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Received - 2023-04-04 12:01:41 PM
Control Number - 54584
ItemNumber - 28

Rakon Energy submits the following comments in response to the Commission's request for comments on Project No. 54584.

Rakon Energy is an independent energy consultant. Rao Konidena, formerly employed with the Midcontinent Independent System Operator (MISO), is the President of Rakon Energy LLC. Rao Konidena is experienced with Loss of Load Expectation analysis.

(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?**

The Commission should look at reliability metrics from the lens of distributed energy and load resources. The Commission should note that the current reliability metric of one day in 10-year standard started in the industry to put a value on the interconnection support needed for an area from its neighbor. It is commonly understood that if an area does not receive external support, then the area's reserve margin will be higher than the area receiving external support. How much support does an area need depends upon how much reliability does the area have to start with? For example, if an area had a loss of load probability of 0.3, which is three days in 10 years, the area needs external support to bring the probability down to one day in 10 years. Hence the amount of external support needed for this area to meet the reliability standard is the difference between 0.3 and 0.1. So, the external capacity has to deliver to an area of at least 0.2, two days in 10-year reliability. That's how the industry started using these reliability metrics - loss of load expectation and loss of load probability.

The loss of load hours translates the loss of load expectation of one day in 10 years to an hourly metric. Since there are 24 hours in a day, the loss of load hours translates into 2.4 hours in 1 year. However, we know intuitively that 2.4 hours during peak demand in the evening in the summer season is much more disruptive to customers than 2.4 hours after midnight. Hence the loss of load hours as a metric loses its value unless we look at the time period in which those hours are lost.

Finally, the metric of expected unserved energy is the result of the models that spit out the loss of load expectation and loss of load hour metrics. And expected unserved energy is valuable to understand how much energy is not met, which leads to an area not meeting its one day in 10 criteria. In other words, an expected unserved energy metric is valuable to provide the deficiency in capacity for an area to maintain its one day in 10 criteria. This EUE value is informational for resources that can provide capacity in an area that is deficient.

- **Which reliability metric, or combination of reliability metrics, should the Commission adopt for the reliability standard in ERCOT?**

Rakon Energy takes no position on this question at this time.

- **What are the advantages of your chosen reliability metrics, and what are the disadvantages of alternative approaches?**

Rakon Energy takes no position on this question at this time.

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

The loss of load expectation analysis is essentially called load deliverability. To understand the concept of deliverability in a reliability standard, it is essential to go back to the reason why we have LOLE. LOLE analysis shows how much an interconnecting area supports an area of interest. Once an area depends upon transmission support to receive capacity located in an external area, two questions need to be addressed. First, is the transmission system reliable? Second, is the capacity that is behind the transmission system reliable? The concept of deliverability in a reliability standard includes answers to both these questions. For example, if area A depends upon external support from an area B through a transmission line that connects area A to area B, that external support is unavailable if the transmission line goes down. Hence we need to model the outage statistics of transmission lines in this LOLE analysis. At the same time, external support is not accessible if the transmission line is in-service, yet the capacity behind the transmission line is unavailable. In this situation, not only is the forced outage rate of the capacity in the external area relevant to the LOLE analysis, but the correlation between the transmission line outage and the forced outage rate of the capacity in the external area needs to be factored in. That correlation is the most effective way for the Commission to include deliverability in this reliability standard discussion.

(3) **Additional considerations in establishing the reliability standard in the ERCOT power region.**

- **Should the reliability standard include a locational requirement?**

Yes, the reliability standard should include a locational requirement. Because each area has a unique set of resources, both supply and demand and unique characteristics of customers, having a locational requirement enables an accurate description of reliability needs. Additionally, a locational requirement provides transparency on the level of transmission support available to an area from an external area. For example, if an area has a planning reserve margin requirement of 15% with transmission support, it is likely another area without enough transmission support has a higher reserve margin of say 20%. However, it should be noted that the entire ERCOT system reserve margin could be 15% hypothetically, but each local area would need a margin in single digits, like 9% depending upon the coincidence of an area's peak load with the ERCOT system peak. So, this peak load contribution of an area to ERCOT's system peak is essential in setting the locational requirement.

