UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Transmission System Planning Performance Requirements for Extreme Weather	))	Docket No. RM22-10-000

INITIAL COMMENTS OF THE ENVIRONMENTAL DEFENSE FUND

The Environmental Defense Fund ("EDF") appreciates the opportunity to submit these Initial Comments in response to the Federal Energy Regulatory Commission's ("FERC" or "Commission") June 16, 2022 Notice of Proposed Rulemaking ("NOPR") in the above-captioned proceeding. In these Initial Comments, EDF supports the Commission's proposal to direct the North American Electric Reliability Corporation ("NERC") to update Reliability Standard TPL-001-5.1 and recommends enhancements to the Commission's proposal, including to ensure that responsible entities conduct thorough reviews and planning regarding extreme weather events, to address the need for expeditious action to address identified reliability risks, and to recognize the particular role that increased interregional transfer capability can play in addressing extreme weather reliability risks. In support thereof, EDF states as follows:

I. INTRODUCTION

The present risk of reliability failures proves that the grid's current configuration and operations are not adequate to maintain reliability. There is increasing recognition of the fact that extreme weather events are occurring at rate that exacerbate threats to electric reliability. Commission action is necessary to develop updated rules and policies that ameliorate those threats and ensure a reliable grid. The NOPR proposes to correct significant gaps in identifying and addressing reliability risks: first, while current rules have some requirements related to considering wildfire and storm-related reliability risks, they do not require consideration of extreme heat and cold risks; second, current rules and processes allow for reliability entities to simply project historical weather patterns going forward, but climate change and the grid's current configuration and operations require the use of forecasting rather than simply historical weather observations to accurately represent future conditions. The increasing frequency and severity of extreme weather events will result in reliability risks that occur more often and require different solutions than historical averages suggest. However, current reliability planning rules do not require consideration of extreme weather scenarios even based on events that have already happened, such as Winter Storm Uri and the unprecedented heatwaves of Summer 2022, nor the likelihood that such events will occur with increasing frequency and become more severe in the future. The way the transmission system is planned must evolve to ensure that the grid is capable of performing reliably when exposed to these types of events. Updating NERC reliability standards, as proposed in the NOPR, is an important step in that evolution, and EDF commends the Commission on initiating this process.

The proposals in the NOPR, although necessary, are not sufficient to address the comprehensive set of risks and threats caused by the grid's inability to respond to extreme heat and cold weather events. As observed by the Commission, "[s]ince 2011, the country has experienced at least seven major extreme heat and cold weather events, all of which put stress on the Bulk-Power System, and resulted in some degree of load shed, and in some cases nearly caused system collapse and uncontrolled blackout, which were only avoided via the actions of system operations."[1] Most recently, Winter Storm Uri serves as a cautionary tale of the astronomical costs and unacceptable loss of human life these extreme events can produce. It also painfully highlights the reasonable, no-regrets solutions that could have been in place to avert such a disaster in the first place. In the western United States, the electric system has been

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[1] NOPR at P 4.

repeatedly impacted by the worst wildfires in a generation, with greater severity and frequency than ever predicted. In large part, these wildfires are being caused by high wind events – winds far exceeding today's current planning standards – causing energized lines to be the cause of several major fires. These fires have been catastrophic—communities throughout the west are forever changed. It is imperative that these rules be updated accordingly.

Not only does the Commission have well-established legal authority to act to address the increased risk from extreme weather due to climate change, a growing list of stakeholders are urging FERC to take action—and highlighting the risks of inaction. The Government Accountability Office recommended that the Commission take steps to identify or assess climate change risks to the grid in order to ensure it is well-positioned to determine the actions needed to enhance resilience to those risks.[2] The Joint Federal-State Task Force on Electric Transmission discussed the "important" and "unique" role that the Commission must play in addressing these risks.[3]

Buried within the modest proposal to update NERC Reliability Standard TPL-001-5.1 is "encouragement" for NERC to establish "requirements that appropriately recognize the value of interregional transfer capability."[4] This tepid recommendation is not commensurate with the demonstrated value and benefits that increased interregional transfer capability can provide. Interregional transfer capability has a unique potential to improve resiliency against a wide

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2 United States Government Accountability Office, Electricity Grid Resilience – Climate Change is Expected to Have Far-reaching Effects and DOE and FERC Should Take Actions (March 10, 2021).

