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| NOGRR Number | [245](https://www.ercot.com/mktrules/issues/NOGRR245) | NOGRR Title | Inverter-Based Resource (IBR) Ride-Through Requirements |

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| Date | July 28, 2023 |

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| Comments |

**Introduction**

NextEra Energy Resources (“NEER”) is one of the world’s largest generators of clean, renewable energy from the wind and sun, with the largest market share of North American wind capacity. NEER currently owns and operates approximately 5,500 MW of wind, solar, and Energy Storage Resources (ESRs) in ERCOT and has made $20 billion in total investments in the State of Texas.

Given NEER’s investment in Texas and the ERCOT market, NEER has a strong interest in ensuring the ongoing reliable operation of the ERCOT grid and fully supports ERCOT’s focus on maintaining the reliability of the ERCOT System. For the reasons stated below, NEER requests that ROS leave NOGRR 245 tabled until the next ROS meeting on September 7, 2023, to allow an alternative proposal to be developed.

NEER also supports adoption of IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems (“IEEE 2800-2022”) for future Generation Resources and believes IEEE’s consensus-based approach to helping equipment manufacturers, project developers, transmission utilities and planners, and power grid operators improve the quality of inverter and facility performance to enhance the stability of the power grid is an important step in maintaining grid reliability as penetration levels of IBRs increase and the technology of IBRs continues evolving.

NEER appreciates the revisions to NOGRR 245 ERCOT adopted in response to initial stakeholder comments; however, essential comments raised by Original Equipment Manufacturers (“OEMs”) and market participants in earlier comments were not addressed and remain key areas of concern. Specific concerns that were not addressed in ERCOT’s latest revisions include:

1) OEMs cannot provide retrofit solutions to bring certain existing wind IBRs into compliance;

2) OEMs do not have the capability to determine whether wind IBRs can comply with the “NOGRR Specificity Requirements” without extensive and complex engineering analysis, and it is very unlikely that necessary wind turbine and wind plant upgrades can be engineered and deployed within the specified timelines; and

3) the compliance timeline for wind projects that are currently under development (and will have SGIAs signed after 6/1/23) is unrealistic because projects must commit and order specific turbines early in the development process and compliant turbine models are not yet available from OEMs, making the compliance timeline unworkable for the development and delivery of compliance solutions, and will lead to significant new project delays or cancellations.

Until these and several other key points are resolved, the NOGRR as proposed could require many existing IBR generators to be removed from service, and delays or cancellations of planned projects; therefore, NEER will remain firmly opposed to the adoption of NOGRR 245.

**Request for NOGRR 245 to Remain Tabled at ROS**

NEER requests that ROS continues to table NOGRR 245 until the September ROS meeting so that NEER and other market participants can present an alternative proposal that addresses the above concerns. Because the latest revisions to NOGRR 245 only became available late last month, the development of NEER’s pending proposal is ongoing, but NEER commits to filing the proposal as redline comments to this NOGRR in time for the next ROS meeting, with the objective of maintaining ERCOT’s stated timeline of consideration by the ERCOT Board of Directors in October.

NEER remains strongly opposed to NOGRR 245 both as initially proposed and as later modified by ERCOT. In its April 2022 review of Solar PV disturbances in CAISO, NERC indicated “The goal of IEEE 2800 is to ensure that *future BPS-connected inverter-based resources* are designed and installed with the equipment capabilities and functional parameters to mitigate some or all of the issues identified in past ERO disturbance analyses”[[1]](#footnote-2) (emphasis added). Applying IEEE 2800-2022 retroactively to Resources that have been in operation for as long as 20 years, as NOGRR 245 appears to do, is inconsistent with NERC’s intent and is an extreme measure for which ERCOT has not yet established clear reliability benefits or justification, including: (a) the reliability value of tradeoffs between ride through enhancements and the loss of capacity on the ERCOT grid; (b) a clear tie between the recent disturbance events (the Odessa events) and the specific approach to addressing them; and (c) a clear relationship between recent disturbance events and wind IBRs, which would be disproportionately affected by NOGRR 245.

