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Large Loads Action Plan

ESIG 2026 Summer Workshop

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June, 2026

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

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

Technical Insights

Data Center Load Loss Event

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Incident Review

Considering Simultaneous Voltage-Sensitive Load Reductions

Primary Takeaways

Operators and planners of the Bulk Electric System (BES) should be aware of the risks and challenges associated with voltage-sensitive large loads that are rapidly being connected to the power system. Specifically, when considering data centers and cryptocurrency mining facilities, entities should be aware of the potential for large amounts of voltage-sensitive load loss during normally cleared faults on the BES. Voltage-sensitive data center-type loads have increased on the system and are predicted to continue growing rapidly. The 2024 NERC *Long-Term Reliability Assessment* (LTRA) documents and discusses this potential growth of data center-type loads. This vignette highlights this load-loss potential based on analysis of a recent event in the Eastern Interconnection and offers some considerations for BES operators, planners, and regulators concerning identifying and mitigating the potential reliability effects and risks presented by these large voltage-sensitive load losses for future operations.

Summary of Incident

A 230 kV transmission line fault led to customer-initiated simultaneous loss of approximately 1,500 MW of voltage-sensitive load that was not anticipated by the BES operators. The electric grid has not historically experienced simultaneous load losses of this magnitude in response to a fault on the system, which has historically been planned for large generation losses but not for such significant simultaneous load losses. Simultaneous large load losses have two effects on the electric system: First, frequency rises on the system as a result of the imbalance between load and generation; second, voltage rises rapidly because less power is flowing through the system. In this incident, the frequency did not rise to a level high enough to cause concern. The voltage also did not rise to levels that posed a reliability risk, but operators did have to take action to reduce the voltage to within normal operating levels. However, as the potential for this type of load loss increases, the risk for frequency and voltage issues also increases. Operators and planners should be aware of this reliability risk and ensure that these load losses do not reach intolerable levels.

Incident Details

At approximately 7:00 p.m. Eastern on July 10, 2024, a lightning arrestor failed on a 230 kV transmission line in the Eastern Interconnection, resulting in a permanent fault that eventually "locked out" the transmission line. The auto-reclosing control on the transmission line was configured for three auto-reclose attempts staggered at each end of the line. This configuration resulted in 6 successive system faults in an 82-second period. The protection system detected these faults and cleared them properly. The shortest fault duration was the initial fault at 42 milliseconds, and the longest fault duration was 66 milliseconds. The voltage magnitudes during the fault ranged from .25 to .40 per unit in the load-loss area.

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EVENT:

- 1,500 MW Load Loss (exclusively data center load)
- Coincident with 230 kV normal line fault clearing
- Widespread: 60 different load points, 25 substations

CONCLUSIONS:

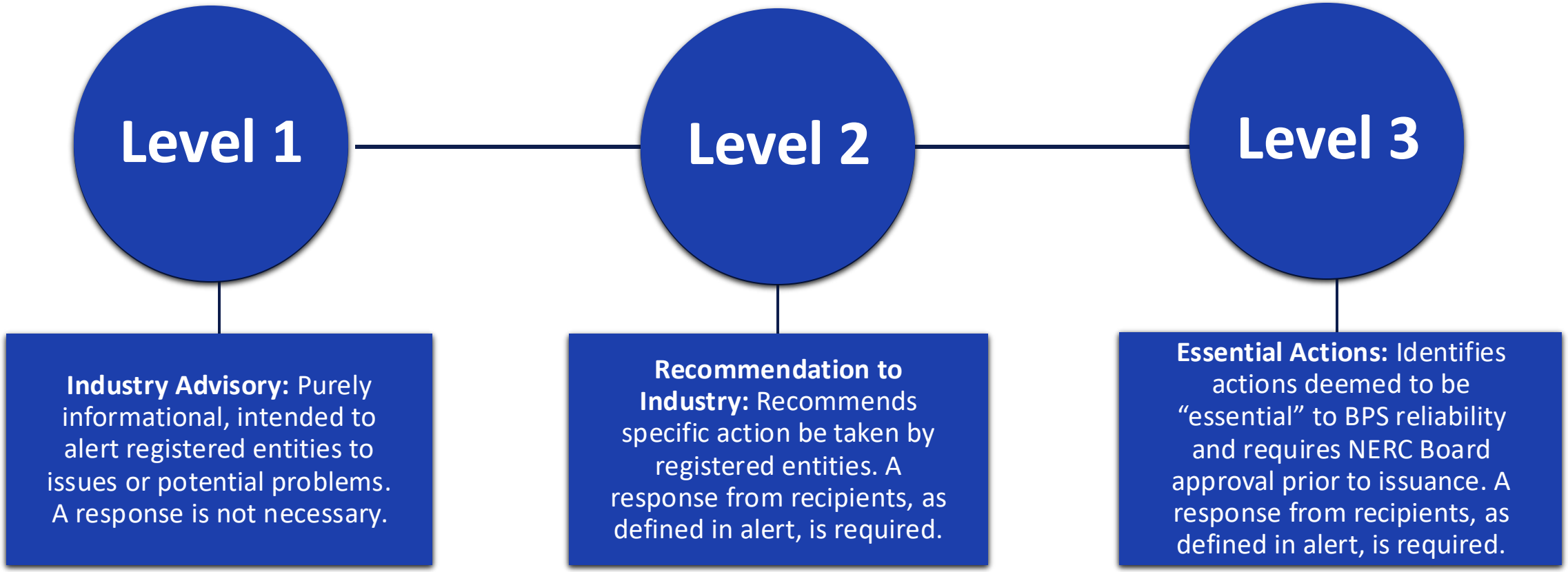
- Require models for large loads to determine Bulk Electric System risk from coincident large load losses
- Assess need for new or modified standards and if large loads should be registered with NERC

