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RIOO Ride-through Submittals and Review Process

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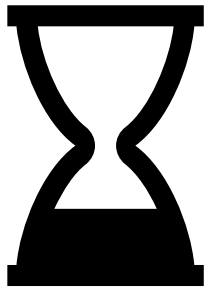
Outline:

- Goal
- Common Issues
- Notifying GRI
- Timing of Submissions
- Capability Curves
- Documentation
- Additional Validation Requirements
- 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 exempt from IEEE 2800-2022 [*see* NOG 2.9.1(8)]
- Missing capability curves
- Capability provided at *facility/site* level instead of *Resource* level (NOG require *Resource* compliance)
- Supporting documentation missing or incomplete
- RoCof/PAJ settings not addressed or unclear
- Submissions need to be **approved** prior to Check List Part 2 and Check List Part 3 approvals.

Key Takeaway: Most delays caused by incomplete submittals, incorrect scope or 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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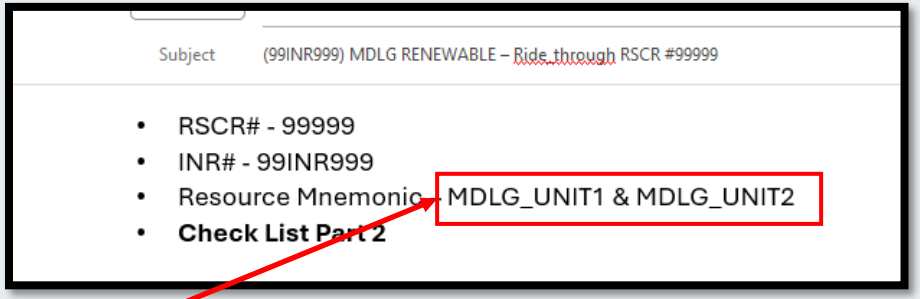
Notifying GRI

- After submitting RSCR for **Check List Part 2** or **Check List 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**
- GRI Team will review submissions on first-in, first-out basis
- For full registration, contact **gri@ercot.com** to schedule meeting
- If there are no changes between submissions to the capability, still send an email to gri@ercot.com stating that there is capability changes from what is in RIOO.



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

Timing of the 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 the following are approved:
    - PFR Test
    - Reactive Test
    - As-Built Model

- **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 the milestones because it cannot validate capability

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

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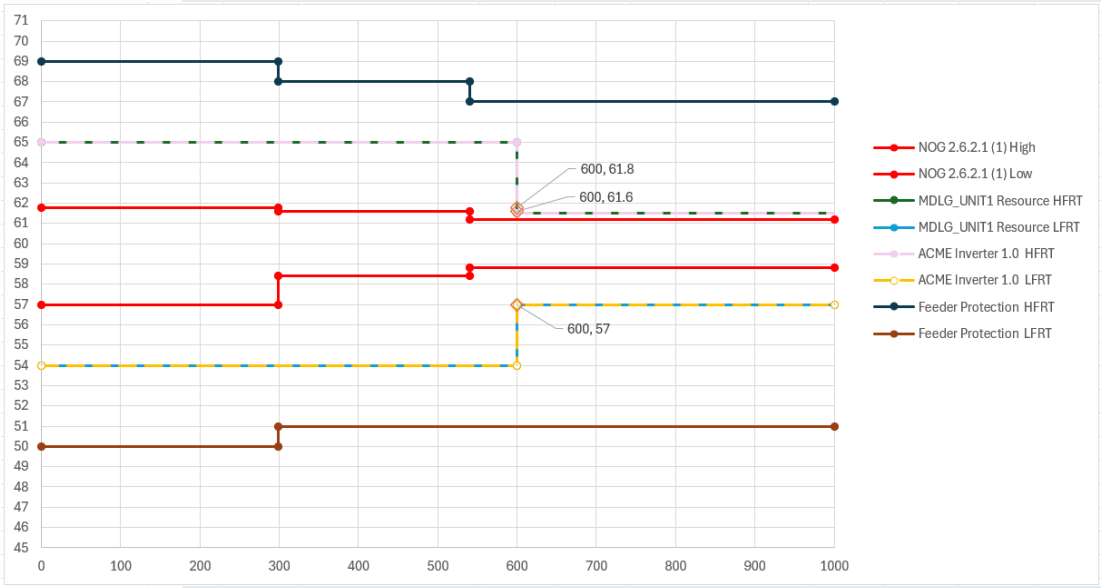
Capability Curves

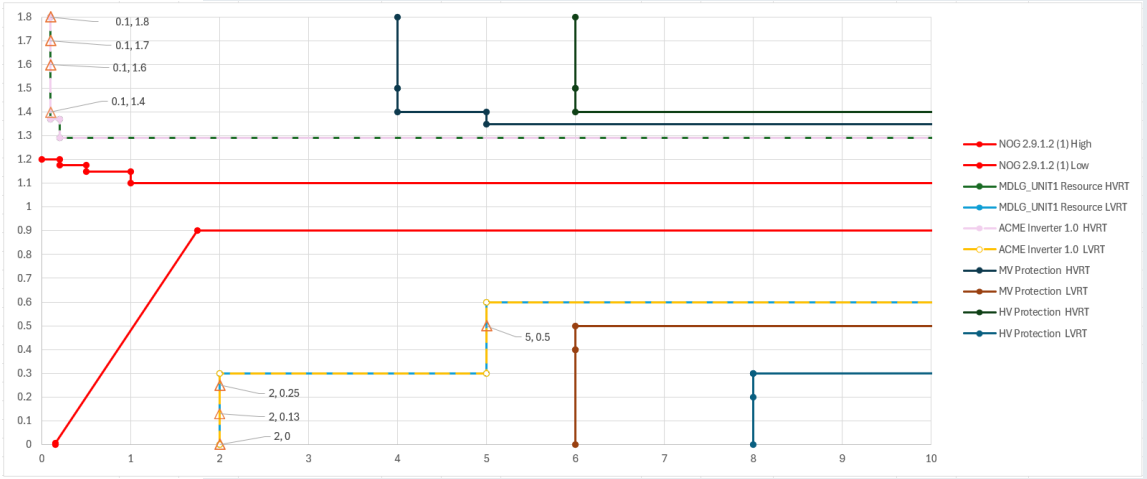
- Submit FRT and VRT curves in PDF or Excel format for Check List Part 2 and Check List Part 3
- Overlay:
  - ERCOT requirements
  - Actual Resource capability (considering ***all*** systems/settings - ***not*** just inverter/turbine capability)
- Include:
  - Inverter/turbine limits
  - Protection systems
  - 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 Resource capability ***after*** maximizing all equipment as required by Operating Guides

FRT Curve Example



VRT Curve Example



Documentation

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

Key Takeaway: Provide complete documentation demonstrating ***Resource*** performance - not performance of individual components

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 have provided waveforms and figures for IEEE 2800-2022 performance
- For GRI Reviewer 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

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: GRI Team changing RIOO and developing internal tools to better assess compliance with requirements

Questions/Comments?

gri@ercot.com

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