**IBRWG Meeting Minutes**

**September 2024**

**Chair: Julia Matevosyan, Vice-Chair: Miguel Cova Acosta**

**IBRWG met on September 16th (Webex, Open Meeting).**

The agenda and the presentation slides are available [here](https://www.ercot.com/calendar/09162024-IBRWG-Meeting-_-Webex)

**IBRWG Main Meeting**

**DWG Procedure Manual Update**

Sun Wook Kang (ERCOT)

* + DWG Procedure Manual - All comments were addressed.
  + The DWG Chair have provided a brief update at the September ROS meeting, indicating that all comments from the commenters have been discussed/addressed and there are no remaining comments.
  + A “draft” manual is posted on the ROS and DWG websites.
  + As the PUCT decision on NOGRR245 is anticipated in September, the potential effective date for NOGRR 245 could be October 1st.
  + Considering this timeline, DWG leadership will request ROS approval at the October 3rd ROS meeting.
  + Until then, the updated DWG manual will be posted as a "DRAFT" on the DWG website to allow for familiarization.
  + Julia: Jonathan Rose (ERCOT) followed up on the question from the last meeting stating that PMVIEW and DMVIEW tools have been updated for the latest NOGRR-245 test proposals. Links to the tools were in his presentation at the August meeting (posted) and also are linked from the ERCOT Model Quality Guide.

**NERC Standards Update (FERC Order 901)**

Mark Henry (TRE)

* + Provided a refresher on FERC Order 901 and NERC’s Work Plan with regard to the directives from the Order.
  + NERC is currently working on Milestone 2 of the Work Plan, that involves filing several new standards addressing performance requirements and post-performance validation for Registered IBRs.
  + [PRC-028](https://www.nerc.com/pa/Stand/Pages/Project-2021-04-Modifications-to-PRC-002-2.aspx) Disturbance Monitoring and Reporting Requirements for IBRs, that reach consensus in August ballot and currently under final ballot, after a small modification.
  + [PRC-029](https://www.nerc.com/pa/Stand/Pages/Project_2020-02_Transmission-connected_Resources.aspx) Frequency and Voltage Ride-Through Requirements for IBRs did not reach consensus in the final ballot in August. This is primarily due to the proposed frequency ride through requirement being beyond IEEE 2800-2022 requirement even, while being applied retroactively (no exemptions as per proposed implementation plan). NERC Board had to invoke a non-traditional procedure to meet FERC Directive (Section 321 of Rules of Procedure) and held Technical Conference on 9/4-9/5 in Washinton D.C. with a number of technical panels where OEMs and plant developers/owners had a chance to provide their input.
  + [PRC-030](https://www.nerc.com/pa/Stand/Pages/Project-2023-02-Performance-of-IBRs.aspx) Unexpected Inverter-Based Resource Event Mitigation reached consensus in September ballot.
  + John Schmall: On PRC-029 is it the same standard drafting team (SDT) that’s working on updating the draft after the TC or is it NERC’s staff/NERC’s Standards Committee?
  + Mark: The latter, but they did get together with the original SDT, he believes.
  + Ken Donahoo pointed out that the frequency ride through requirements in the latest PRC-029 draft were beyond IEEE 2800-2022 frequency ride through specifications. Additionally, there is no exemption process for frequency ride through in the current PRC-029 implementation plan draft. The frequency ride through requirements is thus retroactive. NERC Technical Conference OEMs said they generally had no issues with IEEE 2800-2022 frequency ride through requirements but cannot comply with frequency ride through envelope as per PRC-029 draft.

