteland owners of the benefits that accrue in the long run. A significant amount of groundwork has been done through orientation workshops and demonstrable plantation of pongamia and jatropha with intercropping of productive species and nurseries.

Jatropha, as well as pongamia, another oil-bearing seed tree, can be cultivated with ease in marginal lands. Both are resistant to drought, and both will grow on poor soils. Although the oil produced from both species

is in demand for a variety of uses, their main use is for biodiesel production, an important priority for many of India's state governments.

Because both trees take a long time to reach maturity — jatropha takes about two years, pongamia four — part of the strategy is to sustain farmers' interest by promoting intercrops that command high demand in the market. Legume crops, because they increase soil fertility, are particularly favoured. The legume best suited to conditions in Chintula is horse gram. Horse gram grows well in marginal lands, yields 3 quintals/acre and sells for Rs 6 (\$0.14) per kilogram. It is mostly used to make *rasam*, a soup. Another interim crop is henna. Henna is a perennial crop that commands a good price in the market. The project's thinking was that the promise of immediate income from horse gram and henna would give the farmers enough confidence to prepare the land for long-term gain from jatropha and pongamia. A typical farm only earned about Rs 2,000 (\$47) in additional income from its horse gram crop, but the thing to consider is that previously unused land is now generating cash.

In total, 40 farmers are undertaking energy plantation farming with intercrops on 60 acres of former wasteland. The farmers contributed 50 per cent of the cost for land preparation, mostly through labour. They borrowed Rs 5,150 (\$120) from CREI at 5 per cent interest over five years. The jatropha, which was planted 6 months ago, will not be ready for harvest for another 18 months.

Business plans based on biogas technology

A two-cubic-metre biogas plant is being replicated for production of gas for cooking purposes and domestic lighting purposes. The decision to implement a biogas energy solution for a particular household was arrived at after comprehensive evaluation of the geographic conditions, raw material availability, sustainability and maintenance.

Currently, the households depend on firewood for cooking needs. Availability and fetching of firewood are major issues that the community would like to do away with. The firewood option is also a major health and environmental hazard. This option is very expensive for the group to sustain and the group is looking at alternative sources of fuel for cooking. Each household spends 2-3 hours every day to collect this fuelwood. By eliminating the need to collect the firewood, daily work-hours may be increased from the present 6 hours to 8 or 9 hours. With the gas being supplied through this biogas initiative, the monthly expenditure on firewood and the time saved on fetching it translate into additional income for the group.

On the lines of the SPV lanterns demonstration project, a couple of biogas plants have been constructed for domestic uses of cooking and lighting to gain the acceptance of the community. The results are encouraging, prompting several households in the community to take up this activity. Ten such families who own cattle have come forward to take up this activity.

Business plans based on non-edible oil-expelling activity

One of the most important agricultural interventions that have come out of the CREI project is the cultivation of oilseed tree crops, especially jatropha and pongamia. Both of these oilseeds are poisonous and cannot be consumed by either humans or animals, but the oil is used for medicinal purposes and is also a highly effective organic pesticide. These oil-bearing seeds, along with traditionally popular neem and castor, can be used to make money for cash-poor village women. Since the seeds of each of these four plants mature at different times of the year, oilseeds of one species or another are available nearly year-round.

The difficulty with oilseed production is the cost of expelling the oil from the seed. Oil expellers are expensive — about Rs 1.5 lakh (\$3,500) — and therefore out of reach of most villagers. However, Winrock's

CREI project, as part of its promotion of the commercialization of renewable energy, agreed to guarantee a loan of Rs 1 lakh (\$2,300) to a women's *sangam* in Kothapally village, and the women contributed Rs 50,000 (\$1,160) from their savings.

The *sangam* accrues its savings from the dues of members at Rs 20 (\$0.50) per member per month, as well as from interest on loans to others. The women lend at 24 per cent interest, about Rs 2 (\$0.05) per month, as opposed to outside moneylenders, who charge 60 per cent interest, about Rs 5 (\$0.12) per month. New members are continually invited to join the *sangam*, and all castes are welcome.