Large Loads Working Group

- White paper- Characteristics and Risks of Emerging Large Loads.
- White paper- Assessment of Gaps in Existing Best Practices, Requirements, and Reliability Standards for Emerging Large Loads.
- Reliability Guideline – RisK Mitigation for Emerging Large Loads

White Paper

NERC Alerts


Level 1
Level 2
Level 3
Industry Advisory: Purely informational, intended to alert registered entities to issues or potential problems. A response is not necessary.
Recommendation to Industry: Recommends specific action be taken by registered entities. A response from recipients, as defined in alert, is required.
Essential Actions: Identifies actions deemed to be "essential" to BPS reliability and requires NERC Board approval prior to issuance. A response from recipients, as defined in alert, is required.

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.

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Industry Recommendation

Large Load Interconnection, Study, Commissioning, and Operations

Initial Distribution: September 9, 2025

The purpose of this alert is to address the risks observed from the analyzed large load behavior and to assess the status of industry preparedness in relation to large loads.

NERC, Regional Entities, and NERC registered entities have analyzed a series of disturbances that occurred on the bulk power system (BPS) resulting in widespread and unexpected customer-initiated load reduction of large loads. These disturbances involved multiple events during which 1,000+ MW of unexpected Large Loads output reduction occurred, with most events occurring in 2024 or 2025. The increase of Large Loads-related events coincides with an increase in Large Load penetration across the BPS.

To better understand the reliability impact(s) of emerging large loads on the BPS, NERC established the Large Loads Task Force (LLTF) in August 2024. In July 2025, NERC published a white paper titled *Characteristics and Risks of Emerging Large Loads*[1] that highlights characteristics of Large Loads such as rapid fluctuations in demand and cyclical ramping. That paper includes the following high-priority categories of risks: Long-Term Planning, Operations/Balancing, and Stability.

For this Alert, the term "Large Load" is consistent with the definition in the LLTF white paper referenced above:

> **Large Load - "Any commercial or industrial individual load facility or aggregation of load facilities at a single site behind one or more point(s) of interconnection that can pose reliability risks to the BPS due to its demand, operational characteristics, or other factors. Examples include, but are not limited to, data centers, cryptocurrency mining facilities, hydrogen electrolyzers, manufacturing facilities, and arc furnaces."**

