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Texas Blockchain Council
Bitcoin Mining and Energy Committee
Public Comment on The PUC Market Redesign Project Number 54335

Executive Summary:

The ERCOT energy only marketplace is a cornerstone of the economic engine that has driven Texas to a place of remarkable prosperity. Ensuring sufficient energy generation while maintaining affordable prices is a balancing act that a market with the appropriate guardrails and controls is best equipped to handle. ERCOT doesn't have a capacity problem, it has operations and price signals problem, as demonstrated by the Commission's own E3 report. The hard-working men and women at ERCOT have done their best with the tools allotted them but now is the time to provide them with more ancillary services instead layering on expensive new programs that might blunt the existing incentives in the wholesale market.

Large flexible loads represent an incredibly powerful tool in the hands of the grid operator and are a natural market response by customers to the incentives of the energy market (note exhibits on pages 10 and 11 for additional evidence). We seek the lowest energy costs by locating at low priced parts of the grid and controlling our demand to follow ERCOT dispatch instructions and price signals. These incentives naturally support reliability because of the incentives in the competitive market and don't require government intervention to continue.

The TBC would like to address what it views as concerns regarding how the proposal treats loads that are available in the market for dispatch with the goals of cost causation in mind. In short, "If a load is fully or partially available to be dispatched down such that it is not a part of the reliability problem, that portion of the load that is responsive should not be assigned costs related to the PCM." This can be handled by either not including load that has offered its energy and/or ancillary services in the Day Ahead Market in the calculation of the PCM or providing credits to the load for that capacity so long as it is grossed up to include any reserves that may also be assigned.

For example, imagine a data center that provides ancillary services in each hour of the year for its full demand. This "perfect" load would be fully dispatchable and fully under ERCOT's control. It would earn performance credits for each performance credit hour based on its full capacity but would still have exposure to PCM costs if the value of those credits didn't also include the cost of the reserve margin that would be added to this load.

Next, assume a load isn't providing ancillary services in each hour but has provided ERCOT with an offer curve capable of ramping the load down to minimize electric demand, it shouldn't be penalized if it misses a particular performance credit hour if there was no energy price-based reason to curtail.

Instead, loads that are willing and able to be curtailed should be rewarded for doing so. ERCOT can expand its proposed voluntary large load registration process to allow more loads to curtail based on ERCOT signals and allow these loads to avoid PCM costs. ERCOT may need to offer more lead time for some types of customer demand, but a well-designed program could account for this.

Answers to questions

1. The E3's report observes that the PCM has no prior precedent for implementation, does this fact present a significant obstacle to its operation for the ERCOT market?

The PCM is a major new policy approach, and aspects of it have yet to be seriously considered at the depth that would be required to move forward with the proposed approach. This is especially true because of the novel suggestions in the market design. Issues around credit and collateral, ex ante market power mitigation, the target reserve margin and avoiding perverse customer incentives or generator gaming are all critical to be resolved prior to implementing the market. This work could take years to get right, and it is too risky to move forward with the market design without having done the hard work that is required to make sure it addresses the needs of the Texas power grid without creating additional problems.

2. Would the PCM design incentivize generation performance, retention, and market entry consistent with the Legislature's and the commission's goal to meet demand during times of net peak load and extreme power consumption conditions? Why or why not?

Maybe. It depends on how the program is implemented. However, it does not guarantee market entry, only indirectly addresses the operational needs of ERCOT, and may result in unnecessary cost increases if PCs are difficult to earn or the target reserve margin is too high.

3. What is the appropriate reliability standard to achieve the goals stated in Question 2? Is 1-in-10 loss of load expectation (LOLE) a reasonable standard to set, or should another standard be used, such as expected unserved energy (EUE). If recommending a different standard, at what level should the standard be set (e.g., how many MWh of EUE per year)?

The important thing to remember about any standard is that it is merely an estimation of performance and doesn't reflect how the system will perform under actual system conditions. For example, the ERCOT system had not experienced a firm load shed event in the 10 years prior to Winter Storm Uri, so actual experience could draw one to conclude that the current system conditions represent a 1-in-10-year loss of load expectation and therefore nothing further should be done to the market. It is also important to note that there is a cost to any improvement in the reliability standard and that those costs rise significantly as you decrease the probability of an event. In the past, studies were performed by the Brattle Group that showed this effect. It would be wise to perform a study like this again, to show the level to which we can gain additional reliability at a reasonably low cost. For instance, if it's relatively inexpensive to raise the LOE to a 1-in-15-year expectation, it may be wise to raise the standard further. Alternatively, if the study shows that it's very expensive to maintain a 1-in-10-year level, it could be wise to relax the standard and determine if it's more cost effective to deal with the impacts of an event rather than prevent the event altogether.

