NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

January 9, 2025

Ms. Jennifer Flandermeyer, Chair
NERC Member Representatives Committee

Dear Jennifer:

I invite the Member Representatives Committee (MRC) to provide input on a matter of particular interest to the NERC Board of Trustees (Board) in preparation for its February 13, 2025, meeting in Miami, FL. In addition, input is requested on any items on the preliminary agendas for the February Board, Board Committees, Technical Session, and MRC meetings. The preliminary agenda topics will be reviewed during the January 16, 2025, MRC Informational Session and are included in the posted agenda package (see Item 2).

Understanding and Addressing Risks from Integrating Large Loads

As the electric industry landscape continues to evolve, increasing amounts of large commercial and industrial loads are connecting rapidly to the bulk power system. Emerging large loads such as data centers (including crypto and AI), hydrogen fuel plants, etc. present unique challenges to forecasting and planning for increased demand. Serving this inverter-based demand is vital for North America's economy and it is critical that the demand is integrated in a way that supports the reliable operation of the bulk power system, rather than reducing the grid's performance. In doing so, more demand can be served.

For instance, assuming that sufficient energy production and transmission is available or can be built in time to serve these large loads, recent off-nominal occurrences in both Texas and Virginia have illustrated the current challenge to integrate inverter-based large loads. After the grid experienced a fault from equipment or weather, large amounts of demand left the system (engaging their uninterruptible power supply plans). This reduction of demand exacerbated the impacts of this system fault on the bulk power system, creating imbalances in energy, frequency, and voltage.

It is critical for us to better understand large loads and the potential reliability impacts of the increasing integration and demand. Last year, NERC's Reliability and Security Technical Committee established a Large Loads Task Force to better understand reliability impacts; identify, validate, and prioritize risks; and identify gaps and mitigations of potential risks. On January 8, 2025, NERC published a new incident review examining the risks and challenges posed by the increasing integration of voltage-sensitive large loads, such as data centers and cryptocurrency mining facilities. During the February 12, 2025, Technical Session, we will host a panel of industry representatives focused on the integration of large loads. **As we**

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prepare for the discussion during the Technical Session and continue efforts to understand reliability implications of large load integration, the Board requests MRC feedback on the following:

1. **What risks to reliability, resilience, and security do you see with the increasing integration of large loads?**
2. **What should NERC do to address these emerging risks?**

Additional Follow-Up

We also want to provide continued transparency into various actions the Board committed to last year based on feedback from the MRC, as acknowledged in the June 2024 input letter.

- **Board Meeting Structure, Cadence and In-person Interaction** – During the Board's December 10, 2024, meeting, the Board announced a new meeting cadence that will start in 2026. The new meeting cadence is being established in response to industry feedback and concerns with the current gap between the August and February meetings. Below is a summary of the new meeting cadence which spreads out the three meetings per year more evenly across the year and will continue to provide longer breaks and opportunities for in-person engagement. We will conduct a trial period for 2026 and 2027 and make further adjustments as needed.
  - **February:** In-person at a U.S. hotel, with continuation of a reception and stakeholder dinner.
  - **June:** Alternate every other year between NERC's Washington, DC, office (Board and MRC only in-person) and Canada (meetings in Canada would be held at a hotel, with observers welcome to attend in-person). In the years when the NERC Board and MRC does not meet in Canada, NERC will strive to hold Standing Committee meetings in Canada (e.g., RISC/RSTC).
  - **October:** Alternate every other year between in-person at a U.S. hotel (when June meetings are in Washington, DC) and at a NERC's Washington, DC, office with Board and MRC only in-person (when June meetings are in Canada).
- **Compliance Monitoring and Enforcement Program (CMEP) and Standards Processes** – We remain committed to finding ways to build agility into our regulatory oversight mandate. Below are two recent key activities that support this area:
  - On December 19, 2024, FERC accepted the ERO Performance Assessment and NERC's proposed approach for improved efficiencies in enforcement activities to more effectively support reliability in a vastly changing energy landscape. This approach includes using a Potential Noncompliance abeyance period to enhance NERC standards development processes agility, streamlining the Compliance Exception process, and focusing on timely data analysis to report on trends, themes, and recommendations. The approach is intended to increase flexibility in how the CMEP process is implemented, especially in the early stages of new standards that reinforce the importance of compliance while reducing administrative burdens associated with our CMEP processes.
  - During the November 13, 2024, MRC meeting, NERC announced that it would stand up the Modernize Standard Processes and Procedures (MSPP) Task Force reporting to the Board to

review the current standards development process and make recommendations to transform and strengthen the current procedures and processes to those that will serve industry in a world that has a great deal of uncertainty and poses fast moving risks to the reliability, resilience, and security to the bulk power system. NERC has been working on the details for standing up this task force and will provide an update during the February meetings.

- **Trades Interactions** – NERC is continuing its regular engagement with the Trade Associations and exploring opportunities to make the quarterly Trade Association meetings more robust. Starting in 2025, these meetings will encourage more in-person participation, include more Trustees, and ensure a robust agenda with more time for discussion and engagement.
- **Outreach and Engagement** – Enhancing collaboration and engagement across all stakeholders is a key focus area in the recently updated ERO Enterprise Long-Term Strategy. Currently, in addition to enhancing its regular engagement with the Trade Associations, NERC is facilitating calls with each MRC Sector for informal input during the development of NERC's 2026-2028 plan, which includes specific engagement priorities and goals. NERC and the Regional Entities are also focusing on enhancing state and provincial outreach efforts, including improving coordination and harmonization of messaging. We will continue to explore opportunities to strengthen overall engagement with all stakeholders.

Written comments in response to the input requested above, the preliminary agenda topics, and on other matters that you wish to bring to the Board's attention are due by **January 29, 2025,** to Kristin Iwanechko, MRC Secretary (Kristin.Iwanechko@nerc.net). Please include a summary of your comments in your response (i.e., a bulleted list of key points) for NERC to compile into a single summary document to be provided to the Board for reference, together with the full set of comments. The formal agenda packages and presentations for the Board, Board Committee, Technical Session, and MRC meetings will be available on January 30, 2025. The Board looks forward to your input and discussion during the February 2025 meetings.

Thank You,

Kenneth W. DeFontes, Jr., Chair
NERC Board of Trustees

cc: NERC Board of Trustees
Member Representatives Committee

Edison Electric INSTITUTE

Power by Association℠

Input for the NERC Board of Trustees Provided by the Edison Electric Institute January 29, 2025

On behalf of our member companies, the Edison Electric Institute's (EEI) Reliability Executive Advisory Committee (REAC) appreciates the opportunity to provide the following input for the North American Electric Reliability Corporation's (NERC) Board of Trustees' (BoT) consideration in preparation for its upcoming meeting on February 13, 2025. Our perspectives on bulk-power system (BPS) reliability are informed by EEI's CEO Policy Committee on Reliability, Security, and Business Continuity with the support of the Reliability Technical Committee.

I. SUMMARY OF COMMENTS

- EEI supports the efforts of the Large Load Task Force (LLTF) to identify the various types of large loads, their unique characteristics, and risks.
    - LLTF activities are critical to understanding and addressing the risks of large loads to the grid.
    - Once the large load risks are correctly identified, appropriate mitigations can be developed and implemented.
    - EEI is committed to supporting the LLFT to ensure the timelines set forth in its work plan are achieved.
- EEI recommends NERC perform an assessment any time it exercises its authority under section 321 of NERC's Rules of Procedure (ROP) to identify lessons learned and opportunities for process improvements.
- Efforts to modernize the standards process must maintain stakeholder engagement.
- EEI members appreciate NERC's consideration of MRC and stakeholder feedback and efforts to enhance collaboration.

II. COMMENTS

A. Assessing and Mitigating Risks Posed by Large Loads

The rapidly increasing amounts of large loads connecting to the BPS are posing challenges to the grid because of their unique and in some cases unknown operating characteristics. A few of the challenges and risks we are seeing with large loads include:

- Voltage and frequency swings with extreme cycling;

- System stability issues with the sudden loss of a large load;
- Coordination of protection settings and backup generator schemes;
- Generator resource supply and availability;
- Adequate tools and models for planners and operators;
- Guidance or expectations on interconnection requirements for large loads including certainty of customer load data (load ramps, etc.); and
- Cyber and physical security obligations.

NERC's LLTF activities are critical to understanding and addressing the risks of large loads to the grid. Given their importance, EEI strongly supports the LLTF's work plan, pursuant to which the LLTF will first define the various types of large loads and identify the characteristics and risks they pose to the BPS and then determine the appropriate risk mitigations needed to address the issues identified. The risks posed by large loads must be clear and universally agreed upon before appropriate solutions can be developed and implemented. Collaboration with industry to identify the appropriate tools, including tools other than Reliability Standards (e.g., whitepapers and lessons learned) might provide more timely and appropriate solutions.

The LLTF has targeted the end of 2025 as the date by which it will finish its identification of the characteristics and risks of large loads and corresponding gap assessment. Its adherence to or advancement of this timeline will be critical to ensuring industry is able to quickly address risks from large loads. Given the risks associated with large loads, it would be valuable for industry to receive regular written updates on the LLTF's progress.