3 Fourth Meeting of Joint Federal-State Task Force on Electric Transmission, Docket No. AD21-15 Transcript at 8:12-14 (July 20, 2022) ("Tr.") at 55:13-14 and 55:18-19 (Michigan Chair Scripps).

4 NOPR at P 88.

variety of extreme weather events, particularly extreme heat and cold. As detailed below, study after study shows that the current lack of sufficient interregional transfer capability creates substantial costs and that increasing such capacity would create significant consumer savings, as well as enhancing reliability and creating other co-benefits. For these reasons, the Commission should adopt the proposal to require NERC to modify TPL-001-5.1 as set forth in the NOPR, with the additional suggestions offered by EDF below, and direct NERC to establish a minimum presumptive standard requiring every region to have interregional transfer capability of at least ten percent of its peak load, subject to modification based on the results of extreme weather planning exercises and resulting corrective action plans, updated every 10 years.[5]

II. BACKGROUND

A. Procedural History

On March 5, 2021, the Commission issued an initial Notice of Technical Conference, stating that Commission Staff would convene a technical conference to discuss issues surrounding the threat to electric system reliability posed by climate change and extreme weather events.[6] The technical conference was held on June 1 and 2, 2021. As summarized by the Commission, "there was consensus among panelists that planners cannot simply project historical weather patterns forward to effectively forecast the future, since climate change has

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5 Other stakeholders, including the Kansas Corporation Commission, have also expressed support for such a solution. Docket RM21-17, Initial Comments of the Kansas Corporation Commission (filed August 23, 2022); *see also* NOPR at pages 80-82 (Clements, concurring) (citing comments supporting increased interregional transfer capability, including minimum requirements).

6 March 5, 2021 Notice of Technical Conference, Docket No. AD21-13-000. The Commission issued a Supplemental Notice inviting pre-technical conference comments on March 15, 2021. March 15, 2021 Supplemental Notice of Technical Conference Inviting Comments, Docket No. AD21-13-000.

made the use of historical weather observations no longer representative of future conditions."[7] To address this gap, the Commission issued the NOPR on June 16, 2022.

Pursuant to Section 215(d)(5) of the Federal Power Act,[8] the Commission proposes to direct NERC to submit modifications to Reliability Standard TPL-001-5.1 (Transmission System Planning Performance Requirements) that address concerns pertaining to transmission system planning for extreme heat or cold weather events that impact the reliable operation of the Bulk-Power System. Specifically, the Commission proposes to direct NERC to develop modifications to Reliability Standard TPL-001-5.1 to require:

(1) development of benchmark planning cases based on information such as major prior extreme heat and cold weather events or future meteorological projections;

(2) 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; and

(3) corrective action plans that include mitigation for any instances where performance requirements for extreme heat and cold events are not met.[9]

The Commission declined to propose specific requirements but rather identified concerns that it believed should be addressed by NERC.[10]

B. Legal Authority

Section 215 of the Federal Power Act requires a Commission-certified Electric Reliability Organization ("ERO") (i.e., NERC) to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval. Reliability Standards may be enforced

[7] NOPR at P 3 (citing June 1, 2021 Tr. 30:2-3 (Chang), 31:12-18 (Lisa Barton, Executive Vice President/Chief Operating Officer, American Electric Power)).

[8] 16 U.S.C. § 824o(d)(5).

[9] NOPR at P 6.

[10] NOPR at P 6.

by the ERO, subject to Commission oversight, or by the Commission independently.[11] Pursuant to Section 215(d)(5) of the Federal Power Act, the Commission has the authority, upon its own motion or upon complaint, to order the ERO to submit to the Commission a proposed Reliability Standard or a modification to a Reliability Standard that addresses a specific matter if the Commission considers such a new or modified Reliability Standard appropriate to carry out Section 215 of the FPA.[12]

In addition to its authority under Section 215 of the Federal Power Act, the Commission also has authority to act pursuant to Sections 205 and 206 to address extreme weather events that not only place the reliability of electric service at risk but also implicate Commission-jurisdictional rates. As the Commission has recently recognized, "the consequences [of extreme weather] to the electric system have included rolling blackouts, more extensive service disruptions, limited transmission capacity, and damaged electric infrastructure. These types of impacts not only harm system reliability and strain the grid, but they also affect Commission-jurisdictional rates."[13]

