NOGRR Number	245	NOGRR Title	Inverter-Based Resource (IBR) Ride-Through Requirements

Date	June 7, 2023

Submitter's Information	
Name	Thresa Allen
E-mail Address	thresa.allen@avangrid.com
Company	Avangrid Renewables, LLC
Phone Number	(281) 217-4764
Cell Number	(281) 217-4764
Market Segment	Independent Generator

Comments

Avangrid Renewables, LLC ("Avangrid") is an owner and operator of Generation Resources (i.e., utility-scale Intermittent Renewable Resources (IRRs)) in the ERCOT Region and a Corporate Member of ERCOT, Inc. Avangrid's existing generation fleet in Texas is comprised of multiple Generation Resources that account for more than a gigawatt of capacity on the ERCOT System, all of which is directly impacted by Nodal Operating Guide Revision Request (NOGRR) 245, Inverter-Based Resource (IBR) Ride-Through Requirements.

Avangrid appreciates ERCOT's attention to IBR readiness to address reliability concerns associated with recent ERCOT System disturbances, during which certain IBRs were unable to ride through frequency and voltage deviations. As Avangrid's fleet includes technologies from multiple original equipment manufacturers ("OEMs"), Avangrid has been working closely with each OEM to evaluate the capability for designing the software, hardware, and components necessary to comply with the IBR ride-through requirements proposed by ERCOT in NOGRR245 and ERCOT's Alternative Proposal, and the timeframes associated therewith.

Similar to representations made by OEMs in ERCOT stakeholder meetings and comments to this NOGRR, Avangrid's OEMs have yet to determine whether technically feasible options are available to retrofit Avangrid's IBRs to meet ERCOT's proposed ride-through requirements. Therefore, these comments are intended to provide a structure for consideration by ERCOT and Market Participants that will:

(a) Provide adequate time to work with OEMs to gather technical details for determining feasibility and develop appropriate timelines for implementing feasible options for compliance;

(b) Determine IBR and capacity impacts based upon ineligibility scenarios;

(c) Develop targeted enhancements and requirements for existing IBRs;

(d) Provide investors and developers with greater regulatory certainty; and

(e) Help reduce/prevent voltage ride-through ("VRT") and frequency ride-through ("FRT") events with requirements for new IBRs.

Avangrid respectfully requests that NOGRR245 remain tabled at ERCOT's Reliability Operations Subcommittee (ROS) to allow ERCOT, IBRs and OEMs to continue to work collaboratively to develop the most effective and appropriate ERCOT rules and guidelines to decrease the impact of reliability events associated with the need for IBRs to ride through ERCOT System disturbances.

Collaborative Study

Avangrid recommends that ERCOT, stakeholders and OEMs undertake a study to simulate the state of the ERCOT System to accurately model and determine the amount of capacity at risk of becoming unavailable under NOGRR245. ERCOT has estimated that 3 to 5 GW of IBR capacity may not qualify under the proposed FRT/VRT requirements. Avangrid is concerned that the amount of actual capacity from IBRs that would not qualify is significantly greater than ERCOT's estimate.

Additionally, ERCOT's estimate may not account for the retirement of IBRs and the withdrawal of planned projects due to imprudent economics associated with retrofits and market redesign, and the uncertainty associated with retroactively changing construction standards (i.e., final construction costs and returns on investment). Disqualifying Generation Resources required to meet peak demand will create a reliability issue. Creating eligibility requirements without careful consideration of (a) the IBRs that cannot or will not meet such requirements (i.e., IBR disqualification and retirement), and therefore, (b) the amount of capacity that may be removed from the ERCOT System, fails to constitute reasoned decision-making with respect to assuring reliability of the ERCOT grid.

