

Viewpoint

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Promoting Private Investment in Rural Electrification—The Case of Chile

*Alejandro
Jadresic*

Reform of the energy sector and reform of subsidies ideally go hand in hand. Structural, ownership, and regulatory reforms aimed at making services more efficient should lead to a rethinking of both the delivery mechanism and the level of subsidy. Chile, one of the earliest and most thorough energy reformers, has also been one of the more innovative in restructuring its subsidy schemes. It has seen electrification as a key measure in alleviating poverty in rural areas—in 1992 about 47 percent of its rural population had no access to electricity. Its rural electrification program includes subsidies designed to be consistent with the broad principles of energy reform—decentralization of decisions to the regional and community level, competition (between technologies as well as suppliers), and a requirement that all partners in the process—users and private companies as well as the state—contribute to the financing of expansion projects. The short-term result: an increase in rural electrification of about 50 percent in the first five years of the program.

In the 1980s Chile liberalized its markets, privatized state-owned electricity companies, and allowed the private sector the key role in investment. Before selling the electricity companies, the state split them into generation and transmission companies and distribution utilities. The distribution utilities were divided according to the areas in which they operated, but no exclusive distribution rights were granted. The National Energy Commission (Comisión Nacional de Energía, CNE) was created as the main policymaking and regulatory body. A new electricity law established free entry and competition in generation, a nonexclusive concession system for distribution, and a pricing scheme based on marginal costs, with generation charges reviewed every six months and distribution charges every four years.

Rural electrification in Chile had traditionally been the domain of the state-owned power companies, which followed centrally developed plans and relied on subsidies from the central government

or cross-subsidies from tariffs set above cost in urban areas. Lack of funding and pressure from other priorities made electrification slow.

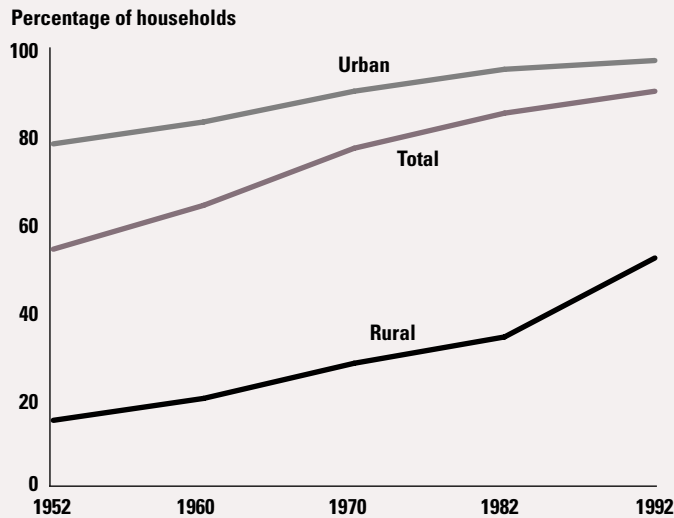
By the early 1990s more than 1 million people—almost half the rural population—still had no access to any source of electricity (figure 1). By contrast, 97 percent of urban households had electricity supply. The lack of access was concentrated in a few regions where most of the rural population lives. It affected mainly lower-income families, since the wealthier could usually afford to install generators or pay for extension of the distribution grid.

To increase rural access to electricity, Chile launched a rural electrification program in 1994. The design of the program is compatible with the overall electricity sector reforms—that is, based on competition, private investment and decentralized decisionmaking. The goal was, with the help of a subsidy, to turn rural electrification into





FIGURE 1 ELECTRICITY COVERAGE IN CHILE, 1952–92



Source: Chilean National Statistics Institute, census data.

an attractive business opportunity. The state, private investors and users would all contribute to funding.

The state's contribution—the subsidies and the cost of managing the program—is delivered through a special fund set up to competitively allocate a one-time direct subsidy to private electricity distribution companies to cover part of their investment costs in rural electrification projects. Bids are conducted annually. To apply for a subsidy, companies present their projects to the regional governments, which allocate the funds to those scoring best on several objective criteria: cost-benefit analysis, amount of investment covered by the companies, and social impact. The central government allocates the subsidy funds to the regions on the basis of two criteria: how much progress a region made in rural electrification in the previous year and how many households still lack electricity. Regional governments also allocate their own resources to the program. The state does not end up owning or operating any facility.

