RETOOLKIT CASE STUDY

Rural Electricity Subsidies and the Private Sector in Chile[1]

1. Overview

Chile's long history of rural electrification began in the late 1930s, when Rural Electric Cooperatives (RECs) were formed to support agricultural development in the fertile lands surrounding the country's regional capitals. Low population density and the rather narrow valleys in which agricultural projects supported themselves largely limited the size of the cooperatives. In the early 1980s, the country's public electricity companies were divided into service territories and sold off to private investors. The cooperatives remained as distribution companies at this time.

At the time of this privatization, it was anticipated that under the new system the private and cooperative distribution companies would continue to expand service to new areas. However, this did not happen. After decades of only gradual expansion, by 1990 rural coverage remained below 50%, with few new ventures to provide rural areas with electricity.

In 1994, to encourage private companies to increase rural coverage, the Government of Chile (GOC) initiated a concerted effort to increase rural electrification from 50% to 75% by the year 2000. They concurrently attempted to rationalize the use of government subsidies provided to achieve them. The result was the establishment of Chile's Rural Electrification Program (PER), which has been quite successful in meeting the challenges of rural electrification through private sector companies and existing cooperatives. The presence of a competitive environment, combined with the willingness of many mature distribution utilities to participate, has been critical to the success of the program.

There are several factors that contributed to the success of the PER to expand access to electricity.

1. The rural electrification program had at its initiation reliable infrastructure for generation and transmission services.
2. The distribution companies were already mature so the program was based on well-established construction practices, experienced construction service providers, and an already existing materials industry.
3. The program was implemented through a competent and motivated government agency, Chilean National Energy Commission (CNE), with sufficient authority to develop and guide a national electrification policy initiative.
4. The policies were developed and applied in a very fair way. In this respect, the government agency had well defined project selection methods and there was a strict adherence to this methodology in project selection.
5. The funds flowed from the national treasury through the National Fund for Regional Development to the rural energy providers, and the government

[1] Meeting the Challenge of Rural Electrification in Developing Nations: The Experience of Successful Programs, ed. By Douglas F. Barnes, ESMAP Discussion Version, April 2005.

provided a sustained political commitment that allowed it to be implemented over a long time period.

By 1999, a year earlier than planned, the PER had achieved 75% rural electric coverage. At the same time, by encouraging management improvements and facilitating stronger negotiation between governments and utilities at the local level, the proportion of state subsidy had declined over time. Building on this success, the GOC has extended the program, and now is well on its way to achieving 90% coverage by 2005.

2. Effects of Privatization on Rural Cooperatives

Chile was one of the first countries in Latin America to make privatization the electricity sector a priority. The electricity law of 1982 defined the terms under which the newly privatized sector would operate, and it stipulated that, in order to utilize public property legitimately in its operations, an electric utility had to become a concessionaire. By 1990, most of the major cooperatives had become concessionaires and had become subject to the regulated tariffs promulgated by the National Energy Commission (CNE). It required concessionaires to submit detailed financial and operational information to regulators for the calculation of these tariffs.

To minimize subsidies for non-electric services and thereby minimize the cost of electricity service to all consumers, the CNE also required that distribution utilities follow strict rules regarding the separation of energy and non-energy business transactions. The transparent accounting that resulted revealed many inefficiencies in the cooperative electric system operations. Downward price pressure exerted by the CNE as a means of providing more reasonable energy prices to consumers, combined with the exclusion of non-electric system income, resulted in financial losses for a significant number of cooperatives. By 1999, 6 of the 13 cooperatives had been sold to IOUs, and others continue to experience difficulties.

3. Comparative Advantages of the Private Distribution Companies

The IOUs that were formed after privatization of the state electricity distribution system have aggressively expanded service in direct competition with many RECs. They have far outperformed the RECs, even though the cooperatives would appear to have been better positioned to develop project portfolios and to expand their service coverage.

At first glance, rural electrification markets may not have appeared to represent a significant opportunity for the IOUs. It seems that the principal reason for their engagement was to establish themselves strategically to take advantage of future load growth. Over the past five years, load growth in Chile has averaged 8%, but most of it has come from urban areas. Even so, if a company can add infrastructure at a fraction of its actual cost even though load density might be low at the outset, this could prove to be an effective strategy once the economy in the new service territory begins to grow more rapidly.

