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| NOGRR Number | [272](https://www.ercot.com/mktrules/issues/NOGRR272) | NOGRR Title | Advanced Grid Support Requirements for Inverter-Based ESRs |
| Date Posted | October 31, 2024 |
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| Requested Resolution  | Normal |
| Nodal Operating Guide Sections Requiring Revision  | 2.14, Advanced Grid Support Requirements for Inverter-Based ESRs (new) |
| Related Documents Requiring Revision/Related Revision Requests | Planning Guide Revision Request (PGRR) 121, Related to NOGRR272, Advanced Grid Support Requirements for Inverter-Based ESRs |
| Revision Description | This Nodal Operating Guide Revision Request (NOGRR) establishes new advanced grid support requirements for inverter-based Energy Storage Resources (ESRs) connected to the ERCOT Transmission Grid.  |
| Reason for Revision |  [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 1 – Be an industry leader for grid reliability and resilience [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 2 - Enhance the ERCOT region’s economic competitiveness with respect to trends in wholesale power rates and retail electricity prices to consumers [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 3 - Advance ERCOT, Inc. as an independent leading industry expert and an employer of choice by fostering innovation, investing in our people, and emphasizing the importance of our mission General system and/or process improvement(s) Regulatory requirements ERCOT Board/PUCT Directive*(please select ONLY ONE – if more than one apply, please select the ONE that is most relevant)* |
| Justification of Reason for Revision and Market Impacts | ERCOT submits this NOGRR to provide greater support for system resilience and to maintain stable operation for an Inverter-Based Resource (IBR)-dominated ERCOT System. The IBRs currently connect to the ERCOT System are wind and solar Generation Resources and ESRs. More than 20 Generic Transmission Constraints (GTCs) have been created and enforced in Real-Time operation to ensure reliable operation. Most GTCs created in the last 10 years were related to IBRs and several of those GTCs are among the top 10 constraints on the ERCOT System. According to the ERCOT monthly Generator Interconnection Status Report, more than 100 GW of IBRs could connect to the ERCOT Transmission Grid by 2026. The continuous growth of IBRs requires ERCOT to explore options and system needs to continuously maintain the desired system stability and resilience. In 2021 and 2023, the North American Electric Reliability Corporation (NERC) published two white papers related to grid forming for Bulk Power System (BPS)-connected battery energy storage systems. In these white papers, NERC stated that grid forming ESRs are needed to maintain stable operation for grids dominated by IBRs. Globally, electric system operators with a high penetration of IBRs, such as the United Kingdom’s Electric System Operator (ESO) and Australia’s Energy Market Operator (AEMO), not only have developed specifications but also implemented several grid-forming ESRs. These industrial efforts have led to the development of new capabilities that are commercially available today. ERCOT has assessed the impact of such advanced grid support capability provided by the ESRs and presented the preliminary results to the Inverter-Based Working Group (IBRWG) in July 2024 (see presentation [ERCOT Advanced Grid Support Inverter-based Energy Storage System Assessment and Adoption Discussion](https://www.ercot.com/files/docs/2024/07/09/2024_07_ERCOT_IBRWG_ERCOT%20Advanced%20Grid%20Support%20Inverter-based%20ESRs%20Assessment%20and%20Adoption%20Discussion_v1_.pdf)). ERCOT believes the proposed requirements will help improve grid stability and resilience to maintain stable operation of the ERCOT Transmission Grid in this context in which IBRs are predominant. The potential benefits observed in the ERCOT assessment include: (1) improvement of voltage and frequency response during events, which would reduce events’ impact to the ERCOT Transmission Grid, (2) reduction in the risk of IBRs tripping or unstable operations, and (3) increase in GTC limits which could reduce generation curtailment due to stability constraints. For those ESRs not required to comply with these advanced grid support requirements, ERCOT plans to consider ways to encourage existing ESRs to provide advanced grid support service when practical and feasible in future Revision Requests. ERCOT also plans to explore whether such advanced grid support services can be provided by other types of IBRs such as wind and solar Generation Resources.  |

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| Market Segment | Not applicable |

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| Proposed Guide Language Revision |

**2.14 Advanced Grid Support Requirements for Inverter-Based ESRs**

(1) An Energy Storage Resource (ESR) that interconnects to the ERCOT Transmission Grid pursuant to a Standard Generation Interconnection Agreement (SGIA) executed on or after April 1, 2025 shall comply with the requirements of this Section.

(a) An ESR shall maintain an internal voltage phasor that is constant or near-constant in the sub-transient to transient timeframe. An ESR shall immediately respond to changes in the external system and maintain ESR control stability during normal and disturbance conditions. The voltage phasor must be controlled to maintain synchronism with the ERCOT Transmission Grid and regulate real power and Reactive Power appropriately to support the ERCOT Transmission Grid.