- **Should the reliability standard include a seasonal component?**

Yes, the reliability standard should include a seasonal component. The reason for this seasonal aspect is traditional. The industry has been concerned about summer peak load hours. Hence the planning reserve margin requirement centered around the summer peak load. However, in the recent past, capacity deficiencies occurred in winter and shoulder months. The variation in capacity in these winter and shoulder months is better captured if the reliability standard includes a seasonal component. For example, the winter demand is typically less than the summer demand; hence we expect the loss of load expectation analysis to indicate that the winter season has better reliability than the summer. But that assumption is not true if the winter heating load demand is similar to an air conditioner load in summer. Additionally, in the shoulder months, in March/April, we expect most units to conduct preventive maintenance to prepare for maximum output during peak summer

load conditions. These variations in maintenance schedules of supply and demand resources should be modeled to assess the reliability standard required for each season.

- **How can extreme events be captured in a reliability standard?**

In a sense, extreme events are already captured in the LOLE analysis. The reason for this is that all the supply and demand side units outage statistics are modeled in the analysis, but those outage statistics are based on historical three-year or five-year average values. It is common knowledge that a unit's reliability will look much better if a five-year historical average is taken compared to last year. Hence before assuming that extreme events are not captured in a reliability standard, the Commission is better served by looking at the historical averages for each unit modeled in the current ERCOT loss of load expectation analysis. If the Commission is not satisfied that extreme events are not captured in the current historical outage statistics of units and transmission, then the Commission should investigate the correlation of top causes of historical outages. For example, if natural gas units have an outage statistic of 6%, but if the natural gas pipeline is constrained, leading to an outage statistic of 10%, then the Commission should ask ERCOT to model the 10% statistic instead of the 6% to account for the extreme event that led to an increased outage for natural gas units. In summary, extreme events are likely captured in the outage statistics of the current analysis. But if the Commission believes that modeling of extreme events do not accurately reflect past historical outages, then the Commission should ask ERCOT to model the correlated outages to more accurately capture the impact of extreme events.

- **How can the value of distributed energy and load resources be captured in a reliability standard?**

Going back to the example of area A, which depends upon area B for transmission support, the Commission should investigate the amount of distributed energy resources that provide capacity in areas A and B. The hypothesis that needs to be tested in the ERCOT analysis is that if an area has 100 megawatts of distributed energy resources – 100 units each with one MW capacity- this area is much more reliable than an area with one single unit of 100 MW capacity. Since the distributed resources can provide much better reliability where they are located without the need for transmission, a locational requirement will show how much an area is dependent on an external area for interconnection support when these distributed resources are not able to deliver capacity. For example, if an area A has 100 units each of 1 MW solar capacity, if a cloud cover removes that solar production for a couple of hours, area A would depend upon an external area to meet the one-day-in-10 standard. At the same time, the analysis should indicate that area A can support area B if all those 100 units of one MW solar capacity produce enough solar to meet the area's reliability requirement but can also support area B if needed. A thorough LOLE analysis should indicate the locational value distributed energy resources and load flexibility provide.

Rakon Energy supports the Microgrid Resources Coalition (MRC) comments[1] submitted in response to this question, "Historical methods have treated load as static values, but in today's system, microgrids (and DERs more broadly) provide highly flexible loads that can either respond for calls to reduce load, or that can inject into the system as supply-side resources." Rakon Energy respectfully reminds the Commission that LOLE analysis in the past was developed when loads were static, not dynamic. The industry has evolved in the past 40 years, and we can no longer assume static loads in LOLE analysis. Hence the load flexibility provided by DERs must be captured in future ERCOT LOLE analyses.

[1] MRC Comments, page 3, https://interchange.puc.texas.gov/Documents/54584_5_1284323.PDF

Rakon Energy supports the Texas Public Power Association (TPPA) comment[2] that the reliability standard should account for the reliability benefits provided by DERs.

Rakon Energy supports the CPS Energy comment[3], "The reliability impact of a loss of a 10 MW DER acting as a generator is much less than a 400 MW generator, and this should be reflected in the modeling of these resources as ERCOT develops its assumptions for the reliability standard, so the distributed generator forced outage rate is not averaged out as these generators are aggregated."

Rakon Energy does not support the following comment[4] from South Texas Electric Cooperative (STEC), "These would include long-term, continuous dispatch for a period of 72 hours." The 72 hours of continuous dispatch requirements for distributed energy and load resources are unsubstantiated and unnecessary.

Rakon Energy supports NextEra Energy Resources (NextEra) comment[5], "The correct accreditation of distributed energy is the first step in ensuring those resources are most accurately accounted for on the system." The Commission should require ERCOT to develop an appropriate capacity accreditation for distributed energy and load resources.