**Draft Proposal for Advanced Grid Support Energy Storage Resource**

Fred Huang (ERCOT)

* + Fred presented 3 documents (all posted on the meeting page):
    - Advanced Grid Support Energy Storage Resource (AGS-ESR) Functional Specification and Test Framework for the ERCOT Grid, Version 1.0, September 2024 – outlines background and need for AGS-ESR as well as the proposed set of tests to evaluate capability of an ESR to provide AGS
    - XXXNOGR-01 Advanced Grid Support Requirements for IBRs Draft v9\_11\_24 – adds AGS-ESR model quality testing requirements to the Nodal Operating Guide, Section 2.14 (new)
    - XXXPGRR-01 Related to NOGRRXXX, Advanced Grid Support Requirements for Inter-Based Resources (IBRs) Draft v9\_11\_24 – adds AGS-ESR modeling requirements to Nodal Planning Guide, Section 6.2, Dynamic Model Development.
  + NOGRR will be posted for formal stakeholder review at the latest in early October. Stakeholders are invited to comment prior to that (the drafts are posted on September IBRWG meeting page) by reaching out to Fred [Shun-Hsien.Huang@ercot.com](mailto:Shun-Hsien.Huang@ercot.com)
  + It would be good to have a 1.5-2-hour work session during October IBRW/DWG Coordination part of IBRWG meeting, where ERCOT staff could share examples for proposed AGS model quality testing for ESRs.

**PFR from IBRs under “Deep” Curtailment**

Luis Hinojosa (ERCOT), Miguel Cova Acosta (Vestas)

* + Luis provided a short intro to the issue. ERCOT is noticing that IBRs under deep (including down to zero) curtailment are failing BAL TRE-001 evaluation.
  + Additionally, there is NERC SAR to BAL-TRE-001 in works that is looking to include ESRs (not previously included in the standard), allow widening of deadband to 34 mHz for resources not participating in Ancillary Services. And could potentially include exemption for IBRs under deep curtailment. The latter is not ideal solution for ERCOT, and they are trying to understand capabilities and limitations of various technologies providing PFR under deep curtailment.
  + Julia comments: The concern is not just with PFR performance of IBRs after the events. ERCOT is on counting resources to provide PFR if these are online and considered to have frequency responsive headroom. Thus, ERCOT counts on curtailed IBRs for PRC (Physical Responsive Capability – total frequency responsive headroom tracked by ERCOT in real time). If these resources are not able to deliver their frequency response within PFR timeframe, this means that ERCOT is underestimating how much PRC they have which can be detrimental to system reliability.
  + Miguel (Vestas) has presented on the limitations of wind turbines to provide PFR when curtailed. The detailed slides are posted on the event page. Miguel did caveat that some of this limitations (and capabilities for proposed potential solutions) may be Vestas-specific and we need to hear from other OEMs.
  + Miguel: (at some point) wind plant under deep curtailment potentially can perform but not to the real time HSL.
  + Luis: asked a question about NTON on slide . Miguel: NTON, may be only Vestas feature but Vestas can have two signals showing number of available turbines and number of turbines available for frequency response separately. Others may not have this.
  + Luis: Changing HSL based on curtailment conditions (and number of turbines available for PFR) is not a good option, because HSL is used to understand available potential for dispatch, in case curtailment can be released.
  + David Penny: asked about impacts on PRC from this issue? Can these be quantified by ERCOT?
  + Luis: Need to do some analysis, will get back on this.
  + Miguel: This seems like a wind tech issue, but important to gather information from other OEMs
  + Luis: Not that sure it’s just wind, would like to discuss with solar OEMs as well. There may be similar concerns through not related to mechanical parts (as in wind turbines).
  + Julia: Would surveying help?
  + Luis: Have done surveying before, it depends who is responding to the survey, people may not know about this issue and capabilities, having OEMs present at IBRWG is helpful. May be a joint item with PDCWG at some point to discuss the solutions.
  + Miguel continues to present on limitations at overfrequency events, when wind turbines are not producing much power overall (from slide 7 onwards).
  + One of the solutions could be setting a non-zero LSL for IBRs was discussed.
  + Regina Sweet (OnWard Energy): commented on commercial aspects of setting LSL for IBRs. It may be not desirable to be online and at certain LSL at negative prices.
  + Nitika: There is no detailed requirement from ERCOT on how to measure/calculate/interpret frequency for PFR. How are people doing it? Is it different by OEM?
  + Miguel: Great point and also relevant to the RoCoF item on today’s agenda. Frequency is not a measurement from the grid, it comes from power plant controller (PPC) processing voltage and current signals. It’s different from calculating zero-crossing or using PLL.
  + Link to a relevant article on the topic of frequency measurement is provided in the chat: <https://ieeexplore.ieee.org/abstract/document/7520347?casa_token=vMys5iMMAUsAAAAA:kekeKzTU9MtzhP7C_xxfP6DwLXjBni8IdT8sVlVKtgCg1G1C_8KoNf6gYZPwPUEQZ99qIafOtg>
  + Nitika: Interesting how others are doing this (measuring frequency), to avoid responding to frequent but short-term frequency deviations (that Miguel talked about on slide 8).
  + Julia: Is any of these limitations to provide PFR captured in the models?
  + Miguel: this will require very detailed models. In user-defined models (UDM) probably some approximation of the response may exist. The limitation is non-uniform throughout the plant and therefore would require detailed plant model to capture.

