

P U B L I C P O L I C Y F O R T H E

Private sector

The World Bank Group

September 1996

Note No. 92

Regulatory Lessons from Argentina's Power Concessions

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Argentina's main purpose in reforming its electricity sector was to achieve efficient pricing and production levels in the short term and an investment level sufficient to meet demand in the longer term. That required a major restructuring of the sector. It started in 1989 with a revamping of the legal framework, followed by the first implementation in 1992, and is still under way. While the results have been impressive by any standard (table 1), as in any complex reform, there are some loose ends, with the incentives for efficient long-term investment probably the most important one. This Note reviews the regulation of the price chain—through generation, transmission, and distribution—and looks at the implications for long-term investment.

Sector organization

The strategy adopted was to vertically separate the industry into generation, transmission, and distribution activities. Generation, considered a competitive activity, was broken up into twenty-five business units that were sold separately to private owners. The core of the reform in generation was the creation of a spot market open to any generator. The spot market matches supply and demand with an hourly price and allows distributors and large users to buy from any provider they choose.

Unlike generation, transmission is considered a natural monopoly. Costs are minimized when only one firm delivers the service in a given area. But even though competition in operation would be inefficient, the government introduced competition for the market by auctioning contractual rights to deliver the services. Built into these (concession) contracts is another periodic competitive threat—to replace the concessionaire with a challenger. This threat obliges the incumbent to be efficient once the contract has been awarded and helps to keep transmission costs to a minimum. The main transmission company, Transener, and four of the five regional transmission companies have been privatized.

There are twenty-two main distribution companies—most under provincial government jurisdiction. Like transmission, distribution is considered a natural monopoly in a given area—although distributors buy electricity in a competitive spot market and face competition from large users, which are allowed to bypass distributors and purchase directly on the spot market. The federal government has awarded exclusive concession contracts for the three large-

TABLE 1 POSTPRIVATIZATION PERFORMANCE—SELECTED INDICATORS

Year	Generation			Transmission forced outages (hours)
	Spot price (\$/MWh)	Thermal availability (percent)	Distribution losses (percent)	
1992	41.85	48.2	21	1,000
1993	32.12	59.8	20	900
1994	24.99	61.3	18	650
1995	22.30	69.9	12	300

Note: The generation data in 1992 are unweighted averages for October–December only (privatization occurred over the period between mid-1992 and mid-1993). Distribution data are for Edesur (privatized in September 1992). Transmission data are for Transener (privatized in July 1993). MWh is megawatt-hour.

Source: CAMMESA, ENRE, and company annual reports.





est distributors, which serve the Buenos Aires area and together buy almost 60 percent of Argentina's electricity consumption. Many of the provincial companies are still to be sold.

Tariffs and investment

All the concession contracts for transmission and distribution have a similar design. The concessionaires have the right to operate the assets and collect the revenues. In return, they must meet specified service, operational, and maintenance quality standards and comply with certain limitations (table 2). The contracts also are the main instrument for regulating transmission and distribution activities. The most important part of this regulation is tariff design, which has a crucial link with investment incentives. In this case, tariffs are based on economic costs, with a price cap formula and a system of sanctions applied to protect users against declining quality of service.

Investments in generation

Generation investments are decided independently by firms. So the type and size of new equipment depend on private profit forecasts. How does the present regulatory environment ensure that generators make the right decisions in an open, competitive market separated from the downstream firm? In a competitive market, investment decisions are motivated by price signals, which provide sufficient information to managers about users' willingness to pay and to users about scarcity. For a socially optimal outcome, this investment decision must be motivated by a positive difference between short-run and long-run marginal costs. So, for the private decision to coincide with the socially optimal decision, prices must meet two conditions: (1) they must exactly reflect short-run marginal costs, and (2) they must accurately signal to the firm the long-run marginal cost.

