

## **Bangladesh: Solar Home Program on Credit Sales**

(A case study for the Renewable Energy Project Toolkit for World Bank Task Managers)  
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### **Overall project description**

1. The Bangladesh Solar Home Program based on facilitating credit sales in rural unelectrified areas is part of a larger rural electrification program supported by the IDA Credit for the "Rural Electrification and Renewable Energy Development" (RERED) project which became effective on December 31, 2002. The main project involves, in addition, (a) the expansion and intensification of the grid based network operated by rural electric cooperatives (PBSs), (b) rationalization and absorption of peripheral towns supplied by the main Government owned parastatal power company (BPDB) to the PBS rural networks, (c) facilitating pilot renewable energy projects to supply off grid areas, and (d) a parallel Solar Home System (SHS) project based on a 'pay-for-service' arrangement operated by the rural cooperatives (PBSs). This case study will describe only the SHS credit sales component (referred to hereinafter as the project). The project is managed and administered by the Bangladesh Infrastructure Development Company (IDCOL) and involves the following activities:

- (a) developing consumer awareness of SHS and their potential for rural lighting
- (b) selection of Participating Organizations (POs) who will be eligible for initial business set up assistance, IDCOL loans and GEF grants;
- (c) establishing standards to be met for equipment;
- (d) providing refinancing of loans of POs to their customers (up to 80%);
- (e) providing and supervising the GEF financed grant (commencing at \$90 per system and declining over the duration of the project to \$50 per system);
- (f) supervising the activities of POs and coordinating activities between participants (POs, suppliers, and customers).

### **Business model**

2. The project is based on credit sales of SHS by selected POs who will receive the GEF financed grant as well as loans to support their own credit facility provided to customers. The POs can be any registered entity (private business, NGO/MFI or other community organization). During the market studies and willingness-to-pay surveys carried out during the preparatory stage of the project it became quite evident that the main barrier to SHS sales is the high initial cost and the inability of the majority of the rural households to meet this expense in the short term. If longer repayment periods are provided the market can be substantially increased. In fact the market estimates were a near term market for 50,000 systems based on credit sales and about 4 million on a longer term if an efficient pay-for-service or similar credit sale system with low monthly payments is developed. As indicated in para 1 the pay-for-service arrangement is being fostered under a separate component of the RERED project. For various reasons<sup>1</sup> the pay-for-service component is planned for development at a latter stage and is not addressed in the current report.

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<sup>1</sup> These include immediate preoccupation of the rural electric cooperatives (PBSs) with the take over of distribution networks from the parastatals and their rehabilitation. It is considered important to make a success out of each new venture when initiated to avoid bad publicity and difficulty of revisiting implementation arrangements

3. While there is no restriction as to the business nature of the PO, loans will only be provided if the PO can demonstrate a good business record of MFI activity<sup>2</sup>. Other suppliers who do not satisfy this criteria will nevertheless be eligible for the GEF financed grant if they join the program as a supply only PO. They will also be eligible to be upgraded to a full PO enjoying all facilities if satisfactory financial backing can be provided or they develop a satisfactory consumer loan record. The POs are selected by calling for invitations issued periodically by IDCOL where their credentials with respect to viability of the business plan, experience in renewables and associated technologies, staffing arrangements, MFI activity etc. are reviewed. While POs are allowed flexibility in deciding their own sales arrangements, options to be offered and credit terms these have to be approved in general by IDCOL. The accounting activity of the SHS program has to be maintained separately and are subject to audits as well as scrutiny and review by IDCOL.

4. The POs have to purchase their requirements of PV panels, batteries and other components directly from vendors and set up their own terms of purchase and payments. In general many vendors have been eager to cooperate with the POs and offer delayed payment terms to facilitate higher volume of sales. The POs also have to make arrangements for regular after sales service and to ensure that any customer complaints are dealt with expeditiously.

### Financing mechanism and Subsidy Arrangements

5. Sales of SHS systems are financed by customer's initial contribution (about 15%), a GEF grant and the credit purchase loan of which 80% is refinanced by IDCOL. In addition, IDCOL expends funds from the GEF grant (mainly in the initial months) for publicity, training and other program support extended to POs. IDCOLs loans to POs and program supervision costs are expended from the IDA Credit.

