



Control Number: 40000



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PROJECT NO. 40268

PUC RULEMAKING TO AMEND PUC §
SUBST. R. 25.505, RELATING TO §
RESOURCE ADEQUACY IN THE §
ERCOT POWER REGION §

PUBLIC UTILITY COMMISSION
OF TEXAS

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TEXAS INDUSTRIAL ENERGY CONSUMERS' INITIAL COMMENTS

I. INTRODUCTION

Texas Industrial Energy Consumers (TIEC) has been an active contributor to discussions regarding market design and scarcity pricing mechanisms since the inception of ERCOT's energy-only market. The issues being considered in this rulemaking are of the utmost importance to TIEC's member companies, who depend on a competitively-priced, reliable electric supply to remain globally competitive. Generation resource adequacy is essential for Texas to continue to grow, but a properly structured market that efficiently prices electricity is equally important. It is not an overstatement to say that striking the right balance between reliability and appropriate pricing mechanisms is critical to the health of the Texas economy.

The quantitative analysis previously filed in this rulemaking by ERCOT illustrates the substantial cost impacts that the Commission's decision in this rulemaking could have for Texas electric customers. ERCOT's Revised Back Cast shows that a \$4,500 System-Wide Offer Cap (SWOC) would have added \$14.05 per MWh across all hours in 2011, when taking into account the market changes that have already been made to increase the instances when the SWOC is triggered. Based on ERCOT power sales in 2010 and 2011, this would have added approximately *\$4.5 and \$4.7 billion per year to wholesale electricity costs*. If a \$9,000 SWOC were applied in the same manner, it would add \$41.69 per MWh to all hours in 2011—an 80% increase—and an estimated *\$13.3 to \$14 billion to wholesale electricity costs*.¹ These are

¹ ERCOT 2011 Revised Back Cast Scenarios at 5-6 (May 11, 2012). These aggregated amounts are based on the per MWh increase multiplied by the ERCOT MWh sales in 2010 and 2011. At \$667 per kW of installed capacity, (Brattle Report at 47) consumers could pay the entire overnight capital costs of approximately 21,000 MW of new peaking generation from one year of this \$14 billion cost increase. Using the Brattle Report's highest cost of capital case (11%), which yields a \$116/kW-yr revenue requirement, this increase alone would support the annualized revenue requirement of 120,000 MW of peaking generation. The annual cost increase for a \$4,500 SWOC would cover the entire overnight capital costs of 7,000 MW of new generation, and the annualized revenue requirement of 40,000 MW.

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staggering numbers, and the impact of the Commission's decision in this rulemaking should not be trivialized or viewed as a purely academic exercise.

In addition to these cost impacts for consumers, setting the SWOC too high will also lead to an inefficient and volatile resource adequacy landscape. As the Brattle Report points out, over-incentivizing the development of generation resources through inappropriate scarcity pricing will not reliably sustain long-term investment in the ERCOT market.² Instead, an inefficiently high SWOC will foster extreme "boom and bust" development cycles that will not ensure consistent and stable resource adequacy. Therefore, a market that over-incentivizes generation can have both long-term and short-term outcomes that are equally as harmful as a market that under-incentivizes generation.

With these points in mind, TIEC makes the following recommendations:

A. The Commission should not approve a SWOC higher than \$4,500 at this time.

As the analysis provided in Exhibit A shows, \$4,500 is the proper SWOC based on the current energy-only market design and the function that the SWOC currently serves.³ Consistent with TIEC's comments in Project No. 37897, increasing the SWOC to \$4,500 should not take effect until a full year after the Commission makes a final decision on that increase.⁴ As discussed in further detail below, if the Commission adopts a \$4,500 SWOC in this rulemaking, TIEC also suggests that the Peaker Net Margin (PNM) trigger and the Low Offer Cap (LCAP) should be eliminated.

² See Brattle Report at 65, 72-73.

³ TIEC refers to the SWOC throughout these comments, rather than the High Offer Cap (HCAP), because if TIEC's recommendations are adopted, there would be only one SWOC and the HCAP and Low Offer Cap (LCAP) features would be eliminated.