The appropriate method should reflect the actual Texas economy and costs of the electric business as much as possible, but any reserve margin will be wrong some of the time. Expected Unserved Energy (EUE) is a good metric, but a better metric considers the value of that unserved energy. Applying a flat economic value (VOLL) to that unserved energy is good but applying a range of values based on the types of loads in the Texas economy is better, because it would reflect the actual lost economic and social opportunities that didn't occur because of lack of energy. Setting a percentage of total load that can be unserved in a year is good but minimizing it by considering the cost of new entry of new capacity or controllable loads is better. Understanding that some loads, like Bitcoin mining, have values of lost load *below* the cost of new entry of new generation should be an input to this approach. All of this is complicated, but

failure to at least attempt to be accurate will result in a reserve margin that is too high and costs customers in Texas too much.

4. The E3 report examines 30 hours of highest reliability risk over a year. Is 30 the appropriate number of hours for this purpose? Should the reliability risk focus on a different measure?

The number of hours monitored is a problematic question as there are two competing needs. The first need is to target periods that most closely align themselves to reliability risk. ERCOT experiences "needle peaks" in that the load during the peak hour rapidly declines in the second highest hour and so on. Using this metric as a guide, the number of hours should be very low (no greater than four or five) such that it only includes periods of actual reserve scarcity and market need. The major concern over using too many hours is that the reserves in those hours will be at times when reserves are relatively large and corresponding prices are low. The impact of losing credits (Resources) or being assigned charges (Loads) will cause participants to behave in very inefficient manners during these periods when robust economic activity should be occurring. It will be important to write rules that do not enhance these market distortions and allow Loads to make widgets and Resources to not spend fuel if the market conditions do not warrant it.

The second need is to gain a broader sense of the performance of the resources and loads over time. This requires many "samples" to ensure that a generator that may normally be very reliable wasn't just having a bad day when the low reserve event happened or a load that is normally not on during net peak hours isn't caught in the middle of an expensive process. The additional need of using many intervals is to reduce the impact that any one hour may have on the outcome, thus lowering the distortions that may occur. As has been cited by the Independent Market Monitor for years, the 4CP response by loads in the market demonstrates a similar

distortion where loads that should be incentivized by the energy price to continue processes and develop products, shut down to avoid transmission charges they would incur if they were in operation during those hours.

The current level of reserves and the severity of weatherA well-designed program will recognize these potential issues and attempt to minimize their impact.

5. Over what period should the hours of highest reliability risk be determined? A year, a season, a month, or some other interval? At what point in time should that determination be made?

TCM does not take a position on the periodicity but notes that whatever interval is chosen, it must work holistically in the framework created for all the elements of this proposal and the existing Energy Only Market. TCM would advise on a few points of consideration though.

Whatever interval is chosen will also establish the timing of the true-up. If a long interval is chosen such as a year, there is the potential for LSE's to be carrying a significant imbalance of the PCM position prior to the true-up settlement. If a period this long is chosen, consideration should be given to at least a partial true-up or some mechanism to help balance these costs for smaller players.

Longer duration intervals would also create more PCM imbalance as there would be a longer duration of measurement between LSE obligations. This is difficult in a dynamic retail market where there is constant load migration such as ERCOT.

If a short duration time is chosen, there is a greater likelihood of the market experiencing the distortions defined in question 4 above as prices during monitored hours especially in the shoulder months will most likely not reflect reserve scarcity.

6. Would a voluntary forward market for generation offers and a mandatory residual settlement process for LSE procurement provide additional generation revenue sufficient to incentivize resource availability in a way that improves reliability?

There isn't enough information to know, and this top-down approach to reliability misses how incentives operate today. Bitcoin mining loads are a great example of how investors are already responding to resource adequacy incentives by making business models around the availability of low-cost electricity. We expect future hydrogen producers to follow the same incentives that our industry follows. A top-down approach can miss how loads are coming to Texas **because** the incentive exists to curtail load and avoid paying for expensive energy costs, which is a **feature** of the existing market that increases reliability.

