Harmonizing Large Load Interconnection Requirements in the West

Large Load Industry Advisory Group

Meeting #2

June 25, 2026

WIRAB
Western Interconnection Regional Advisory Body

Meeting Logistics

Recording

This meeting is being recorded and **may be posted publicly**. By participating, you consent to your name, voice, and image being part of the recording.

How to Participate

Use the **"Raise Hand"** feature to ask questions or provide input

Feel free to use the **chat** and make sure to send your chat to **Everyone**

We will be using **Slido** later in the meeting to solicit feedback

Audio Etiquette

Everyone came into the meeting muted

Please **mute yourself** when not speaking

If joining by phone, please identify yourself in the chat

Materials & Follow-Up

Slides and materials will be shared after the meeting and available on the webpage

Contact information will be provided at the end for follow-up questions or comments

Outline

Introductions and Background	Overview of WIRAB's role and motivation for this effort Explanation of the Industry Advisory Group's role
Large Load FIR Template Framework	Overview of proposed structure Discussion on how it can be used
Interactive Discussion and Q&A	Open Discussion and Slido Polls
Closing and Next Steps	Preview of next meeting topics and expected deliverables Upcoming meetings

WIRAB's 2026 Strategic Initiatives

Long-term Planning Data and Models

Initiative 1: Advise WECC to work with states, provinces, and planning entities to improve long-term planning assumptions, data, and models to meet evolving regulatory and reliability needs.

Large-load Performance Requirements

Initiative 2: Advise WECC, NERC, and stakeholders to develop common interconnection and performance requirements for large loads—especially data centers—to ensure reliable and secure integration into the Bulk Power System.

Resource Adequacy with Electrification and Large Loads

Initiative 3: Advise WECC to study the impacts of rapid electrification and large load growth on reliability, including regional and seasonal resource adequacy trends.

Energy Storage Reliability Standards

Initiative 4: Advise WECC and the ERO to assess whether reliability standards adequately reflect the growing role of energy storage technologies in supporting grid stability and essential reliability services

Large Load Industry Advisory Group Meeting Schedule

Date	Topics
✅ May 28, 2026 (11:00 a.m.–12:00 p.m. MT)	Kickoff: Background, Goals, and Timeline
June 25, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Review
July 16, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Template Section #1
August 13, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Template Section #2
September 24, 2026 (11:00 a.m.–12:00 p.m. MT)	Large Load Interconnection Requirements Template Section #3
October 22, 2026 (11:00 a.m.–12:00 p.m. MT)	Template Review and Finalizing
November 12, 2026 (11:00 a.m.–12:00 p.m. MT)	Template Finalizing and Next Steps
December 3, 2026 (11:00 a.m.–12:00 p.m. MT)	Industry and Public Webinar

Kickoff Meeting Recap: May 28, 2026

Key Takeaways	Industry Priorities	Project Direction	Today's Focus
• Large load growth is accelerating across the West. • Reliability concerns are driving new interconnection requirements. • Utilities, regulators, and industry are developing new approaches.	• Consistent requirements • Clear expectations • Efficient interconnection processes • Reliable grid operations	• Share lessons learned • Review existing requirements • Identify leading practices • Develop a Western template FIR	• Review existing requirements • Discuss gaps and opportunities • Begin shaping the template

https://www.westernenergyboard.org/harmonizing-large-load-interconnection-requirements-in-the-west/

Industry Advisory Group Participation

Introductions:

- Name
- Organization
- Role
- Favorite place in the West to spend a summer holiday weekend?

June 2026 Registration Snapshot: Registered Participants: 97; Organizations Represented: 77

Organization Type	Count
Utilities, Transmission Providers, ISOs/RTOs, Cooperatives, and Public Power Entities	~65
Consultants, Developers, Technology Providers, Law Firms, and Other Industry Participants	~20
Reliability / Regional Organizations (WECC, NERC, WIEB, SPP, etc.)	~7
Government / Regulatory Agencies	~3
Trade Associations	~1
Large Load / Data Center Companies	~1

Participant Engagement

34% Active Participants

- Interested in contributing directly to development of the Large Load Interconnection Requirements Template

66% Monitoring Participants

- Interested in receiving updates and reviewing project outputs

Thank You!

Next Industry Advisory Group Meeting

July 16, 2026 at 11:00 AM MT

Eric Baran

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720-897-4600 x 207

WIRAB
Western Interconnection
Regional Advisory Body

Large Load Interconnection Requirements Review

Industry Advisory Group (IAG) Meeting

Ryan D. Quint, PhD, PE, *President and CEO*
Kyle Thomas, PE, VP, *Engineering and Compliance Services*
Jiecheng "Jeff" Zhao, PhD, PE, *Manager, Engineering*

June 25, 2026

Elevate Energy Consulting

Helping enable a reliable, resilient, affordable, and sustainable energy future for generations to come.

- ***Outstanding technical expertise*** in inverter-based technologies, grid interconnection, transmission planning and operations, protection system engineering, regulatory compliance, dynamic modeling and studies, data center modeling, etc.

