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**COMMENTS OF ROBERT L. BORLICK ON THE BRATTLE GROUP STUDY OF
ERCOT INVESTMENT INCENTIVES AND RESOURCE ADEQUACY**

On June 1, 2012, the Brattle Group released its final report of a study it conducted under contract to the Electric Reliability Council of Texas (ERCOT), which examined the investment incentives and their resource adequacy consequences in the ERCOT wholesale power market.¹ On June 13, 2012 the Public Utilities Commission of Texas (PUCT) established Project 40480 which requests interested parties to submit comments on the report. This statement responds to that request.

ABOUT THE AUTHOR

Robert Borlick is an energy consultant with more than 30 years experience related to the economics underlying competitive, wholesale electric power markets. He contributed to the design and implementation of the energy-only electricity markets in Australia and New Zealand as well as to restructured electricity markets in a number of other countries, including the US. In 2005 he co-authored a White Paper for the Midwest ISO describing an energy-only market designed for the Midwest.² In addition, for the past six years Mr. Borlick has extensively assisted the Midwest ISO with the development of their demand response programs and has actively participated in a number FERC dockets related to demand response. From 1999 to 2007 Mr. Borlick was a Senior Advisor with the Brattle Group.

SUMMARY STATEMENT

This is a very good report; there's a lot to like in it. Clearly the authors have learned a great deal in the past several years about the benefits that energy-only markets offer, as well as the critical

¹ *The Brattle Group*, ERCOT Investment Incentives and Resource Adequacy, June 1, 2012.
² Midwest ISO, AN ENERGY ONLY MARKET FOR RESOURCE ADEQUACY IN THE MIDWEST, November 23, 2005. Available at: http://www.hks.harvard.edu/hepg/Papers/MISO_Resource_Adequacy_112305.pdf.

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role of demand response in maintaining resource adequacy in such markets. That said, the study is overly pessimistic regarding the prospects of developing demand response within the ERCOT footprint and thus is subtly biased in favor of ERCOT adopting some form of capacity market.

In my professional opinion ERCOT currently operates the most advanced, most economically efficient, electricity market in the US. Nonetheless, ERCOT needs substantially more demand response than it currently has to avoid involuntary load curtailments, to most efficiently utilize its existing supply resources and to incent the entry of new generating capacity when that is economically justified.

The Commission needs to launch an aggressive program to develop demand response while recognizing that the requisite amount of demand response will take several years to fully develop. In light of this gestation period the Commission should also consider implementing an *interim* program for ERCOT to procure short lead-time, supply-side and demand-side capacity on an out-of-market basis in order to ensure resource adequacy in the near-term.

Finally, what the Commission should not do is adopt any variant of a permanent capacity market.

SPECIFIC COMMENTS ON THE REPORT

Let me begin by saying that I particularly like, and agree with, the following Brattle Group observations:

- "...little empirical work has been done ...to quantify the economics of the 1-in-10 criterion to confirm that it reasonably balances the tradeoffs between the economic value of reliability and the system capital costs imposed."³
- "...a pure energy-only market achieves the economically optimum reserve margin because customers choose the level of supply based on their willingness to pay for power during shortages."⁴
- "Demand response can thus reduce the amount of generation reserves needed to maintain a given level of reliability. Moreover, demand response can enable energy-only markets to

³ *Brattle*, p. 102.

⁴ *Id.*, p. 104.

