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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 of Decision | | September 22, 2025 | |
| Action | | Recommended Approval | |
| Timeline | | Urgent | |
| Estimated Impacts | | Cost/Budgetary: None  Project Duration: No project required | |
| Proposed Effective Date | | The first of the month following Public Utility Commission of Texas (PUCT) approval | |
| Priority and Rank Assigned | | Not applicable | |
| 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. | |
| ROS Decision | | On 12/5/24, ROS voted unanimously to table NOGRR272 and refer the issue to the Dynamics Working Group (DWG) and IBRWG. All Market Segments participated in the vote.  On 7/10/25, ROS voted unanimously to grant NOGRR272 Urgent status; and to table NOGRR272. All Market Segments participated in the vote.  On 8/7/25, ROS voted to recommend approval of NOGRR272 as amended by the 8/1/25 ERCOT comments. There was one opposing vote from the Independent Generator (EDF Renewables) Market Segment and four abstentions from the Independent Generator (3) (Southern Power, Vistra, Calpine) and Independent Power Marketer (IPM) (Geronimo) Market Segments. All Market Segments participated in the vote. | |
| Summary of ROS Discussion | | On 12/5/24, participants reviewed the 12/4/24 Jupiter Power comments and requested NOGRR272 be referred to the DWG and IBRWG for further discussion.  On 7/10/25, ROS reviewed the 6/4/25 Plus Power, 6/13/25 NextEra Energy Resource, 7/1/25 ERCOT, 7/8/25 Plus Power, 7/9/25 Joint Commenters, and 7/10/25 HGP comments. Participants acknowledged ERCOT’s desire for NOGRR272 to advance in time for consideration at the September 23, 2025 ERCOT Board of Directors meeting. Some participants expressed concern that NOGRR272 does not align with PGRR121 language, risking ambiguity and conflicting operational requirements. Other participants expressed concern regarding the accuracy of NOGRR272 modeling efforts, and the absence of details necessary for “Original Equipment Manufacturers” (OEMs) to build grid-forming resources that satisfy various conditions.  On 8/7/25, ROS reviewed the 8/1/25 Spearmint Energy, 8/1/25 Mortenson, 8/1/25 esVolta, 8/1/25 ERCOT, and 8/6/25 Plus Power comments. Participants discussed the intention and implications of paragraph (2) of Section 2.14 in 8/1/25 ERCOT comments. Participants expressed confusion regarding equipment expectations. ERCOT stated continued willingness to work with stakeholders to further refine NOGRR272 moving forward. | |
| TAC Decision | | On 8/27/25, TAC voted to recommend approval of NOGRR272 as recommended by ROS in the 8/7/25 ROS Report as amended by the 8/20/25 ERCOT comments; and the 10/31/24 Impact Analysis. There were three abstentions from the Independent Generator (2) (Jupiter Power, Vistra) and IPM (SENA) Market Segments. All Market Segments participated in the vote. | |
| Summary of TAC Discussion | | On 8/27/25, TAC reviewed the 8/20/25 ERCOT comments. Some participants expressed preference for a market-facing approach and voiced lingering concerns regarding capability requirements, compliance obligations, and unrealized new technology issues. ERCOT reiterated its willingness to consider a market-facing approach as conversation evolves. | |
| TAC Review/Justification of Recommendation | | Revision Request ties to Reason for Revision as explained in Justification  Impact Analysis reviewed and impacts are justified as explained in Justification  Opinions were reviewed and discussed  Comments were reviewed and discussed (if applicable)  Other: (explain) | |
| ERCOT Board Decision | | On 9/22/25, the ERCOT Board voted unanimously to recommend approval of NOGRR272 as recommended by TAC in the 8/27/25 TAC Report. | |
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| **Opinions** | | | |
| Credit Review | | Not applicable | |
| Independent Market Monitor Opinion | | IMM has no opinion on NOGRR272. | |
| ERCOT Opinion | | ERCOT supports approval of NOGRR272. | |
| ERCOT Market Impact Statement | | ERCOT Staff has reviewed NOGRR272 and believes that it provides a positive market impact by leading the industry in grid reliability and resilience through establishment of new advanced grid support requirements for inverter-based ESRs connected to the ERCOT Transmission Grid. | |

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| Market Segment | Not applicable |

