2024 - 2025 IBR Ride-Through Events & Lessons Learned

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Overview

- NOGRR 245 and NOGRR 255 summary

- Overview of past ride-through events

- Share key lessons learned from recent Apparent Performance Failure (APF) investigations and other past events

- Provide a high-level workflow through APF detection, model correction, and Corrective Action Plan (CAP) implementation

- Clarify when and how PGRR 109 is used to implement necessary model and field settings changes

NOGRR 245 and 255 Summary

- NOGRR 245:
  - Updated voltage (NOG 2.9.1.1 (8) & 2.9.1.2 (8)) and frequency (NOG 2.6.2.1 (6)) ride-through requirements for IBRs and Type 1 & 2 Wind Resources for qualified resources
  - NOG 2.13:
    - Defines APFs i.e. when a resource fails to ride through a disturbance even though voltage/frequency at the POIB remained within the required thresholds
    - Requires APFs to perform model validation to ensure ride-through performance and field settings match the dynamic model
- NOGRR 255 (NOG 6.1.4.1 – NOG 6.1.4.4):
  - Establishes high-resolution monitoring requirements for IBRs
  - Enhances ERCOT's ability to analyze transient disturbances and performance of IBRs

Overview of Recent Events

ERCOT IBR Ride-Through Events (2024-Present)
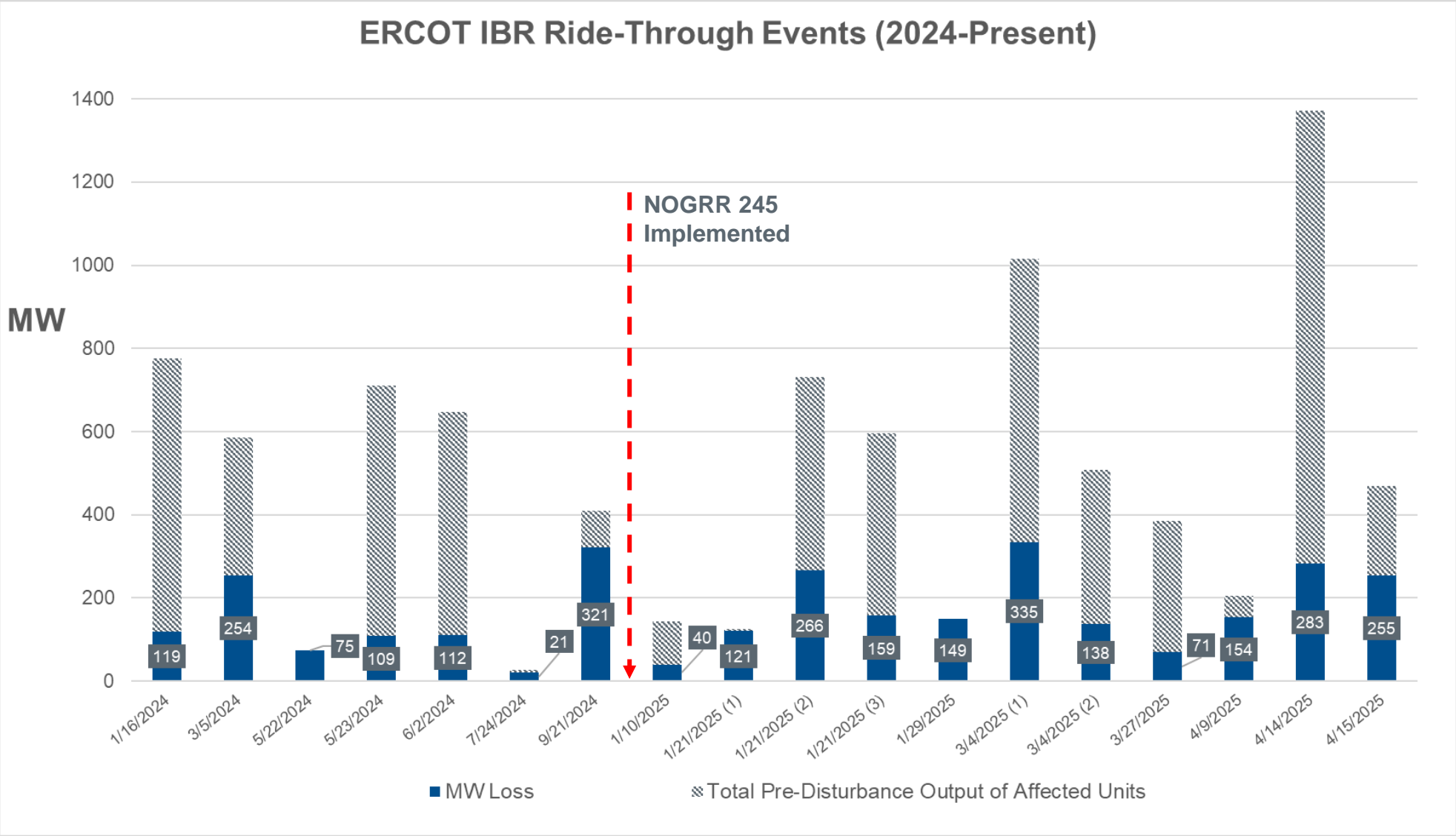
Common Lessons from Event Investigations

