

GRID EMT

SIMULATION INITIATIVE

Large Load Integration Strategy at NERC

Mohamed Osman, NERC

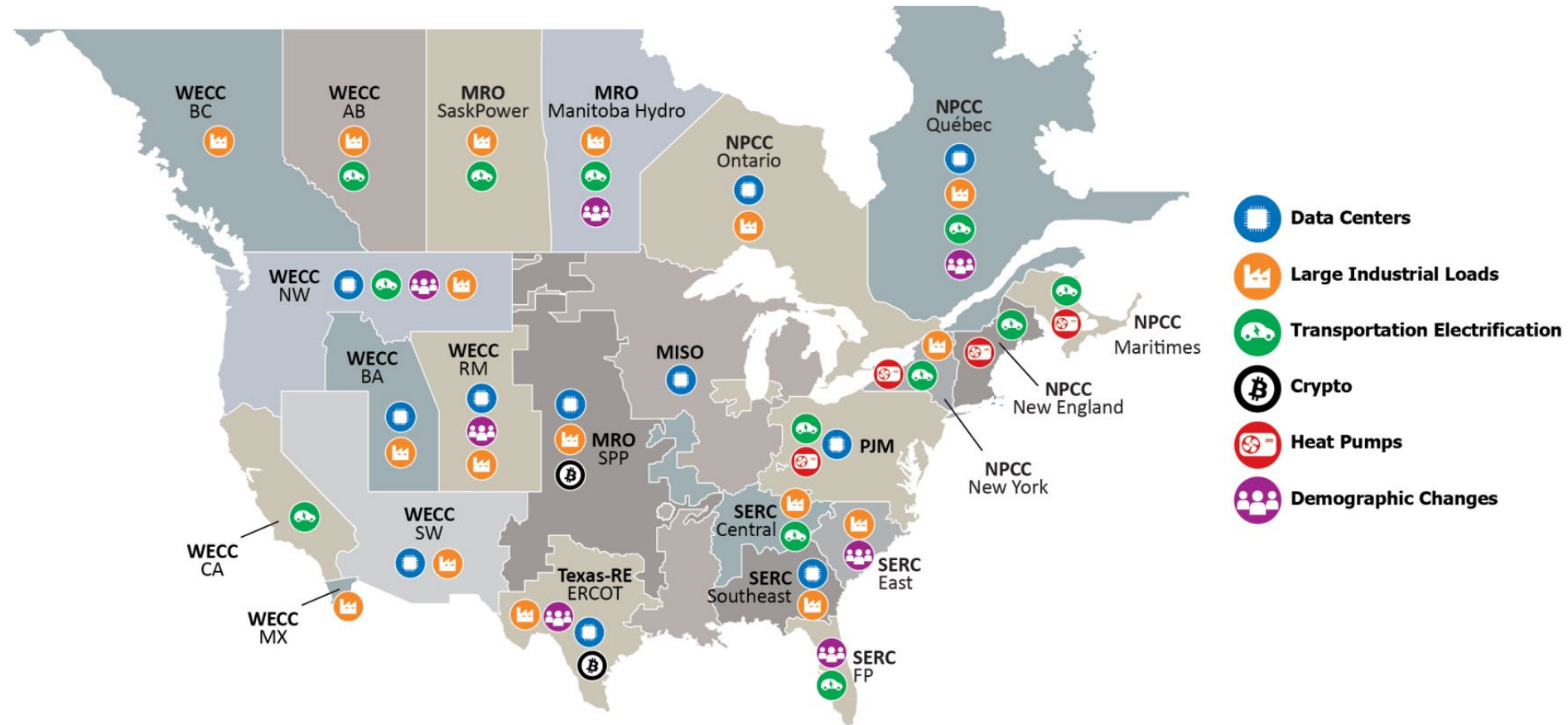
Principal Engineer

August 18-21, 2026

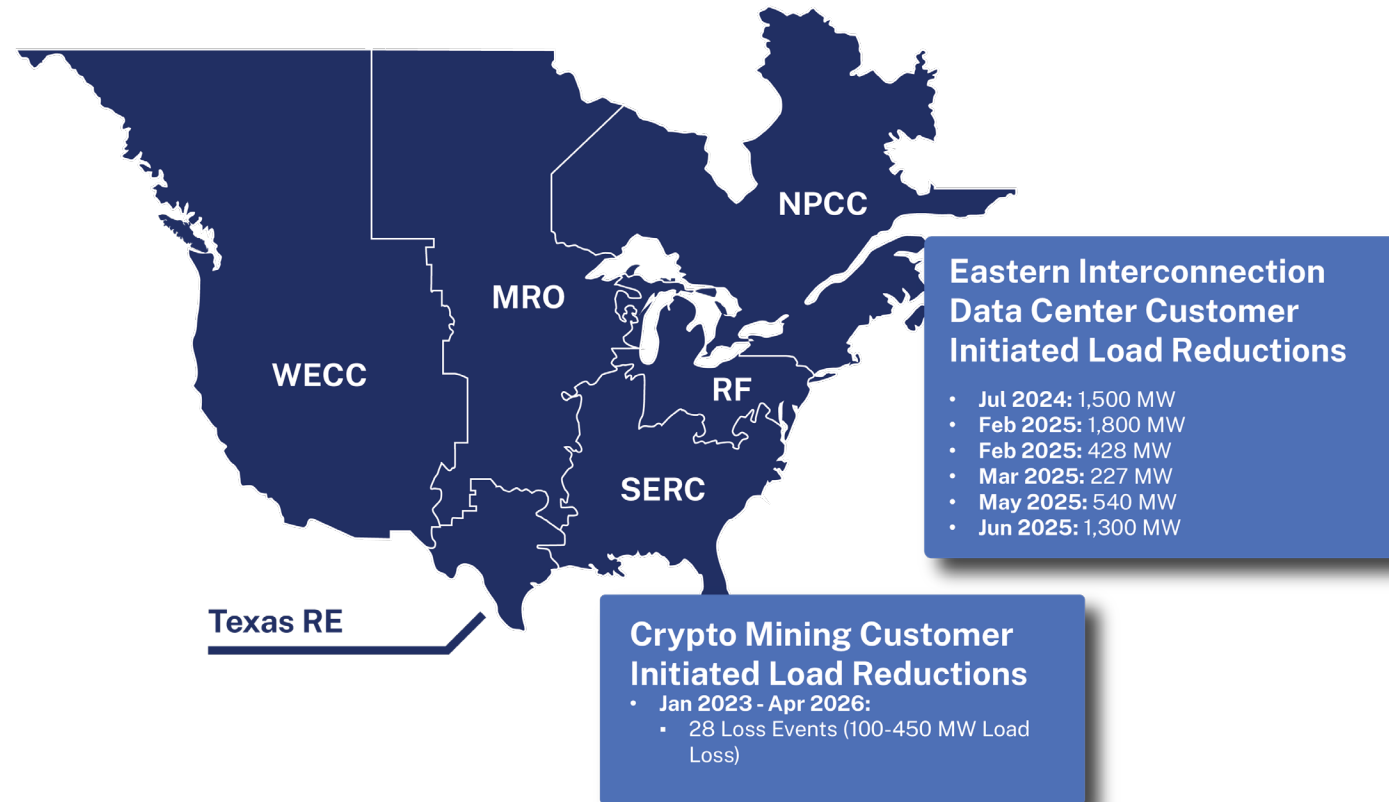


U.S. DEPARTMENT
of **ENERGY** | Office of
Electricity

What NERC's 2025 Long-Term Reliability Assessment Told Us



Recent Incidents: Voltage Sensitive Customer Initiated Load Reductions



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

Integrating Large Computational Loads

- Large commercial and industrial loads—specifically “computational loads” such as data centers—present unique factors for consideration to the electric grid.
- *Our challenge: Integrate these computational loads onto the bulk power system while ensuring reliability and security.*
- NERC is working alongside the electric power and data center industries to enhance understanding and implement necessary mitigation measures for computational loads.



