

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

**Climate Change, Extreme Weather, and)
Electric System Reliability)**

Docket No. AD21-13-000

**POST-TECHINCAL CONFERENCE COMMENTS OF THE
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION**

The North American Electric Reliability Corporation (“NERC”) hereby provides comments in response to the Notice Inviting Post- Technical Conference Comments issued in this proceeding on August 11, 2021.¹ As the Commission-certified electric reliability organization (“ERO”),² NERC is responsible for the development and enforcement of mandatory Reliability Standards for the reliable operation of the bulk-power system and for performing periodic assessments of the reliability and adequacy of the bulk-power system in North America. NERC previously provided comments in this proceeding on April 15, 2021.³ NERC thanks the Commission and Commission staff for the opportunity to provide additional comments in this proceeding to address the items noted in the August 11 Notice.

I. NERC POST-TECHNICAL CONFERENCE COMMENTS

In these comments, NERC addresses the following topics from the August 11 Notice:

- Question 2: Use of probabilistic approaches to account for extreme weather;
- Question 5: Required use of transmission topology optimization;

¹ Notice Inviting Post-Technical Conference Comments, *Climate Change, Extreme Weather, and Electric System Reliability*, Docket No. AD21-13-000 (Aug. 11, 2021) [hereinafter August 11 Notice].

² The Federal Energy Regulatory Commission (“Commission”) certified NERC as the ERO in 2006. *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006), *order on reh’g and compliance*, 117 FERC ¶ 61,126 (2006), *order on compliance*, 118 FERC ¶ 61,030 (2007), *order on clarification and reh’g*, 119 FERC ¶ 61,046 (2007), *aff’d sub nom. Alcoa Inc. v. FERC*, 564 F.3d 1342 (D.C. Cir. 2009).

³ *Comments of the North American Electric Reliability Corporation, Climate Change, Extreme Weather, and Electric System Reliability*, Docket No. AD21-13-000 (Apr. 15, 2021).

- Question 6: Opportunities to improve Reliability Standards in order to address the risks of extreme weather events;
- Question 9: Alternative resource planning approaches to the use of the 1 day in 10-year Loss of Load Expectation standard.

NERC's comments are listed under the corresponding question from the August 11 Notice below.

A. Question 2 Regarding Use of Probabilistic Approaches to Account for Extreme Weather

Question 2 of the August 11 Notice seeks comment on the following (internal citations omitted):

Several panelists at the technical conference suggested that greater use of probabilistic approaches could provide a more robust approach to accounting for extreme weather. Would incorporating probabilistic methods into local transmission planning and/or regional transmission planning/cost allocation processes allow public utility transmission providers to more effectively assess low probability/high impact events and common mode failures? If so, should such practices be incorporated into public utility transmission providers' local transmission planning and/or regional transmission planning/cost allocation processes? What, if any, jurisdictional tariff changes would be necessary to incorporate these practices into existing transmission planning and cost allocation processes? Similarly, should such practices be incorporated into any resource adequacy assessments carried out under FERC-jurisdictional tariff provisions?

NERC comments on this question as follows. Incorporating probabilistic approaches in resource adequacy, energy sufficiency, and transmission planning contributes to a more reliable bulk-power system by exposing the hours with potential resource shortfall and transmission deliverability risk on the system. As the bulk-power system continues its rapid transformation toward increasing reliance on variable energy resources and distributed energy resources, these risk hours are no longer assumed to be limited to the time of peak demand in many areas.

In recent years, NERC has increased the use of probabilistic methods in its work, including its reliability assessments, and has dedicated staff and effort towards developing cutting edge probabilistic methods. The NERC Probabilistic Assessment Working Group develops probabilistic analysis that contributes to NERC's Long-Term Reliability Assessment every other year.⁴ NERC is also investigating the development of probabilistic methods to study resource adequacy, energy sufficiency, and transmission adequacy for reliable delivery in composite reliability studies as well as to develop enhanced reliability metrics.

NERC looks forward to enhancing and promoting increased adoption of probabilistic methods in collaboration with industry and supports the Commission exploring ways to promote their use.

B. Question 5 Regarding Required Use of Transmission Topology Optimization

Question 5 of the August 11 Notice seeks comment on the following (internal citations omitted):

Transmission topology optimization (also sometimes known as transmission switching) involves dynamically modifying transmission topology as a component of determining optimal day-ahead and real-time energy market solutions. Should RTOs/ISOs be required to incorporate transmission switching or transmission topology optimization in their day-ahead and real-time energy markets? Could the adoption of such optimization approaches both reduce costs and improve the resilience of the transmission grid?

NERC comments on this question as follows. Prior to requiring the use of transmission switching or transmission topology optimization, the Commission should study whether the

⁴ From October 5 - October 7, 2021, the NERC Probabilistic Assessment Working Group and the Western Electricity Coordinating Council will host the second, biennial Probabilistic Analysis Forum to discuss current topics on probabilistic assessments, approaches and experiences. Topics will include: (1) probabilistic analysis basics; (2) resource adequacy metrics and methods; (3) calculation and specific implementation of resource adequacy metrics; (4) probabilistic approaches in transmission planning; and (5) current industry efforts and related applications.