EEI is committed to supporting the LLFT to ensure this important work is completed in a timely manner.

B. NERC BoT ROP 321 Actions

The use of ROP 321 was never used before 2024, but now it has been used twice in less than 6 months—first, with the inverter ride-through standard and now with the cold weather standard. EEI recommends NERC perform an assessment any time ROP 321 procedures are exercised to identify lessons learned and opportunities for improving the process and sharing the findings with industry. The assessments should consider using an independent reviewer that looks holistically at the specific project in question.

The uses of ROP 321 to date revolved around standards modifications with short timelines. In its Five-year ERO Assessment that FERC accepted on December 19, 2024, the ERO Enterprise signals its intent to shift its focus toward existing and emerging high-risk areas and away from minimal-risk areas. One such way it intends to do so is through the introduction of a Potential Noncompliance abeyance period (when appropriate, as determined by NERC) after a Reliability Standard

becomes effective. We view this as a positive step forward which may potentially produce helpful future outcomes in the Reliability Standards development process. However, none of the intended benefits of this change will be immediately impactful nor prevent industry from ensuring the requirements under development are clear and technically feasible.

The cost for entities to comply with standards is significant, with industry spending millions of dollars to meet standards requirements to ensure reliability and security of the BPS; a clear understanding of these very technical standards is important. Iterative Reliability Standards revisions that might be needed because we do not get Reliability Standards modifications substantially right the first time will result in entities spending millions more to make mid-stream changes to compliance programs and infrastructure. Iterative standards development could also equate to a higher volume of Reliability Standards development projects requiring industry resources for drafting, commenting on, and voting on Reliability Standards, which may negatively impact the speed required to wholly address risk. This is the opposite of NERC's intended goal. Reliability along with customer affordability must be considered before moving forward with standards.

C. Modernizing the Standards Process

EEI supports NERC's current efforts to modernize the standards process. NERC has a unique role as a convener of industry expertise. Unilateral or hastily developed standards are contrary to the ERO Enterprise model and can have unintended negative consequences and potentially make the BPS less reliable and secure. In order to avoid such outcomes, the modernization of the standards process must prioritize stakeholder engagement to ensure that any such process changes are successful and that standards are technically feasible. EEI strongly urges NERC staff to actively collaborate with industry and the NERC Standards Committee and seek their feedback at every stage of the modernization effort. This approach will safeguard the essential principles of transparency, consensus-building, and balance—cornerstones of an effective and credible standards development process—while providing opportunities to enhance these critical elements. We look forward to engaging in this important effort to evaluate the standards process.

D. Enhanced Industry Engagement and Collaboration

EEI members appreciate NERC's consideration of MRC and stakeholder feedback regarding meeting cadence and in-person interactions, and we look forward to implementing the new meeting schedule beginning in 2026. We also appreciate NERC's efforts to enhance collaboration with the Trade Associations and improve communications with industry for a more reliable and secure grid.

EEI's REAC looks forward to continuing its long-standing collaboration with NERC to efficiently and effectively mitigate risk to the BPS.

MEMORANDUM

TO: Ken DeFontes,
Chair, NERC Board of Trustees

FROM: Roy Jones
Scott Tomashefsky
Tom Heller
Colin Hansen

DATE: January 29, 2025

The Sector 2 and 5 members of the North American Electric Reliability Corporation (NERC) Members Representatives Committee (MRC), representing State/Municipal and Transmission Dependent Utilities (SM-TDUs), appreciate the opportunity to respond to your January 9, 2025, letter to the members of the MRC in which the NERC Board of Trustees (Board) requests MRC input on the reliability implications of large load integration. Your letter specifically asks:

- What risks to reliability, resilience, and security do you see with the increasing integration of large loads?
- What should NERC do to address the emerging risks?

SM-TDUs appreciate your letter's follow-up on the issues we raised in our policy input responses last year. We look forward to continuing our collaboration with the Board to support NERC's mission of assuring the effective and efficient reduction of risk to the reliability and security of the bulk-power system.

SUMMARY OF COMMENTS

- Large loads can impact bulk power system reliability, so NERC and the industry should continue collaborating to identify reliability gaps and to address those gaps in cost effective and legally defensible ways.
- Sector 2 and 5 members are committed to participating in NERC's efforts to improve the standards drafting process in ways that maintain stakeholder participation and balloting.
- Public power community is looking forward to participating actively in the development of the 2025 ERO Risk Priorities report to ensure that the perspectives of community-owned, not-for-profit utilities is reflected in the risk report.
- We appreciate NERC's efforts to improve stakeholder engagement and look forward to continued improvements.

SM-TDU COMMENTS

NERC and the industry should continue collaborating to identify and address the bulk power system reliability gaps of large load integration.

SM-TDUs recognize that large loads can individually and collectively impact bulk power system reliability and security. NERC's recent incident review, cited in your letter, demonstrates one such impact: the potential for large amounts of voltage-sensitive load loss during normally

cleared faults. NERC's Large Load Task Force has received several presentations from industry experts and outside consultants that demonstrate additional potential impacts.

While SM-TDUs recognize these potential security and reliability impacts at a high level, the precise scope of the risks is not yet comprehensively understood. The specific risks appear to be highly dependent on the nature of the large loads being integrated: their size, their type of load (e.g., data centers, cryptomining, hydrogen electrolyzers), voltage of their interconnection, etc. NERC's Large Load Task Force—which itself is a collaborative effort among industry experts and NERC's technical staff—is currently developing a white paper to comprehensively identify the potential risks and their scope.

SM-TDUs support the ongoing work of NERC's Large Load Task Force. Of particular interest is developing best practices around factoring large loads into transmission planning, BES operations, and contingency planning. NERC should continue providing resources to that task force to carry out its work over the next year of mapping out risks, identifying reliability gaps, and ultimately making recommendations on how to address those gaps. Importantly, the work of the Large Load Task Force has been—and must continue to be—focused on impacts to the bulk power system.

Efforts to improve the standards drafting process must maintain stakeholder participation and balloting.

In November 2024, the MRC was informed of the Board's intention to establish a task force to modernize standard processes and procedures (the Modernize Standard Processes and Procedures Task Force). SM-TDUs are committed to actively engaging in that important work to improve the standard development process while still maintaining industry participation and the balloting process that have been essential to producing consensus based, technically sound, and fairly enforceable standards.

SM-TDUs recognize that NERC can improve the standards development process. We are very concerned that the Board decided to use of Rule 321 twice in a single year, when such an approach has not been used before. SM-TDUs understand the need for NERC to respond to specific FERC timelines, and on occasion even opt to exercise Rule 321. We strongly suggest, however, that the use of Rule 321 be utilized with caution. Regardless of the Rule 321 path chosen (balloting vs NOPR), stakeholder feedback must be considered and responded to; to do otherwise could result in a regulatory action that may not achieve the long-term result of reducing reliability risk. Regulatory timelines are clearly important, but technical expertise must inform the final decision. Furthermore, in responding to specific FERC timelines, rather than exercising the Rule 321 process, NERC has the option—and should feel empowered—to request additional time from FERC to complete the stakeholder balloting process when doing so is likely to produce a more optimal technical solution, providing greater long-term benefits to the grid.

We look forward to contributing positively to the Modernize Standard Processes and Procedures Task Force. As we conveyed to the Board last year, SM-TDUs have been at the forefront of proposing solutions to ensure standard drafting teams use consistent terminology and that

standards have unambiguous applicability sections; our suggestions, if implemented, would speed up standards development processes and reduce unnecessary failed ballots.

2025 ERO Risk Priorities report should reflect the perspectives of community-owned, not-for-profit utilities.

NERC's biennial ERO Risk Priorities report is an important tool for industry and policymakers to focus efforts and resources on the issues that are most important to bulk power system reliability. SM-TDUs look forward to participating actively in the development of the 2025 ERO Risk Priorities Report to ensure that the perspectives of community-owned, not-for-profit utilities are reflected in the risk report.

We appreciate NERC's efforts to improve stakeholder engagement and support continued efforts.

SM-TDUs appreciate the follow up in your letter regarding improving stakeholder engagement. The proposed board meeting structure, cadence, and opportunities for in-person interaction with the MRC that will begin in 2026 are promising, and they are an improvement over the current structure. We further appreciate the planned efforts to improve interactions with the Trade Associations and generally improving outreach with industry. SM-TDUs support those efforts to continue improving engagement with industry to improve the reliability of the bulk power system.

MEMORANDUM

TO: Ken DeFontes,
Chair, NERC Board of Trustees

FROM: Latif Nurani, Senior Regulatory Counsel, American Public Power Association
Tom Falcone, President, Large Public Power Counsel
Tom Heller, Executive Director, Transmission Access Policy Study Group

DATE: January 29, 2025

The American Public Power Association, Large Public Power Council, and Transmission Access Policy Study Group concur with the Policy Input submitted today by the State/Municipal and Transmission Dependent Utility Sectors of the Member Representatives Committee, in response to NERC Board Chair Ken DeFontes' January 9, 2025, letter requesting policy input in advance of the February 2025 NERC Board of Trustees meeting.

