Control Number: 40000

Item Number: 473

Addendum StartPage: 0

PROJECT NO. 40000

COMMISSION PROCEEDING TO ENSURE RESOURCE ADEQUACY IN TEXAS	§ § §	PUBLIC UTILITY COMMISSION OF TEXAS

SOUTH TEXAS ELECTRIC COOPERATIVE INC.'S
COMMENTS CONCERNING THE RESERVE MARGIN

Comes Now South Texas Electric Cooperative, Inc. ("STEC") and files its comments addressing the questions posed by the Commission concerning the ERCOT reserve margin. STEC appreciates the opportunity to address these important questions. STEC believes the ERCOT reserve margin should be a mandate and it should be an economically optimal reserve margin. The standard for an economically optimal reserve margin should equate the annual benefit of a reduction in the value of lost load from capacity addition times the loss of load probability to the annualized cost of new entry of the most economic demand-side resource and/or generation resource. If a reserve margin mandate is adopted, a centralized forward capacity market is the most effective way from a cost/benefit stand-point to meet the standard for the reserve margin. In support thereof, STEC shows as follows:

1. Should the economic optimal reserve margin be a mandate?

STEC believes the economic optimal reserve margin should be a mandate. All aspects of modern life depend upon the availability of electricity when you need it, not just when it is available. If there is not a dependable availability of electric power the growth of the Texas economy could come to a standstill. Both small and large businesses must have electric power available to operate. Every curtailment of electricity can adversely affect their profit margin.

473

If Texas begins to have a reputation that the availability of electricity is unreliable, business and industry may no longer find Texas a desirable place to locate.

Today, individuals depend heavily on the availability of electricity. For most, if not all households, heat in the winter and air conditioning and even fans depend on the availability of electricity. The use of modern technology requires electricity. Computers, I-Pads, smart phones, even Wi-Fi all require electricity.

The need for a mandate becomes even more crucial in a deregulated market. In a regulated market, the utility has a duty to build or obtain by contract a sufficient supply of power to meet its customer's needs. The utility also has a much better handle to know what those needs are than the retail provider in a deregulated market. In the ERCOT deregulated market, the retail electric providers typically do not construct generation through their affiliate. Instead, they tend to depend upon the power market. Moreover, their needs are not as easily known because they do not have a certificated area to serve, rather their load increases or decreases at the whim of whether the customer stays with them or moves to another retail electric provider. Requiring that the reserve margin be a mandate is crucial to ensure that needed power is available. The public reaction that has occurred in the past when curtailments have been necessary should confirm the need for the mandate.

2. **What standard should be used?**

STEC submits that the standard for an economically optimal reserve margin should equate the annual benefit of a reduction in the value of lost load from capacity addition times the loss of load probability to the annualized cost of

new entry of the most economic demand-side resource and/or generation resource.[1] It is equally important that these numbers be based on current competitive market data - e.g. through a centralized forward capacity market using a capacity demand curve consistent with the recently adopted Operating Reserve Demand Curve (ORDC). If we have a mandated reserve it is crucial that it is an economically optimal reserve margin in reality, not just in name only.

The "1 event in 10 years" standard historically used by ERCOT does not fit the definition of an "economically optimal" reserve margin. For instance, ERCOT estimates that the "1 event in 10 years" standard would require more than a 16% reserve margin. Yet, low natural gas prices keeps the energy prices low. If the reserve margin is set too high and energy prices are depressed, a forward capacity market, which STEC believes is the most effective way from a cost/benefit standpoint to meet an economically optimal reserve margin, will become the market to recover costs, potentially even stranded costs. This could then become a huge subsidy for generators that would be difficult to undo. At best, it would likely lead to volatile cycles of forward capacity prices.