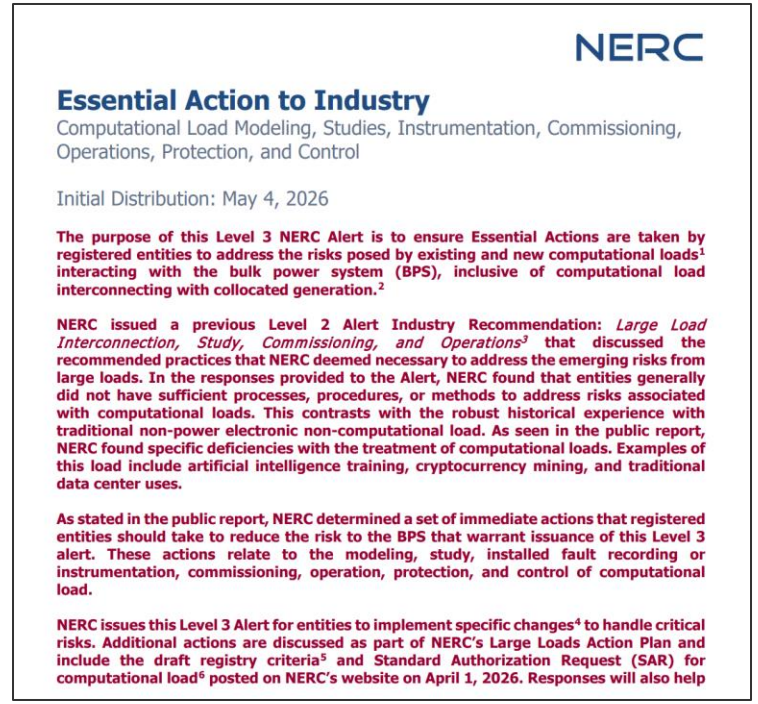
Rapid, major swings in load, experienced both in typical operations as well as in response to grid disturbances, can impact the BPS's ability to maintain frequency, regulate transmission voltage, and otherwise maintain stability. The comparatively large size, unique end-use operational characteristics, unique facility design, and unique operational performance of Large Loads necessitate enhancements to interconnection processes, BPS planning studies and models, validation of installed facility equipment, and operational communication with these customers. Accurate,

Level 2 Alert

Summary Report

NERC Level 3 Alert

- A Level 3 Essential Actions Alert, released May 4, 2026, recommends seven near-term mitigation actions that current registered entities are urged to take to address critical reliability risks.
- The deadline for registered entities to submit their responses is August 3, 2026.



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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 loads[1] 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 changes[4] to handle critical risks. Additional actions are discussed as part of NERC's Large Loads Action Plan and include the draft registry criteria[5] and Standard Authorization Request (SAR) for computational load[6] posted on NERC's website on April 1, 2026. Responses will also help

