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PROJECT NO. 54584

	§	**PUBLIC UTILITY COMMISSION**
RELIABILITY STANDARD FOR THE ERCOT	§	**OF TEXAS**
MARKET	§	

THE ADVANCED POWER ALLIANCE AND AMERICAN CLEAN POWER ASSOCIATION COMMENTS

The Advanced Power Alliance (APA) and the American Clean Power Association (ACP) appreciate the opportunity to respond to the Public Utility Commission of Texas (Commission) Staff's Questions for Comment in Project No. 54584: *RELIABILITY STANDARD FOR THE ERCOT MARKET.* The comments submitted do not reflect the opinions of any individual member company.

I. INTRODUCTION

The Advanced Power Alliance (APA) and the American Clean Power Association (ACP) serve as the voice of more than 800 member companies that represent a diverse cross-section of the world's leading energy companies, energy investors, energy consumers, and power generation manufacturers from across the clean power sector that are driving high-tech innovation through the development of generation assets including wind, solar, and energy storage, spurring massive investment in the U.S. economy while creating jobs for American workers.

Projects developed by our member companies and investors generate local tax revenue for schools, services, and infrastructure, as well multi-generational income for Texas landowners, mainly in rural Texas. Our members' projects help to create cleaner air, water, and improved human health.

II. GENERAL COMMENTS

APA and ACP appreciate the opportunity to provide comments on the questions staff presented related to defining a reliability standard for the ERCOT Region. We believe that the changing nature of both supply and demand-side resources and more extreme weather warrant the use of more refined resource adequacy metrics to understand system needs better and more precisely.

Different reliability metrics serve different purposes. While the one day in ten years Loss Of Load Expectation (LOLE) (1-in-10) standard is still widely utilized, this metric has lost some of its usefulness as the grid has evolved. For this reason, other markets are currently considering alternatives to the LOLE as the single metric. The 1-in-10 standard considers only the likelihood of an outage occurring and not the amount of electricity that is expected to be lost as a result. This standard can have the effect of overstating capacity needs which is unnecessarily costly for consumers without providing additional benefit.

The types of reliability events that arise today are much more varied and a broader set of reliability metrics are needed to ensure resource adequacy to meet demand. Understanding the size, frequency, duration, and timing of potential shortfalls is essential to finding the right resource solutions. LOLE is an inadequate metric on its own because it provides limited information on a shortfall's event size and duration. This makes it difficult to know the true impact of potential shortfalls and nearly impossible to determine the types of resources necessary to reduce the number of shortfalls.[1]

A recent study performed by Southwest Power Pool (SPP) showed that under certain conditions, the number of outages (i.e., LOLE) could remain low even as the magnitude of those outages (i.e., expected unserved energy or EUE) increased exponentially concluding that the one day in ten years metric might not be appropriate to apply to a system with a high

[1] Redefining Resource Adequacy Task Force 2021, *Redefining Resource Adequacy for Modern Power Systems*, Reston VA: Energy Systems integration Group (ESIG), p. 10.

penetration of renewables.[2] To further illustrate the deficiency of relying solely on the LOLE metric, ERCOT expected a reserve margin of 16.2% prior to Winter Storm Uri, but, on February 15, 2021, experienced a -21.1% reserve margin instead.[3]

Energy and Environmental Economics', Inc. (E3) assessment of the status quo demonstrates that the LOLE metric is not the appropriate target. According to E3, the energy-only market in Texas in 2022 achieved a LOLE target of 0.03 days per year, remarkably better than the industry standard of 0.1 days per year.[4] However, during calendar year 2022, ERCOT operated on the brink of power outages multiple times and yet, the LOLE metric failed to capture these occurrences. The Commission cannot expect a market design aimed solely at achieving this arbitrarily selected metric to improve reliability when the same metric indicates that there is no reliability problem to begin with, despite evidence to the contrary.