January 29, 2025

Cooperative Sector Input to the NERC Board of Trustees

The Cooperative Sector appreciates the opportunity to provide insights to the NERC Board of Trustees (BOT) regarding the critical issues of integration of large loads on the Bulk Electric System (BES). In addition to sharing thoughts on the preliminary agenda topics for the February 2025 meetings, and additional Board considerations.

Cooperatives are generally supportive of integrating these large loads as these loads are important to the US economy and national security. This innovation alignment enhances the US Federal Government's renewed focus on advancing Artificial Intelligence (A.I.) which is now a technology priority, as are the electric infrastructure improvements required to support these new loads.

The risks and recommendations provided are closely aligned with several of the Cooperatives **Reliability and Affordability** core strategic issues initiatives including:

- Changing energy landscape requires technology, transmission, and time beyond what is available today. It must be inclusive of all energy sources to maintain the reliable and affordable flow of power that is the cornerstone of the American economy.
- "Disorderly" retirement of existing generation is directly impacting reliability.
- Permitting challenges: The current permitting process required to build, site, and maintain electric generation and transmission infrastructure is outdated and creates a significant impediment to meeting tomorrow's energy needs.

Summary of Input

The Cooperative Sector believes the foundation of any activities undertaken by the ERO to address the impacts of large loads is grid reliability. The ERO, in conjunction with its partnership with industry stakeholders, have the capability to manage the impacts of integrating large loads. It is important to assess and identify reliability impacts including any gaps in the existing Reliability Standards for the interconnection of large loads on the Bulk Electric System (BES).

Our comments are focused on the following:

- **Risks**: Large loads may introduce reliability challenges, including system imbalances, forecasting and utilization uncertainty, voltage sensitivity and ramp variability.
- **Recommendations**: Emphasize modeling, stakeholder engagement, acceleration of Large Load Task Force (LLTF) and Load Modeling Working Group (LMWG) deliverables, and evaluation of standards development.
- **Follow-up Items**: Proposed enhancements align with the ERO Enterprise's focus areas of Energy, Security, Engagement, and Agility.
- **Future Agenda Enhancements**: Advocate for a continued focus on DER and large load integration in strategic discussions

Responses to the specific questions asked by the NERC Board

1. **What risks to reliability, resilience, and security do you see with the increasing integration of large loads?**
    - The integration of large loads, including data centers, cryptocurrency facilities, and hydrogen fuel plants, introduce complex challenges:
        - **System Imbalances**: Rapid disconnection of large loads during system faults may exacerbate energy, frequency, and voltage imbalances absent system protection and operational coordination, as demonstrated in recent events in Texas and Virginia.
        - **Forecasting Uncertainty**: The transient nature and non-linear growth patterns of these loads complicate demand forecasting and resource planning.
        - **Utilization Uncertainty:** Likewise, the transient nature of these loads can create uncertainties respecting utilization of selected locations and recovery of utility investments especially once the necessary electric infrastructure is in place, and energy and capacity have been developed or procured.
        - **Voltage Sensitivity**: Increased sensitivity to grid disturbances due to inverter-based connections amplifies reliability risks.
        - **Ramp Variability**: The operational issues associated with the need for fast ramping capability of dispatchable generation.

2. **What should NERC do to address these emerging risks?**
    - **Enhanced Modeling:** Develop detailed models and guidelines, like IEEE 2800 standards for inverter-based resources, to evaluate the impact of large loads on grid stability. Modeling data that is necessary to complete improved facility interconnection studies including steady-state analysis, short circuit analysis, dynamic analysis, and electromagnetic transient (EMT/PSCAD) analysis could include:
        - Ride-through requirements (voltage, fault, and frequency).
        - Power factor performance verification if applicable.
        - Assess sub-synchronous resonance performance.
        - Test controller interactions, particularly for closely located data centers or generation interconnections (assuming EMT models for other facilities exist).
    - **Proactive Stakeholder Engagement**: Foster partnerships with large load operators to ensure adherence to reliability requirements and encourage the provision of certified models during interconnection planning.
    - **Incident Analysis Frameworks**: Expand analysis protocols for off-nominal events to include mitigation strategies specific to inverter-based load behavior.
    - **Resource Adequacy Evaluation**: Support methods to accurately account for large loads and co-located loads in a manner that not only ensures reliability but also does not result in over- or under-calculating the resource adequacy needs and contributions of those loads such that other loads and customers are not left adversely impacted.
    - **Acceleration of Large Loads Task Force (LLTF) deliverables** – The LLTF is a group of experts that is tasked with identifying the unique characteristics and risks associated with emerging large loads, and then validating and prioritizing these risks. Cooperatives

support the planned deliverables of the LLTF but with the urgency of developing solutions to address these risks.
Suggest that the proposed Q4- 2025 completion for the **White Paper: Assessment of gaps in existing practices, requirements and Reliability Standards for Emerging Large Loads** be accelerated to Q3 2025**.** Suggest that the proposed Q2 – 2026 completion for the **Reliability Guideline: Risk Mitigation for Emerging Large Loads** be accelerated to Q4-2025**.** The collaborative stakeholder efforts of the LLTF can help identify areas where existing standards can be enhanced if needed for large loads. In addition, dependent on the results of the LLTF efforts, it may provide an opportunity to take a proactive approach to identity large load locations and explore potential criteria for large load registration, ensuring such criteria are flexible enough to accommodate diverse load profiles while still maintaining the overarching goal of reliability. This may include considerations for load size, operational impact, and geographic distribution.

- **Acceleration of Load Modeling Working Group (LMWG) Data Center Load Modeling deliverable** - The purpose of the LMWG is to drive the advancement and utilization of dynamic load modeling on an interconnection-wide basis. Cooperatives support the planned deliverables of the LMWG in developing new approaches to model data centers, refining existing approaches to model data centers, and developing potential approaches to differentiate between different types of computational facilities (Crypto mines and data centers) with an accelerated completion prior to Q2 – 2026.
- **Knowledge Transfer** – Briefing and publishing in a timely manner Incident Reports and Lessons Learned are essential in developing solutions to address real-time reliability and operations challenges of large load installations.

3. **Follow-up Items**
    - **Board Meeting Structure, Cadence, and In-person Interaction -** Cooperatives support the new meeting cadence that will start in 2026 and appreciates the willingness of the Board to adjust the meeting cadence to provide optimal in-person engagement of stakeholders, Board, and ERO.
    - **Compliance Monitoring and Enforcement Program (CMEP) and Standards Processes -** Cooperatives agree that the proposed enhancements align with the ERO Enterprise Long Term Strategy foundational focus areas:
        - **Energy:** Incorporating advanced data analytics to identify and address risks associated with large loads.
        - **Security:** Strengthening grid resilience through robust physical and cyber defenses for load interconnections.
        - **Engagement:** Facilitating transparent, value-driven collaborations with stakeholders to address emerging challenges.
        - **Agility and Sustainability:** Streamlining processes to accommodate rapid changes in grid infrastructure while ensuring cost efficiency.
4. **Future Agenda Enhancements:** Cooperatives commend the ERO in its commitment to operational transparency and stakeholder inclusivity. We suggest the following topics be considered as well.
    - Incorporating DER and Large Load Integration into Agenda Topics: These issues warrant ongoing attention to ensure alignment with the evolving energy landscape.

- Enhancing Feedback Mechanisms: Establish robust, iterative feedback loops to ensure Member Representatives Committee (MRC) contributions are actionable and reflected in strategy development.

Submitted on behalf of the Cooperative Sector by:
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Policy Input of the Merchant Electricity Generator Sector (Sector 6)

To the North American Electric Reliability Corporation (NERC) Board of Trustees

January 29, 2025

Summary:

- Allow for an inclusive and open forum to review the work of the NERC and ESIG Large Load Task Force (LLTF) after they have completed their tasks and allow for stakeholder input.
- Examine how to modernize and transform a 20th century grid designed and operated with synchronous generators and linear loads in mind to support non-traditional sources of supply and load.
- Engage industry more formally and robustly before Standards Authorization Requests (SAR) are drafted and approved to ensure consensus is achieved on high-level, threshold issues before standards drafting begins.

Policy Input:

We appreciate that NERC is undertaking efforts to more clearly identify and articulate the risks of adding certain large loads to the Bulk Electric System. NERC's Reliability and Security Technical Committee approved the NERC Large Load Task Force (LLTF) Charter in August 2024, and since its inception, the NERC LLTF has hosted many high-quality presentations by utilities, industry, and planning coordinators. Additionally, there are existing and/or concurrent platforms collecting data and perspectives on this issue that warrant attention from NERC. For example, Electric Reliability Council of Texas' (ERCOT) Large Flexible Load Task Force has met routinely since April 2022 and debated how certain large loads may affect grid reliability and how they may be interconnected reliably. Also, the Energy Systems Integration Group (ESIG) initiated their Large Load Task Force (LLTF) with a webinar in December 2024, and we are optimistic that effort will bear fruit within a year. The aforementioned venues have or will probe the details of and deliberate on what risks certain large loads may pose to the grid, including jurisdictional questions,

and offer potential solutions. We encourage the Board to consider the work of these task forces and stakeholder input at a future date, preferably in an open and inclusive forum to inform the NERC effort on this emerging and important issue.

