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Question	Reply
Do Type 3 wind projects that undergo repower have until 1/1/2028 to comply with NOGRR 245 modification requirements?	<p>Type 3 WGRs are "inverter-based" so all requirements applicable to IBRs apply to them. NOGRR245 was written so the requirements in Nodal Operating Guides (NOG) Sec. 2.9.1.1 apply to an IBR with a Standard Generation Interconnection Agreement (SGIA) dated after 8/1/24 and any existing Resources that go through modifications to which Planning Guide Sec. 5.2.1(1)(c) applies after 8/1/24. If a Resource with a SGIA pre-dating 8/1/24 makes modifications covered by Planning Guide Sec. 5.2.1(1)(c) and fully implements the work by 1/1/28, it must meet only the VRT requirements in NOG 2.9.1.2 but still must <i>maximize</i> VRT capability to the fullest extent the equipment allows (consistent with Good Utility Practice). [See, NOG 2.9.1(1) and 2.9.1(8)]</p> <p>If the work is not fully implemented by 1/1/28, the post-modification Resource must meet the requirements in NOG Sec. 2.9.1.1. If the Type 3 WGR undergoing modifications covered by Planning Guide Sec. 5.2.1(1)(c) will not have the work complete by 12/31/25, it must request an extension pursuant to NOG Sec. 2.12.</p>
Market Notice M-A010825-01 indicates "IBR/Type 1/Type 2 WGR" must meet the ride through requirements. Type 1 IBRs are Photovoltaic however there are four types of WGR, Type 1, 2, 3, and 4. Is this specific to WGR (Type 1 and 2) and not Solar (Type 1). The requirements also state Type 3 WGR may seek an extension. Does this notification impact Photovoltaic (Type 1)?	Your understanding is correct. Type 1 and 2 refer to WGR types. A "Type 1 IBR" would fall under the definition of an "IBR" in the Resource Attribute section of the ERCOT Nodal Protocols (Section 2 Definitions). Type 1 and 2 WGRs are specifically referenced because they are not technically "IBRs" but are covered by the operating guide language that transitioned from "IRR" to "IBR." Any references to extensions for a Type 3 WGR are to accommodate only that specific technology.
Do the NOGRR 245 requirements apply to my project?	The NOG requirements implemented through NOGRR245 apply to transmission-connected IBRs, Type 1 WGRs and Type 2 WGRs and appear in ERCOT NOG Sections 2.6.2.1; 2.9; 2.9.1; 2.9.1.1; 2.9.1.2; 2.11; 2.12 and 2.13 (and all sub-sections).
<ul style="list-style-type: none"> • What is the difference between Type of IBR 1, 2, and 3? • If applicable, is there documentation regarding required testing, submitting results, and due dates? 	<ul style="list-style-type: none"> • A Type 1 WGR is a wind plant using directly-connected induction generators (such plants are not IBRs). A Type 2 WGR is a wind plant using induction generators with external resistance control (such plants are not IBRs). A Type 3 WGR is a wind plant using doubly fed induction generators (Type 3 WGRs are considered IBRs). • Market Notice: https://www.ercot.com/services/comm/mkt_notices/M-A010825-01 More info: https://www.ercot.com/files/docs/2021/04/20/Model_Quality_Guide.zip
The VRT model for projects must be updated to meet NOGRR245 requirements. When must model updates be completed and what changes must be made.	Models should accurately reflect plant performance (NOGRR245 did not change that). Model updates submitted after 10/1/24 (e.g., for QSA qualification, etc.) must include model quality tests per DWG Procedure Manual Section 3.1.5: https://www.ercot.com/files/docs/2024/11/08/05.%20%20Dwg-Procedure-Manual-Revision-22-clean.docx
Would it suffice to submit the IFC MQT models (including the preferred curves and maximized protection settings) for ERCOT review before Part 3 testing	Because the project has a SGIA after 8/1/2024, it must ensure its FRT capability is set to the maximum level the equipment allows to meet or exceed the requirements of NOG Sections 2.6.2.1(1) - (5) as soon as

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<p>(i.e., after synchronization)? Otherwise, what would be the correct course of action? The project went through 8/1 QSA with no GIM post-QSA; no equipment change, project size or data assumptions changes from QSA study. SGIA was signed after 8/1/24. In this case, would NOGRR245 in its entirety still apply to this project?</p> <p>Does it suffice to provide as-built MQT models including the preferred curves and maximized protection settings and submit for ERCOT's review?</p>	<p>practicable but not later than 12/31/25 or at the time of synchronization with the grid for new IBRs synchronizing after 12/31/25. The project must also maximize VRT capability to meet or exceed NOG Sections 2.9.1.1(1) - (7) as well as meet or exceed the capability and performance requirements in IEEE 2800-2022 Sections 5, 7 and 9, including any intra-standard cross-references or definitions (consistent with Good Utility Practice).</p> <p>Yes, the as-built MQT is required per the Planning Guide process for commissioning. A NOGRR245 template must also be completed prior to synchronization. ERCOT is finalizing template.</p>
<p>Do we have to restudy stability for a Resource with a SGIA after 8/1/2024.</p>	<p>A project with a SGIA after 8/1/2024 must ensure its FRT capability is set to the maximum level the equipment allows to meet or exceed the requirements of NOG Sections 2.6.2.1(1) - (5) as soon as practicable but no later than 12/31/25 or at the time of its synchronization with the grid for Resources synchronizing after 12/31/25. For VRT, the project must meet or exceed capability and performance requirements in IEEE 2800-2022 Sections 5, 7 and 9, including any intra-standard cross-references or definitions and must maximize VRT capability to meet or exceed NOG Sections 2.9.1.1(1) - (7).</p> <p>If a previously submitted facility model already reflects those capabilities, restudy may not be necessary. However, even if a restudy is not necessary, the interconnecting entity must submit an updated MQT per the current Dynamics Working Group Procedure Manual prior to qualification for a QSA.</p>
<p>NOGRR245 went into effect on 10/1/24 and excludes projects with SGIA prior to 8/1/24. However, ERCOT board notes indicate it was recommending to PUCT that new preferred requirements apply to all IBRs. Please clarify how modification to ERCOT requirements applies. Do we need to retune the PSS/E and PSCAD models to comply with preferred requirements. Please indicate whether a new solar project must comply with new requirements for QSA, when COD is achieved, or in the future.</p>	<p>The NOG fundamentally establish FRT and VRT requirements. It is not correct to state the NOG sections revised on 10/1/24, “exclude projects with an executed SGIA prior to August 1, 2024.” The revised NOG requirements define the Resources to which they apply (and many apply to Resource with SGIA before 8/1/24). Essentially, all IBRs, Type 1 WGRs and Type 2 WGRs must maximize ride-through capability to the maximum extent the equipment allows consistent with Good Utility Practice. See, NOG Sec. 2.6.2.1(6); 2.9.1(8); 2.9.1.1(8); 2.9.1.2(8).</p> <p>NOG Sec. 2.9.1(8) requires Resources with a SGIA before 8/1/24 that cannot fully meet IEEE 2800-2022 Sections 5, 7, and 9 to maximize performance of protection systems, controls, and other plant equipment to achieve, as close as reasonably possible, the capability and performance set forth in IEEE 2800-2022 Sections 5, 7 and 9 as soon as practicable but no later than 12/31/25 or by Commercial Operations Date (COD), whichever is later.</p> <p>Submitted models for planned facilities must accurately reflect anticipated facility performance aligned with</p>