More information on the upcoming Forum and the work of the Probabilistic Assessment Working Group is available at <https://www.nerc.com/comm/RSTC/Pages/PAWG.aspx>.

market benefits of such an approach would exceed any reliability risks that may result from its use. In conducting this evaluation of benefits compared to the reliability risks of topology optimization, the Commission should consider that there are a number of technologies that can be deployed to improve transmission use. For example, Flexible AC Transmission Systems (“FACTS”) can be used to manage flows, which can be adjusted quickly to meet contingency needs. This may be a better option than switching lines out of service to manage flows, as the unavailability of switched-out lines could exacerbate system events.

C. Question 6: Opportunities to improve Reliability Standards in Order to Address the Risks of Extreme Weather Events

Question 6 of the August 11 Notice seeks comment on the following (internal citations omitted):

Panelists at the technical conference suggested that current requirements for system performance under extreme weather scenarios may need to evolve. Should the transmission planning requirements established under North American Electric Reliability Corporation (NERC) reliability standard TPL-001-4/5 be modified to better assess and mitigate the risk of extreme weather events and associated common mode failures? Should any additional changes be considered to the NERC Reliability Standards to address the risk of extreme weather events?

NERC comments on this question as follows. In its previous comments in this proceeding, NERC highlighted that efforts were underway to develop a suite of revised Reliability Standards to address the reliability risks posed by cold weather: proposed Reliability Standards EOP-011-2 (Emergency Preparedness and Operations); IRO-010-4 (Reliability Coordinator Data Specification and Collection), and TOP-003-5 (Operational Reliability Data) (collectively, the “Cold Weather Reliability Standards”). In June 2021, NERC filed the Cold Weather Reliability

Standards with the Commission for approval.⁵ The Commission approved the standards on August 24, 2021.⁶ The Cold Weather Reliability Standards will advance the reliability of the bulk-power system by requiring generators to implement plans for cold weather preparedness. Additionally, the Cold Weather Reliability Standards will enhance the ability of the Balancing Authority, Transmission Operator, and Reliability Coordinator to plan and operate the grid reliably during cold weather conditions by requiring the exchange of information related to the generator's capability to operate.

With respect to extreme weather more generally, NERC staff will continue to examine the Reliability Standards to determine if other modifications are needed. Presently, Reliability Standard TPL-001-4 requires planning entities to study, in the planning horizon (i.e. one to five years ahead), wide-area, long-duration events affecting the transmission system caused by loss of generating stations due to factors such as wildfires and severe weather.⁷ For these extreme events, if the analysis concludes there is Cascading caused by the occurrence of extreme events, the Reliability Standard TPL-001-4 calls for an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts of the event(s) to be conducted. Additional modifications may be appropriate as the resource mix is transformed to one that is more sensitive to severe weather conditions, as some types of severe weather events or conditions could result in the loss of a substantial amount of resources due to fuel concerns. To cite a few examples, conditions such as smoke, unexpected cloud cover, or snow could result in loss of solar resources.

⁵ *Petition of NERC for Approval of Proposed Reliability Standards EOP-011-2, IRO-010-4, and TOP-003-5*, Docket No. RD21-5-000 (Jun. 17, 2021).

⁶ *N. Am. Elec. Reliability Corp.*, 176 FERC ¶ 61,119 (Aug. 24, 2021).

⁷ Reliability Standard TPL-001-4 – Transmission System Planning Performance Requirements, <https://www.nerc.com/pa/Stand/Reliability%20Standards/TPL-001-4.pdf>. In January 2020, the Commission issued Order No. 867 approving Reliability Standard TPL-001-5. See *Transmission Planning Reliability Standard TPL-001-5*, Order No. 867, 170 FERC ¶ 61,030 (2020). Reliability Standard TPL-001-5 will become effective in accordance with its phased-in implementation plan on July 1, 2023.

Conditions involving a loss of wind could result in loss of wind generator resources. For natural gas generators, some conditions that could lead to loss of resources include those that can cause wellhead, processing plant, or compressor station freezing, ambient temperature conditions that are outside the operating temperatures for the plant, or damage or freezing to plant equipment. These severe weather events should be evaluated to determine their likelihood and impact. Further, these severe weather events may need to be added as performance planning events in the TPL-001-4 Reliability Standard, rather than extreme events, with their potential reliability impacts mitigated through corrective action plans.

NERC's assessments and the results of the FERC/ERO Enterprise joint inquiry into the causes of the February 2021 cold weather event may provide additional considerations for Reliability Standards enhancements in the operational planning (i.e. one day to one year ahead) timeframe. Such enhancements could include, for example:

- Reliability Standard requirements that determine the ambient temperature and weather conditions to which plants must weatherize.
- Reliability Standard requirements for the Generator Owner to identify and implement freeze protection measures for cold-weather-critical components and systems, and for Generator Owners to develop and implement Corrective Action Plans when their facilities experience outages, failures to start, or derates due to freezing.
- Reliability Standard requirements that better account for expected generator availability during cold weather, taking into account factors such as contractual arrangements for natural gas supply.
- Reliability Standard requirements to protect critical natural gas infrastructure from manual and automatic load shedding, to avoid adversely affecting bulk-power system reliability.
- Reliability Standard requirements for the Reliability Coordinator or Balancing Authority to develop seasonal emergency energy management plans, to address conditions such as wildfires, extreme hot and cold temperatures, and severe storms (i.e. hurricanes).
- Reliability Standard requirements for the Reliability Coordinator to develop a rolling three week emergency energy management plan.

