Market Restructuring in South America

Latin America is a region in political and economical transition, with a growing tendency toward open economies and democratic governments. The debt crisis is coming to an end, irrespective of dramatic but transient slowdowns like that of Mexico. Significant economic reforms are giving shape to market economies with increasing economic growth. Geopolitical reasons are making the United States and European countries look with increasing interest to investments in the region, some of these being transferred from the troubled economies of southeastern Asia.

A further development of interest in the region is the contribution of new commercial international agreements to economic development, among them the new Mercosur pact, which created an integrated market of 200 million people over a area of 12 million square kilometers, incorporating Argentina, Brazil, Paraguay, Uruguay, Bolivia, and Chile.

The electric power industry in Latin America has faced a profound transformation, with no parallel worldwide. New electric sector regulations were set in Chile in 1982, Argentina in 1992, Peru in 1993, Bolivia and Colombia in 1994, the Central American countries of Panama, El Salvador, Guatemala, Nicaragua, Costa Rica, and Honduras in 1997. Brazil is also joining the group, and Venezuela and Ecuador have initiated actions.

The diversity in the size of countries and power demand is striking, but all are following similar paths for reform (Brazil on one end is a country with a population of 160 million and an installed capacity of 58,000 MW, while Honduras has 4.4 million people and 396 MW). The level of electricity consumption is still low, if compared to the industrialized world.

The electric power industry, unlike the telecommunications industry, has had no great technical innovation or technological breakthrough to justify the change of the industry's organization. The reasons for deregulation in Latin America varied from country to country, but most have been essentially economic or political.

Reforms have had radical results in all countries. In Chile, two power suppliers have given place to seven generating companies competing in the main grid. In neighboring Argentina, still more strikingly, over 30 private generator rivals have replaced two state-owned companies. In Buenos Aires and Lima, two distribution companies compete not only against each other but also against an ideal model.

The countries that have restructured and privatized their electric power sectors have attracted investments from numerous U.S., Canadian, French, Portuguese, and Spanish companies, with limited demand growth in their own countries. Chilean companies have grown into electricity multinationals present in generation, transmission, and distribution investments in Argentina, Bolivia, Peru, Brazil, Colombia, and waiting for better conditions.

This article summarizes a Plenary Session presentation given by Hugh Rudnick at the Harvard Electricity Policy Group meeting, which was held 29-30 January 1998 in San Diego, California. A complete paper on this topic is available by contacting H. Rudnick, Pontificia Universidad Católica de Chile, Casilla 506, Correo 22, Santiago, Chile, +56-2-6864281, FAX +56-2-432563, E-mail: h.rudnick@ieee.org, Web http://www.ing.puc.cl/~power.

The Betania 510-MW hydro power station, which belonged to the Colombian government, was privatized and bought by a group of investors led by Endesa SA, the Chilean power company. Endesa has more installed capacity outside Chile, with investments in Argentina, Brazil, Colombia, and Peru.
All the countries, except Peru, have allocated the payment of tolls to those that make a natural use of the lines, where natural use is measured based on incremental impact at optimal dispatch. The payments have no relation with commercial use and contracts among agents. The argument is that the natural uses determine the pressure over the transmission network imposed by generators and consumers, by the simple fact that they are connected to the grid, irrespective of their commercial supply agreements. The argument behind this tariff scheme is that those agents that cause transmission expansion have to take into account those costs on their investment decisions, either as generators or consumers. Argentina and Chile consider that generators, needing to reach the market, are fully responsible for transmission expansion and have to cover tolls. Bolivia distributes responsibility among generators and consumers.

Another central difference arises. While Argentina and Chile evaluate transmission natural use considering incremental impact at peaking conditions, Bolivia averages impact at different load levels. The first approach assigns responsibility to agents that use maximum transmission capacity (assuming each line is used at its height at system peaking time). The second approach attempts to measure economic use in a full cycle of system utilization, corresponding to an energy flow approach rather than a power flow one. It assumes that transmission line design and investment are conditioned by the flow of energy.

These incremental approaches have in practice proved to be very troublesome. Disputes have arisen in Bolivia and Chile among agents on use determination, dispatch models utilized
for that purpose, and marginal bus location. In fact, the natural use is conditioned by the location of the marginal bus in the system economic dispatch. If the location varies over time, so varies the allocation of transmission tolls among generators and consumers, and among each of those two groups. Generators have complained in the Bolivian system that variability of the toll does not provide a stable coherent economic signal for system expansion. In Chile, generators disagree on the dispatch model to use and its handling of transmission models. Neither scheme has a clear definition of how network restrictions and the economic decoupling of parts of the system are to be handled in relation to transmission pricing.

Performance Based Approaches for Distribution Pricing

A fundamental reform in the region has been the introduction of pseudo-market principles in the electrical distribution activity for end customers, a stage of the electrical chain where competition is not considered feasible. As this activity was to be developed through geographic monopolies, it was considered necessary to introduce economic efficiency incentives to the provision of this end service. The new approaches are different from the cost-based approaches in the United States, used in most Latin American countries before the reform, in which distributors are paid in function of their accounting costs. For example, in the new Chilean and Peruvian models, the distribution tariffs try to make the private monopoly compete with a reference efficient model firm, via a yardstick competition or benchmark regulation approach. It basically corresponds to competition by comparison with a reference firm, in which a specific profitability for each distributor is not assured nor limited, depending on the results of its relative efficiency compared with the reference model upon which base the tariffs are calculated.