⁴ Note that if the Commission approves the proposed rule in Project No. 37897, the \$4,500 SWOC under that rulemaking could simply remain in effect until longer-term market changes are addressed in a future project, as discussed below.

B. The Commission should not adopt recommendations from the Brattle Report in a piecemeal fashion.

TIEC strongly opposes picking certain items from the Brattle Report and attempting to incorporate them into the current market design without also implementing other necessary and related Brattle recommendations.

In particular, the Commission should not simply incorporate the Brattle Report's \$9,000 Value of Lost Load (VOLL) price cap as the SWOC in this rulemaking. The current SWOC and the type of VOLL Price Cap addressed in the Brattle Report are fundamentally different, used to measure different things, and triggered in completely different ways.⁵ If the Commission seeks to implement a VOLL price cap, it would need to concurrently implement the Brattle Report's related recommendations, including creating a long, gradual, administrative scarcity pricing curve and ensuring that the VOLL price cap would only be triggered when firm load is being shed, and not in all the instances when the current SWOC would be reached.⁶ The Brattle Report also explicitly states that the Commission would need to conduct a VOLL study to identify the appropriate number, which may not be \$9,000/MWh.⁷ The appropriate price cap, scarcity pricing curve, and VOLL price cap could also be impacted by the Commission's policy decisions on the appropriate reliability metrics and how the reserve margin should be viewed.⁸ These issues would need to be fully examined and considered simultaneously before any prices above \$4,500 would be appropriate.

C. The Commission should consider recommendations from the Brattle Report in a subsequent project, as recommended in Chairman Nelson's memorandum.⁹

Many of the Brattle Report recommendations echo the principles and positions TIEC has long advocated as appropriate in an energy-only market. These recommendations deserve serious consideration by the Commission. In particular, the Commission should consider:

⁵ See Brattle Report at 78.

⁶ *Id.* ("The purpose of imposing a price cap at VOLL is to prevent LMPs from exceeding customers' willingness to pay to avoid outages during load-shed events.").

⁷ *Id.* at 77.

⁸ *Id.* at 4-5.

⁹ Project 37897, Chairman Nelson Memo (Jun. 12, 2012).

- Pricing Reliability Unit Commitment (RUC) energy at an amount that more closely reflects commitment costs or estimated uplift payments, rather than at the SWOC;
- Implementing a gradual demand curve that borrows from ancillary services other than Regulation-Up, such as Responsive Reserve Service (RRS), and that prices energy from those services to more accurately reflect their proximity to load shed;
- Removing automatic SWOC pricing in other circumstances (i.e., proxy offer curves);
- Reducing RRS by 500 MW;
- If a price cap is going to be set based on VOLL, only allowing this cap to be reached when firm load is actually being shed;
- Whether a separate, lower *offer* cap should be established distinct from an administrative price cap; and
- Reexamining the current reliability metrics and the role of the reserve margin.

The current rulemaking does not provide sufficient time to vet and implement these types of significant market changes. Accordingly, these issues should be addressed in a subsequent proceeding.

These and other issues are discussed in further detail below.

II. COMMENTS ON THE PROPOSED RULE

A. The appropriate SWOC level under the current market design is \$4,500.

If the Commission seeks to adopt a long-term SWOC in this rulemaking without making any of the more comprehensive changes that the Brattle Report recommends in conjunction with a VOLL price cap, then TIEC's analysis shows that \$4,500/MWh is the appropriate SWOC.¹⁰ A SWOC at this level will permit a peaking unit to recover its investment over a 20-year period, which is based on the cost of new entry (CONE) and useful life assumptions in the Brattle Report.¹¹

¹⁰ Exhibit A.

¹¹ Brattle Report at 48.