Rakon Energy respectfully submits to the Commission that not all distributed energy and load resources are equal. London Economics International alludes to this issue in their statement[6], "How load resources "perform" under normal and extreme conditions is not solely a function of price signals." There are primarily 2 considerations for the Commission to assess how distributed energy and load resources perform – reliability and economics. Providing a price signal before an emergency incentive gives these resources an economic signal, whereas allowing resources to participate during an emergency event is a reliability signal. ERCOT system needs both to ensure reliability.

Rakon Energy supports RMI's comment[7], "Distributed energy resources including virtual power plants and flexible load can play a key role in supporting grid reliability and their contribution should be evaluated consistently with supply-side resources."

Rakon Energy supports NRG Energy's comment[8], "The strategic energy and risk valuation model ("SERVM') used by ERCOT and Astrape should reflect a range of distributed energy capacities, startup times, ramp rates, and other factors, as well as varying price responsiveness of and voluntary load reductions by load resources."

Rakon Energy also supports the following statement[9] from Texas Solar Power Association and Solar Energy Industries Association ("Solar Associations"), "Cost transparency will help the Commission determine the most economic manner in securing system reliability and on allocating dollars between resource adequacy and increasing investments in transmission and distribution."

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[2] TPPA comments, page 5, https://interchange.puc.texas.gov/Documents/54584_8_1284353.PDF
[3] CPS Energy comments, page 7, https://interchange.puc.texas.gov/Documents/54584_7_1284345.PDF
[4] STEC comments, page 6, https://interchange.puc.texas.gov/Documents/54584_6_1284327.PDF
[5] NextEra comments, page 4, https://interchange.puc.texas.gov/Documents/54584_11_1284379.PDF
[6] London Economics International comments, slide 6, https://interchange.puc.texas.gov/Documents/54584_12_1284380.PDF
[7] RMI comments, page 5, https://interchange.puc.texas.gov/Documents/54584_14_1284412.PDF
[8] NRG comments, page 4, https://interchange.puc.texas.gov/Documents/54584_16_1284429.PDF
[9] Solar Associations comments, page 7, https://interchange.puc.texas.gov/Documents/54584_18_1284435.PDF

(4) **How frequently should the Commission update the calculation of the requirement necessary to meet the reliability standard?**

Rakon Energy takes no position on this question at this time.

- **What criteria should help determine the frequency of the update?**

Rakon Energy takes no position on this question at this time.

(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.**

MISO's LOLE report would be worthwhile for the Commission to review, specifically the Local Resource Zones, Local Reliability Requirement, Local Clearing Requirement, Capacity Import Limits and Capacity Export Limit calculations, and how MISO calculates wind capacity credit from Effective Load Carrying Capability calculations.

MISO Loss of Load Expectation report for the Planning Year 2022-23 can be found here - https://cdn.misoenergy.org/PY%202022-23%20LOLE%20Study%20Report601325.pdf

MISO Wind and Solar Capacity Credit report published in March 2023 can be found here - https://cdn.misoenergy.org/2023%20Wind%20and%20Solar%20Capacity%20Credit%20Report628118.pdf

Information about how MISO Local Resource Zones are determined can be found here - https://help.misoenergy.org/knowledgebase/article/KA-01073/en-us

MISO Zonal Coincidence Factors are posted here - https://cdn.misoenergy.org/Zonal%20Coincidence%20Factors%202006_2020574464.pdf

Rakon Energy Comments Executive Summary for Project No. 54584

(1) The Commission should look at reliability metrics from the lens of distributed energy and load resources. The Commission should note that the current reliability metric of one day in 10-year standard started in the industry to put a value on the interconnection support needed for an area from its neighbor.

(2) The correlation between the transmission line outage and the forced outage rate of the capacity in the external area is the most effective way for the Commission to include deliverability in this reliability standard discussion.

(3) Yes, the reliability standard should include a locational requirement. Because each area has a unique set of resources, both supply and demand and unique characteristics of customers, having a locational requirement enables an accurate description of reliability needs.

(4) Yes, the reliability standard should include a seasonal component. Because variations in maintenance schedules of supply and demand resources accurately capture the reliability standard required for each season.

(5) If the Commission believes that the current modeling of extreme events does not accurately reflect past historical outages, then the Commission should ask ERCOT to model the correlated outages to more accurately capture the impact of extreme events.

(6) A thorough LOLE analysis should indicate the locational value distributed energy resources and load flexibility provide.

(7) MISO's LOLE report would be worthwhile for the Commission to review, specifically the Local Resource Zones, Local Reliability Requirement, Local Clearing Requirement, Capacity Import Limits, and Capacity Export Limit calculations.