Typical costs for SHSs sold on credit purchase terms by POs is provided below:

#### SHS System costs and credit sales arrangements

For a 3 year credit sale (All figures converted to US\$)						
	40 Wp system		50 Wp system		75 Wp system	
From customer's perspective:						
Name of PO	GS	BRAC	GS	BRAC	GS	BRAC
Cost of system to customer	279.89	278.20	379.36	354.07	571.57	522.68
Down payment (usually 15%)	41.98	42.15	56.90	67.44	85.74	84.30
Balance on loan	237.90	236.05	322.46	286.63	485.84	438.37
Total interest (6% flat for GS, 15% flat for BRAC)	42.83	106.22	58.05	128.98	87.46	197.27
Fixed monthly installment over credit period	7.79	9.51	10.57	11.55	16.73	17.67
From PO's perspective:						
GEF grant (currently @\$70 will be \$50 after 40,000 SHS are sold)	70.00	70.00	70.00	70.00	70.00	70.00
Customer down payment	41.98	42.15	56.90	67.44	85.74	84.30
Customer loan (portion by PO)	47.58	47.21	92.46	57.33	255.84	208.37
IDCOL refinanced portion of loan (lower of 80% of PO loan or \$230)	190.32	188.84	230.00	229.30	230.00	230.00
Total	349.89	348.20	449.36	424.07	641.57	592.68

<sup>2</sup> Including recovery rates and previous record of micro finance activity

6. The GEF grant is provided on a reducing basis with the first 20,000 systems sold under the program entitled to \$90 per system, the next 20,000 systems at \$70 per system and the balance at \$50 per system. The declining grant is provided to recoup the higher costs of the initial sales which also includes the start up costs of the POs. As the program gathers momentum and demand for SHS increase, it is expected that the sales rate can be maintained at reducing grant levels and that eventually the program will be self sustaining. The IDCOL loan to POs is provided at 6% interest and a 10 year term with a 2 year moratorium period (for principal payment only).

7. While the POs are free to set up their own sales terms and lending arrangements these have to be within the guidelines set by IDCOL and the PO participating agreement requires coordination with IDCOL in this aspect. All POs commenced their operations using the standard MFI terms currently in practice in Bangladesh. This involves a 15% down payment and an interest calculated on a flat overall basis of 15%. In effect, the lending rate is about 26% on a reducing balance computation. With time there is indication that the POs will reduce the interest charged and already the largest volume supplier (Gramen Shakti) has reduced the interest to 6% flat (equivalent to 11% on reducing balances). Different loan terms are also offered but most sales are now being made on a 3 year repayment term. The subsidy element of the program is based on the GEF grant (currently \$70 per system) and the terms of the IDCOL refinance loan. An important variation from the usual grant terms of other projects is that the grant is a fixed amount and independent of the size of the system. Thus the grant is a lower percentage for those requiring larger systems.

### **Institutional and program arrangements**

8. The program is administered by IDCOL, who is responsible for the activities indicated in para 1. A key feature of the program is the active involvement of the project entity in facilitating and development of the program. Rather than establishing the operating guidelines and then taking a passive role while relying on private entities to carry out the marketing and consumer awareness initiatives, the program relied on IDCOL to carry out these initial activities as well as in assisting POs acquire the necessary skills for this new venture. In particular, while the NGO/MFI activity was well developed in rural Bangladesh these entities had little or no knowledge of the technical or business activities of a SHS program.

9. Thus the initial activities involved:

- (a) assistance to POs by way of training of personnel in SHS activities (installation and maintenance) as well as in business organization and development. Assistance in start up activities also involved providing motor cycles, computers, tools and equipment to the selected POs;
- (b) launching a consumer awareness program to popularize the use of SHS in rural areas. A number of television and radio advertisements, publicity bill boards, and demonstration of SHS installations in selected rural areas were arranged to enable rural people to gain a first hand knowledge of the potential of SHS.

While a part of the initial costs were paid for by the POs (to gain commitment to the program) the main expenditures during the start-up phase were borne from a GEF project preparatory (PDF "B") grant of US\$ 340,000. The expenditure also involved setting up 250 SHS systems on a pilot basis (50 each provided to 5 participating POs).