The location was strategic. Kothapally is located close to the important town of Mall, where the residents of 25 villages spread throughout three districts (Mahbubnagar, Ranga Reddy and Nalgonda) do their shopping. The proximity of Kothapally to Mall means that the products of the oil expeller can be conveniently marketed. The Kranthi Mahila Sangam, which now has 100 members, was established in 2000. The president, Guddula Narsamma, says, "Traditionally, we collected wild oilseeds daily, selling them at Rs 1-1.5 (\$0.02-0.03) a kilogram. After CREI came, we were able to sell directly to the *sangam* — there was no longer any need to leave the village at all."

Another improvement is that unlike previously, when each woman worked alone, now they are all involved. They benefit individually by collecting the seeds, and as a group by selling them. They also benefit from the added value derived from the cake made from the oilseed residue, which is sold as insecticide.

The project's marketing efforts are geared towards four uses:

- To blend the oil with diesel for use as fuel;
- For domestic lighting purposes;
- For sale as raw material to biofuel production units;
- Sale of the cake as a manure.

Business plans based on solar drying

Agricultural produce tends to ripen at the same time, so that markets are often glutted with particular crops, a situation that leads to low prices and fierce competition. To avert such a situation and provide year-round income, the CREI project approached the Vasundara village with the idea of drying crops to preserve them. While open sun drying may be the most inexpensive and extensively used option for many of the products, it is unhygienic, unreliable and time-consuming.

After due consideration, the villagers agreed to use their savings to buy a solar dryer, and nothing would ever be the same. The first step was to identify the correct dryer. That took six months. Solar dryers are not an off-the-shelf item in India, and the CREI team, once it understood what the Vasundara women wanted, had to hire a local manufacturer to build it to specifications. The cost was Rs 40,000 (\$930). The women borrowed half the money from the CREI project, which gave them a generous repayment time of seven years. However, the solar dryer was such an unqualified success that the Vasundara women expected to be able to pay back the full amount in only two years.

Every element in the enterprise was covered in extensive training sessions in the food-drying process, as well as associated matters such as hygiene. The women learned about food grade standards and quality control in drying and packing operations. Marketing was an important component in the training as well, and links

were made to supermarkets that stock dried food products. Special deals were struck with college hostels, where the women would provide dry foods for specific functions. And of course the products would be sold regularly in local markets.

The process began with a participatory approach, which led to the identification of local resources and skills. Once renewable energy technologies were adopted, business plans could be developed, leading to capacity-building.

In solar drying, different procedures must be followed for each commodity. The most important foods in Peddathundla are ginger, coriander, chillies, tomatoes and curry leaves. Although each commodity is different, the average time for drying food is 9-10 hours. Vasundara employs four of its members to manage the solar dryer at a daily wage of Rs 30 (\$0.70). The women could make Rs 40 (\$0.90) outside, but they much prefer this arrangement because they do not have to leave the village.

The women make more than Rs 3,000 (\$70) per month — about Rs 40,000-50,000 (\$930-\$1,160) per year. Their revolving fund is continually replenished, and their lending business flourishes. Besides the Vasundara group, two other groups have invested in solar dryers, and more are sure to follow.

Capacity-building

The CREI project's focus has been on developing these rural groups as enterprises with a vision for long-term success. Towards this end, tailored training programmes were drawn up for business plans generated during the implementation stage. Most of these training programmes are now completed with support from the local NGOs, equipment vendors and other training institutes. The areas of training include accounting and book-keeping, business management, creating and improving technical and managerial capacities of the groups and leaders, and marketing and technical aspects related to operation and maintenance of RET systems.

Although the CREI project goal was to formulate and develop a few demonstrable and working business plans based on clean energy technologies, the ultimate goal is to use these pilot models and replicate them in other rural areas of Andhra Pradesh and India. In this regard, CREI has mobilized additional financial resources from the Swiss Agency for Development and Cooperation (SDC) to carry out capacity-building activities. The primary goal of this additional initiative is to create a pool of resources and skills that may be utilized effectively in developing and implementing livelihood projects based on renewable energy technologies.

The experiences and the lessons gained from the implementation of the CREI project will be shared with the target audience for further replication and expansion in other CREI districts. The business development process from CREI will be tailored into specific training modules for enterprise incubation activities.

