

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

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.

inform potential future standards revisions developed in coordination with NERC's Large Loads Working Group of the Reliability and Security Technical Committee.

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Status:	Acknowledgement Required by Midnight Eastern on May 11, 2026 Reporting Required by Midnight Eastern on August 3, 2026
	PUBLIC: No Restrictions More on handling >>
Instructions:	This Level 3 NERC Alert provides specific Essential Actions that NERC registered entities should consider in response to a particular issue. Pursuant to Rule 810 of NERC's Rules of Procedure,⁷ NERC registered entities shall (1) acknowledge receipt of this advisory within the NERC Alert System, and (2) report to NERC on the status of their activities in relation to this Essential Action (as provided below). For United States entities, NERC will aggregate the responses and provide an anonymized report to Federal Energy Regulatory Commission (FERC) as required under Rule 810. This Level 3 NERC Alert is not the same as a Reliability Standard, and it does not create a mandatory obligation to take the Essential Actions. Your organization will not be subject to penalties for failure to implement the Essential Actions. Issuance of this Essential Action, however, does not alter the requirements of any approved Reliability Standard or excuse the failure to follow the practices discussed in the Essential Action if such failure constitutes a violation of a Reliability Standard. Registered entities must continue to comply with applicable Reliability Standards.
Distribution:	Initial Distribution: Transmission Planner (TP), Planning Coordinator (PC), Transmission Owner (TO), Balancing Authority (BA), Reliability Coordinator (RC), and Transmission Operator (TOP) Who else will get this alert? >>
Primary Interest Groups:	Transmission Planning, Generation Engineering, Generation Operations, System Operators, System Operators – System Protection, System Operators – Transmission Engineering

⁷ <https://www.nerc.com/AboutNERC/Pages/Rules-of-Procedure.aspx>

Essential Action:

Essential Actions are specific actions that NERC has determined to be essential for certain segments of owners, operators, or users of the BPS to undertake to ensure the Reliable Operation of the BPS. Pursuant to Rule 810 of NERC's Rules of Procedure (ROP),⁸ NERC registered entities shall (1) acknowledge receipt of these Essential Actions within the NERC Alert System, and (2) report to NERC on the status of their activities in relation to these Essential Actions (as provided below). Confidential Information shall be protected in accordance with the provisions of Section 1500 of the ROP. As emphasized in Section 810, for example, NERC's report to FERC regarding actions taken in response to this Alert will include "appropriate protection for Confidential Information or Critical Energy Infrastructure Information."⁹

Similarly, any public report with findings from this Alert will ensure appropriate protections under Section 1500 of the ROP.

Essential Action #1

TPs and PCs should develop a detailed list of modeling data, settings, and parameters needed from computational loads and distribute this to TOs in their footprint. TOs should reflect this in their facility interconnection requirements.¹⁰ TPs and PCs should use the *PERC1* (Power Electronic Reconnecting and Ceasing)¹¹ model, or a model with equivalent or better capabilities, at minimum, as a base for these requirements.¹² Power electronic drives supplying cooling loads should also be represented with an appropriate model. Additionally, TPs and PCs should do the following:

1. Model the computational load records separate from other industrial loads. Model the computational load facility's Information Technology (IT) load separate from the non-IT load (see item 2.c. below).
2. Collect the following data from the computational load entity:¹³
 - a. **Electrical Size and Power Factor** – Expected MW for minimum and maximum consumption as well as expected power factor, on a seasonal basis. If the computational load facility is expected to grow, include forecasted values of the buildout schedule for future-year studies.

⁸ See [NERC Rules of Procedure](#).

⁹ Section 810(5) of the ROP.

¹⁰ Some computational load entities seek to interconnect at pre-existing generation sites. TOs should reflect their appropriate interconnection requirements for computational loads for instances where these are directly connecting to the BPS as well as through a Generator Owner's Facility.

