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This case study is part of a series reviewing business models for private companies providing infrastructure services to rural customers in developing countries. The case studies assess factors driving the performance of private companies in a variety of rural contexts and sectors and under diverse legal and regulatory arrangements. This case study is based on research by Paul Lewington, Economic Consulting Associates Ltd., and Carlos Zilli, Mercados de Energía S.A. The primary funding for this research came from the Public-Private Infrastructure Advisory Facility, a multilateral technical assistance fund. The World Bank task team for the case studies was Alan Townsend, Clive Harris, Lorenzo Bertolini, Michael Schui, Juan Navas-Sabata, and John Newstead.



Private Rural Power

Network Expansion Using an Output-Based Scheme in Guatemala

In 1998 the government of Guatemala privatized the two companies responsible for distributing electricity in rural areas. The new owner, Union Fenosa, was obliged to implement an ambitious five-year rural electrification program. The goal: to increase the share of households with an electricity connection from 64 percent to 90 percent by 2004. Under this output-based scheme the two companies are paid US\$650 for each eligible residential connection made. If no connections are made, no payment is made. So far the scheme has performed well—completing 122,000 new rural connections between May 1999 and May 2002—and is on track for the 2004 targets.

Before Guatemala privatized electricity distribution, consumers were served by one of two publicly owned entities. Those in Guatemala City and surrounding departments were served by Empresa Eléctrica de Guatemala S.A., privatized in 1998. The mostly rural consumers in the rest of the country received service from Instituto Nacional de Electrificación (INDE), a vertically integrated utility. In 1998 INDE's distribution business was split into two companies covering distinct regions, Distribuidora Eléctrica de Occidente (DEOCSA) and Distribuidora Eléctrica de Oriente (DEORSA), and privatized with a 50-year concession to operate the distribution assets. Union Fenosa Internacional, S.A., won the bid for both companies, paying US\$101 million for an 80 percent stake in the two.

Rural electrification had gotten a boost when the main Guatemalan social fund increased its

activities in electrification after the peace accords ending the civil war were signed in 1996. But while the share of households with a connection (the electrification rate) exceeded 90 percent in Guatemala City, it was much lower in rural areas. In 1998 it was estimated that only 60 percent of the population had access to electricity, one of the lowest rates in the region. To spur rural electrification, the government created Programa de Electrificación Rural (PER). And when it privatized DEOCSA and DEORSA, the government incorporated the scheme into the concession agreement, obliging the new owner to implement the extension targets of the PER.

Expanding access through Programa de Electrificación Rural

Under the PER the government is setting aside US\$333 million to fund expansion of the rural

transmission and distribution networks. The investments in transmission (US\$151 million) will go to lines and substations. And those in distribution will connect 280,000 residential consumers in around 2,600 communities. Once these connections are completed in 2004, the national electrification rate is expected to reach 90 percent. That will mean a substantial increase in the customer base for the two companies, which was about 410,000 for DEOCSA at the time of privatization and about 222,000 for DEORSA.

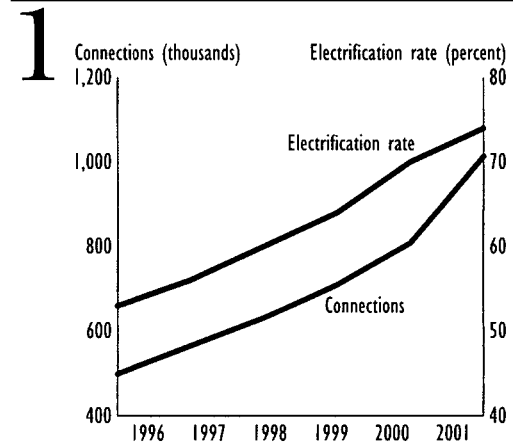
The expansion plan for distribution involves a simple incentive structure: the two companies receive a US\$650 subsidy for each verified, eligible residential connection they make. This amount is based on the costs of past connections in INDE's rural programs as well as costs in neighboring countries. At present two simple criteria determine eligibility: the connection must be for a residential dwelling, and the dwelling must be more than 200 meters from the existing network. Sector law requires distribution companies to connect any consumer within 200 meters of the network who requests service, although the companies may require a refundable deposit from the consumer when they make the connection. So PER funds are not being used to subsidize connections within the 200-meter zone, although Union Fenosa has argued that the contract governing the PER does not rule this out.