3. **What is the most effective way to meet the standard from a cost/benefit stand-point?**

STEC believes that a centralized forward capacity market is the most effective way from a cost/benefit standpoint to meet the above standard. Such an economically optimal reserve margin and a forward capacity market with a sloped demand curve are complimentary of each other, thereby providing support to ensure that the capacity market provides the needed guaranteed

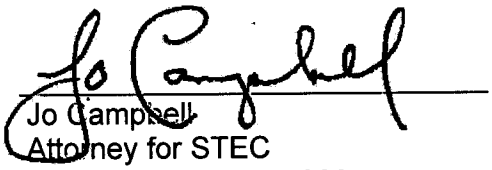
[1] See attached paper, *Mechanism To Ensure Resource Adequacy* by Shams Siddiqi for further information.

support to ensure that the capacity market provides the needed guaranteed revenue stream to support only needed generation and not a secondary bonus stream. STEC would argue, however, that the centralized forward capacity market to be effective must be designed to meet the unique characteristics of the ERCOT market and not be a design forklifted from another region. For instance, to prevent some of the criticisms of other forward capacity markets, the payment from the forward capacity market in ERCOT should approach zero as the revenue stream from margins on energy and capacity sales in ERCOT-run markets, including the revenues generated through the ORDC adder, approach the clearing price set in the forward capacity market.

4. **Are the correct assumptions used in the load-growth forecast?**

STEC understands that ERCOT/GATF is looking into this issue. Therefore, STEC defers judgment pending the outcome of those findings.

Respectfully submitted,



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MECHANISM TO ENSURE RESOURCE ADEQUACY

By

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The changes to the ERCOT market being considered by the Commission in Project 40000 have very significant impact on the future of this market and so all alternatives and implications need to be heard by the Commission in order to arrive at an informed decision. The proposal in this paper is meant to provide a different perspective to the problem and possible alternate solution that may be more palatable to many ERCOT market participants.

Background on the Capacity Issues facing the ERCOT Market

The forecasted Planning Reserve Margin (PRM) for the ERCOT market seems likely in the future to fall below its "target" (or may already be below its target based on recent studies) using the criterion of 1"event" in 10 years. Of course, this criterion is not based on economics as the "event" could be 1 hour, multiple hours, or even days in duration and one MW to several hundreds of MWs in amount. A criteria based on economics would trade-off the benefit of lower loss of load expectation (LOLE) in MWh times the corresponding Value of Lost Load (VOLL) against the cost of capacity to determine the appropriate level of reserve margin. This implies that if capacity (i.e. a call on energy) is inexpensive, then it makes economic sense to procure a greater amount of capacity than would be the case if capacity were expensive.

The Operating Reserve Demand Curve (ORDC) recently adopted by the Commission does attempt to make that tradeoff in the short-term - particularly when applied in the Day-Ahead Market (DAM) in procuring ancillary services (which is currently not being considered). The ORDC price adder is in effect a "capacity" payment - where resources are paid for being available to be "called" on - similar to a "call option" premium payment with a strike price capped at the system-wide offer cap. Call option premiums are paid regardless of whether the option is exercised or not. One concern with the current thinking on ORDC is that Demand Response (DR) and energy efficiency may not be properly accounted for - this issue is addressed later.

So if ORDC is going to create a "capacity" payment, do we still need a forward capacity market in ERCOT? Regulators and many others are concerned that with Planning Reserve Margins falling below some target, there is a greater likelihood of involuntary load curtailment. The ERCOT "Energy-Only" market seems to be sending the signal that unless the market is much tighter (PRM lower) and prices in the market are much higher, there isn't much appetite for entering into forward contracts at prices that will allow for the construction of new resources. The relatively low price of natural gas and the length of forward contract in a market with retail

competition and robust customer switching are other issues faced by the market. The "Energy-Only" market prices are also quite volatile and difficult to forecast - even with the introduction of ORDC, this is not likely to change significantly. Investors would prefer more certainty in the revenue expectations of their investment.

How can the market get tighter PRM and higher prices without greater involuntary load curtailment? The answer is through greater voluntary load curtailment, i.e. DR, and setting prices appropriately to reflect scarcity whenever DR is deployed. What does it take for large DR penetration in the market? It takes high prices or certainty of returns for the DR investors. Since it seems like the current market conditions[1] aren't resulting in the needed DR penetration, one way to get from the current situation to where the market needs to be is to let PRM further tighten which likely increases the risk of involuntary load curtailment until sufficient DR penetration - this may not be an acceptable path for regulators and many others.

