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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 | September 29, 2023 |

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| Submitter’s Information | |
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| Company | ERCOT |
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| Market Segment | Not Applicable |

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| Comments |

ERCOT provides these comments in response to requests at the September 26, 2023 Technical Advisory Committee (TAC) meeting asking ERCOT to provide the Requests For Information (“RFIs”) issued to Resource Entities and questions submitted to Original Equipment Manufacturers (“OEMs”) related to the proposed requirements in NOGRR245. Accordingly, ERCOT provides the following information.

ERCOT sent RFIs to Resource Entities on September 27, 2023 with the following instructions:

* ERCOT is requesting information from Resource Entities to assess the ability of all current (Inverter-Based Resources (IBRs) and Type 1/Type 2 Wind-powered Generation Resources (WGRs) to perform to the proposed requirements in the September 14, 2023 ROS-recommended version of NOGRR245 (<https://www.ercot.com/files/docs/2023/09/19/245NOGRR-46%20ROS%20Report%20091423.docx>) in comparison to the requirements in ERCOT's August 18, 2023 comments to NOGRR245 (<https://www.ercot.com/files/docs/2023/08/18/245NOGRR-35%20ERCOT%20Comments%20081823_1.docx>).
* Complete all fields for each individual transmission-connected wind, solar or Energy Storage Resource (ESR).
* Unit IDs should not be modified from what matches the ERCOT Network Operations Model. Manufacturers and Models are for the Inverter or Turbine and not panels or battery cells.
* ERCOT requests responses as soon as practicable but *no later than November 6, 2023* to allow ERCOT to follow-up on missing data or other issues and aggregate responses prior to the December TAC meeting.
* Resource Entities should not leave any fields (other than the "comment" field) blank.
* For the ROS-recommended version of NOGRR245, please respond to the "Yes" or "No" questions assuming you implement ***commercially reasonable*** solutions. If commercially reasonable solutions are not available, respond "No."
* For the "Fully Meeting Requirements Date," provide the currently-anticipated date by which commercially reasonable solutions can be implemented to allow all Frequency Ride-Through (FRT) and Voltage Ride-Through (VRT) requirements to be met without any exemptions. If this date is "unknown" because there are no commercially reasonable solutions available, please state "1/1/2099."
* For the version of NOGRR245 in ERCOT's August 18, 2023 comments, please respond to the "Yes" or "No" questions assuming you implement all ***technically feasible*** solutions and assuming you have sufficient time to implement those solutions.
* For the "Fully Meeting Requirements Date," provide the currently-anticipated date by which all technically feasible solutions can be implemented to allow all FRT and VRT requirements to be implemented. If this date is "unknown" because there are no technically feasible solutions available, please state "1/1/2099."
* For the question on "Would targeted exceptions specified in....allow compliance?" Please answer “Yes”, “No”, or “NA” (if already can meet performance requirements). Please detail in the comments any specific targeted exceptions that would be necessary due to technical infeasibility.
* ***Technical feasibility*** includes installation of supplemental dynamic reactive devices (e.g., STATCOM or Synchronous Condenser) or co-located ESRs that can replace the active/reactive current during a fault. Technical feasibility also includes solutions needing additional time to implement (as identified by the OEM) beyond the deadline proposed in the version of NOGRR245 proposed in ERCOT's August 18, 2023 comments. Technical feasibility does *not* include commercial feasibility or timeframes not currently sufficient for specific models. When timeframe is insufficient, provide comments to the specific requirements that need additional time and why.
* Any comments you provide should be unit specific.

ERCOT issued the RFIs to each Resource Entity with wind, solar and ESRs to provide the following information for each unit:

For the ROS-recommended version of NOGRR245 or the version of NOGRR245 in ERCOT’s August 18, 2023 comments:

* UNIT\_ID
* Unit Type
* MANUFACTURER
* # OF TURBINES/INVERTERS
* MODEL
* NAMEPLATE MAX MWs
* 2.6.2.1 (1) Frequency Ride Through curve
* 2.6.2.1(3) Protection System Coordination
* 2.6.2.1(3) Rate of Change of Frequency (RoCoF)
* 2.6.2.1 (4) Current injection settings
* 2.6.2.1 (5) Controls system coordination
* 2.6.2 (3) Filtered quantities/ time delay use

For the ROS-recommended version of NOGRR245:

* Section 2.9.1.1 (1) Table A (Wind)or Table B (PVGR/ESR) VRT Curves
* 2.9.1.1 (1) Table C VRT Curves
* 2.9.1.1(3) Protection System Coordination
* 2.9.1.1 (4) Current injection settings
* 2.9.1.1 (8) Phase Angle Jump
* 2.9.1.1 (5) Controls system coordination
* 2.9.1.1 (6) Filtered quantities/ time delay use
* 2.9.1.1 (7) Multiple excursion requirements
* What is the anticipated date of meeting all FRT and VRT requirements listed with no exemptions needed?

