



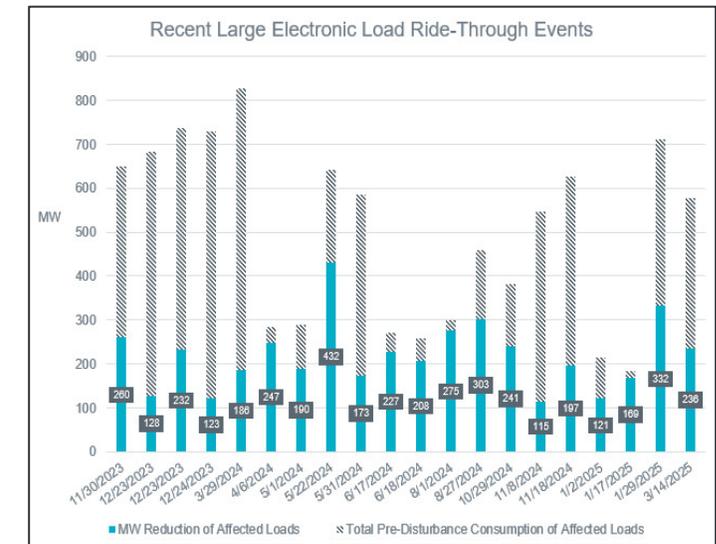
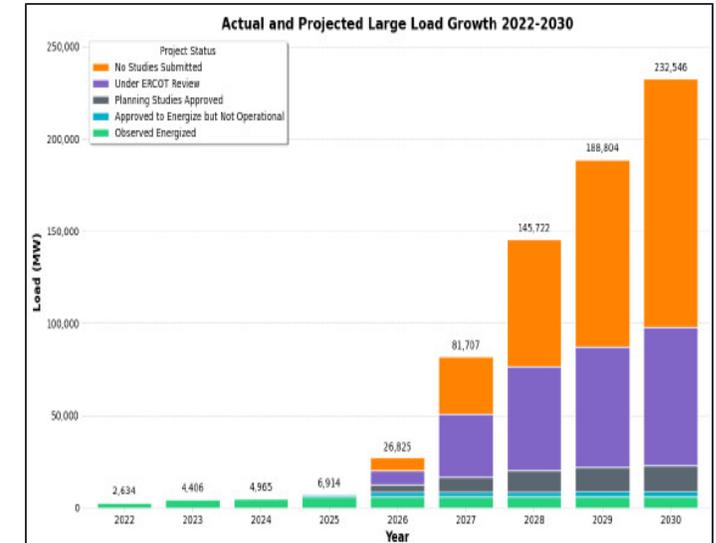
Potential PGRR XXXX - Dynamic Model Submission and Review Requirements for Large Loads, including Large Electronic Loads

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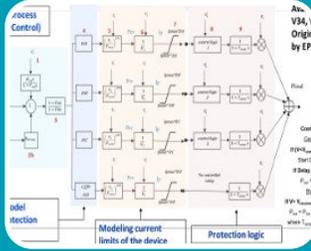
LLWG, February 19, 2026

Background

- More than 200 GW of Large Load interconnection requests
- Many are Large Electronic Loads (LELs)
- LEL Tripping Events Since 2022
- Potential Reliability Risk
- ERCOT will submit the planning guide revision request (PGRR), *Dynamic Model Submission and Review Requirements for Large Loads, including Large Electronic Loads*



Purpose – PGRR: 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)

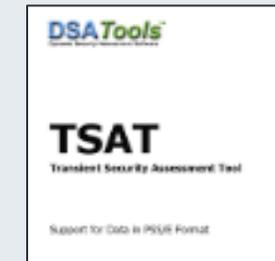
- Submission of dynamic data representing accurate behavior of LL should include models, parameters, and supporting documentation
- Software requirements: PSCAD required for all LLs
 - Data must be compatible with current ERCOT planning & operations software as described in DWG Procedure Manual Section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

- Before initiating stability study (Applicable to all LLs)
 - 9.3.4.3 (1) in the PGRR
 - Review submitted MQT, particularly VRT performance

LL Quarterly Stability Assessment (QSA)

- 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)

Initial Energization

- 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 such as conversion of crypto to data center or ride-through capability