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	<p>the ultimate operating requirements. Therefore, if model performance for the planned facility does not meet applicable requirements, tuning and adjustment (that can be achieved in the field) as well as potential re-study may be necessary before it can proceed through the interconnection process.</p> <p>There are limited scenarios where extensions and exemptions may apply, but in general:</p> <ul style="list-style-type: none"> • A project with a SGIA on or after 8/1/2024, must comply with the voltage ride-through requirements in NOG 2.9.1.1 and Sections 5, 7 and 9 of IEEE 2800-2022. • A project with a SGIA before 8/1/2024, must comply with the voltage ride-through requirements in NOG 2.9.1.2. • A project that initiates a GIM on or after 8/1/2024 (even if the SGIA is before 8/1/2024), must comply with the voltage ride-through requirements in NOG 2.9.1.1 and Sections 5, 7 and 9 of IEEE 2800-2022. • All projects must maximize their ride-through capabilities (consistent with Good Utility Practice) by 12/31/2025.
<p>1. Based on NOG 2.9.1.2(9), if a Resource with SGIA before 8/1/24 does not comply w/ Legacy VRT Requirements by 12/31/5, RE must submit IVRTCR by 4/1/25. Correct? What are VRT requirements set on 5/1/4: are they Legacy Voltage Ride-Through Requirements?</p>	<p>Based on representations made by Market Participants ERCOT worked with in drafting NOGRR245, it was understood Resource Entities would <i>maximize</i> the ride-through capabilities of Resources to the fullest extent the equipment allows consistent with Good Utility Practice. In other words, NOGRR245 was not intended to have Resource Entities simply meet the minimum ride-through capability of their Resources.</p> <p>Every IBR, Type 1 WGR and Type 2 WGR must maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed IEEE 2800-2022 sections 5, 7 and 9. If an IBR with an SGIA executed prior to 8/1/24 cannot fully meet those requirements, it must maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to achieve, as close as reasonably possible, IEEE 2800-2022 sections 5, 7 and 9 as soon as practicable but no later than 12/31/25 or its COD, whichever is later. See, NOG Sec. 2.9.1(8).</p> <p>An IBR, Type 1 WGR and Type 2 WGR with an SGIA date before 8/1/24 must meet the ride-through requirements in NOG Sec. 2.9.1.2(1)-(7) as soon as practicable but no later than 12/31/25 or its COD, whichever is later. See, NOG Sec. 2.9.1.2(8).</p>

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<p>2. Based on NOG 2.9.1(4), if Resource with SGIA executed before 8/1/24 that comply with Legacy VRT Requirements, need not meet Preferred VRT Requirements. Correct? If no requirement, should we still evaluate the NOGRR preferred curves?</p> <p>3. Based on DWG Procedure Manual Revision 21 Section 3.1.5.4, Resources not subject to the “preferred” Voltage Ride Through requirements of NOG 2.9.1.1 are only required to ride through the first</p>	<p>If an IBR, Type 1 WGR or Type 2 WGR with an SGIA prior to 8/1/24 cannot comply with Sec. 2.9.1.2(1) - (7) by 12/31/25 after maximizing the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice), the Resource must, by 4/1/25, submit an Initial Voltage Ride-Through Capability Report (“IVRTCR”) pursuant to Section 2.11.2 and request an extension pursuant to Section 2.12. If the Resource submits an IVRTCR and cannot comply with NOG Sections 2.9.1.2(1) - (7) with an extension, it must submit a notice of intent to request an exemption pursuant to Section 2.12 and comply with the voltage ride-through requirements in effect on 5/1/24 until it maximizes its voltage ride-through capability. See, NOG Sec. 2.9.1.2(9).</p> <p>The voltage ride-through requirements in effect on 5/1/24 can be found in the NOG Library on the ERCOT web site: https://www.ercot.com/files/docs/2024/04/26/May%201,%202024%20Nodal%20Operating%20Guide.pdf</p> <p>2. The first and foremost requirement is that every IBR, Type 1 WGR and Type 2 WGR maximize the performance of its protection systems, controls, and other plant equipment to meet and, if possible, exceed the capability and performance set forth in sections 5, 7 and 9 of the IEEE 2800-2022 standard. See, NOG Sec. 2.9.1(8). If the Resource cannot fully meet the requirements of sections 5, 7, and 9 of the IEEE 2800-2022 standard, it must maximize the performance of its protection systems, controls, and other plant equipment (consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance set forth in sections 5, 7 and 9 of the IEEE 2800-2022 standard. See, NOG Sec. 2.9.1(8).</p> <p>If an IBR, Type 1 WGR or Type 2 WGR has fully maximized its ride-through capability and still cannot meet the requirements of IEEE 2800-2022 nor the requirements in NOG Sec. 2.9.1.1, it must meet the ride-through requirements in NOG 2.9.1.2.</p> <p>3. Yes.</p>

