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**PROJECT NO. 51603**

**REVIEW OF DISTRIBUTED ENERGY RESOURCES § PUBLIC UTILITY COMMISSION  
§  
§ OF TEXAS**

**OFFICE OF PUBLIC UTILITY COUNSEL’S RESPONSE TO COMMISSION STAFF’S REVIEW OF DISTRIBUTED ENERGY RESOURCES QUESTIONS**

The Office of Public Utility Counsel (“OPUC”) respectfully submits these comments in response to the questions regarding the review of distributed energy resources (“DER”). On April 20, 2022, Commissioner McAdams filed a memorandum in Project No. 52373, Review of Wholesale Electric Market Design, requesting interested market participants provide responses to a number of questions related to DER. At the April 21, 2022, open meeting, the Commissioners directed the Staff (“Staff”) of the Public Utility Commission of Texas (“Commission”) to file the questions in Commissioner McAdam's memorandum, along with any additions Staff elects to make, in a new DER project. Accordingly, Staff has restyled Project No. 51603 to serve as a clearinghouse project for the development of DER issues. OPUC participated in each of these discussions. Staff requests comments on the proposed discussion draft by June 15, 2022. Therefore, these comments are timely filed. OPUC makes the following comments:

**I. RESPONSES TO STAFF QUESTIONS**

- 1. Distribution planning and control: What planning, and control processes and practices should the Commission consider for greater DER participation and grid resilience? Which entities should be involved in planning and control processes and practices?**
  - i. What are the different utilization and participation formats for existing DERs on distribution networks?**
  - ii. Should the current size limit on unregistered distributed resources be reconsidered?**

The use of Distributed Energy Resources (DER) in the Electric Reliability Council of Texas (ERCOT) region continues to trend upward. There are currently over 1,300 MW<sup>1</sup> of unregistered DERs in ERCOT, and an unknown number of potential but unregistered controllable load resources. Based on annual reports filed at the Public Utility Commission (PUC) of Texas by Transmission & Distribution Service Providers (TSDPs), these DER numbers are continually rising. Some reasons for this increase include customer desire for independence of power, environmental consciousness, and declining costs of DER acquisition. In its concept paper published in 2017, ERCOT mentioned that these resources are generally located on the distribution system, and therefore present challenges associated with modeling their location, behavior, and market participation. However, based on installed capacity and current rates of growth, these resources do not pose an immediate or near-term reliability concern for the transmission grid.<sup>2</sup> Additional drivers for DER growth include participation in emergency response service (ERS), demand-charge avoidance in the form of four coincident peak (4CP) response, and load zone-level wholesale price response in the real-time energy market.<sup>3</sup>

There are two types of DERs in the ERCOT market that bring both challenges and opportunities. First, self-dispatchable generation that uses diesel fuel, natural gas, or landfill gas which can start and run quickly. Second, intermittent generation, primarily rooftop solar.<sup>4</sup> These units typically generate electricity automatically when their energy source is present and are typically offsetting native load and exporting excess generation during light load conditions.

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<sup>1</sup> 2021 STATE OF THE MARKET REPORT FOR THE ERCOT ELECTRICITY MARKETS, Potomac Economics, IMM for ERCOT, May 2022, filed with PUCT.  
[Interchange - Documents \(texas.gov\)](https://www.ercot.com/files/docs/2021/04/27/05._DERs_Reliability_Impacts_FINAL.pdf)

<sup>2</sup> ERCOT- DISTRIBUTED ENERGY RESOURCES (DERS) Reliability Impacts and Recommended Changes, Version 1.0 March 22, 2017.  
[https://www.ercot.com/files/docs/2017/04/27/05.\\_DERs\\_Reliability\\_Impacts\\_FINAL.pdf](https://www.ercot.com/files/docs/2017/04/27/05._DERs_Reliability_Impacts_FINAL.pdf)

<sup>3</sup> ERCOT- DISTRIBUTED ENERGY RESOURCES (DERS) Reliability Impacts and Recommended Changes, Version 1.0 March 22, 2017.  
[https://www.ercot.com/files/docs/2017/04/27/05.\\_DERs\\_Reliability\\_Impacts\\_FINAL.pdf](https://www.ercot.com/files/docs/2017/04/27/05._DERs_Reliability_Impacts_FINAL.pdf)

