

January 10, 2024

Via Electronic Delivery: Kaitlyn.Peterson@mail.house.gov

Congress of the United States
House of Representatives
Kaitlyn Peterson
Legislative Clerk
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515-6115

RE: Request for Responses to Additional Questions for the Record, dated December 18, 2023

Dear Ms. Peterson:

Attached below please find my responses to the questions included in Chair Duncan's letter of December 18, 2023. If Members have any additional questions, please do not hesitate to contact me.

Sincerely,

/s/ D. W. Rickerson, P.E.
D. W. Rickerson, P.E.
Senior Vice President and Chief Operating
Officer
Electric Reliability Council of Texas, Inc.
(512) 248-6501
Woody.Rickerson@ercot.com

Attachment

Attachment—Responses to Additional Questions for the Record

The Honorable Jeff Duncan

- 1. Is there evidence that subsidies for gride scale battery storage, solar, and wind resources suppress capacity and energy market prices in your region? If so, please describe.**

The ERCOT energy market has experienced periods of extremely low, and occasionally even negative, real-time prices when wind and solar units are on the margin. Production tax credits for wind generating units can incentivize operators of these units to offer at negative prices. Wind, solar, and particularly battery storage, each have a distinct effect on electricity prices that varies throughout the day and seasonally. The market interaction of these three resource types with traditional dispatchable generation is complex. ERCOT does not have a capacity market.

- a. In your opinion, have subsidies negatively affected market outcomes? Do subsidies for batteries, solar, and wind discourage investment for new dispatchable thermal generation? How much have these market conditions contributed to the retirement of existing dispatchable thermal resources?**

ERCOT has seen an increase in both wind and solar interconnections in the last 10 years that has corresponded with a decrease in the amount of dispatchable generation being constructed compared to historical levels. In addition, ERCOT has seen an increase in battery interconnections, and batteries have begun to heavily displace traditional generation in the Ancillary Services market. There have also been more than 11,000 MW of retirements of dispatchable units in that period. Some of these units would have undoubtedly retired even without competition from wind, solar and batteries, but the timing of those retirements might have been different. However, it is indisputable that the operation of low-marginal cost generation such as wind and solar has impacted the economics of operating and developing dispatchable generation, likely influencing many retirement decisions.

Overall, it is difficult to quantify the market impact to consumers of wind, solar, and battery subsidies. Consumers have benefited from lower energy prices in both real-time and in forward markets. However, delivery of energy from wind and solar resources has resulted in increased transmission charges. In the ERCOT system wind and solar resources are typically located in areas far from load. ERCOT does not have a comparison of what those same transmission charges would have been if wind and solar had not been subsidized. Lastly, a grid with high penetrations of wind and solar resources is more complicated to reliably operate. That complexity also results in increased costs to consumers.

- b. Do these subsidies and their effects on markets make your system more reliable or less reliable?**

The wind, solar, and battery penetration that has accompanied subsidies increases the complexity of reliably operating a power grid. First, the inverter-based

technology that is used to connect these types of generation to the grid presents new challenges in maintaining grid stability, grid inertia, and overall system strength that traditional generation does not pose. This new complexity must be incorporated in ERCOT control systems, processes, and procedures, and in the training and knowledge of engineers and operators. Second, the variability of wind and solar contributes to uncertainty in balancing generation and load and makes accurate forecasts of weather conditions even more important in managing the grid. Finally, integrating batteries requires sweeping changes in software, modeling, and market rules to account for the operational characteristics of batteries, including limited discharge duration and the need for batteries to recharge from the grid once they discharge. Overall, the increased complexity can work against reliability.

c. What steps are you taking to ensure that these subsidies are not unduly discriminatory and preferential, and that rates remain just and reasonable?