¹¹ More information on the PERC1 model can be found here: [Load Characteristic Model: PERC1](#)

¹² For more modeling information beyond this action, see NERC's [Dynamic Modeling Recommendations](#). The *PERC1* model covers a significant portion of the expected positive sequence behaviors expected from computational loads. A baseline set of requirements means that any successor model, more detailed model (e.g., EMT), or additional TP or PC specific requirements can be added on top of the data or information necessary to populate the *PERC1* model.

¹³ Alternatively, the TP or PC can collect this through a different entity, potentially even a Registered Entity.

- b. **Dynamic Characteristics** – Collect the parameters for the dynamic representation of the computational and cooling loads response as well as controller or device actions¹⁴ expected to operate during simulated Disturbances.¹⁵ Collect information or model parameters that affect the dynamic performance of the load facility including uninterruptable power supply (UPS) settings and configurations.
- c. **Composition** – Percentage of IT load vs. non-IT load (e.g., cooling/motor load) at various loading levels.¹⁶ This percentage should be used to allocate the percentage of electronic load models (e.g., PERC1 modeled load) vs. traditional load models for this facility in simulation models.
- d. **Expected Ramp Rate** – Expected maximum ramp rate (MW/min) in down-ramp and up-ramp.
- e. **Protective Devices** – TPs and PCs should model the actions of protection and control devices within the facility by representing them at the point of common coupling with the computational load with standalone models or integrated into equipment models. These models should represent voltage and frequency parameters and relays that could isolate this load from the BPS or reduce the facility's demand. TPs and PCs should also collect the reconnecting voltage and timing for when the computational load facility would be expected to reconnect to the System. These protection models should also represent relevant relays or control hardware that could “trip” and restore the facility¹⁷ or switch to and from backup power.
- f. **On-Site Generation** – Information regarding on-site generation for when the facility is expected to transfer to on-site generation or utilize the on-site generation for Demand Response or other controlled interactions. Full generation representation should be pursued if the generation source (inclusive of Battery Energy Storage Systems) plans to be operated in parallel with the BPS.
- g. **Facility Use** – Information on what the facility will be used for (e.g., traditional compute and storage, AI training, inference, or cryptocurrency mining). This may include percentages for each use-case when the facility has multiple use-cases and may additionally

¹⁴ NERC Incident Review [Considering Simultaneous Voltage-Sensitive Load Reductions](#)

¹⁵ See definition of Disturbance in the [NERC Glossary of Terms Used in Reliability Standards](#). This can include representation of the computational load during power oscillations.

¹⁶ Sometimes referred to as the power utilization effectiveness (PUE). PUE calculates the expected ratio of the load composition supporting the IT load. When using PUE ratios, submitting entities are encouraged to also include the type of non-IT loads to ensure proper motor load representation of the load facility.

¹⁷ For example, a relay model that includes parameters for a 0.85 p.u. voltage for 30 seconds would “trip” the load model in simulation.

require a separate set of model information for 2.b to 2.f in these different end-uses.

3. Implement processes and procedures to require specific modeling information from computational load entities during interconnection and throughout the operational lifecycle of the data center, including model updates when a qualified change¹⁸ to the facility occurs.

Essential Action #2

TPs and PCs should study their system¹⁹ with additional considerations for computational loads that include at least the following:

1. Evaluate System Operating Limits or similar operating envelope limitations for additional load to connect to the area before voltage or frequency instability. This may include P-Q and P-V analysis, system strength screening, or transient domain limits.
2. Identify areas vulnerable to instabilities due to computational loads and develop appropriate mitigation measures in accordance with established planning criteria.
3. Identify credible Contingencies²⁰ where the aggregate loss or reduction (including customer-initiated load reductions) of computational loads are expected to cause planning criteria violations and update Contingency files accordingly.²¹ The amount of load loss involved with these Contingencies should also be communicated to BAs and Resource Planners (RP).

Essential Action #3

PCs should revise their definition of “qualified change”²² that triggers a review of local area protection, stability limits, and other reliability studies to account for computational load. This definition should include language to account for the following:

1. Growth of the computational load.
2. Changes to settings, parameters, or configuration of the computational load electrical supply equipment and end-use equipment.