The Commission need not look further than Winter Storm Uri for evidence of the connection between extreme weather and just and reasonable rates. During that event, power prices reached or exceeded $1,000/MWh in the Midcontinent Independent System Operator's

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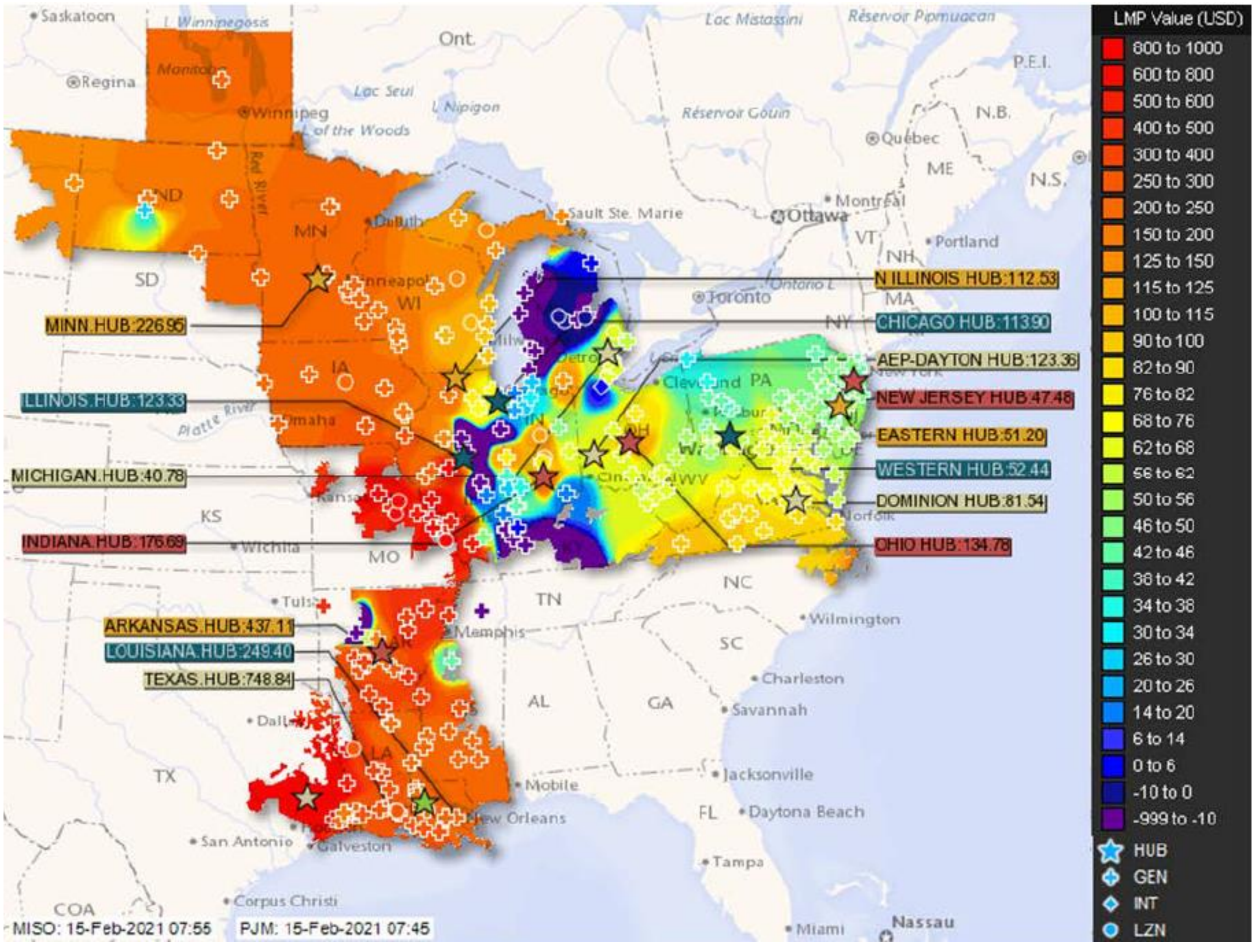
11 16 U.S.C. § 824o(e).

12 16 U.S.C. § 824o(d)(5).

13 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 at P 13 (2022).

