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RIOO Ride-through Submittals and Review Process

Mario Alberto de la Garza

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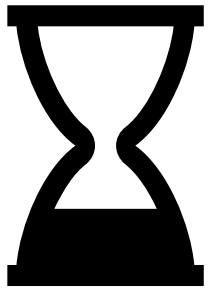
Outline:

- Goal
- Common Issues
- Notifying GRI
- Timing of Submissions
- Capability Curves
- Documentation
- Additional Validation Requirements
- SGIAs
- Future Improvements

Goal

- Reviews delayed due to incomplete or unclear submittals
- Creates extra work for Resource Entities and ERCOT
- Presentation covers:
  - Requirements for approval
  - How to submit data
  - How to reduce review timeline



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Common Issues

- Data not at Resource level
- Legacy Resources not required to meet IEEE 2800-2022 [NOG 2.9.1(8)]
- Missing capability curves
- Capability provided for facility/*site* instead of *Resource* (NOG require *Resource*)
- Supporting documentation missing or incomplete
- RoCof/PAJ settings not addressed or unclear

Key Takeaway: Most delays caused by incomplete submittals, incorrect scope, missing documentation or settings to verify compliance.

(8) The Resource Entity or IE for each IBR shall maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations) to meet and, if possible, exceed the capability and performance set forth in sections 5, 7 and 9 of the IEEE 2800-2022 standard. If an IBR with an SGIA executed prior to August 1, 2024 cannot fully meet the requirements of sections 5, 7, and 9 of the IEEE 2800-2022 standard, the Resource Entity shall maximize the performance of its protection systems, controls, and other plant equipment (within equipment limitations) 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 as soon as practicable but no later than December 31, 2025 or by its Commercial Operations Date, whichever is later. The Resource Entity must inform ERCOT (in a manner prescribed by ERCOT) of the date on which the IBR, Type 1 WGR, Type 2 WGR or Type 3 WGR has fully maximized its capability with respect to the specified IEEE 2800-2022 requirements. To establish capabilities to the maximum extent the equipment allows as used throughout this Section means the Resource Entity must make 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.

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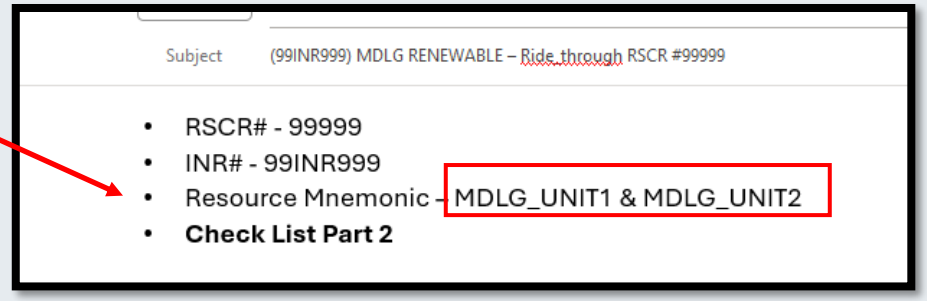
Notifying GRI

- After submitting RSCR ***before*** requesting **Check List Part 2** or **Part 3** approval in RIOO, send email to gri@ercot.com and copy **Resource Integration**
  - Subject Line: **(INR#) Project Name – Ride-through RSCR #**
- Email should contain:
  - RSCR#
  - INR#
  - Resource Mnemonic (Substation Code_Unit Name)
  - **Check List Part 2** or **Check List Part 3**
- Submissions reviewed in order received
- For full registration, contact **gri@ercot.com** to schedule meeting



Key Takeaway: Email gri@ercot.com after submitting Ride-through change request (RSCR)

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Timing of Submission

- **When to Submit**
  - Submit Check List Part 2 ride-through package ***before*** requesting Part 2 approval
  - Submit Check List Part 3 ride-through package after part 3 testing is approved and could be in parallel with the PGRR109 submission

- **Why Timing Matters:**
  - Submitting after test completion ensures ride-through capability reflects actual field settings and final Resource configuration
  - ERCOT will reject submissions made before completing those milestones because it cannot validate capability

- **ERCOT will *try* to review ride-through submissions within 5 business days**

Key Takeaway: Submit ride-through data only after required tests and as-built model are approved to avoid RSCR rejection.