  #trust

- ***Elevating our industry partners*** including large utilities, system operators, renewables developers, asset owner/operators, regulators, nonprofits, trade organizations, national laboratories, research institutes, and more to tackle complex challenges facing the electricity sector

  #impact

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Disclaimers

- These views reflect the insights of Elevate Energy Consulting and do not necessarily reflect the views of Elevate's industry partners and clients.
- These views reflect learnings from working on multiple projects and all results have been genericized and anonymized to ensure confidentiality.
- These views are solely for informational purposes, discussion, and *elevating* industry understanding of practical and pragmatic issues.

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Slido Responses from Last Meeting

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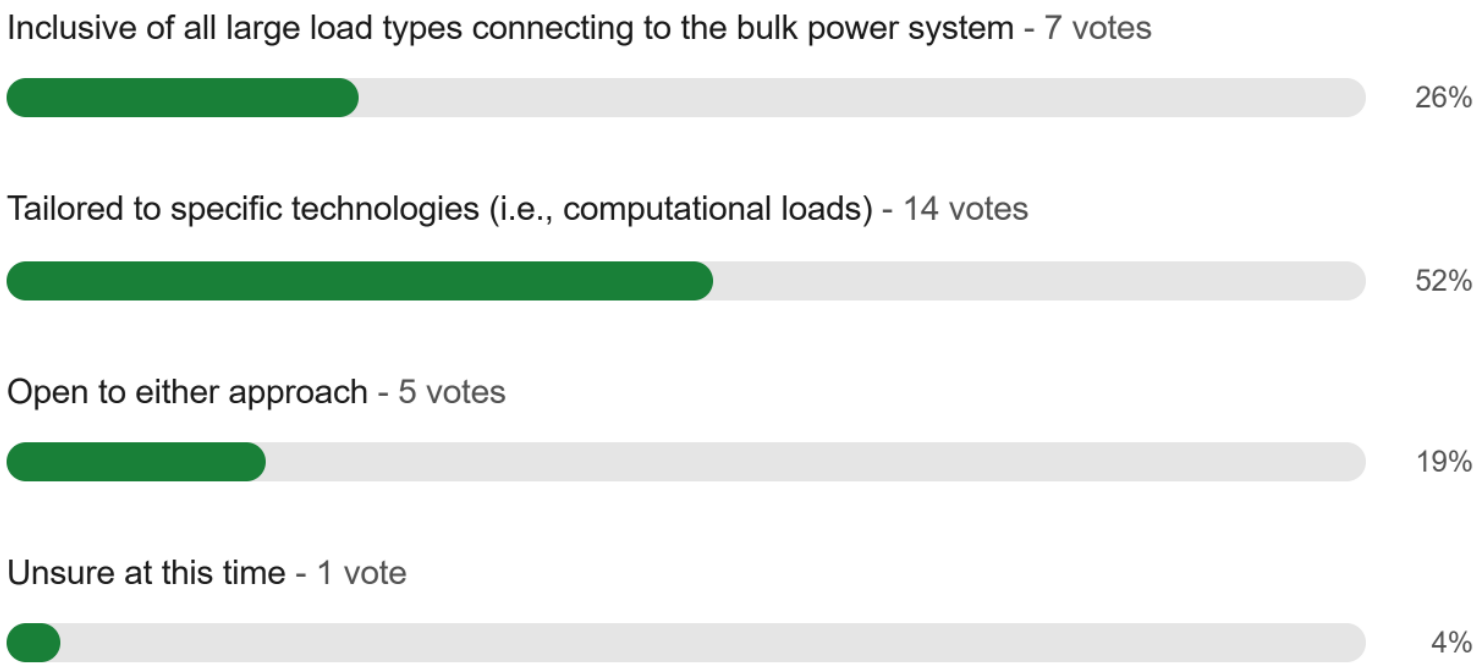
Would you prefer to see large load interconnection requirements inclusive of all large load types above a size threshold or should they be tailored to specific technologies (i.e., computational loads)?