¹⁸ See [FAC-001-4](#) and [FAC-002-4](#).

¹⁹ This can be done through TPL-001 assessments or other planning analysis.

²⁰ The definition of Contingency is available in the *NERC Glossary of Terms used in Reliability Standards* here: https://www.nerc.com/globalassets/standards/reliability-standards/glossary_of_terms.pdf

²¹ The Contingency definition (i.e., elements affected) should be updated for all planning studies where the Contingency is credible.

²² See [FAC-001-4](#) and [FAC-002-4](#).

3. Repurposing²³ of computational load for a significantly different application.

Essential Action #4

TOs should establish a commissioning process for computational loads. Some items in the commissioning process may need to be repeated when a significant change to the facility occurs. This process should include all items required for operational readiness, including the following:

1. Processes to evaluate the “as-built” load facility model, including processes to assess model quality and for performing model verification and model validation.
2. Processes to notify owners of affected nearby systems (e.g., generation facilities) of planned load commissioning tests, in instances where the nearby system uses the same or electrically close point of common coupling to the BPS.
3. Where possible, a full facility load and no-load test of the facility and tests of applicable electrical control modes²⁴ of operation. Additionally, if possible, at least a 10% change from nominal voltage (both a 10% increase and a 10% decrease from nominal) should be performed with individual phase currents.²⁵ The full load, no-load, and voltage change testing should be performed with the facility’s computational equipment installed and operational.²⁶
4. Processes to ensure that communication and testing coordination capabilities are coordinated between the TO, TOP, BA, and RC and the computational load customer.
5. Processes to coordinate a commissioning checklist before energization between the TO and the computational load customer to review and test the functional performance of the facility. This checklist should also be coordinated with the relevant RCs, TOPs, and BAs; furthermore, surrounding GOPs should also be coordinated with where generation facilities are identified as part of item 2. The checklist should include items for the following:
 - a. Switching

²³ For example, altering the computational load facility from a data warehouse or crypto mining facility to an AI training facility.

²⁴ For example, switching from an “eco” mode on the UPS to supplying through on-site Battery Energy Storage Systems. These tests should be unique to the planned operation of the constructed facility.

²⁵ One possible method for performing this test is to change the tap setting on the step-down transformer to adjust the voltage on the low side of the transformer.

²⁶ Alternate verification of this capability and testing can exist that may satisfy the reliability need of these tests. The TO should use engineering judgement on if these tests are feasible at the time of commissioning.

- b. Design Prints
- c. Functionally test electrical supply ac/dc protection circuitry
- d. Functionally test electrical supply protection system settings
- e. Functionally test supervisory control and data acquisition (SCADA) points
- f. Functionally test remedial action schemes (RAS) if there is generation behind the meter that is not allowed to export.
- g. Functionally test electrical equipment including circuit breakers, transformers, and onsite generation (if operated in parallel with the BPS)
- h. In-service load and protection coordination checks
- 6. Verification after energization that all parties have the same or consistent data needed for the following:
 - a. SCADA systems
 - b. As-built diagrams, ratings, and information
 - c. One-lines identifying responsibilities of TO and computational loads.

Essential Action #5

TPs and PCs should study and implement corrective actions with TOs on the system side of the interconnection to ensure no non-consequential loss of firm load for computational load from normally cleared non-bus faults.^{27,28} Loss of firm load can also be Non-Consequential load loss but does not include customer-initiated load reductions.²⁹

1. TPs and PCs should acquire the necessary facility-level relaying and protection settings, files, or configurations from the computational load entities. TPs and PCs should use that information to evaluate the response of the computational loads' protection and control systems to normally cleared faults.
2. TOs should coordinate with computational load customers, where possible, on customer-side improvements to maximize the

²⁷ NERC Incident Review [Considering Simultaneous Voltage-Sensitive Load Reductions](#)

²⁸ See TPL-001 Table 1 – Steady State & Stability Performance Planning Events for the events for which non-consequential load loss should not occur. In very limited and rare instances, some normally cleared faults may interrupt firm electric service. Table 1 and the surrounding TPL-001 requirements explicitly detail the performance expectations. Available here: [TPL-001-5.1](#)

²⁹ Non-Consequential load loss is defined in the [NERC Glossary of Terms used in Reliability Standards](#). Non-Consequential load loss occurs when load is isolated from the BPS that is not part of removing the faulted equipment.

computational load facility-level “ride-through” performance up to equipment capability limitations to increase stability margins.

