

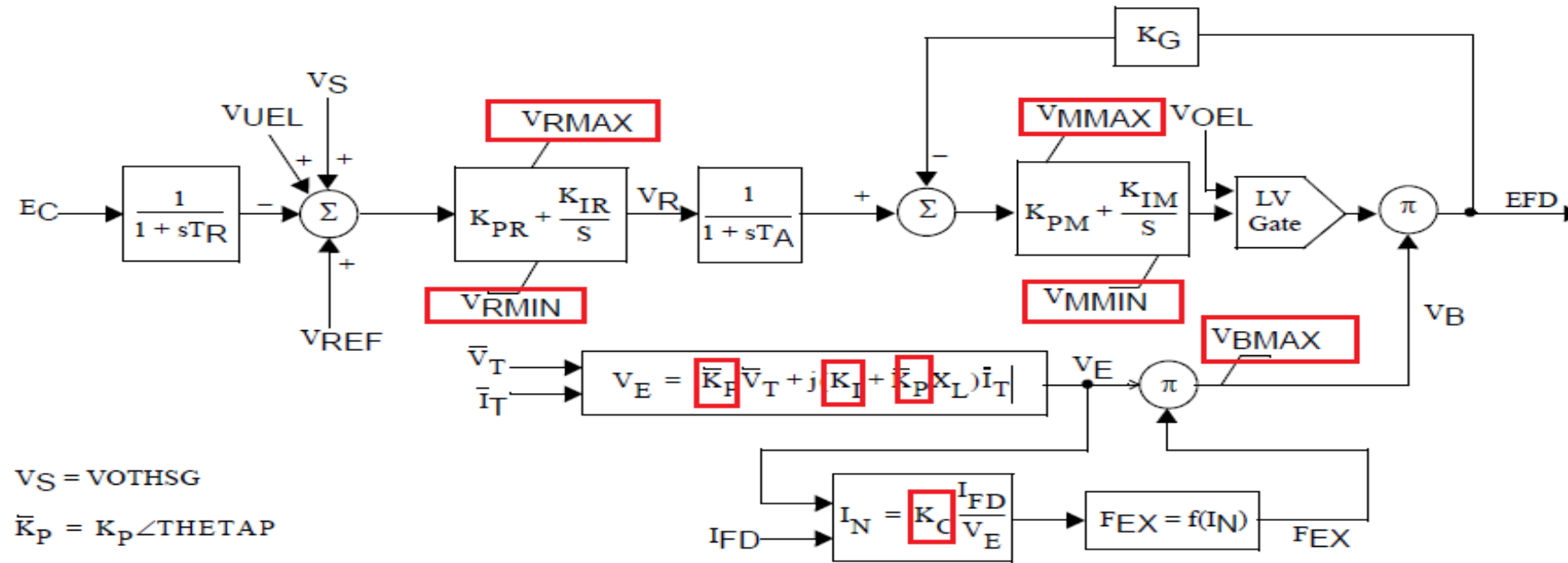
# **Generator Model Verification**

## **MOD-026-1 and MOD-027-1**

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# Generator Model Verification



Source: Siemens PTI

# MOD-026-1 and MOD-027-1 Background

## Drafted as part of Project 2007-09 Generator Verification

- Standard Authorization Request dated April 3, 2007
- Also included MOD-025, PRC-019, and PRC-024
- One identified purpose is to ensure that generator models accurately reflect the generator's capabilities and operating characteristics

## Effective July 1, 2014

- Phased in implementation for Generator Owner model verification

# Implementation Plan

**July 1, 2014**

- MOD-026-1: R1, R3, R4, R5, R6
- MOD-027-1: R1, R3, R4, R5

**July 1, 2018**

- MOD-026-1 & MOD-027-1: R2 – 30% of applicable unit gross MVA for each Interconnection

**July 1, 2020**

- MOD-026-1 & MOD-027-1: R2 – 50% of applicable unit gross MVA for each Interconnection

**July 1, 2024**

- MOD-026-1 & MOD-027-1: R2 – 100% of applicable unit gross MVA for each Interconnection

# Applicable Unit Criteria – ERCOT Interconnection

## MOD-026-1 & MOD-027-1 Applicability

- Individual generating unit greater than 50 MVA (gross nameplate rating) directly connected to the Bulk Electric System (BES)
- Each generating plant / Facility consisting of multiple units that are connected to the BES at a common bus with total generation greater than 75 MVA (gross aggregate rating)
- (MOD-026-1) A technically justified unit that meets NERC registry criteria but is not otherwise included in the above Applicability sections 4.2.1, 4.2.2, or 4.2.3 and is requested by the Transmission Planner

## BES Definition

- Generating resource(s) including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above with:
  - a) Gross individual nameplate rating greater than 20 MVA
  - b) Gross plant/facility aggregate nameplate rating greater than 75 MVA

# Implementation Plan

Implementation percentage calculations based on “applicable units”

- Units that do not meet “applicable unit” criteria will not be included in calculations

Implementation percentages measured by unit gross MVA

- FAC-008-3 Facility Ratings
- RARF or other data submittals
- Review for consistency with gross MVA utilized in implementation plan calculations

Units meeting “applicable unit” criteria that do not require a verification will be included in implementation percentage calculations

- Net Capacity Factor
- Generators that do not have frequency or voltage controls