Rates paid by consumers are largely based on bilateral contracts between Load Serving Entities (LSEs) and Generators agreed upon outside of the ERCOT-administered wholesale market. In real-time, ERCOT dispatches existing generation based solely on market pricing without regard to technology, subject to any constraints necessary to maintain system reliability. The ERCOT interconnection process of new generation does not consider fuel types except to prioritize dispatchable generation in the study process. ERCOT does not have a transmission reservation system whereby one type of generation is treated more favorably than other types. In Transmission Planning studies, dispatchable generation is the only generation type dispatched at full output.

d. Would you consider state renewable mandates as out of market interventions? Would you consider the mandates as a form of market power?

Renewable mandates are, by definition, out-of-market interventions and can be expected to affect market outcomes. Depending on the specific design, a renewable mandate could raise market power concerns; however, some renewable mandates may not raise these concerns.

2. Recognizing that ERCOT is an energy only market, is ERCOT considering market changes to maintain reliability?

ERCOT is currently working with the Public Utility Commission of Texas (PUCT) to implement a number of market changes adopted by the Texas Legislature and the PUCT with the goal of ensuring reliability. These initiatives include, but are not limited to:

- The creation of a Performance Credit Mechanism (PCM), which will increase reliability by providing additional compensation for dispatchable generation that performs in the most critical hours;
- Enhancements to the Operating Reserve Demand Curve (ORDC) to incentivize self-commitment of dispatchable generation and improve resource revenues during scarcity conditions; and

- Establishing a Dispatchable Reserve Reliability Service, which is a new ancillary service that will provide additional revenues for resources capable of operating at their highest sustainable limit for 4 hours.

In addition, the PUCT is in the process of implementing the Texas Energy Fund, which was created by the Texas Legislature to make low-interest loans available to assist the development of new and upgraded dispatchable generation in the near future and to provide completion bonus grants to new dispatchable generation facilities that meet certain criteria.

- a. Are you concerned that there will be a recurring need to defer retirements or enter into out of market contracts to retain generators if subsidies persist and the markets do not change to correct inefficiencies?**

Yes, ERCOT is concerned that continuing retirements of dispatchable generators will raise reliability concerns that could lead to a need for out-of-market action. In November 2023, ERCOT issued a Request for Proposal (RFP) in an attempt to find up to 3,000 MW of additional generation or load curtailment to mitigate the reliability risk that would be present if a severe winter storm were to occur in the ERCOT footprint. ERCOT had not previously issued such an RFP. Without additional generation or demand response the need that drove the RFP is likely to continue in future winters.

- b. Are forward looking markets like capacity markets needed to procure enough resources that can provide essential reliability services?**

Not necessarily. ERCOT believes an energy-only market that adequately compensates resources that provide power during scarcity conditions can provide sufficient revenue certainty to attract enough dispatchable generation to provide essential reliability services. The upcoming PCM changes will help provide some of that additional revenue certainty.

- 3. Please describe your generator retirement process. Are current retirement processes that retain resources while transmission upgrades are implemented sufficient to prevent the scale of retirements facing RTOs/ISOs?**

Generators must provide ERCOT 150 days' notice of their proposed suspension of operations, which allows ERCOT to determine if the suspension of operations would result in violations of transmission reliability criteria. Units can be placed in a Reliability Must Run (RMR) agreement if such a need is identified. This process does not evaluate the impact of a generator retirement on system capacity needs. At this time, ERCOT's rules do not explicitly contemplate the use of RMR or similar processes to prevent retirements that could result in a deficiency of dispatchable generating capacity on a purely system-wide basis.

a. Do you consider issues other than reliability violations on the transmission system when assessing the impacts of proposed generator retirements?

No. ERCOT's evaluation of a retiring unit's reliability impacts is currently limited to transmission system issues and does not consider the effect of the retirement on Resource Adequacy. Market considerations are also not factored into the analysis.

i. For example, should violations of other reliability criteria, shortfalls of FERC-approved resource adequacy requirements, or need for essential reliability services be considered when a generator proposes to retire?