Level 3 Alert

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

Commissioning

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

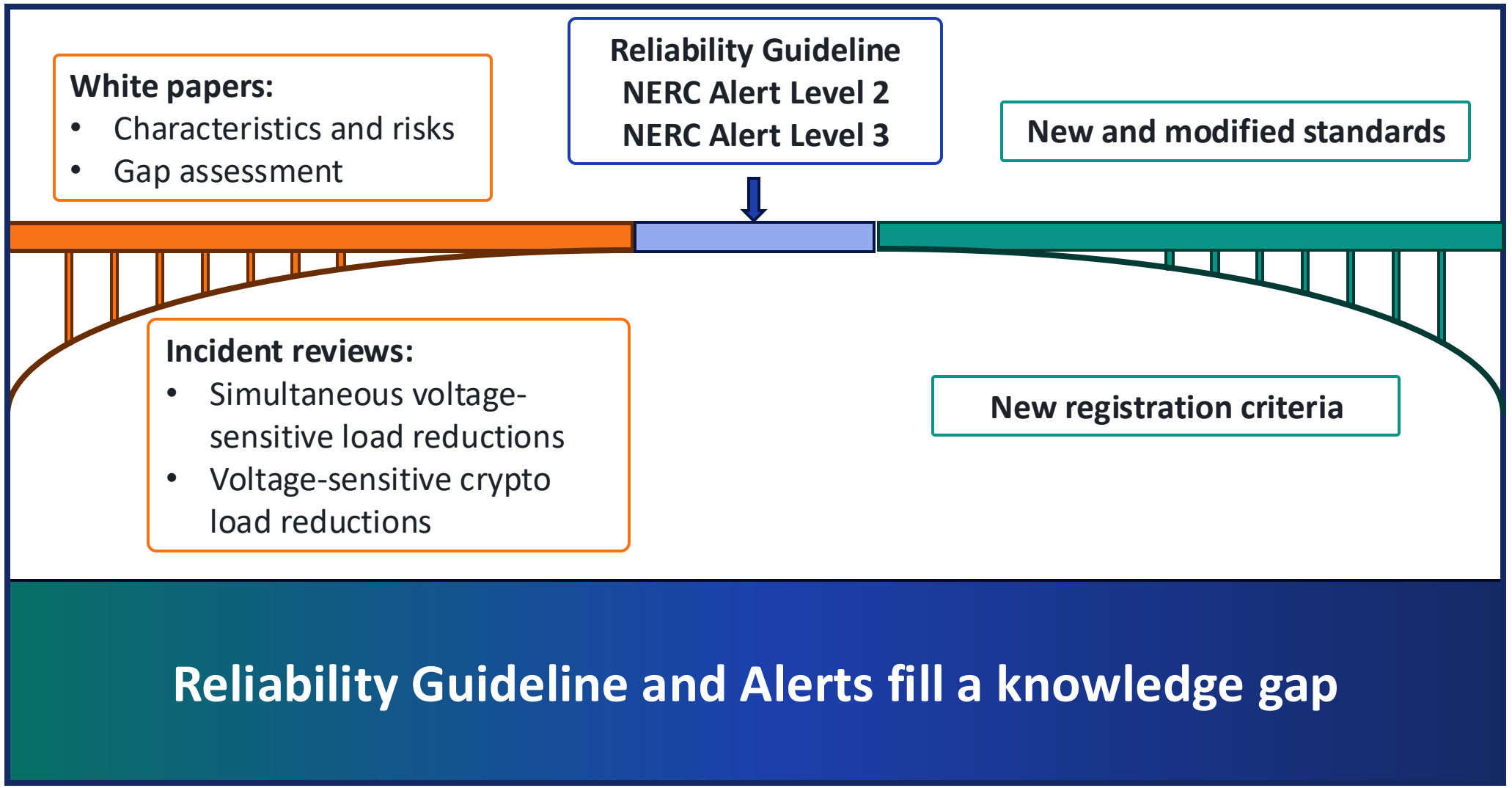
Operations

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

Protection and Control

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

Building the Bridge



Additional LMWG and LLWG Products

Technical Reference Document: Data Center Load Modeling

SAR Planning

White Paper: Large Load Disturbance Performance

White Paper: EMT Modeling and Simulation Considerations for Large Loads

Coming Q3/Q4 2026!

Load Modeling Working Group

Large Loads Working Group

Registration

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

Registration Criteria for Large Loads

- On April 1, 2026, NERC posted draft registry criteria for computational large loads, including data centers and cryptocurrency mining.
- The criteria define the scope of what entities will be required to register with NERC and comply with NERC Reliability Standards.
  - Proposed threshold of 20 MW or more aggregated computational load at a point of interconnection 60 kV and above.
- NERC accepted comments until May 15, 2026. Comments will be carefully considered.

Draft Registry Criteria

Standards

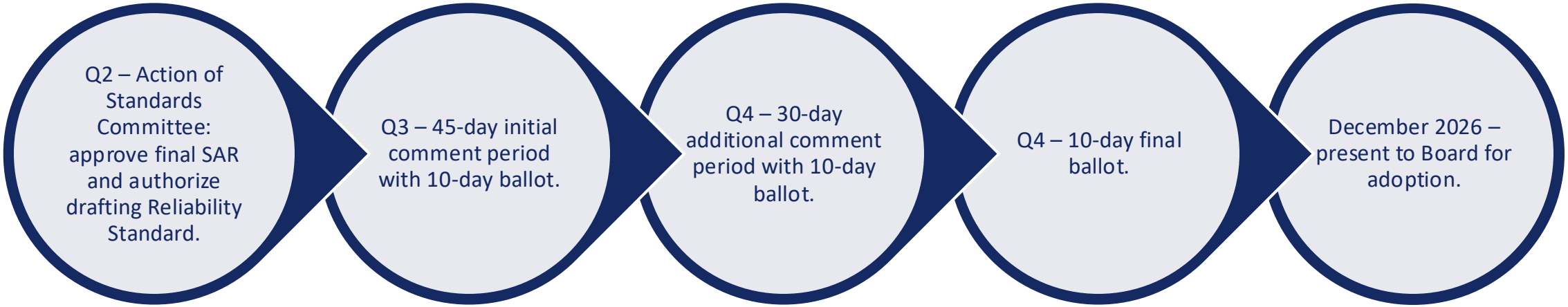
Standards for Computational Loads

- 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.
- NERC posted a Standard Authorization Request (SAR) for comment on April 1, 2026. It includes:
  - New definitions for use in Standards for Computational Loads
  - A “foundational” Reliability Standard.
- Comments on the SAR due April 30, 2026.
- There will be opportunities for feedback on the draft standard through the commenting and balloting process.

