

impacts from extreme weather, the ERO Enterprise agrees that such studies can help entities better prepare for and mitigate some of the resulting risks. The ERO Enterprise therefore supports revising Reliability Standard TPL-001-5.1 to better address extreme heat and cold conditions in transmission planning studies. In issuing a final rule in this proceeding, the Commission should provide ample flexibility to NERC to determine how to best address the reliability concerns identified in the NOPR through NERC's open and inclusive, consensus-driven standard development process.

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II. SUMMARY OF THE NOPR

In the NOPR, the Commission proposes to direct NERC, the Commission-certified Electric Reliability Organization,⁴ to revise Reliability Standard TPL-001-5.1 (Transmission System Planning Performance Requirements) to address reliability concerns pertaining to transmission system planning for extreme heat and cold weather events that affect the reliable operation of the Bulk-Power System.⁵ Preliminarily finding that a reliability gap exists in Reliability Standard TPL-001-5.1 with respect to a lack of long-term planning requirement for extreme heat and cold

⁴ NERC was certified by the Commission as the ERO, pursuant to Section 215(c) of the Federal Power Act, by Commission order issued July 20, 2006. *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006).

⁵ NOPR at P 47.

weather events,⁶ the Commission proposes to direct NERC to develop standards modifications to require:

1. the development of benchmark planning cases based on information such as major prior extreme heat and cold weather events or future metrological projections, along with system performance requirements for such events;⁷
2. the study of extreme heat and cold conditions using steady state and transient stability analyses expected to cover a range of extreme weather scenarios including the expected generation resource mix's availability during extreme weather conditions and the broad impacts of extreme weather, and addressing the following six points:⁸
 - a. steady state and transient stability analysis;
 - b. transmission planning studies of wide area issues;
 - c. concurrent generator and transmission outages;
 - d. sensitivity analysis;
 - e. consideration of modifications to the traditional planning approach (such as inclusion of probabilistic approaches into studies);
 - f. coordination among planning coordinators and transmission planners and sharing of results; and
3. the development of Corrective Action Plans ("CAPs") that include mitigation for any instances where system performance requirements during extreme heat and cold events are not met.⁹

Related to its proposal, the Commission seeks comment on whether currently effective Reliability Standard MOD-032-1 (Data for Power System Modeling and Analysis) is sufficient to ensure that planning entities would have the necessary data to perform their analyses.¹⁰

⁶ *Id.*

⁷ *Id.* at PP 47, 50-56. The Commission emphasizes the need for consistency in these benchmarks given that the same types of extreme weather events are likely to affect multiple planning areas.

⁸ *Id.* at PP 47, 57-82.

⁹ *Id.* at P 83. The *Glossary of Terms used in NERC Reliability Standards* defines a Corrective Action Plan as "a list of actions and an associated timetable for implementation to remedy a specific problem."

¹⁰ *Id.* at P 63.

Additionally, the Commission seeks comment on whether drought or other extreme weather conditions (e.g. tornadoes or hurricanes) should be within the scope of the final rule.¹¹

The Commission proposes to direct the ERO to submit a revised standard addressing the reliability concerns identified in the NOPR within one year of the effective date of a final order, with an implementation plan specifying compliance with the revised standard beginning no later than one year after Commission approval.¹² The Commission seeks comments on its proposals.

III. ERO ENTERPRISE COMMENTS

The ERO Enterprise supports the Commission's efforts to strengthen the reliability of the Bulk-Power System by addressing the risks posed by extreme heat and cold weather conditions. Multiple events of the last decade have demonstrated the impacts extreme heat and cold can have on reliability, and the grid's resource mix continues to transform to one that is more susceptible to extreme weather. Understanding and addressing the reliability risks posed by these extreme hot and cold conditions has been a high priority of the ERO Enterprise, as demonstrated through its recent work on reliability assessments,¹³ the joint investigation with Commission staff into the causes of the February 2021 cold weather event affecting Texas and the Southwestern United States,¹⁴ two standard development projects addressing cold weather preparedness and

¹¹ *Id.* at PP 90-93.

¹² *Id.* at P 48.

¹³ NERC's Reliability Assessments are available on NERC's webpage at <https://www.nerc.com/pa/RAPA/ra/Pages/default.aspx>.