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<p>dip of the below voltage dip profiles. This first dip is within the “legacy” LVRT requirements of NOG 2.9.1.2. Must we run voltage dip of 0.7 pu at POI for project with SGIA before 8/1/24?</p> <p>4. Based on NOG 2.9.1(6), Resource with SGIA after 8/1/24 must comply with Preferred Voltage Ride-Through Requirements by synchronization date. Correct?</p> <p>5. If so and assuming QSA model did not evaluate Preferred VRT Requirements, would a revised model suffice?</p>	<p>4. The primary obligation is to maximize the performance of protection systems, controls, and other plant equipment to meet and, if possible, exceed the capability and performance set forth in sections 5, 7 and 9 of the IEEE 2800-2022 standard consistent with Good Utility Practice. See, NOG 2.9.1(8).</p> <p>Additionally, pursuant to NOG Sec. 2.9.1(2) an IBR with a SGIA executed on or after 8/1/24 must meet or exceed the capability and performance requirements in sections 5, 7 and 9 of IEEE 2800-2022, including any intra-standard cross references or definitions. The Resource must also maximize the performance of protection systems, controls, and other plant equipment (consistent with Good Utility Practice) to comply with the ride-through requirements in NOG Sec. 2.9.1.1. See, NOG 2.9.1.1(8).</p> <p>A project with a SGIA after 8/1/2024, must ensure its frequency ride-through capability is set to the maximum level the equipment allows to meet or exceed the requirements of NOG Sections 2.6.2.1(1) - (5) as soon as practicable but no later than 12/31/25 or the time of its synchronization with the ERCOT Transmission Grid if it synchronizes after 12/31/25.</p> <p>5. The NOG performance requirements apply regardless of what was reviewed for QSA. In general, past QSA qualifications will not be revisited, but the as-built model update required by the NOG must include a Model Quality Test (MQT) in accordance with the currently-approved DWG Procedure Manual. As models must accurately reflect plant performance, any failure to meet required performance in the MQT must be corrected.</p>
<p>Seeking guidance from ERCOT on the applicable requirements for a project with a SGIA signed on June 8, 2022 that met QSA pre-requisites on 8/1/24. Given the SGIA was executed prior to 8/1/24:</p> <ul style="list-style-type: none"> • For frequency ride through - Section 2.6.2.1.1 of the NOG apply • For voltage ride through - Section 2.9.1.2 of the NOG apply 	<p>Based on representations made by Market Participants ERCOT worked with in drafting NOGRR245, it was understood Resource Entities would <i>maximize the ride-through capabilities</i> of their Resources. Therefore, NOGRR245 requires all IBRs, Type 1 WGRs and Type 2 WGRs to <i>maximize – to the fullest extent possible</i> – frequency and voltage ride-through capability. In other words, NOGRR245 was not intended to have Resource Entities simply meet the <i>minimum</i> ride-through capability of their Resources.</p>

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	<p>NOG Section 2.6.2.1(6) requires Resources to ensure their frequency ride-through capability is set to the <i>maximum level the equipment allows to meet or exceed</i> the requirements of NOG Sec. 2.6.2.1(1) - (5) as soon as practicable but no later than 12/31/25 or at the time of its synchronization with the ERCOT Transmission Grid for projects synchronizing after 12/31/25.</p> <p>Once a Resource has maximized its ride-through capability, if it cannot meet the requirements of NOG Sec. 2.6.2.1(1) – (6) by 12/31/25, it must – by 4/1/25 - submit an Initial Frequency Ride-Through Capability Report (“IFRTCR”) pursuant to NOG Section 2.11.1 and submit an <i>extension</i> request or <i>notice of intent to request an exemption</i> pursuant to NOG Section 2.12.1 and comply with the frequency ride-through requirements in effect on 5/1/24 until the Resource maximizes its frequency ride-through capability as set forth in NOG Sec. 2.6.2.1(6).</p> <p>For voltage ride-through, every IBR, Type 1 WGR and Type 2 WGR must maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed the capability and performance set forth in sections 5, 7 and 9 of the IEEE 2800-2022 standard.” See, NOG Sec. 2.9.1(8).</p> <p>If Resource with an SGIA executed prior to 8/1/24 cannot fully meet the requirements of IEEE 2800-2022 Sections 5, 7, and 9, it must <i>maximize the performance of its protection systems, controls, and other plant equipment</i> (consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance set forth in IEEE 2800-2022 Sections 5, 7 and 9 <i>as soon as practicable but no later than 12/31/25 or its COD, whichever is later</i>. See, NOG Sec. 2.9.1(8).</p> <p>A Resource with an SGIA date before 8/1/24 must also meet the ride-through requirements in NOG Sec. 2.9.1.2(1)-(8) as soon as practicable but no later than 12/31/25 or its COD, whichever is later.</p> <p>If a Resource with an SGIA prior to 8/1/24 cannot comply with NOG Sec. 2.9.1.2(1) - (7) by 12/31/25 after maximizing the performance of its protection systems, controls, and other plant equipment, the Resource must - by 4/1/25 - submit an Initial Voltage Ride-Through Capability Report (“IVRTCR”) pursuant to NOG Sec. 2.11.2 and request an <i>extension</i> to comply pursuant to NOG Sec. 2.12. If the Resource submits an IVRTCR and cannot comply with 2.9.1.2(1) - (7) even with an extension, it must</p>