Therefore, an additional distribution component is added to the regulated generation and transmission prices. This value-added component (VAD) recovers costs of operation, including allowed losses, and a return on investment of efficient distribution companies. It is based on the new replacement cost of assets employed in distribution with different efficiency standards applied to operation and system expansion. The tariff is not based on actual costs incurred by any given distribution company, but on investment, operation, maintenance, and general administrative standards and overall efficiency of operations of a model company, which is used as a benchmark.

VAD values are determined every 4 years. Tariff studies are performed by both the regulator and by the distribution companies. Each party hires specialized consultants to perform a parallel tariff study. The tariffs are calculated as a weighted average of the results of the regulator-commissioned study and the companies' study, with the results of the regulator's study bearing twice the weight of that of the companies.

The VAD studies provided increasingly diverging results, as obtained by the regulator consultants and those of the distribution firms. This became critical in 1992 and drove the parties to intensive negotiations; some companies appealed before the justice courts, but those appeals were not accepted. This caused public turmoil and mutual recriminations through the national press and a severe impact in the stock exchange. The conflict had a scope that went beyond the tariff fixation due to the important presence of pension funds as owners of distribution firm's stock values, which started to fall. With this information, in the 1996 tariff process, all the involved parties made an important effort to revert this diverging historical trend. It was agreed to reduce room for divergence and to center the efforts in deep technical and economic analysis on the construction of the model reference firms. The differences in the studies in terms of the trend seen in former processes were eminently decreased. In spite of this initial positive exercise of convergence between the parties, conflict still developed. Ultimately, the process ended at the legal courts. After a lengthy process that ended in the supreme court, tariffs were set recognizing arguments filed by both the regulator and the regulated. Nevertheless, the court decided mainly on procedural matters, leaving open the essential issues discussed.

The Chilean government is assessing changes to the regulation. Different avenues of future conflict resolution have been stated. There is a need to continue the improvement of the VAD process methodology. In addition, the idea of using an arbitrator has been considered, as it has been done in other cases in the electricity law.

No plans are considered to introduce retail competition. The efforts are concentrated on extending open access to distribution systems to increase competition on supply to consumers over 2 MW. Retail consumers would benefit at the end, as regulated prices calculated by the regulator must follow average competitive prices.

Other countries are exploring improvements to the Chilean scheme. Peru decided that only one study would be developed by the distribution companies and supervised by the regulator. The conflict equally arose on the resultant values. Bolivia chose a price-cap RPI-x approach, but the evaluation process is still in progress to draw any conclusions on results.
Integration of the Energy Sectors

The structural changes that are taking place in Latin-American economies coupled to the privatization process have also accelerated the globalization of the energy industry. Regional energy integration initiatives are developing seeking to reduce energy costs in front of stand-alone national systems. Electricity and gas are the most dynamic areas of the energy integration process, and they develop hand to hand. While in Brazil and Paraguay all power generation is presently produced by hydroelectric plants, Chile, Colombia, and Peru incorporate some coal thermal generation, with hydroelectricity still covering most of demand. Natural gas is abundant in Argentina, Peru, and Bolivia and appears as an attractive alternative to respond to large demand growth in neighboring countries, particularly given natural gas ease of use, low cost, and significant environmental advantages. Natural gas network international interconnections are developing, determined largely by the use of natural gas to fuel combined cycle power plants. Coal will be phased out dramatically given the developments.

Among the political issues that arise in an integration process, it is not easy to deal with a history of border conflicts between countries, which has even caused wars. The old concept of energy as a national-security resource is present in many nations, mainly among the military hierarchy, with a deep fear of energy dependence. These fears are being overcome through the signing of bilateral and multilateral agreements, supported by a return of democracy and political stability to the region. Globalization of the markets in what some name the “diplomacy of economics” is also supporting a change of the political atmosphere. International energy consortiums with complementary partners that support each other across political state boundaries are developing everywhere and furthering the cause of energy integration.

Among the regulatory issues that come up, concern arises on how differently each country has structured its energy markets (mainly gas and electricity), allowing or not vertical integration. Although most countries have chosen similar paths for restructuring the energy industry, introducing competition where feasible, questions remain on the treatment of the monopolistic activities. Questions arise on the regulation of international transportation service (gas or electricity), with issues emerging on exclusive concessions, open access obligations, public service duties, regulation of prices, and price differentiation, among other issues.

Conclusions

State-owned electricity monopolies are still in place in Brazil, both at the level of the federal government and of the states. However, privatization steps have been taken in the area of power distribution and generation, with specific contracts between the buyers and the government. Behind the privatization process is the need for investment to support a growth of 1,350 MW a year of new generating capacity over the next 10 years, over 2 billion dollars a year. In parallel, the federal government is studying a global restructuring plan to demonomize the industry and introduce incentives for competition. Changes include the creation of a new regulatory agency. The market design proposed by consultants to the government considers an independent system operator, responsible for operation and dispatch, using hydroelectric data as well as thermal fuel costs, and determining spot prices based on resultant marginal costs evaluated with computer dispatch models. Bid schemes were considered incompatible with the predominantly hydro characteristic of the system.

Government-owned monopolies still run the electricity sectors in Mexico, Paraguay, Uruguay, and most of Ecuador and Venezuela. Incipient restructuring efforts have taken place, but the final structures are being discussed.

In the rest of Latin America, electric power industry reforms have been dramatic, with all agents involved compelled to increase their efficiency, either in supply or demand. The challenges have posed difficult questions to all concerned, particularly as competition increases beyond geographical and political boundaries. Private generation investment has taken place without government intervention, increasing supply in countries where electricity growth is a basic requirement for economic development.

Market design has been based on a new understanding of the technical and economic characteristics of the market. Without any previous models or experiences on which to rely, problems have been faced on achieving truly competitive markets.

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About the Author

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