TIEC's calculations are based on the PNM backcast previously provided by ERCOT,¹² and the most conservative CONE assumptions from the Brattle Report, including an after-tax weighted average cost of capital of 11%, which is admittedly high.¹³ The analysis assumes normal conditions in 45% of years, excess capacity in 45% of years, and "tight" conditions in 10% of years. TIEC's analysis shows that a simple-cycle gas turbine with a CONE of \$116,000 would need to recover \$667/kW to justify new investment. With a \$4,500 SWOC, the peaking unit could expect to recover approximately \$760/kW over 20 years, which is more than adequate to justify the investment under Brattle's assumptions. This analysis demonstrates that, absent additional market changes, increasing the current SWOC to \$4,500 cap is sufficient to incentivize new investment. Therefore, under the current market design and based on the current function served by the SWOC, the Commission should not adopt an increase any higher than \$4,500/MWh.

B. The Brattle Report's \$9,000/MWh example for a VOLL price cap should not be taken out of context and used as the SWOC under the current market design.

A VOLL number, like the \$9,000/MWh example in the Brattle Report, cannot be used in the same manner as the current SWOC.¹⁴ As the Brattle Report explains, if a price cap is going to be set based on VOLL, that number must be supported by a VOLL study of the ERCOT market, and should only be reached when firm load is actually being shed.¹⁵ Potentially, a separate *offer* cap would still need to be established, which would be reached before higher administrative scarcity prices are set based on reliability actions. Fundamentally, the current SWOC and the type of VOLL price cap recommended in the Brattle Report are not interchangeable, and adopting the \$9,000/MWh number in the Brattle Report as the current SWOC would be wholly inappropriate. The Brattle Report makes this distinction clear:

[W]e recommend creating a functional distinction among: (1) ERCOT's price cap, which is currently undefined, meaning that prices may exceed the offer cap depending on transmission constraints; (2) the high, low and other offer caps

¹² See ERCOT's Revised 2011 Back Cast Analysis (May 11, 2012).

¹³ Brattle Report at 48.

¹⁴ TIEC also notes that the Brattle Report provides no empirical data for the \$9,000 VOLL assumption, so the Commission should conduct additional analysis to determine whether that is the appropriate VOLL number. Brattle recommends that a study be done to establish the appropriate number for ERCOT. Brattle Report at 77.

¹⁵ Brattle Report at 77, 81.

created for market mitigation purposes and implementing the small fish rule; and (3) administrative scarcity pricing thresholds used to set prices during scarcity events.¹⁶

The Brattle Report also makes clear that imposing a very high price cap approximating the VOLL would be appropriate only with the implementation of a long, gradual demand curve, and that the cap should be reached “*only in extreme scarcity events when load must be shed.*”¹⁷ The existing SWOC is triggered much more frequently than a VOLL cap should be, and recent actions have further increased the likelihood of it being used to set prices, including when RUC is deployed, when RRS is deployed, when any Emergency RMR unit is deployed, and anytime there is a proxy offer. The Brattle Report does not support replacing the current SWOC with a number that approximates VOLL while leaving all other aspects of the current market design the same. Rather, setting the SWOC at a level that approximates the VOLL and allowing that SWOC to be triggered anytime reserves are deployed is completely inconsistent with the Brattle Report’s recommendations.¹⁸ Such a result would be extremely harmful to consumers and would create volatile cycles of over- and under-build rather than contributing to stable, long-term resource adequacy.

If the Commission seeks to implement a cap that is higher than \$4,500, then the triggers for the current cap would need to be removed and the Commission would need to consider numerous other market changes recommended by the Brattle Group. Accordingly, the Commission should adopt a \$4,500 SWOC in this proceeding, and defer future changes to a subsequent proceeding, as discussed below.

C. The Commission should consider additional market design changes in a subsequent proceeding.

For a SWOC or price cap in excess of \$4,500 to be appropriate, the Commission would need to make significant additional changes to the current market design. TIEC agrees with many of the Brattle Report’s recommendations; however, the timeframe for this rulemaking does

¹⁶ *Id.* at 78.

¹⁷ *Id.* at 81 (emphasis added).