One of the repeated pieces of feedback Avangrid has received from various OEMs is the need for detailed information regarding any new FRT/VRT requirements before models can be created to study the technical feasibility of whether software or hardware can be developed to retrofit an IBR for compliance with new FRT/VRT requirements. Until OEMs provide outcomes of these studies, IBR owners are unable evaluate the economics essential for determining whether to retrofit or retire an IBR in ERCOT.

Avangrid is not suggesting that there is not a demonstrated need for ERCOT to propose updated and revised FRT/VRT requirements. Rather, Avangrid recommends that a collaborative study be undertaken to (a) determine which existing IBRs cannot or may not comply with new FRT/VRT requirements, and (b) model the ERCOT System without the IBRs that cannot or may not comply with those FRT/VRT requirements.

A study to identify the IBRs that cannot or may not comply with NOGRR245, along with a simulation of the ERCOT System without such IBR capacity, can be modeled after the VRT study that was conducted following the passage of OGRR208. *See* ERCOT VRT Study Workshop (Jun. 26, 2009). At the time, there was a concern that VRT requirements for Wind-powered Generation Resources ("WGRs") would be implemented without a demonstrated need. Therefore, before requiring all WGRs to retrofit their facilities to comply with the requirements, the ERCOT Board issued a directive for an independent consultant (without bias or financial interest in the study's outcome) to conduct a study to determine whether there were any ERCOT System reliability risks related to existing WGRs with Interconnection Agreements ("IAs") executed prior to Nov. 1, 2008, that could not comply with ERCOT's VRT requirements. Given the results of the study, ERCOT determined that no changes to WGR VRT requirements were required for such WGRs.

ERCOT Considerations

In parallel with a collaborative study, ERCOT can review existing/interconnected IBRs in a system dynamic stability case. This will provide valuable information to more precisely target the reliability concerns related to recent FRT/VRT ERCOT System disturbance events. Additionally, a more thorough understanding of the near-term impacts of events caused by localized generation loss of Generation Resources unavailable under new FRT/VRT requirements will be beneficial in determining the appropriate applicability of such requirements on IBRs—e.g., FRT/VRT requirements based on attributes, location, or most recent IA execution.

ERCOT should also consider the various ERCOT requirements and timelines that will apply to IBRs required to undergo retrofits for compliance with new FRT/VRT requirements—e.g., ERCOT approval for planned outages; Generation Resource Interconnection or Change Request ("GINR") process applicability; Notice of Suspension of Operations (NSO) process applicability; clarification of "in-kind" replacements; possibility of required transmission upgrades and related studies; retrofitting vs. repowering; Resource registration updates. Additionally, ERCOT should consider developing a separate process or Protocol/Other Binding Document (OBD) waivers to accommodate the facilitation of retrofits for compliance with new IBR FRT/VRT requirements.

Bifurcated Approach for Implementing New FRT/VRT Requirements

Echoing many comments submitted in NOGRR245, and in line with IBR standard development processes occurring nationwide, Avangrid likewise supports a bifurcated approach for implementing new IBR FRT/VRT requirements.

Accordingly, NOGRR245 should be modified to apply only to IBRs that execute an IA following implementation of NOGRR245 (i.e., "New IBRs"). With respect to IBRs with IAs executed before the implementation of NOGRR245 (i.e., "Existing IBRs"), ERCOT, IBRs, and OEMs should work to:

(a) Determine technical feasibility and timing for retrofitting Existing IBRs;

(b) Conduct a coordinated study to:

(i) Determine Existing IBR and capacity impacts associated with implementation of new FRT/VRT requirements;

(ii) Develop targeted enhancements to, and requirements for, Existing IBRs based on certain factors (e.g., attributes, location, IA execution date); and

(iii) Develop timelines for implementing the necessary software/hardware on Existing IBRs; and

(c) Implement the appropriate FRT/VRT requirements for Existing IBRs.

Upon determining the appropriate FRT/VRT requirements for Existing IBRs, and the associated timeline(s) for implementing such requirements, a new/separate NOGRR should be sponsored to incorporate the new FRT/VRT requirements for Existing IBRs.

