# Overview of PGRR075 & PGRR085 Modeling Improvement Initiatives

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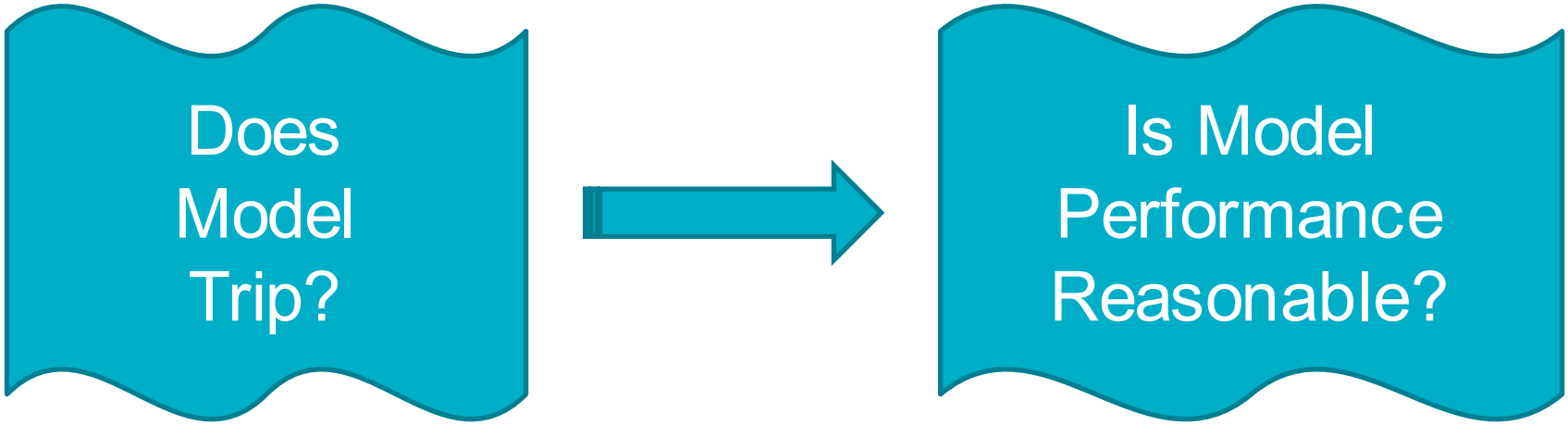
# Background

- Submission of accurate models has “always” been required
- NERC model validation requirements (MOD-026/MOD-027)
- IBRs are a different animal
- VRT test – purpose and evolution
- DMView tool development