Multiple Choice Poll | 27 votes | 27 participants



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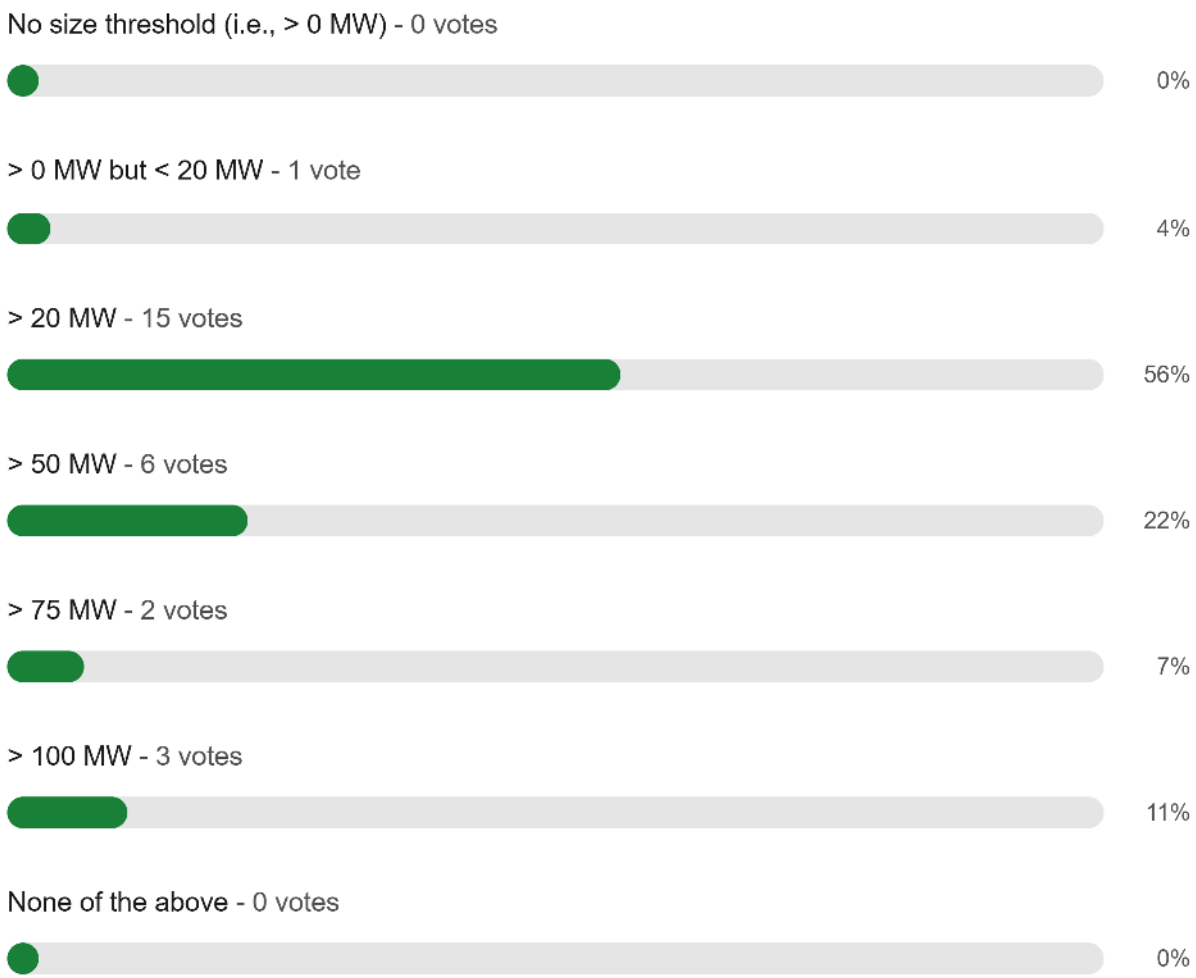
slido

What size threshold (MW) do you believe suitable for establishing large load requirements for loads connecting to the bulk power system?

Multiple Choice Poll | 27 votes | 27 participants



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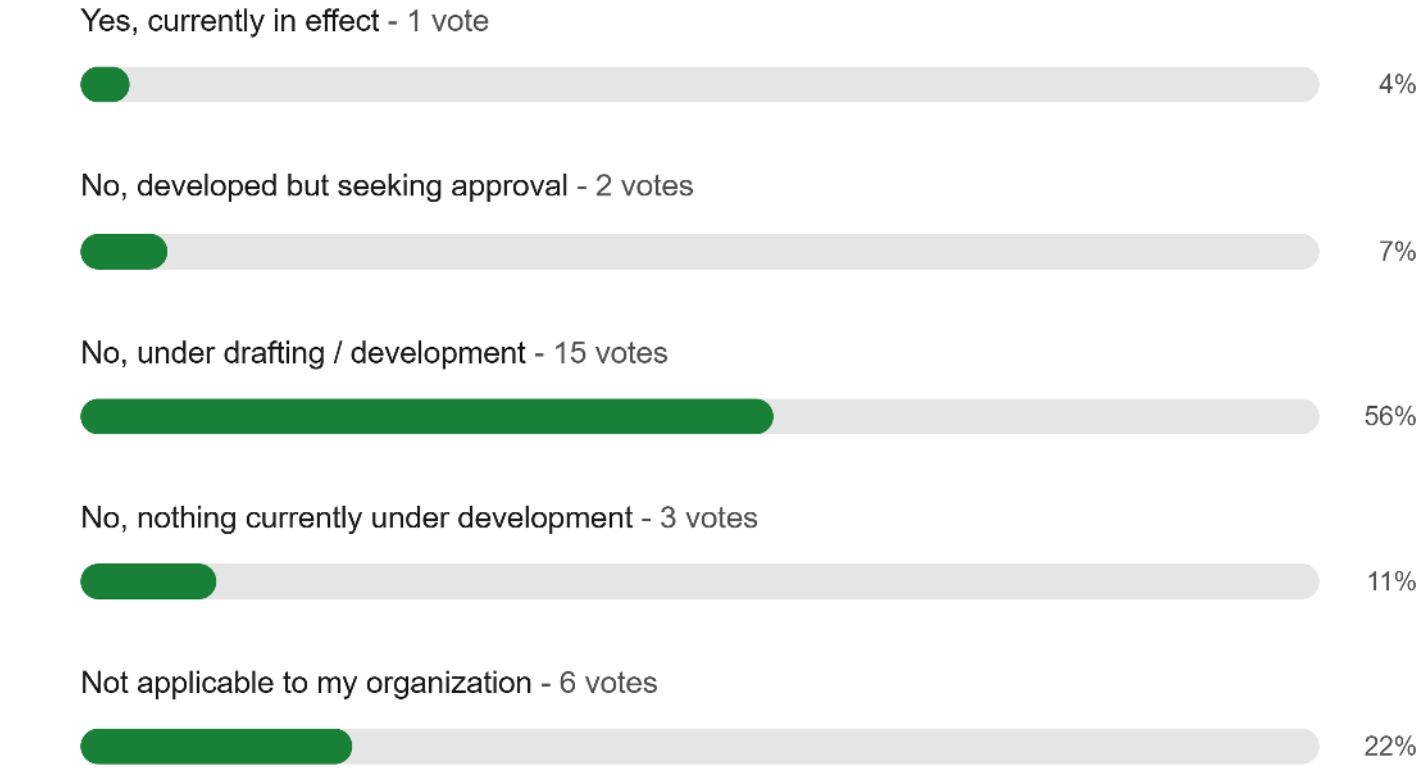
Does your organization currently have interconnection requirements in place for large loads connecting to the transmission system (bulk power system)