Essential Action #6

TOs should install and utilize dynamic fault recording devices to capture and share computational load facility electrical performance during system disturbances. This action could be accomplished through collaboration with the computational load owner to install, or grant access to existing, dynamic fault recording devices. TOs may coordinate with the RC to determine at which computational load facilities these devices should be installed. This should include digital disturbance recording and fault recording technology for continuous recording at lower resolution and trigger-based recording at higher resolution (e.g., digital fault recorders). TOs should supply the data from these devices³⁰ as required by TPs, PC, RCs, Regional Entities, or the Electric Reliability Organization (ERO) to aid in event analysis and root-cause analysis for System Disturbances.

Essential Action #7

TOPs, RCs, and BAs should establish Interpersonal Communication³¹ capabilities with computational loads to improve their situational awareness and joint operating procedures to ensure the reliable operation of the BPS during planned and emergency conditions. TOPs, RCs, and BAs should issue instructions, orders, or similar information to computational load entities through voice, SCADA, or other communication platforms to prevent BES Emergencies.³²

³⁰ These specifications on sample rate, recording retention window, and specific triggers will be custom to the facility. Some information can be found in [PRC-028](#) and [PRC-002](#). See the Additional Information section below for a Reliability Guideline that also includes information on how to specify.

³¹ See definition of this term in the [NERC Glossary of Terms used in Reliability Standards](#).

³² See Recommendation 1 and Recommendation 4 of NERC’s Level 2 Alert for recommendation for how computational load entities should respond to these instructions. That is, computational load entities should comply with the issued instruction or order.

Reporting Instructions:

Initial acknowledgement of receipt is required by **May 11, 2026**, Midnight Eastern via the NERC Alert System. Responses to the questions below are required to be submitted via the NERC Alert System by **August 3, 2026**, Midnight Eastern.

A valid response in the NERC Alert System consists of the following three steps by the submitting entity:

- Acknowledgement of the Alert
- Submission of Response
- Approval of Response

The NERC Alert System contains menu options for each of the above commands that are available to authorized individuals upon login. A response will not be considered valid until all three steps have been completed.

All registered entities belonging to the TP, PC, TO, BA, RC, and TOP functional groups are required to acknowledge receipt of this Alert and respond, as applicable.

All registered entities covered by this Essential Action are required to provide an approved response as defined above to the following questions:

Questions

All Entities answer the following Questions:

1. Select the option to describe the workload required to implement Essential Action 1:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 1 is not applicable to my entity's functional group(s)
2. Select the option to describe the workload required to implement Essential Action 2:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 2 is not applicable to my entity's functional group(s)

3. Select the option to describe the workload required to implement Essential Action 3:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 3 is not applicable to my entity's functional group(s)
4. Select the option to describe the workload required to implement Essential Action 4:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 4 is not applicable to my entity's functional group(s)
5. Select the option to describe the workload required to implement Essential Action 5:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 5 is not applicable to my entity's functional group(s)
6. Select the option to describe the workload required to implement Essential Action 6:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 6 is not applicable to my entity's functional group(s)
7. Select the option to describe the workload required to implement Essential Action 7:
 - A. Low effort to implement changes
 - B. Significant effort to implement changes
 - C. Cumbersome workload and effort to implement changes
 - D. Essential Action 7 is not applicable to my entity's functional group(s)
8. Select the option to describe the level of external action required to implement the Essential Actions:

- A. Requires coordination with an external commercial entity
- B. Requires action by an external regulatory agency
- C. Requires no external coordination to implement

9. Please include additional information that provides better understanding for your responses in the text field.

TP and PC only

10. Do your current modeling requirements include the actions in Essential Action 1?

- A. Yes
- B. No, however, we plan to modify our requirements to include
- C. No, and we have no plans to modify our requirements

11. If you answered “No, however, we plan to modify our requirements to include” when do you plan to implement changes to your modeling requirements to align with Essential Action 1?