- Reliability Standard for the development of a Seasonal Energy Management Plan based on regional extreme weather scenarios, to be assessed as part of NERC’s seasonal assessments, and to include weatherization, fuel availability, projected unit maintenance, electric supply to gas wellheads and compressors, operating procedure, and so on; and a determination of the sources of energy and the degree of certainty with each source.

In examining potential Reliability Standards enhancements, NERC looks to those that can be applied using NERC’s principles for performance-based standards. NERC looks forward to reviewing the suggestions provided by commenters in this proceeding and the annual Reliability Technical Conference docket (Docket No. AD21-11-000) regarding Reliability Standards enhancements that may help address the reliability risks posed by extreme weather.

D. Question 9 Regarding Alternative Resource Planning Approaches to the Use of the 1 Day in 10-year Loss of Load Expectation Standard.

Question 9 of the August 11 Notice seeks comment on the following (internal citations omitted):

Multiple panelists at the conference suggested that the current reliance on the 1 day in 10-year Loss of Load Expectation is outmoded. Are there alternative resource adequacy planning approaches that could be more robust alternatives to the use of the 1 day in 10-year Loss of Load Expectation standard? Please describe such alternatives, including describing whether such alternatives have been used either in the United States or elsewhere.

NERC comments on this question as follows. In 2021, NERC formed the Energy Reliability Assessment Task Force (“ERATF”) to assess risks associated with unassured energy supplies, including the inconsistent output from variable renewable energy resources, fuel location, and volatility in forecasted load, which can result in insufficient amounts of energy on the system to serve electrical demand. A key charge of this group will be to address energy availability concerns related to operations, operations planning (i.e. one day to one year), and the mid-to long-

term (i.e. one to five years) planning horizons that were identified in the December 2020 white paper titled *Ensuring Energy Adequacy with Energy Constrained Resources*.⁸

In the December 2020 white paper, NERC recommended that energy limitations be incorporated into the electric power resource adequacy models to more accurately estimate the key adequacy metrics, such as loss-of-load expectation, loss-of-load hours, and expected unserved energy. An important feature of integrating the suggested analyses with existing tools is the ability to incorporate operational solutions (e.g., demand response, voltage reduction, and public appeals) into the planning models. Using studies that consider cross-energy sector impacts and limitations, such as incorporating fuel or pipeline infrastructure limitations into probability-based resource adequacy models, will provide an accurate representation of risk which can then aid in the identification of risk-based planning solutions.

NERC further recommended that cross-energy sector studies include agreed-upon study criteria between the sectors on what it means to be reliable and what are the implications on resilience.⁹ This is important as one sector may have a view of reliability that does not translate into other dependent sectors; for example, whether sustaining the loss of a large natural gas storage field be considered a credible event impacting reliability that should be addressed by both the natural gas and electric sectors. Additionally, agreement is needed on contingencies impacting fuel transportation or severe weather event scenarios that impact multiple energy sectors. (Such contingencies may translate into future standard development work as noted in NERC's comments in the preceding section.)

⁸ NERC, *Ensuring Energy Adequacy with Energy Constrained Resources* (December 2020), available at <https://www.nerc.com/comm/RSTC/ERATF/ERATF%20Energy%20Adequacy%20White%20Paper.pdf>.

⁹ See NERC Reliability Issues Steering Committee, *Report on Resilience* (Nov. 2018), available at https://www.nerc.com/comm/RISC/Related%20Files%20DL/RISC%20Resilience%20Report_Approved_RISC_Committee_November_8_2018_Board_Accepted.pdf.

Among other tasks, the ERATF is charged with identifying the parameters for tools and methods that can identify that the right mix of resources is available to ensure sufficient amounts of energy are available to serve demand, meet ramping requirements at all times, and ensure the required energy can be delivered from the source to the end user. The ERATF will gather industry feedback and insights and provide recommendations for further action. NERC encourages Commission staff and stakeholders to participate in the activities of the ERATF and looks forward to reviewing the suggested approaches of other commenters in this proceeding.

II. CONCLUSION

NERC thanks the Commission and Commission staff for the opportunity to submit post-technical conference comments in this proceeding and respectfully requests that these comments be accepted for consideration.

Respectfully submitted,

/s/ Lauren A. Perotti

Lauren A. Perotti
Senior Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099 – facsimile
lauren.perotti@nerc.net

*Counsel for the North American Electric
Reliability Corporation*

Date: September 24, 2021

CERTIFICATE OF SERVICE

I hereby certify that I have served a copy of the foregoing document upon all parties listed on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, D.C. this 24th day of September, 2021.

/s/ Lauren A. Perotti

Lauren A. Perotti

*Counsel for the North American Electric
Reliability Corporation*