Supplemental Note — LEL Modeling Approach

1. Current standard models have limitations. For example, the composite load model (CMLD) may not adequately represent the dynamic behavior of LEL
2. Reliable system assessment requires accurate load representation
3. PTI is developing a new PSS/E v36 standard library model for LEL
4. As announced at the LLWG meeting, a user-defined model (UDM) and supporting documentation for the power-electronic portion of LEL are available on the [NERC LMWG resources website](#)
5. If the UDM alone cannot adequately represent the LEL, a dual-model approach—using the UDM for power electronics and CMLD for cooling—should be considered to achieve more accurate and comprehensive LEL modeling (Reference: [LEL Modeling Approach and Survey Update Dec 18-2025](#)) until the long-term solution (PSS/E V36 standard library model or other UDM in Ver36) is in place
6. Ensure the model demonstrate the expected LEL dynamic characteristics, and coordinate with the interconnecting TSP

Next Step

- ERCOT to submit the PGRR - LL Dynamic Model Submission and Review Requirements for March ROS
- Stakeholder to review and provide any comments

Questions?



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Appendix - Section 6.2(6)(a) in PGRR: Model Quality Test

- (a) Results of the following model quality tests, simulation files, and other supporting information shall be provided to demonstrate acceptable model performance in accordance with the Dynamic Working Group Procedure Manual.
 - (i) Flat start test: A no-disturbance test shall be performed to demonstrate appropriate model initialization and the Facility's dynamic response under a no-disturbance condition.
 - (ii) Large voltage disturbance test: The high and low voltage ride-through profiles as described in Nodal Operating Guide Section 2.15, shall be applied to the POI to demonstrate the dynamic response of Large Load.
 - (iii) Converter model validation test for Large Electronic Load (LEL): This test is to demonstrate that the PSCAD model, as described in the Dynamics Working Group Procedure Manual, accurately represents the dynamic responses of all power electronic-based dynamic devices within the Facility: This validation is not intended to be site-specific; rather it is intended to be a hardware type test, where models representing different converter hardware are benchmarked for accuracy. The validation results shall be included in a PSCAD model. Results for the following converter model validation tests shall be provided to demonstrate model accuracy. Additional details about each test are included in the Dynamics Working Group Procedure Manual.
 - (A) Large voltage disturbance (voltage ride-through tests);
 - (B) Subsynchronous test.

Appendix - Section 9.2.1(1)(d) in PGRR: Process for Existing LEL with Planned Material Change

- (d) A modification of an existing Large Electronic Load that materially changes dynamic characteristics or operating behavior in a manner that may affect system performance or ride-through capability. Material changes include, but not limited to, changes in the technology (e.g., conversion of cryptocurrency mining loads to data centers) or controls (e.g., protection schemes or relay settings) that affect system response, voltage or frequency ride-through, or dynamic behavior at the POI or Service Delivery Point.

Appendix - Section 9.3.4.3(1) in PGRR: Data Submission Prior to Stability Study

- (1) The lead TSP shall not initiate the stability study prior to receiving from the ILLE dynamic load modeling information sufficient to properly model the load in the stability studies, in accordance with paragraph (6) of Section 6.2, Dynamics Model Development. The TSP shall check the dynamic load information according to the procedure specified in Section 3.4.4, Load Model Data, of the Dynamics Working Group Procedure Manual.

Appendix - Section 9.6(1)(f) in PGRR: Data Submission Before Initial Energization (LEL Only)

- (f) The ILLE associated with the Large Electronic Load shall submit to the interconnecting TSP the applicable dynamic models for the “as-built” data and the data submitted for the ERCOT Quarterly Stability Assessment under Section 5.3.5, documentation clearly indicating any differences, results of the model quality tests of the “as-built” data overlaid with the results of the data submitted for the quarterly stability assessment, associated simulation files pursuant to paragraph (6) of Section 6.2, Dynamics Model Development, and an attestation confirming that the as-built data aligns with field settings. The interconnecting TSP shall review the submitted materials and provide its assessment, including a determination of whether a new stability study is required due to any modifications, and submit both the materials and the assessment electronically to Dynamicmodels@ercot.com for ERCOT review. The phrase “LEL prior to Initial Energization” must be included in the subject line of the submission email. ERCOT shall respond to the interconnecting TSP and the ILLE within ten Business Days of the submission, indicating whether the submission is acceptable or if additional information is required. If additional time is needed for review, ERCOT may extend this review period by an additional twenty Business Days and will notify the interconnecting TSP and the ILLE by email.

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

- Example voltage profile for Large Voltage Disturbance Test
- ERCOT will share the draft DWG Procedure Manual updates at the future LLWG meeting