¹⁸ Brattle Report at 78.

allow for thorough consideration and proper implementation of those recommendations. Accordingly, the following issues should be examined in a subsequent proceeding.

i. Appropriate Scarcity Pricing

If the Commission considers increasing the SWOC above \$4,500 or implementing a VOLL price cap, the Commission would need to concurrently implement a number of other market changes recommended by the Brattle Report. Specifically, the Commission would first need to ensure that any scarcity pricing mechanisms only come into play under appropriate conditions. The Brattle Report recommends that scarcity pricing should only come into play under circumstances that actually relate to a shortage of installed capacity, and not during the type of transient operational events that cause Non-Spinning Reserve Service (NSRS) or RUC to be utilized.¹⁹ As the Brattle Group appropriately notes, “ramping and forecasting considerations represent real system operating needs, but are not related to resource adequacy or the realized reserve margin.”²⁰ TIEC has consistently advocated this position, including in its comments on NSRS and RUC pricing.²¹ TIEC agrees with the Brattle Group’s analysis recommending that RUC should not be priced at the SWOC, but at “an amount that more closely reflects their commitment costs or estimated uplift payments.”²² The Brattle Report also found that some recently adopted “interventions such as deploying responsive reserves only at \$3,000/MWh even for the first MW deployed may be overpriced.”²³ The report also held that procuring an additional 500 MW of RRS may create scarcity pricing in non-scarcity conditions, and should not be retained unless there is empirical reliability data showing a need to carry this amount of RRS.²⁴ These are all important issues that should be addressed to ensure that price formation occurs in an efficient manner, and that scarcity pricing only occurs under true scarcity conditions.

¹⁹ Brattle Report at 72 (“[W]e define “scarcity conditions” as those hours when administrative interventions are required in response to capacity shortages, and where a contributing cause of the capacity shortage is a low planning or realized reserve margin.”).

²⁰ Brattle Report at 75.

²¹ See Project No. 37897, TIEC Comments at 1-3 (Oct. 14, 2011); NPRR 435, *Requirements for Energy offer Curves in the Real Time SCED for Generation Resource Committed in RUC*, TIEC Comments (Jan. 17, 2012).

²² Brattle Report at 73.

²³ *Id.* at 79.

²⁴ *Id.* at 75.

ii. *Gradual Demand/Scarcity Pricing Curve and VOLL Price Cap*

Similarly, in conjunction with the recommendation to implement a VOLL price cap, the Brattle Report also recommends a scarcity pricing mechanism that differentiates between various levels of declining reliability, rather than an “all-or-nothing” SWOC approach as under the current market design. TIEC agrees that a longer, more gradual scarcity pricing curve should be developed to replace the current Power Balance Penalty Curve (PBPC), which escalates from \$200 to \$3000 over 50 MW. TIEC has taken a similar position previously in Project No. 37897 and in discussions at ERCOT. As the Brattle Report notes, “[a] more continuous scarcity pricing approach will better-enable price-responsive demand to contribute to price formation even if it is not incorporated into SCED.”²⁵ Allowing prices to rise in smaller increments to signal different levels of scarcity pricing will facilitate more granular and efficient market response to a given price signal before a higher signal is set. This will prevent inappropriate market response to “transient” high prices or response that overshoots the mark, resulting in a subsequent price reversal. The Brattle Report contemplates that the curve would extend over several thousand MWs encompassing Reg-Up (for energy), RRS, Emergency Response Service (ERS), and would ultimately terminate at a high price cap (as opposed to an offer cap) that reflects the value of lost load when firm load is shed.²⁶ This type of scarcity pricing curve could facilitate market response more efficiently and would differentiate between the severity of different reliability actions, which should produce better market outcomes. These changes would need to be implemented before transitioning to a market design with a VOLL price cap.

It is also important to note that the \$9,000/MWh number referenced in the Brattle Report as an appropriate administrative scarcity price during load shed events is not necessarily the appropriate VOLL price cap for the ERCOT market. Rather, the Brattle Report specifically recommends that a detailed study should be conducted to determine the appropriate VOLL number for ERCOT, including studying the VOLL of different customer classes and the ratios in which load shed impacts these customer classes.²⁷ This type of analysis cannot be accomplished under the time constraints currently in place in this rulemaking. If the Commission considers

²⁵ Brattle Report at 79-80.

²⁶ See *id.* at 79-81, Table 16.