APA and ACP urge the Commission to carefully consider a variety of metrics rather than adopting and relying upon a single metric. The Commission should also consider other metrics besides LOLE and EUE including the economically optimal reserve margin as described by the Brattle Group. According to the Brattle Group, the economically optimal reserve margin minimizes total system costs by weighing: (1) increasing capital costs of building more generation plants to achieve the higher reserve margins, against (2) decreasing scarcity-event-related costs as higher reserve margins help to avoid load shedding, reserve shortages, demand-response calls, and other emergency event costs.[5]

As the variability of both demand and supply continue to increase, it will become more important to analyze the specific risks of extreme outcomes, not just include the extreme outcomes in an average with all other outcomes.

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[2] Southwest Power Pool, Expected Unserved Energy (EUE), November SAWG Meeting , available at https://spp.org/Documents/68194/sawg%20agenda%20&%20background%20materials%202022 1109-10.zip.
[3] Patrick Milligin, Winter Storms FFreak Havoc on ERCOT Grid, ICF Insights / Energy, (Feb. 23, 2021), available at https://www. icf. com/insights/energy/winter-storms-ercot-grid.
[4] E3 Report at 126.
[5] The Brattle Group, *Estimating the Economically Optimal Reserve Margin in ERCOT* (Jan. 2014) at V.

III. RESPONSES TO COMMISSION STAFF'S QUESTIONS

(1) The Commission has previously considered various reliability metrics, such as Loss of Load Expectation (LOLE), Loss of Load Hours (LOLH), and Expected Unserved Energy (EUE). - Which reliability metrics, including those not previously studied, should the Commission consider in establishing a reliability standard for the ERCOT power region? - Which reliability metric, or combination of reliability metrics, should the Commission adopt for the reliability standard in ERCOT? - What are the advantages of your chosen reliability metrics, and what are the disadvantages of alternative approaches?

APA/ACP RESPONSE:

APA and ACP believe that with the changing nature of both supply and demand side resources and more extreme weather events, the traditional 1-in-10 LOLE threshold could serve as a reliability floor. However, LOLE by itself does not paint a full picture of reliability because it only describes the frequency of loss of load events, not their magnitude or duration. An LOLE standard would view a loss of load event of a mere 10 MWh equally as a loss of load of 10,000 MWh even though the latter is 1,000 greater in magnitude. Similarly, an LOLE standard would view a one-hour loss of 10 MWh worth of load equally as a 24-hour loss of 10,000 MWh, despite their different durations and magnitudes and even though the latter is a severe and potentially catastrophic event and the other a relatively minor event.

Different reliability metrics measure different things. While LOLE helps identify the amount of capacity needed to meet a given target, EUE can identify the amount of energy needed at specific times. The Commission should consider adopting multiple, complementary metrics, each measuring the impact of load shed events differently. A combination of these metrics would ensure reliability against both the frequency and magnitude of loss of load events.

APA and ACP were encouraged to see that ERCOT is considering such a combination of reliability metrics at its recent workshop on reliability. However, ERCOT should avoid adopting a hard cap on load shed events. Specifically, ERCOT discussed the possibility of establishing a

maximum amount of load to be shed in any given hour, and a maximum duration of any load shed event. However, limits placed on any one hour may be too limiting overall. For example, if a 10-hour limit were to be adopted, and ERCOT had to shed 10 MW of load every hour for 11 hours, that would fail the standard. However, it is clear that a 10 MW load shed for every hour for 11 hours does not amount to a large load-shed event and it would be unnecessarily costly to consumers to plan additional investments to prevent such small events. It is important to balance reliability with total system costs and EUE measures unserved energy risk more accurately. Further, ERCOT should quantify the value of lost load to improve analysis of optimal economic reserve margins and understand the cost-benefit tradeoffs as the system continues to evolve.

It is important for ERCOT to conduct detailed analysis to help the Commission determine an appropriate EUE standard. This standard should balance sufficient reliability and expected cost to ensure such reliability. A starting point in this analysis could be to determine the economic value of lost load ("VOLL"). Once established, the VOLL can be used as an effective economic metric for cost-benefit analysis of optimal reserve margin calculations. APA and ACP also recommend studying and updating the VOLL on a regular basis to maintain accuracy. These metrics, working in tandem, will allow the market to respond and achieve the desired reliability goals from both a frequency (LOLE) and duration (EUE) of event perspective.

(2) What is the most effective way that the Commission can include deliverability in the reliability standard?