7. Does a centrally cleared market through ERCOT sufficiently mitigate the risk of market power abuse? Should additional tools be considered?

Not on its own. A forward market would help by allowing ex ante market power mitigation rules to be developed, but the PCM will change all of the incentives in the ERCOT market, and the entire market must be considered together to avoid market power or gaming issues.

8. If the commission adopts a market design with a multi-year implementation timeline, is there a need for a short-term "bridge" product or service, like the Backstop Reliability Service (BRS), to maintain system reliability equivalent to a 1-in-10 LOLE or another reliability standard? If so, what product or service should be considered?

Getting the PCM right will take years unless it is rushed. In the meantime, a backstop reserve service can provide a bridge of sorts, as can procuring more ancillary services. In choosing the bridging mechanism, it would be wise to observe the long-term revenues as the market will. For instance, if the Backstop Reliability Service (BRS) is to only provide revenues for a year or two,

the cost of that service may be exorbitant as the developer has to view only a couple of years of benefit from that program before it is retired. This would be mitigated if the bridging mechanism "bridges" payments as well. In other words, if it is easy for the BRS reserves to participate in the PCM once it goes into effect, those costs could be reduced.

Increasing ancillary services is already designed to bridge into the PCM approach, so it would appear to be the better bridging approach.

9. If implementing a short-term design as a "bridge" delays the ultimate solution, should it be considered? Is there an alternative to a bridge solution that could be implemented immediately, using existing products, such as a long-term commitment to buy the additional 5,630 MW of Ancillary services necessary to achieve the 1-in-10 LOLE reliability standard?

Yes. The PCM should be developed very deliberately and thoughtfully. Even if it *can* be implemented quickly, it shouldn't be – getting the incentives right will take time. Procuring more ancillary services would be a very good policy on its own, even if the PCM is never implemented. Therefore, the approach is an excellent policy in the meantime.

10. What is the impact of the PCM on consumer costs?

Any new market design focused on increasing investment will naturally increase costs, and this includes proposals like buying more ancillary services. What is important is how the market design creates incentives for industries like ours to reduce their costs in ways that have direct impacts on grid reliability. The worst part of the PCM isn't the possible higher costs, but rather the potential disconnects between actual operational needs and incentives. If customers curtail electric demand when there are sufficient low-cost reserves to keep them online and operating at an energy cost below their value of lost load, an incentive to reduce their demand is a market

failure. The PCM could do this if it is poorly designed. We therefore encourage the Commission to create a voluntary demand response program in lieu of creating incentives to curtail based on when the customer best guesses a performance credit hour will occur. Loads that are willing and able to be curtailed should be rewarded for doing so. ERCOT can expand its proposed voluntary large load registration process to allow more loads to curtail based on ERCOT signals and allow these loads to avoid PCM costs. ERCOT may need to offer more lead time for some types of customer demand, but a well-designed program could account for this. This creates a win/win - customers can stay online if there's no actual need to turn off, but if there is an actual need, ERCOT has more command and control to be sure that loads will curtail. This is a natural expansion of the policy ideas under consideration in the large flexible load task force and creates a monetary reason why customers would sign up for a program that mandates their curtailment.

11. What is the fastest and most efficient manner to build a "bridge" product or service, such as the BRS, in order to start sending market signals for investment in new and dispatchable generation, while a multi-year market design is implemented by ERCOT?

ERCOT could just buy more ancillary services. This would have short term and long-term impacts on grid reliability by increasing ERCOT's ability to respond to operational issues and sending a price signal to the forward market that more reserves are required. To minimize the cost of this decision and increase the total flexibility being provided, some of these reserves should come from longer lead time resources, so that generators can stay offline if not actually needed within the next hour and loads that need more notice could provide some reliability services.

12. In what ways could the Dispatchable Energy Credit (DEC) design be modified through quantity and resource eligibility requirements, e.g. new technology such as small modular nuclear reactors, in such a way that it incentivizes new and dispatchable generation?

The fundamental flaw with the DEC design is the payments only occurring to new generation. This further impairs the profitability faced by existing dispatchable generators as it creates a new set of subsidized resources in the market. Therefore, it is likely to be counterproductive as dispatchable capacity that is added forces existing dispatchable capacity into retirement.

Exhibits on following page.

