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Does Competitive Electricity Require Capacity Markets? The Texas Experience: A Summary*

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Findings

- The costs of instituting a capacity market in Texas will almost surely exceed any benefits it might bring.
- The economic theory behind capacity markets is deeply flawed, both in general and when applied to Texas.
- Shifting to a capacity market would be a source of inefficiency and a barrier to competition that would likely increase the cost of electricity for consumers.

This is the fourth in a series of papers examining the debate over the reliability of the Texas electricity market.

Executive Summary

The exception to the rule among U.S. power markets administered by Regional Transmission Operators is the Electricity Reliability Council of Texas (ERCOT). ERCOT's "energy-only" market relies on competitive market forces to meet the long-term electricity needs of the 23 million Texans in its service area. Shorter-term needs are also met through the competitive market, supplemented by markets for ancillary services.

Competition has worked remarkably well in ERCOT since its introduction about 15 years ago. Consumers can choose over a hundred different plans from dozens of providers. Billions of dollars invested in generation have provided Texas with a reliable supply of affordably priced electricity.

However, recent concerns about the adequacy of generation investment have led to the consideration of imposing a "capacity market" in ERCOT. Proposals would make ERCOT more like other U.S. power markets, which require that sellers of power to end-users must own or have contractual access to generation capacity sufficient to cover their loads. In other words, in a capacity market the government rather than the market determines when supplies of electricity are adequate to meet long-term reliability needs.

Our examination of ERCOT's history and operation brings a conclusion that the costs of instituting capacity markets in its territory will almost surely exceed any benefits they might bring. Those costs have proven substantial in other regions. In the Pennsylvania–New Jersey-Maryland Interconnection (PJM) capacity charges in 2010 added $140 per year to an average residential electric bill and $1,000 to that of a retail store. From the capacity market's 2007 inception through 2011, PJM retail customers paid over $50 billion in capacity charges—93 percent of which went to owners of existing generation and only 1.8 percent to new and reactivated units. Had they been spent directly on new capacity, the funds could have purchased 129 combined-cycle gas-fired generators, each with 400 megawatts (MW) of capacity. (American Public Power Association 2012, 1)

We find little potential value of a capacity market in Texas. One reason is that we find the economic theory behind capacity markets to be deeply flawed, both in general and when applied to ERCOT. Additionally, we find that investment in generation in ERCOT is likely to continue and, as it has in the past, provide sufficient reserves to maintain reliability. Shifting to a capacity market is unnecessary, and would in reality be a source of inefficiency and a barrier to competition that would likely increase the cost of electricity for consumers.

The Rationale for Intervention is Flawed

In the U.S. and around the world, electricity restructuring is converting regulated monopolies into market regimes. The characteristics of those markets, however, are critical determi-

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nants of their performance and remain the subjects of active policy debate. One important issue is whether electricity markets can—without government intervention—provide adequate generation to reliably power society's needs.

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Advocates for government intervention believe that electricity's special characteristics require capacity markets for reliability and efficiency; others see capacity markets as little more than mechanisms to transfer wealth to owners of otherwise uneconomic generation. Most U.S. regional transmission operators (RTOs) currently operate such markets or impose rules whose effects are similar. In practice, capacity charges are often substantial percentages of consumer bills, and their sizes have become political issues. In the Northeastern United States, the governments of New Jersey and Maryland have mandated ratepayer-subsidized generation investments, ostensibly in order to reduce capacity charges.

Recent perceived slowdowns in generation investment in Texas are said to threaten ERCOT with dangerously low reserve margins, a situation compounded by high load growth and an increasing presence of intermittent wind generation that requires substantial support from conventional generators.

The most important rationales for intervention assume "market failures" that leave the "private" returns to generation investment lower than the "social" returns such as system-wide reliability that markets do not properly price. We find this analysis overly narrow because it does not examine the ability of peaking plants to supply ancillary services such as reserve capacity. Its logic also depends critically on an assumption that demand-side response in power markets is insufficient to prevent blackouts when electricity demand exceeds supply. In reality, demand response has become an important and growing force in power markets.

Why Capacity Markets?

Capacity markets do not exist for goods other than electricity. There is, for example, no system of payments to pizza restaurants for merely having pizza ovens available. Milk drinkers do not pay surcharges to farmers to ensure that "cow capacity" is available. Someone who wants a hotel room for a certain night in the near future makes a reservation, but there is no payment for the hotel's capital costs. Any proposed justification of capacity markets for electricity should also explain why they are unnecessary or inefficient elsewhere.

Any economic rationale for capacity markets or resource adequacy programs must rest on a finding that absent such institutions markets will "fail" and yield economically inefficient outcomes. Further, there should be a showing that the choice of a capacity market or adequacy requirement is superior to economically feasible alternatives because it maximizes net economic benefits. Any chosen intervention must take account of electricity's physical difficulties that are compounded by economic inefficiencies in markets that have not been allowed to innovate and mature because of decades of heavy regulation.

We note that some possible justifications for intervention have lost some of their force. One of these is risk aversion. Joskow (2008), among others, has said that investors in an energy-only market may under-build peaking capacity because they must rely on rare and unpredictable price spikes for recovery of their capital. In most other markets, however, investment and the returns to investors will account for risks. As capacity runs short, the increasing severity and frequency of price spikes will ultimately induce investment. Given the greater risks, investors will have to be compensated with higher average returns. There are few obvious differences between the types of risk faced by generation builders and investors in industry-specific capital elsewhere. Further, numerous institutions facilitate the reallocation of risks among investors, most obviously portfolio diversification. A capacity requirement may smooth income streams but allocates investments to capacity that would otherwise go to more valuable sectors.