- Large majority of events have been partial site trips (i.e., only some of the individual units fail to ride through)
- Improper voltage/frequency trip settings on inverters, turbines, and relays
- Uninterruptible Power Supply (UPS) and crowbar failures
  - Requires modifications of maintenance strategy
- Insufficient inverter logging capability
  - Causing issues in the OEM's ability to diagnose the root cause of the APF
- Inability to diagnose why fault codes were triggered
  - Providing meaning of fault code does not give the sufficient information to get to the root cause
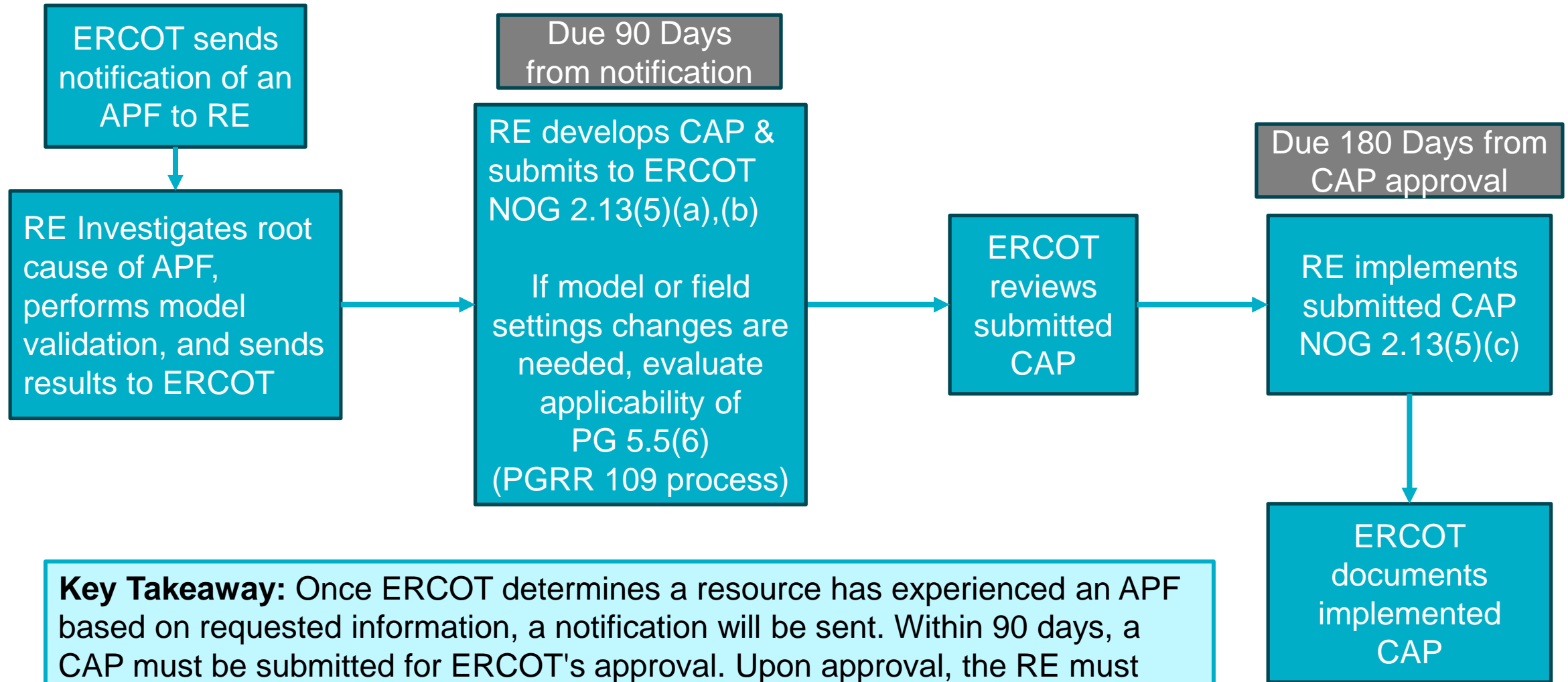
Common Lessons from Event Investigations