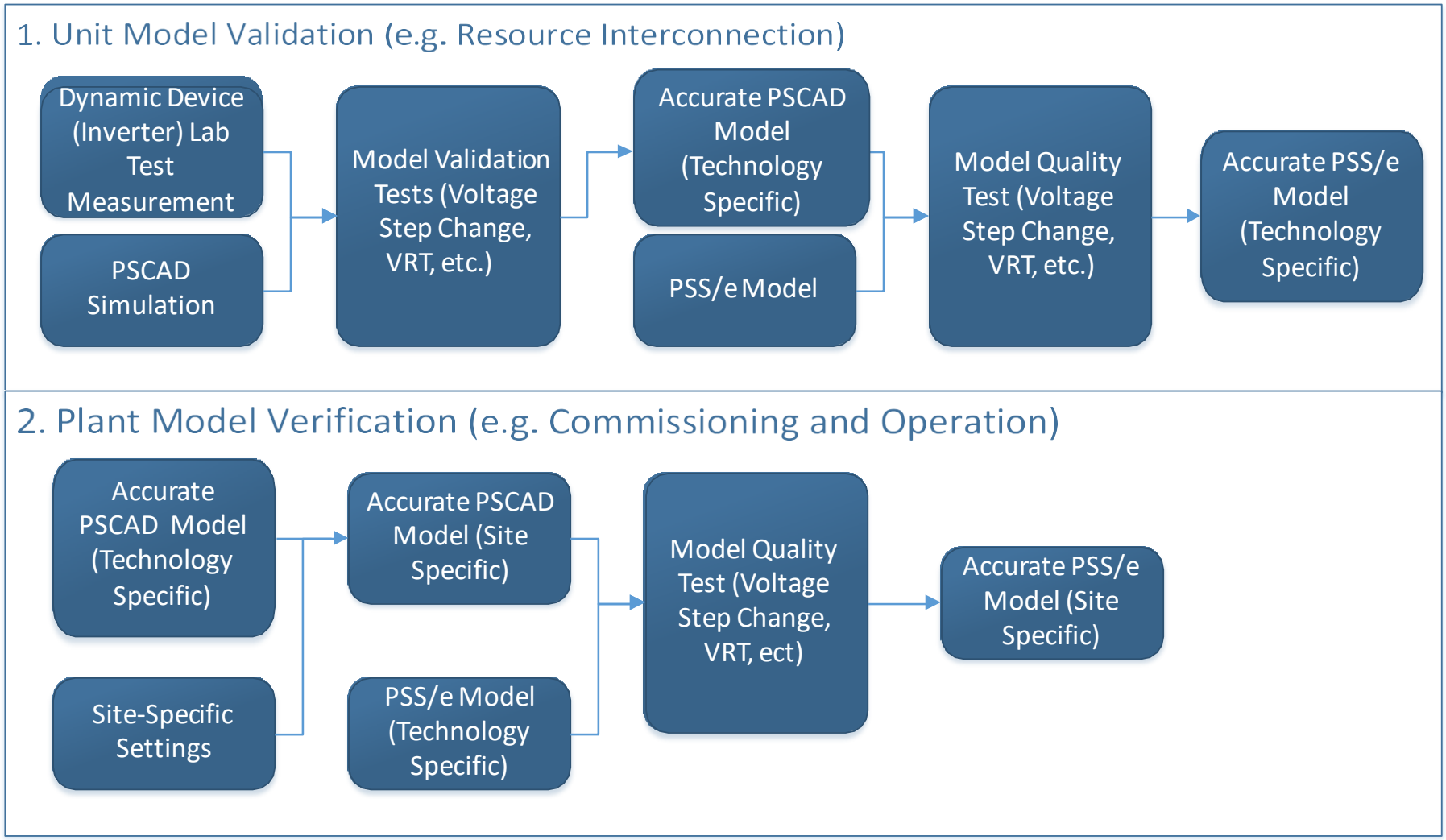
# PGRR-075

- Effective May 1, 2020
- Introduced model quality test (MQT) requirements (for PSS/e dynamic model)
- Performed/submitted by resource owner
- Demonstrate basic reasonable model performance
  - Flat Start Test (no disturbance test)
  - Voltage Step Change Test
  - Frequency Step Change Test
  - Voltage Ride Through Test (HVRT & LVRT)
  - Short Circuit Ratio Test
- Performance guidance published in DWG Procedure Manual

# PGRR-085

- Effective March 1, 2021
- Introduced MQT requirements for PSCAD model
  - Same reasonability tests as PSS/e MQT plus added phase angle jump test
  - Performance consistency across software platforms (PSS/e, PSCAD)
- Introduced unit model validation (UMV) requirements (for PSCAD model)
  - Intended to be a lab test model validation
  - Technology specific rather than site specific
- Introduced parameter verification requirements
  - Document that site specific tunable field settings match model parameters
- Performed/submitted by resource owner

# Model Validation and Verification Concept
## Implemented with PGRR-075 and PGRR-085



# Summary of Dynamic Model Requirements

| Requirement | Applicable Equipment | Required Tests[1] | When to Update | Responsible Entity | Language |
|---|---|---|---|---|---|
| Model Quality Test for PSS/e Model | All Resources and Dynamic Transmission Elements (system strength test is only required for inverter-based devices) | Flat start, small and large voltage disturbance, small frequency disturbance, and system strength tests | A new or updated model | Equipment owner (RE, IE or TSP) | PG 6.2(5)(c) |
| Model Quality Test for PSCAD Model | Inverter-based Resources (IBRs) and Dynamic Transmission Elements | All above tests plus phase angle jump test | A new or updated model | Equipment owner (RE, IE or TSP) | PG 6.2(5)(c) |
| Unit Model Validation for PSCAD Model[2] | Inverter-based Resources (IBRs) | Step change in voltage, large voltage disturbance, system strength, phase angle jump, and subsynchronous tests | A new PSCAD model provided after 3/1/21. (Validation tests should not need updating for model parameter updates on an existing model.) | Resource owner (RE or IE) | PG 6.2(5)(d) |
| Model Parameter Verification ("Verification Report") | All Resources and Dynamic Transmission Elements | Provide evidence that tunable model parameters match what is implemented in the field. Evidence can take the form of screenshots, nameplate photographs, signed manufacturer commissioning reports, etc. | 1. Required within 30 days of COD (i.e., Part 3 approval),<br>2. 12 to 24 months after COD or 12-24 months after March 1, 2021 for existing resources,<br>3. A minimum of every 10 years.<br>4. Within 30 days of a change at the plant | Equipment owner (RE, IE or TSP) | PG 5.5, PG 6.2(5)(b) |

(1) Detailed test information is available in the DWG Procedural Manual 3.1.5.

(2) Benchmark the PSCAD model against actual hardware measurements. This is not a site-specific test; the same report can be submitted for different projects whenever that the same inverter is used.

# References

- Model Quality Guide, published on the RE webpage at ercot.com
- Dynamic Model Templates, published on the RE webpage at ercot.com
- Planning Guide Revision Request PGRR-075 (approved & effective)
- Planning Guide Revision Request PGRR-085 (approved & effective)
- Planning Guide section 5.5 (in particular, paragraph (2) and (3))
- Planning Guide section 6.2 (in particular, paragraph (5))
- DWG Procedure Manual section 3.1

# Questions