During the February ERCOT Board of Directors meeting, it was noted that IBRs are now necessary to meet demand in ERCOT. Since then, the value of IBRs for system reliability has been especially evident during this summer’s heat waves. As the reliability advisor to TAC, ROS needs data and reliability analysis to weigh these matters and reach a reasonable, fact-based policy decision.

In addition, ERCOT’s comments contravene a long-established compromise grandfathering existing Resources from updated voltage ride-through (“VRT”) requirements, to which ERCOT was a party.[[2]](#footnote-3) ERCOT should carefully consider the implications of reversing course, and to the extent a change is necessary to resolve a reliability issue, the resolution should be narrowly tailored to serve a compelling and clearly identified reliability issue. Further, ERCOT’s proposal that addresses IBRs but does not also address synchronous, thermal resource performance issues that also contributed to recent disturbances should be strictly scrutinized by market participants, the ERCOT Board of Directors, and the Public Utility Commission of Texas (PUCT). Finally, ERCOT’s revised NOGRR 245 proposal does not fully consider feedback from OEMs about the feasibility of ERCOT’s suggested approach. NEER has deep reservations about each of these matters and believes that a consensus resolution among affected stakeholders and ERCOT would be warranted and appreciated.

To that end, NEER is willing to work with ERCOT and its member companies on an alternative approach. This approach will take some time to develop but will be based on IEEE 2800-2022 and feedback from OEMs and IBR owners and will be designed to be practicably implemented. NEER requests that ROS table the NOGRR 245 discussion in order to allow time to develop a fully formed proposal that can be considered as an alternative to ERCOT’s recent comments.

If adopted as currently drafted based on ERCOT’s June 22 comments, the implementation of NOGRR 245 could lead to the unavailability of significant amounts of IBRs. The range of IBR capacity that could be affected is difficult to estimate, but rescinding current grandfathering rules could affect the availability of approximately 8.5 GW to 12.7 GW of wind IBRs, and the infeasible “NOGRR Specificity Requirements” have the potential to impact the availability of any or all the wind IBRs on the ERCOT System. To avoid this result and the resulting reliability impacts, both ROS and ERCOT should consider less impactful ways to resolve reliability concerns and implement the IEEE 2800-2022 standards before voting on the ERCOT June 22 comments.

**Concerns and Recommendations Regarding ERCOT’s June 22, 2023, NOGRR 245 Revisions**

**Overview**

As stated above, NEER supports the adoption of IEEE 2800-2022 for future IBRs as well as other reasonable efforts to improve grid stability; however, it is critical that IEEE 2800-2022 be implemented in a way that is feasible for all IBRs, including older IBRs and IBRs that are currently under development. Because NOGRR 245 includes requirements that are infeasible for both older wind IBRs and IBRs under development, NEER strongly opposes its adoption in its current form.

In particular, NEER objects to the application of new, infeasible standards to pre-2014 wind IBRs as well as to the fact that IBRs that are currently being developed under existing interconnection agreements must comply with new requirements prior to commencing operation. NEER objects to this latter requirement because the wind IBR development life cycle is several years long, so wind projects that will come online during the next few years were designed to meet the ride-through standards that are in effect today, and wind turbine OEMs have stated they cannot provide compliance solutions for newly developed wind IBRs within the timeframe NOGRR 245 requires.

Further, all existing wind IBRs were designed to comply with the VRT and frequency ride-through (“FRT”) standards that existed when they were commissioned, and ERCOT understood that capability and approved their interconnection on the basis that the capability and the ride-through standards that were in place at the time were sufficient to ensure reliable operation of the ERCOT System. Compliance with previously acceptable standards, combined with the long history of reliable performance by wind IBRs, raises doubts about the need for the rigid, no exceptions, compliance requirements proposed in NOGRR 245

In addition, permitting ERCOT to require Resources to come off-line and granting ERCOT unlimited discretion to keep them off-line, potentially indefinitely, will predictably lead to enforcement of unreasonable and arbitrary remedies, as well as other situations no IBR owner can support. NEER is unaware of any ISO or RTO having such broad authority and opposes granting it to ERCOT without first developing clear, objective steps IBR owners can take to resume operations following a tripping event.