APA/ACP RESPONSE:

Deliverability is a critical component in the consideration of the contribution a resource can provide to the system's overall resource adequacy framework. During Winter Storm Uri, there were megawatts of generation trapped behind constraints that could have served load but for transmission congestion. Even with adequate generation, bottlenecks in the transmission system interfere with the reliable, efficient, and affordable delivery of electric power. It is critical to include quantifiable transmission benefits in the transmission planning

process to meet economic planning test thresholds to ensure adequate delivery of available resource output to load.

The transmission system provides an effective bulwark against threats to the generation fleet through the diversification of resources and multiple pathways for power to flow ultimately to customers.[6] By providing customers access to generation resources with diverse geography, technology, and fuel sources, the transmission network buffers customers against extreme weather events that affect a specific geographic location or some external phenomenon such as unavailability of fuel and physical or cyber-attacks that affect only a portion of the generating units.[7] A robust transmission system supports resilience, reliability, and efficiency.

While deliverability must be considered during reliability analysis to accurately measure how much generation can be delivered to load, the Commission should avoid imposing onerous firm transmission requirements on generators. Deliverability analysis and requirements to perform network upgrades to ensure firm transmission service have caused interconnection queue bottlenecks in other RTOs that will not be resolved for many years. Texas remains an attractive market for new investment in generation capacity in large part because it has not adopted deliverability requirements and associated studies and upgrades as a condition for interconnection. To the extent the Commission is concerned about attracting investment in new generation, the Commission should be wary of inadvertently creating bottlenecks in its interconnection process.

In order to promote deliverability, APA and ACP suggest the Commission evaluate outage requirements. The market has witnessed increasing episodes of Operating Condition Notices (OCN) and Energy Emergency Alerts (EEA) during certain seasons that substantially

[6] The Brattle Group, Chupka (2018), "Recognizing the Role of Transmission in Electric System Resilience," p.3.
[7] *Id.*

impact delivering low cost, available power to consumers. Additionally, the available transmission lines face increased constraints due to rerouting of power limiting deliverability.

Finally, it is of utmost importance that all potential resources be fully and properly considered with appropriate and accurate reliability factors established for each resource type, with those factors based on a rigorous and in-depth review of each one using up-to-date data.

(3) Additional considerations in establishing the reliability standard in the ERCOT power region. - Should the reliability standard include a locational requirement? - Should the reliability standard include a seasonal component? - How can extreme events be captured in a reliability standard? - How can the value of distributed energy and load resources be captured in a reliability standard?

APA/ACP RESPONSE:

APA and ACP believe the most appropriate method to analyze loss of load risk is via probabilistic loss of load studies. ERCOT has experience using the strategic energy and risk valuation model (SERVM) to conduct probabilistic simulations for reserve margin and loss of load studies, and APA and ACP believe this tool should be used to study various scenarios and assess potential loss of load risk.[8] The results of these studies can be benchmarked against the reliability standard adopted by the Commission, and the Commission may then make policy decisions necessary to achieve the standard if the studies demonstrate insufficient resource capabilities.

A reliability standard could include a locational requirement to assess if there are sufficient resources to deliver energy to serve load across the ERCOT transmission system. This would require ERCOT to analyze transfer capability across the transmission system and identify different zones that could be served by local resources or resources outside the zones via transmission delivery. The ability of a new transmission project to increase transfer capability

[8] See "Workshop on ERCOT's Proposed Reliability Standard Study Framework" presented by ERCOT at a workshop on March 15, 2023.

and facilitate the integration of new resources to meet the reliability standard would be a reliability benefit that should be assessed in the transmission planning process.

A seasonal component to more accurately model and assess load shed risk that is different across seasons may be the most beneficial. However, while seasonal may be more accurate than an annual model, it is more complex to model and administer.

Finally, ERCOT's probabilistic studies should model extreme weather events and correlated outage risk of resources during extreme weather events, which have demonstrated increased risk of high forced outage risk for resources during extreme cold temperatures. Additional review is likely needed to determine appropriate ways to incorporate the potential risks posed by extreme weather events.

(4) How frequently should the Commission update the calculation of the requirement necessary to meet the reliability standard? - What criteria should help determine the frequency of the update?