Phase 1: New IBRs

Overall, Avangrid supports the implementation of the proposed FRT/VRT requirements in NOGRR245 on New IBRs. This will provide developers and OEMs a phased-in process to work on ensuring that New IBRs are designed to meet NOGRR245 FRT/VRT requirements. In addition, it will provide investors and developers with greater regulatory certainty regarding ERCOT's requirements and expectations of New IBRs, and OEMs with greater certainty regarding ERCOT's operating and performance guidelines. Finally, requiring New IBRs to comply with NOGRR245 requirements will help mitigate FRT/VRT-related reliability concerns associated with continued growth of IRRs and ESRs on the ERCOT System.

Phase 2: Existing IBRs

Until ERCOT, IBRs and OEMs have determined the most appropriate and feasible options for effectively managing Existing IBRs to help maintain reliability, Avangrid proposes that Existing IBRs (including in-flight projects with executed IAs and IBRs that execute IAs before the implementation of NOGRR245) remain responsible for satisfying the FRT/VRT requirements under the current ERCOT Protocols and Operating Guides, while continuing to work diligently with OEMs and ERCOT to determine feasibility and timing for IBR updates and retrofits, and providing the necessary information for a coordinated study.

Avangrid has received consistent messaging from OEMs that developing timelines for knowing when, and whether an Existing IBR can be retrofitted to meet new FRT/VRT requirements, is challenging without additional details regarding ERCOT's proposed requirements. Therefore, based on numerous OEM discussions and feedback, Avangrid offers the below observations and recommendations for implementing new FRT/VRT requirements on Existing IBRs.

Senior IBRs

It is Avangrid's understanding from OEMs that for most IBRs with IAs executed prior to 2011, retrofits for complete compliance with the ERCOT-proposed FRT/VRT requirements is likely impossible. Senior IBRs are generally made up of WGRs that are close to retirement based on the age of the asset. Appreciating ERCOT's concerns about retaining current exemptions for senior IBRs, Avangrid proposes that ERCOT consider granting good cause exemptions on a case-by-case basis for IBRs that currently qualify for FRT/VRT exemptions under ERCOT rules. A coordinated study, as described above, may also provide valuable information regarding an IBR's ability to withstand frequency/voltage deviations based on the IBR's attributes, location, and other system disturbance-related factors. A good cause exemption process can take into account, any findings from a coordinated study related to or impacting the IBR, and require the IBR to make FRT/VRT-related software/hardware upgrades currently available in marketplace. Providing senior IBRs with an opportunity to continue operations through the IBR's end-of-life will serve the interests of the ERCOT System and the IBR asset—i.e., ERCOT will have greater transparency into the IBR's ability to manage a system disturbance and the IBR; the ERCOT System will not lose valuable megawatts prior to the IBR's retirement; and the IBR asset's rate of return will not be compromised by terminating operations before its expected end-of-life. Avangrid welcomes discussion regarding additional conditions for continued operation of these facilities.

Intermediate IBRs

Avangrid has been advised that some or all of the proposed FRT/VRT requirements in NOGRR245 may be achievable by IBRs that reached commercial operations between 2011 and 2020. However, with this group of intermediate IBRs lies significant uncertainty from the OEM perspective because the types of improvements needed for intermediate

IBRs are still unknown—i.e., whether compliance can be achieved with software changes alone or in addition to upgrades to physical components. For example, some upgrades to intermediate IBRs may be available/feasible to meet single event ride-through requirements, but not available/feasible to satisfy multiple event ride-through requirements. Given the uncertainty regarding intermediate IBRs, Avangrid requests time to continue working with ERCOT and OEMs to establish the requisite studies and analyses for determining appropriate FRT/VRT requirements for these facilities.

