

Summary Response to SAR Comments

NERC Project 2023-07 Transmission System Planning Performance Requirements for Extreme Weather October 2023

Comments Received Summary

There were 31 sets of responses, including comments from approximately 93 different people from approximately 81 companies representing 10 of the Industry Segments as shown in the table on the following pages.

A summary of comments submitted can be reviewed on the [project page](#). If you have an interest in joining the distribution list for this project, please reach out to standards developer, [Jordan Mallory](#).

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel there has been an error or omission, you can contact Director of Standards [Latrice Harkness](#) (via email) or at (404) 446-9728.

Consideration of Comments

The NERC Project 2023-07 thanks all of industry for your time and comments. The standard drafting team (SDT) feels that many great points have been provided for the SDT to consider during the drafting phase of this project. High level themes received from industry are located below (bolded is the high-level theme followed by the SDT's response).

Addressed in TPL-001-5.1

FERC Order 896 Paragraph 5 states: "...Reliability Standard TPL-001-5.1 was developed to establish transmission system planning performance requirements that ensure that the Bulk-Power System operates reliably over a broad spectrum of system conditions and following a wide range of probable contingencies. Both it and its successor, TPL-001-5.1, include provisions for transmission planners and planning coordinators to study system performance under extreme events based on their experience; however, neither standard specifically requires entities to conduct performance analysis for extreme heat and cold weather, despite the fact that such conditions have clearly demonstrated a risk to the Reliable Operation of the Bulk-Power System, thus leaving a reliability gap in system planning." To address the reliability gap, FERC has directed NERC to modify an existing or create a new Reliability Standard by December 2024.

Confine scope of project where extreme weather will be experienced and consider regional variances.

Paragraph 3 of FERC Order 896, which states: "...planners cannot simply project historical weather patterns forward to effectively forecast the future, since climate change has made the use of historical weather observations no longer representative of future conditions. For example, extreme summer heat in regions like the Pacific Northwest and extreme winter cold in regions like Texas have increased demand for electricity at times when historically demand has been low. As events such as these will likely continue to

present challenges in the future, transmission planners and planning coordinators must account for this new reality in their planning processes." The SAR has been drafted at an appropriate level to ensure all regions are prepared for continued future climate change and/or the SDT has the flexibility to draft regional variances should the team decide this route is needed.

Guidance on extreme heat and cold weather events

The SDT will focus on extreme heat and extreme cold weather conditions during this project. Please see FERC Order 896 for additional details regarding examples and further details on extreme heat and extreme cold weather. Order No. 896, Transmission System Planning Performance Requirements for Extreme Weather, 183 FERC ¶ 61,191 (2023), available at [FERC Order 896 \(link\)](#).

Specifically, Paragraph 2: "We take this action to address challenges associated with planning for extreme heat and cold weather events, particularly those that occur during periods when the Bulk-Power System must meet unexpectedly high demand. Extreme heat and cold weather events have occurred with greater frequency in recent years and are projected to occur with even greater frequency in the future. These events have shown that load shed during extreme temperature results in unacceptable risk to life and have extreme economic impact. As such, the impact of concurrent failures of Bulk-Power System generation and transmission equipment and the potential for cascading outages that may be caused by extreme heat and cold weather events should be studied and corrective actions should be identified and implemented." The SDT will take your comment into consideration during the drafting phase of this project."

In addition, paragraphs 20–24 in FERC Order 896 provide examples of the major extreme heat and extreme cold weather.