Large Loads Action Plan

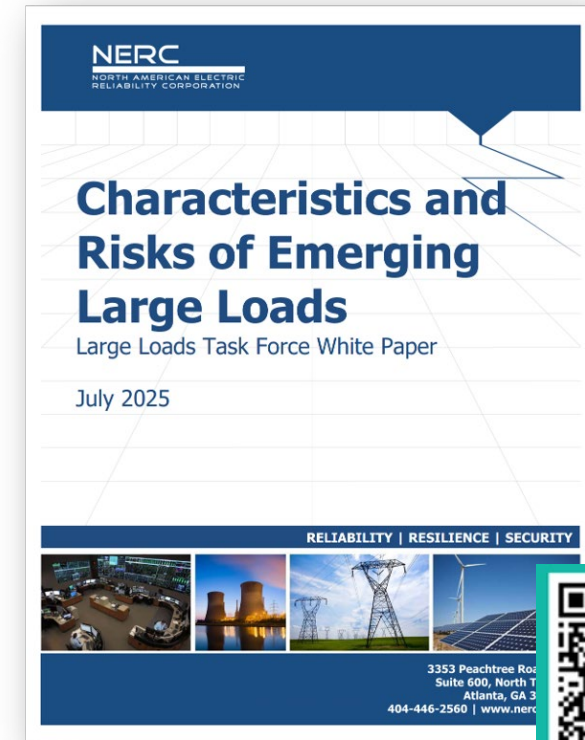
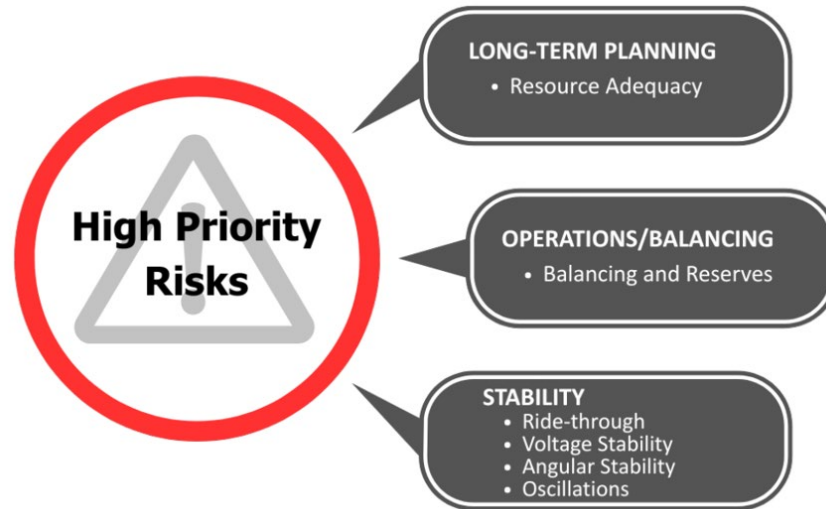


U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

Large Loads Working Group White Paper (July 2025)

- The Large Loads Working Group issued a white paper in July 2025 on Characteristics and Risks of Emerging Large Loads.