¹⁴ *See* FERC, NERC, and the Regional Entity Staff Report, *The February 2021 Cold Weather Outages in Texas and the South Central United States* (Nov. 2021), <https://www.ferc.gov/media/february-2021-cold-weather-outages-texas-and-south-central-united-states-ferc-nerc-and>.

operations,¹⁵ a 2021 NERC alert regarding cold weather preparedness,¹⁶ the ongoing work of the NERC Energy Reliability Assessment Task Force,¹⁷ and other entity outreach efforts.

The ERO Enterprise supports the Commission’s attention to the role Reliability Standards for long-term transmission planning can play in helping to address the risks posed by extreme heat and cold conditions, and offers the following comments for the Commission’s consideration.

A. The ERO Enterprise Supports Revising Reliability Standard TPL-001-5.1 to Address Extreme Heat and Cold.

The ERO Enterprise supports revising Reliability Standard TPL-001-5.1, or in the alternative developing a new transmission planning Reliability Standard, to better account for the risks posed by extreme heat and cold weather conditions. During the 2021 Climate Change, Extreme Weather, and Electric System Reliability technical conference proceeding, NERC remarked on the need to revisit the TPL-001 Reliability Standard to better address the risks posed by extreme weather and associated common mode failures impacting resource availability and the transmission system, including consideration of requiring Corrective Action Plans for system performance issues identified through extreme heat and cold weather studies.¹⁸ The currently

¹⁵ These projects are Project 2019-06 Cold Weather, resulting in the Cold Weather Reliability Standards approved by the Commission in 2021 (see *infra* n. 20), and Project 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination, initiated to address the recommendations of the FERC, NERC, and the Regional Entity Staff Report, *The February 2021 Cold Weather Outages in Texas and the South Central United States* (Nov. 2021). More information on Project 2021-07 is available at <https://www.nerc.com/pa/Stand/Pages/Project-2021-07-ExtremeColdWeather.aspx>.

¹⁶ NERC, *Recommendation to Industry: Cold Weather Preparedness for Extreme Weather Events* (Aug. 18, 2021), <https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20R-2021-08-18-01%20Extreme%20Cold%20Weather%20Events.pdf>.

¹⁷ More information regarding the Energy Reliability Assessment Task Force is available at <https://www.nerc.com/comm/RSTC/Pages/ERATF.aspx>.

¹⁸ See *Post-Technical Conference Comments of the North American Electric Reliability Corporation, Climate Change, Extreme Weather, and Electric System Reliability*, Docket No. AD21-13-000 (Sep. 24, 2021). Reliability Standard TPL-001-5.1 distinguishes between the mitigation that is required for system performance issues identified through study of “planning events”, described in Table 1 to the standard, and “extreme events,” described in Table 2 to the standard. For “planning events”, or “Table 1” events, an entity must develop a Corrective Action Plan if studies indicate system planning performance requirements are not met. For “extreme events,” or “Table 2 events,” an entity must perform an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences of the event if studies indicate that there will be Cascading.

effective TPL-001 Reliability Standard, TPL-001-4, and the approved successor standard Reliability Standard TPL-001-5.1, require Transmission Planners and Planning Coordinators to evaluate, as part of extreme event steady state analysis, wide area events affecting the Transmission System, which may include loss of two generating stations resulting from conditions such as wildfires or extreme weather, or other events based on operating experience that may result in wide area disturbances. Entities are not required to develop Corrective Action Plans to address any system performance issues identified through these studies. This approach was appropriate at the time the TPL-001 Reliability Standard and its predecessor standards were initially developed, as it was representative of the ubiquitous central-station resource mix at the time. However, the grid is transforming to one which is more decentralized, with higher sensitivity to weather conditions. Thus, there is opportunity to improve the TPL-001 Reliability Standard to better account for the demonstrated impacts of extreme heat and cold weather on the transforming grid, and to require entities to take corrective actions when studies indicate system performance issues as a result of these conditions.