support sufficient generation investment to reliably serve the residual load.”⁵

- “Realizing a continuum of high prices related to demand reductions at varying levels of scarcity would create a more robust and predictable distribution of peaking prices. This translates into a more stable revenue stream for generators than reliance on rate excursions too a high price cap.”⁶
- “When there is insufficient supply to meet load and maintain the full amount of operating reserves, prices should still reflect marginal system costs, but the marginal cost should also account for the possibility of shedding load.”⁷
- “We estimate a total achievable potential of 8-15% of peak load reductions, which implies that DR penetration could grow by another 4-11% of peak load.”⁸
- “The TDSPs will soon complete the deployment of the Advanced Metering Infrastructure (AMI) in all investor-owned utility territories achieving capabilities beyond all other states....AMI will enable REPs to offer time-varying and dynamic rate options to the mass market....”⁹
- “Recent pilots ... have consistently shown that customers will reduce peak demand when faced with a higher peak price or a rebate for load curtailment...Peak load reductions generally range from...10% to 30% for rates with stronger peak price signals.”¹⁰
- “...the Commission’s plan to raise the price cap will incent REPs and customers to develop more DR to hedge their exposure and reduce the cost to serve.”¹¹
- “As our ERCOT market simulation demonstrate, several thousand megawatts of load would have to be willing to respond and set prices at several thousand dollars per MW to provide the price and investment signals needed to achieve the 1-in-10 resource adequacy target.”¹²
- “Overall, we believe that ERCOT’s energy-only market may be only marginally riskier than energy-and-capacity markets....” for investors in generation than today’s forward capacity

⁵ *Id.*, p. 88.

⁶ *Id.*, p. 88.

⁷ *Id.*, p. 71.

⁸ *Id.*, p. 90.

⁹ *Id.*, p. 93.

¹⁰ *Id.*, p. 93.

¹¹ *Id.*, p. 94.

¹² *Id.*, p.105.

markets (like PJM's) because neither provide long-term cash flow assurance."¹³

- "Is the current 1-event-in-10-years (1-in-10) reliability standard yielding the appropriate and efficient resource adequacy target around which to design the ERCOT wholesale power market?"¹⁴

This is a long, complicated report with lots of moving parts. Even with my three decades of professional involvement in wholesale market design and another decade with demand response, I had to read the report twice to fully comprehend the methodology employed and the results obtained. In light of its complexity I would have expected that the Brattle Group consultants to provide the Commission with more guidance on which option to choose from the many that are proffered. Instead they chose to adopt an agnostic approach. My interpretation of the study results strongly suggests a clear course of action for the Commission to take, as described below.

CRITICAL ROLE OF DEMAND RESPONSE IN ENERGY ONLY MARKETS

The Brattle Group correctly identifies the need for substantial additional demand response to support ERCOT's energy only market and points out that a huge potential exists for its development. Yet deep in the report the consultants present the unsupported conclusion that the amount of demand response needed to maintain an acceptable level of resource adequacy is unachievable (at least in the near-term), stating:

Mass market penetration will be slow and possibly never very deep due to limited interest and lack of economies of scale [emphasis added].¹⁵

This is more challenging than it sounds because ERCOT demand response penetration is currently low and increasing DR penetration is likely to proceed slowly.¹⁶

These statements appear to be based on the tacit assumption that the Commission will do little to accelerate demand response development. I disagree with this pessimistic view. From that perspective it is a small step to conclude that some form of capacity market is needed.

¹³ *Id.*, p. 2.

¹⁴ *Id.*, p. 100.

¹⁵ *Id.*, p. 93.

¹⁶ *Id.*, p. 105.

The Brattle report repeatedly cites the publications of Ahmad Faruqui, the Brattle Group's consultant with the most experience with retail demand response programs but it appears that he did not participate in this study.¹⁷ The study's pessimistic assessment of demand response development within ERCOT is at odds with the empirical results presented in Dr. Faruqui's publications and with the presentation he recently made at the 2012 ADS Town Meeting.¹⁸

Texas is one of the nation's leaders in smart meter deployment. Both CenterPoint and Oncor have projected full deployment by the end of 2012 with AEP-Texas following close behind.¹⁹ Admittedly, it will require some time to fully implement dynamic rates and to convince retail consumers to fully exploit the benefits of selectively reducing their loads, but that hardly justifies dismissing the contribution that small customer demand response can, and most likely will, make to resource adequacy.