**The impact of NOGRR 245 needs to be studied to ensure the impacts are understood.**

NOGRR 245 trades a potential reduction in one reliability risk, IBR tripping risk, for an increase in another reliability risk, capacity insufficiency risk, without providing supporting analysis showing that this tradeoff improves reliability. To date, only anecdotal information regarding isolated wind IBRs tripping over a five-year period has been provided in support of the position that eliminating grandfathering for approximately 12.7 GW of the wind IBR fleet is essential to improve grid reliability. No data has been presented that quantifies the reliability benefits of applying NOGRR 245 retroactively to currently grandfathered wind IBRs and potentially forcing them out of the market.

A full study of the expected reliability improvements from improved FRT and VRT, net of the adverse reliability impacts caused by enforcement of NOGRR 245’s non-compliance provisions, needs to be conducted to ensure NOGRR 245’s potential impacts on reliability are understood.

NEER has genuine concerns that the reliability benefits from additional grid stability will be more than offset by detrimental effects from the loss of capacity associated with ERCOT’s proposed enforcement authority. The reliability study should quantify both the existing risk associated with retaining grandfathering and the risk reduction if grandfathering is rescinded.

To provide insight into how significantly NOGRR 245 could affect reliability, NEER has begun evaluating how the loss of pre-11/2008 grandfathered wind IBR capacity could impact reliability and consumer energy costs. The analysis uses traditional Monte Carlo modeling of the ERCOT System (similar to the modeling that was performed by the consultant hired by the PUCT to estimate the costs and benefits of the performance credit mechanism (“PCM”)).

Preliminary results indicate loss of pre-2008 wind IBRs causes a significant increase in the number of Energy Emergency Alert (EEA) Level 1 events at the one day in ten-year interval, doubling the number of EEA Level 1 events from six to twelve events annually. In addition, expected total costs to serve the ERCOT System increases range from $1.2 billion annually in the loss of pre-2008 wind IBR case to over $3 billion in other cases that include higher levels of restricted wind IBRs.

This analysis clearly demonstrates the potential adverse impacts NOGRR 245’s enforcement mechanisms can have on reliability. Given the magnitude of the increase in EEA events and the impact to consumer costs, it is critical for ERCOT to conduct and present a thorough reliability analysis that quantifies the expected improvements in reliability from additional ride through capability, the risks of restricting IBR operations, and the overall impact on loss of Load risk.

**Separate rules and compliance timelines should be developed based on OEM constraints.**

Despite significant differences in historical ride-through performance between different IBRs, as well as fundamental differences in the design and manufacturing of large turbines and PV IBRs that affect product development life cycles and timelines required to bring design changes and new ride-through capability to market, NOGRR 245 includes a single rigid compliance timeline that applies uniformly to all IBRs, regardless of the differences between the OEMs and IBR technologies. NOGRR 245 should be revised to recognize the different timelines and performance constraints each IBR OEM has discussed in prior comments, particularly with regard to the significant differences for wind turbines that include mechanical and drivetrain considerations in addition to converter considerations.

**The proposed “NOGRR Specificity Requirements” should be revised or removed.**

Unlike the FRT and VRT standards for which wind OEMs stated some turbines models can comply and others cannot comply, OEMs have consistently stated that they cannot verify compliance with the “NOGRR Specificity Requirements” for *any* turbine models.

To date, ERCOT staff has been unwilling to consider modifying or eliminating the NOGRR specificity standards. NEER believes it is unreasonable for ERCOT to continue pursuing a standard for which OEMs say they lack the capability to perform the analysis for the entire 40 GW of installed wind. NEER suggests ERCOT work with OEMs to identify alternatives that OEMs are capable of providing to move the discussion forward.

**Type 1 and Type 2 wind turbines are not IBRs under the ERCOT Nodal Protocols, and they are expressly excluded from IEEE 2800-2022, so they should not be included in the performance requirements of NOGRR 245.**

During recent stakeholder discussions, ERCOT staff indicated that both Type I and Type II wind turbines would be subject to the requirements of NOGRR 245 under the current proposal. These two types of wind turbine technologies fall outside the definition and outside the scope of IEEE 2800-2022 and should therefore be excluded from NOGRR 245’s performance standards.