As the Commission recognizes, long-term transmission planning studies cannot remedy all reliability impacts from extreme heat and cold conditions.¹⁹ Resource planning must play an important role. Operations planning and preparedness requirements, such as those found in the Cold Weather Reliability Standards approved by the Commission in 2021,²⁰ also play an important role. However, enhanced transmission planning study requirements would help planners understand the limitations of the transmission system and resource availability under extreme heat

¹⁹ See NOPR at P 38 (“System planning measures alone will not eliminate the reliability risk associated with extreme heat and cold events.”).

²⁰ *N. Am. Elec. Reliability Corp.*, 176 FERC ¶ 61,119 (2021) (approving 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)).

and cold conditions, enabling them to take steps ahead of time that would help minimize the potential impacts of such events and document the need for controlled load shed where appropriate.²¹ Given the demonstrated risks to reliability, the ERO Enterprise agrees that mandatory Reliability Standards that clearly address long-term transmission planning for extreme heat and cold conditions is both necessary and appropriate.

As the ERO, NERC is well positioned to develop technically sound, consensus Reliability Standard requirements for extreme heat and cold transmission planning studies through its open and inclusive standards development process. Accordingly, the Commission should provide ample flexibility to NERC to determine how to best address the considerations discussed in the NOPR in any final rule issued in this proceeding. With the need for flexibility being front of mind, the ERO Enterprise offers comments on several aspects of the NOPR proposals for the Commission's consideration, to better inform a final rule in this proceeding.

Proposed Benchmark Approach. The NOPR proposes that the ERO employ a benchmark-based approach, using information from previous extreme heat or cold events or future climate or meteorological projections, to promote consistency in transmission planning studies for extreme heat and cold conditions among similarly situated entities. The NOPR proposes that the ERO have flexibility in how it implements that approach.²² The ERO Enterprise notes that significant work would be required to develop the necessary technical foundation for a uniform planning approach that properly accounts for regional differences in climate and weather patterns and other relevant considerations. The ERO Enterprise therefore agrees that NERC should have flexibility in how it

²¹ NOPR at P 51.

²² *Id.* at PP 50-53.

ultimately structures the resulting Reliability Standard requirements, and that NERC should not be limited to consideration of only the example approaches identified in the NOPR.

Study Framework. The NOPR proposes that NERC develop a Reliability Standard that requires planning for extreme heat and cold events using steady-state and transient stability analyses expanded to cover a range of extreme weather scenarios including the expected resource mix's availability during extreme heat and cold weather conditions, and including the broad area impacts of extreme heat and cold weather.²³ The ERO Enterprise generally supports consideration to these factors in a revised transmission planning Reliability Standard, and offers the following comments regarding specific items on which the Commission seeks comment. First, regarding assumptions for performing modeling and planning, the ERO Enterprise comments that some of the impacts of extreme weather do not result directly from hot and cold temperatures, but long-term widespread weather and environmental conditions that can impact resource availability or the transmission system itself. These long-term widespread conditions, including high winds, diminished winds, dust, smoke, fog, and increased cloud cover, should be considered appropriately in any required studies. For example, high winds in the Midwestern United States recently caused the loss of over 13,000 MW of wind generation, with the causes of the losses divided equally between high-speed cut-offs and loss of transmission. For scenarios such as this, the time component scenario is important (that is, time of year and duration of the conditions), and this should be factored into planning studies. Second, regarding opportunities to improve wide-area planning studies and coordination, including identifying which entities should be responsible for performing the coordination and related considerations,²⁴ the ERO Enterprise comments that a

²³ *Id.* at P 57.

²⁴ *Id.* at P 67.

registered entity subject to the Reliability Standard, such as a Planning Coordinator or Transmission Planner, should be responsible for performing any necessary work for wide area studies. The studies should be coordinated as appropriate for the area. The specific procedural details for coordination on wide area studies, however, do not need to be mandated in a Reliability Standard. Other coordination requirements, such as those related to sharing of study results and coordination for corrective actions across multiple Transmission Planner areas, can be addressed through the standard development process with consideration to any factors identified by the commenters in this proceeding.