Standard Authorization Request

Timeline: Standards for Computational Loads

- Project 2026-02 Computational Loads – Timeline 2026



- Key next steps:
  - Drafting team training and scheduling of meetings.
  - Short-Term Advisory Group formation and scheduling of meetings.

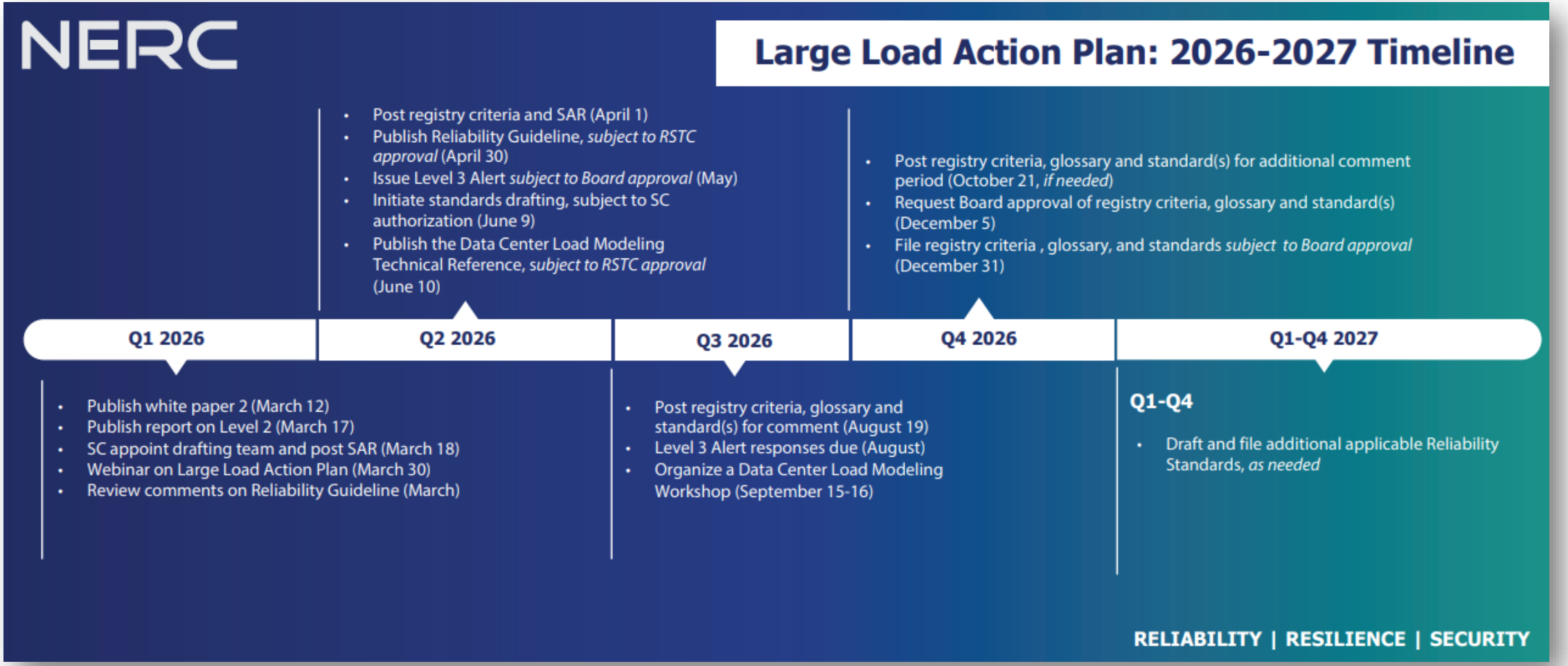
A Collaborative Process

- NERC works in collaboration with stakeholders across all its initiatives.
- As we move from data collection and analysis to the comment and drafting phase, **perspective and input from stakeholders remains critical.**
- NERC works to achieve the greatest possible consensus, while fulfilling its statutory requirement to provide for the reliability and security of the electric grid.