It is not clear that prices in Argentina's spot market fulfill these two conditions (see the generation tariff principles in table 2). First, the marginal cost pricing essentially reflects the cost of fuel—not, as it should, the entire marginal

operating cost. Second, although Argentina's tariff includes a capacity payment to generators to provide a signal for long-run investment decisions, the allocation rules on who gets these payments may be biased toward base load generation with too few peaking plants. There may also be a bias toward hydro plants, as generators have strong incentives to underinvest in units requiring huge sunk costs. This bias has also been observed in the United Kingdom.

Under the institutional arrangements in the Argentine electricity sector, this bias could be corrected by coordination between generators and distributors. In other countries, an alternative would be internalization through the transmission operators, since they are the essential link in the system. This solution would imply an explicit recognition of the natural regulatory features of the transmission company and would be best implemented under public ownership.

Investments in transmission

For now, the high-voltage network concessionaire, Transener, is not responsible for decisions to build and finance new lines. This avoids having the monopolist in charge of the network, which would have given it exorbitant power over upstream and downstream activities. The operator earns a fixed remuneration (for connection, transmission capacity, and energy transported) to ensure that there is no distortion in the spot prices of electricity or in the prices fixed by contracts (table 2). But with this cost-plus pricing, the operator has few direct incentives to invest; the indirect incentives are the penalties it must pay if it fails to meet the service quality standards set by the concession contract.

Who then pays for investment in transmission? All users of the grid (generator, distributors, and large users) pay connection and variable energy charges. The energy charges are paid through node prices that reflect short-run marginal costs in the network (including losses and congestion). As congestion increases, node prices fall for generators and rise for distributors and large users, creating an incentive to build new capacity. Expansion decisions should be made—and paid

TABLE 2 ELECTRICITY REGULATION IN ARGENTINA

Regulation	Generation	Transmission	Distribution
Term	Not applicable.	Concessions are for 95 years. Term is divided into management periods of 10 years (except for a first term of 15 years). At the end of each period, the regulator rebids the concession.	
Obligations and limits	<ul style="list-style-type: none"> ▪ Open entry and exit. ▪ To join spot market, generators must agree to certain technical and commercial rules. ▪ No performance standards. ▪ No public sector control over investment. 	<ul style="list-style-type: none"> ▪ Operate and maintain existing system with no obligation to expand. ▪ Allow indiscriminate access to capacity to any agent in the spot market. ▪ Maintain specific quality standards: <ul style="list-style-type: none"> - In technical product (voltage variations). - In technical service (duration and frequency of interruptions). ▪ Do not buy or sell energy. 	<ul style="list-style-type: none"> ▪ Meet all demands for service in concession area. ▪ Allow third parties to use the system in exchange for a regulated tariff. ▪ Meet specific standards: <ul style="list-style-type: none"> - In technical product (voltage variations). - In technical service (duration and frequency of interruption). - In commercial service (customer complaints and the like).
Tariff principles	<ul style="list-style-type: none"> ▪ In the spot market, generators receive a uniform tariff at the point of delivery based on the economic costs of the system. The tariff is based on estimated hydroelectric production, the probability of system failure, and a ranking of generators by marginal cost. The hourly spot price for the wholesale market is determined by the fuel cost of the last unit in operation, after ranking the generators in decreasing order of efficiency. ▪ Capacity payments do not enter the spot price, but are charged separately at a rate of US\$10 per megawatt-hour—an administered price set by the secretariat of energy. 	<ul style="list-style-type: none"> ▪ Tariff design must permit firms to operate prudently and economically and to generate enough revenue to cover reasonable operational costs, taxes, amortization, and a rate of return set by formula (based on efficiency, operational performance, and returns to firms facing similar risks). ▪ Tariffs should be differentiated to reflect the costs of different services, form of delivery, location, and any other relevant factor specified by the regulator. ▪ Tariffs must guarantee the minimum reasonable price to users while ensuring reliability of supply. ▪ To ensure correct economic signals to users, prices are determined by the cost of energy transported, connection charge, and cost of transport capacity. ▪ The concessionaire then gets a stable tariff reflecting the expected average prices at connection nodes over the next 5 years. 	<ul style="list-style-type: none"> ▪ The price to users must separately identify the cost of electricity from the spot market. ▪ When large users (those with demand over 100 kilovolts) go directly to the wholesale market, their fee is uniform but must include the cost of transport.
Type of regulation	<ul style="list-style-type: none"> ▪ The single market price is determined by the costs of the last unit called on to generate electricity. ▪ The costs recognized for each unit are based on fuel cost and specific consumption. 	<ul style="list-style-type: none"> ▪ $RPI - X$, $X = 0$ for first 5 years. ▪ Semiannual indexation to U.S. price index: 67% PPI, 33% CPI. ▪ Tariffs set in U.S. dollars. 	<ul style="list-style-type: none"> ▪ $RPI - X + Y$, $X = 0$ for first 5 years. ▪ Maximum price with total pass-through of energy costs in spot market (Y) and indexation to U.S. price index (X) as in transmission. ▪ The RPI formula is applied to the specific tariff structure. ▪ Tariffs are set in U.S. dollars.