The Brattle Group's analysis does convincingly demonstrate is that ERCOT's energy only market will not achieve the industry's 1-in-10 reliability target without substantial amounts of additional demand response. As the report correctly states:

Thus, it is very difficult to achieve a 1-in-10 reliability target through scarcity pricing unless large amounts of demand response are able to avoid load shedding without eliminating scarcity prices.²⁰

I agree. However, the converse of this is also true, i.e., that with more demand response, particularly price responsive demand, rather than interruptible loads, the ERCOT energy only market is fully capable of achieving and maintaining an acceptable level of resource adequacy, including the 1-in-10 standard, with a \$3,000/MWh energy price cap. Figure 25 (reproduced below) in the report clearly supports this conclusion.

¹⁷ Dr. Faruqui is neither a coauthor, nor is mentioned in the acknowledgements section of the report.

¹⁸ Ahmad Faruqui, THE TRANSITION TO DYNAMIC PRICING, National Town Meeting, Demand Response and Smart Grid, June 28, 2012.

¹⁹ Edison Foundation, Institute for Electric Efficiency, UTILITY-SCALE SMART METER DEPLOYMENTS, PLANS, & PROPOSALS, May 2012. Available at: http://www.edisonfoundation.net/iee/Documents/JEE_SmartMeterRollouts_0512.pdf.

²⁰ *Brattle*, p. 66.

**Figure 25
Economic Equilibrium with Current Price Caps**

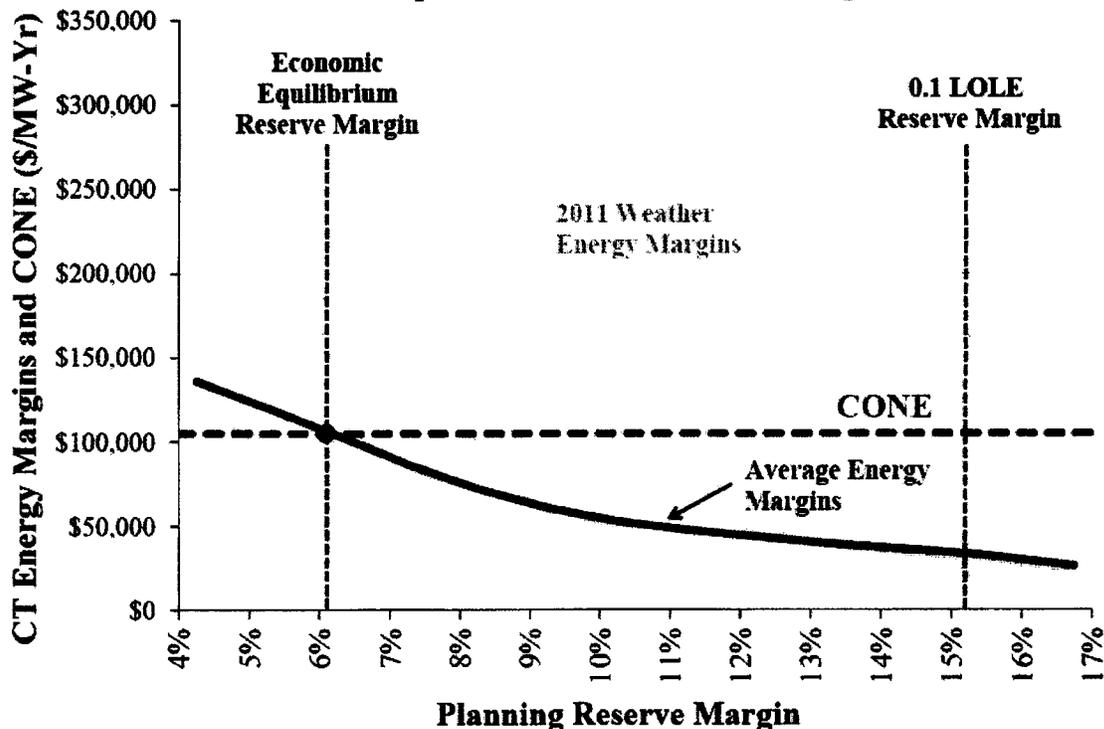


Figure 25 shows that a planning reserve margin of about 6.1 percent will produce energy prices sufficient to support economic entry of new generating plant in 2012 based on a \$3,000/MWh energy price cap.²¹ It also assumes the currently existing amount of ERCOT-controllable load response resources (1,765 MW) and the price responsive demand of large industrial customers (1,700).²² Now suppose an additional 6,000 MW of demand response (about equal to 9 percent of the forecasted 2012 weather normalizes system peak demand) were available within ERCOT.