Multiple Choice Poll | 27 votes | 27 participants



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Slido Q&A and Polls

- Join Link: https://app.sli.do/event/fbHTk2Z44f4FzCNqqcYVbK
- www.slido.com
- Join Code: 1708151

NERC Alerts on Large Loads

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

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,

[1] "White Paper: Characteristics and Risks of Emerging Large Loads," NERC, Jul. 2025. Available: https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Whitepaper%20Characteristics%20and%20Risks%20of%20Emerging%20Large%20Loads.pdf

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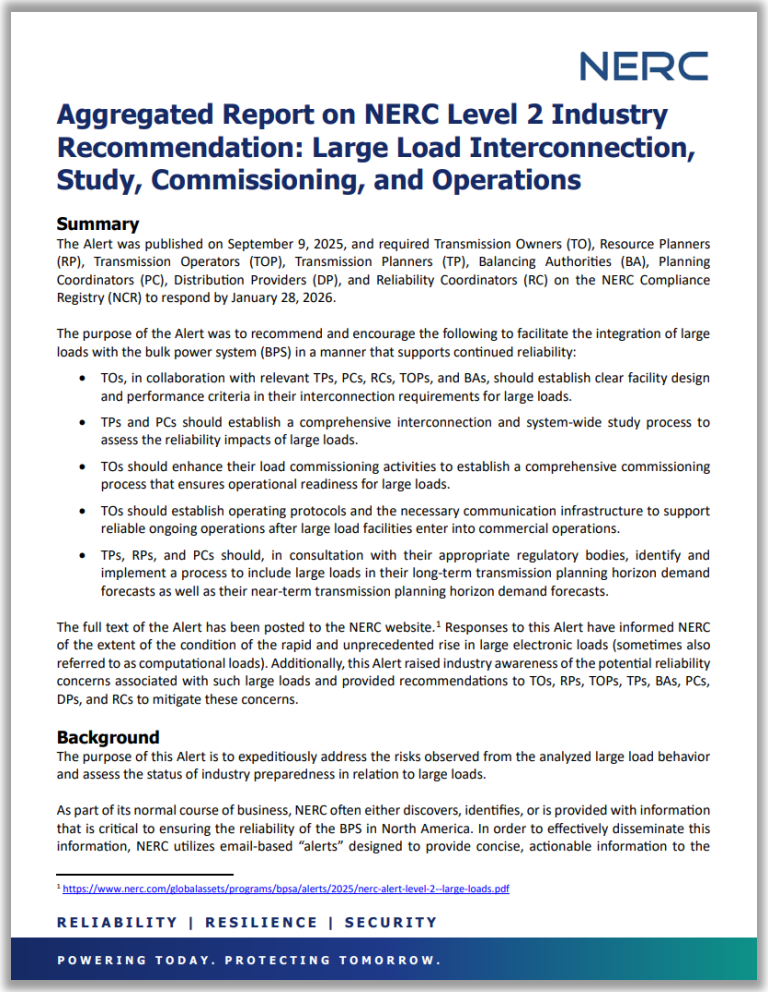
Source: NERC



NERC

Aggregated Report on NERC Level 2 Industry Recommendation: Large Load Interconnection, Study, Commissioning, and Operations

Summary

The Alert was published on September 9, 2025, and required Transmission Owners (TO), Resource Planners (RP), Transmission Operators (TOP), Transmission Planners (TP), Balancing Authorities (BA), Planning Coordinators (PC), Distribution Providers (DP), and Reliability Coordinators (RC) on the NERC Compliance Registry (NCR) to respond by January 28, 2026.