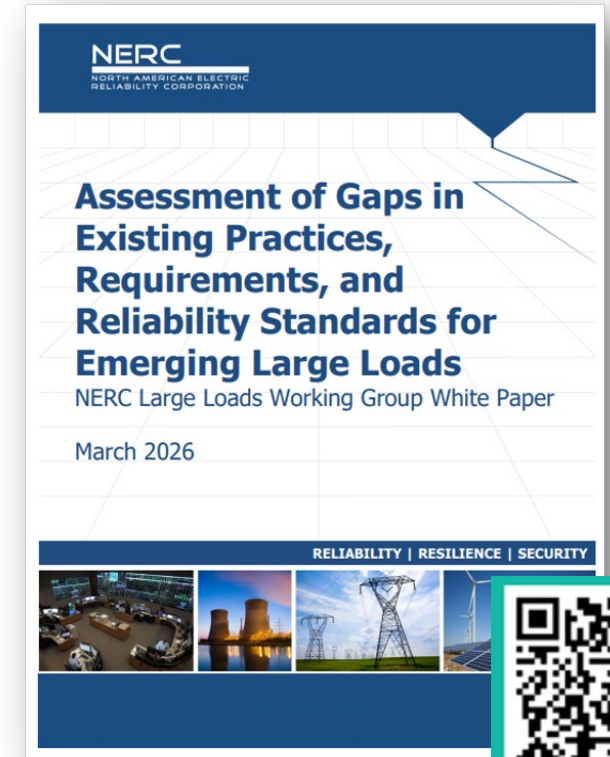
White Paper



U.S. DEPARTMENT
of **ENERGY** | Office of
Electricity

Large Loads Working Group White Paper (March 2026)

- The Large Loads Working Group issued a second white paper in March 2026.
 - The white paper found that existing Reliability Standards, processes, and requirements are **inadequate** to address the needs for emerging computational large loads.
 - Recommended updates to registration criteria, Reliability Standards, processes/requirements, and other areas.



White Paper



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

Level 2 Alert Findings

- In September 2025, NERC issued a Level 2 Industry Recommendation Alert.
- This Alert recommended that industry take specific actions to mitigate risks to the bulk power system.
- Many entities do not have specific procedures to handle the unique challenges associated with large loads.
- Many entities do not have a process to coordinate with Transmission Owners and Distribution Providers to establish protection coordination requirements for large loads.
- Many entities report waiting on or coordinating with a separate entity, primarily their ISO or RTO.



Level 2 Alert



Summary Report



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

NERC Level 3 Alert

- A Level 3 Essential Actions Alert, released May 4, 2026, recommends seven near-term mitigation actions that current registered entities can take to address critical reliability risks.

NERC

Essential Action to Industry

Computational Load Modeling, Studies, Instrumentation, Commissioning, Operations, Protection, and Control

Initial Distribution: May 4, 2026

The purpose of this Level 3 NERC Alert is to ensure Essential Actions are taken by registered entities to address the risks posed by existing and new computational loads¹ interacting with the bulk power system (BPS), inclusive of computational load interconnecting with collocated generation.²

NERC issued a previous Level 2 Alert Industry Recommendation: *Large Load Interconnection, Study, Commissioning, and Operations*³ that discussed the recommended practices that NERC deemed necessary to address the emerging risks from large loads. In the responses provided to the Alert, NERC found that entities generally did not have sufficient processes, procedures, or methods to address risks associated with computational loads. This contrasts with the robust historical experience with traditional non-power electronic non-computational load. As seen in the public report, NERC found specific deficiencies with the treatment of computational loads. Examples of this load include artificial intelligence training, cryptocurrency mining, and traditional data center uses.

As stated in the public report, NERC determined a set of immediate actions that registered entities should take to reduce the risk to the BPS that warrant issuance of this Level 3 alert. These actions relate to the modeling, study, installed fault recording or instrumentation, commissioning, operation, protection, and control of computational load.

NERC issues this Level 3 Alert for entities to implement specific changes⁴ to handle critical risks. Additional actions are discussed as part of NERC's Large Loads Action Plan and include the draft registry criteria⁵ and Standard Authorization Request (SAR) for computational load⁶ posted on NERC's website on April 1, 2026. Responses will also help



Level 3 Alert



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

NERC Level 3 Alert

Modeling

- Model IT load separate from motor load
- Collect specific data for modeling
- Process for detailed modeling

Studies

- Identify vulnerabilities and develop mitigations
- Evaluate limits for credible Contingencies

Fault recording instrumentation

- Install and utilize recording devices
- Capture facility performance for System Disturbances
- Utility access to devices

Operations

- Establish Interpersonal Communication Capabilities
- Issue instructions to entities to prevent BES Emergencies

Commissioning

- Checklist of key data
- Communicate to neighbors and affected Systems
- Evaluation of “as-built” for model validation/ verification