"Extreme weather-related events that spread across large portions of the country over the past decade demonstrate the challenges to transmission planning from extreme heat and cold weather patterns. The NOPR discussed seven major extreme heat and cold weather events that had occurred since 2011. Of these, four (2011, 2013, 2018, and 2021) were extreme cold weather events that nearly caused system collapse if the operators had not acted to shed load. The remaining three events (2014, 2020, and 2021) were extreme heat weather events that resulted in generation losses and varying degrees of load shedding. Since the issuance of the NOPR, another extreme cold weather event indicated reliability challenges faced by the Bulk-Power System. In December 2022, Winter Storm Elliott caused extreme cold conditions that significantly stressed the Bulk-Power System, forcing some utilities to deploy rolling blackouts to preserve Bulk-Power System reliability. These extreme heat and cold events demonstrate a risk to Reliable Operation of the Bulk-Power System. These conditions have created an urgency to address the negative impact of extreme weather on the reliability of the Bulk-Power System. To that end, the directives to NERC in this final rule aim to improve system planning specifically for extreme heat and cold weather events. The potential impact of widespread extreme heat and cold events on the reliability of the Bulk-Power System can be modeled and studied in advance as part of near-term and long-term transmission system planning. Responsible entities could then use the studies to develop transmission system operational strategies or corrective action plans with mitigations that could be deployed in preparation for extreme heat and cold events. The current transmission planning Reliability Standards, however, do not obligate transmission planners and planning coordinators to consider

extreme hot and cold weather in their transmission assessments. In particular, Reliability Standard TPL-001-5.1 requires steady state and stability analyses to be performed for certain extreme events but does not require steady state and stability analyses for extreme heat and cold conditions. Likewise, while Reliability Standard TPL-001-5.1 Table 1, provisions 2.f (stability) and 3.b (steady state), requires responsible entities to study events based on operating experience that may result in a wide-area disturbance, the Standard does not specify the study of extreme heat or cold conditions. While wide-area extreme heat and cold weather events may not occur every year, their frequency and magnitude are expected to increase. The National Oceanic and Atmospheric Administration’s (NOAA) data and analyses show an increasing trend in extreme heat and cold weather events, and the U.S. Environmental Protection Agency climate change indicators also show upward trends in heatwave frequency, duration, and intensity. NOAA states that climate change is also driving more compound events, i.e., multiple extreme events occurring simultaneously or successively, such as concurrent heat waves and droughts, and more extreme heat conditions in cities.”

Narrow scope to focus on extreme cold weather and lesser extend heat

NERC was directed to address extreme cold and extreme heat weather events. Based on the events stated in the FERC Order, the SDT determined that the SAR is drafted at the appropriate level regarding the extent of extreme heat events to be addressed during the drafting phase of this project. See FERC Order 896 Paragraph 20:

“...The remaining three events (2014, 2020, and 2021) were extreme heat weather events that resulted in generation losses and varying degrees of load shedding.”

Consider a new standard.

The team will consider all possible paths during the drafting phase of this project. A new standard will be a part of that consideration.

Revise TPL-001

The team will consider all possible paths during the drafting phase of this project. Revisions to TPL-001 will be part of that consideration.

Consider how GMD (TPL-007) was drafted for the layout of this standard.

The team will consider all possible paths during the drafting phase of this project and will take a look at how TPL-007 was drafted as guidance.

Use FERC/NERC reports and regional analysis.

The SDT will use the FERC/NERC report and other analysis/reports to assist with data gathering and determination of drafting requirements and/or determining benchmarks.

Consider alignment methods, terminology, and timeframes in EOP-012 standard.

The SDT will consider methods, terminology, and timeframes in EOP-012 standard during the drafting phase of this project.

Avoid one size fits all standard.

The SDT acknowledges that a one size fits all may be complicated when it comes to weather condition assessments and will consider this during the drafting phase of this project.

Frequency of event (1 in 25-year event)

Duration of frequency will be discussed and determined by the SDT during the drafting phase of this project.

Reach out to RTO/ISO, National Laboratories, NOAA, and other agencies.

The SDT plans to involve the respective agencies to assist in discussion around meteorological projections and/or other respective areas when it comes to developing suggested benchmarks for this project.

Use extreme heat or cold weather conditions rather than extreme events.

The SDT will consider usage of terms during the drafting phase of this project.

Consider realistic schedules for data preparation and performing of the scenario planning study.