Short-Term Advisory Group

- New concept, inspired by process change recommendations.
- Additional subject matter experts to support drafting team for Reliability Standards.
  - Expedite and enhance consensus building
  - Participate in Quality Reviews
  - Review and provide input to drafts of standard and supporting documents
  - Participate on sub-teams
  - Support outreach
  - Participate in project update communications

Timeline: NERC and Large Loads

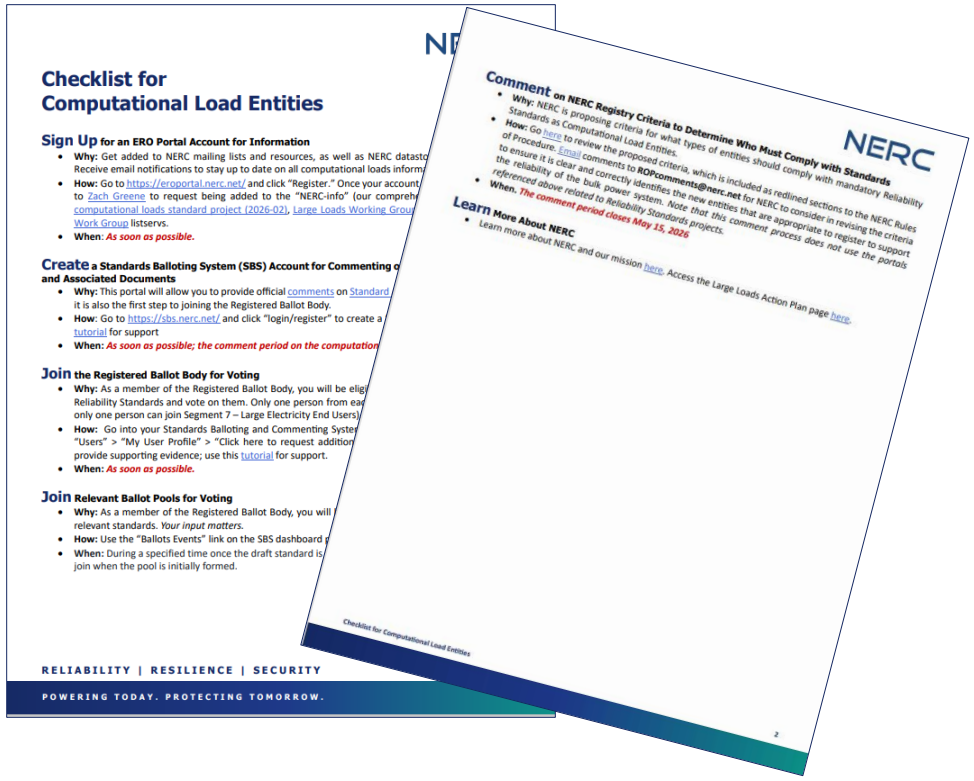


Make Your Voice Heard at NERC

- **Join NERC as a member**
  - Complete membership application on ERO Portal: https://eroportal.nerc.net/
  - More information: https://www.nerc.com/who-we-are/membership
  - Questions: nercmembership@nerc.net
- **Participate in the standards development process**
  - Support standard drafting projects
  - Comment on draft standards
  - Join the Registered Ballot Body via the Standards Balloting and Commenting System (SBS): https://sbs.nerc.net/
  - SBS Tutorial: https://www.nerc.com/globalassets/standards/documents/2023/sbs_tutorial_for_external_users.pdf
  - More information on standards: https://www.nerc.com/standards
- **Observe or join a committee**
  - Committees: https://www.nerc.com/who-we-are/committees
  - NERC event calendar: https://www.nerc.com/events
- **Share your expertise**
  - Attend workshops and conferences
  - Comment on publications (e.g., white papers, technical reference documents)

Make Your Voice Heard at NERC

- Review our Computational Load Checklist to find actions to take right now.
- Contact us to learn more and join the NERC listserv for updates.
- Get in touch if you are interested in joining a working group.
  - Large Loads Working Group
  - Load Modeling Working Group



View our checklist for relevant information and links

View Checklist

Contact us with questions and comments

Contact NERC

Discussion