IEEE 2800-2022 specifically notes:

“A wind turbine generator generally uses one of the following electric generator configurations: direct connected asynchronous generator (type I), asynchronous generator with external resistance control (type II), doubly-fed generator (DFG) (type III), full-rated power converter (type IV), or direct-connected synchronous generator with torque/speed converter (type V). ***For the purposes of this standard, only WTGs that use power electronic inverters/converters for interconnection to the grid are considered (e.g., type III and type IV)****."[[3]](#footnote-4)* (emphasis added)

Under “Resource Attributes” in Section 2, Definitions, of the Nodal Protocols, an IBR is defined as:

“*Inverter-Based Resource (IBR)-* A Resource that is connected to the ERCOT System either completely or partially through a power electronic converter interface.”[[4]](#footnote-5)

Therefore, because Type I and Type II wind turbines do not use power electronic converters to connect to the ERCOT System, they are not IBRs and should be excluded from NOGRR 245.

**Additional standards and controls should be added to ensure equitable, non-discriminatory treatment of all IBRs.**

ERCOT’s authority to unilaterally prohibit IBRs from operating needs to be modified to include clear standards and controls that ensure uniform, non-discriminatory treatment and clear criteria which, when satisfied, will allow Resources to promptly return to operation. IBR owners also need a clear path to quickly appeal to the PUCT or another neutral party on an expedited basis when they believe it is necessary.

**The breadth of NOGRR 245’s potential impacts on electric reliability, consumer costs, and future investment in ERCOT are consistent with the impacts of significant policy decisions, so NOGRR 245 should be subject to a similar review, analysis, and input as other major policy changes.**

NOGRR 245 is proceeding as a Nodal Operating Guide rule change to improve a technical performance standard for IBRs, but due to the scope and magnitude of its potential impacts, it is effectively a significant policy decision and as such it merits all the analysis, review, and transparency that would normally accompany such significant change in policy.

NEER anticipates bringing forward a proposal that will offer most of the grid stability benefits ERCOT would like to realize, while avoiding many of the significant unintended impacts that may occur if NOGRR 245 is adopted. NEER believes this is yet another important reason to keep NOGRR 245 tabled at ROS for another month while an alternative is developed.

**NOGRR 245 should be bifurcated into more than one rule revision so each rule revision can be narrowly tailored to address the constraints and challenges that are unique to different categories of IBRs.**

The current attempt to address the ride through capabilities of all IBRs in a single NOGRR is overly complicated and unworkable. Each category of IBR that is affected by NOGRR 245 (grandfathered wind, existing non-grandfathered wind, wind under development with a signed interconnection, wind under development without a signed interconnection, existing solar, solar under development with a signed interconnection, solar under development without a signed interconnection) faces different compliance challenges and constraints. NEER believes bifurcating NOGRR 245 into more than one rule change, and developing different sets of rules for similarly situated IBRs that face similar constraints will simplify the NOGRR approval process and help ERCOT achieve its intended results more quickly.

**Conclusion**

NEER commends ERCOT’s leadership in bringing IBR ride-through performance improvements to the forefront and encouraging IBR owners and OEMs to quickly make IBR ride-through capability a priority. Given the impact and importance of the issues raised herein, NEER hopes ERCOT will support the request to keep NOGRR 245 tabled and provide NEER and other stakeholders the opportunity to develop an alternative proposal for consideration at the September ROS meeting.

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| Revised Cover Page Language |

None

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| Revised Proposed Guide Language |

None

1. NERC, “Multiple Solar PV Disturbances in CAISO – Disturbances between June and August 2021 Joint NERC and WECC Staff Report”, 42. [↑](#footnote-ref-2)
2. See ERCOT’s April 17, 2014, comments on NOGRR 124 which state that EDF-RE’s proposal was supported by OWG, ROS, and ERCOT, and that most of the exempted WGRs do not “materially” deviate from the proposed ride through standard. [↑](#footnote-ref-3)
3. IEEE 2800-2022, IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems, 39. [↑](#footnote-ref-4)
4. ERCOT Nodal Protocols, Section 2, 88 [↑](#footnote-ref-5)