- A. 2026
- B. 2027
- C. 2028
- D. Beyond 2028

12. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.

13. Does your existing annual study process include the actions in Essential Action 2?

- A. Yes
- B. No, however, we plan to modify our requirements to include
- C. No, and we have no plans to modify our requirements

14. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 2?

- A. 2026
- B. 2027
- C. 2028
- D. Beyond 2028

15. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.
16. Do your current studies evaluate and provide mitigations for the items discussed in Essential Action 5?
- A. Yes
 - B. No, however, we plan to modify our requirements to include
 - C. No, and we have no plans to modify our requirements
17. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 5?
- A. 2026
 - B. 2027
 - C. 2028
 - D. Beyond 2028
18. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.

PC only

19. Does your definition of “qualified change” include the items discussed in Essential Action 3?
- A. Yes
 - B. No, however, we plan to modify our requirements to include
 - C. No, and we have no plans to modify our requirements
20. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 3?
- A. 2026
 - B. 2027
 - C. 2028
 - D. Beyond 2028
21. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.

TO Only

22. Do your existing commissioning practices include the items discussed in Essential Action 4?
- A. Yes
 - B. No, however, we plan to modify our requirements to include
 - C. No, and we have no plans to modify our requirements
23. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 4?
- A. 2026
 - B. 2027
 - C. 2028
 - D. Beyond 2028
24. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.
25. Do your existing protection and coordination practices include the items discussed in Essential Action 5?
- A. Yes
 - B. No, however, we plan to modify our requirements to include
 - C. No, and we have no plans to modify our requirements
26. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 5?
- A. 2026
 - B. 2027
 - C. 2028
 - D. Beyond 2028
27. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.
28. Do your existing dynamic fault recording devices or access to such devices include the items discussed in Essential Action 6?
- A. Yes
 - B. No, however, we plan to modify our requirements to include

C. No, and we have no plans to modify our requirements

29. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 6?

A. 2026

B. 2027

C. 2028

D. Beyond 2028

30. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.

TOPs, RCs, BAs Only

31. Do your current operating practices include the Interpersonal Communication practices discussed in Essential Action 7?

A. Yes

B. No, however, we plan to modify our requirements to include

C. No, and we have no plans to modify our requirements

32. If you answered “No, however, we plan to modify our requirements to include,” when do you plan to implement changes to your modeling requirements to align with Essential Action 7?

A. 2026

B. 2027

C. 2028

D. Beyond 2028

33. If you answered “No, and we have no plans to modify our requirements,” please explain in the text field.

Additional Information:

The rapid increase of computational loads continues to evolve. NERC has identified other risks, gaps, and materials that would be useful for recipients of this alert to follow. The following links provide additional information and best practices:

- [Large Load Action Plan](#) – Outlines NERC’s plan for further actions associated with computational loads, which also contains information about the draft registry criteria and standards project referenced in the alert.
- [Characteristics and Risks of Emerging Large Loads](#) – Highlights the risks and characteristics with large loads, including computational loads.
- [Assessment of Gaps in Existing Practices, Requirements and Reliability Standards for Emerging Large Loads](#) – Highlights the gaps in utility practices, NERC Reliability Standards, and other industry work related to large loads, including computational loads.
- [Reliability Guideline: Risk Mitigation for Emerging Large Loads](#) – Highlights the best practices to enhance entity practices to resolve gaps for large loads, including computational loads.
- [Data Center Information Collection Questionnaire](#) – Helps TPs model data centers using key information gathered from large loads for the purposes of data center modeling in transmission studies.

Contact:

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