The PUCT has opened a rulemaking to establish a reliability standard for the ERCOT region. ERCOT is participating with the PUCT in that rulemaking. Once a Reliability Standard is established, the potential impact a retiring generator has on resource adequacy could conceivably be added to the transmission analysis that ERCOT performs for retiring units. This change would be up to the PUCT, which would also need to approve changes to ERCOT market rules to effectuate this outcome. ERCOT is not subject to FERC-approved resource adequacy requirements.

b. Should RTOs/ISOs be able to retain generators until the capacity, energy, and essential reliability services they provide are replaced?

While being able to retain generators for reliability purposes might be useful for achieving near-term reliability goals, giving ERCOT the authority to retain generators to meet future system demand would raise important market policy issues that ERCOT's direct regulator, the PUCT, and possibly the Texas Legislature would need to consider.

4. Electrification of the heating and transportation sectors has the potential to greatly increase electric demand and capacity needs. The nation's top reliability organization, the North American Electric Reliability Corporation (NERC), and leaders from the Federal Energy Regulatory Commission (FERC), have testified that we currently have a potential reliability crisis caused by the potential loss of firm, baseload generation. This issue grows greater with the proposed EPA rules that place regulations on coal and natural gas-fired generation. When do you anticipate reliability concerns materializing or have they already materialized? What are you doing to solve this resource adequacy crisis and potential energy adequacy crisis?

ERCOT's recent RFP for capacity (November 2023) is evidence that reliability concerns are already present. In addition to the Texas Energy Fund, which the Texas Legislature created to assist the development of new and upgraded dispatchable generation, important upcoming market reforms, including the PCM and DRRS, could help solve the problem of declining dispatchable generation capacity. These reforms are expected to be implemented by 2026. Additionally, transmission planning changes have recently been put in place to maximize the delivery of as much of the energy from existing units as economically makes sense. ERCOT also studies future conditions with scenarios that include large-scale retirements to alert policy makers of potential issues. However, none of the market reforms

ERCOT is expecting to implement could ensure reliability if EPA regulations such as the proposed Greenhouse Gas rule constrain the development of dispatchable capacity. These proposed regulations could have immediate impacts on generator retirements due to impacts on investment incentives but will almost certainly force retirements when they take effect. The Greenhouse Gas rule, as proposed, would take effect in 2030. EPA's Ozone Transport Federal Implementation Plan (FIP), which could have significant impacts on dispatchable generation in the ERCOT fleet, was proposed to be effective this past summer but was stayed by the U.S. Court of Appeals for the Fifth Circuit.

a. How do you plan to retain existing dispatchable generation and incent new of entry of dispatchable generation if your markets currently do not?

ERCOT does not currently have a direct mechanism for retaining existing dispatchable generation or incentivizing the construction of new dispatchable generation other than the RMR process that addresses only local transmission reliability issues. ERCOT, located within a single state, does have one of the most efficient generation interconnection processes in the country. The future implementation of market improvements such as the PCM and DRRS will provide additional compensation for dispatchable generation that runs during the most critical hours of the year. In addition, the Texas Legislature has created the Texas Energy Fund, which makes low-interest loans available to assist the development of new and upgraded dispatchable generation in the near future, along with completion bonus grants for new dispatchable generation facilities that meet certain criteria.

b. If your system is already facing resource adequacy issues without electrification and demand increase, how will the system be able to sustain large demand growth amidst significant thermal resource retirements?

This question captures ERCOT's core reliability concern. In addition to the incentives for retaining and developing new dispatchable generation, described above, ERCOT is also evaluating possible improvements in demand response. Many of the newest types of loads can be responsive to changes in prices. These new loads, if given the right incentives, could help flatten the demand for electricity while making the off-peak hours more profitable for baseload generation. ERCOT is well positioned to allow these new types of load to bid in their demand to be dispatched by ERCOT. It is unclear exactly how much demand response potential exists with existing and future loads. Even with strong growth in demand response, ERCOT continues to expect that additional dispatchable generation will be needed to alleviate reliability concerns associated with growing demand.

c. What steps is ERCOT taking to incentivize weatherization of natural gas infrastructure or firm fuel supplies?