That noted, we would like to draw the Board's attention to NERC's recent "Incident Review: Considering Simultaneous Voltage-Sensitive Load Reductions" ("Incident Review") conclusion that "[m]ost of the load loss in this event can be attributed to the interaction between the automatic reclosing sequence on the faulted transmission line and the data center's protection/control scheme that counts the number of voltage disturbances within a specified period of time." The Incident Review focused exclusively on the data center conduct and did not address whether six discrete voltage depressions occurring over 82 seconds for a single fault is appropriate. The Incident Review hints at data center operators' need for stable, reliable power and describes various schemes to ensure uninterrupted power but implies the onus is solely on the data center operator to conform to the transmission operator's protection schemes, regardless of whether those protection schemes are suboptimal or create risk for the data center's operations. NERC's assumption that the grid elements acted optimally may be correct, but without addressing the issue directly, the Incident Review analysis is incomplete.

This topic, and the recent experience with NERC's approach to Inverter Based Resources, suggest a need for a fundamental review of the interaction between the grid and the elements that interconnect to it, whether they be supply or load. It is a fact that a grid designed with large station, synchronous generators and linear loads in mind is struggling to accommodate new sources of non-traditional supply and load. However, NERC's current approach to these evolving circumstances is to demand new devices conform to the existing paradigm. This approach may seem straightforward but risks higher costs, reduced innovation, and less flexibility. We recognize the challenges posed by a paradigm shift, especially in the electric industry, but we must leave no stone unturned to modernize and transform the grid to support the 21st century economy and solidify the United States' preeminent leadership position. This task demands the Board's aspirational leadership; creative and lateral thinking; and a willingness to examine and challenge long-held approaches. We trust the Board is up to the task.

Finally, Mr. DeFontes invited the MRC to provide input "into other matters that [we] wish to bring to the Board's attention." We understand that NERC is proposing to convene a "targeted task force" to review the standards process with the intent of reducing the time from issue identification to Standards Authorization Request (SAR) and from SAR approval to a filed reliability standard within 18 months and 18 months, respectively. The effort explicitly places expediency as the goal. While we are supportive of efforts to introduce efficiency, it should not be done at the expense of diminishing stakeholders' participation in the process or circumventing their opportunities to provide input. In our August 11, 2024 Input Letter, we referenced contemporaneous documents that demonstrate NERC and stakeholders identified IBR integration and cold weather performance as risks more than a decade ago. Unfortunately, NERC and stakeholders failed to act timely, and FERC issued orders directing NERC to make filings by certain deadlines. FERC even imposed certain requirements that NERC and stakeholders interpreted differently.

While NERC's preference may be to seek more control over the standards process to meet FERC-imposed deadlines; we draw a different conclusion. Broad stakeholder participation must begin earlier in the process; the standards process should strive to achieve consensus as to scope and need before SARs are approved. In certain recent examples, industry did not support draft reliability standards because there was disagreement on fundamental issues. When these divergent opinions were raised during the balloting process, the response was often that it was too late to make the change, the change was too material, or both. We see the primary concern with the standards process is that industry is being offered fully drafted standards before consensus is achieved on high-level, threshold issues.

To ensure a more comprehensive and inclusive stakeholder process, NERC should continue to lean into efforts to strengthen stakeholder engagement and input – particularly early in the standards scoping process. One way that this could be accomplished is through the increased use of technical conferences or other industry workshops before the SARs are drafted and introduce an industry comment period and ballot on the SARs. These proceedings can produce critically valuable information, including data and analysis that can help inform to what extent a prospective standard will be technically or logistically feasible. Obtaining this information early in the

standards development process would help to streamline the conversation around future standards development and help to bracket the task of future standards drafting teams. The open discussions during these sessions would also increase awareness and knowledge among all stakeholders, including voting entities and may encourage participation and voting from a greater pool of stakeholders.

Industry recognizes and appreciates the efforts that NERC and the Board has taken, including holding webinars and other engagement sessions. Thank you for the opportunity to provide these comments.

Sincerely,

Sector 6 Merchant Electricity Generator Representatives:

/s/	/s/
Mark Spencer	Srinivas Kappagantula
LS Power	Averon Energy

To: NERC Board of Trustees

From: Sector 7 – Electricity Marketer MRC Representatives

Date: January 14, 2025

Re: February NERC Board Meeting Policy Input

Thank you for the opportunity to provide input to the NERC Board of Trustees on large load integration. We greatly appreciate the open exchange between the NERC Board of Trustees and the MRC Representatives.

What risks to reliability, resilience, and security do you see with the increasing integration of large loads?

The Sector 7 MRC Representatives believe the integration of large loads adds risks to the bulk electric system including but not limited to:

Short-term Load Variability – Many of the large loads included in the planning forecast are price sensitive on a minute by minute basis (in particular crypto). As wholesale ISO prices change, these loads are capable of responding with significant load swings. Additionally, as described in the Input Letter, these loads may instantaneously remove load from the system based on physical conditions/disruptions. If not accounted/planned for properly, these load swings can cause reliability issues.

Long-term Load Variability – Depending on the business structure of the large load owner, bankruptcy and ceasing consumption can happen faster than expected. These events could remove large load centers from the grid and disrupt short and long term planning.

System Adequacy – As demand increases, the need for supply also increases. If the current rate and expectations of large load integration continues, it is likely that demand will outpace supply. This risk is compounded by the following:

- Delaying generation retirements is only a short-term gap solution;
- Interconnection queue inefficiencies are preventing necessary generation build;
- Renewable heavy queue will not sufficiently serve large consistent loads;
- Natural Gas infrastructure buildout is required to facilitate new gas generation.

Cyber Security – Many of these large loads utilize sophisticated online controllers and algorithms. A breach of security could lead to the short-term load volatility described above.

Reduced System Inertia – As large flexible loads (and inverter based resources) increase, the amount of inertia on the system decreases, making the system more vulnerable to frequency and voltage fluctuations. This again can lead to the short-term load variability described above.

What should NERC do to address these emerging risks?

Sector 7 MRC Representatives recommend that the NERC consider the following when addressing these emerging risks:

1. Recommend clear interconnection requirements for large loads, only including them in planning studies once these requirements have been demonstrated to be attainable.
2. Develop sophisticated forecasting tools that can incorporate the complexities of large loads into the LTRA.
3. Incorporation of large load characteristics into all forward looking studies and scenario analysis.
4. Work hand in hand with the integrated markets. While not specifically under NERC jurisdiction, the integration of large loads can lead to unexpected and undesirable market outcomes. Additionally, many market constructs (Ancillary Services, Price Sensitive Bidding, Reliability Products) will be developed that address some of the risks described earlier. It is recommended that NERC work with the markets on a comprehensive plan to address both market and reliability issues simultaneously.
5. Consider Emergency Procedures for large loads to help maintain reliability. In particular, evaluate a priority list for unserved load during resource constrained scenarios.
6. Further study the risks and performance of large loads as they pertain to the short-term load variability described above.
7. Continued support for the large load task force.

Sector 8 Policy Input for the NERC Board of Trustees & Member Representatives Committee

February 13, 2025 Board Meeting

ELCON, on behalf of Large End-Use Consumers, submits the following policy input for the consideration of NERC's Board of Trustees (BOT) and the Member Representatives Committee (MRC). It responds to BOT Chair Ken Defontes, Jr.'s January 9, 2025 letter to Jennifer Flandermeyer, Chair of the MRC.

SUMMARY

Large Consumers (Sector 8) appreciate the urgency by NERC to ensure the reliability of the Bulk Power System is not negatively impacted by large load demand growth that produces unpredictable and variable operating characteristics (e.g., crypto-mining, data centers). Similar to the challenges experienced with ride-through capabilities of inverter-based resources, a significant portion of growing energy demand is coming from inverter-based loads which can rapidly increase or decrease demand. However, not all large loads are similarly situated or configured. As such, Sector 8 responds as follows:

1. **What risks to reliability, resilience, and security do you see with the increasing integration of large loads?**
    - While studying the potential adverse reliability impacts caused by the rapid integration of large loads, Sector 8 cautions NERC to tailor any mitigation measures to those loads that have the potential to cause grid disturbances.
    - Sudden unexpected drops in large load demand not only harms the reliability of the grid but can also damage other interconnected equipment including those of other loads.

2. **What should NERC do to address these emerging risks?**
    - The NERC RSTC Large Load Task Force's efforts should continue to focus where reliability and security expert engineers have first-hand experience and knowledge of current large load operating characteristics and risks. Resources should be made available for data gathering and analytics.
    - NERC should prioritize focus on measures and mandates meant to mitigate the reliability impacts from those large loads that have variable operating characteristics and hence pose potentially serious reliability impacts to the grid.