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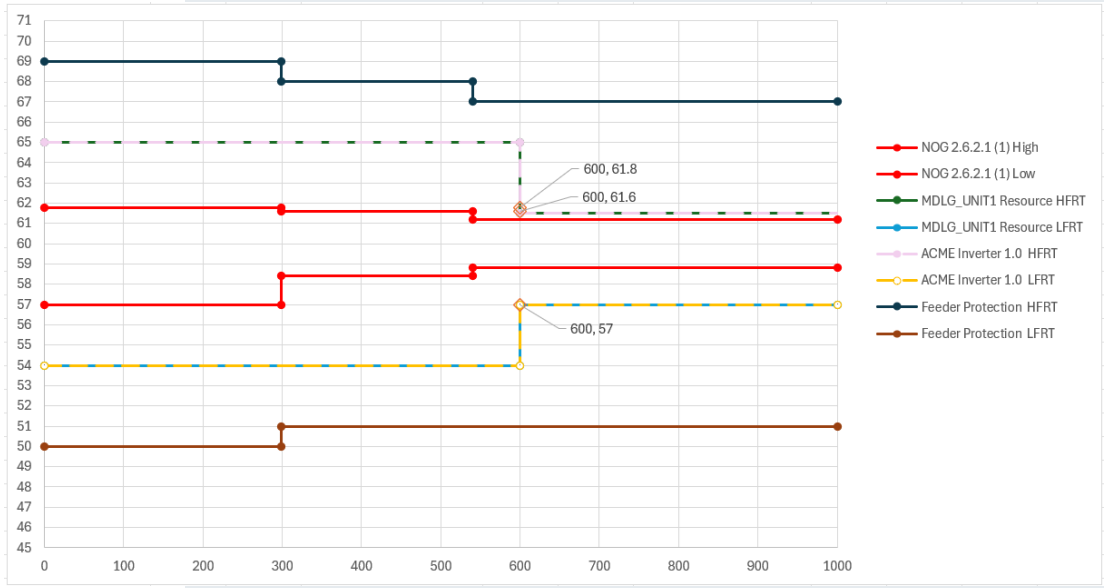
Capability Curves

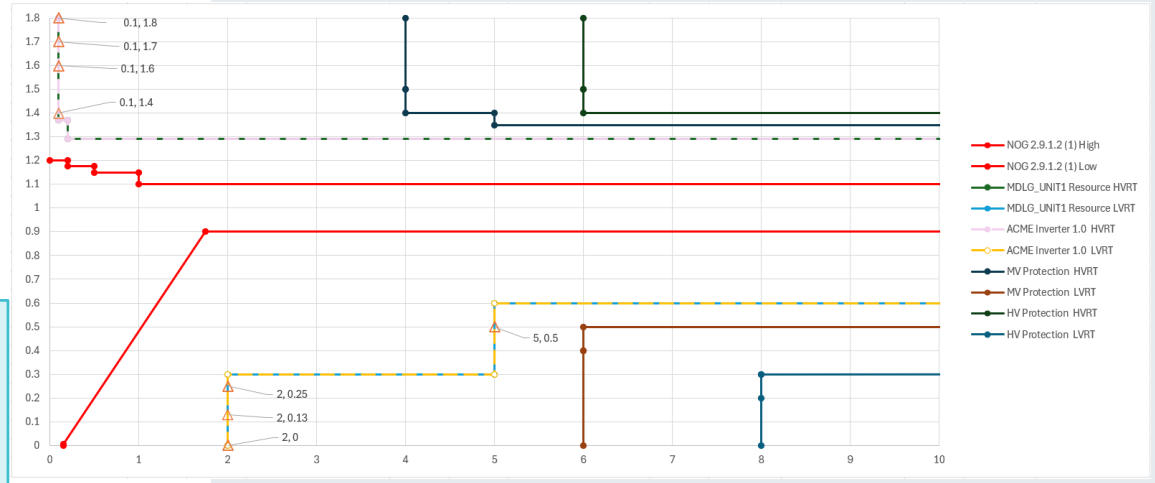
- Submit FRT and VRT curves in PDF or Excel format for Check List Part 2 and Part 3
- Overlay:
  - NOG requirements
  - Actual Resource capability (considering ***all*** systems/settings - ***not*** just inverter/turbine capability)
- Include:
  - Inverter/turbine limits
  - Protection systems
  - Any limiting equipment
  - Resource capability based on *most limiting element*
- Mark RIOO-RS points for verification
- Clearly state if no protection systems exist

Key Takeaway: Submit complete, clearly labeled capability ***curves*** demonstrating ***<u>Resource</u>*** capability ***after*** maximizing all equipment

FRT Curve Example



VRT Curve Example



Documentation

- **Important:** Ride-through requirements at ***Resource level*** (not site/inverter/turbine)
- Inverter/turbine data ***not*** **sufficient**
- OEM documentation validating inverter/turbine capability
- Documentation for ***all*** components affecting performance
- Studies/assessments to determine Resource capability (***not*** Model Quality Test)
- As-left/As-built settings (*e.g.*, feeder relay settings)

