Electricity Restructuring: Growing Problems

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For most of its history, the electricity industry has been regarded as a natural monopoly. Thus, it was believed that efficiency in electricity provision is greater when the industry is vertically integrated, with individual firms controlling generation, transmission and distribution functions in a particular geographic area.

Recent advances in electricity generation technologies, however, have weakened the reasons why the sector should be vertically structured and treated as a monopoly. Consequently, in many countries as well as U.S. states, the goal has been to change this industry to a horizontally structured competitive marketplace.

But designing a regulatory framework for the new system has proven difficult.

Among the problems that have emerged include generators' ability to manipulate market prices. A report by the U.S. Department of Energy says that firms can increase profits by employing a simple market power bidding strategy to cut output and increase net revenues from generation by driving up the market price of electricity. In California, as well as the United Kingdom, researchers have estimated wholesale electricity prices to be up to 75 percent above competitive levels at times.

In general, electricity reforms try to end the control of traditional utilities (IOU's) over generation, transmission and distributions functions. New laws allow almost any firm to generate and sell electricity. Access to the transmission grid is open to any generator for a fee. To assure a level playing field, the operator of the transmission system (SO) is independent; otherwise, the generator that operates the transmission system would be in a position to discriminate against rival generators

who request access the grid. In addition, there is an independent body that is in charge of determining the market price of electricity. In California, it is called the California Power Exchange (CalPX).

The system in California is similar to reforms elsewhere in the world. With information provided to it by generators, CalPX runs an auction every morning and sets prices. CalPX has a day-ahead market, an hour-ahead market and a real-time market. CalPX offers power for 24-hour blocks and determines the equilibrium of supply and demand and the market-clearing price.

The problem with this system is that by providing the PX with false information, generators can make profits beyond the level of efficiency.

"GAMING THE SYSTEM" ...AN INTERNATIONAL PROBLEM

The abuses observed in California are similar to those observed elsewhere. One way generators can take advantage of the system is by bidding zero to inject electricity into a point on a transmission line it knows will be congested. The next day, the generator offers a large amount of electricity, but then offers to not supply the electricity at a very high price, which yields a negative price.

That is, the generators can tell the SO that if it wants to buy back its energy, then it must pay a certain amount per MW-hour because there is a cost for the generator to change its generation plans. In California this problem has been addressed by divesting the industry.

A second way a generator can abuse the system is simply by declaring a generation capacity level, which is below its actual capacity. This reduces the expected electricity supply, and the authorities increase the market-clearing price.

Subsequently, the generator has a net gain because it is getting a higher price for the electricity it ultimately sells.

There is another feature that makes electricity regulation difficult. Researchers at the University of California, Berkeley, note that electricity has become the most volatile commodity, and cite several key physical characteristics of the supply and demand for electricity, which have important effects on the behavior of electricity spot prices:

- The electricity spot price shows strong mean-reversion. The reason for this is that when the price of electricity is high, its supply tends to increase, thus putting a downwards pressure on the price; when the spot price is low, the supply of electricity tends to decrease, thus providing an upwards lift to the price.

- The presence of price jumps and spikes, which result from limited amount of installed supply capacity coupled with low demand elasticity exacerbate the price volatility of electricity.

- Electricity prices also demonstrate stochastic volatility and regime-switching in some markets. Since the temperature is one of the dominating factors which influence the aggregate load level, the temperature implies that the volatility of spot prices can be a random factor.

The extreme volatility in spot prices suggests that the electricity regulatory framework and physical infrastructure in California, as well as other electricity systems, are not sufficiently adapted to a fully competitive electricity market, so that regulators as well as generators face substantial uncertainties.

In order to create efficient electricity markets, the system operator needs perfect information about generators' operating conditions. The challenge is to design a system that removes generators' ability to mislead the SO without increasing interference in the operations of generators and increasing the cost of regulation.

Experience with deregulated electricity markets is relatively brief and electricity markets are very complex. Thus, it is not surprising that the introduction of reforms has not been smooth. But if problems with generators are not solved, energy consumers, as well as government authorities, will question some aspects of electricity reform.

ABOUT THE AUTHOR

Roberto Torres is the manager of Frost &. Sullivan's Energy Group, specializing in Latin America Research. He follows the region's on-going energy sector restructuring process; government initiatives to

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Prior to joining Frost &, Sullivan, Mr. Torres held research positions at several economics and business research organizations, including: Centro de Investigacion y Docencia Economicas; Center for U.S.-Mexican Studies, and the American Chamber of Commerce in Mexico.

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