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	submit a <i>notice of intent to request an exemption</i> pursuant to NOG Sec. 2.12 and comply with the voltage ride-through requirements in effect on 5/1/24. See, NOG Sec. 2.9.1.2(9).
<ul style="list-style-type: none"> • Can ERCOT comment on how a resource owner may proceed to verify compliance? For example, are simulation results showing compliance to the items below necessary? <ul style="list-style-type: none"> ○ Negative sequence current injection and angle [IEEE 2800 Section 7.2.2.3.4] ○ IBR performance specifications at the unit terminals [IEEE 2800 Section 7.2.2.3.5 Table 13] ○ ROCOF [IEEE 2800 Section 7.3.2.3.5] ○ Transient Overvoltage [IEEE 2800 Section 7.2.3] ○ Consecutive voltage deviations ride-through [IEEE 2800 Section 7.2.2.4] 	The requirements you cite are not specifically evaluated in the ERCOT model quality tests. Responses to the questions ERCOT will send through the upcoming DocuSign process are intended to document Resource capabilities and expected performance with respect to these items (rather than demonstration in specific simulations). However, models must accurately represent the dynamics of the device and model verification reports that support the model data based on documented field settings must be provided as specified in the Dynamics Working Group Procedure Manual for Generation Resources, Energy Storage Resources and for Transmission Elements represented in the dynamic model as required by ERCOT Planning Guide Section 6.2(5)(a) and (b). Those reports must demonstrate the commonly tuned model parameters match site-specific settings implemented in the field. The DocuSign document ERCOT will send this week provides an opportunity to explain any modeling limitations.
Following the question above, if simulations are required to verify compliance, does ERCOT provide any guidance on the methodology/ approach of the simulations and evaluation or, would it be sufficient to follow the guidelines in IEEE 2800-2022 itself, together with reasonable engineering judgement?	All Operating Guide requirements mandate operating performance regardless of any model or testing results. Presumably, accurate models would give Resource owners a high degree of confidence their facilities comply with requirements. ERCOT model quality tests are example checks ERCOT performs to provide confidence facilities meet certain requirements. However, ERCOT does not mandate specific tests for every requirement. One of the purposes of the information-gathering exercise being done through the DocuSign process is to ensure Resource owners are aware of ride-through requirements. Complying with the requirements is mandatory regardless of any ERCOT efforts to verify performance.
Can ERCOT comment whether it is sufficient to provide attestation following the DocuSign process, or is there a requirement to submit a report showing simulation results and verifying compliance using the appropriate models?	<p>A specific simulation demonstrating compliance with every requirement is not required. The ERCOT Planning Guide requires certain documentation, but operational performance must meet the applicable requirements regardless of any documentation supplied to ERCOT. In the upcoming DocuSign process, ERCOT will ask Market Participants to attest to the fact they have configured equipment to ride-through frequency and voltage disturbances to the <i>maximum extent their equipment allows consistent with Good Utility Practice</i>.</p> <p>NOGRR245 did not change the requirements for submitting models and simulation data already in the ERCOT Planning Guide and Dynamics Working Group Procedure Manual. Specifically, Planning Guide Section 5.2.1 indicates all of Section 5 applies to new generators one megawatt or greater and existing</p>

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	Resources if they meet any of the criteria in Planning Guide Section 5.2.1(1)(c). Planning Guide Section 5.5 then addresses the types of data to provide to ERCOT before it can approve a new generator or changes to an existing Resource. For example, Planning Guide Section 5.5(4) provides that, prior to and IBR's Resource Commissioning Date, the Interconnecting Entity (IE) must submit appropriate dynamic models for the "as-built" data and data submitted for the quarterly stability assessment, documentation clearly indicating any differences, results of the model quality tests of the "as-built" data overlaid with the results of the data submitted for the quarterly stability assessment, and associated simulation files pursuant to Planning Guide Section 6.2(5)(c). For existing Resources, the Resource Entity (RE) must provide the data and information set forth in Planning Guide Section 5.5(6).
With respect to the 4/1/25 deadline for extensions and exemption requests, it seems a resource owner cannot verify if its resource will meet ride-through requirements at the POIB (and therefore know if an extension/exemption request should be made) without verifying compliance using the models. Can ERCOT comment if this understanding is correct?	Operating Guide Sections 2.6.2.1; 2.6.2.1.1; 2.9.1; 2.9.1.1 and 2.9.1.2 provide ride-through performance criteria at the Point of Interconnection Bus (POIB). ERCOT cannot provide you instructions on how to ensure your Resource meets those performance criteria.
If simulation results are required to show compliance, are all models (PSSE, TSAT, PSSE) required to be tested or can an appropriate model be selected based on the requirement? =====	ERCOT Planning Guide Section 6.2(5)(a) requires Market Participants to provide models with parameters accurately representing the device's dynamics. Assuming it complies with that requirement, a Resource could be confident it meets operational performance requirements by undertaking its own investigation. ERCOT does not require a specific simulation demonstrating compliance with every Operating Guide requirement. =====
For example, in PSCAD, should we run the frequency protection test for 299 seconds (or other requirements specified with long time durations)? If this is the case, the simulation is quite long in real time.	Operating Guide Section 2.6.2.1(1) shows the minimum ride-through time (in seconds). For frequency > 61.6 Hz and ≤ 61.8 Hz, the Resource must ride-through for at least 299 seconds. Resources must meet that performance requirement. ERCOT does not currently require a specific simulation demonstrating performance for this case, but a Resource still must comply with the requirement.
If simulation results are required to show compliance, for solar + battery storage projects, which scenarios are required for compliance evaluations (all 5 scenarios or a subset from solar only, battery discharge, battery charge, partial solar + partial battery discharge, solar + battery charge)?	Resources must comply with the NOG requirements for all scenarios in which the Resource may operate while connected to the ERCOT System. The Dynamics Working Group Procedure Manual requires that model quality tests be submitted for maximum power injection and maximum power withdrawal scenarios. [See, DWG Procedure Manual Section 3.1.5.1] The Model Quality Guide posted on the Resource Integration webpage recommends at least four test scenarios for hybrid and self-limiting facilities. Resource Entities may test additional scenarios.