- Frequency measurement issues
  - Responding to instantaneous frequency measurement during the fault
  - Some entities are evaluating changes in reaction time to detected frequency excursions during faults
- Lacking high resolution data (reminders on NOGRR255)
- Dynamic data contradicting registered model may require the need to follow PG 5.5(6) (PGRR 109 process)
- Urgency in completing RCAs and the corrective actions is needed. Multiple facilities have had additional ride-through failures while completing their RCA and CAPs

APF High-Level Timeline

ERCOT sends notification of an APF to RE

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RE Investigates root cause of APF, performs model validation, and sends results to ERCOT

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Due 90 Days from notification

RE develops CAP & submits to ERCOT NOG 2.13(5)(a),(b)

If model or field settings changes are needed, evaluate applicability of PG 5.5(6) (PGRR 109 process)

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ERCOT reviews submitted CAP

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Due 180 Days from CAP approval

RE implements submitted CAP NOG 2.13(5)(c)

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ERCOT documents implemented CAP

Key Takeaway: Once ERCOT determines a resource has experienced an APF based on requested information, a notification will be sent. Within 90 days, a CAP must be submitted for ERCOT's approval. Upon approval, the RE must implement the CAP and notify ERCOT within 180 days.

Planning Guide 5.5(6) (PGRR109 Process)

- For operational units, the PGRR109 process is required when changes affect dynamic performance at POI
  - If the facility is in the commissioning phase and fails to meet performance requirements during a real-time event, re-evaluation of model performance and/or re-study may need to be reconducted per PG Section 5.5(4)
- Ensures consistency between planning models and field settings
- Required documentation to be submitted to RIOO – RS:
  - A report containing the settings that are being changed (Current vs. Proposed parameter modification)
  - An MQT Report overlaying the PSSE/PSCAD model showing the current modification response with the proposed modification
  - The ERCOT PSSE/PSCAD model in the dynamic model templates
  - An email to DynamicModels@ercot.com with "IBR Proposed Modification" when they submit their files to RIOO-RS to let us know that their submission is ready for review
- ERCOT Operations may allow expedited field changes to improve ride-though performance per PG 5.5(6)(vii)

Key Takeaways

- NOGRR 245 & 255 have provided a pathway to address APFs and how to monitor them

- Root cause analysis (RCA) documentation from APFs have provided insight to how resources behave during an event, however insufficient information surrounding the event should be addressed moving forward to develop a sufficient CAP

- Accurate and well-maintained models that accurately reflect what's in the field are important

- High-resolution data monitoring is essential for diagnosing performance issues

- When field settings change, model updates via Planning Guide 5.5(6) may be required

Questions?