Exhibits:

Exhibit 1 – Turning down during peak demand and price periods

High power prices create a strong incentive for Bitcoin miners to curtail operations during periods of grid stress

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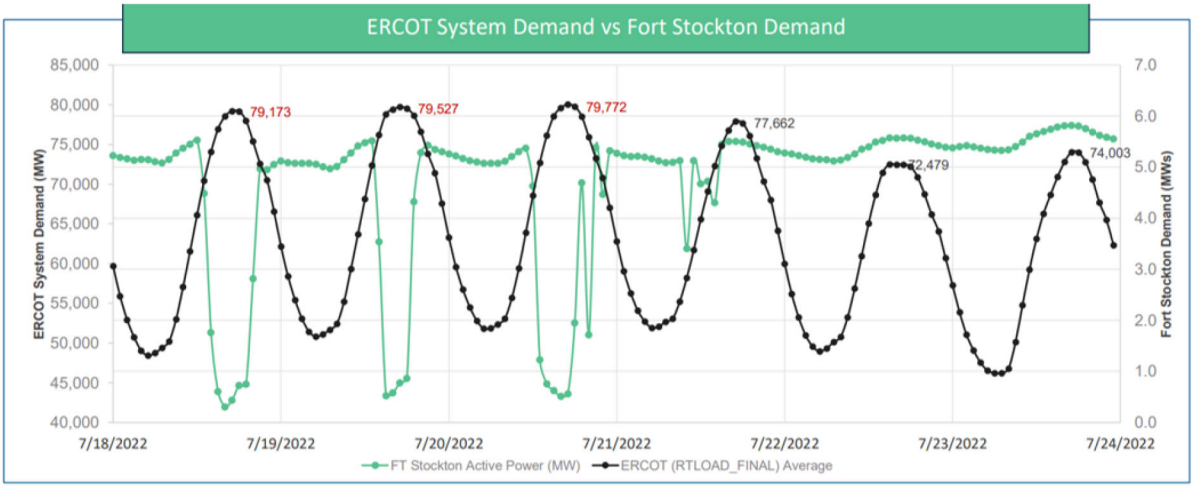

Exhibit 2 – Reducing power costs by avoiding peak demand periods

Over a three-year period, curtailing operations 5% of the time yields significant savings on power costs

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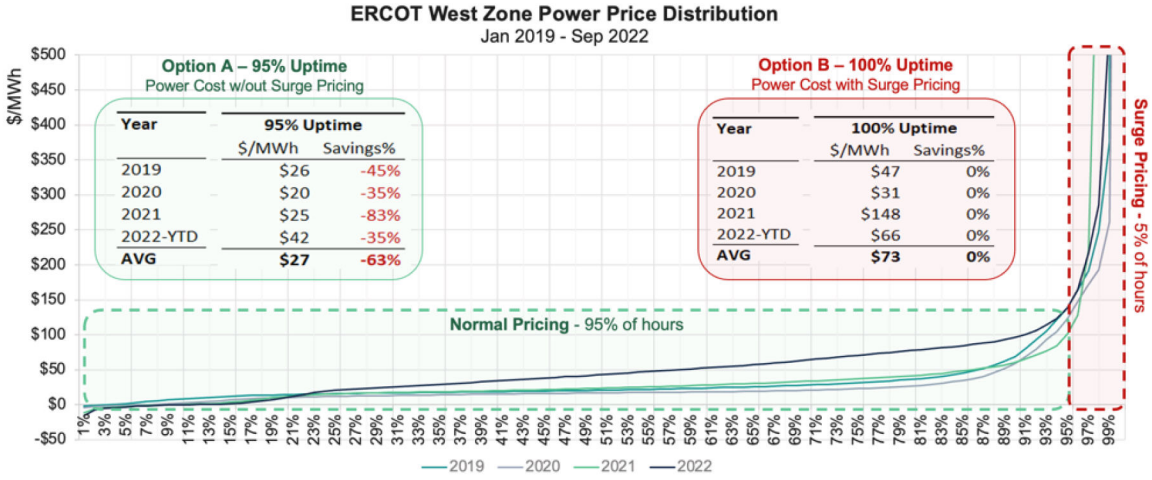

Exhibit 3 – Reacting (within seconds) to unplanned grid events

To provide grid stability services as a Controllable Load Resource, a data center must be able to react to events in 15 seconds or less. This is called *Primary Frequency Response*.

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