Key Takeaway: Provide complete documentation demonstrating ***Resource*** performance - not individual components or multiple Resources connected at same POI

Feeder Relays Settings as Left

Device	Type	Model	Frequency Resoonsive Setting (Hz)	Frequency-Responsive Time Delay(s)
F110	Feeder Relay	ML-900	63.5	0.5
F110	Feeder Relay	ML-900	56.99	0.5
F120	Feeder Relay	ML-900	63.5	0.5
F120	Feeder Relay	ML-900	56.99	0.5
F130	Feeder Relay	ML-900	63.5	0.5
F130	Feeder Relay	ML-900	56.99	0.5
F140	Feeder Relay	ML-900	63.5	0.5
F140	Feeder Relay	ML-900	56.99	0.5

Additional Validation Requirements

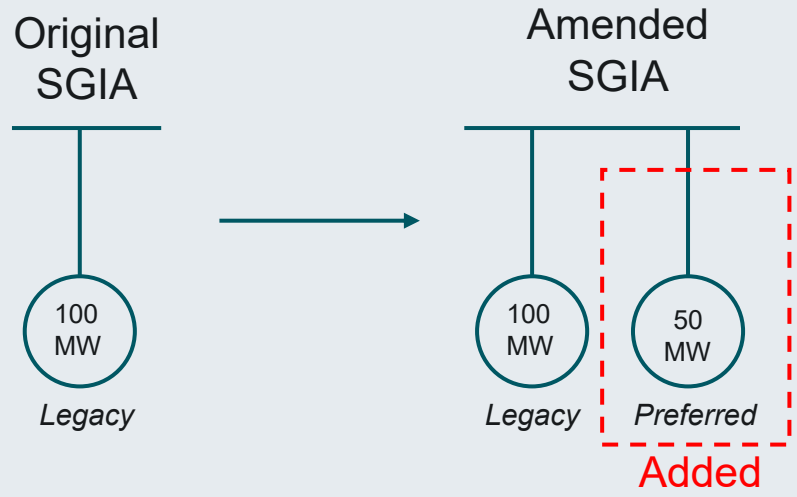
- Provide **source for capability data**
- Include OEM assessments or validated calculations
  - Some OEMs provided waveforms/figures for IEEE 2800-2022 performance
- For ERCOT to properly assess IEEE 2800-2022 information, Resource Entity must provide data source
- Demonstrate:
  - No power reduction or tripping due to RoCoF or PAJ within “No Trip Zone”
- Submit **as-left settings with highlighted values**

Key Takeaway: Provide complete, traceable supporting data, including IEEE 2800 sources and protection/control settings (e.g., RoCoF and PAJ) to demonstrate Resource meets NOG requirements

SGIAs

- Because SGIA date drives requirements, ERCOT reviews SGIAs in RIOO-IS and compares to PUCT Interchange
- If SGIA is amended for any applicable reason (see below), new/modified portion of Resource must meet requirements effective at the time of amendment
  - Adding new Generation Resource or ESR connected at same POI as existing Generation Resource or ESR
  - Increasing real power rating of IBR by ≥ 10 MW in a single year
  - Making changes to IBR to which PG § 5.2.1(1)(c)(ii) or (v) applies
- **NOTE**: For FRT/VRT, effect of SGIA amendments governed by NOG § 2.9.1

Example



Key Takeaway:

- SGIA execution date determines applicable operational and technical requirements
- SGIA changes may cause Preferred VRT + IEEE 2800-2022 requirements to apply

Restated SGIAs

- Resources with Amended and **Restated** SGIA executed after 8/1/24 must comply with ***Preferred*** requirements and IEEE 2800-2022 if Section 10.3 “Entire Agreement” has the following or similar language:

> *This Agreement, including all Exhibits, Attachments and Schedules attached hereto, constitutes the entire agreement between the Parties with reference to the subject matter hereof, and supersedes* ***all prior and contemporaneous understandings or agreements, oral or written, between the Parties with respect to the subject matter of this Agreement, including without limitation the Original Agreement****.*

Key Takeaway: Restated SGIAs after 8/1/24 trigger Preferred VRT + IEEE 2800 compliance

Future Improvements

- RIOO Implementation of front-end validation rules
- Examples:
  - Validating maximization dates
  - Validating cross panel data inputs
- Internal tools for compliance assessment
- Goal: **Reduce review time and improve submission quality**

Key Takeaway: ERCOT changing RIOO and developing internal tools to better assess compliance with requirements

Questions/Comments?

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