²¹ This is based on the industry-accepted assumption that developers will build new generation if they can earn the Cost of New Entry (CONE) price through net energy rents in the first year of plant service. This assumption is neither firmly grounded in market-based finance theory nor empirically corroborated. However, for purposes of commenting on this report I provisionally accept it. For a thorough discussion of CONE see:

Wilson, James F., "Forward Capacity Market – CONEfusion," *The Electricity Journal*, November 2010, Vol.23, Issue 9, pp. 40.

²² *Id.*, pp.56-57 and 89.

That would effectively increase the planning reserve margin close to 15.25 percent, which is about what Figure 25 indicates is needed to achieve the 1-in-10 reliability target.

In 2003 I conducted a similar analysis that examined the relationship between the amount of price responsive demand in a generic energy-only market (but patterned after PJM) and the energy price cap needed to satisfy the 1-in-10 industry standard.²³ The results it produced suggested that a \$2,500 price would most likely be high enough to support the entry of new generating capacity if price response demand reached the level of about 10 percent of peak demand. Given the increased cost of combustion turbine capacity, that price would need to be revised upward today. Also, I modeled the demand response as a continuous function of market prices using the price elasticity estimated from the Georgia Power Company's Real Time Pricing Program, which has existed since the early 1990s. In contrast, the simple aforementioned adjustment to the Figure 25 data merely assumes that all of the demand response interrupts just when the energy market price reached the ceiling. Despite these differences the results of the two analyses are surprising consistent.

AVOIDING UNECONOMICALLY HIGH ENERGY PRICE CAPS

Procuring energy at prices higher than the value that customers place on that energy is doing them a disservice. Given a choice residential customers would prefer to have their service occasionally interrupted for an hour rather than pay more than about \$3,500/MWh for the foregone energy.²⁴ In fact, this is the primary reason the Midwest ISO chose to cap its energy prices at \$3,500. This suggests that when involuntary load curtailments are necessary the optimal load-shedding strategy would sequentially disconnect residential customers through rolling blackouts rather than before disconnect higher-valued commercial and industrial loads who generally will be willing to pay the high prices.

²³ Borlick, Robert L., Mandatory Reserve Margins – Good Idea or Not?, 26th IAEE International Conference, Prague, Czech Republic, June 3-7, 2003. Available at: http://www.brattle.com/_documents/uploadlibrary/presentation583.pdf

²⁴ Leora Lawton, Michael Sullivan, Kent Van Liere, and Aaron Katz, A Framework and Review of Customer Outage Costs: Integration and Analysis of Electric Utility Outage Cost Surveys, Lawrence Berkeley National Laboratory, LBNL-54365, November 2003, p. 41. Available at: <http://certs.lbl.gov/pdf/54365.pdf>.

CONSIDER ABANDONING THE 1-IN-10 INDUSTRY STANDARD

The Brattle Group is correct in suggesting that the Commission consider the 1-in-10 standard in favor of something more rational, such as the normalized Expected Unserved Energy (EUE) standard. I cannot agree more. Furthermore, a number of other electric power consultants (myself included) have been questioning this standard for many years. James F. Wilson published a series of articles on this issue in *Public Utilities Fortnightly*.²⁵ Although this issue is important the Commission should not be detracted the Commission from addressing the more pressing issue of stimulating demand response development.

FACILITATING DEMAND RESPONSE IN ERCOT

As I stated earlier, the Brattle consultants are correct in assuming that price responsive demand will not spontaneously develop in a timely manner. Accordingly the Commission should take the actions described below.