**NOGRR 245 Update**

Stephen Solis (ERCOT) – no slide discussion.

* + On 8/20/2024 ERCOT BOD  (1) recommended approval of NOGRR245 as recommended by TAC in the 6/7/24 TAC Report as amended by the 8/16/24 ERCOT comments with a recommended priority of 2025 and rank of 3515, and (2) designate a subsequent NOGRR as a Board Priority Revision Request to address the remaining details of the exemption process and to have the NOGRR at the ERCOT Board’s February 2025 meetings for consideration, with instruction to TAC leadership to provide detailed reports on this subsequent NOGRR at the ERCOT Board’s October and December 2024 meetings.
  + Next Group is PUCT, one of the commissioners would like to evaluate how NERC Standards efforts (in conjunction with FERC Order 901, discussed earlier today) will be affecting NOGRR245 implementation.
  + Julia: Isn’t it true that ERCOT can have requirements that go beyond NERC Standards, if there is reliability need identified?
  + Stephen: Yes, and it has been done previously. However, if NERC Standard already delivers what ERCOT needs the practice has been not to rehash same or similar language in ERCOT protocols. So, it remains to be seen based on the latest PRC-029-1 language and PUCT’s decision during their meeting on September 9/26.
  + Julia: What are the next steps with the follow up NOGRR?
  + Stephen: ERCOT is starting a new draft based on the language that has been pulled out of NOGRR245 draft. Due to the short timeline for the development (based on BOD directives) this item will probably remain with ROS or TAC but ERCOT will update IBRWG on the status.

**RoCoF and Phase Jump Measurement Discussion**

Stephen Solis (ERCOT), Miguel Cova Acosta (Vestas) – no slide discussion.

* + Stephen briefly introduced the issue, see slides from August IBRWG.
  + Miguel reflects depends on what you use to measure RoCoF against, you may be doing some filtering that may lead to confusion. Coming back to the frequency question, how it is measured matters:
* PLL
* Fourier transformation
* Use of 0 crossing
  + Depending on the method used, different frequency may result. For example, Vestas uses third party instrumentation for measurements/calculation of frequency and therefore it’s their algorithm that informs downstream controls.
  + Filtering over 200 ms is required according to IEC 614000 standard. The standard also defines how to measure RoCoF but the question is how to measure frequency, is there a standard that defines that?
  + You may miss some bad RoCoF if averaging over too large of a time window.
  + Miguel mentioned that there are more advanced requirements for RoCoF calculation and performance at high RoCoF in other countries, but there may be no need to go into such detail in ERCOT.
  + Julia: It will be impractical to achieve the same frequency measurement/ calculation method is used in all equipment. What if ERCOT proposes a method, how can OEMs comply with it and, for what ERCOT measures and calculates RoCoF for, ride through 5 Hz/s RoCoF?
  + Stephen: Would like to understand how it’s measured on the plant side first before facing pushback for something ERCOT proposes.
  + Julia to Miguel: we need to understand what “bad” RoCoF means? Is it just high RoCoF or is it some RoCoF that leads to IBR tripping?
  + Miguel: Just high RoCoF. When talking about tripping we need to keep in mind that tripping due to physical hardware limitations is different to software tripping, the latter directly uses frequency calculation the former might not.
  + This issue requires further discussion with OEMs and others to come up with workable solutions.