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Improving Electricity Service to a Slum in São Paulo, Brazil



Overview of Paraisópolis

Before project implementation in Paraisópolis, the second largest ‘favela’ (slum) in São Paulo, the quality of electricity service was very poor: almost all the households and businesses had illegal electricity connections, were exposed to dangerous network and wiring conditions and did not pay for service. Households and businesses consumed high amounts of electricity – on average 250 kWh/ month – due to the very poor condition of household appliances and electrical equipment (especially refrigerators and electric water heaters for showers), and the lack of price signal to encourage consumers to use electricity wisely.

Through a Global Development Alliance partnership with the International Copper Association (ICA), USAID and ICA teamed with AES-Eletropaulo to develop, test, and evaluate customized approaches to regularizing electricity service in a target area of Paraisópolis. The pilot was the first to be launched under the USAID-ICA Slum Electrification and Loss Reduction (SELR) program, which was initiated in October 2005 on the theme of regularizing and improving electricity service to low income communities. In addition to the pilot in Paraisópolis, a second is in the design phase in Mumbai, India and a third is being planned for Africa.

The Problem and Proposed Solutions

The selected pilot area covers two neighborhoods (Antônico and Centro) within Paraisópolis, a favela with approximately 20,000 households in the middle of São Paulo. This target area includes 4,365 low income households and businesses (of which 60 households had small home businesses and 423 were stand-alone commercial enterprises of varying sizes and types of services/sales). Like most other favelas, Paraisópolis is an informal community which lacks many municipal services and is home to families that migrated from rural areas over the years. Located in a large ravine, Paraisópolis has a physically challenging geography and is surrounded by middle- and upper-income residential areas. Although the land is publicly owned, the Paraisópolis households have occupied it for generations and the São Paulo city government is currently implementing a land tenure program to register residents and transfer title to them.

As a first step in the regularization program, AES-Eletropaulo contacted community leaders to work with them on the scope and scale of the project and then held a series of community meetings to educate residents about the program, bill payment, their energy consumption and measures that could be taken to reduce electricity usage. Identifying, registering and

numbering the individual households and businesses was sometimes a challenging task given the narrow, winding streets and alleys; the fact that multiple families often live in a single home; the lack of street names; and parallel registration efforts being made by the municipality and other service companies. The community campaigns were carried out over several months and were supplemented by door-to-door visits by community “agents” and utility staff to each household both pre- and post- regularization. As residents previously did not have to pay for electricity (except in some cases to get their illegal connection), these campaigns were important to educate consumers on the importance of paying, understanding their electricity bill, and implementing efficiency measures that could be undertaken to reduce consumption and costs.

Under the project, the distribution network was upgraded and households and businesses were metered. The households were not charged a connection fee and any debts owed were forgiven. A key component of the SELR program was the use of new technologies and techniques to reduce theft and improve the efficiency of the distribution network. These included the following:

- Using bi-coaxial cable in the new service drop to each individual meter.
- Introducing electronic metering for large commercial consumers to allow easy disconnect or “social cutting” in the case of non-payment.¹
- Replacing 12 conventional overloaded transformers with efficient transformers.

Given the high level of consumption by households and the urgent need to reduce their usage and enhance the affordability of service, the project undertook a number of measures to increase household efficiency. These encompassed energy audits of every household to identify energy efficiency opportunities, the replacement of three incandescent bulbs with efficient compact fluorescent bulbs in each home, the replacement of refrigerators in bad condition, and rewiring of homes with especially poor internal wiring in households that met low-income criteria. An audit of a sample of



A community meeting to explain the program.

commercial customers provided the project with the information needed to make recommendations on the energy efficiency measures these customers could adopt to reduce their bills.