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<p>Our understanding of the process is summarized in the steps below - can ERCOT please comment?</p> <ol style="list-style-type: none"> 1. Verify max capability from OEM for VRT and FRT capability (or obtain from OEM documentation, if provided) 2. Use the maximized settings into the latest plant model, run simulations to validate compliance, and tune settings further if needed <ol style="list-style-type: none"> a. If any compliance issues are found per the simulations, resource owner will submit either an extension or exemption request as appropriate, by 4/1/25 3. If no issues in the simulation results and the maximized settings from the model are different than what is in the field, initiate Generator Interconnection or Modification (GIM) process 4. Once the GIM process is complete, maximized settings are implemented in the field and will be consistent with the models 	<p>In a general sense, the steps you set forth are accurate. However, if the settings from models differ from the settings in the field, the Resource owner must follow the process described in Planning Guide Section 5.5(4) (for a new generator) or Planning Guide section 5.5(6) (for existing Resources) before implementing any modification to a control setting or equipment <i>that impacts the dynamic response</i> (such as voltage, frequency, and current injections) at the Point of Interconnection Bus (POIB). Once the Resource owner submits the required data and information and ERCOT and the interconnecting TSP approve the proposed modifications, the Resource owner can implement the modifications in the field.</p>
<p>Which tests should be performed to validate the VRT/FRT maximum capability? Should we utilize the test set from ERCOT model quality tests?</p>	<p>ERCOT model quality tests are example checks ERCOT performs to provide confidence facilities meet certain requirements. However, ERCOT does not mandate specific tests for every requirement.</p>
<p>Because some projects going through repowering may face challenges meeting the preferred requirements due to technology limitations, although performance improvements can still be achieved, flexibility on the implementation date would help developers plan repowers and other modifications with greater certainty.</p> <p>=====</p> <p>1. What is the interpretation of "modification was fully implemented prior to January 1, 2028" in NOG Sec. 2.9.1(1)(a)(ii)? Specifically, what criteria must be met for this milestone to be considered achieved? Additionally, is there a specific milestone or reference that formally marks its fulfillment?</p>	<p>Changing the language in the NOG requires using the NOG Revision Request process. See, https://www.ercot.com/mktrules/guides/noperating</p> <p>=====</p> <p>1. NOG Section 2.9.1(1)(a)(ii) states the modification must be <i>fully implemented</i> before 1/1/28. ERCOT Planning Guide Section 5.2.1(1)(c)(iii) provides that, “modifying any control settings or equipment of [IBRs] that impact the dynamic response (such as voltage, frequency, and current injections) at the Point of Interconnection (POI) in a manner that is deemed to require further study in accordance with the process outlined in paragraph (5) of Section 5.5, Generator Commissioning and Continuing Operations” must follow the requirements in Planning Guide Section 5.2.</p>

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<p>2. Could "modification was fully implemented prior to January 1, 2028" be tied to a more certain date in the process, such as the execution of the GIA or another clearly defined milestone?</p> <p>3. If the term is equivalent to the COD, how would ERCOT address projects that are scheduled to reach COD before January 1, 2028 but encounter construction or supply chain delays, pushing COD beyond the deadline?</p>	<p>Based on the plain meaning of the words "fully implemented," the modifications must have gone through the ERCOT processes described in the ERCOT Planning Guide and be <i>completed</i>; in other words, nothing is left to accomplish in the project to modify the equipment or settings.</p> <p>2. Changing the language in the NOG requires using the NOG Revision Request process. See, https://www.ercot.com/mktrules/guides/noperating</p> <p>3. The plain language of NOG Section 2.9.1(1)(a)(ii) states the modification must be fully implemented before 1/1/28, it does not say anything about COD. Operating Guides Section 2.11(3) requires that, upon completing the work to maximize ride-through capability, the Resource Entity must inform ERCOT it completed the work.</p>
<p>From previous communication, we understood that if the current settings sufficiently meet the ride-through requirements, meaning they are not set at the minimum of the requirement, but also not set to the absolute maximum of the capability, then setting changes would not be required. Could you reconfirm if this understanding is correct?</p> <p>=====</p> <p>If that is correct, how should the columns for pre-maximization and post-maximization in the template be completed? Because the settings are already "maximized," they would fall under post-maximization. However, in that case, there would not be distinct "pre-maximized" settings. Could you confirm whether this approach aligns with ERCOT's expectations?</p>	<p>The wording of the NOG does not require setting equipment to "the absolute maximum of the capability." NOG Section 2.9.1(8) provides that "maximizing" means making, "software, settings, firmware, and parameterization changes, which includes any memory upgrades to accommodate such changes that do not involve modifying other Resource equipment or components, to maximize capabilities of the Resource with respect to the specified IEEE 2800-2022 requirements <i>in accordance with Good Utility Practice.</i>" (emphasis added)</p> <p>Thus, if you believe you have maximized the Resource's ride-through capability to the maximum extent the equipment allows <i>consistent with Good Utility Practice</i> and the Resource at least meets the requirements in NOG Sections 2.6 and 2.9 (whichever apply to it), no additional setting changes would be required.</p> <p>=====</p> <p>You should enter into the pre-maximization and post-maximization columns the actual values for the Resource capability before and after maximization. If it is your position those values are the same <i>after</i> maximization as they were <i>before</i> maximization, you would enter the same number in each column. However, doing so would imply you have not attempted to maximize the Resource's ride-through capability. Pursuant to NOG Sec. 2.11(1), if you believe your Resource has already maximized its ride-through capabilities to meet or exceed the applicable ride-through performance requirements, you must submit to ERCOT accurate models reflecting the field settings of the</p>