Managing the fund and verifying results

A trust fund was established for the PER scheme to ensure that funds are not diverted to other uses. Banco Agrícola Mercantil de Guatemala administers the fund, while the Bank of New York holds the funds offshore. The government capitalized the fund with more than US\$100 million of privatization proceeds from the sale of shares in DEOCSA and DEORSA, which later added more than US\$50 million in government bonds. The balance needed, around US\$180 million, is being sought from different sources.

The fund is managed by a technical committee consisting of representatives of the Ministry of Energy and Mines (presently, the energy minister), INDE (the vice minister for energy), and the two companies. In some countries leaving control of the funding mechanism within the ministry might be undesirable because of poten-

Figure 1 Household connections and electrification rate in Guatemala



Source: DEOCSA, DEORSA (connections), and Comisión Nacional de Energía Eléctrica

tial conflicts of interest, but there is no evidence that this has been a problem in Guatemala. The committee approves the annual work plan and authorizes the release of 20 percent of its estimated costs up-front.

The technical committee hires independent supervisors to verify that the connections made by DEOCSA and DEORSA are eligible for reimbursement under the PER. The supervisors visit communities to check whether the new connections are outside the 200-meter zone and are in residential dwellings. They report to INDE, which sometimes performs additional checks. INDE then submits a final report to the technical committee, which authorizes payment of the other 80 percent.

Reaching the targets

The PER is on track to reach the target of 280,000 connections by 2004 (figure 1). Between May 1999, when the program began, and May 2002 PER funding was verified for 122,000 connections in 1,100 communities. Another 12,000 connections were made but not certified as eligible for funding, most because they turned out to be inside the 200-meter zone. The two companies have also made about 200,000 connections (including regularization of unofficial connections) outside the PER. An advantage of the PER design is the apparent efficiency of concentrating the program in essentially one company. Evidence suggests that bulk purchases of equip-

ment have reduced costs below those in earlier rural programs in Guatemala.

Meanwhile, the transmission expansion plans of the two companies have fallen behind schedule. Difficulties in obtaining the right-of-way for lines are cited as the main reason for the delays.

Using competition for funds

Competition for subsidies can help minimize program costs and promote good customer service. Does the PER include any element of competition? Its funds are reserved for expanding the networks of DEOCSA and DEORSA. So municipally owned electricity companies, which account for less than 10 percent of sales and connections in Guatemala, have no chance to compete for the PER funds. Nor do self-help groups or social funds. The government introduced competition at the outset—for the right to implement the program and to operate the existing networks—by bundling the construction of the 280,000 connections with the privatization of the networks.

Alternatively, the government could have delinked grid expansion from operation and perhaps broken the expansion down into smaller connection projects that could have been bid out separately. But increasing the number of organizations that could access the fund would have made implementation more complex and increased the administrative burden on the government, particularly by requiring it to let a series of contracts. The present approach places the burden of contracting and implementation on DEOCSA and DEORSA.

Targeting the subsidies

Where resources are limited, selective targeting of subsidies is always preferable. While the PER does not explicitly target its subsidies to the poor, it probably benefits the poor. According to DEOCSA and DEORSA, households connected under the PER consume only a very basic service at around 30–40 kilowatt-hours (kWh) a month. By and large the people who do not have connections are the poor and indigenous communities. The expansion of the network during 1996–99 meant that these previously excluded groups were twice as likely to receive an electricity connection as they had been

before—because even a nontargeted program will benefit these groups if it leads to a sufficiently large increase in connections (Foster and Araujo 2001). That is what happened in 1996–99, and it is reasonable to expect a similar result under the PER.

