Review of Dynamic Model Requirements: Including approved PGRR075 and PGRR-085

Jonathan Rose
ERCOT Transmission Planning

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Overview

- This presentation provides an overview of dynamic model requirements, including the approved PGRR075 (effective 5/1/2020) and PGRR085 (effective 3/1/2021).
  - PGRR-075 introduces the dynamic model quality test requirements.
  - PGRR-085 introduces the dynamic model validation and quality test requirements in Section 5.7.1 and Section 6.2 of the Planning Guides.

- **For IBRs (inverter-based resources like wind/solar/batteries):** PG 6.2(5)
  - PSCAD models must be provided with a **model quality test report**
  - PSCAD models must be provided with a **hardware benchmark**
  - Applies whenever PSCAD model is first provided or updated

- **For all resources:** PG 5.7.1
  - Tunable parameters in the model must be periodically verified:
    - Within 30 days of Part III approval (≈ Commercial Operations Date) or any change in settings
    - Within 12 – 24 months of Part III approval (for new resources)
    - Within 12 – 24 months of 3/1/21 (for existing resources)
    - A minimum of every 10 years
  - Different models should yield a consistent response (PSS/E, PSCAD, TSAT)

Overview of Dynamic Model Requirements

Requirement	Applicable Resources	Required Tests[1]	When to Update	Responsible Entity	Language
Model Quality Test for PSS/E Model	All (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	RE, IE and TSPs	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	RE, IE and TSPs	PG 6.2.5(c)
Unit Model Validation for PSCAD Model[2]	Inverter-based Resources (IBRs) and Dynamic Transmission Elements	Step change in voltage, large voltage disturbance, system strength, phase angle jump, and subsynchronous tests	A new or updated model	RE, IE and TSPs	PG 6.2.5(d)
Model verification	All	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), 2. In 12 to 24 months after COD or after March 1, 2021 for existing resources, 3. A minimum of every ten years. 4. Within 30 days of a change at the plant	RE, IE and TSPs	PG 5.7.1, 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

- Planning Guide Revision Request PGRR-085 (approved & effective)
- Planning Guide 5.7.1 (in particular, paragraph (4)(e) & (4)(f))
- Planning Guide 6.2 (in particular, paragraph (5))
- Dynamics Working Group DWG Procedure Manual section 3.1
- Model Quality Guide, published on the RE webpage at ercot.com
- Dynamic Model Templates, published on the RE webpage at ercot.com

Miscellaneous Reminders:

- PSS/E Dynamic models must be submitted using a Template
  - The Template serves as the vehicle for both the PSS/E and the TSAT model submission
  - If submitting a model that is a User-Defined Model (UDM) then additional UDM files are required for TSAT
  - If submitting a model that is a generic or standard library model available in PSS/E and TSAT, then no additional files are required for TSAT
- The TSAT model and PSS/E model should be the same type of model with the same parameter settings and format. This permits interoperability and allows the same Template to be used for both
- Performing a NERC MOD 26, 27? Running your model quality tests at the same time is a more efficient means to meet both NERC and ERCOT requirements. (Refer to the Model Quality Guide.)
- Converting from UDM to Generic? Suggest to have the vendor/manufacture to verify the conversion and provide their attestation. Details are available in this presentation