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Question	Reply
	Resource consistent with applicable requirements for model updates in the Protocols, Operating Guides and Other Binding Documents.
1. If a repowering reaches COD before 2028, what requirements must it meet: legacy or preferred?	<p>1. The requirements are for <i>all</i> IBRs, Type 1 WGRs and Type 2 WGRs to maximize the performance of their protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance set forth in IEEE 2800-2022, sections 5, 7 and 9, not just meet the minimum requirements in Section 2.9.1.2. [See, Operating Guides Section 2.9.1(8)]</p> <p>If the Resource cannot meet or exceed the IEEE 2800-2022 requirements, NOG Section 2.9.1(8) requires it to maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance set forth in IEEE 2800-2022 sections 5, 7 and 9.</p> <p>After maximizing to achieve - as close as possible - IEEE 2800-2022, NOG Sections 2.9.1(1)(b) and 2.9.1.2(8) require the Resource to maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed the performance requirements in Sections 2.9.1.2(1)-(7).</p> <p>For the purposes of those NOG sections, “maximizing” means making software, settings, firmware, and parameterization changes (which includes any memory upgrades to accommodate such changes that do not involve modifying other Resource equipment or components) to maximize capabilities of the Resource with respect to the specified IEEE 2800-2022 requirements in accordance with Good Utility Practice. [See, Operating Guide Section 2.9.1(8)]</p> <p>So long as the Resource repowering is <i>fully implemented</i> prior to 1/1/28, NOG Sections 2.9.1(1)(a)(ii) and 2.9.1(4) provide the Resource is <i>required</i> to meet the performance capabilities in Section 2.9.1.2.</p>
2. Does meeting legacy requirements only mean maximizing ride through capabilities?	2. The requirements are for <i>all</i> IBRs, Type 1 WGRs and Type 2 WGRs to maximize the performance of their protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance set forth in IEEE 2800-2022, sections 5, 7 and 9, not just the <i>minimum</i> requirements in

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<p>3. Once the legacy requirements are met, will the project meet compliance?</p>	<p>Section 2.9.1.2. The Resource must, however, <i>at least</i> meet the requirements in Section 2.9.1.2. That section contains specific ride-through requirements in Sections 2.9.1.2(1) and (3) through (7).</p> <p>3. If ERCOT learned a Resource did <i>not</i> maximize its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance in IEEE 2800-2022, sections 5, 7 and 9 (and not just meet the <i>minimum</i> requirements in Section 2.9.1.2), the Resource could be considered out of compliance.</p>
<p>4. Once the project has met compliance before 2028, will it be required to also meet IEEE 2800 after 2028?</p>	<p>4. If you mean the Resource <i>fully implemented</i> modifications complying with Section 2.9.1.2 before 1/1/28, see the response to Question #1, above.</p>
<p>5. If the intent was to reach COD before 2028 but COD is delayed beyond the owner’s control into 2028, can you confirm only legacy requirements are to be met?</p>	<p>5. Please refer to the response to Question #1, above. Additionally, the analysis does not focus on “COD” but on when the Resource <i>fully implements</i> the modifications. If the Resource does not <i>fully implement</i> the modifications prior to 1/1/28, NOG Section 2.9.1(8) requires the Resource to meet and, if possible, exceed IEEE 2800-2022 sections 5, 7 and 9. If it cannot meet IEEE 2800-2022, Section 2.9.1(1)(a)(ii) requires the Resource to meet the preferred requirements in Section 2.9.1.1.</p>
<p>6. If a repower without changing the inverters occurs before 2028, what requirements does the project need to meet: legacy or preferred?</p>	<p>6. The analysis does not focus solely on whether inverters are changed. Any modification of an existing Resource that meets the requirements in Planning Guide Section 5.2.1(1)(c) must go through the Generator Interconnection or Modification (GIM) process. Please refer to Question #1, above.</p>
<p>7. If a repower without changing the inverters occurs after 2028, what requirements does the project need to meet: legacy or preferred?</p>	<p>7. The same response as provided to Question #5, above, applies to this scenario.</p>
<p>Scenario:</p> <ul style="list-style-type: none"> a. An amended SGIA after 8/1/2024 b. Resource to implement a “top-off” scenario for repower (replacing parts such as rotor and blades providing a MW uplift and may include software update) c. Requires GINR submittal to ERCOT for repower to complete applicable studies and models 	