<sup>4</sup> ERCOT- DISTRIBUTED ENERGY RESOURCES (DERS) Reliability Impacts and Recommended Changes, Version 1.0 March 22, 2017.  
[https://www.ercot.com/files/docs/2017/04/27/05.\\_DERs\\_Reliability\\_Impacts\\_FINAL.pdf](https://www.ercot.com/files/docs/2017/04/27/05._DERs_Reliability_Impacts_FINAL.pdf)

DERs bring multiple benefits to the electrical system including reduced transmission losses, reduced capital costs for high voltage interconnection facilities, and increased resiliency of distribution circuits to transmission failure events. However, the use of DER can also negatively affect grid operations in multiple ways, including increased error in load forecasting. Inaccuracies in the long-term load forecast due to over- or under forecasting of DER in an area could lead to building too little or too much transmission, leaving infrastructure ill-equipped to handle the needs of the grid.

OPUC did not find a short-term approach to resolve these DER issues. ERCOT's independent market monitor (IMM) may provide a better suggestion for the short-term approach for the Commission's discussion. In the long term, ERCOT may consider congestion management plans or any other new mechanism that achieves similar outcomes, but it needs to make sure reliability is guaranteed and that it will not affect consumers. Therefore, an impact analysis is essential to begin such projects.

Currently, ERCOT has eight load zones, including four competitive load zones. All sites in an aggregate load resource (ALR) must be within only one load zone. There are no ALRs currently registered in the ERCOT market. Protocol and other binding document language would need to be developed and written in the long term, if required.

The DER data from distribution service providers (DSPs) and transmission service providers (TSPs) may help support the ERCOT grid monitoring functions. This in turn may help ERCOT for long-term planning purposes, but ERCOT needs to work with TSPs and DSPs to identify the correct data. When DERs are comprised mainly of solar photovoltaic (PV), forecasting behavior is manageable with good estimates of installed capacity by transmission and distribution interface and high-quality weather data. The composition of DER will soon become more complex, with more widespread installation of storage devices, solar PV combined with battery storage, and penetration of electric vehicles.<sup>5</sup>

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<sup>5</sup> NERC, Distributed Energy Resources Task Force Report, February 2017, p 35.  
[https://www.nerc.com/comm/Other/essntlrbltysrvkstskfrDL/Distributed\\_Energy\\_Resources\\_Report.pdf](https://www.nerc.com/comm/Other/essntlrbltysrvkstskfrDL/Distributed_Energy_Resources_Report.pdf)

OPUC is concerned about the reliability of the grid's continuous flow of power and equally concerned that upgrading the grid without corresponding gains in reliability and resilience will negatively affect the residential and small commercial consumers with the accompanying costs. The currently unregistered DERs that are in the ERCOT market need to be registered. This can be achieved at the beginning of the distribution level. Therefore, OPUC agrees with NERC's recommendation and recommends that the Commission order ERCOT to design and implement short term and long-term DER programs and provide a grid service compensation to customers by ensuring that customers receive compensation for both energy exports and grid services.<sup>6</sup>

## **2. Transmission and distribution modification: What equipment, processes, and standards need to be implemented to allow for further DER participation?**

For long-term planning, the following methods may help assist further DER participation:

- a. Performing minor upgrades to the Distribution and Transmission system is one of the best strategies for the long term, and it can be determined on a case-by-case or system-by-system basis. In some cases, changing voltage regulator or capacitor set points can help mitigate impacts. Changing the power factor on the DER can also represent a low-cost integration option. A small change can have a big effect with low cost.
- b. The Commission, ERCOT, utilities, and other stakeholders need to work together for a common understanding of the standards that need to be put into place to maintain system stability, minimize harmonics, and allow for use of alternative set points to implement the rule developed by Institute of Electrical and Electronics Engineers (IEEE) 1547-2018.<sup>7</sup>

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<sup>6</sup> NERC, Distributed Energy Resources Task Force Report, February 2017, p 35.  
[https://www.nerc.com/comm/Other/essntlrbltysrvdstskfrcDL/Distributed\\_Energy\\_Resources\\_Report.pdf](https://www.nerc.com/comm/Other/essntlrbltysrvdstskfrcDL/Distributed_Energy_Resources_Report.pdf)