There may be an alternative path to reaching the goal of significantly higher DR penetration. This alternative would guaranty a certain amount of "capacity" payment or Peaker Net Margin for resources. Resources voluntarily relying on such a guaranty would forego some or all of the "capacity" payments that exceeded the guaranteed amount - similar to ERCOT reliability commitments. As DR penetration increases and market price increases, fewer resources would want to take this guaranty but rather rely on the potential for higher market returns. This alternative may be thought of as a mechanism that lets an Energy-Only market like ERCOT transition to a state where this mechanism becomes irrelevant and the Energy-Only market functions as intended - where the market decides on new investments and bears the risk of such decisions. This alternative path, let's call it Mechanism to Ensure Resource Adequacy (MERA) is more fully described below.

Should the economic optimal reserve margin be a mandate? What standard should be used?

The more appropriate question is: does the ERCOT market need a mechanism to provide incentives for investments in DR, energy efficiency, and generation resources in order to avoid increased likelihood of involuntary load curtailment with a tightening market? If the answer is "yes," then we should consider all alternative mechanisms and their implications for the market. All mechanisms are likely to be regulatory interventions in the market and so must be carefully considered.

A fixed PRM mandated number that is based on some archaic engineering criterion such as "1 event in 10 years" is likely to cause more harm than good. Such a number has no basis in economics, as discussed above, and if applied with a Forward Capacity Market (FCM), is likely to result in highly volatile capacity prices. If such a number is set too high by regulators, then it would likely result in "over-build" (compared to market equilibrium) and depress the energy

[1] The impacts on the market of ORDC is yet unknown

market[2] - thereby making the regulatory "capacity" market being a large part of resource revenues. The jump of capacity prices from near zero when the market PRM is above the mandate to high numbers with the market is below is not conducive to new investment.

Other markets with FCM, like PJM, employ a sloped demand curve for capacity. However, this sloped demand curve is often based on some engineering criteria like "1 event in 10 years" and thus may not be economically optimal.

It makes sense to base any capacity demand curve on economics - i.e. tradeoff the benefit of a reduction in the cost of expected lost load (LOLE*VOLL) from capacity addition and the cost of new entry of the most economic demand-side resource and/or generation resource. This capacity demand curve should be consistent with the ORDC. The cost of new entry should be based on offers submitted by demand-side and generation resources. Ideally, ERCOT would optimize its selection of resources based on the resources' contribution to reducing cost of expected lost load over the year by minimizing the offer-based costs of the resources and the cost of expected lost load across several probabilistic scenarios. MERA proposes to use this kind of optimization or some simplification of this optimization where resources submit offers that specify either their minimum PNM requirement or capacity payment requirement.

Description of the Mechanism to Ensure Resource Adequacy

The most effective way to meet the objective described in the previous paragraph from a cost/benefit standpoint may be the proposed MERA. A high level description of MERA is given next, followed by the reasons why it may be an effective solution.

The MERA proposal at a high level may be described as follows:

1. Similar to a FCM, ERCOT would hold forward auctions where demand-side and generation resources would submit offers specifying either their minimum PNM or capacity payment requirement. ERCOT would execute the auction using the optimization algorithm described above to determine the selected resources and the PNM or capacity clearing prices. Existing generation resources that are not scheduled to be mothballed or retired would always be considered in the auction and be price takers in the auction (i.e. zero offer price). Price takers in the auction would not be subject to clawback of excess capacity payments over the year. New resources may also submit price taker or zero price offers to avoid clawback. The optimization would also provide the clearing price distribution throughout the year. Under MERA, no changes would be needed to the system-wide offer cap or any other existing market design elements,

[2] Unless DR can meet most of that huge need and DR is able to set prices at high offer caps like current levels - all unlikely in such an FCM design

except possibly market price setting when DR is deployed outside of SCED and ORDC capacity payments to DR and, for specified lengths of time, energy efficiency load reduction[3].

