PGRR 144 - Dynamic Model Submission and Review Requirements for Large Loads, including Large Electronic Loads

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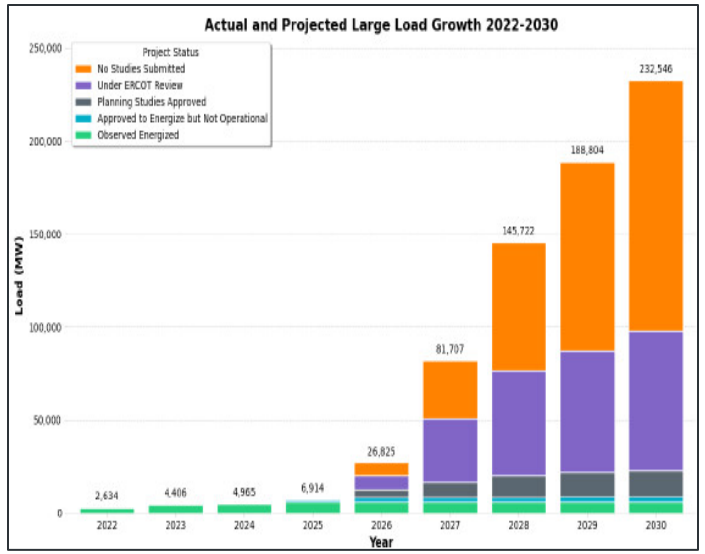
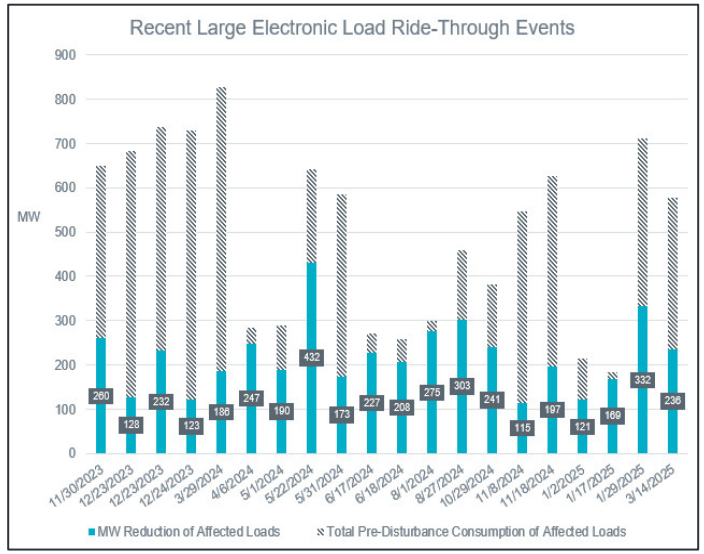
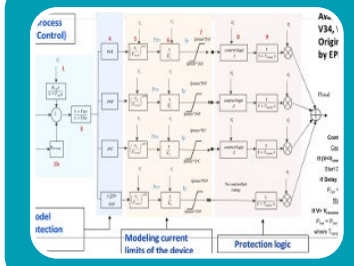
Background

- More than 200 GW of Large Load interconnection requests
- Many are Large Electronic Loads (LELs)
- LEL Tripping Events Since 2022
- Potential Reliability Risk

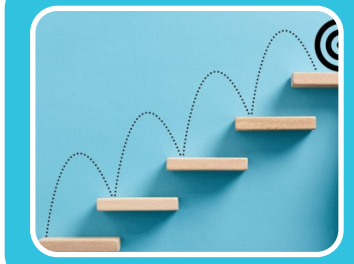




Purpose – Dynamic Model Submission and Review Requirements



Clarifies dynamic data requirements and require model quality test



Clarifies LL dynamic model data submission milestones for review

Clarifies process for potential material changes to the existing LELs

Dynamic Data Requirement (PG 6.2(6) in the PGRR)

- Submission of dynamic data representing accurate behavior of LL should include models, parameters, and supporting documentation
- Software requirements: PSCAD required for all LLs
  - Data must be compatible with current ERCOT planning & operations software as described in DWG Procedure Manual Section 3.1.1, Software
- Model Quality Test is required for all LLs

Large scale, phase-domain analysis tool (e.g., Interconnection studies)

Electromagnetic Transient (EMT) tool for more detailed study (e.g., SSO study, Study for weak grid)

Operation software for real time TSAT analysis

Current vs Proposed - Software Platform and Model Quality Test (MQT)

	Current Process	Proposed PGRR
PSS/E	Required for all LLs	No change
PSCAD	Required for subsynchronous oscillation study (SSO) or co-located LLs	Required for all LLs
TSAT	Required for all LLs if PSSE User Defined Model (UDM) is submitted	No change
Model Quality Test using the software platform (i.e., PSS/E, PSCAD, and TSAT)	Required for RE/IE with co-located LLs, aiming to ensure resource ride-through performance	Required for all LLs

Model Quality Testing Framework (PG 6.2(6) in the PGRR)

- Site-specific Model Quality Test (MQT*) (All **LLs**)
  - Flat Start Test: Verifies proper model initialization and stable response under no disturbance
  - Large Voltage Disturbance (VRT) Test: modeled voltage ride-through capability at the POI under large disturbances
  - Demonstrate dynamic model meets the performance requirements
  - The MQT must be performed using PSS/E, PSCAD, and TSAT (if PSS/E UDM is used)
- Converter Model Validation Test (CMV*) (**LELs** only)
  - Hardware-type validation for the UPS converter and associated computational load
  - Demonstrate accuracy of the PSCAD model of the converter type
  - Large Voltage Disturbance (VRT) Test
  - Subsynchronous Test (frequency scan sweep)
- MQT requirement for LEL vs Non-LEL
  - For LEL facilities, MQTs are required to demonstrate that the model of the project meets the ride through criteria (e.g., proposed voltage ride through requirements in the ongoing NOGRR282)
  - For non-LEL facilities, MQTs are required, with the purpose of improving understanding of voltage ride-through capability

* Note: Guidance of MQT and CMV will be available in the DWG Procedure Manual

Key Milestones for Dynamic Data Submission and Review in the Interconnection Process

Stability Study in LLIS → **LL Quarterly Stability Assessment (QSA)** → **Initial Energization**

- **Before initiating stability study (Applicable to all LLs)**
  - 9.3.4.3 (1) in the PGRR
  - Review submitted MQT, particularly VRT performance
- **Prior to entering QSA (Applicable to all LLs)**
  - Section 5.3.5 (5) of the current Planning Guide
  - Test model performance
  - Check consistency against the data used in the stability study and consistency of performance across different software platforms (e.g., PSSE vs PSCAD)
- **Prior to initial energization (Applicable to LEL only)**
  - PGRR 9.6(1)(f) in the PGRR
  - Check consistency between as-studied (QSA) data vs as-built data
  - Attestation that as-built data aligns with actual field settings

- **Note**: Completion of MQTs does not constitute an endorsement or a determination that an LEL will comply with the operating requirements established under NOGRR282 during operations.

Existing LEL Material Change (9.2.1(1)(d) in PGRR)

Material changes to the existing **LELs** are required to go through LLI process.

Example: technology changes adversely affecting ride-through capability

Next Step

- Stakeholder to review and provide any comments

Questions?

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