("MISO") and Southwest Power Pool's ("SPP") respective footprints, as shown in the figure below.[14]



This figure establishes the clear nexus between extreme weather events and the Commission's responsibility to ensure just and reasonable rates under the Federal Power Act.

III. INITIAL COMMENTS

EDF supports FERC's proposal to require that NERC modify Reliability Standard TPL-001-5.1, including to provide for: (1) the development of benchmark planning cases; (2)

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14 Michael Goggin, Transmission Makes the Power System Resilient to Extreme Weather at figure 3 (July 2021), *available at* https://acore.org/wp-content/uploads/2021/07/GS_Resilient-Transmission_proof.pdf ("Resilient Transmission Study").

planning for extreme heat and cold events using steady state and transient stability analyses expanded to consider a range of extreme heat and cold weather scenarios; and (3) mandatory corrective action plans.[15] The Commission should modify its proposal to direct NERC to develop a framework for benchmark cases and scenarios, to include a broader range of extreme weather events, including but not limited to drought, and to ensure that planning exercises also incorporate changes in baseline temperatures and weather patterns due to climate change. Furthermore, the Commission should direct NERC to establish a minimum presumptive standard requiring every region to have interregional transfer capability of at least ten percent of its peak load, subject to modification based on the results of extreme weather planning exercises and resulting corrective action plans, updated every 10 years.

A. Increasingly Frequent and Severe Extreme Weather Events Create Severe Reliability Risks to the Transmission System and Associated Assets

The increase in frequency and severity of climate change impacts is creating new risk profiles for the electricity system, including direct impacts on the transmission system as well as impacts on the availability and performance of the generation resources that the transmission system depends on to serve load. The transmission system is vulnerable to a variety of climate change impacts, including:[16]

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15 *See* NOPR at P 47.

16 A range of possible effects to the Bulk Power System are further discussed in Justin Gundlach and Romany Webb, Climate Change Impacts on the Bulk Power System: Assessing Vulnerabilities and Planning for Resilience (2018), *available at* https://climate.law.columbia.edu/sites/default/files/content/docs/Gundlach-Webb-2018-02-CC-Bulk-Power-System.pdf; *see also* Melissa R Allen-Dumas et al., Extreme Weather and Climate Vulnerabilities of the Electric Grid: A Summary of Environmental Sensitivity Quantification Methods 9-13 (2019), *available at* https://www.energy.gov/sites/prod/files/2019/09/f67/Oak%20Ridge%20National%20Laboratory%20EIS%20Response.pdf.

- **Increasing average temperatures and extreme heat**: As noted in the NOPR, the transmission system is vulnerable to extreme heat events.[17] The frequency at which heat waves occur has already increased due to climate change—in the 1960s, there was an average of two heat waves per year across the country; during the 2010s, this number increased to six.[18] Heat waves are expected to increase in severity and frequency.[19] In addition to extreme heat events, average baseline temperatures are also increasing, and are expected to rise further in coming decades.[20] These higher temperatures can result in transmission line resistance, and in turn, lead to increased electricity losses during transmission.[21] Higher temperatures also accelerate the aging of transmission equipment and can cause lines to sag, potentially resulting in damage to the line and surrounding environment.[22] Extreme heat events also lead to significant increases in demand for electricity.

- **Extreme cold:** As detailed in the NOPR, extreme cold events have resulted in a number recent transmission failures in recent years.[23] Extreme cold events will remain regionally and locally important threats to the operation of electricity systems.[24] Extreme cold can damage transmission and distribution lines, impact fuel supplies, and increase electricity demand for heating, leading to power outages.[25]

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17 *See* NOPR at pages 20-21, 23-24, 26-28.

18 *Climate Change Indicators: Heat Waves*, U.S. EPA, https://www.epa.gov/climate-indicators/climate-change-indicators-heat-waves (last visited Aug. 22, 2022).

19 R.S. Vose et al., Temperature Changes in the United States, in CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, Volume I 185 (D.J. Wuebbles et al. eds., 2017).

20 *Id.* (forecasting annual average temperatures are forecasted to increase by 2.5ºF between 2021 and 2050).

21 *See generally* Jayant Sathaye et al., Estimating Risk to California Energy Infrastructure from Projected Climate Change 27 (2011), https://doi.org/10.2172/1026811.

