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GPOBA
The Global Partnership on Output-Based Aid

LESSONS LEARNED



Decentralized Electricity for Universal Access in Bolivia

SECTOR CONTEXT AT PROJECT PREPARATION

In 2004, at the time of appraisal, the poverty rate in rural areas of Bolivia, where approximately one-third of the population live, was 82 percent. Less than half of the rural population had access to electricity, and the majority of schools and health centers in rural areas were not electrified.[1] The provision of infrastructure services was therefore an urgent necessity but also costly. In 2003 the World Bank approved a $20 million credit as the first phase of a ten-year Adaptable Program Loan package for Decentralized Infrastructure for Rural Transformation (IDTR), a major component of which focused on rural electrification. This project developed an innovative model for off-grid rural electrification through public-private partnerships: medium-term service contracts (MSCs) for electricity provision through solar home systems (SHSs) for dispersed rural population, in which the service provider was responsible for the operation and maintenance of the SHSs during its initial years. In 2006, the Government of Bolivia (GoB) launched a strategy for universal access to electricity, which recognized the need to mobilize both public and private sector financing and expertise. The GoB was interested in exploring MSCs as the lead mechanism for the off-grid window of its Universal Access Fund.

THE PROJECT AND ITS PARTNERS

The GPOBA project, which was approved in 2007, built on the experience of the IDTR project. It was comprised of grants totaling $5.2 million to support the provision of electricity under the framework of the Government's universal access strategy. The grant recipient was the Ministry of Services and Public Works, with implementation by the Project Coordination Unit of the IDTR. The project's aim was to increase access to renewable electricity for households, micro-enterprises,

RESULTS ACHIEVED

After initial delays associated with political changes and institutional challenges, the project closed very strongly in 2013, exceeding its original targets. A successful bidding process succeeded in achieving a lower subsidy level per unit, making possible the installation of a larger number of SHS and Pico-PV systems than planned.

- Installation of 7,700 SHSs for dispersed, low-income, rural households, schools, clinics, and micro- and small enterprises (including 126 systems for public buildings not initially included in the project design).
- Distribution of 5,705 Pico-PV systems for lighting and basic communication services for the poorest households.
- Consolidation of output-based service contracts between government and private sector service providers as a mechanism for electrification of poor, dispersed households under the new universal access policy; the project involved eleven contracts (eight for SHSs, two for Pico-PV systems, and one for public schools) with two service providers who are now well established in rural areas and in a position to continue providing their service.

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schools, and clinics in remote, rural areas of Bolivia through output-based service contracts and subsidies to private sector providers for the sale, installation, and after-sales service of at least 7,000 SHSs. The subsidy was originally set at $650 per SHS unit (61 percent of project costs for a typical 50Wp system for households, and 69 percent of a typical school system). Users would pay: (i) upfront fee of $50; (ii) repayment of remaining system costs, either in cash or through micro-credit of approximately $335; and (iii) replacement of battery of about $65 if the battery failed before the project ended. User payments were verified regularly on a random sample basis, with penalties for providers who overcharged. The user was responsible for replacement of batteries and spare parts for the rest of the system's estimated 20-year operation. User contribution was estimated based on a demand survey, assessing willingness-to-pay and the IDTR experience. However, it was expected that subsidies could be reduced through the competitive bidding process.

A sub-component of the project consisted of a pilot to facilitate market development of Pico-PV systems by providing incentives for companies to offer PV systems below 20Wp for basic lighting and communication services via existing sales points. These systems were aimed at populations who could not afford subsidized SHSs. The project set a target of 2,000 Pico-PV systems, with subsidies of $150 per unit, covering market development costs and half of the average price for a the system. Given supply and demand uncertainties, flexibility was built in to the project, so that subsidy amounts could be adjusted as needed. A third component of the project provided for technical assistance (TA) for transaction support, coordination, and supervision; this was consistent with best practices for off-grid electrification, which indicates that such projects require substantial TA if they are to succeed.

The project was restructured to adapt to new organizational conditions, allow more time for its completion, take account of lower-than-estimated subsidy costs for SHSs, and reduce the after-sales service period.

Lessons Learned

1 **Local government commitment from the early stages of a rural electrification effort is key to effective project design**. The active involvement of departmental governments and municipalities was key to the successful implementation of the project, providing important information on communities' requirements, challenges related to poverty levels, and financing. Specifically, municipalities and local governments covered a percentage of costs users were unable to pay, with user contributions—which had been estimated at $390 per unit—reduced to an average of approximately $100 per unit. The mobilization of these additional resources to offset the limited means of users was instrumental in the project meeting its objectives. Involvement of local entities from early in the project design stage can also help to ensure that local interests continue to be aligned with long-term objectives of rural electrification efforts.

2 **A well-designed bidding process has the potential to reduce subsidy requirements and enhance the results of a rural electrification project.** A competitive bidding process that incorporates incentives to maximize the leveraging of grant proceeds (e.g., the selection of bids based on the lowest subsidy requirement per unit) is an effective way of taking advantage of what the market can offer, reducing subsidy requirements while increasing the scope of an electrification project. In this project, the average subsidy for an SHS was reduced to $479 from the original $650 estimate, a result of the bidding process (subsidies for Pico-PV units were reduced from $150 to $20, as municipalities and departmental governments covered a significant part of the cost).

3 **Flexible project design can help to maximize the benefits of the electrification effort, but benefits and costs must be balanced.** In projects such as this one, the limited economic capacities of households in dispersed rural areas constitutes a major constraint and often requires the support of local governments. However, between one locale and another, there may be variations in local governments' willingness and capacity to support electrification efforts. The degree of local support for financing of off-grid solutions should therefore be carefully assessed during project preparation, along with households' financial means and willingness-to-pay, and a project design adopted that can respond effectively to the particular conditions found in each community. In addition, the process of pre-qualifying bidders in this project did not initially attract enough competition, and bidding conditions were adjusted, reducing the service contract period to two years and lowering risks to the service provider. A new bidding process succeeded in achieving a lower subsidy level per unit, thus enabling a larger number of SHS and Pico-PV installations. However, this amendment in the service contract from four years to two may imply a trade-off between effective project implementation and sustainability.

4 **Adequate training of customers in the use of SHSs is essential to full attainment of the benefits of electrification.** Experience in both the IDTR and the GPOBA projects has made clear the importance of familiarizing customers with the correct use and primary maintenance of photovoltaic equipment in order to enable them to take full advantage of electrification. This training should be incorporated into the obligations of service providers and other entities responsible for monitoring longer-term operation and maintenance.

5 **An OBA approach complemented by medium-term service contracts incorporates efficiency incentives and helps guarantee adequate electricity service during a specific period; however, achieving longer-term sustainability may require additional approaches.** The project succeeded in installing a large number of SHSs in remote areas and guaranteeing operation over a two-year period following installation. However, long-term sustainability of SHSs—i.e., after four to five years, when most batteries will need replacing—may require a project design oriented towards greater involvement of local communities and/or the long-term involvement of a utility or electricity service provider.

[1] As of 2015, the percentage of Bolivia's rural population with access to electricity has risen to 72.5 percent. (source: World Bank)