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| **Comments Received** | |
| **Comment Author** | **Comment Summary** |
| Jupiter Power 120424 | Indicated it cannot support the proposed requirement for grid-forming inverters for ESRs as described in the NOGRR |
| Plus Power 011525 | Requested ERCOT address a range of questions regarding service integration before moving NOGRR272 forward; emphasized that ERCOT establish a fair and transparent compensation mechanism that recognizes the capital and operational costs incurred by ESRs in providing essential grid-forming services |
| SRDC 011625 | Stated that, to avoid potential policy challenges, NOGRR272 requirements should be forward-looking for resources that execute a Standard Generation Interconnection Agreement (SGIA) on or after a date in the future as opposed to retroactively; argued that the NOGRR272 requirement to install equipment that is “over and above” existing technology providing additional service to the grid warrants renumeration; and posed additional questions in order to resolve perceived NOGRR272 issues |
| Joint Commenters 020525 | Expressed concern regarding NOGRR272 mandate that one subset of ERCOT resources pay for a service that results in significant stability benefits to the ERCOT System without any rate of return, long-term contract guarantee, or other compensation mechanism; requested ROS continue to table NOGRR272 until Joint Commenters file anticipated Nodal Protocol Revision Request (NPRR) |
| Plus Power 051325 | Cautioned that NOGRR272 fails to account for the additional costs associated with hardware, software, modeling, testing, and compliance to make facilities capable of providing such services; requested that ERCOT establish a clear regulatory framework for renumeration, define ESR performance requirements more clearly, and integrate grid-forming services into broader Ancillary Service framework; and encouraged ERCOT withdraw NOGRR272 in preference of NPRR1278, Establishing Advanced Grid Support Service as an Ancillary Service |
| ERCOT 060425 | Offered clarifying edits; cited issues with NPRR1278; requested that ROS advance NOGRR272 in consideration of September 23, 2025 ERCOT Board of Director meeting discussion; and proposed development of a future ERCOT-sponsored NPRR that will implement a one-time advanced grid support new technology incentive concept in order to encourage advanced grid support adoption for existing IBRs |
| Plus Power 060425 | Reiterated NOGRR272 concerns regarding impractical implementation timeline, ambiguous performance requirements, and assumption that grid-forming functionality is standard or is cost-free in battery storage projects; criticized NOGRR272 as imposing a new regulatory obligation that negatively impacts one type of Generation Resource, namely ESRs, at the benefit of all other types; requested ERCOT reconsider NPRR1278 and withdraw NOGRR272; and provided additional edits in event ERCOT proceeds with NOGRR272 |
| NextEra Energy Resources 061325 | Provided clarification edits; requested that ROS recommend approval of NOGRR272 as amended by the 6/13/25 NextEra Energy Resource comments |
| ERCOT 070125 | Responded to issues raised in 6/4/25 Plus Power and 6/13/25 NextEra Energy Resource comments; proposed additional edits; and committed to working with stakeholders to develop a market-based framework to compensate ESRs if withholding headroom and maintaining State of Charge (SOC) becomes necessary in the future |
| Plus Power 070825 | Expressed continued opposition of NOGRR272 on grounds of not being technology-neutral; requested that, if ERCOT not withdraw NOGRR272 in favor of NPRR1278, ERCOT revise NOGRR272 per provided phased approach language |
| Joint Commenters 070925 | Proposed additional edits regarding effective date and compliance concerns on top of the 7/1/25 ERCOT comments; requested that ROS recommend approval of NOGRR272 as amended by the 7/9/25 Joint Commenters comments or, alternatively, continue to table NOGRR272 for continued discussion; committed to supporting Urgent status request if necessary for NOGRR272 to receive September 23, 2025 ERCOT Board of Directors meeting discussion |
| HGP Storage 071025 | Requested ERCOT revise NOGRR272 or shift to a market-based, inclusive advanced grid support framework that acknowledges investment realities and statutory limits |
| Spearmint Energy 080125 | Cautioned against perceived NOGRR272 technical flaws and offered additional edits to ensure proposed requirements are technically feasible and do not unintentionally inhibit resource optimization or interoperability |
| Mortenson 080125 | Expressed concerns regarding variations in technical and procedural requirements across different U.S. markets |
| esVolta 080125 | Requested removal of language from paragraph (2) of Section 2.14 of the 7/1/25 ERCOT comments, believing it to impose advanced grid-forming inverter requirements on resources undergoing certain modifications |
| ERCOT 080125 | Clarified that an ESR is not required to reserve its capacity or SOC to provide advanced grid support; reiterated belief that requirements proposed for inverter-based ESRs in NOGRR272 are reasonable in their applicability to ESRs and are not discriminatory; countered stakeholder concerns regarding presence of too many grid-forming IBRs and higher numbers of ESRs providing advanced grid support; and proposed additional edits to revise the applicability date to April 1, 2026 |
| Plus Power 080625 | Reiterated concerns regarding a lack of clear technical performance requirements, compliance metrics, and transition time to implement as-yet-undefined performance requirements in 8/1/25 ERCOT comments; and cautioned against ERCOT’s proposal that NOGRR272 requirements apply to portions of an ESR when there are non-in-kind replacements of equipment or modifications that add MW capacity, believing it to present a potential risk of unexpected behavior during fault responses |
| ERCOT 082025 | Removed reference to non-in-kind replacements of equipment and provided language clarifying that Section 2.14 requirements apply only to portions of ESR modifications adding MW capacity, on an aggregate nameplate basis, on or after April 1, 2026 |
| Plus Power 091625 | Provided letter requesting the ERCOT Board of Directors remand NOGRR272 to TAC with direction to revise NOGRR272 to eliminate the requirement that inverter-based ESRs with an original SGIA executed on or after April 1, 2026 be required to provide the advanced grid support services that meet the modeling requirements of PGRR121 |

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| **Market Rules Notes** |

None

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| Proposed Guide Language Revision |

**2.14 Advanced Grid Support Requirements for Inverter-Based Resources (IBRs)**

(1) An Energy Storage Resource (ESR) shall provide the following advanced grid support when within the inverter current limit:

(a) Meet the modeling requirements in Planning Guide Section 6.2, Dynamics Model Development, to demonstrate the capability to maintain an internal voltage phasor in the sub-transient-to-transient timeframe and control the voltage phasor to maintain synchronism with the ERCOT Transmission Grid.

(2) An ESR interconnected to the ERCOT Transmission Grid pursuant to an original Standard Generation Interconnection Agreement (SGIA) executed before April 1, 2026 is not required to comply with the requirements of this Section 2.14. Notwithstanding the prior sentence, the requirements of this Section 2.14 apply to those portions of any ESR modifications adding MW capacity, on an aggregate nameplate basis, on or after April 1, 2026.