For the version of NOGRR245 in ERCOT’s August 18, 2023 comments:

* Would targeted exceptions specified in §2.6.2.1 (6) allow compliance?
* §2.9.1.2 (1) Table A VRT Curves
* §2.9.1.2(3) Protection System Coordination
* §2.9.1.2 (4) Current injection settings
* §2.9.1.2 (8) Phase Angle Jump
* §2.9.1.2 (5) Controls system coordination
* §2.9.1.2 (6) Filtered quantities/time delay use
* §2.9.1.2 (7) Multiple excursion requirements
* Would targeted exceptions and extensions specified in §2.9.1.2 (9), §2.9.1 (1) and §2.9.1 (2) allow compliance?
* What is the anticipated date of meeting all FRT and VRT requirements listed with no exemptions needed?
* Comments

ERCOT is requesting turbine and inverter OEMs for transmission-connected IBRs and Type 1/Type 2 WGRs within ERCOT to provide information related to their products. OEMs cannot determine what is “commercially reasonable” (which is the Resource Entity’s discretion). Additionally, the ROS-recommended version of NOGRR245 imposes the VRT curves from IEEE 2800-2022 standard (§2.9.1.1) (with exemptions), which are stricter than the curves proposed in ERCOT’s August 18, 2023 comments (§2.9.1.1). The ROS-recommended version of NOGRR245 allows for exemptions for solutions not “commercially reasonable” at the Resource Entity’s discretion, which the OEM cannot determine.

Any OEM that has not received a questionnaire from ERCOT by October 3, 2023 should contact the ERCOT sponsor of these comments as noted above. The ERCOT questionnaire for OEMs will include the following instructions:

* ERCOT is requesting information from OEMs to assess the ability of all current (Inverter-Based Resources (IBRs) and Type 1/Type 2 WGRs to perform to the revised requirements in ERCOT's August 18, 2023 comments to NOGRR245 (<https://www.ercot.com/files/docs/2023/08/18/245NOGRR-35%20ERCOT%20Comments%20081823_1.docx>).
* Complete all fields for each individual transmission-connected wind, solar or Energy Storage Resource (ESR) product or platform.
* ERCOT requests responses to ERCOT at [RFI@ercot.com](mailto:RFI@ercot.com) *and* in public comments as soon as practicable but *no later than November 6, 2023* to allow ERCOT to follow-up on missing data or other issues and aggregate responses prior to the December TAC meeting.
* OEMs should not leave any fields (other than the "comment" field) blank.
* For the version of NOGRR245 in ERCOT's August 18, 2023 comments, please respond to the "Yes" or "No" questions assuming you implement all ***technically feasible*** solutions and assuming you have sufficient time to implement those solutions.
* For the software and hardware solution deliverable dates and implementation times, provide the best available date and times by which all technically feasible solutions can be implemented to allow all FRT and VRT requirements to be implemented. If this date is "unknown" because no technically feasible solutions are available, please state "1/1/2099." If the product can already meet all requirements, please provide the current date.
* For the question, "Would additional targeted exceptions specified in....allow compliance?" Please answer “Yes”, “No”, or “NA” (if already can meet performance requirements). Please detail in the comments any specific targeted exceptions necessary due to technical infeasibility.
* ***Technical feasibility*** includes solutions needing additional time to implement (as identified by the OEM) beyond the deadline proposed in the version of NOGRR 245 proposed in ERCOT's August 18, 2023 comments. Technical feasibility does *not* include commercial feasibility or timeframes not currently sufficient for specific models. When timeframe is insufficient, provide comments to the specific requirements needing additional time and why.
* ERCOT also asks if installation of supplemental dynamic reactive devices (e.g., STATCOM or Synchronous Condenser) or co-located ESRs that can replace the active/reactive power during a fault is a technically feasible solution.
* Any comments you provide should be product or platform specific.

For the version of NOGRR245 in ERCOT’s August 18, 2023 comments:

* Unit Type
* MANUFACTURER
* # OF TURBINES/INVERTERS
* MODEL
* NAMEPLATE MAX MWs
* §2.6.2.1 (1) Frequency Ride Through curve
* §2.6.2.1(3) Protection System Coordination
* §2.6.2.1(3) Rate of Change of Frequency (RoCoF)
* §2.6.2.1 (4) Current injection settings
* §2.6.2.1 (5) Controls system coordination
* §2.6.2 (3) Filtered quantities/ time delay use
* Would additional targeted exceptions and extensions beyond those specified in §2.9.1.2(9), §2.9.1(1) and §2.9.1(2) allow to meet performance where no technically feasible options are available?
* §2.9.1.2 (1) Table A VRT Curves
* §2.9.1.2(3) Protection System Coordination
* §2.9.1.2 (4) Current injection settings
* §2.9.1.2 (8) Phase Angle Jump
* §2.9.1.2 (5) Controls system coordination
* §2.9.1.2 (6) Filtered quantities/ time delay use
* §2.9.1.2 (7) Multiple excursion requirements
* Would targeted exceptions and extensions specified in §2.9.1.2(9), §2.9.1(1) and §2.9.1 (2) allow compliance?
* Date required software changes can be delivered
* Time required for software changes to be implemented for one plant (days)
* Date required hardware changes can be delivered
* Time required for hardware changes to be implemented for one plant (days)
* Supplemental Dynamic Reactive or battery/supercapacitor an option to meet requirements
* By what date do you believe you can begin shipping IBR unit equipment capable of meeting IEEE-2800-2022 standard Section 5, Section 7, and Section 9 requirements in accordance with the additions, clarifications, and exceptions as identified in NOGRR 245?
* Comments