ENCOURAGE PARTICIPATION OF THIRD PARTY CURTAILMENT SERVICE PROVIDERS

The fastest way to increase the amount of price responsive demand in ERCOT is to facilitate the wholesale market entry of third-party Curtailment Service Providers (CSPs) who contract with retail customers to reduce their loads when the hourly wholesale market prices exceed the marginal energy price in the customers' retail contracts (or utility tariffs). The CSPs then pay the customers for their demand reductions and simultaneously resell them to ERCOT, which recovers the payments from buyers in the wholesale market. In effect, ERCOT treats this demand response as a "supply" resource equivalent to generator energy injections.

CSPs primarily target medium to large commercial and industrial customers, because these customers can provide large increments of demand response relative to the marketing and administrative costs the CSPs must incur. In contrast, residential and small commercial customers are unattractive targets for the CSPs. For this reason the amount of demand response potential that can be tapped through CSPs is limited, particularly so in ERCOT where medium to

²⁵ See: <http://www.fortnightly.com/fortnightly/2010/04/reconsidering-resource-adequacy-part-1>
<http://www.fortnightly.com/fortnightly/2010/05/reconsidering-resource-adequacy-part-2>

large customers that are not already buying directly from the wholesale market account for significantly less than 30 percent of the peak demand.

The economically efficient way for ERCOT to recover each payment is to charge it back to the specific REP (or utility) whose retail customers produced the demand response, i.e., to “reconstitute” that wholesale buyer’s load by adding back the energy that the REP (or utility) would have purchased but for the demand response produced by its retail customers.²⁶ This is the payment recovery methodology that the California ISO implemented in 2010 with FERC approval, to avoid paying twice for the same MWh of demand response.²⁷

One drawback to developing demand response through CSPs is that this approach not as economically efficient as dynamic pricing at the retail level because of the additional administrative costs that CSPs introduce, including the need to measure and verify the magnitudes of the load reductions claimed by the CSPs. Despite this drawback CSPs can provide a useful interim, “second-best” solution until dynamic pricing is widely adopted.²⁸

Although CSPs can rapidly develop a lot of demand response (and they have in the Eastern ISOs) treating demand response as a “supply” resource will produce undesirable economic outcomes if the prices paid to the CSPs are excessive.²⁹ This issue was exhaustively addressed in a FERC Rulemaking that culminated to Order 745.³⁰ Unfortunately, Order 745 prescribes that ISOs

²⁶ In 2011 FERC Order 745 prohibited load reconstitution. The State of California, among other plaintiffs, has filed suit in the DC Court of Appeals in an effort to overturn Order 745.

²⁷ California Independent System Operator Corp., 132 FERC ¶ 61,045 (2010).

²⁸ This paragraph only applies to economic demand response, which provides an energy product, not to ancillary services such as regulation or contingency reserves, which can only be provided directly to the System Operator.

²⁹ The economically efficient price a retail customer should receive for a MW of load reduction is the locational market price (LMP) less the marginal energy price (“G”) in the customer’s retail tariff. This price, when added to the customer’s bill reduction due to the reduced consumption, equals LMP. Paying a CSP the full LMP for its aggregated load reductions creates the likelihood that it will pay the retail customers more than LMP minus G, thereby providing those customers with incentives to forgo electricity usage that creates more economic value than the costs saved by not generating that electricity.

For further discussion, see: Borlick, Robert, L., “Pricing Negawatts,” Public Utilities Fortnightly, August 2010.

<http://www.fortnightly.com/fortnightly/2010/08/pricing-negawatts>

³⁰ Federal Energy Regulatory Commission, Docket No. RM10-17-000, Order No. 745, Demand Response Compensation in Organized Wholesale Energy Markets, March 15, 2011.

overcompensate the CSPs producing uneconomic outcomes that ultimately will raise the cost of electricity, particularly the small customers that do not enjoy the subsidized payments.³¹ I strongly urge the Commission to not repeat FERC's mistake; however, this statement is not the place to address in detail the various options for pricing and payment recovery of CSP induced demand response.