The IOUs also had long-established sister corporations that provided such services as engineering, procurement, and construction of new projects for the distribution companies. The very nature of the subsidies designed for PER meant that participants could profit from project construction and electricity sales. In addition, the companies could take advantage of a fiscal credit equivalent to the full project value, while due to

the subsidies provided under PER the cost to them was only a small percentage of actual cost. These short-term benefits made the projects attractive to the IOUs.
The cooperatives could also take advantage of these same benefits, so it is somewhat surprising that the IOUs have been far more successful in competing for PER program funds. The RECs were much smaller than the IOUs, and had far fewer institutional resources to enable them to compete effectively. They also lacked experience in competitive markets. By contrast, the IOUs were well managed and willing to take reasonable risks to open new and attractive markets. They had more engineers, financial analysts, and financial resources available to develop projects. In most cases, the quality of their proposals and the price competitiveness far exceeded those of the RECs. Their larger size enabled them to lower their stated subsidy requirements, in effect, underbidding the cooperatives to win the most contested projects. Their large size also helped them to recover funds lost in such competitions by obtaining higher subsidies on projects for which there was no competition. Lastly, the IOUs understood how to lobby the political system, an area in which the RECs were relatively inexperienced.
In summary, the IOUs have been far more significant PER players than the RECs. IOU participation is a principal reason for the PER's success, which is predicated on competition. Had the IOUs not shown an interest in the PER, the cost of construction per customer would likely have been much higher and the impact less. However, in fairness to the cooperatives, it should be noted that the level of PER investment increased dramatically at the very time that they were forced to restructure themselves and focus on cost-cutting across all operational fronts. The end result was that nearly half of the RECs did not survive, and of those that did only a few were subsequently involved in expanding service through the PER.

4. Rationale for Government Involvement in PER

PER architects were confident about dedicating resources to the program. Electrification was viewed as a relatively good public investment. A subsidy mechanism already existed for electrification, meaning it was possible to restructure the existing program rather than having to initiate a new one. The expansion of electricity to rural areas was viewed as having both social and developmental benefits, helping to integrate them into the rest of the country. It is an interesting twist that Chile's development indicators were designed in such a way that having electricity increased a family's score on the poverty index scale, thus providing the government an efficient pathway for monitoring the impact on development. Finally, a successful rural electrification program was viewed as having potential political benefits.
The focus on poverty alleviation is another important key to understanding the nature of the GOC's commitment to rural electrification. From the beginning, it focused explicitly on assisting projects that the private sector would not undertake on its own. Thus, the PER focused on projects with negative financial rates of return, which were considered unattractive to the distribution utilities. The key to a successful PER was structuring public subsidies in an efficient way, while causing as little market distortion as possible.

5. Subsidy Allocation Methodology

The project evaluation methodology consists of a three-part process. First, an economic analysis is performed of the project. Second, a financial analysis of the project cost and financial rate of return is performed. Lastly, given the results of the project financial rate of return and the economic rate of return previously calculated, a maximum amount is set for the project subsidy.

The project economic evaluation is taken as indicative of the project's overall worthiness as compared to the existing situation in the project site. The baseline situation without electrification is estimated through surveys that identify the quantities and forms of energy currently in use that would be displaced by electrification, in kilowatt-hours. For example, kerosene lanterns, dry cells, and automotive batteries.

The future situation (with the project implemented) is estimated for the project site from actual consumption data gathered from similar projects already executed in areas demographically similar to the potential project site. Families are classified by socio-economic status, and the gross social benefit is calculated for each group, and the economic (social) NPV (or ENPV) is calculated over 30 years, usually using a social discount rate of 12%. If the ENPV is greater than the initial project cost, the project passes this first screen and goes into the regional electrification database. If not, then the project is rejected as a candidate for funding.

In parallel with the economic analysis, a financial analysis is carried out to determine if the project will be financially attractive for the distribution company after taking into consideration the subsidy of the capital costs. This is a traditional assessment of the project's financial net present value (FNPV) to 30 years.

Finally, the PER/FNDR subsidy is set just above the financial break-even point at a 12 percent discount rate, in order to allow a reasonable rate of return to the implementing utility for its commitment to manage the project over its 30-year lifetime. Thus, the project must be economically for the country and financially attractive for the utility in order to qualify for the subsidy from the government.

6. CNE's Role in Funding PER and Supporting Decentralization

The design of the PER, and the ultimate responsibility for achieving its electrification goals, fell to the Chilean National Energy Commission (CNE), which was then part of the Ministry of Energy. The CNE recognized that the key decisions influencing electrification were made at the regional level, planned and negotiated between the respective regional government, municipalities, and utilities. Further, the CNE did not control infrastructure funds; these flowed from the national treasury through the National Fund for Regional Development (FNDR), located in the Ministry of the Interior. The CNE's primary role, then, was to provide a coherent set of goals for electrification, a plan for achieving them, and sufficient leadership so that the regional governments would take notice and follow the plan. The CNE in fact has provided only a small portion of total PER program funding, but has played an important and strategic role in regional program evaluation and education, as well as creating high visibility for electrification activities at the national level.