## ERO Enterprise CMEP Practice Guide: Phased Implementation Plans with Completion Percentages

- The percentages identified in the implementation plans must be achieved by a registered entity as identified by its unique NERC Compliance Registry (NCR) Number as registered in the Region (i.e., not based on a collection of registered entities that are individually registered), unless specific guidance is otherwise provided
- Changes in the number of items a registered entity has during the implementation period could have an effect on the number of items that need to be completed in order to achieve the completion percentages identified by the implementation plan. As such the denominator (i.e., total number of items a registered entity has) of the percent compliant equation will be based on the number of items the registered entity has as of the date the identified percentage must be achieved

# Generator Owner Responsibilities

**R2** – Provide a verified generator model to Transmission Planner\*

\*Note: ERCOT ISO is not a registered Transmission Planner

**R3** – Provide written response to Transmission Planner within 90 days of receive written notification or written comments regarding issues with model

**R4** – Provide revised model data or plans to perform model verification within 180 days of making changes that alter equipment response characteristics

**R5\*** – Provide a written response to Transmission Planner, within 90 days following receipt of a technically justified unit request from the Transmission Planner to perform a model review of a unit or plant

\*R5 only included in MOD-026-1



# Attachment 1 – Generator Model Verification Periodicity

## Initial Verification

- Transmit verified models in accordance with applicable implementation plan

## New Generating Units or Control Systems

- Transmit verified model to Transmission Planner within 365 days after commissioning date

## Subsequent Verification

- Transmit verified models to Transmission Planner on or before 10-year anniversary of last transmittal

# Attachment 1 – Generator Model Verification Periodicity

## Net Capacity Factor Considerations

- Existing applicable units with a current average net capacity factor over the most recent three calendar years of 5% or less
- Net capacity factor calculations based on Appendix F of GADS Data Reporting Instructions
- R2 is met for generating unit with statement to Transmission Planner indicating net capacity factor of applicable unit meets verification condition in Attachment 1

## Additional Considerations

- A single verification may be performed for equivalent units if equivalent units meet verification conditions in Attachment 1
- If the unit does not have an applicable control system, R2 is met for generating unit with statement to Transmission Planner indicating unit meets verification condition in Attachment 1

# Audit Approach – Performance Driven

**(R2) What is the gross MVA of the Generator Owner’s “applicable units” within the ERCOT Interconnection?**

- Does the gross MVA identified for each “applicable unit” align with other data sources reviewed (i.e., Facility Ratings, RARF)?

**(R2) Which “applicable units” have a verified model that has been provided to the Transmission Planner?**

- Was the verification performed in accordance with R2?
- Was the verified model provided to the correct entity?

**(R2) Does the percentage of the “applicable units” with a verified model provided to the Transmission Planner meet the percentages in the implementation plan?**

- Models not verified in accordance with R2 will not be counted as an “applicable unit” with a verified model in calculations.

# Audit Approach – Event Driven

## **(R3) Has the Generator Owner received a response from the Transmission Planner expressing concerns or issues with the model provided?**

- If yes, did the Generator Owner provide a written response in accordance with R3 to the Transmission Planner within 90 days of receipt?
- If no, how did the Generator Owner make this determination?

## **(R4) Has the Generator Owner make changes to its control system that alter the equipment response characteristics?**

- If yes, was a revised model provided to the Transmission Planner within 180 days of making the changes?
- If no, how did the Generator Owner make this determination?

## **(MOD-026-1 R5) Has the Generator Owner received a request from its Transmission Planner to perform a model review?**

- If yes, did the Generator Owner provide a written response in accordance with R5 to the Transmission Planner within 90 days of receipt?
- If no, how did the Generator Owner make this determination?

# Audit Approach – Process Driven

## Process Questions

What data does the Generator Owner utilize in its percent compliant calculations?

How does the Generator Owner review model information to confirm verification was performed in accordance with R2?

How does the Generator Owner verify the appropriate Transmission Planner personnel received the verified model?

How does the Generator Owner track changes to control systems that may alter equipment response characteristics?

Has the Generator Owner designated a point of contact for Transmission Planner responses and requests?

# Transmission Planner Responsibilities

**R1 – Provide instructions and/or model data to Generator Owner within 90 calendar days of receiving a written request**

**Generator Owner provides verified model information in accordance with R2**

**R5/R6\* – Evaluate model and provide written response to Generator Owner within 90 days**

**\*R6 for MOD-026-1 / R5 for MOD-027-1**

# Audit Approach – Performance Driven

(R5/R6) What verified models have been provided to the Transmission Planner?

- Expected that almost all Transmission Planners will receive models by July 1, 2018

(R5/R6) Did the Transmission Planner verify the model is usable?

- Model initializes
- Negligible transients
- Positive damping

(R5/R6) Did the Transmission Planner provide a written response to the Generator Owner within 90 days?

- Technical justification required if model not usable

# Audit Approach – Event Driven

**(R1) Has the Transmission Planner received a request for instructions and/or model data?**

- If yes, were model instructions and/or model data provided to the Generator Owner within 90 days?
- If no, how did the Transmission Planner make this determination?



# Audit Approach – Process Driven

## Process Questions

Does the Transmission Planner have a list of generators connected to its Transmission Planner area?

Has the Transmission Planner designated a point of contact for Generator Owner requests and verified model information?

How does the Transmission Planner determine if a model is usable or not usable?

Does the Transmission Planner have instructions for obtaining models, block diagrams, and/or data sheets that are acceptable?

How does the Transmission Planner ensure a response is provided to the Generator Owner within 90 days of receiving verified model information or a request for instructions/model data?

# Questions?