²⁷ *Id.* at 77.

implementing a gradual, administrative scarcity pricing curve and VOLL price cap, the appropriate VOLL for ERCOT would need to be addressed in a subsequent proceeding.

iii. Reexamining Reliability Metrics and the Role of the Reserve Margin

The Brattle Report also provides an instructive discussion about the interplay between the reserve margin and its impact on scarcity pricing that is needed to support investment. Over the years, the meaning of the “reserve margin” and the specifics behind the “1-in-10-years” reliability target have become vague, and these terms are often used imprecisely in discussions about market design. ERCOT’s reserve margin is based on an exceedingly restrictive reliability measure—allowing only one load shed event, no matter how brief, due to resource inadequacy every ten years.²⁸ This appears to be a much higher threshold than the “one-day-in ten years” metric used by some other power pools, like SPP.²⁹ As the Brattle Report points out, if, in addition to this very restrictive reliability standard, the resulting “target” reserve margin is treated as a minimum requirement, this essentially ensures that scarcity pricing will be insufficient to support investment. For this reason, in an energy-only market the Brattle Report recommends “determining the *desirable* reserve margin target and, separately, a *minimum acceptable* reserve margin needed to avoid extremely adverse consequences under worst-plausible weather and outage conditions.”³⁰ The Commission must consider this dynamic and its impacts on the appropriate SWOC or a VOLL price cap before making any increases beyond the \$4,500/MWh that is justified under the current market design.

In short, TIEC believes that many of the Brattle recommendations deserve further consideration by the Commission and, if implemented, could potentially justify a higher SWOC or price cap, which would need to be supported by empirical data and analysis. However, given that these changes and this analysis cannot reasonably be accomplished under the timeframe of this rulemaking, the Commission should instead address them in a subsequent project. Accordingly, the Commission’s SWOC decision in this rulemaking should be based on the *status*

²⁸ Brattle Report at 4, 101-102.

²⁹ *Id.* at 4.

³⁰ *Id.* (emphasis in original).

quo. As discussed above, the current market design and function of the SWOC supports an offer cap no higher than \$4,500.

III. RESPONSE TO COMMISSION QUESTIONS

1. *Should the sequence of changing the high system-wide offer cap (HCAP) increase at a different rate and over a different period? For example, are any of the following cases preferable to that proposed in the rule? Whatever is ultimately determined to be the appropriate HCAP, should the increase be in one or two steps, rather than three or four? Should the specific year for each increase or the specific date of June 1 for the increase each year be changed? If so, what should be the effective date of each change?*

For the reasons discussed above, consistent with the analysis in Exhibit A, the SWOC should not be increased beyond \$4,500 based on the current market design and function of the SWOC. If the Commission adopts the proposed rule in Project No. 37897, which currently contemplates a SWOC of \$4,500, there may be no need for additional increases unless additional market changes are implemented in a subsequent proceeding. If the Commission does not adopt the proposed rule in Project No. 37897, the Commission should raise the SWOC to \$4,500 effective no sooner than one year after adoption of the rule.

If the Commission seeks to increase the SWOC above \$4,500, or implement a VOLL price cap, this would need to be done in a subsequent proceeding in conjunction with the other market design changes addressed above and supported by appropriate analysis. These changes would likely take at least a year to consider and approve, and could take longer to implement. Under any scenario, market participants should be given a year after a final decision increasing the SWOC, or adopting more fundamental market design changes like a VOLL price cap, to adjust their market positions, execute new retail and wholesale contracts, and make other necessary revisions to their business models before the change takes effect. *See the response to Question 3 for further discussion.*

2. *Is the use of the peaker net margin (PNM) method described in the rule the appropriate mechanism to measure resource adequacy in an energy-only market? If no, what should replace it? Should the PNM trigger amount be the cost of new entry (CONE) or a multiple of the CONE as determined by ERCOT? Should the trigger causing the system-wide offer cap to be reset to the low system offer cap be based on a calendar year or a rolling 12-month period, or should the use of the mechanism be based on hitting the trigger for a single year, or for multiple years? Should variability*

in the weather be taken into consideration in determining whether the PNM trigger is met?