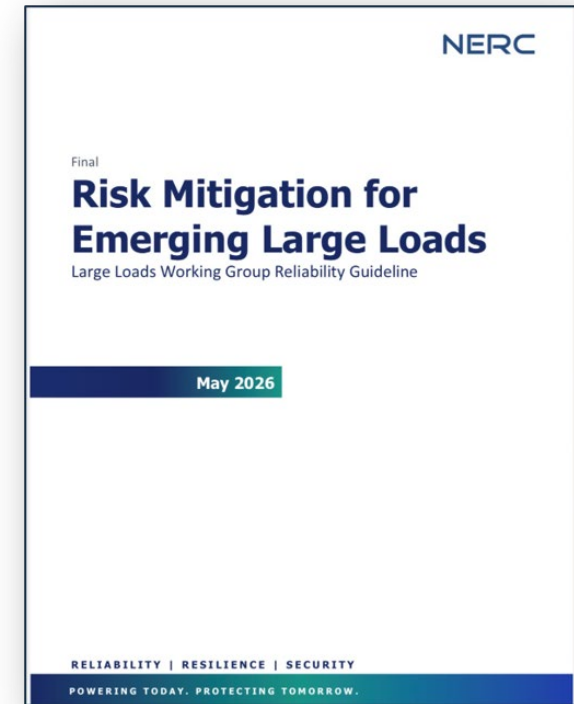
Protection and Control

- Coordinate local transmission and load protection
- Do not reduce for typically cleared faults (non-consequentially)



Reliability Guideline

- Best-practice guidance on mitigating risks to BPS reliability from integration of emerging large loads.
- Voluntary and non-binding. The guideline is intended to supplement any existing or new Reliability Standards.