Junior IBRs

It is Avangrid's understanding that most IBRs that have achieved commercial operations since 2021 currently meet some or all of the requirements proposed in NOGRR245, and upgrades to meet the requirements are achievable. However, to properly evaluate the capabilities of junior IBRs, OEMs must determine the requisite studies and analyses for achieving compliance with new FRT/VRT requirements. For example, a detailed electro-magnetic transient ("EMT") modeling analysis may be necessary for determining a junior IBR's response to multiple ride-through events occurring sequentially over a period of seconds. While the feasibility of retrofits for junior IBRs to meet new, more stringent FRT/VRT requirements is presumptively greater than that of intermediate IBRs, and junior IBRs may be able to be retrofitted with more timely software upgrades, enough uncertainty exists to require additional diligence though continued work with ERCOT and OEMs to develop appropriate FRT/VRT requirements for these facilities.

IBRs Requiring OEM Studies

As mentioned above, OEMs have expressed a need for clarity and certainty regarding new FRT/VRT requirements to properly evaluate the feasibility of retrofitting IBRs. It is also important to be mindful that many Existing IBRs have been designed and manufactured by the same OEMs. Moreover, these OEMs may be the same OEMs that are in the process of building New IBRs. Subjecting all IBRs to new FRT/VRT requirements at the same time, rather than through a phased-in approach, will inevitably create bottlenecks within OEMs with respect to: (a) determining what is required to retrofit various IBRs for compliance; (b) developing the software/hardware required to retrofit the IBRs; and (c) implementing the necessary changes (i.e., installing software and hardware) to retrofit the IBRs.

Once a more detailed study scope is available to OEMs to create models to study technical feasibility for IBR compliance with new FRT/VRT requirements, Avangrid recommends that ERCOT and IBRs develop a schedule and guidelines for communicating project plans. For example, if OEMs anticipate that it will take, at minimum, one year to provide an initial project plan for intermediate IBRs, and two to three years (depending the types of retrofits involved—i.e., software changes and minimal hardware changes or more comprehensive physical component retrofits) to provide a final report on the technical scope, schedule, and feasibility of available solutions, then a schedule should be developed to ensure that all parties (ERCOT, IBRs, and OEMs) are aware of related deadlines.

Further, Avangrid recommends a review and negotiation period for IBRs and ERCOT to reach an acceptable performance plan (final agreement) for continued operation of an IBR without mitigation plan restrictions. The final agreement should also include an implementation timeline and deadline (e.g., not to exceed 18 months).

Avangrid considers OEM project plans and final reports to be critical in determining the viability of retrofitting a Generation Resource to achieve compliance with new and significant operational requirements.

Additional Parallel Efforts

Avangrid further recommends that ERCOT and IBRs, through the appropriate ERCOT stakeholder forum(s), actively explore alternative methods for strengthening the ERCOT Transmission Grid to help prevent ERCOT System disturbances associated with frequency and voltage deviations—e.g., additional 345kV lines; strategic installation of grid-forming transformers. Creating a comprehensive approach for addressing these issues will help ensure greater reliability and continued performance of available capacity and new capacity to serve the ever-growing demand in the ERCOT Region. The physical location of Generation Resources relative to distribution equipment also plays a significant role in the overall performance and reliability of the ERCOT System. Avangrid appreciates that performance of individual Generation Resources, facility protections, and experienced facility operators are essential to the management of the ERCOT System. Therefore, Avangrid encourages the continued maximization of existing capabilities to help improve ERCOT System performance.

In conclusion, Avangrid appreciates the opportunity to provide comments to NOGRR245. Avangrid respectfully requests that ERCOT and stakeholders consider these comments in deciding how to implement the most effective and appropriate FRT/VRT requirements on IBRs. Accordingly, Avangrid requests that NOGRR245 remain tabled at ROS to allow ERCOT, IBRs and OEMs to continue to collaborate on the necessary steps for determining such requirements.

Revised Cover Page Language

None

Revised Proposed Guide Language

None