The weatherization of natural gas infrastructure is not part of ERCOT's responsibilities. Under state law, that responsibility belongs to the Railroad Commission of Texas. ERCOT does have a firm fuel program to compensate

natural gas-powered electric generation facilities for keeping a secondary fuel on site and maintaining the ability to use that fuel to power their units.

5. While the interconnection queue is large, not all resources in the queue get built. What percentage of the generation queue has historically come onto the system? How much from the existing queue to expect to be built?

For 2018, about 40% of the approximately 21,000 MW (nameplate) of generation projects entered into the ERCOT interconnection process eventually became commercially operational. In 2019, only 22% of the approximately 34,000 MW (nameplate) of generation projects submitted into the ERCOT interconnection process became commercially operational. The percentage continued to decline in 2020 with only 7% of the approximately 41,000 MW of nameplate capacity entered in the interconnection process becoming commercially operational. For the years 2021-2023, it is still too early to determine what percentage of the projects entered into the interconnection process in those years will reach commercial operations, but the overall number of projects submitted has increased each year after 2020. It is likely that the historic percentage of units that become commercially operational will continue to decrease for these most recent years and into the near future. The number of projects currently in the interconnection queue outweighs what will be supported economically by load growth.

a. Can you provide an estimate of the gross cost of all the additional renewable capacity you expect to get built?

ERCOT does not have access to the construction cost of new generation and only has access to cost estimates for a subset of the overall transmission improvements that are constructed on the ERCOT system. System transmission improvements can aid dispatchable generation, load, and renewable generation in different degrees. ERCOT does not separate those costs by category.

b. Can you elaborate on the projects that are delayed or canceled due to cost increases?

ERCOT does not have access to the reasons underlying cancellation of generation projects.

i. What is the reliability impact of these delays and cancelations if they force retirement of existing dispatchable thermal resources but no new capacity is added?

ERCOT is uncertain whether planned generation would typically have any impact on retirement decisions for existing generators in advance of the planned generation coming online; however, the announcement of planned generation can discourage investment in other generation, including dispatchable generation.

ii. Are these projects subject to financial penalty if they are unable to meet their obligations? Should project financiers and sponsors be required to

pay for any out of market actions to retain dispatchable thermal resources that are needed when new projects are unable to meet their timelines and obligations?

Under ERCOT rules, generation developers are not required to comply with any specific development timeline, though they do have deadlines to achieve certain milestones following completion of other milestones. Accordingly, there is no penalty for failing to meet deadlines, although ERCOT may refer an entity that fails to comply with certain milestone deadlines to the PUCT, and the PUCT may impose an administrative penalty for a violation of such a requirement.

c. Have you been consulted by EPA or FERC on the proposed power sector regulations?

Yes, ERCOT and other RTOs/ISOs have had several discussions with EPA about potential improvements to the Greenhouse Gas rule that might help to ensure system reliability. ERCOT has not been involved in any discussions with FERC about these issues.

d. If the EPA rules are enacted, will you be able to reliably operate your system?

Continued reliable operation will depend on the effect the enacted rules have on existing generation. ERCOT is concerned that the Greenhouse Gas rule and other EPA regulations could lead to a significant number of generator retirements. The retirement of existing generation, even in limited quantities, will have a negative effect on reliable operation. This effect is exacerbated by the fact that units can announce and complete a retirement much more quickly than new generation can be developed and brought online. The proposed EPA rules do pose a threat to reliable operation of the grid.

e. Should nuclear play a larger role in reliably operating the system and meeting state emission targets?

Nuclear generators have provided a reliable source of dispatchable generation in the ERCOT system for many years. ERCOT expects that additional nuclear generation would benefit reliability.

6. What is the expected cumulative cost of the transmission needed to integrate renewables?

ERCOT does not calculate a cost of new transmission that is needed to integrate renewable generation, and such a calculation would be very difficult, as it would require consideration of the locations where dispatchable generators that would have otherwise been built would be constructed, which would require significant speculation. Moreover, transmission improvements provide benefits to load, dispatchable generation, and renewables. The benefits vary continually depending on operating conditions, and so estimating an accurate

cumulative transmission cost for integrating renewables apart from other generators and load would be very difficult.

a. Can you describe your coordination efforts with neighboring RTOs/ISOs?