Many other classes of large loads, especially those in the large industrial and manufacturing sector are more predictable, reliable, ratable, with proven operational track records, and capable of riding through grid disturbances and thus do not pose major instability risks to the Bulk Power System.

Reliability Risks of Large Loads

Sector 8 appreciates NERC's efforts to anticipate reliability and security risks from integrating new large loads to the Bulk Power System. Sector 8 has historically represented large industrial and manufacturing users of electricity but has seen new customer classes with different configurations and operational characteristics. Unlike traditional large loads that can take several years to connect and generally operate predictably for decades, newer loads are seeking to connect massive amounts of electricity demand in relatively short time frames where usage can surge and drop in an instant, causing significant reliability risks.

For instance, crypto-mining loads are typically price driven and will ramp up or down operations according to those price signals. Conversely, data centers that power our global economy and are needed for artificial intelligence build-out and development, are typically more predictable with 24/7 power demand, but due to their configurations, small frequency or voltage blips can cause the entire load to trip offline resulting in a major unplanned grid disturbance.

Not only do these significant shifts in demand cause grid instability, but they can also damage sensitive equipment for other customers on the grid. For example, rotating motors and sensitive electronic components used in manufacturing equipment may be damaged during sudden losses and restoration of power. A sudden loss of power in a manufacturing plant in the process industries can cause a disruption in the flow of fluids and upset the process units. This can lead to equipment damage due to rapid temperature changes, over-pressuring of equipment, and/or mechanical stresses. Potential damage can include pipe or vessel ruptures; or plugging and mechanical damage to pumps and compressors. These issues can also result in personnel safety hazards and environmental exceedances.

As the NERC RSTC Large Load Task Force continues to research and understand the exact nature of these emerging large loads, it is imperative that NERC understand and differentiate amongst "large loads" based on key operating characteristic differences that may pose reliability risks instead of treating all "large loads" as a monolith. It's important to recognize that traditional large loads do not pose the same reliability risk that the emerging inverter-based load may pose to the Bulk Power System. For example, it would be very easy to combine all current Sector 8 companies into the category of "large loads" despite very different operating characteristics and threats posed to grid reliability.

What should NERC do to address these emerging risks?

NERC must continue to support the RSTC Large Load Task Force's efforts to accurately define the reliability challenges posed by new large loads and develop mitigation measures to combat grid instability. The Large Load Task Force is best positioned to provide the clearest roadmap for anticipating and dealing with reliability challenges caused by certain operational characteristics. This Large Load Task Force support should also include resources for accurate data gathering and analytics. Neither NERC nor Task Force participants should perform the work in vacuums. A collaborative approach is imperative to ensuring accuracy.

It is imperative that to the extent NERC develops mitigation measures or mandatory reliability standards, those measures are precisely tailored to those customers that actually pose risks to grid stability. Broadly applying measures, rules, or other costly programs will directly harm those large customers that have been reliably and predictably operating and served for decades. Those facilities that have ride-through capabilities, can't easily ramp up or ramp down, and exhibit steady demand should not be operationally or financially burdened with unnecessary mandates. Similar to the "cost causation" principle for transmission development, only those loads causing grid reliability challenges should be subject to any mitigation measures, programs, or rules meant to address the reliability risks they pose.

In closing, Sector 8 greatly appreciates NERC's diligence in addressing the challenge of new large loads connecting to the Bulk Power System. We look forward to working with NERC to identify the specific reliability challenges posed by certain large customers and how to mitigate those impacts. NERC must endeavor to apply future mitigation measures with precision so as not to unduly burden those predictable large loads that do not typically cause grid disturbances or further exacerbate challenging grid conditions.

MEMORANDUM

TO: Kenneth W. DeFontes, Jr, Chair NERC Board of Trustees

FROM: Michael Moody and Darryl Lawrence – MRC Sector 9 Small End-Use Electricity Customer Representatives

DATE: **January 29, 2025**
SUBJECT: Small End-Use Sector (9) Response to Request for Policy Input to the NERC Board of Trustees

The representatives of the NERC Member Representatives Committee for the Small End-Use Customer Sector (9) appreciate the opportunity to provide these comments in response to the request in your letter to Ms. Jennifer Flandermeyer on January 9, 2025.

The NERC Board of Trustees, in response to MRC member suggestions, provided an opportunity for open input to the Board.

The Small End-Use Sector (9) responds by restating a prior Policy Input response that may be better addressed by the Board under this open input:

The Board in preparation for the discussion during the Technical Session and continue efforts to understand reliability implications of large load integration, the Board requests MRC feedback on the following:

1. What risks to reliability, resilience, and security do you see with the increasing integration of large loads?

Sector 9 Response: The Sector members have identified a critical risk to resilience (noted in prior Policy Input) regarding Automatic Underfrequency Load shedding. That risk is exacerbated due to new large loads. (See Sector 9 policy input dated July 24, 2024). In the earlier response we noted that the generally fast changing nature of the power system puts the functionality of the existing automatic under frequency load shedding programs at risk for the following reasons:

For Reference PRC-006-5 states as its purpose the following (emphasis added):

> To establish design and documentation requirements for automatic underfrequency load shedding (UFLS) programs to arrest declining frequency, assist recovery of frequency following underfrequency events and provide last resort system preservation measures.

1) The power systems in North America are rapidly changing on both the generation and load side of the energy balance equation as expressed in numerous short-term and long-term assessments, along with many disturbance reports where the power systems are telling operators that they are at risk.
2) Automatic Underfrequency load shedding programs are a critical element of system resilience, intended to avoid wide area blackouts.
3) Automatic underfrequency load shedding program functionality is validated in hindsight only once every five years under the existing NERC PRC-006-5 standard (see R4).
4) While this approach was appropriate more than thirteen years ago in an era of low to no load growth, in the current conditions, this approach is no longer protective of the functionality of automatic underfrequency load shedding programs and must be revisited quickly given the present pace of change the power system is experiencing.
5) The advent of large loads appearing at Gigawatt scale is a new dimension, adding urgency to timely mitigation of the risk that a given Transmission Owners automatic underfrequency load shedding program may not work. While PRC-006-5 puts the burden on the Transmission Owner to come up with the required program, it may be the case in some instances that there is not enough load presently on a given TO's system to be added to the existing automatic underfrequency load shedding existing program in the conventional way (via the distribution system) to offset the presence of the new large load(s). This design aspect must be reviewed and assessed as part of a review of the service approach for the new large load and administrative methods embedded in the PRC-006-5 standard.
6) It may be necessary to engage the new large load entities to offer some of their proposed new load to be included in the PRC-006-5 automatic underfrequency load shedding programs to avoid placing an unfair burden on existing small users of the TO's power system.

2. What should NERC do to address these emerging risks?

Sector 9 recommends the following urgent actions be considered to be taken by the Board and NERC Management as appropriate.

1) Expedite the current PRC-006-5 SAR working its way to the RSTC (via the IRPS) which is considering modifications to the PRC-006-5 standard. The issue of the five-year interval has already been recommended there, but Sector 9 understands that the SAR has not advanced due to other higher priorities.
2) Expand that SAR (currently in the IRPS) to consider whether the option of requiring the new large load (threshold to be determined) should be required to offer some of its new load to be included in the local connecting Transmission Owners automatic underfrequency load shedding program.
3) Conduct a survey of all TO's facing new large loads (data centers, chip fabs, crypto miners, etc.) to identify what their plans are to meet their PRC-006-5 obligations

once the new large load is energized. Distill the results of the survey and allow the results to inform the SAR development process to thereby inform the standards drafting team of the modifications needed to stay ahead of this risk to resilience.

4) Call for review of the TO's (connecting to a new large load) automatic underfrequency load shedding program prior to connecting the new large load (rather than after the fact on the five-year interval).
5) Let the industry know that adherence to the requirements of PRC-006-5 is critical to maintaining resilience of the more brittle power system we expect in the future and that compliance will be strictly enforced.
6) Given the urgency of the issue, the Board may either use NERC's Urgent Action process or provide guidance prior to the implementation of a revised PRC-006-5 standard for Transmission Owners connecting new large loads to be cognizant of the cross functional impact of new large load and their existing automatic underfrequency load shedding programs.

ISO/RTO Council's Policy Input to Board of Trustees

January 29, 2025

The ISO/RTO Council[1] (IRC) offers the following input to the Member Representatives Committee (MRC) in response to Mr. Kenneth W. DeFontes, Jr.'s, letter dated January 9, 2025.

IRC Summary Comments

The IRC appreciates this opportunity to provide input on addressing the reliability, resilience, and security risks posed by the increasing integration of large loads. Given the unprecedented actual and forecasted load growth of recent years, evolving grid reliability challenges, and the resource adequacy implications of serving large loads, timely addressing this topic is vital to maintaining a reliable grid.