If technically and economically feasible, the first choice is to provide service at the standards offered by the distribution grid (220 volts effective monophasic alternate voltage and 50 hertz frequency, with twenty-four-hour availability).

But where the costs of this solution are too high, alternative technologies are considered. These alternatives, mainly for self-generation in isolated communities, include:

- Photovoltaic solutions for isolated rural dwellings.
- Hybrid systems that reduce fossil fuel dependence and operating costs.
- Small hydroelectric power stations, independent or combined with other energy sources.
- Experimental solutions based on wind power and biomass systems, which would require a resource assessment program before being applied.

To ensure sustainability, all costs over the life of the projects are considered in the appraisal, as well as organizational schemes for operating and maintaining the projects.

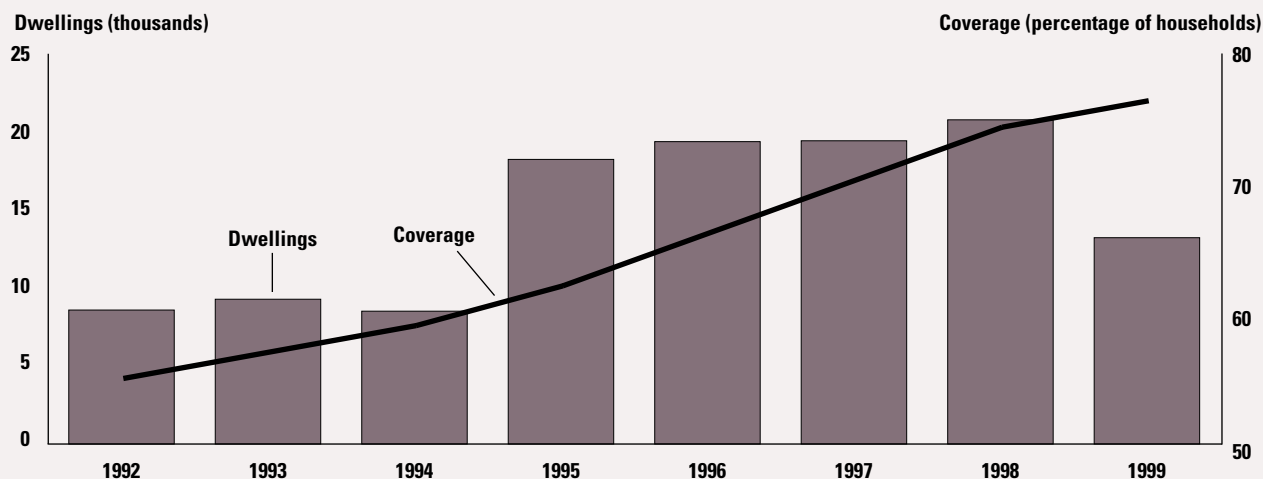
The program in action

The central government's tasks of providing funds and technical assistance and coordinating the program are handled mainly by the CNE. The CNE prepared a planning and management model for the technical units of the regional governments that would lead the process. It also created methodological tools to ensure efficient allocation of the state subsidies, based on national and international experience. And it prepared preinvestment studies to generate initial project portfolios for each region.

The target was to reach 75 percent rural coverage by 2000, and 100 percent after 10 years (the program is expected to run until 2004). It was estimated that the state would have to invest about US\$150 million, which would allow electrification of roughly 110,000 rural dwellings.

Communities in areas lacking electricity supply generally propose the rural electrification projects, supported by local distribution companies interested in providing the service. A community presents a project to its municipality, which then asks the distribution company to prepare a technical proposal, at no cost to the municipality, or

FIGURE 2 RURAL DWELLINGS OBTAINING ELECTRICITY AND RURAL ELECTRICITY COVERAGE IN CHILE, 1992–99



Note: Data for 1999 are estimates.
Source: Chile, National Energy Commission 1999.

contracts for this service with an independent consulting company. Once the proposal is prepared, the municipality lists the project in a publicly accessible register.