10. The assistance during the start-up phase (approximately January to December 2002) enabled the POs to quickly gain proficiency in the SHS business. During the project phase (from January 2003) the POs handle all activities independently and are responsible for the marketing

within their selected areas, arranging supplies from SHS vendors, determining the creditworthiness of customers, processing the credit sales, installing the system, providing equipment guarantees as arranged with vendors, attending to after sales service of the equipment and most importantly, recovering installment payments from customers. While the larger POs market the SHS systems in all parts of the country other POs focus their attention in specific areas in which they have an advantage. There is a healthy competition among POs and there are no restrictions or licensed areas for their operations.

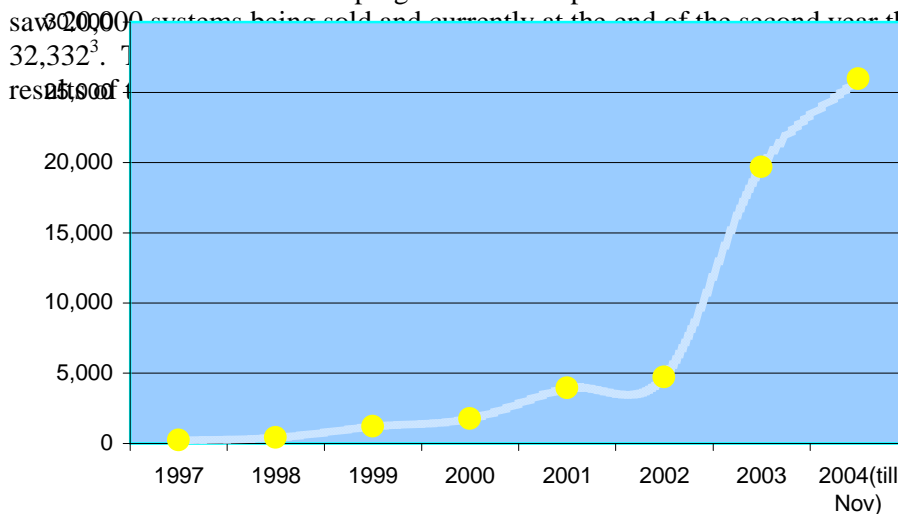
11. In addition to the activities described above, IDCOL also bears responsibility for coordination between stakeholders and ensuring verification of installations for which purpose a complete data base on all SHS installations is maintained. The latter is a very important function when grants are administered. Local officials such as school teachers have been co-opted to undertake the initial checking of installations which is followed up by inspections from a pool of inspectors and rechecking on a sample basis by IDCOLs own staff.