USAID, AES-Eletropaulo, ICA and its local affiliate – Procobre, worked closely to ensure a coordinated approach to project design and implementation. A ‘responsibility matrix’ was prepared which presented the project components and indicated the organization that was responsible for funding and implementing each task. AES-Eletropaulo picked up the bulk of the project costs, including the distribution network upgrades, metering, consumer registration, and new refrigerators (with ICA); ICA paid for the efficient transformers, rewiring of households, and preparation of a financial model; USAID covered the community campaign costs, audits of each household and selected commercial customers, purchase of CFLs (with AES-Eletropaulo), post-project survey, and efficiency recommendations to targeted commercial customers. Total project costs were \$2.52 million.

The Outcome

Data on pilot project results are presented in the box on this page. A consumer poll, conducted after project completion and several months of billing, showed that most of the regularized families in the pilot area were highly satisfied with their better quality service and the assistance received in improving their household energy efficiency. Of the 400 households surveyed, 62% rated their overall satisfaction with the project as a 9 or 10 on a scale of 1 to 10. Not surprisingly, this percentage increased to 98% for those who received a new refrigerator and were re-wired and to 80% for

¹ Social cutting is limiting the amount of kWhs that a customer can use (but not disconnecting) in the case of non-payment.

PILOT RESULTS

<i>Measure</i>	<i># installed or completed</i>
Conventional meters and posts installed	4460
Remote meters	435
Pre- or post regularization door-to-door visits by community agents	8594
Community and school events (# events; # attending)	27 events with 4906 attending
Replacement of inefficient incandescent light bulbs with efficient compact fluorescent bulbs (CFLs)	9588 CFLs
Refrigerator assessments completed	2598
Inefficient refrigerators replaced with PROCEL A-rated ones as needed ²	500
Wiring safety assessments completed	2433
Rewiring of unsafe internal wiring and fixtures and replacement of electric water heaters ³	500
Replacement of individual outside lights with public lighting	505 (472 in alleys and 33 in main streets)
Commercial audits and recommendations made	70

those who were only re-wired. The majority (88%) of the households considered the quality of the electricity service to be good or very good after project implementation compared to only 17% before the project. Eighty-nine percent of the households would recommend the program to other residents.

² Overall 727 needed replacement with 444 in bad condition and 283 in very bad condition; however only 532 families signed agreements to replace their refrigerators (they were either consistently absent or refused the refrigerator) and only 500 refrigerators were available.

³ 1406 were found to be in bad and very bad condition but funds were limited to 500 in the pilot.

The energy efficiency measures taken in the households and distribution network are expected to yield annual energy savings of over 2 million kWh. Until recently, bills to households and businesses were capped at 150 kWh to help households transition to paying for service as well as to educate them about their actual consumption levels and charges once the cap is removed. It is expected that additional savings will accrue (but additional bad debt may also occur) when larger consumers start to experience the true cost of their consumption.

After project implementation, AES-Eletropaulo began to collect a significant amount of new revenue from consumers who had not previously paid for their electricity consumption. Annual billing is expected to reach over \$920,000; currently, the bad debt rate is about 35%. This bad debt rate is relatively high and is due to the large number of commercial customers with high consumption levels that are unable or unwilling to pay. The bad debt rate is expected to decrease, based on experience in other areas, as AES-Eletropaulo implements its 'social cutting' program and enforces collections. However, while survey results show that nearly a third of households took a 'great effort' to pay their electricity bill, 56% said that if budgets were tight, they would select to forgo paying this bill. This is a challenge to project sustainability and needs to be taken into account by AES-Eletropaulo as it rolls out of the SELR program to hundreds of thousands of additional favela households in São Paulo over the next two to three years.

The pilot approach and results were shared at a workshop, entitled "Improving Electricity Service for the Urban Poor," which was hosted by USAID, AES-Eletropaulo, and ICA in São Paulo, Brazil from December 4-7, 2007. It was attended by over 100 utility managers, experts, and development officials from 23 countries drawn from Asia, Africa, Latin America, Europe and North America. In addition to learning about the Paraisopolis pilot, workshop participants shared their experiences with SELR programs and explored alternative solutions to the many technical, economic and social issues associated with expanding and improving electricity service for slum communities.

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