Using the prescribed criteria and tools, the regional planning agency evaluates the projects, analyzing their economic and financial costs and benefits and calculating the contribution of the company and the subsidy required. Only projects with a positive social return but a negative private return are considered for subsidies. The program allows a 10 percent real rate of return on investment, similar to that used for setting tariffs for the projects, over a thirty-year horizon.

After being analyzed, the projects are submitted to the head of the regional government in a portfolio of all those meeting the minimum requirements. The head of the regional government then presents a proposal to the regional council, which has to allocate the state funds among the projects, taking into account the number of beneficiaries, the unit cost, and the financing needs. The regional government then allocates the funds to the companies that presented the projects selected.

The responsibility for financing the projects is split up as follows:

- Users have to cover the costs of the in-house wiring, the electric meter, and the coupling to

the grid. These expenditures, nearly 10 percent of the costs of each project, are initially financed by the distribution company and repaid by the users over time. Once the project is operating, the users have to pay the regulated tariffs.

- The distribution company is required to invest at least the amount calculated using a formula set by the government—to avoid cheating. The company also must operate the projects.
- The state has to provide a subsidy for the investment costs that is no more than the (negative) net present value of the project, which in any case has to be smaller than the total investment.

Grants from international organizations have also been used in the program, especially for experimental projects based on self-generation systems using alternative energy sources.

Once a project has been implemented, the distribution company takes care of operation, management, and maintenance, recovering its costs through the tariffs charged consumers, which are set by the CNE.

Results

The program has increased the coverage of electricity systems in rural areas from 53 percent in 1992 to 76 percent at the end of 1999, exceeding the 75 percent target set for 2000. And it has



shown that it is possible to create market incentives that lead to efficient private solutions to rural electrification—an important lesson at a time when so many developing countries are reforming their power markets and privatizing their state-owned electric utilities.

An innovative aspect of the program has been the use of competition. It has successfully introduced competition at several levels: among communities, for financing for their projects; among distribution companies, for implementation of their projects; and among regions, for the funds provided by the central government.

The state has contributed the most funding to the program, investing US\$112 million in rural electrification in 1995–99, something less than what was estimated at the beginning of the program. For their part, the companies have helped define the projects, invested resources, and undertaken the commercial risk, and continue to own and manage the installations. Private investment in the program so far has totaled US\$60 million. Companies have participated in the program as a strategic move to protect their existing distribution area and discourage entry by competitors. From the companies' perspective rural electrification is a riskier business than traditional distribution. Customer payments are generally low while operating and maintenance costs are high compared with those in urban areas. But companies expect consumption to increase as users realize the potential for income generating activities such as fishing and forestry.

As hoped, users have participated in identifying and defining the projects—helping to establish the needs and priorities in each region—and in financing the investments. Regional governments have promoted the program among communities, provided basic assistance in preparing the projects, decided which would be implemented, and allocated resources accordingly. They have also coordinated and monitored the implementation of the projects. Essential in involving regional authorities is the fact that success in the program has become a key political achievement.

Most of the projects have involved extension of the grid, a solution that usually means a lower cost per connected dwelling and a higher quality of service. But several projects have relied on alternative technologies, primarily one-house photovoltaic systems. These systems have been installed in isolated areas in the northern part of the country (for nearly 1,000 dwellings), which has some of the strongest solar radiation in the world. The nonconventional technologies generally provide electricity at a higher cost and poorer quality (lower voltage, fewer hours of service). But they have been an attractive alternative where extending the grid is too costly because of the distance from the existing grid or the high dispersion of dwellings. Both these causes have increased the marginal cost of rural electrification in Chile. In 1995 the average state subsidy per dwelling amounted to US\$1,080; in 1999 it reached US\$1,510. This outcome is nevertheless consistent with the program's goal of maximizing rural electricity coverage within budget constraints, which mandates first implementing the projects with the highest impact per unit of investment. At the same time, however, it allows a growing role for nonconventional technologies in rural electrification projects, as improvements in these technologies reduce their costs and make them increasingly competitive with conventional solutions.

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Alejandro Jadresic (jadresic@ctcreuna.cl), former minister of energy of Chile (1994–98)

This Note is based on a chapter in Energy Sector Management Assistance Programme (ESMAP), Energy and Development Report 2000: Energy Services for the World's Poor (Washington, D.C.: World Bank, 2000).



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