The CNE initiated a variety of activities in the regions in order to encourage planning, professionalism, and expansion of regional electrification programs—in essence, the CNE pushed for the formation of "regional PERs". In sum, the CNE's leadership, more

than its funding, was critical for stimulating each region to achieve the aggressive objectives of the PER.

Community participation is sometimes emphasized as an important aspect of the PER. This is true enough, since the demand for electrification in most cases begins from the expression of need from an organized community, and even more so to the extent that municipal-level political processes reflect community priorities. Moreover, given that the FNDR subsidy can only be authorized once for each family, community members have a broad incentive to make sure the most effective solution is selected. To a large extent, this sort of community participation is not new to the PER, since the funding process for electrification prior to the PER already rewarded community initiative with a greater likelihood of project approval, funding and construction.

Additionally, during the course of each project's definition and approval, the community (i.e. the project beneficiaries) participates in some key decisions. The most important is the monetary contribution of the individual users to the initial cost of the project. In general, the user must pay for, at a minimum, the corresponding residential service drop and interior wiring installation, which typically amount to around 5% of the total project cost. Depending on each user's ability to pay, this cost can be financed by the utility, to be recovered over time through the periodic electric bill. In projects for which funds are so limited that economic viability (and therefore subsidy approval) is in doubt, the user or municipality may make additional contributions to increase the possibility of approval. Relative contributions to a project are typically negotiated between the utility, municipality and the future users. But once a project has taken shape the utility supplants the municipality as the primary driving force.

7. Implications of the Subsidy Funds

As we have seen, at the regional level, the government receives project proposals from electric utilities and cooperatives, which compete for limited grant funds. In general, projects that provide new electric connections with the lowest FNDR subsidy per connection are funded progressively, until the subsidy funds for that year are exhausted. The funding strategy is thus designed to reward utilities requesting lower subsidies on a per user basis, even if each utility proposes a unique set of projects. The successful utility is awarded more of its proposed projects, and is paid the subsidy for each upon initiation of construction. In its simplest form, competition for FNDR subsidies occurs implicitly between rival utilities in a cycle of strategy, action, and reaction.

The state explicitly limits the FNDR subsidy to a maximum of a project's initial capital cost. Therefore, each potential project must be shown to generate at enough cash flow to pay for long-term operation and maintenance costs. If a project will not generate sufficient cash flow to cover O&M, for example due to low projected demand and/or low customer densities, then it will not be approved for subsidy. While such a high maximum subsidy may not seem limiting, the result does in fact reduce the potential for gross unit cost excesses of some programs in other countries, and does represent a clear limit on the willingness of the state to pay the private sector for the provision of social services such as rural electricity. The significant initial subsidy encourages utilities to build new lines sooner rather than later. Once lines are built and consumers are provided with electricity service, the utility assumes responsibility for all maintenance and operating costs.

The majority of rural distribution companies have placed little or no emphasis on load promotion in their newly constructed lines. Several reasons may be behind this. The most significant was the continued existence of PER funds through the FNDR, and the competitive nature of their allocation, has meant that distributors have an incentive to focus their personnel time and effort on system expansion, including short-term planning construction-related activities. Their view was that as long as profits could be made from the construction program, load growth could wait. Another factor is that the potential for productive load growth appears at least on the surface to be rather low in rural Chile, where rural residents have not traditionally engaged in a great deal of economically productive activities.

8. The Success of Subsidy Program

For the government, the main objective measure of PER success was the total number of new households in the country that were able to adopt electricity. Achieving the six-year goal of 75% coverage by the end of the year 2000 required allocating a proportionately greater percentage of funds to those regions with the highest number of households without electricity. This is because the remotest regions in Chile had most of the households without electricity. As a consequence, the PER subsidy was considered by the government as a way to achieve equity in terms of rural electrification. Thus, it was well targeted to the poorest households in the country since they received most of the project funding.

Over a seven-year period (1992-1999), total rural electrification investments nationwide totaled US$ 211 million, of which 133 million (63%) was provided by the FNDR. Of the maximum funding level of $43 million, reached in 1998, FNDR subsidies accounted for more than $ 26 million or 60% of the investments for that year.

Over the same seven-year period, the maximum number of annual connections was also achieved in 1998, and the 75% goal in 1999. About 70% of all connections made under the PER through 1999 were achieved in the remotest areas of the country. For the program, costs per consumer increased over time as coverage expanded, population densities decreased, and the so-called “marginal new connection” required more effort to reach. During this period, nearly 120,000 households nationwide were provided with electricity.

Although the cost per connection increased, the proportion of subsidy funds declined over the life of the program. The per-connection subsidy amounts grew more slowly than the total cost per new connection over time. This means that the growth of non-state contributions to new electrification projects outpaced increases in total cost. Maturation of regional program staff, combined with a competitive environment engendered by the presence of multiple service providers, resulted in increased efficiency in the use of PER funds over time, thereby contributing to program success.