ERCOT is not synchronously connected with any other region, resulting in a unique set of coordination efforts. ERCOT coordinates the flow of energy across 820 MW of DC ties with SPP. During critical operating periods ERCOT also coordinates with SPP and MISO for the use of over 3400 MW of switchable generation resources. These switchable plants can move from one region to another, effectively providing their power where it is most critically needed. In addition, there are small amounts of load that can be switched between regions.

b. What is your position on a minimum transfer requirement between planning regions?

There are many factors that inform whether additional transfer capability should be constructed between planning regions, including the geographic interface between regions, the overall geographic and MW size of each region, the location of load centers within each region, the geographic effect severe storms have had on each region, allocation of project costs among regions, and, for the ERCOT region, the amount of switchable generation and load transfer capability that is already present. The recent Department of Energy National Transmission Needs Study, published on October 30, 2023, failed to take most of these factors into consideration. ERCOT suggests that the amount of interregional transfer capability should be coordinated by adjacent planners and should not be mandated by federal requirements.

c. Would a minimum transfer capability requirement undermine the autonomy of the various RTOs/ISOs and their planning processes?

A minimum transfer capability requirement could undermine the autonomy of the RTOs/ISOs and their planning processes, as it could remove or hinder their ability to assess the need for, and determine whether to construct, additional interregional transfer capability. Depending on the nature of the requirement, it may also undermine their ability to allocate the costs of interregional transmission projects constructed to meet the requirement. Finally, depending on the magnitude of transfer capability that would be required and whether AC or DC connections would be required between existing interconnections, additional transmission could impede RTO/ISO control of their respective wholesale markets by requiring coordinated dispatch of generation.

The Honorable Kelly Armstrong

1. Weather-dependent generation is penetrating the generation mix at an increasing rate.

a. Has your organization evaluated accreditation processes for these resources?

ERCOT does not have a capacity market and does not have a capacity accreditation process for Resources of any type.

i. If so, does this accreditation consider the weather risks associated with weather-dependent generation?

ERCOT does not have a capacity accreditation process.

b. Is your organization evaluating seasonal accreditation effective load carrying capacities for weather-dependent generation, including wind and solar?

ERCOT does not have a capacity accreditation process.

i. If so, is your organization evaluating the varying levels of reliability that accompany this standard?

ERCOT does not have a capacity accreditation process. However, ERCOT is introducing changes to its generation forecasting methodologies in its semiannual Capacity, Demand and Reserves report to utilize effective load carrying capability (ELCC) values that will account for the intermittency of wind and solar.

c. Does your organization have the same reliability standards for weather-dependent generation (wind and solar) as it does for dispatchable resources (coal, natural gas, nuclear)?

ERCOT does not have a reliability standard specific to each type of generation resource. ERCOT does have unique ELCC measurements for each type of generation, and ERCOT's inspections take into account the unique weatherization challenges for each type of resource.

2. Traditional load forecasting tools rely on customer history and interactions to approximate demand needs, including peak consumption.

a. To what extent does your organization consider external studies or critiques of load forecasting models when acquiring capacity?

ERCOT uses traditional forecasting methods, econometric forecasts, and external studies that are focused on different segments of the load to help provide an accurate picture of future load conditions. However, ERCOT does not have a capacity market and does not acquire capacity.

The Honorable Lizzie Fletcher

- 1. Following the winter storm, the Texas legislature passed legislation to require weatherization of critical energy infrastructure provides that energy providers can opt out of the requirement after paying a \$150 application fee. Does this opt-out provision present risks to grid reliability in extreme weather events?**

ERCOT understands this question to refer to the Railroad Commission's rules governing weatherization of certain natural gas facilities. ERCOT understands that the final Railroad Commission natural gas weatherization rule (16 Texas Administrative Code § 3.66) requires all critical natural gas facilities to comply with the rule's weatherization standards.