APA/ACP RESPONSE:

Consistency in resource adequacy analysis and reporting will provide better insight on what shortfall events look like across the system and will help the industry better understand how resource adequacy risks shift with changes in the resource mix of increased variable renewable energy, energy storage, and load flexibility of modern power systems.[9] We believe the Commission could start with a biennial review and evaluate the need for more or less frequent analysis. The Commission should also consider utilization of the metrics to develop detailed statistics of the shortfall events themselves in order to better characterize the size, frequency, duration, and timing of events so that mitigation measures can be properly sized.[10]

[9] ESIG at 29.
[10] *Id* at 10.

In line with the above, a permanent working group should be established to monitor the progress or the lack thereof in effectively utilizing these standards. This is particularly important during this early phase of the transition that is currently underway to ensure reliability standards include sufficient resource adequacy for meeting reliability rules. This, coupled with extreme weather and uncertainty issues, makes resource adequacy a top priority. This working group would monitor relevant resource adequacy assessments by ERCOT and advise the PUCT, when appropriate, as to its insights regarding resource adequacy matters.

(5) If you have any industry or academic papers on the topic and best practices that you believe the Commission should review while establishing the reliability standard for the ERCOT power region, please provide them.

APA/ACP RESPONSE:

Energy Systems Integration Group. 2021. Redefining Resource Adequacy for Modern Power Systems. A Report of the Redefining Resource Adequacy Task Force. Reston, VA.
https://www.esia.eneray/resource-adequacy-for-modern-power-systems./

Resource Adequacies Metrics and Their Applications
https://www.nysrc.org/PDF/Reports/Resource%20Adequacy%20Metric%20Report%20Final%204-20-2020%5B6431%5D.pdf

Effective Load Carrying Capability
http://www.caiso.com/Documents/IssuePaper-GenerationDeliverabilityAssessment.pdf

Three probabilistic metrics for adequacy assessment of the Pacific Northwest power system
https://www.sciencedirect.com/science/article/pii/S0378779619301713

IV. CONCLUSION

The Advanced Power Alliance and the American Clean Power Association appreciate the opportunity to provide comments in this project. We urge the Commission to carefully consider a variety of metrics rather than adopting and relying upon a single metric. We look forward to continuing to work with the Commission as the Commission determines the reliability standard for the ERCOT region.

PROJECT NO. 54584

EXECUTIVE SUMMARY OF THE ADVANCED POWER ALLIANCE AND AMERICAN CLEAN POWER ASSOCIATION COMMENTS

- The changing nature of both supply and demand-side resources and more extreme weather warrant the use of a broader set of reliability metrics to ensure resource adequacy to meet demand.

- A reliability standard that considers the size, frequency, duration, and timing of potential shortfalls is essential to finding the right resource solutions.

- LOLE is an inadequate metric on its own because it provides limited information on a shortfall's event size and duration. This makes it difficult to know the true impact of potential shortfalls and nearly impossible to determine the types of resources necessary to reduce the number of shortfalls.

- A recent study performed by Southwest Power Pool (SPP) showed that under certain conditions, the number of outages (i.e., LOLE) could remain low even as the magnitude of those outages (i.e., expected unserved energy or EUE) increased exponentially concluding that the one day in ten years metric might not be appropriate to apply to a system with a high penetration of renewables.

- According to E3, the energy-only market in Texas in 2022 achieved a LOLE target of 0.03 days per year, remarkably better than the industry standard of 0.1 days per year. However, during calendar year 2022, ERCOT operated on the brink of power outages multiple times and yet, the LOLE metric failed to capture these occurrences.

- Even with adequate generation, bottlenecks in the transmission system interfere with the reliable, efficient, and affordable delivery of electric power. It is critical to include quantifiable transmission benefits in the transmission planning process to meet economic planning test thresholds to ensure adequate delivery of available resource output to load.

- In order to promote deliverability, APA and ACP suggest the Commission evaluate outage requirements. The market has witnessed increasing episodes of Operating Condition Notices (OCN) and Energy Emergency Alerts (EEA) during certain seasons that substantially impact delivering low cost, available power to consumers. Additionally, the available transmission lines face increased constraints due to rerouting of power limiting deliverability.