22 *Id.* at 25-26.

23 NOPR at pages 19-28, 45-47.

24 *See* Hans O-Portner et al., *Climate Change 2022: Impacts, Adaptation and Vulnerability*, in SIXTH ASSESSMENT REPORT (AR6) OF THE INTERGOVERNMENTAL PANEL CLIMATE CHANGE, SPM-7 at 6–27 (2022), *available at* https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_FinalDraft_FullReport.pdf. While study on climate change's influence on cold weather events continues, advancements in attribution science have allowed for researchers to identify potential links between Arctic warming and cold waves—such as the February 2021 event—in mid-latitude regions. *See, e.g.,* Judah Cohen et al., *Linking Arctic variability and change with extreme winter weather in the United States*, 373 SCIENCE 1116, 111–1121 (2021).

25 *See* NOPR at pages 19-28; Craig D. Zamuda et al., *Energy Supply, Delivery, and Demand, in* IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH

- **Storms, hurricanes, flooding, and sea-level rise:** Climate change is increasing the severity of hurricanes and heavy rainfall events, resulting in more flood events,[26] which damage transmission infrastructure. Infrastructure located on the coast or along inland waterways is at particular risk. The high winds associated with hurricanes can also result in significant damage to transmission infrastructure. During Hurricane Ida in 2021, 150-mile-per-hour winds damaged eight transmission lines used to deliver electricity to New Orleans, causing widespread outages.[27] In addition, sea-level rise can put infrastructure at risk of nuisance flooding (i.e., flooding that occurs during high tides), storm surge, and permanent inundation.[28] Sea levels along coastlines in the contiguous United States have increased by an average of 0.25-0.3 meters between 1920 and 2020.[29] Sea levels are expected to increase by the same amount again, on average, over the next thirty years (i.e., through 2050).[30]

- **Wildfire:** The western United States is particularly vulnerable to wildfire risk.[31] Climate change is expected to increase wildfire risk, which can damage or force the shutdown of

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NATIONAL CLIMATE ASSESSMENT, VOLUME II 174, 176 (D.R. Reidmiller et al. eds., 2018).

26 *See* Zamuda, *supra* note 25, at 179-181, 191; *see also* U.S. Dep't of Energy, U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather at 28 (2013) (hereinafter 2013 DOE Report).

27 David Baker et al., *Ida Death Toll Rises to 4 as New Orleans Faces Long Blackout*, BLOOMBERG (Aug. 30, 2021), https://www.bloomberg.com/news/articles/2021-08-30/new-orleans-levees-withstood-hurricane-ida-as-electricity-failed?cmpid=BBD083121_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=210831&utm_campaign=greendaily&sref=P6xXtEaF.

28 *See* U.S. Dep't of Energy, Climate Change and the Electricity Sector: Guide for Assessing Vulnerabilities and Developing Resilience Solutions to Sea Level Rise 8, 14, 89-90 (2016), *available at* https://www.energy.gov/sites/prod/files/2016/07/f33/Climate%20Change%20and%20the%20Electricity%20Sector%20Guide%20for%20Assessing%20Vulnerabilities%20and%20Developing%20Resilience%20Solutions%20to%20Sea%20Level%20Rise%20July%202016.pdf.

29 W.V. Sweet et al., Global and Regional Sea Level Rise Scenarios for The United States xii (2022), *available at* https://aambpublicoceanservice.blob.core.windows.net/oceanserviceprod/hazards/sealevelrise/noaa-nos-techrpt01-global-regional-SLR-scenarios-US.pdf.

30 *Id*.

31 *See* M.F. Wehner et al., *Droughts, Floods, and Wildfires*, in CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, Volume I 231 (D.J. Wuebbles et al. eds., 2017).

above-ground electricity equipment.[32] An example of this occurred in Washington state in 2015, where a wildfire forced the state to shutdown a transmission line, which then resulted in the curtailment of output from a hydroelectric power plant.[33] More recently, in parts of California, there have been forced pre-emptive shutdowns of transmission and distribution lines to mitigate wildfire risk in times of extreme dry conditions.[34] Extreme wind events have led to transmission and distribution lines detaching from their poles; even with proper vegetation management, the many dead and dying trees in California as a result of historic droughts result in far higher consequences than ever conceived. Recent legislation requires utilities in California to take specific action to address wildfire threats.[35]