Understanding and Addressing Risks from Integrating Large Loads

- The IRC finds the NERC Large Load Task Force's (LLTF's) work important, valuable, and on track to deliver on key objectives as pointed out in our responses within this letter.
- The IRC supports the development of a consistent method or procedure for co-locating large loads with generation resources to promote certainty and clarity for all entities.
- The IRC requests that NERC consider addressing real-time operations, system planning, model development, related cyber needs and communication protocols for large loads by pursuing large load registration requirements and developing Reliability Standards as necessary and consistent with NERC's Rules of Procedure.
- As a general backdrop, the pace at which large loads are requesting to interconnect to the Bulk Power System (BPS) adds to existing resource adequacy and other reliability challenges that must be analyzed and addressed holistically and comprehensively.
- The IRC recognizes the importance of serving large loads as efficiently, effectively, and reliably as possible.

IRC Responses to Specific MRC Policy Input Questions

What risks to reliability, resilience, and security do you see with the increasing integration of large loads?

- *Resource adequacy:* The unprecedented growth of electrical demand associated with large loads could outpace the growth of generation resources needed to serve this new load while maintaining reliable service to existing load and other sources of load growth.
- *Co-located large load configurations:* Co-locating large load with generators may impact resource adequacy, reliability system operations, and equitable alignment of transmission system usage. As such co-location of large loads becomes more commonplace, it is imperative the reliability concerns addressed in this response paper are evaluated and addressed as needed. The IRC recognizes and understands the integration of large loads is in North America's best interest and must be done promptly and properly.

[1] The IRC comprises the Alberta Electric System Operator (AESO), the California Independent System Operator Corporation (California ISO), Electric Reliability Council of Texas, Inc. (ERCOT), the Independent Electricity System Operator (IESO) of Ontario, ISO New England, Inc. (ISO-NE), Midcontinent Independent System Operator, Inc., (MISO), New York Independent System Operator, Inc. (NYISO), PJM Interconnection, L.L.C. (PJM), and Southwest Power Pool, Inc. (SPP).

- *Large load characteristics*: The operational characteristics of large loads can complicate the challenge of meeting this demand growth, resulting in a need for coordination, terms and conditions, and advanced authorization before these loads are placed in service.
    - The location of a large load in relation to generation resources is a key factor in assessing the impact of that particular large load on resource adequacy, reliable system operations, and equitable alignment of transmission system usage.
    - Some large loads (primarily data centers and cryptocurrency mining facilities) can behave quite differently from conventional loads, which can result in operational challenges, as further detailed below.
- *Voltage ride-through/Voltage stability issues:* large loads that do not ride through voltage fluctuations can cause over voltage events, power swings, and operational challenges on the system as a whole.
- *Frequency and stability issues:* Large loads tripping offline or transitioning to on-site backup power unexpectedly can cause over frequency events on the system as a whole, which could result in ride-through and other performance issues with generation resources, particularly inverter-based resources and distributed energy resources.
    - Large loads will also need to be coordinated with UFLS during underfrequency conditions.
- *Load shed obligations:* Depending on the amount of load a Transmission Owner is obligated to shed during emergency operations, it may be difficult for the Transmission Owner to manage its load shed obligations if a significant portion of the Transmission Owner's footprint consists of large loads. The concern may indicate a need to re-evaluate load shed prioritization in a load shed scenario.
- *Forced oscillations:* Large loads that cycle frequently could cause forced oscillations.
- *Supply chain:* Long lead times for breakers, transformers, steel, and concrete could result in delays in timely completing transmission upgrades needed to serve large loads.
- *Planning challenges:* Obtaining details necessary to plan for large loads, such as the actual load size, energization plans, ride-through capabilities, and accurate models, can be challenging given that large loads are not registered with NERC.
- *On-site back-up units:* Environmental restrictions can impact the ability of large loads to operate on-site back-up diesel generation units to ease stress on the BPS during periods of high system-wide demand.
- *Protecting the system against malicious actors:* If malicious actors compromise and obtain control of operational systems at large loads, those malicious actors could attempt to use the compromised loads to destabilize the BPS.
- *Forecasting:* Not all announced large loads are ultimately constructed, which complicates the development of accurate short- and long-term system plans and forecasts. Additionally, current forecasting practices rely on historic information. To account for the size and unknown performance characteristics of these large loads, forecasting practices will need to change and be supported by the load owner through collaboration with the Load Serving Entity to develop a more granular data set.
- *Lessons learned from existing large loads:* A review of how reliability risks were mitigated and transmission planning was performed when existing large loads, such as petroleum refineries, were constructed and interconnected may prove instructive in identifying the most effective way to interconnect and serve new large loads . The LLTF is well positioned to perform such a review.
- *Transmission System Performance:* Due to the rapid pace large loads are looking to connect to the grid, they are often working directly with generation owners and may, at times, bypass the local utility and

regional planner during the Planning phase. If these entities are not aware of the new load connecting until after it's already connected, the transmission system may not have the reinforcements needed to reliably support this load and meet the system performance requirements of the TPL Standards.

- *Relay coordination*: A formal relay coordination between all impacted entities in the area (transmission, distribution, generation) is needed to ensure reliable operations.

What should NERC do to address these emerging risks?

The IRC requests that NERC:

- Continue its support of the LLTF and the NERC Event Analysis Subcommittee (EAS). The LLTF has been convened to identify, validate, and prioritize risks and reliability impacts related to large loads and identify ways to mitigate those risks and reliability impacts. The EAS analyzes events and develops recommendations, thereby disseminating knowledge across the industry and providing valuable assistance for large load integrations.
- Support the development of a consistent method or procedure used for co-locating large loads with generation resources to promote certainty and clarity for all entities.
- Consider pursuing NERC registration requirements for large loads so that appropriate Reliability Standards can be developed to reduce the risk of large loads significantly impacting the integrity of the BPS. We anticipate that large load registration would be based on factors such as the amount of load, interconnection voltage, and interconnection point, which includes large loads co-located with generation.
- Develop Reliability Standards specific to large loads to address real-time operations, system planning, development of large load models, related cyber needs and communication protocols. Such standards should require the exchange of relevant information between large load owners and the appropriate functional entities.

Conclusion

Reliably serving large loads requires collaboration among all impacted entities, including, but not limited to, FERC, NERC, State regulators, Planning Coordinators, Reliability Coordinators, Balancing Authorities, Transmission Planners, Transmission Owners and Operators, Generator Owners and Operators, Distribution Providers, and large load owners and operators. IRC members are participating in the LLTF and plan to continue this participation as we continue to integrate large loads.

The IRC requests additional follow-up from this Policy Input letter as concerns are addressed and future concerns materialize. As always, we appreciate the opportunity to provide our policy input to the MRC for NERC's upcoming Board of Trustees meeting, and we appreciate the additional follow-up NERC has provided regarding recent Board actions.

+North American Generator Forum

Policy Input to the NERC Board of Trustees
February 13, 2025 Meeting
Provided by the North American Generator Forum

The North American Generator Forum (NAGF) appreciates the opportunity to provide policy input for the NERC Member Representatives Committee ("MRC") and Board of Trustees ("BOT") in response to BOT Chair Kenneth W. DeFontes, Jr.'s letter dated January 9, 2025. The NAGF provides the following policy input in advance of the NERC BOT meeting.

Summary

The NAGF appreciates that NERC views the addition of large loads as a potential risk to grid reliability and resilience. The NAGF views the issue as primarily a resource adequacy issue. The rate of addition of large loads can exceed the rate of addition of generation. Per section 215 of the FPA, NERC is somewhat limited in their ability to regulate these loads. The burden for controlling how and when these loads interconnect falls to the individual states and the ISO/RTOs, so we recommend that NERC work with the states and the ISO/RTOs until such time as FERC expands NERC's oversight.

Discussion

As the Board prepares for the discussion during the Technical Session and continues efforts to understand reliability implications of large load integration, the Board requests MRC feedback on the following:

1. **What risks to reliability, resilience, and security do you see with the increasing integration of large loads?**

   The NAGF believes that the growing addition of Large Loads poses an increasing risk to reliability. These large loads call into question resource adequacy and overall grid resilience, since building and interconnecting large loads can happen at a much faster pace than for the generation needed to support the increasing demand. Additionally, we have concerns about grid stability when large loads trip offline or shift to backup generation during electric transients. The unique characteristics of these voltage-sensitive loads and their response to BES electrical transients can have a significant impact on grid dynamics.
   However, the NAGF is focused on the generation sector, and has little expertise in these loads and all the challenges that they pose.

2. What should NERC do to address these emerging risks?

From the NAGF's perspective, it does not appear that NERC has the ability to regulate these loads, as this issue falls outside of Section 215 of FPA, unless the large loads would also qualify as a registered entity, such as a Distribution Provider. This is the situation that one of our members was involved in when they were drawn into a discussion about providing generation for a new data center.

Without a clear mandate to regulate the interconnection and operations of these large loads, NERC can hold technical conferences and invite the large load developers and owners to attend. The NAGF believes that the power to regulate the interconnection and operation of these large loads falls to the ISO/RTOs and the individual states that can promulgate rules required for interconnection. NERC may have a (voluntary) role in helping coordinate the requirements for those entities to implement.

In addition, using the aforementioned data center/DP example, the NAGF believes that the existing load interconnection processes are still valid and useful for large loads.