Performance Requirements and Required Corrective Actions. The NOPR proposes that NERC incorporate performance requirements when developing study requirements for extreme heat and cold conditions,²⁵ and to require entities to develop corrective action plans that include mitigation for any instances where performance requirements for extreme heat and cold events are not met.²⁶ The ERO Enterprise agrees that any revised transmission planning Reliability Standard requiring the study of extreme heat and cold conditions (and other pertinent long-term widespread weather and environmental conditions) should have system performance requirements, consistent with other transmission planning Reliability Standards. The ERO Enterprise also agrees that any revised Reliability Standard directed under a final rule issued in this proceeding should require that entities develop Corrective Action Plans that include mitigation for instances where performance requirements for selected extreme weather and environmental conditions are not met for at least some of the planning scenarios. Such Corrective Action Plans could include planning for new transmission solutions or the types of actions identified by the Commission in the NOPR,

²⁵ *Id.* at P 55.

²⁶ *Id.* at P 83.

including operational strategies, additional contingency reserves, energy efficiency programs, examining interregional transfer capability (particularly as it relates to the ability to import power from neighboring regions), transmission switching/configuration, or adjusting outages.²⁷ Corrective Action Plans may also identify that, in some cases, some amount of controlled load shed may be required to maintain the stability of the system.²⁸

The ERO Enterprise submits that, in the final rule, the Commission should provide flexibility to NERC to consider a range of approaches to transmission planning for extreme weather and environmental conditions, including the development of scenarios which would constitute TPL-001 “Table 1 planning events” and for which Corrective Action Plans would be required if defined system performance requirements are not met, and the development of more extreme weather and environmental scenarios which would constitute TPL-001 “Table 2 extreme events” and for which an entity must evaluate possible actions to reduce the likelihood or mitigate the consequences of the events if studies indicate Cascading. Such an approach would be consistent with the risk-based framework for transmission planning studies in currently effective Reliability Standard TPL-001-5.1. To be clear, the ERO Enterprise agrees that Corrective Action Plans should be required for the more likely scenarios. There may be merit, however, to also considering requirements for the study of more severe, less likely scenarios to improve understanding of the potential reliability impacts, even if requiring entities to take corrective actions for those scenarios would not be cost effective or otherwise consistent with a risk-based framework for transmission system planning.

²⁷ See *id.* at P 84 for examples of potential corrective actions identified by the Commission.

²⁸ See *id.* at P 56 (“In establishing any proposed performance requirements, NERC should seek to prevent system instability, uncontrolled separation, and cascading outages. While load shedding could still occur during extreme heat and cold events to prevent instability, uncontrolled separation, and cascading, it should be minimized as much as possible.”)

B. The ERO Enterprise Supports a Risk-Based Approach to Including Other Extreme Weather Conditions in Transmission Planning Studies, with Consideration to Regional Differences.

The ERO Enterprise supports consideration of other extreme weather conditions beyond extreme heat and cold in the TPL-001 Reliability Standard, with proper consideration paid to regional differences regarding the types of extreme weather conditions to which the region is reasonably likely to face.²⁹ For some areas, particularly the western United States, long-term drought conditions should be considered in the scope of extreme weather impacts to be studied, due to impacts on generator cooling, availability of hydroelectric resources, and potential wildfire risk impacting both output from photovoltaic resources (due to smoke) and the transmission system. Other widespread, long duration extreme weather events, such as coastal flooding due to hurricanes, fog, extensive river flooding, smog, high or low wind conditions, icing issues, or extreme snowstorms, may be more appropriate for other regions of the United States. As noted above, there may be additional consideration to the long-term impacts of certain weather conditions and resulting effects on resource availability and the transmission system.

NERC's standard development process is well situated to developing technically sound, consensus approaches for addressing these factors and extreme weather scenarios in transmission planning studies, including identifying which of these scenarios should be studied as "Table 1 planning events" and which should be addressed as "Table 2 extreme events", consistent with the risk-based framework of the TPL-001 Reliability Standard. In issuing a final rule in this proceeding, the Commission should provide sufficient flexibility to the ERO to determine, through the standard development process, how these and other extreme weather factors should be addressed in any new or revised transmission planning Reliability Standard.

²⁹ *Id.* at P 92 (seeking comment on including planning for drought conditions within the scope of the final rule).

C. Reliability Standard MOD-032-1 Provides Entities with Authority to Request Data Needed for New Transmission Planning Studies.