Although these climate impacts are discussed separately, they can occur simultaneously and cause compounding effects on the transmission system.[36] In addition to the direct impacts noted above on transmission infrastructure, transmission system operators will also have to plan for climate-related disruptions to other parts of the electricity system, including generation. Drought and higher temperatures pose risks to the availability and operation of thermoelectric generators. For example, increased temperatures will lead to an increase in water temperatures, which can cause thermoelectric power plants to exceed regulated thermal limits for wastewater discharges.[37] Nuclear power plants that draw cooling water from rivers or streams could also be impacted if the water temperature rises above set thresholds.[38] Higher temperatures may further

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32 *See* U.S. Dep't of Energy, Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions ii, 2-1 (2015); Zamuda, *supra* note 25, at 182–183; Melissa R Allen-Dumas et al., *supra* note 16, at 13.

33 Crystal Raymond, Seattle City Light Climate Change Vulnerability Assessment and Adaptation Plan 49 (2015).

34 *PG&E shutdown: 800,000 people to lose power to prevent California wildfires*, THE GUARDIAN (Oct. 9, 2019), https://www.theguardian.com/us-news/2019/oct/08/california-power-outage-blackout-wildfire-prevention.

35 2019 Cal. Stat. Ch. 79.

36 Gundlach & Webb, *supra* note 16, at 6-7.

37 *Id.* at 8-9; *see also* 2013 DOE Report, *supra* note 26 at 10–11.

38 Gundlach & Webb, *supra* note 16, at 8-9; *see also* 2013 DOE Report, *supra* note 26, at 10-11.

alter precipitation patterns (e.g., by causing more precipitation to fall as rain rather than snow), potentially affecting the operation of hydroelectric power plants, particularly in areas that rely on snowmelt to augment stream flows in summer.[39] As a result, plants may be forced to shut down temporarily, curtail generation, or request permission to exceed regulatory discharge limits when water temperatures are too warm.[40] In addition, similar to the effects caused by higher temperatures, prolonged drought could impair thermoelectric generating facilities that require water for cooling[41] and hydroelectric generating facilities that rely on stream flows.[42]

Distribution system assets will suffer many of the same impacts from extreme weather events and other effects of climate change as transmission system assets; while the distribution system must be the subject of separate reliability and resiliency planning processes, generally overseen by state regulators,[43] failures at the distribution system level may also impact the operation of and demands on the wholesale transmission system. Demand-side actions and other distribution-level activities have the potential to either exacerbate or mitigate the impacts of extreme weather events on the electric system as a whole.

Changing baseline conditions, including increasing average temperatures, will also impact the effects of and preparations for extreme weather events. As described above,

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39 *See* Gundlach & Webb, *supra* note 16, at 9-10; U.S. DEP'T OF ENERGY, CLIMATE CHANGE & THE ELECTRICITY SECTOR: GUIDE FOR CLIMATE CHANGE RESILIENCE PLANNING 10-11 (2016) (hereinafter DOE Planning Guide).

40 Gundlach & Webb, *supra* note 16, at 8-10; *See* 2013 DOE Report, *supra* note 26, at 2.

41 Argonne National Laboratory, Impacts of Long-Term Drought on Power Systems in the U.S. Southwest 10, 37 (2012), https://perma.cc/7EKU-2Z3C; Gundlach & Webb, *supra* note 16, at 9.

42 *Id.*; 2013 DOE Report, *supra* note 26, at 26.

43 *See Electric Resilience Toolkit,* Initiative on Climate Risk & Resilience Law (last visited Aug. 23, 2022), https://www.icrrl.org/electric-resilience-toolkit/

additional exposure to higher temperatures can accelerate the aging of transmission lines and other assets. Transmission providers, generation owners, distribution system operators, and other participants in the energy system often depend on periods of mild temperatures, and therefore low demand and system stress, to conduct maintenance, repairs, and upgrades of their assets that will increase reliability and resiliency during periods of higher demand and extreme weather events. However, increasing average temperatures have reduced the system's ability to accommodate simultaneous downtime of assets.[44] At the same time, increased risk of extreme weather events throughout the year raises the risk of removing assets from service for maintenance even during periods where average demand remains low; for example, the generator shortages during Winter Storm Uri were exacerbated by the number of fossil-fueled generators that had scheduled planned outages for maintenance during the typically low-demand Texas winter.[45]