January 29, 2025

Mr. Kenneth W. DeFontes, Jr.
Chair, NERC Board of Trustees

Ms. Jennifer Flandermeyer
Chair, NERC Member Representatives Committee

Re: Request for Policy Input on Large Load Reliability Risk Issues

Dear Mr. DeFontes and Ms. Flandermeyer:

The New York State Reliability Council ("NYSRC") is pleased to respond to the January 9, 2025 Member Representatives Committee ("MRC") request for input on risks to reliability that are emerging quickly and require an accelerated response, especially given the integration of inverter-based resources.

Background on the NYSRC

The NYSRC was approved by the Federal Energy Regulatory Commission ("FERC") at approximately the same time as the formation of the New York State Independent System Operator, Inc. ("NYISO") to ensure that the reliability of New York State's bulk power system would be maintained in the transition to a fully competitive wholesale electricity market. The NYSRC has fulfilled this responsibility for more than 20 years. The NYSRC accomplishes this through the adoption of Reliability Rules that establish necessary requirements to protect the reliability of the state's bulk power system. These rules are inclusive of, and go beyond, the NERC and NPCC Standards, and are binding on the NYISO and its market participants.

Response to Request for Policy Input

The NYSRC offers the following responses to NERC's MRC request for policy input:

Q1. What risks to reliability, resilience, and security do you see with the increasing integration of large loads?

A1. NYSRC Response:

- The NYSRC has recognized the risks to reliability and resilience from the connection of large loads in prior submission it has made to FERC. On December 9, 2024, the NYSRC filed the attached comments in Docket No. AD24-11-000 in response to the FERC Large Load Technical Conference held on November 1, 2024. In its response, the NYSRC noted that the current regulatory requirements under NERC's PRC-006-5 – Automatic Underfrequency Load Shedding ("UFLS") – are not adequate to preserve reliability and resilience given the present pace of accelerated connection of the large loads. The reliability risk is that automatic underfrequency load shedding programs (the last line of defense) may not function as required to limit the extent of load loss resulting from system disturbances.
- In the interest of brevity and efficiency, the NYSRC will not restate the positions advanced in its comments in the FERC Large Load Technical Conference proceeding, but instead attaches them to this correspondence for consideration by the NERC Board of Trustees.
- There is a need for new interconnection processes for large loads to ensure that when they are studied under TPL standards and deficiencies are identified, they are not permitted to interconnect until deficiencies are addressed.

Q2. What should NERC do to address these emerging risks?

A2. NYSRC Response:

- In its attached comments, the NYSRC recommended to FERC that the following potential actions should be considered:
  - Shorten the time interval between automatic underfrequency reviews from the present five-year requirement.
  - Require that an automatic underfrequency program review be undertaken as part of the large load interconnection study process and adjust the automatic underfrequency programs accordingly.
  - Require large loads to offer a portion of the proposed connected load to be part of and under the control of the interconnecting utility's automatic UFLS programs.
  - There is an urgent need to harmonize federal and state jurisdictional issues regarding interconnecting large loads to the bulk electric system.

The NYSRC has a direct interest in ensuring that the addition of load does not disrupt reliability and resilience after a disturbance to the power system. Continued analysis and assessment of this matter is critical to the successful interconnection and operation of large new loads. The NYSRC appreciates the opportunity to provide input on such a critical issue and thanks the Board of Trustees for the thoughtful consideration of the comments advanced herein.

Respectfully Submitted,

/s/ Amanda De Vito Trinsey

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Attachment
cc: NERC Board of Trustees

Attachment

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Large Loads Co-Located at Generating Facilities	)	Docket No. AD24-11-000

POST-TECHNICAL CONFERENCE COMMENTS OF THE NEW YORK STATE RELIABILITY COUNCIL

On November 1, 2024, the Federal Energy Regulatory Commission ("Commission") held a Commissioner-led technical conference in the above captioned proceeding to discuss generic issues related to the co-location of large loads at generating facilities. Thereafter, a Notice of Request for Comments was issued inviting post-conference comments by December 9, 2024.[1] The New York State Reliability Council, L.L.C. ("NYSRC") hereby submits these post-technical conference comments regarding additional matters that should be considered as part of the Commission's comprehensive review of the effects resulting from large new loads entering the system.

I. Introduction

The NYSRC is a not-for-profit entity, organized in 1999 and authorized by the Commission, whose mission is to promote and preserve the reliability of electric service on the New York State Power System by developing, maintaining, and, from time-to-time, updating the Reliability Rules which shall be complied with by the New York Independent System Operator, Inc. ("NYISO") and all entities engaging in electric transmission, ancillary services, energy and power transactions on the New York State Power System. The NYSRC conducts its mission with no intent to advantage or disadvantage any Market Participant's commercial interests. Its sole

[1] Docket No. AD24-11-000, *Notice of Request for Comments* (issued Nov. 8, 2024).

focus is maintaining the reliability of the bulk electric system in New York (the New York Control Area or "NYCA").

The subject large loads –whether co-located with generating facilities or standalone – will most likely be interconnected at voltage levels exceeding the 100kV NERC Definition of Bulk Electric System. As a result, this will bring the interconnection of such large load facilities within the scope of the Commission-approved Electric Reliability Organization ("ERO") mandatory requirements that are designed to preserve the reliable operation of the power system.[2]

In general, under the ERO standards, all proposed system modifications, including transmission and generation additions or significant load reductions or additions, must be analyzed and designed to ensure system-wide coordination and continued system reliability and resilience to provide society with an "adequate level of reliability."[3] Reliability Coordinators, Transmission Planners and Transmission Planning Coordinators and Regional Entities comply with ERO reliability standards requirements and, in some cases, regional criteria requirements that provide the minimum power system performance expectations. These requirements serve as the foundation for good utility practices in transmission planning and operation. The Commission has a substantial role through its policies, its oversight and approval of ERO activities.

As the power system becomes demonstrably more operationally stressed due to the increased penetration of intermittent resources, concerns over their performance during disturbances, and the upward pressure that is placed on the system due to public policy driven electrification programs coupled with the new large loads coming online, the likelihood of

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[2] See the definition of Bulk Electric System (BES) and Bulk-Power System in the NERC Glossary *available at*:
https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf.

[3] *See*, NERC Filing to the Commission regarding Adequate Level of Reliability, May 10, 2013, attached hereto as Appendix 1.

triggering automatic underfrequency load shedding ("automatic UFLS") programs may increase.[4] While there are many areas of reliability related concern[5], one that has not been raised is Automatic UFLS programs in their role as the last line of defense used during periods of stressed system conditions after operators have exhausted all of their manual load shedding (*i.e.*, rotating blackout) options. Although the automatic UFLS standard calls for having a certain amount of load to be under automatic control to be shed, the addition of large loads at a swift pace makes it all the more important to ensure that the automatic UFLS programs are up to date and can address the presence of the new large loads on the system. The NYSRC has direct interest in ensuring that the addition of load does not disrupt reliability and resilience after a disturbance to the power system.

II. NERC Standards and Guiding Principles

There are a number of NERC standards and principles that the NYSRC submits should be relied upon more heavily in the analysis surrounding the reliability and resilience impacts of large new loads coming online and their interaction with existing automatic UFLS programs.

A. FAC-001-4 – Facility Interconnection Requirements

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[4] *See*, NYISO 2024 Reliability Needs Assessment ("RNA") *available at*: https://www.nyiso.com/documents/20142/2248793/2024-RNA-Report.pdf/0fe6fd1e-0f28-0332-3e80-28bea71a2344 (issued Nov. 21, 2024). The RNA states:

> "[t]he forecasted transition from a summer-peaking system to a winter-peaking system also poses challenges to grid reliability . . . . This shift, driven by the electrification of the building and transportation sectors, is expected to accelerate over the next ten years. Increased winter demand introduces new reliability concerns, particularly around fuel availability for gas-fired generators. On the coldest days, natural gas distribution companies prioritize residential heating and limit the fuel available to generators without firm contracts. These coldest days also correspond to peak winter demand periods when the gas fleet is needed most.
>
> Given the rapid pace of change on the bulk electric system, the NYISO will continue to monitor these and other developments to determine whether changing system resources and conditions could impact the reliability of the New York electric grid."

[5] A number of concerns raised during the Technical Conference are already in the record. These include reliability related ancillary services, black start capability, and resource adequacy for customers.

