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LESSONS LEARNED

GPOBA
The Global Partnership on Output-Based Aid

Bangladesh Rural Electrification and Renewable Energy Development – SHS Project

DEVELOPMENT CHALLENGE

Access to infrastructure is a key driver for reducing poverty and promoting shared prosperity. In Bangladesh, where economic growth has accelerated steadily over the past decades, about a third of the country's estimated 166 million inhabitants remain below the poverty line, and a large portion of the population still has little or no access to electricity or clean energy sources. In rural areas of the country, where more than 70 percent of Bangladesh's inhabitants live, the electrification rate is about 50 percent. The dispersed nature of rural settlements and the presence of numerous rivers make grid electrification difficult and often prohibitively expensive. Off-grid renewable energy is therefore the only realistic option for electricity provision in many areas of the country. In response to these needs and challenges, Bangladesh has developed the world's largest and most dynamic national off-grid electrification scheme, a Solar Homes System (SHS) program benefitting more than 18 million people to date, and yielding lessons that may be applicable to other countries considering off-grid solutions for energy access.

THE PROJECT AND ITS PARTNERS

In 2010, a Global Partnership on Output-Based Aid (GPOBA) grant for $13.95 million was approved to improve electricity access for poor households in rural Bangladesh in remote, off-grid areas through the provision of SHSs. This project was part of a larger SHS program using the OBA approach that began in 2003 with financial and technical support from the World Bank under the Rural Electrification and Renewable Energy Development (RERED) project. The International Development Association (IDA) has strongly supported the program, and a significant number of other development partners have joined since its inception.

The strong partnerships created under RERED helped to make the SHS program extremely successful, with about 50,000 SHSs currently installed per month.

The OBA project was implemented by the Infrastructure Development Company Limited (IDCOL), a government-owned finance company, in partnership with participating organizations (POs)—mostly NGOs with a strong focus on microfinance—selected by IDCOL. The financing mechanism of the project consisted of IDCOL extending a credit line to the POs and capital subsidies for the SHSs, making solar energy affordable to the poor in remote, off-grid areas.

POs offered microfinance loans to households and were responsible for system installation. SHSs ranged in size from 10 to 135 watt peak (Wp), and a capped OBA subsidy was provided for all sizes. Households made a down payment of 10–15 percent of the cost of the system, with the remainder being repaid in two to three years at prevailing market interest rates of 12–15 percent. Seventy to eighty percent of the credit that the POs extended to the households was eligible for concessional refinancing from IDCOL. Following installation of the systems, POs submitted a loan refinancing and grant application. After inspections and verifications of installed SHSs, IDCOL released the credit and the subsidy to the POs.

Because of the scale of the project, inspection by IDCOL was done on a random sample basis. IDCOL verified that the installations were in off-grid areas, POs had used certified products, technical requirements had been met and systems were fully operational. A technical audit by an independent third party was conducted in alternate years. POs were responsible for providing maintenance and customer training during the loan-repayment period. Based on the SHS warranty obligations, they also offered after-sales service contracts to households that had repaid their loans.

OBA Lessons Learned Series is a forum for discussing and disseminating project insights at the conclusion of projects in supporting the delivery of basic services to the poor. GPOBA is a partnership established in 2003 by the UK (DFID) and the World Bank. Its other donors are the International Finance Corporation (IFC), the Netherlands (DGIS), Australia (DFAT), and Sweden (Sida). For more information visit www.gpoba.org *or email us at* gpoba@worldbank.org.

Lessons Learned

1 **A vibrant microfinance environment is key to project success.** A pre-existing network of competitive microfinance institutions had well established relationships with clients in rural areas to whom they could offer an additional service. The historical presence of these organizations allowed for cost-effective and efficient outreach, while their familiarity to rural consumers led to greater trust in the project POs and resulted in larger uptake of SHSs. It was also found that selling SHSs on credit encouraged system upkeep – when POs visited households to collect payments, they were able to provide after-sales maintenance service at the same time.

2 **The presence of a competent and committed implementing agency enabled the project to succeed.** One of the early challenges that RERED encountered in Bangladesh was that traditional financiers were unwilling to finance 'nonproductive loans' such as those for SHSs. An alternative source of funding was found in IDCOL, which is governed by an independent and qualified board of directors drawn from government and the private sector. IDCOL turned out to be an enthusiastic promoter of off-grid solutions and an extremely effective implementer, with a strong capacity to manage an off-grid electrification program.