The purpose of the Alert was to recommend and encourage the following to facilitate the integration of large loads with the bulk power system (BPS) in a manner that supports continued reliability:

- TOs, in collaboration with relevant TPs, PCs, RCs, TOPs, and BAs, should establish clear facility design and performance criteria in their interconnection requirements for large loads.
- TPs and PCs should establish a comprehensive interconnection and system-wide study process to assess the reliability impacts of large loads.
- TOs should enhance their load commissioning activities to establish a comprehensive commissioning process that ensures operational readiness for large loads.
- TOs should establish operating protocols and the necessary communication infrastructure to support reliable ongoing operations after large load facilities enter into commercial operations.
- TPs, RPs, and PCs should, in consultation with their appropriate regulatory bodies, identify and implement a process to include large loads in their long-term transmission planning horizon demand forecasts as well as their near-term transmission planning horizon demand forecasts.

The full text of the Alert has been posted to the NERC website.[1] Responses to this Alert have informed NERC of the extent of the condition of the rapid and unprecedented rise in large electronic loads (sometimes also referred to as computational loads). Additionally, this Alert raised industry awareness of the potential reliability concerns associated with such large loads and provided recommendations to TOs, RPs, TOPs, TPs, BAs, PCs, DPs, and RCs to mitigate these concerns.

Background

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

As part of its normal course of business, NERC often either discovers, identifies, or is provided with information that is critical to ensuring the reliability of the BPS in North America. In order to effectively disseminate this information, NERC utilizes email-based "alerts" designed to provide concise, actionable information to the

[1] https://www.nerc.com/globalassets/programs/bpsa/alerts/2025/nerc-alert-level-2--large-loads.pdf

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Source: NERC

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 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

[1] NERC is currently working to register a "Computational Load Entity" for these loads. Currently, this would include loads that are 20 MW and greater, connected at 60kV, and contain more than 1 MW of IT Load. More information is available on NERC's Rules of Procedure webpage.
[2] Colocation with generation is one significant way computational load is interacting and using the BPS.
[3] See *Aggregated Report on NERC Level 2 Industry Recommendation: Large Load Interconnection, Study, Commissioning, and Operations* to see the results of the previous Level 2 Alert.
[4] As indicated in the public level 2 alert report, entities that do not have and do not expect to integrate computational loads within two years may not find it useful to implement these Essential Actions. These Essential Actions are for those entities that have or could expect to have computational loads or that may include these loads in the next two years. This includes entities that do not have computational load in their territory but could feasibly receive a request for one. Entities should implement these Essential Actions prior to receiving a computational load interconnection request.
[5] More information is available on NERC's Rules of Procedure webpage.
[6] More information is available on the Project 2026-02 webpage.

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Source: NERC

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Applicable to **current Registered Entities*

NERC Level 3 Alert: Computational Loads

- **Essential Action 1:** TPs and PCs develop a detailed list of modeling data, settings, and parameters needed from computational loads and distribute this to TOs in their footprint. TOs reflect this in their facility interconnection requirements. Use the PERC1 model or a model with equivalent or better capabilities, at minimum
- **Essential Action 2:** TPs and PCs study their system with additional considerations for computational loads – SOLs, instabilities, aggregate loss risks
- **Essential Action 3:** PCs revise "qualified change" definition that triggers a review of local area protection, stability limits, and other reliability studies to account for computational load.
- **Essential Action 4:** TOs establish commissioning process for computational loads including verifications, notifications, testing, processes and coordination, checklists, etc.
- **Essential Action 5:** TPs and PCs study and implement corrective actions with TOs to ensure no non-consequential loss of firm load for computational load from normally cleared non-bus faults.
- **Essential Action 6:** TOs install and utilize digital recording devices (continuous and triggered) to capture and share computational load facility performance during disturbances.
- **Essential Action 7:** TOPs, RCs, and BAs establish Interpersonal Communications with computational loads to improve situational awareness and joint operating procedures during planned and emergency conditions; issue instructions, orders, or similar information to computational load entities through voice, SCADA, or other comms platforms.

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SDT Alignment with L3 Essential Actions