If the Commission adopts a \$4,500 SWOC in this proceeding, the PNM trigger and the LCAP should be eliminated. The PNM trigger for the LCAP has created significant confusion over the years,³¹ and the PNM levels that are currently being considered are unlikely to come into play. Moreover, TIEC believes that the LCAP would likely be unworkable in practice. For example, if the PNM threshold were hit before the end of the summer peak season, a reduction in the SWOC could eliminate certain high-cost resources from the market and cause certain price-responsive loads to choose to take power, which could degrade reliability regardless of whether generation revenues have been sufficient to incentivize future generation development. The historical misuse of the PNM and the potential difficulties that could be caused by the LCAP support setting an appropriate SWOC and then eliminating these features.

However, if the Commission adopts an SWOC that is higher than \$4,500, the LCAP and PNM triggers should be maintained despite their drawbacks. A SWOC higher than \$4,500 would not be justified under the current market design and would create significant risk of inappropriate wealth transfers from load to generators, which would necessitate some mechanism to protect against this result.

3. How long would it take market participants to adjust their financial exposure to the proposed amendments? Will these changes affect liquidity in the ERCOT market? If so, how? Will financial counterparties in hedging arrangements continue to be willing to participate, and if so, at what cost, if the HCAP is increased significantly? Would there be any difference if changes were made over a shorter or longer period of time?

As discussed in TIEC's comments in Project No. 37897,³² a SWOC increase should take effect no sooner than one year after the Commission's final decision to adopt that increase. Given that most retail contracts are executed for one year or less, the market needs at least a year to allow most existing contracts to expire and allow LSEs and customers to adjust their hedging strategies and contract language before such a change takes effect. Failing to provide the market

³¹ There has been considerable confusion, historically, about whether the PNM trigger for the LCAP is a "target" that should be achieved to incentivize new entry. The PNM trigger was intended to be a circuit-breaker to prevent undue wealth transfers for loads under extreme circumstances, but has been consistently misused and misinterpreted since its implementation.

³² TIEC Comments on Proposed Rule (May 29, 2012).

with a sufficient opportunity to adjust to this change will (1) increase financial risk for all market participants without providing sufficient time to manage that risk, (2) create uncertainty about pricing under current retail contracts, and (3) increase the risk of REP defaults, which could cause significant market uplifts and Provider of Last Resort (POLR) transitions. For industrial customers in particular—whose energy costs can comprise up to 70% of production cost—renegotiating a retail supply agreement can be a time-consuming and resource-intensive process that often takes many months or longer. Without sufficient time, these customers may not be able to effectively contract for the risk protection that is appropriate for their businesses.

For these reasons, TIEC opposes implementing any SWOC increase until a full year after the Commission approves the increase.

4. *Should the HCAP ultimately go to \$12,000 or \$15,000, and if so over what time period? If the HCAP is raised to these levels, should the energy from the various ancillary services deployed by ERCOT be priced at the same amount, should there be a slope for the prices for these services, or should ERCOT procure different amounts of these services?*

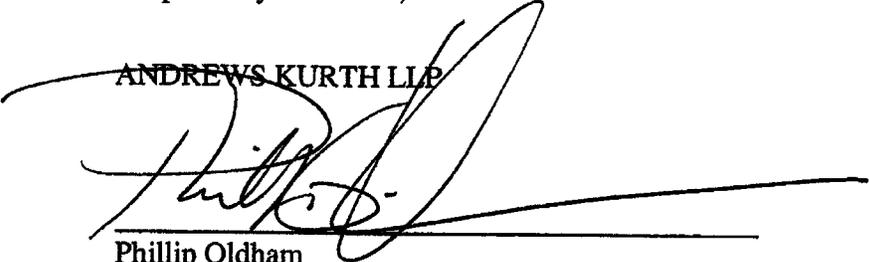
TIEC does not support increasing the SWOC to these levels. As discussed above, \$4,500 is the appropriate SWOC based on the existing market framework and the purpose that is currently served by the SWOC. TIEC supports developing a more robust scarcity pricing curve, but what the upper end of that curve should be, and whether it should perform as an offer cap or an administrative VOLL price cap, are issues that need to be considered comprehensively in a subsequent proceeding. There is no empirical data to support the Brattle Report's \$9,000 VOLL cap, much less these higher numbers. If the Commission seeks to incorporate a price cap that approximates the VOLL, the Commission would need to first conduct a VOLL study and incorporate the other significant market changes the Brattle Report recommends in association with a VOLL price cap. These types of complex, interrelated issues and significant market changes cannot be adequately addressed under the time constraints currently in place for this rulemaking. Accordingly, these issues should be addressed in a subsequent proceeding.