The subsidy has led to some perceptions of unfairness, because it allows users connected under the PER to pay a deposit of only US\$10. So while a community within the 200-meter zone may have to pay sizable refundable deposits (reportedly as high as US\$3,000 per household in some cases), a community a short distance away outside the zone—which could be wealthier than the first—gets connections virtually free. The program could have made the subsidy available to all unserved consumers while requiring that they pay a nonrefundable connection charge. But while this option might have reduced the perceptions of unfairness, it might also have led to fewer connections outside the 200-meter zone for poor people unable to raise a higher up-front connection charge.

The subsidy, based on the average cost of connections, has allowed Union Fenosa an apparent average profit of around 7 percent on each connection. But Union Fenosa projects that the costs of connections will probably rise in the last two years of the program as it extends to more remote communities. Will DEOCSA and DEORSA be willing to make those higher-cost connections? How strong the incentives will be for doing so is not yet clear, because the contract governing the PER seems to have no clear penalties for failing to complete the program. “Sculpting” the connection payment, by paying larger subsidies for connecting more distant communities, might provide better incentives. But the information available at the time the contract was signed might not have permitted a reasonable estimate of the relationship between cost and distance from the network. Moreover, targeting subsidies to specific groups or locations would complicate administration and planning.

Initially, the government did try to target subsidies, attaching to the plan a list of communities and the expected number of connections in each. But when DEOCSA and DEORSA began work, they discovered that about a third of these

communities already had an electricity connection or had one under construction. The companies have therefore had to identify substitute communities, which they have done through weekly meetings with INDE. This process has been fairly efficient. Perhaps even more efficient, though, would be to rely on the companies to identify communities based on clear eligibility criteria, possibly with binding targets in different zones. That approach might raise concerns that the companies would make only the lowest-cost eligible connections. But it is not clear that the communities INDE has proposed are in more remote or less populated areas than those that DEOCSA and DEORSA have proposed.

Covering the cost of service

The sector regulator, Comisión Nacional de Energía Eléctrica, regulates the prices that DEOCSA and DEORSA can charge their customers. At present the prices for residential consumers using less than 300 kWh a month are subsidized through a social tariff. Although retail tariffs for “social tariff customers” are lower, the companies do not bear the cost because the government reduces the generation price. So this subsidy does not provide a disincentive to serving social tariff customers connected under the PER. But the subsidy in the social tariff is poorly targeted, benefiting more than 80 percent of rural consumers. The average consumption of those connected under the PER, around 30–40 kWh a month, might be a more appropriate consumption level for the social tariff.

The regulator allows DEOCSA and DEORSA to charge consumers eligible for the social tariff a fixed charge of about 90 cents a month and a variable charge of about 7.4 cents per kWh. So a customer using 40 kWh a month pays around US\$4 a month. Given the low consumption by these customers, DEOCSA and DEORSA have argued for increasing the fixed charge, because it is difficult for them to recover the fixed costs of serving consumers (including billing and metering). The fixed charge may be increased at the next regulatory review.

Are connections a good measure of output?

While the scheme bases payment on the “output” of completed connections, a more ideal

definition of output would include factors relating to the service consumers receive. Under the present scheme, if consumers receive poor-quality service after their connection is made, the company could be penalized under general quality of service obligations but would not have to refund any of the connection subsidy. Linking payment of the subsidy to a measure of service or throughput would reduce the risk of poor service. But it would also greatly increase the complexity and burden of monitoring. So while connections are not a perfect measure, they do have the benefit of being easily verifiable and therefore useful in a large-scale program such as the PER.

Reaching the rest

When the PER is completed in 2004, the government expects that around 90 percent of Guatemalan households will have access to electricity. How can it extend access to the other 10 percent? That may require different approaches to providing subsidies, depending on the reason for lack of access. Evidence suggests that around a third of households without electricity live next to a household that does have a connection (Foster and Araujo 2001). So for some of the unconnected households, inability to pay the deposit for a connection may be the explanation. Among rural households, those that lack connections will be in increasingly isolated areas. Connecting these households may require subsidies for off-grid approaches or, in some cases, for municipal companies not now eligible for PER funding.

Reference

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