Project 2026-02 Page

Data Sharing	***Focus: Type of data, clear and transparent data specs, etc.*** • CLE provide data to TOs, TPs, PCs, TOPs, BAs, RCs for entities to perform required reliability functions.
Interconnection Process & Req's	***Focus: Interconnection process, coordination, and requirements*** • TOs have interconnection requirements for CLs • CLEs coordinate with TO on requirements and studies • TOs have procedures to coordinate with TPs, PCs, TOPs, RCs, and BAs on req's
Modeling and Studies	***Focus: Studies for CLs and Requesting Data from CLEs for Studies*** • TPs/PCs have procedures for performing interconnection studies for CLs • Define Qualified Change for CLs • Appropriate modeling in studies for CLs (steady-state, dynamics, short-circuit, EMT)
Protection and Monitoring	***Focus: Coordinate settings and have high-resolution monitoring*** • CLEs, TOs, DPs communicate and coordinate protection settings and coordination • TOs have procedures to confirm high-resolution monitoring and recording for CLs; procedures for obtaining such data for event analysis
Commissioning	***Focus: Process and coordination of commissioning activities*** • TOs have procedures for commissioning CLs • Coordinating with TPs, PCs, TOPs, RCs, and BAs on commissioning needs • Procedures to obtain model, data, and info updates due to changes during commissioning
Operations Comms & Response	***Focus: Flexibility in preferred interpersonal communications*** • CLs have interpersonal communications with TOPs and BAs • Coordination for loss of comms between entities • CLs respond to Operating Instruction from TOPs, BAs, and RCs, with exceptions

CL: *Computational Load*
CLE: *Computational Load Entity*

**Shared in public SDT meeting. Subject to change based on SDT discussions and activities. Consult SDT for specific details.*

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NERC Computational Load Registration + Standards

Computational Load: Load comprised of electric power demand from information technology equipment, such as servers, storage, and networking hardware.

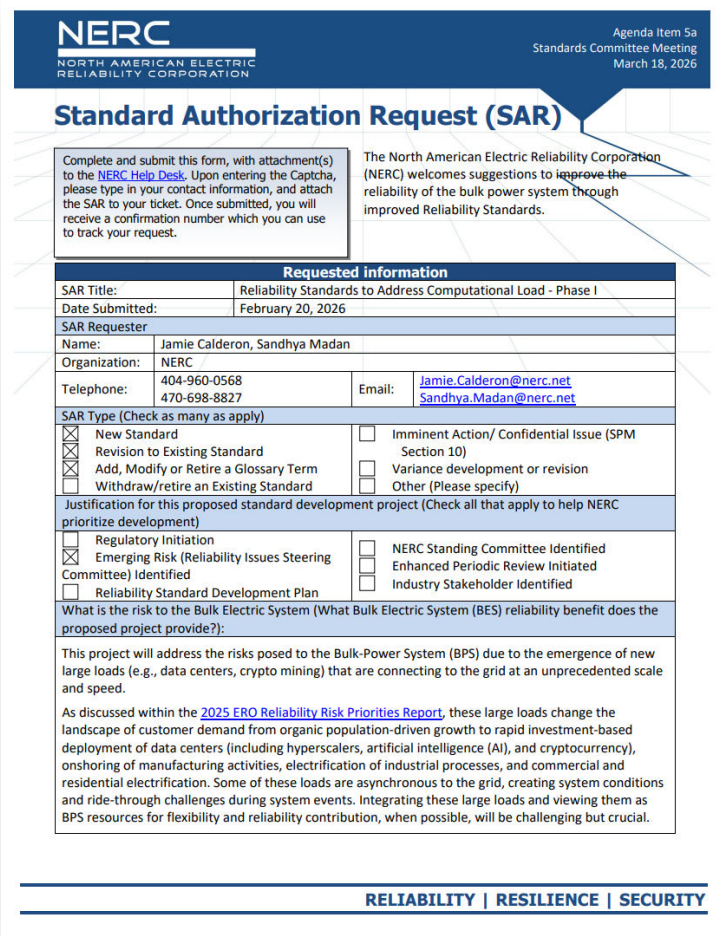
Computational Load Entity: the end-user or the entity that hosts end-users that receives electric power for Computational Load."

Must be registered with NERC if:

1) contributes to an aggregate connected Load capability **>= 20 MW**, and
2) at a single point of interconnection to the BPS at a voltage **>= 60 kV**, and
3) hosts **>= 1 MW of Computational Load.**

Result: if a 20 MW building has at least 1 MW of computational load, would be NERC Registered.

NERC's proposed definitions & registration criteria for Computational Loads



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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Agenda Item 5a
Standards Committee Meeting
March 18, 2026

Standard Authorization Request (SAR)

Complete and submit this form, with attachment(s) to the NERC Help Desk. Upon entering the Captcha, please type in your contact information, and attach the SAR to your ticket. Once submitted, you will receive a confirmation number which you can use to track your request.

The North American Electric Reliability Corporation (NERC) welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards.

Requested information			
SAR Title:	Reliability Standards to Address Computational Load - Phase I		
Date Submitted:	February 20, 2026		
SAR Requester			
Name:	Jamie Calderon, Sandhya Madan		
Organization:	NERC		
Telephone:	404-960-0568 470-698-8827	Email:	Jamie.Calderon@nerc.net Sandhya.Madan@nerc.net

SAR Type (Check as many as apply)

- [x] New Standard
- [x] Revision to Existing Standard
- [x] Add, Modify or Retire a Glossary Term
- [ ] Withdraw/retire an Existing Standard
- [ ] Imminent Action/ Confidential Issue (SPM Section 10)
- [ ] Variance development or revision
- [ ] Other (Please specify)

Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)

- [ ] Regulatory Initiation
- [x] Emerging Risk (Reliability Issues Steering Committee) Identified
- [ ] Reliability Standard Development Plan
- [ ] NERC Standing Committee Identified
- [ ] Enhanced Periodic Review Initiated
- [ ] Industry Stakeholder Identified

What is the risk to the Bulk Electric System (What Bulk Electric System (BES) reliability benefit does the proposed project provide?):

This project will address the risks posed to the Bulk-Power System (BPS) due to the emergence of new large loads (e.g., data centers, crypto mining) that are connecting to the grid at an unprecedented scale and speed.