The SDT will consider preparation and performing schedules during the drafting phase of this project.

Various recommendations on 1 in 10 load scenario, specific criteria as to what constitutes extreme weather demand (example, demand expected at a 90-10 weather scenario, or a once in 31-year weather, or a 3 standard deviation weather temperature or demand expected in a 90-10 weather scenario, once in 31-year weather, or a 3-standard deviation in weather temperature), etc.

The SDT will consider all these recommendations during the drafting phase of this project.

Define "benchmark event" and/or "wide area"

Possible NERC glossary of terms like "benchmark event" or "wide area," etc. will be discussed and determined by the SDT during the drafting phase of this project.

Other extreme weather events (i.e., wind, wildfire, hurricanes, humidity, etc.)

Due to the tight turnaround of this project, this SDT will keep its focus on extreme heat and extreme cold weather. Notes will be taken regarding other extreme weather discussed during this project. Additional considerations outside of this scope can be considered for a later drafting team. Lastly, there is nothing that precludes an entity from studying extreme events that would pose a risk to the BPS.

Narrow scope to BES instead of BPS

The SDT determined to keep the scope of extreme heat and extreme cold weather events to what FERC Order 896 focuses on, which is the BPS. See Paragraph 1 of FERC Order 896.

“...the Commission directs the North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization (ERO), to submit a new Reliability Standard or modifications to Reliability Standard TPL-001-5.1 that addresses concerns pertaining to transmission

system planning for extreme heat and cold weather events that impact the Reliable Operation¹ of the Bulk-Power System.²”

Overlap with other TPL SDT

Each SDT has been provided with a scope of work, which does not overlap with one another. This team will focus on drafting requirements that focus on benchmarking planning for extreme heat and extreme cold events. The Standards Developers are in close coordination with one another as modifications are made to the TPL standards.

Lead by PCs with input from TPs. Avoid piling on too many coincident improbable contingencies which would not produce useful results.

The SDT will take this into consideration during the drafting phase of this project.

TOs and GOs input to contingency development.

The SDT will take this into consideration during the drafting phase of this project.

Standard should specify scenarios.

The SDT will take this into consideration during the drafting phase of this project.

Limit sensitivity to the most impactful scenarios within the planning region.

Consistent with your comment, in FERC Order 896, the Commission states: "We also direct NERC to include in the Reliability Standard the framework and criteria that responsible entities shall use to develop from the relevant benchmark event planning cases to represent potential weather-related contingencies (e.g., concurrent/correlated generation and transmission outages, derates) and expected future conditions of the system such as changes in load, transfers, and generation resource mix, and impacts on generators sensitive to extreme heat or cold, due to the weather conditions indicated in the benchmark events."

Limiting considerations to specific seasonal conditions conflicts with the directive that both extreme heat and cold weather events should be considered. The SDT will consider these variants (sensitivities) into account during the drafting phase of this project.

Extreme weather variant definition flexibility needed to allow PC and TP to utilize judgment.

The SDT will take this into consideration during the drafting phase of this project.

Consider CAPs for 300 kV and above.

The SDT will take this into consideration during the drafting phase of this project.

CAPs should be for several independent contingencies, rather than one specific contingency.

¹ The FPA defines "Reliable Operation" as "operating the elements of the Bulk-Power System within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements." 16 U.S.C. 824o(a)(4).

² The Bulk-Power System is defined in the FPA as "facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof), and electric energy from generating facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy." *Id.* 824o(a)(1).

The SDT will take this into consideration during the drafting phase of this project.

Inconsistency with SAR - identifies CAPs are required to prevent cascading and thermal overloads. Cascading is consistent with TPL-001, but thermal overloads are not.

The SDT sought clarification from the folks who drafted this project's SAR. This project is to focus on events that could trigger cascading conditions.

Expand on "cost impacts" in SAR - performing analysis or CAPs. Per SAR, cost is unknown and will be considered by SDT.

The SDT will take this into consideration during the drafting phase of this project.