The following are the expected outputs from this capacity-building initiative, which will complement the CREI project:

- A pool of trained personnel who could impart knowledge and skills necessary for potential small entrepreneurs establishing businesses using renewable energy;
- NGOs, self-help groups and other user groups with adequate awareness and other skills required to implement renewable energy projects for sustainable livelihoods (about 6-8 in all, covering five districts of AP) as business proposals;
- Successful pilots under CREI replicated in other districts of AP through sharing of successes and experiences (especially from Winrock International India);

- Training modules for implementation of renewable energy projects;
- Sensitization of financial institutions and creation of a suitable atmosphere for lending to renewable energy projects.

Finance and credit support

CREI has established links with local banks and other financial support agencies with the RETs for livelihoods agenda to fund the initiatives. At the proposal stage, CREI envisaged linkages with Syndicate Rural Development Trust (SRDT) and Canara Bank Trust for entrepreneur incubation, and to consider them for managing the fund of \$154,000 allocated under the project towards seed money assistance to prospective entrepreneurs/user groups. But after consultations with both banks, it was concluded that SRDT and Canara Bank Trust could not be engaged to take up the seed funding activity originally envisaged under CREI. As an alternative, the CREI team began working with Basix, a microcredit organization based in Hyderabad and working in all the project areas of CREI, using it as the financial intermediary to administer the funds. A framework on the seed capital mechanism and its modus operandi was developed.

The business initiatives involving the SPV lanterns have started earning income, facilitating loan repayments, as lanterns' lease/hire has become an attractive and popular option. The repayments are diverted into a separate loan account with a leading commercial bank. CREI plans to utilize the repayment history and the viability of these business models to attract commercial banks and microcredit institutions for mainstream lending for renewable energy projects.

With a view to building upon and enhancing the ongoing initiatives on the promotion of the commercialization of RETs under CREI, the project team has developed the innovative concept of establishing a risk guarantee fund. The purpose of this fund would be to provide an impetus to commercial lending for RET enterprises/projects through partial coverage of business and financial risks that could potentially be borne by entrepreneurs and lending institutions involved in such enterprises/projects. Anchored to the proven concept of linking enterprise assistance services with long-term credit and financial facilitation, the introduction of a risk guarantee fund, positioned as a financial product, will complement the activities so far undertaken under CREI by incubating investment interests of lending institutions.

Establishment of resource centre

In August 2005, CREI formally established a resource centre in Hyderabad to act as a repository of information related to renewable energy businesses, and to provide advisory services. The centre is hosted by the Andhra Pradesh Industrial and Technology Consulting Organization (APITCO) in partnership with the Rural Economic and Educational Development Society (REEDS). Winrock International India (WII) would provide relevant technical assistance to the resource centre. The CREI project would fund 70 per cent of the resource centre implementation cost and the balance would come as a cost-share from APITCO/REEDS. A detailed marketing plan was being developed by REEDS and APITCO for the long-term sustenance of the resource centre. In addition, a coordination group, which would function as an action team, would be set up to coordinate and implement all the resource centre activities. This working group is composed of project team members from WII, APITCO and REEDS.

A tripartite memorandum of understanding outlines the roles and responsibilities of WII, APITCO and REEDS in the resource centre implementation. The memorandum of understanding also includes specific

project deliverables, schedule of activities, budget, marketing plan for sustainability of the resource centre and the setup of a coordination group for the operation of the resource centre.

The resource centre would function as information centre/help desk and perform the functions of collecting, analysing and disseminating information and capacity-building on:

- Appropriate technologies and information on manufacturers, suppliers etc.
- Relevant rules and regulations;
- Relevant financial and technical assistance agencies;
- Training modules;
- Outreach and communication;
- Project/business facilitation.

Outreach

Based on the achievements of the project so far, the project team prepared two outreach documents: a brochure explaining the goals and principles of CREI, and a publication containing six case studies of the CREI businesses. The case studies effectively illustrate CREI's success in providing value addition and income generation through RET interventions. The case studies also highlight the specific technology intervention and cost economics for future replications. A dissemination plan identifying a strategy and target audience will be put in place for outreach/communication on the CREI project model.