2. All available resources are guaranteed the PNM or capacity clearing price over the year (of course, assuming they are available throughout the year) through adjustments to the ORDC capacity payments and utilizing all the settlement treatment that are part of the ORDC. Similar to a balancing account concept, the capacity payment from the ORDC[4] would be adjusted each month (or once at the end of the year) such that over the year the guaranteed PNM or capacity payment is met. If the unadjusted market prices over the year exceed the guaranteed amount, then some or all of the capacity payment above the guaranteed amount would have to be refunded by the selected resources that submitted non-zero offers in the auction - similar to current reliability commitment rules. This provides an incentive for resources not wanting the guaranties once there is ample DR penetration and market prices rise. However, if energy prices (excluding ORDC capacity payments) themselves result in payments that exceed the guaranteed amount (in situations like 2011), then that revenue would remain with the resource.

The reasons MERA may be an effective solution are as follows:

1. MERA is addressing the core concern of investors in the current market condition. The revenues for selected resources may be even more certain than other FCM since it takes both energy and capacity prices into account. However, the tradeoff is that selected resources forgo some or all additional profits in exchange for this guaranty.

2. MERA does not require the predetermination of a separate capacity demand curve. The auction is based on economically trading off reduced cost of lost load based on the ORDC curve and the cost of new entry.

3. MERA avoids double payment by loads for the same capacity. For example, 3 years prior to 2011, resources may have wanted significant capacity payments for that year not knowing it would be an unusually high priced year. Under other FCM designs, loads would not only pay the extremely high prices in that year but also the capacity payments on top of that. Such an outcome would jeopardize the market through consumer backlash.

4. MERA recognizes that the ORDC capacity price reflects the value of capacity for each interval and thus is the preferred way to pay any auction-related capacity payments as well. It essentially adjusts the ORDC capacity payments based on guaranteed amount recovery. This eliminates the lengthy debate over how and when to allocate the auction capacity clearing price over the year.

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[3] ORDC capacity payments should be paid to energy efficiency load reduction - similar to capacity payments from FCM in PJM. Energy efficiency load reduction can be considered as a call option that is always exercised - similar to a must-run base load plant which would receive the ORDC capacity payment.

[4] This may be considered as adjustments to the ORDC parameters which are set trading off various considerations anyway.

5. MERA intrinsically incorporates an "economically optimal reserve margin" in the auction engine optimization algorithm. This avoids the contentious debates over reserve margin mandates and criteria, any capacity demand curves, and a single number that determines the percentage of the resource capacity is credited in the auction for the whole year.

About the Author

Dr. Shams Siddiqi is the President of Crescent Power, Inc., an energy consulting firm located in Austin, Texas. However, the views expressed herein are the author's own and are not to be construed as those of Crescent Power, Inc., or any of its clients.

Dr. Siddiqi received the Ph.D. degree in Electrical Engineering from the University of Texas at Austin in 1993 and his dissertation was on *Reliability Differentiated Pricing and Optimal Planning for Electrical Power Systems.*

Dr. Siddiqi is one of the principal designers of the ERCOT Nodal Market who developed and proposed most of the advanced features of the market. These features include:

1. The Day-Ahead Market design that allows for full co-optimization of Ancillary Services and energy, the purchase of Point-to-Point Obligations in the DAM, and the ability to self-commit resources.

2. The two-step method used in the Security Constrained Economic Dispatch (SCED) that mitigates against the exercise of locational market power arising from congestion on Non-competitive Constraints.

3. The Element Competitive Index (ECI) used to determine Competitive Constraints that is an objective measure of the competitiveness of any constraint.

4. The Congestion Revenue Right (CRR) market with counter-party credit limits as constraints within the CRR engine and the handling of over-sold (CRRs) where the holders of over-sold CRRs are paid up to the legitimate hedge value of those CRRs.

5. Mitigation measures in the CRR market, DAM, Reliability Unit Commitment (RUC) process, and Real-Time Market.

6. Many of the credit provisions for the various ERCOT-run markets.

He was also deeply involved in the Zonal ERCOT market structure development process.

He has over twenty years of experience conducting business in the ERCOT market both as a consultant and on behalf of ERCOT market participants and has published extensively in the *IEEE Transactions on Power Systems* in the field of Energy Economics.