Implementing Capacity Markets

Markets generate prices whose movements convey information about shifts in consumers' valuations and producers' opportunity costs. Because prices impact the returns to alternative choices, they induce resource owners to shift toward more profitable activities and consumers to economize on goods whose relative prices have risen. Capacity prices, however, do not emerge from a market but are instead deduced from a model of a "demand curve" that planners have devised in order to yield predictable returns to investors in generation. The construct bears no relation to the demand curve of elementary economics, which summarizes the valuations of voluntary purchasers in a market. This artificiality means that capacity markets will only by accident be indicators of economic scarcity. In principle, the price of a unit of capacity should measure the value of improved reliability that will result from investment in it. Value of lost load, however, is difficult to even conceptualize (an outage allows some activities to be postponed while others are lost forever) and it differs among consumers and over time.* Whether to improve reliability depends on marginal costs and benefits of doing so, and whether to use a capacity market depends on the costs and benefits of the alternatives. As technologies, costs, and demand change, so must the calculations.

Whatever their basis in economic theory, prices in the capacity market impact the relative profitability of investment in different types of generation and load management. Those prices, however, can also provide perverse incentives; for example, maintaining obsolete generation in order to capture capacity market revenues rather than to retire and replace it with more efficient units. Further, market participants may have risk management tools other than capacity ownership at their disposal. Fuller development of these options can mean that capacity markets will not fade away after they have outlived their usefulness. Owners of otherwise uneconomic generators that remain operable will attempt to protect their income streams, and the politics of RTO governance may allow them to survive.

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be important for every type of generator at some points in its life. There appears to be general agreement that if generation investment in Texas is in fact inadequate, that problem is with a small set of peaking generators and it exists for no more than 100 to 200 hours per year. If these are the problem units, any capacity policy should be directed toward them rather than instituting a vastly more complex policy that affects all generators along with demand response. In our next section we show that there are strong reasons to doubt the common assertion that investment in peaking generators in ERCOT is intrinsically unprofitable.

A capacity market can also affect outcomes in less regulated markets by affecting the rewards to investments in them. Some advocates of capacity markets view reduced energy price volatility as a virtue. If, however, a capacity market reduces price fluctuations relative to an energy-only regime, investments by users to reduce peak consumption become less valuable. If there are reasons (e.g., environmental) for investments that reduce peak demand, the operators of a capacity market will again need to formulate administrative rules to restore desired levels of demand response, e.g., allowing it to be bid in as a capacity resource. Our problem is that prices in a capacity market are of necessity determined by those same administrative rules and may have little relation to actual scarcities in either the short run or the long.

Summary and Conclusions

The theoretical case for capacity markets is weak at best. Many of its arguments depend on oversimplified assumptions that are at variance with reality, particularly those that are necessary to produce the "missing money" phenomenon. Other possible market failures including the inefficiencies of nonprice rationing during shortages are becoming less relevant as markets develop, more users see prices

* For an introduction to the difficulties of estimating value of lost load, *see* London Economics (2011).

based on marginal cost, and demand management becomes more widespread. A capacity market is an institution in which people have no choice but to trade a contrived good that has little or no economic value. This fact implies that the prices that prevail for capacity and amounts to be invested in it will be administratively set and have only a tenuous connection with economic efficiency. The "demand curves" seen in northeastern capacity markets are unrelated to those that measure consumer valuations in ordinary markets. There are great difficulties in ascertaining the contributions of various types of capacity to reliability, and for determining the value of deliverability. Even the most vocal of advocates for these markets have stated that their institutions and quantitative specifications must be determined by experts without actual market interests who will put theoretical ideals in place, a process quite at variance with the realities of RTO governance.

An examination of ERCOT's current state does not provide coherent support for radical change in its markets. First, ERCOT is said to be falling behind on investments needed to maintain its reserve margin. In reality, the 2011-12 shortfalls are largely explicable as idiosyncratic, the results of political, regulatory, and weather events rather than economic ones. In most years of its existence a three- or five-year projection would show ERCOT falling dangerously short of reserves, but market forces have invariably succeeded in restoring their generation adequacy. The most recent reports also indicate that market forces continue to operate, and that ERCOT is taking advantage of other options such as de-mothballing generation and augmenting demand response. Second, allegations that investment is persistently unprofitable in ERCOT's energy-only markets rest on a regulator-determined formula (Peaker Net Margin) whose definition only allows tabulation of Balancing Market revenues and costs. Adding in potential revenues from the sale of ancillary services leads to a conclusion that peaking units are often economically viable investments. On the surface it appears odd that generation investment in ERCOT continues apace despite official calculations of its unprofitability. In reality, a more detailed picture of the choices available to generators shows that building them for ERCOT's actual markets is often profitable.

The problems that exist in ERCOT have multiple sources. The first consists of certain rules that used reserve prices to reduce prices during periods of scarcity. The Texas Commission has partially addressed this question. The second is that demand management has yet to grow the institutions and attain the scale that would make it truly symmetric with supply in setting prices. The importance of both these problems should not be minimized.

However, these problems do not stem from any inherent flaws in electricity markets that render them incapable of functioning properly. Instead, they are a result of intervention that has inhibited—or prohibited—innovation and kept the market from developing solutions to these highly complex issues. The answer, then, is not to abandon the market in favor of even more intervention, but to lessen intervention to allow the market to work more efficiently. Some will dismiss this approach. But as we have shown, a realistic comparison of the performance of the energy-only market with that of an actual (rather than theoretical) capacity market performance proves that the case for retaining ERCOT's energy-only regime is a strong one. ★

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