Final Reliability Guideline

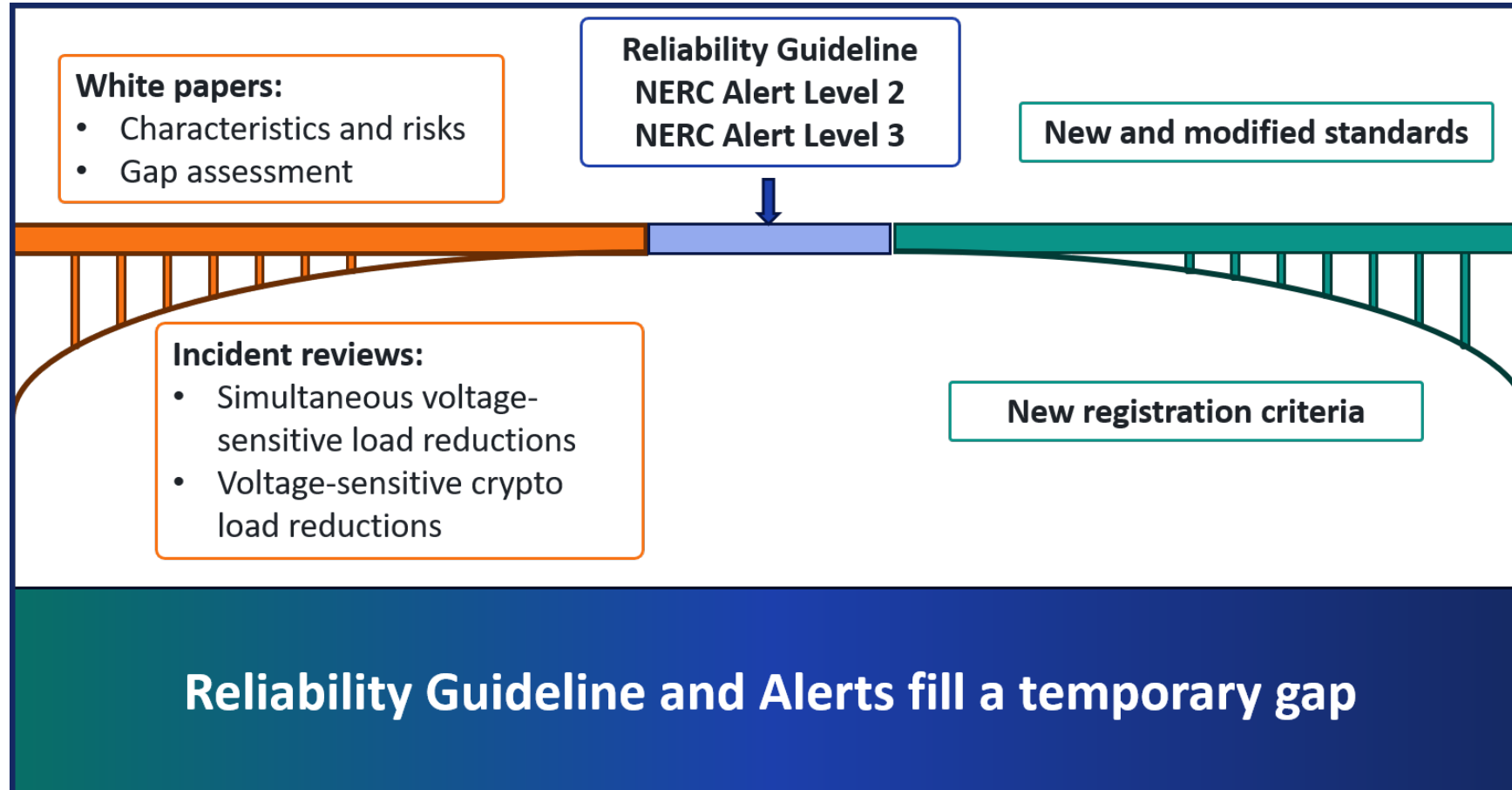


What the Reliability Guideline Says About Oscillations

- Considerations for 0.1-2.0 Hz forced oscillations
- Other dynamic interactions like:
 - Subsynchronous control interactions (SSCI)
 - Subsynchronous torsional interactions (SSTI)
- TOs, TPs, PCs, and RCs should collaborate to establish requirements for large loads
- Key mitigations
 - Detection and mitigation
 - Interconnection process
 - Monitoring requirements
 - Event analysis and model validation



Building the Bridge



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

Registration

Why?

- Identify entities that impact reliability
- Notify those that must comply
- After registration, Reliability Standards apply

Who?

- Criteria to be determined
- Exception process available

When?

- After criteria developed in NERC Rules of Procedure
- After approval by FERC in the United States

How?

- Day-to-day delegated to Regional Entities



Standards for Computational Loads

- New and updated Reliability Standards will address computational loads in the Bulk Power System.
 - Some for existing registered entities, some for new computational load entities.
- There will be opportunities for feedback on the draft standards through the commenting and balloting process.
- **Registry criteria and standards are planned to be filed by end of 2026.**



Standard Project



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity

NERC Action Plan to Integrate Computational Loads

- Updating registry criteria
- Developing Reliability Standards
- Technical resources, including:
 - White papers
 - Reliability guideline
 - NERC Alerts
 - Incident reviews
 - Collaborative workshops and roundtables



Large Loads Working Group



Timeline: NERC and Large Loads

Large Loads Action Plan

Q3 2026

- Host a webinar on the Level 3 Alert (July 8)
- Publish the Data Center Load Modeling Technical Reference (July, subject to RSTC approval)
- Responses Due: Level 3 Alert (August 3)
- Post registry criteria for 30-day comments (August)
- Post standards within 10-day balloting and 30-day comment period (August)
- Organize a Data Center Load Modeling Workshop (September 15–16)

Q4 2026

- Post registry criteria, glossary, and standard(s) for additional comment period (October 21 if needed)
- Request Board approval of registry criteria, glossary, and standard(s) (December 25)
- File registry criteria, glossary, and standard(s) (December 31, subject to Board approval)

Q1–Q4 2027

- Draft and file additional Reliability Standards as needed

NERC

RELIABILITY | RESILIENCE | SECURITY



U.S. DEPARTMENT
of **ENERGY**

Office of
Electricity



U.S. DEPARTMENT *of* ENERGY

Office of Electricity