IV. CONCLUSION

TIEC appreciates the opportunity to submit these comments and looks forward to working with the Commission and other market participants to develop a rule that will support the efficiency and fundamental design of ERCOT's energy-only market.

Respectfully submitted,

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ATTORNEY FOR TEXAS INDUSTRIAL
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System-Wide Offer Cap (SWOC) Proposal and Supporting Analysis**Assumptions:**

- Peaking Unit costs \$667/kW. This translates to an average annual Peaker Net Margin (PNM) requirement of \$116,000 to earn an 11% after-tax return, or \$116/kW-yr as a first year progressive payment.¹
- Assume capacity is tight in 10% of years; capacity is normal in 45% of years; and that there is excess capacity in 45% of years.²

Results:

- 2010 State of the Market Report by the Independent Market Monitor indicates that average PNM prior to the recent protocol changes and rule amendments related to resource adequacy was \$40-50,000/year. For the peaking unit described in the Assumptions, this would allow the unit to recover 33% - 40% of investment, which is consistent with the insufficient investment ERCOT has experienced in the recent past.
- The chart below provides an estimate of the average PNM that would result from various cap levels, and the \$/kW recovery this would provide for a peaking unit, including the impact of all of the recent protocol and rule changes related to resource adequacy.³
- Based on these assumptions, values above **\$667/kW of investment recovered justify construction of a new unit.** Values significantly above this level will ultimately result in over-investment in new generation, driving the market toward oversupply and ultimately a higher percentage of years for the low PNM case. Values significantly below this level will cause inadequate investment in new generation and tighter than expected conditions.

¹ This number is based on the high end of the range shown in the Brattle Report at pg. 48. This is a levelized real number, as opposed to a levelized nominal cost. The low end of Brattle's range is a first year progressive payment of \$90/kW-yr escalated at 2.5% for 20 years.

² This assumption is based on the fact that ERCOT's reserve margin and planning requirements are currently based on one loss of load event in 10 years. The analysis assumes that the year in which the loss of load event occurred would be the only "tight" year of the ten. The PNM for "tight" years was based on actual 2011 data per ERCOT's backcast. Since there was no actual loss of load during peak periods in 2011, a year in which actual load shed at peak occurs could be expected to be even tighter, resulting in even higher PNM. The distribution between normal and low years was split evenly.

³ This analysis is based on a probability distribution applied over the life of the investment (in this case we assumed 20 years). Actual PNM can be expected to deviate from the average in any given year.

EXHIBIT A

IMPACT OF VARYING SWOC LEVELS FOR BRATTLE'S 11% ATWACC⁴

	\$3,000	\$4,500	\$6,000	\$9,000
Low PNM (45% of years)	\$65,000	\$85,000	\$100,000	\$130,000
Normal PNM (45% of years)	\$100,000	\$135,000	\$166,000	\$229,000
High PNM (10% of years)	\$150,000	\$208,000	\$265,000	\$364,000
Average PNM	\$89,250	\$120,000	\$146,000	\$198,000
\$/kW Recovered	\$561/kW	\$760/kW	\$942/kW	\$1,310/kW
5x16 Annual Price	\$58/MWh	\$68/MWh	\$79/MWh	\$99/MWh

From this chart, and based on the assumptions outlined above, a **\$4,500 SWOC** would be sufficient when combined with all the changes that have been made to date related to resource adequacy to incentivize the construction of resources.⁵

⁴ After-Tax Weighted Average Cost of Capital.

⁵ Note that using the low end of the Brattle Report's range, a \$3,000 SWOC would be sufficient. However, the mid-point of the range requires a SWOC greater than \$3,000.