### Technical Issues

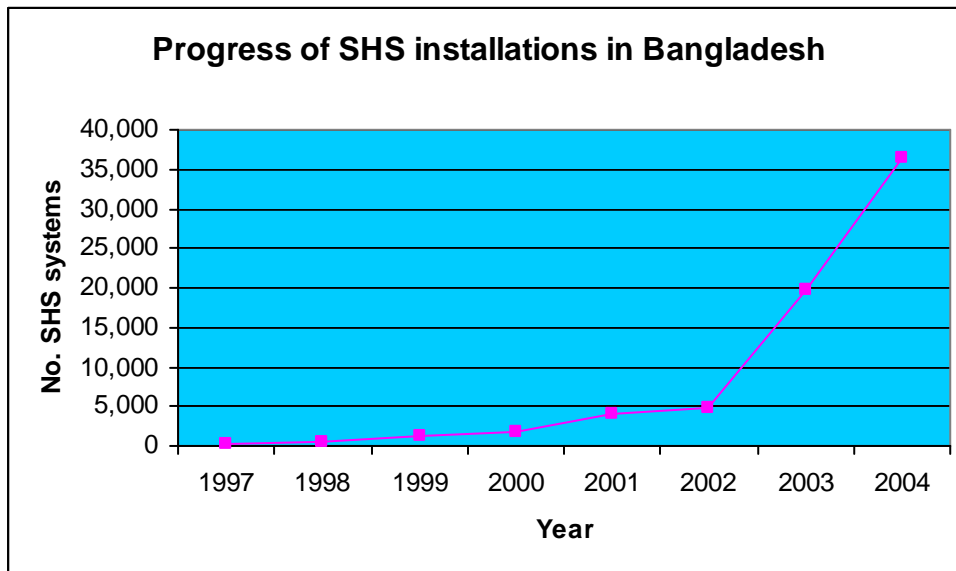
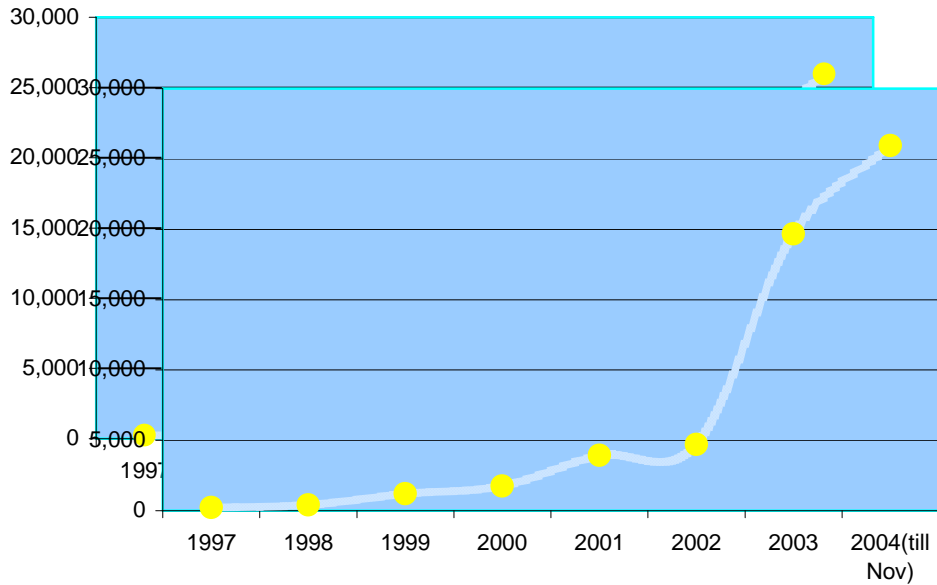
12. IDCOL is also supported by a technical group which handles certification of equipment that will be eligible to be used in the program. This group also assists when technical issues such as equipment malfunction arise. The suppliers are obliged to provide guarantees of 20 years for the solar panel, 5 years for the battery, 3 years for the controller and 1 year for the light fixtures. In addition, the battery suppliers have arranged for the buy back of unserviceable batteries at a prearranged price and for their environmentally safe disposal.

### Impacts and results

13. The success of the program has been phenomenal. The first 14 months of the program saw 32,332<sup>3</sup> systems being sold and currently at the end of the second year the total sales stand at 25,000 systems in the country along with the



<sup>3</sup> The severe floods experienced in August 2004 resulted in some fall in sales but the program is back on track with installations at the rate of about 1,800 systems per month.



### Monitoring and Evaluation

14. A monitoring and evaluation exercise is planned to be conducted this year along with that of the grid connected program. Panel surveys will be carried out in successive years and socioeconomic and development impacts of rural electrification is expected to be documented and analyzed in these surveys. It is also intended to use the survey results for developing suitable monitoring indicators to aid in future rural electrification efforts.

## **Key lessons learned**

15. The main reason for the success of the program has been the ability to develop NGO/MFI operators in rural Bangladesh to operate as SHS vendors. The project operated on the premise that these NGOs already have the confidence of the rural population and will be able to function as an efficient and trusted source of SHS delivery. In addition their collection history was strong enough to develop a credit line (though considerably longer than what they have been previously accustomed to). The challenge faced was to ensure that the NGOs can gain proficiency in SHS systems, their dealings with equipment suppliers and customers during after sales support. The project shows that this can be done with careful planning and adequate support in the initial stages.

16. Another important lesson is that initial assistance in establishing a market for SHS systems is important. This is needed both for the new vendors with no previous experience on the subject as well as for developing the confidence of consumers on a high priced and relatively unknown product. New markets need to be primed by appropriate assistance and redressing bottlenecks as they arise and not only by setting the overall guidelines and rules of play. It is expected that with these key barriers broken down the SHS market will thrive in unelectrified areas.

17. The project also demonstrate that rural people with limited means place a fairly high value on basic lighting service and is prepared to pay a considerable portion of their income on such a service. While the results of the monitoring an devaluation exercise is still not in, field visits conducted indicate the high satisfaction with the service from SHS systems and the impact on the livelihood and living standards of rural people.