3 **Supporting technical and commercial sustainability has been a key to the success of the solar energy program.** Technical assistance resources included in the project have aided IDCOL in establishing a market for SHSs and managing the growing program. IDCOL's independent Technical Standards Committee approves the standards for SHSs, and IDCOL practiced constant enforcement with the POs of technical and performance standards. They provided recourse if customers experienced problems, and ensured that any problems were quickly addressed. Moreover, IDCOL aims to make the SHS program fully commercial, with POs eventually borrowing funds at market terms from commercial sources. Both the refinancing rate and the capital subsidy have been gradually reduced as the market responds to the project's success.

4 **High population density reduced the cost of project implementation and contributed significantly to its success.** As one of the most densely populated countries in the world, Bangladesh was able to leverage economies of scale, helping to bring down unit costs. High population density also supported competition in the market, as POs competed vigorously to provide attractive credit packages to consumers. While economies of scale can be achieved in less densely populated countries, the mechanisms for achieving it may need to be different than those operating in Bangladesh, as competition for customers will likely be less intense.

5 **Making SHSs affordable through a combination of consumer credit, subsidies, and product choice opened the way to their widespread adoption.** However, even with affordable financing, actions to foster consumer trust in new technologies were needed. The project showed that rural households will pay for a SHS if monthly costs are commensurate with current expenditure on other energy sources. However, consumers must have confidence in the systems if they are to invest a significant share of their income in them. That confidence was built in Bangladesh through ensuring technical quality (the setting and enforcement of stringent quality standards, including a 20-year warranty for the solar panel and a five-year warranty for batteries); the provision of strong after-sales service; and raising consumer awareness about the use of SHSs, which helped to foster a sense of ownership and ensure proper maintenance.

RESULTS ACHIEVED

This project exceeded its initial targets, and positive outcomes for rural households were recorded. The project's original aim was to support installation of 315,000 SHSs, benefitting about 1.4 million people. As the subsidy amount per SHS gradually decreased from $50 per connection to $20 per connection for smaller systems, it was possible to install about 497,608 SHS, benefitting over 2.2 million people. An impact assessment funded by GPOBA[1] has shown that the use of SHSs in rural Bangladesh has had several positive outcomes. The replacement of smoke-emitting kerosene lamps with solar-powered lights reduced levels of household air pollution. Solar-powered lighting allowed schoolchildren to study for longer periods in the evening, and it enhanced mobility and security, particularly for women and girls. SHSs enabled the charging of mobile devices and increased household use of television and radio, which enabled greater connectivity to the outside world and allowed access to information that could improve health and have other positive social benefits.

Enhanced sustainability of the solar energy program. The introduction of LED bulbs allowed smaller, less costly systems (under 30 Wp) to deliver energy levels that had previously required larger systems. This technology, coupled with the project's support for increased competition among POs and the decreasing market price of solar panels, resulted in the decline of unit prices so many households that previously could not afford a SHS, even with subsidies, are now able to buy one.

Successful implementation by IDCOL has allowed for expansion of the agency's activities. Given the size of the SHS program, IDCOL has established regional offices to ensure inspection and monitoring in a cost-effective manner. Building on the implementation experience in the SHS program, IDCOL has now ventured into mini-grids, solar irrigation pumps, improved cookstoves (which require less fuel and reduce smoke emissions), and biogas digesters, to further increase access to clean energy in rural Bangladesh.

The project is being scaled up. An additional GPOBA grant of $15 million under RERED II aims at scaling up access to clean energy for the poor in rural Bangladesh. It will benefit over 1.2million people and covers installation of four clean energy technologies, with 225,000 SHSs; two mini-grids benefitting; 330 solar irrigation pumps; and 9,850 biogas plants. The scale-up will more effectively target poor households in rural, remote areas by providing subsidies for small systems only (below 30 Wp). By leveraging the capacities of microfinance institutions and the private sector, the grant will further contribute to strengthening the ongoing development of a commercial market for SHSs and other renewable energy solutions.

[1] Shahidur Khandker, Hussain Samad, Zubair Sadeque, Mohammed Asaduzzaman, Mohammad Yunus and Enamul Haque. "Surge in Solar-Powered Homes. Experience in Off-grid Rural Bangladesh." Directions in Development. World Bank.