Under mandatory NERC Standard FAC-001-4 all Transmission Owners through requirement R1 are required to have documented Facility interconnection requirements to address interconnection for end-user loads. The purpose is to address the impact of these loads on the reliable operation of the power system in accordance with the purpose of the FAC-001-4 standard which is: "[t]o avoid adverse impacts on the reliability of the Bulk Electric System, Transmission Owners and applicable Generator Owners must document and make Facility interconnection requirements available so that entities seeking to interconnect will have the necessary information."[6]

B. FAC-002-3 – Facility Interconnection Studies

Mandatory NERC Standard FAC-002-2-4 is intended to assure that the impact of interconnecting new or changed Facilities on the Bulk Electric System are comprehensively studied. Through R6, the Planning Coordinator is required to have identified and make publicly available a threshold definition of what it considers a "qualified change" to the power system. Typically, this is in the form of a voltage threshold and a MW or MVA load size. In New York for example, this requirement is met through the NYISO's publication of Technical Bulletin #259 which specifies a 10 MW and 115 kV threshold.[7]

C. PRC-006-5 - Automatic Underfrequency Load Shedding (UFLS)

Not specifically discussed in the Technical Conference, but extremely important to the preservation of an adequate level of reliability are the mandatory requirements, is PRC-006-5 related to automatic UFLS. The purpose of the standard is stated as follows: "[t]o establish design

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6 *See*, NERC Standard FAC-001-4, available at: https://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-001-4.pdf.

7 *See*, NERC Standard FAC-002-4 available at: https://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-002-4.pdf.

and documentation requirements for [automatic UFLS] programs to arrest declining frequency, assist recovery of frequency following underfrequency events and provide last resort system preservation measures." (emphasis added.)

The functionality of this "last resort system preservation" program is assessed through studies, which identify the electrical islands that may be formed under simulated conditions. The studies are used to establish the parameters of the UFLS Entity automatic UFLS programs as required by the standard. Automatic load shedding programs will activate and shed pre-selected load automatically if all manual load shedding (rotating blackouts) by operators has been exhausted and system frequency continues to decline. The expectation is that the system can be reconstructed from the remaining energized islands to reduce the likelihood that the black start of the entire system is avoided as much as possible. This is a resilience performance requirement more than a reliability performance requirement in the first instance.

III. Impact of System Frequency on Reliability and Resilience

During the Technical Conference, a number of system reliability issues were raised, one of which was maintenance of system frequency within the prescribed limits. The system frequency is closely monitored by system operators, and deviations from normal ranges are reported through the requirements of BAL-003-2.[8]

Mr. Gugel, NERC's Vice President of Regulatory Oversight, during the Technical Conference described an example of over frequency (upon loss of a large load) reliability risk. Gugel expressed a reliability concern regarding situation where the sudden loss of a nearby large load might result in overspeed of the nearby generator and then dynamically propagate into other

[8] *See* BAL-003-2 *available at*: https://www.nerc.com/pa/Stand/Reliability%20Standards/BAL-003-2.pdf. This standard requires that under normal operation, Balancing Authorities provide sufficient Frequency Response capability to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value.

system elements, potentially leading to costly damage to generation equipment or uncontrolled system separation. This propagation may lead to loss of service to other loads outside the immediate large load facility and nearby generator(s). Expanding on this concern is the fact that if the impact of large loads on Automatic UFLS programs is not studied, and a propagating disturbance event is severe enough, it could also lead to the loss of generation in a wide area resulting in a frequency decline that triggers at the set points designed into automatic UFLS programs.

Potential adverse impacts to reliability and resilience must be examined in advance (not reactively) and be addressed through the design of the interconnection facility as specified in NERC standards FAC-001-4 and FAC-002-4. Good utility practice mandates that the reliability effects of the added large load be thoroughly examined in advance, the risks thoroughly identified, and then mitigated through the application of good utility practice in planning, design, construction, and testing. A substantial portion of what is required in the ERO standards is directed in such a way as to avoid ever experiencing load loss, cascading, and uncontrolled separation as outlined in the definition of the adequate reliability mentioned earlier. But the automatic UFLS programs are rarely thought of because they are not triggered frequently. Although, in recent years, automatic UFLS has come close to being activated during Winter Storm Uri.[9]

IV. Policy Considerations and Potential Solutions

Given the impact to public health and safety if the UFLS program is not properly triggered, coupled with the large size of the prospective new loads entering the system as discussed in the Technical Conference, it is strongly advised that the Commission offer some guidance on the applicability of the requirements of PRC-006-5 and the importance of the analysis prior to connecting the large load.

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[9] *See, FERC - NERC - Regional Entity Staff Report: The February 2021 Cold Weather Outage in Texas and the South Central United States*, (Nov. 2021), p. 156.

It may be feasible to rely on the notion that the NERC standard speaks for itself and that good utility practice mandates that underfrequency load shedding programs be reviewed as part of each interconnection study under FAC-001 and FAC-002. There is currently no such requirement, however and the NYSRC submits that this concept should be considered as part of the dialogue and as a potential solution to preventing a potential future reliability issue.

It is likely that when the standards were drafted, NERC did not envision the magnitude of the single load additions that are being contemplated and studied at this time (*i.e.*, 500, 1,000, 1,500 MW/MVA loads). At the time of the standard's development, load growth was either relatively slow or non-existent in some areas and there was consensus around the current requirement in R4 to perform a functional review of the effectiveness of the UFLS program only once every five-years. It is entirely possible that without offering some portion of the newly connected large load to become part of the automatic UFLS program, the utility may not be able to find enough additional load to place under automatic UFLS control to meet the NERC or regional standard requirements. More importantly, if a portion of the large new load is not incorporated in a study, the studied system's automatic UFLS program may not work to achieve the purpose of providing guidance and limiting the extent of system separation. This is a retroactive, not preemptive approach. The Commission should consider modifying this approach to account for the current state of the system and the rapid changes underway.

The NYSRC respectfully requests that the Commission take note of this aspect of integration of large loads into the system and offer some guidance to the ERO and to industry. At the Technical Conference there was recognition that the large new loads will be coming quickly. The need to identify the processes necessary to serve these loads and understand the relationship between their service and automatic UFLS programs is urgent. It is likely that retroactive automatic UFLS studies conducted only once every five years will not pick up the reliability and resilience

implications of these large loads on the existing automatic UFLS programs unless they are conducted more frequently or before energization of the new large load.

One model to consider is to require the automatic UFLS studies annually, as is currently required under the TPL-001 standard. Although other intervals between one and five years could be considered, these will suffer the same defect unless a forward-looking test year (near -term, long term as in TPL-001) is implemented. Alternatively, a review of each specific new large load, using each Planning Coordinator's existing definition of "qualified change" to trigger a review of the automatic UFLS program in the area to which it is interconnecting is appropriate. If the load is large (threshold to be determined), perhaps an even wider area examination beyond the local interconnecting utility's automatic UFLS programs might be necessary and considered, perhaps on a Balancing Authority wide area basis.

Accordingly, the NYSRC submits that automatic UFLS programs must be designed to be preemptive (as many things in electric utility design and operation already are) and not be reactive and modified only after an adverse public health and safety event our outcome occurs. The power system has its own unique way of very quickly signaling to society through adverse outcomes when mistakes in power system planning, design and operation are made. The topic of large load addition's reliability and resilience impacts on the effectiveness of automatic UFLS programs should be brought forward for review and discussion by the Commission. Understanding the new natural "islands" that may be formed after the large load is connected to the system is critical to development of resilient system restoration plans. These restoration operating plans rely on thorough, forward-looking understanding of the expected outcomes of large new loads on existing automatic UFLS programs.

V. Conclusion

The NYSRC thanks the Commission and Commission staff for conducting this technical conference and appreciates the thoughtful consideration of the comments advanced herein.

Dated: December 9, 2024
Albany, New York

Respectfully Submitted,

/s/ Amanda De Vito Trinsey

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APPENDIX 1

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Link to Filing:https://elibrary.ferc.gov/eLibrary/filedownload?fileid=01b12894-66e2-5005-8110-c31fafc91712

May 10, 2013

VIA ELECTRONIC FILING

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: Informational Filing on the Definition of "Adequate Level of Reliability"

Dear Ms. Bose:

The North American Electric Reliability Corporation ("NERC") hereby submits solely as an informational filing the definition of "Adequate Level of Reliability" that the NERC Board of Trustees approved on May 9, 2013 (Attachment A), and a supporting technical report (Attachment B). NERC is not requesting the Commission to take any action on this definition.[1]

The Commission directed NERC to consider and propose methods for ensuring Reliability Standards provide for an adequate level of reliability and for defining an "adequate level of reliability" in the Commission order certifying NERC as the Electric Reliability Organization.[2] "Adequate level of reliability" is a term used in Section 215 (c)(1) of the Federal Power Act, specifying what standards the ERO can develop and enforce.

The definition of "Adequate Level of Reliability" will be used primarily to guide NERC Reliability Standards development, but also by the NERC Performance Analysis Subcommittee and NERC reliability assessment staff to assess Bulk Electric System reliability and identify gaps in data. Other NERC groups, such as the Reliability Issues Steering Committee, will be able to use the definition and supporting technical report for guidance when addressing major reliability issues and prioritizing work. Neither document should be interpreted as requiring the development of specific standards or additional compliance elements.

Respectfully submitted,

/s/ Stacey Tyrewala
Stacey Tyrewala
Senior Counsel for North American Electric Reliability Corporation

[1] This definition supersedes the prior definition submitted for informational purposes on May 5, 2008 in Docket No. RR06-1-000.

[2] The Commission certified NERC as the electric reliability organization ("ERO") in accordance with Section 215 of the FPA on July 20, 2006. *N. Amer. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006).