<sup>7</sup> NERC, Distributed Energy Resources Task Force Report, February 2017.  
[https://www.nerc.com/comm/Other/essntlrbltysrvdstskfrcDL/Distributed\\_Energy\\_Resources\\_Report.pdf](https://www.nerc.com/comm/Other/essntlrbltysrvdstskfrcDL/Distributed_Energy_Resources_Report.pdf)

- c. ERCOT may need to consider congestion management plans or any other new mechanism that achieves similar outcomes, but needs to make sure reliability is guaranteed, and that it will not negatively affect consumers. All the current unregistered DERs that are in the ERCOT market need to be registered at the beginning of the distribution level. The DER data from DSPs and TSPs may help ERCOT plan for the long-term security of the grid system.
- d. The ERCOT IMM supported the decision to implement nodal pricing for Controllable Load Resources (CLRs). The IMM, in its 2021 report, mentioned that there has been a proliferation of proposed net metering schemes since adoption of NPRR945, Net Metering Requirements, that distort the incentives provided by this directive. Loads that can be turned on and off quickly, such as data centers and crypto mines, should be incented to be dispatchable in real time through CLR participation rather than reducing their consumption to avoid transmission cost allocation and other load charges. Net metering schemes should, at a minimum, only be allowed with affiliated entities. This would help support price formation and provide better congestion management. The IMM recommends requiring CLRs to have their own meters, rather than allowing net metering schemes amongst unaffiliated entities with meters at the point of interconnection,<sup>8</sup> and OPUC agrees.

**3. Cost quantification: How much transmission and distribution investment will be necessary and what methods would be available to recuperate costs? And should the Commission consider new methods of cost allocation and recovery for DER-related infrastructure enhancements?**

- i. What market signals, if any, should be considered related to DERs aimed at providing grid services?**

OPUC supports the following points that the IMM highlighted for the ERCOT market improvements, including: implementation of an uncertainty product, reevaluation of net metering

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<sup>8</sup> 2021 STATE OF THE MARKET REPORT FOR THE ERCOT ELECTRICITY MARKETS, Potomac Economics, IMM for ERCOT, May 2022, filed with PUCT.  
[Interchange - Documents \(texas.gov\)](#)

at certain sites, implementation of smaller load zones that recognize key transmission constraints, changing transmission cost allocation to better reflect the true drivers for new transmission, implementation of a Point-to-Point Obligation bid fee, exclusion of fixed costs from the mitigated offer caps, pricing ancillary services based on the shadow price of procuring each service, and modification of the allocation of transmission costs by transitioning away from the 4CP method to better reflect the true drivers for new transmission, as IMM continuously raising the issue that the current method of allocating cost provides a cost avoidance signal to non-opt-in entities and transmission level customers.<sup>9</sup> Without additional information and specificity around the cost information noted, the impact of an alternative cost allocation will be unknown. To ensure that ratepayers are not incurring excessive system upgrades costs, steps should be taken to begin categorizing and tracking cost data for when numerous small DER interconnections trigger substantial system upgrades.

**4. Data accessibility: What data would improve supply side dynamics and encourage targeted development? What information would be useful to establish a current baseline and assess future market potential? What accessibility and information security concerns should be considered?**

**i. What level of information should entities responsible for planning and control of DERs have access to for long-term planning purposes?**

As stated by ERCOT in its market report,<sup>10</sup> the growth in intermittent resources and distributed generation will increase supply uncertainty. The thermal generation trips, load forecast errors, and wind and solar forecast errors all contribute to the net uncertainty faced by the market operator. The growth in wind and solar, coupled with increasing amounts of distributed generation that is not controlled by ERCOT, will significantly increase the uncertainty that ERCOT faces. This uncertainty significantly affects both ERCOT's planning and operations. Therefore, ERCOT

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<sup>9</sup> 2021 STATE OF THE MARKET REPORT FOR THE ERCOT ELECTRICITY MARKETS, Potomac Economics, IMM for ERCOT, May 2022, filed with PUCT.  
[Interchange - Documents \(texas.gov\)](https://www.ercot.com/files/docs/2022/05/2021_State_of_the_Market_Report_for_the_Ercot_Electricity_Markets.pdf)