for—by the potential beneficiaries. But the current expansion rules fail in that they recognize beneficiaries only on the supply side—the generators. The generators have argued for some time that those on the demand side—distributors and large users—also should pay for expansion, since they would benefit. Until recently, all parties had an incentive to wait for someone else to pay. Since transmission is the mechanism that guarantees competition in generation and supply, the resulting underinvestment is a worry. In May 1996, a potential crisis was averted by a decision of the secretary of energy to allow a special fund (SALEX) to finance (rather than simply reimburse firms for) about US\$80 million of the US\$250 million needed for expansion. The generators will pay the rest. This is a short-term fix but no long-term solution. What is needed is a change in the definition of the beneficiaries of expansion.

This problem is not unique to Argentina—any country considering a vertically separated industry and market-oriented approaches to the delivery of electricity will have to address it. There is no clear, simple conceptual solution. To allow competition in generation, there must be third-party access to transmission lines. But that gives a transmission line the characteristic of a public good: several firms can use it without impeding its use by others, so no firm wants to pay its fair share. The incentive to free ride is what makes financing difficult.

Because a private user of the line will not internalize all the potential investment gains to get an efficient level of investment, property rights to the lines must be allocated by an entity with some responsibility for social concerns. This entity also needs power to prevent free-riding. A short-run solution for Argentina could be to give these responsibilities to ENRE, the federal regulator, making sure that the decisionmaking process is based on public hearings and that the secretary of energy is viewed as the arbitrator in case of conflict. To solve free riding problems in investment, this entity should have the power to exclude “bad” agents (free riders) from using new investments. To prevent abuses, there

should be an implicit qualified majority rule in the investment decisionmaking process.

Investments in distribution

Decisions to invest in distribution are in principle left to the concessionaire. Yet because the concessionaire has a contractual obligation to provide service to anyone requesting it at the set tariff, the government has some leverage in the decisionmaking through the design of tariffs and penalties. The government has designed these incentives well: the tariff and penalty system in the concession contracts has prompted the distribution companies to expand their networks to the point at which the marginal cost of expansion equals the marginal cost of penalties. (The marginal cost of penalties includes the revenue generated by additional users of the system.) Thus, overall, the model warrants consideration by provincial governments in privatizing their distribution companies.

Conclusion

While Argentina's power sector reforms have been impressive, some fine-tuning is needed to address investment distortions. In generation, concession contracts need to include a more comprehensive definition of short-run costs, and the capacity charge should be revised to more accurately signal long-run marginal cost pricing. In transmission, the main problem is that the definition of beneficiaries responsible for financing new lines excludes those on the demand side and is likely to result in suboptimal investment decisions.

For more on the topic, see C.M. Bastos and M.A. Abdala, “Reform of the Electric Power Sector in Argentina,” ENRE, Buenos Aires, 1993; A. Estache, F. Helou, and M. Rodríguez-Padina, “A Portable Version of Electricity Regulation in Argentina,” World Bank, Latin America and the Caribbean, Country Department I, Washington, D.C., 1995; and World Bank, “Argentina, Reforming Provincial Utilities: Issues, Challenges, and Best Practice,” Report No. 15063-AR, Washington, D.C., 1996.

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