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<p>1. Under the scenario described above, what is the minimum long-term obligation the entity must meet assuming it can implement the modifications <u>prior to 1/1/28</u>? [NOTE: In general, a SGIA amendment will have updated dates (energization, synchronization and COD) and the original SGIA date does not change. On questions 1a. and 1b. below what we seek clarification on if the SGIA date is always the original SGIA date or the amendment date?</p> <p>a. If the site <u>can</u> meet the legacy VRT/FRT requirements in full, is the expectation that as long as the top-off is implemented prior to 1/1/28 the site will be in compliance (assuming it is maximized)?</p> <p>b. If the site <u>cannot</u> meet the current legacy VRT/FRT requirements in full and currently has some type of ERCOT exemption, what is the expectation of this top-off scenario if the repower implemented prior to January 1, 2028? [NOTE: “some type of exemption” relates to the partial ride through exemptions in the protocols for older sites based on their SGIA and COD dates.] How are those sites treated?</p> <p>i. Does it need to meet legacy requirements in full or is in violation?</p>	<p>1. The original SGIA date remains in place (<i>i.e.</i>, an amendment does not change the original SGIA date). Although we cannot interpret the NOG (and other requirements) for you, generally speaking, the NOG require all Resources to maximize ride-through capability to the fullest extent possible consistent with Good Utility Practice. If the “repower” you describe must go through the process applicable through Planning Guide Section 5.2.1, the Resource must meet the Frequency Ride-Through requirements in Operating Guide Section 2.6.2.1 and the Voltage Ride-Through requirements in Operating Guide Section 2.9.1(2)-(5).</p> <p>a. Section 2.9.1(4), provides that an IBR, Type 1 WGR or Type 2 WGR with an original SGIA executed before 8/1/24 that implements modifications complying with Section 2.9.1.2 prior to 1/1/28 is not required to meet or exceed the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022 standard. However, the Resource must still maximize its ride-through capability to the fullest extent the equipment allows consistent with Good Utility Practice.</p> <p>b. NOG Section 2.9.1(4), provides that an IBR, Type 1 WGR or Type 2 WGR with an original SGIA executed before 8/1/24 that implements modifications complying with Section 2.9.1.2 prior to 1/1/28 is not required to meet or exceed the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022 standard. Again, however, the over-arching requirement is for Resources to maximize their ride-through capability to the fullest extent the equipment allows consistent with Good Utility Practice.</p> <p>The ERCOT Protocols contained no “exemptions” for older sites based on their SGIA and COD dates. If you are referring to the <i>Operating Guide</i> sections in effect before NOGRR245 (<i>i.e.</i>, NOG Sections 2.9 and 2.9.1), they also contained no “exemptions” and, in any event, no longer apply <i>except</i> to the extent a Resource that requests and obtains an exemption from the current ride-through requirements must <i>at least</i> meet the requirements in effect on 5/1/24. All exemptions under the current NOG will be handled pursuant to the current NOG – no “partial exemptions” apply.</p> <p>i. When the NOG require a Resource to meet certain requirements, it means the Resource must meet <i>all</i> applicable requirements.</p>

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Question	Reply
c. What happens if the site implements modifications after 1/1/28 due to delays?	c. The NOG clearly provide an IBR, Type 1 WGR or Type 2 WGR with an original SGIA executed before 8/1/24 that implements modifications complying with Section 2.9.1.2 <i>prior to 1/1/28</i> , is not required to meet or exceed the capability and performance requirements in sections 5, 7 and 9 of the IEEE 2800-2022 standard. It states further that any IBR modifications implemented on or after 1/1/28 do not qualify for this exception. Therefore, for modifications completed after 1/1/28, the Resource would have to meet the requirements in IEEE 2800-2022.
d. What is the trigger or verification the modification was completed by 1/1/28 (e.g. how will ERCOT confirm this)?	d. NOG Section 2.11(3) requires the Resource to inform ERCOT it completed maximizing its ride-through capability, “upon completing the work to maximize ride-through capability...”
What are the requirements associated with NOGRR245 and to what Resources do they apply?	<p>The NOG requirements established through NOGRR245 apply to all IBRs, Type 1 WGRs and Type 2 WGRs. All such facilities must maximize ride-through capabilities to the fullest extent the equipment allows (consistent with Good Utility Practice) and provide ERCOT specific design, operational, and model data. A Resource with a SGIA dated before 8/1/24 must meet the ride-through requirements in NOG Sections 2.6.2.1; 2.9; 2.9.1; 2.9.1.2; 2.11; 2.12 and 2.13 (and all sub-sections). A Resource with a SGIA dated after 8/1/24 (or that goes through the GIM process after 8/1/24) must meet the ride-through requirements in NOG Sections 2.6.2.1; 2.9; 2.9.1; 2.9.1.1; 2.11; 2.12 and 2.13 (and all sub-sections).</p> <p>This answer tried to summarize the requirements but the actual language of the NOG prevails.</p>
Our inverter protection settings for existing facilities were established based on equipment capability rather than absolute limits, meaning they are configured to trip near or at those limits. The existing settings are fully compliant and do not risk tripping within the ride-through requirements; therefore, it does not merit making updates to the protection settings. We believe the effort and cost required to strictly adhere to NOGRR245 by maximizing settings to “absolute” equipment limits would not be justified. Do you agree?	Based on representations made by Market Participants ERCOT worked with in drafting NOGRR245, it was understood Resource Entities would <i>maximize</i> the ride-through capabilities of their Resources. Therefore, the NOG as revised by NOGRR245 require all IBRs, Type 1 WGRs and Type 2 WGRs to maximize – to the fullest extent possible – frequency and voltage ride-through capability. In other words, NOGRR245 was not intended to have Resources simply meet the <i>minimum</i> ride-through capability. Importantly, the NOG provide that, to establish ride-through capabilities to the maximum extent the equipment allows means making software, settings, firmware, and parameterization changes (which includes any memory upgrades to accommodate such changes that do not involve modifying other Resource equipment or components) to maximize the Resource’s ride-through capabilities in accordance with Good Utility Practice. Thus, maximization does not mean going to the “absolute limits” of equipment capability. Appropriate margins in accordance with OEM guidance and Good Utility Practice are expected to prevent equipment damage when maximizing performance.