INCENT DEMAND RESPONSE THROUGH DYNAMIC PRICING IN RETAIL TARIFFS

Developing demand response through dynamic retail pricing will be difficult for the following two reasons:

- Most customers (particularly the small customers) are happy with their flat tariffs and see no need to become more involved in managing their electricity consumption. This is partly due to human nature, which opposes to change, and partly due to customers' ignorance regarding the potential bill savings that dynamic pricing can provide.³²
- Retail Electricity Providers (REPs) will not be motivated to offer dynamic pricing tariffs for which there is little or no customer demand.

This is a classic "chicken-egg" conundrum that will not resolve itself without aggressive intervention by the Commission.

Addressing the first reason, the Commission can facilitate a full-scale effort to educate retail customers on the benefits to be derived from dynamic pricing. The Transmission and Distribution Service Providers (TDSPs) are well positioned to implement such education programs because most retail customers are captive to these entities so the TDSPs can easily recover their program costs through T&D surcharges with no exposure to the risk of customer switching leaving behind stranded costs.

³¹ Borlick, "Paying for Demand-Side Response at the Wholesale Level: The Small Consumers' Perspective," The Electricity Journal, Vol. 24, Issue 9, November 2011.

³² Few small customers understand that their flat tariffs contain a substantial hedge premium that their REPs must charge in return for taking on the risks associated with the uncertainties associated with future wholesale market prices and with the customer's consumption behavior during high-priced hours. Moving to a tariff indexed to the day-ahead or real-time wholesale spot market prices immediately avoids this hedge premium, thus produces a lower expected bill even if the customer does nothing to mitigate the bill through load shifting or load reductions during the high-priced hours.

The second reason poses a more difficult problem because the Commission has no authority over retail rate designs. However, perhaps one way to make dynamic pricing available to all retail customers would be to require the REPs that are providers of last resort to offer all retail customers the option to buy their electric energy at hourly prices directly indexed to the wholesale Day-Ahead or Real-Time markets.

ENSURING NEAR-TERM RESOURCE ADEQUACY

The Brattle Study indicates that ERCOT is likely to have difficulty meeting its peak load in 2014.³³ Given the lead times needed to bring new generating capacity into service (even simple cycle combustion turbines) other types of capacity will be needed to meet this near-term need. The obvious candidates are energy efficiency and emergency demand response (i.e., interruptible loads that are called on as a last resort) but it is likely that some low investment supply-side capacity will also be attracted, such as capacity uprates or mothballed plants. This has been the experience of PJM in its RPM auctions, which have attracted relatively little new plant additions but lots of interruptible load.

Given this potentially *in extremis* situation the Commission should consider directing ERCOT to competitively procure new supply, energy efficiency and demand response capacity for delivery in year 2014 and perhaps for several subsequent years as well. A descending clock auction would be a suitable mechanism for this, whereby the final clearing price would be paid to all resources whose offers are accepted. ERCOT could then recover the payments made for this capacity by billing it to the TDSPs, and to the other utilities such as CPS and Austin Energy, in proportion to their respective *net* contributions to the regional peak loads.³⁴ Of course, retail customers will ultimately pay for the capacity but they will also benefit from avoided involuntary service interruptions. These stopgap procurement auctions can continue until sufficient price responsive demand develops to obviate the need for such procurements.

³³ *Brattle*, p. 25.

³⁴ By net contribution is meant the amount of capacity shortfall of a utility that has not procured sufficient resources to meet its own peak load.

The Brattle Group is correct in opposing the routine reliance on out-of-market mechanisms, which are inefficient. On the other hand, they are preferable to permanently converting ERCOT to a capacity market – which would then be inefficient in perpetuity.

CONCLUSIONS

ERCOT's energy-only market has served Texas consumers well from its inception. It is the most innovative, economically efficient wholesale power market in the US. Nonetheless, it needs to develop a substantial amount of demand response in order to meet future needs. Before the Commission concludes that the current market design must be replaced with one that makes capacity payments it should thoroughly examine the impact of increased amounts of demand response – particularly price responsive demand driven by dynamic pricing at the retail level.

ERCOT doesn't need a capacity market; it just needs retail customers to see accurate price signals.

Respectfully submitted by,



Robert L. Borlick

July 10, 2012
Washington, DC