As discussed within the 2025 ERO Reliability Risk Priorities Report, these large loads change the landscape of customer demand from organic population-driven growth to rapid investment-based deployment of data centers (including hyperscalers, artificial intelligence (AI), and cryptocurrency), onshoring of manufacturing activities, electrification of industrial processes, and commercial and residential electrification. Some of these loads are asynchronous to the grid, creating system conditions and ride-through challenges during system events. Integrating these large loads and viewing them as BPS resources for flexibility and reliability contribution, when possible, will be challenging but crucial.

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SAR for NERC Standard(s) for Computational Loads

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Template Large Load Interconnection Requirements

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U.S. Large Load Landscape Examples

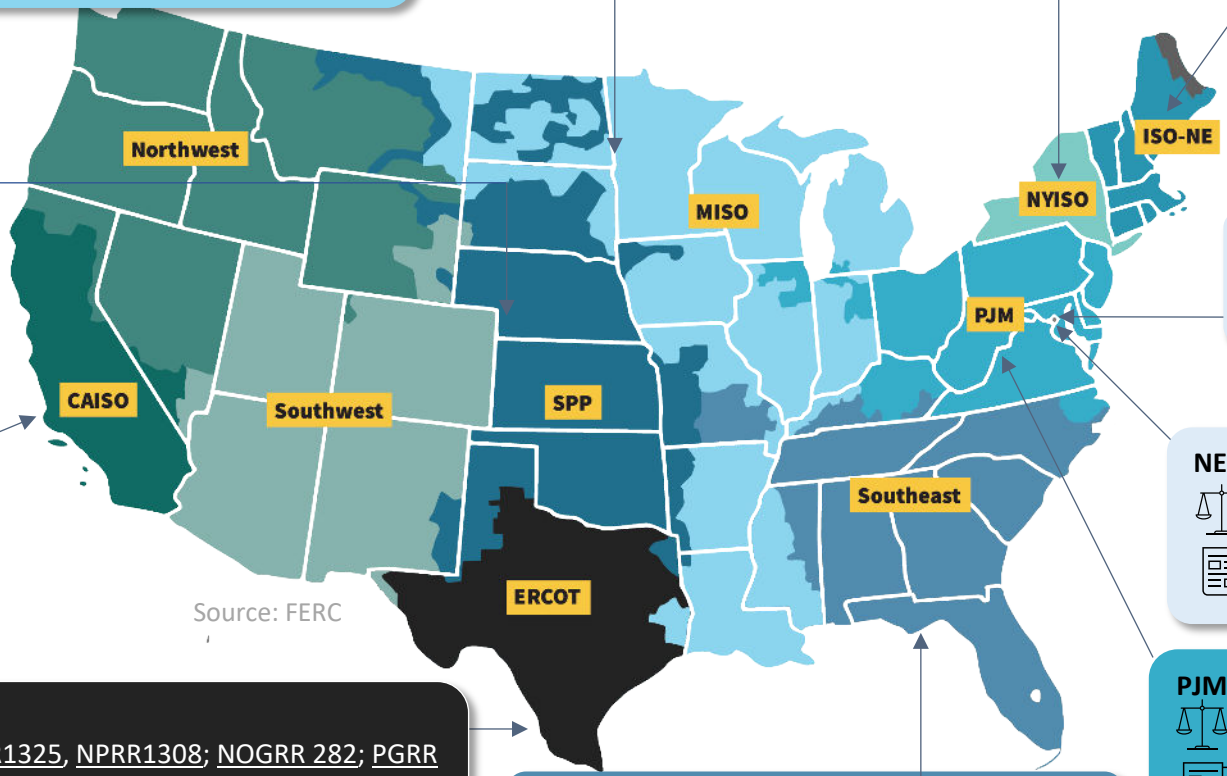
MISO
Requirements under development
LL Working Group; Zero-injection GIA; LL Interconnection Reliability Req; LL Additions Website

NYISO
PSEG LL Perform. Req.
LL Interconnection Considerations; NYSRC's LL Working Group

ISO-NE
None requirements presently
Planning for Large Loads

Non-profits
IEEE Data Center Grid Readiness Efforts; ESIG LL Disturbance Events

SPP
Ride-through Req.
High-impact LL Integration (1,2); LL Presentation; LL design Presentation;



Source: FERC

FERC
FERC ANOPR Docket No. RM26-4-000)

National entities

CAISO
Requirements under development
LL Initiative Tech. Req. (Present., Webinar, Straw.); LL Considerations (Issue Paper, Present, Webinar)

NERC
NERC Alert
LLTF White Paper; LL Action Plan; LL Tech. Conference; Crypto Incident Review

ERCOT
PGRR145, NPRR1325, NPRR1308; NOGRR 282; PGRR 144; LL Power Variation Req.; Planning Guide; PGRR115; NPRR1234
LL 'Batch Study' process (Workshop #2, #3)

Southeast
Southern Company LL Tech Req.; Southern Company LL Modeling Req.