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	<p>NOG Sec. 2.9.1(8) provides that every IBR, Type 1 WGR and Type 2 WGR must maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed the capability and performance in IEEE 2800-2022 sections 5, 7 and 9. If an IBR with an SGIA executed prior to 8/1/24 cannot fully meet those requirements, the Resource must maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to achieve, as close as reasonably possible, the capability and performance set forth in IEEE 2800-2022 sections 5, 7 and 9 as soon as practicable but no later than 12/31/25 (or its COD, whichever is later).</p> <p>Pursuant to NOG Section 2.9.1(1)(b), an IBR, Type 1 WGR and Type 2 WGR with an SGIA date before 8/1/24 must meet the ride-through requirements in NOG Sec. 2.9.1.2 as soon as practicable but no later than 12/31/25 (or its COD, whichever is later). See, Section 2.9.1.2(8). Additionally, pursuant to NOG Section 2.9.1.2(8), each IBR, Type 1 WGR or Type 2 WGR must maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed the performance requirements in NOG Sections 2.9.1.2(1) - (7) as soon as practicable but no later than 12/31/25 or its COD, whichever is later.</p>
What activities must we do by 4/1/25 versus 12/31/25?	<p>4/1/25</p> <p>For Resources with a SGIA before 8/1/24:</p> <ol style="list-style-type: none"> 1. If the Resource cannot meet Sections 2.6.2.1(1)-(6) by 12/31/25, submit an Initial Frequency Ride-Through Capability Report (IFRTRC) and request an extension or exemption (as applicable) by following Section 2.12. [See, 2.6.2.1(7)] 2. If it cannot meet Sections 2.9.1.2(1)-(7) by 12/31/25, submit Initial Voltage Ride-Through Capability Report (IVRTRC) and request an extension by following Section 2.12. [See, 2.9.1.2(9)] 3. If it cannot meet Sections 2.9.1.2(1)-(7) <i>even with an extension</i>, submit IVRTRC and request an exemption by following Section 2.12. [See, 2.9.1.2(9)] <p>For Resources with a SGIA after 8/1/24:</p> <ol style="list-style-type: none"> 1. If it cannot meet IEEE 2800-2022 Sections 5, 7 and 9 by its synchronization date, request a temporary extension by following Section 2.12. [See, 2.9.1(6)]

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	<p>2. If it needs time to implement upgrades or retrofits to meet Section 2.9.1(7), request an extension request by following Section 2.12.</p> <p>12/31/25 Unless: (i) an extension is granted; (ii) an exemption is granted; or (iii) the Resource has not reached synchronization or COD (as applicable):</p> <ol style="list-style-type: none"> 1. Meet or exceed the capability and performance requirements in IEEE 2800-2022 Sections 5, 7, 9 to the fullest extent equipment allows 2. Ensure frequency ride-through capability is set to the maximum level equipment allows to meet or exceed Sections 2.6.2.1(1)-(5) 3. Resources with SGIA before 8/1/24: maximize performance of protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed Sections 2.9.1.2(1)-(7) [See, 2.9.1.2(8)] 4. Resources with SGIA after 8/1/24: maximize performance of protection systems, controls, and other plant equipment (within equipment limitations and consistent with Good Utility Practice) to meet and, if possible, exceed Sections 2.9.1.1(1)-(7) [See, 2.9.1.1(8)]
<p>I have a Resource with an SGIA dated after 8/1/24 (or an existing Resource going through the Planning Guide Sec. 5.2.1(1)(c) GIM process). Does my Resource have to meet the IEEE 2800-2022 performance criteria or the requirements in NOG Sec. 2.9.1.1?</p>	<p>Basically, the Resource must meet both sets of requirements.</p> <p>To be more specific, IEEE 2800-2022 contains ride-through curves and other general requirements and information that are not <i>necessarily</i> performance-based. Section 2.9.1.1 is intended to be specific ride-through requirements for the ERCOT Region. Generally speaking, the Sec. 2.9.1.1 requirements are somewhat different than those in IEEE 2800-2022.</p> <p>In summary, the NOG require Resources to maximize ride-through capability, “to meet and, if possible, exceed” the capability and performance in IEEE 2800-2022 as well as Sections 2.6.2.1 and 2.9.1.</p> <p>The <i>Required Criteria</i> appear in Sections 2.6.2.1 (frequency) and 2.9.1 (voltage) even though all Resources should “strive to meet or exceed” the Required Criteria in Sections 2.6.2.1 and 2.9.1. See, Operating Guides Section 2.13(1).</p>

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Question	Reply
	For Resources with an approved exemption or extension, the Resource’s documented maximum ride-through capability becomes its compliance requirement. See, e.g., Operating Guide Sections 2.12.1(4) and 2.13(1).
My Resource has a SGIA originally signed before 8/1/24 but amended after 8/1/24. For purposes of the NOG sections on ride-through, which date applies?	An amendment does not change the original date of a contract and, therefore, the original pre-8/1/24 SGIA date applies.
In the IFRTCR and IVRTCR (subsection (l)), what model is needed – pre-maximization or post-maximization?	Resources should submit pre-maximization and post-maximization models so ERCOT can determine the changes made during the maximization process. A Resource must submit correct models pursuant to ERCOT Planning Guide Sections 5.2.4(1), (2) and Public Utility Commission of Texas Electric Substantive Rule § 25.503(f)(8). Additionally, if a Resource capacity changes or Resource limitations occur that materially affect the availability of a unit or facility, the anticipated operation of a Resource, or the Resource’s ability to comply with ERCOT dispatch instructions, the Resource must immediately notify ERCOT pursuant to Public Utility Commission of Texas Electric Substantive Rule § 25.503(f)(9).
What models are required by April 1, 2025 (e.g., PSCAD, PSSE, TSAT, etc.) assuming IFRTCR/IVRTCR is being submitted?	All required models should be submitted. If a PSCAD model was not previously required, a PSCAD model would not technically be required solely due to submission of the IFRTCR/IVRTCR. However, given industry trends, a PSCAD model may very well be required for all Resources at some point.
Do any of the balance of plant relays (e.g., collector system over-voltage, under-voltage, POI voltage/frequency protections, etc.) need to be included in the models?	To the extent any “balance of plant” equipment affects the Resource’s ability to ride-through system disturbances, you should include it in the model.