<sup>10</sup> ERCOT- DISTRIBUTED ENERGY RESOURCES (DERS) Reliability Impacts and Recommended Changes, Version 1.0 March 22, 2017.  
[https://www.ercot.com/files/docs/2017/04/27/05\\_DERS\\_Reliability\\_Impacts\\_FINAL.pdf](https://www.ercot.com/files/docs/2017/04/27/05_DERS_Reliability_Impacts_FINAL.pdf)

might face substantial uncertainty from multiple sources in the two to four-hour ahead timeframe. OPUC supports the recommendation that the IMM made to allow the markets to manage and price this uncertainty. The IMM recommended that ERCOT create a two- to four-hour uncertainty product that ERCOT can utilize when the uncertainty results in tight supply-demand conditions or high ramp demands.<sup>11</sup>

The long-term load forecast is one of the critical inputs to the Capacity, Demand and Reserves (CDR) report. The forecasted growth of DER will have an impact on planning decisions. Inaccuracies in the long-term load forecast due to over- or under forecasting of DER in an area could lead to building too little or too much transmission. Such CDR reports are very helpful for planning purposes.

According to the NERC 2017 distributed energy resources task force report,<sup>12</sup> behind-the-meter DERs are not typically metered. In general, its effect is to reduce the amount of generation or net imports needed for system balance; thus, DER directly lowers the measured load. However, in operations (resource commitment and dispatch) and planning (future needs) work, DER represents another variable to consider, net interchange. The NERC 2017 report shows that actual net load is lower than originally estimated due to an increased number of renewable resources.

$$\text{Load} = \text{Generation} + \text{Net Actual Interchange}^{13}$$

Lastly, OPUC agrees with the IMM's recommendation to support implementing nodal pricing for CLRs. The IMM, in its 2021 report, recommended requiring CLRs to have their own meters, rather than allowing net metering schemes amongst unaffiliated entities with meters at the point of interconnection.<sup>14</sup>

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<sup>11</sup> 2021 STATE OF THE MARKET REPORT FOR THE ERCOT ELECTRICITY MARKETS, Potomac Economics, IMM for ERCOT, May 2022, filed with PUCT.  
[Interchange - Documents \(texas.gov\)](#)

<sup>12</sup> NERC, Distributed Energy Resources Task Force Report, February 2017, p 33.  
[https://www.nerc.com/comm/Other/essntlrlbltysrvkstskfrcdL/Distributed\\_Energy\\_Resources\\_Report.pdf](https://www.nerc.com/comm/Other/essntlrlbltysrvkstskfrcdL/Distributed_Energy_Resources_Report.pdf)

<sup>13</sup> NERC, Distributed Energy Resources Task Force Report, February 2017, p 34.  
[https://www.nerc.com/comm/Other/essntlrlbltysrvkstskfrcdL/Distributed\\_Energy\\_Resources\\_Report.pdf](https://www.nerc.com/comm/Other/essntlrlbltysrvkstskfrcdL/Distributed_Energy_Resources_Report.pdf)

<sup>14</sup> 2021 STATE OF THE MARKET REPORT FOR THE ERCOT ELECTRICITY MARKETS, Potomac Economics, IMM for ERCOT, May 2022, filed with PUCT.  
[Interchange - Documents \(texas.gov\)](#)



## 5. Other related questions

- i. Should the Commission consider classifying various DER types? If so, on what basis should DERs be classified? For example, size, performance, characteristics, or some other attribute? (E.g., rooftop solar PV, distribution connected energy storage, microgrids)
- ii. What issues should be considered for segmentation and islanding? Should there be consideration related to DERs associated with critical facilities and entities?
- iii. What should be done to encourage consistency in interconnection agreements between the various interconnecting entities?
- iv. What can the Commission do to promote consistency in its DER policy between the ERCOT and non-ERCOT markets?
- v. What successes have been seen in other states that could be implemented in Texas?
- vi. What can reasonably and economically be done within a 5-year timeframe?
- vii. What other issues, if any, should the Commission consider and address while developing rules related to DERs?