PJM
Dominion LL Interconnect. Req. (Attach. 8)
Expedited Interconnection Track (Present, FERC Filing): Interconnection Board Plan (Press Release, Letter)

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Jump to Template Document

Group Discussion

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Discussion Topics

- Technology-specific requirements
- Prioritizing risks and concerns (i.e., requirements to cover)
- Review latest working draft template requirements
- Technical discussion on requirements template
- Sharing industry efforts and activities
- Open Q&A and discussion

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Slido Responses

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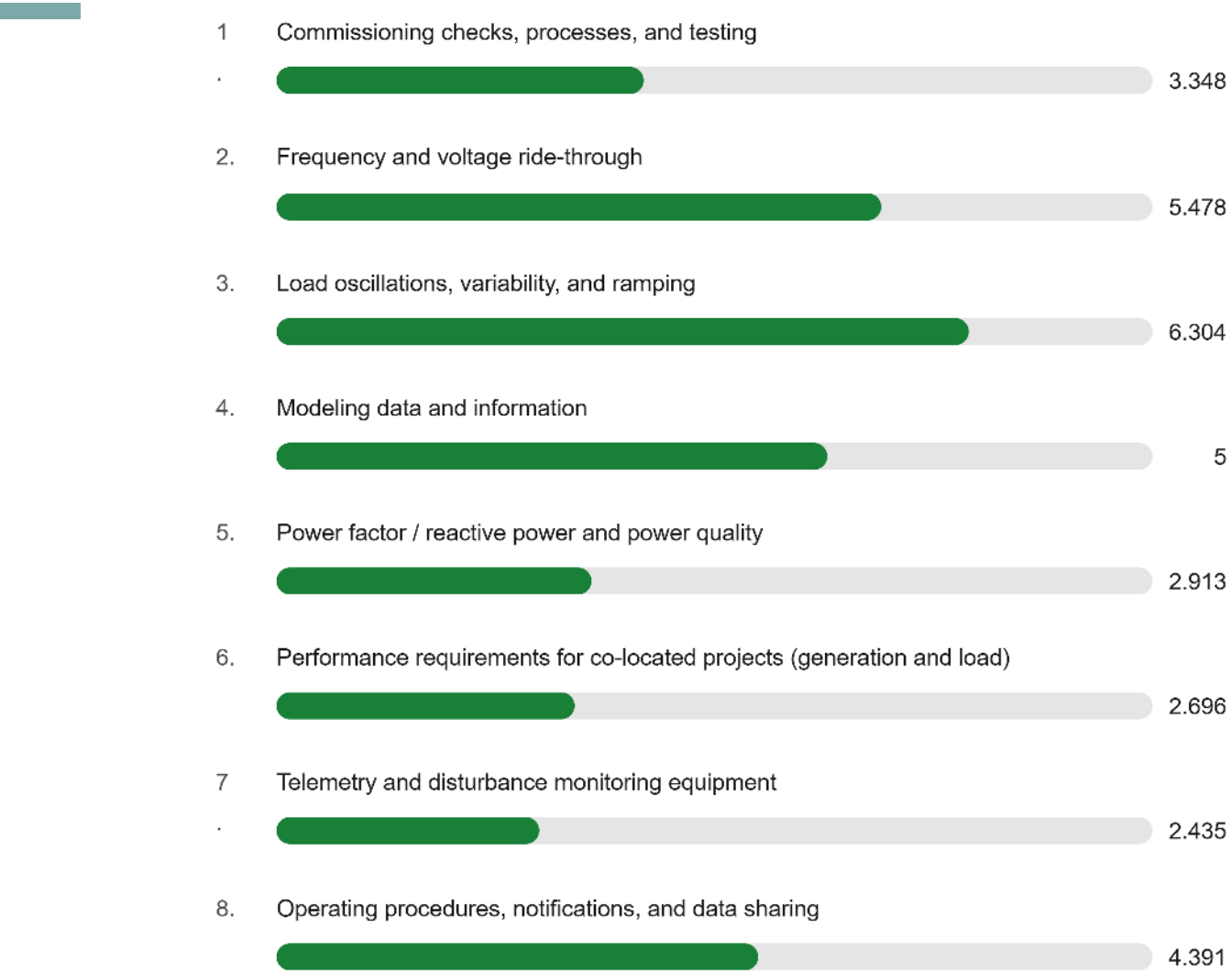
Please rank the following risks and concerns that should be covered in the template large load interconnection requirements.

Ranking Poll | 23 votes | 23 participants



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