9. Lessons from the Chilean Experience

The Chilean experience in rural electrification is unique for a number of reasons. First, the country has a professionalized public sector with a tradition of consistency and relative impartiality. Moreover, Chile has relied upon private firms for providing many basic services and infrastructures far longer than have many other developing countries,

and public-private interactions are relatively well demarcated. In addition, the strength of Chile's economy during the 1990s—which included the period coinciding with the Asian economic crisis to which Chile was intimately linked—has provided a stable foundation for providing subsidies to fund poverty alleviation and infrastructure development, including electrification.

Chile's rural electrification model may have substantial relevance to programs in other countries. However, it can only be replicated only if there is competitive environment for subsidy funding. The model has particular relevance to programs designed to develop and apply consistent, mechanisms for prioritizing projects base on appropriate methods. The decentralized nature of infrastructure decision-making, another key aspect of Chile's program, is also relevant in countries that are anxious to move some administrative oversight to local governments.

- *Sustained Political and Financial Support*. Rural infrastructure programs require long time frames in which to mature, and their benefits cannot be realized within a single presidential term. The success of Chile's PER hinged upon a high level of multi-year financial and political commitment through various national agencies, as well as strong regional government buy-in.
- *Basis for Competition*. Competition depends on the presence of a well-organized, well-trained, and experienced set of actors that can provide services to electrification programs. The group of private and cooperative utilities in Chile had this critical experience.
- *Focus on Regions Without Extensive Coverage*. The PER's priorities were established and maintained to focus on regions with the highest number of households without electricity. Thus, most funds were allocated to the southern regions.
- *Objective Methods*. While the PER had clear political motivations, its project portfolios were assembled and approved based on economic and financial criteria rather than political processes. Objective methods were used to determine levels and application of program subsidies. The fact that subsidy percentages decreased over time illustrates that the subsidies were applied in a clear way.
- *Effective Management and Coordination*. PER managers modified program characteristics over time to compensate for changing conditions, which increased positive program results. Continued involvement of a well-trained, motivated program coordination group was of paramount importance to program success. Coordinated by the CNE, the group consisted of professionals from several agencies.
- *Clearly-defined Role of Central Stakeholder*. The need ongoing involvement of a central stakeholder may not always be well recognized. Countries considering adapting Chile's model to their own situations should carefully examine CNE's critical role within the PER. Without the central agency's continuous support, PER funding may well have terminated from one administration to the next.
- *Need To Establish Construction Standards Before Implementation*. In Chile, the distribution utilities have lacked incentive to review construction standards to optimize cost because PER subsidy contributions cover most construction

costs. Since the utilities usually hire construction contractors affiliated with the utility holding company, the more the system costs, the greater the margin yielded by the project. Construction standards should be developed by independent parties and reviewed by participating utilities to ensure that neither group compromises use of program funds and that, after construction, operating costs are no higher than necessary.

- *Combining Capital Cost Subsidy Approach and Project Financial Viability*. Limiting the subsidy to a maximum of a project's initial capital costs has encouraged utilities to construct new lines. But once a line is built, the requirement that a project be financially viable encourages the utility maintain service levels high. Thus, the Chile subsidy approach encourages the distribution utilities to both expand and maintain service long after the payment of the subsidy.
- *Decline in the Role of the Cooperatives*. Chile's RECs enjoyed nearly six decades of providing rural communities ancillary services. They developed productive-use support programs for agricultural activities supported by credit and equipment programs offered through central and branch offices. They provided health clinics, educational support, seed and fertilizer, and water and irrigation services. Ironically, these very advantages, which later distinguished them from their IOU competitors, were negated in 1997, when it was ordered that all non-energy services be unbundled and separated from cooperative utility operations. Although, on the surface, it made sense to separate dissimilar lines of business, the effect has been that many rural communities now have less access to essential services. Some RECs have responded by becoming more like their IOU competitors, abandoning many of the social services developed by their membership for general membership benefit. Others have moved away from electricity distribution as a core activity.
- *Lack of Promotion of Productive Uses*. Lack of emphasis on and progress in promoting productive uses of electricity have limited the PER's economic impact. If promoting productive uses is a program priority, then the rural electrification program must mandate it, and funding must be provided to finance productive use loans. Without such a specific program focus, distribution utilities will not make it a priority.
- *Limits of the Poverty Alleviation Model*. Chile's national census, taken every 10 years, allocates development points based on a family's access to an electricity connection, poverty reduction, by definition, is viewed as following mechanistically from electrification. On the one hand, setting the bar intentionally low has made PER measurement of achievement simple; on the other hand, the true economic value of the program cannot be understood.