As stated above, an increasing number of DER systems can impact the stability, reliability, and efficiency of power grid operations. Without coordination with the distribution equipment on the grid, DER systems could cause voltage oscillations, create reverse power flows on circuits not designed for two-way flows, and cause other power system impacts that could, ironically, increase the frequency and duration of outages when the DER is intended to do just the opposite. OPUC supports the IMM's recommendation to require CLR to have their own meters, rather than

allowing net metering schemes amongst unaffiliated entities with meters at the point of interconnection.<sup>15</sup>

It is OPUC's position that the Commission, ERCOT, utilities, and other stakeholders need to work together for a common understanding of the standard to maintain system stability, minimize harmonics, and allow for use of alternative set points to implement IEEE 1547-2018. Additionally, OPUC recommends that the Commission order ERCOT to design and implement long term DER programs that consider how to simplify the way grid service compensation is provided to customers, and in the meantime, provide for customers to receive compensation for both energy exports and grid services. ERCOT should develop a transition plan for interim DER programs, such that the coordination of said transition promotes market stability and minimizes customer confusion.

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<sup>15</sup> 2021 STATE OF THE MARKET REPORT FOR THE ERCOT ELECTRICITY MARKETS, Potomac Economics, IMM for ERCOT, May 2022, filed with PUCT.  
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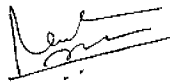
## II. CONCLUSION

OPUC appreciates the opportunity to provide this response to Staff's questions regarding the DERs and looks forward to working with Commission Staff and other stakeholders in this project.

Date: June 15, 2022

Respectfully submitted,

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## OPUC's Executive Summary

- OPUC believes that DERs bring multiple benefits to the electrical system, including reduced transmission losses, reduced capital costs for high voltage interconnection facilities, and increased resiliency of distribution circuits to transmission failure events. However, the use of DER can also negatively affect grid operations in multiple ways, including increased error in load forecasting and inaccuracies in the long-term load forecast due to over- or under-forecasting of DERs in an area that could lead to building too little or too much transmission.
  - OPUC did not find a short-term approach to resolve these DER issues.
- OPUC recommends that the Commission order ERCOT to design and implement short term and long-term DER programs and provide a grid service compensation to customers, thereby ensuring that customers receive compensation for both energy exports and grid services.
- OPUC recommends that the Commission, ERCOT, and all other stakeholders should work to develop a transition plan for interim DER programs such that it can create market stability and minimize customer confusion.
- Distribution and Transmission system minor upgrades is one of the best strategies for the long term and it can be determined on a case-by case or system-by-system basis. When upgrading, it should be completed at the lowest cost possible. In some cases, changing voltage regulator or capacitor set points can help mitigate impacts. Changing the Power factor on the DER can also represent a low-cost integration option. A small change can have a big effect with a low cost.
- The Commission, ERCOT, utilities, and other stakeholders need to work together for a common understanding of the standard to maintain system stability, minimize harmonics, and allow for use of alternative set points to implement IEEE 1547-2018.
- ERCOT may consider congestion management plans or any other new mechanism that achieves similar outcomes, but ERCOT also needs to make sure reliability is guaranteed, and consumers will not be impacted negatively. All the current unregistered DER's that are in the ERCOT market need to be registered first, and it can be done at the distribution level at the beginning. The DER data from DSPs and TSPs may help ERCOT for the long-term planning of the grid system.

- DER forecasting for planning purposes must address the DER adoption or growth scenarios and the impact on net load of DER performance or autonomous behavior.
- OPUC supports the following points that the IMM highlighted for the ERCOT market improvements, including: implement an uncertainty product, reevaluate net metering at certain sites, implement smaller load zones that recognize key transmission constraints, change transmission cost allocation to better reflect the true drivers for new transmission, implement a Point-to-Point Obligation bid fee, exclude fixed costs from the mitigated offer caps, price ancillary services based on the shadow price of procuring each service, and modify the allocation of transmission costs by transitioning away from the 4CP method.
- OPUC supports the IMM's recommendation to require controllable load resources to have their own meters, rather than allowing net metering schemes amongst unaffiliated entities with meters at the point of interconnection.
- OPUC agrees with the IMM's decision to support implementing nodal pricing for CLRs.
- OPUC supports the recommendation that IMM made to allow the markets to manage and price this uncertainty.