Reliability Standard MOD-032-1 (Data for Power System Modeling and Analysis) requires planning entities to jointly develop steady-state, dynamics, and short circuiting modeling data requirements for the planning area that includes data listed in Attachment 1 to the standard, along with specifications addressing matters such as reporting format, detail, and periodicity. In the NOPR, the Commission notes the relationship between Reliability Standards MOD-032-1 (Data for Power System Modeling and Analysis) and TPL-001-5.1, and seeks comment on whether existing Reliability Standards “are sufficient to ensure that responsible entities performing studies of extreme heat and cold weather conditions have the necessary data, or whether the Commission should direct additional changes pursuant to FPA 215(d)(5) to address that issue.”³⁰ In response to this question, the ERO Enterprise comments that the Commission does not need to direct NERC to revise Reliability Standard MOD-032-1 to account for new data required for extreme heat and cold weather studies. Attachment 1 to the standard requires functional entities to provide “other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes” for each of the three types of data required (steady-state, dynamics, and short circuit). Planning Coordinators and Transmission Planners are empowered to use this provision to request any specific data needed for studies of extreme heat and cold conditions.

To the extent NERC’s stakeholders identify that specific revisions would be beneficial for reliability, those revisions could be included in the scope of a TPL-001 revision project; however, the Commission does not need to direct revisions to Reliability Standard MOD-032-1 to account for any new extreme heat and cold study requirements at this time.

³⁰ *Id.* at P 63.

D. The Commission Should Coordinate the Timing of a Final Rule in this Proceeding with a Final Rule in the *One-Time Informational Reports on Extreme Weather Vulnerability Assessments* Proceeding.

In the NOPR, the Commission has proposed to direct NERC to submit a revised TPL-001 Reliability Standard addressing the extreme heat and cold weather study considerations within one year of a final rule issued in this proceeding.³¹ In a separate proceeding (Docket Nos. RM22-16-000 and AD21-13-000), the Commission has proposed to direct one-time informational reports from transmission providers describing their current or planned policies and processes for conducting extreme weather vulnerability assessments.³² This information regarding current industry practices and procedures, particularly as they relate to reliability, may prove useful to the NERC standard development process. Accordingly, the Commission should consider coordinating the timing of any final rule(s) and required actions in the two proceedings so as to allow NERC's process to benefit from any filings transmission providers are required to submit.

E. The Commission Should Clarify its Implementation Deadline Proposal in Any Final Rule Issued in this Proceeding.

In the NOPR, the Commission proposes to direct NERC to have “compliance obligations for all proposed new or modified Reliability Standards beginning no later than 12 months from the date of Commission approval” of any proposed new or modified standard.³³ If the Commission is inclined to include this implementation deadline proposal in a final rule issued in this proceeding, the ERO Enterprise respectfully requests that the Commission clarify its expectation regarding the “one year” timeframe. That is, whether entities must begin to comply with all new study requirements within one year of Commission approval (i.e. completed studies with Corrective

³¹ NOPR at P 48.

³² *One-Time Informational Reports on Extreme Weather Vulnerability Assessments Climate Change, Extreme Weather, and Electric System Reliability*, Notice of Proposed Rulemaking, 179 FERC 61,196 (2022) (Dockets No. RM22-16-000 and AD21-13-000).

³³ NOPR at P 48.

Action Plans developed), or whether a phased-in approach beginning no later than one year is permitted for entities to coordinate on the development of new models, collect new data, and perform the necessary coordination to study wide area impacts before completing studies and developing any associated Corrective Action Plans. The latter approach is consistent with how NERC has previously approached implementation for new and revised transmission planning requirements in the TPL-001 and TPL-007 Reliability Standards.

IV. CONCLUSION

The ERO Enterprise supports the Commission's efforts to strengthen the reliability of the Bulk-Power System by addressing the risks posed by extreme heat and cold weather conditions, and it supports modifying Reliability Standard TPL-001-5.1, or in the alternative developing a new Reliability Standard, to better account for these risks in transmission planning studies. NERC's open and inclusive stakeholder process is well positioned to develop cost effective, consensus Reliability Standard requirements addressing the concerns identified in the NOPR. The ERO Enterprise appreciates the opportunity to provide comments in this proceeding.

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