The risks of extreme heat and the wildfires, droughts, and storms that may accompany the extreme heat are particularly acute because such heat events drive increases to electricity demand at the same time as they disrupt the operation of transmission and generation. Furthermore, blackouts during such events create greater risks to human life and health than blackouts during periods of mild temperatures. Extreme cold events cause similar increases to electricity demand,

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44 Dennis Wamsted and Seth Feaster, Institute for Energy Economics and Financial Analysis, *May heat wave exposes myth of fossil fuel reliability as Texas coal- and gas-fired generators fail early season performance test* (June 27, 2022), available at https://ieefa.org/resources/may-heat-wave-exposes-myth-fossil-fuel-reliability-texas-coal-and-gas-fired-generators.

45 FERC, NERC, and Regional Entity Staff Report, The February 2021 Cold Weather Outages in Texas and the South Central United States at Appx. H (November 2021), *available at* https://www.ferc.gov/media/february-2021-cold-weather-outages-texas-and-south-central-united-states-ferc-nerc-and ("February 2021 Cold Weather Report"). ERCOT, MISO, and SPP were able to mitigate this issue by canceling some planned generator outages. *Id.* at 61-62.

as well as increases to natural gas demand for non-electric uses, and curtailments of either resource are likely to result in harms to human life and health. In both cases, the elevated demand has the potential to create even greater stresses on the electric system and require that performance be maintained at a high level to prevent blackouts.

B. Responsible Entities Must Conduct Enhanced Planning Recognizing Changing Baselines and Increased Frequency of Extreme Weather Frequency and Severity

The current framework requires planning exercises to identify risks to the reliability entity's operations and reliability. However, those requirements do not sufficiently account for the risks of extreme weather events, as described above. In particular, they do not require evaluation of the risks posed by extreme heat, extreme cold, or drought and do not require that responsible entities conduct scenario analyses that account for changing baselines and the increased frequency and severity of extreme weather events, instead permitting evaluations that assume that historical trends will continue.

Current extreme weather planning is particularly insufficient because the scenarios that are required to be considered, including hurricanes, tornadoes, and wildfires, have very different types of impacts than the types of events not considered like extreme heat and cold. In particular, hurricanes and tornadoes generally cause damage to particular transmission assets, rather than causing simultaneous stress across the system, and do not directly correlate with high demand for electricity. They also do not cause the same sorts of risks of correlated generator outages. While wildfires may be more likely to be correlated with extreme heat and drought, current planning requirements do not require consideration of multiple events occurring simultaneously and the direct impacts of wildfires on the transmission system are likely to impact much smaller areas than an extreme heat wave. Therefore, no current required planning activities account for the broad, correlated asset and operational contingencies and risks created by extreme heat or extreme cold.

The NOPR repeatedly cites to record evidence demonstrating the increasing severity and frequency of extreme weather events:

- "[e]xtreme heat and cold weather events are occurring with greater frequency, and are projected to occur with even greater frequency in the future;"[46]
- "[g]enerally, industry experts agreed that extreme weather events are likely to become more severe and frequent in the future…;"[47]
- "While these wide-area extreme events may not occur every year, their frequency and magnitude are expected to increase;"[48]
- "NOAA's data and analyses show an increasing trend in extreme heat and cold events…;"[49]
- "the U.S. Environmental Protection Agency climate change indicators also show upward trends in heatwave frequency, duration, and intensity;"[50]
- "NOAA states that climate change is also driving more compound events, which are multiple extreme events occurring simultaneously or successively, such as concurrent heat waves and droughts, and more extreme heat conditions in cities;"[51]
- "With respect to extreme cold, NOAA explains that accelerated arctic warming is likely contributing to the increasing frequency of Arctic polar vortex-stretching events that

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46 NOPR at P 2 (citing Environmental Protection Agency, *Climate Change Indicators: Weather and Climate* (May 12, 2021) (EPA Climate Change Indicators), https://www.epa.gov/climate-indicators/weather-climate).

47 *Id.* at P 13 (citing CAISO Pre-Conference Comments at 1-3; California Public Utilities Commission Pre-Conference Comments at 4; Oregon Public Utilities Commission Pre-Conference Comments at 2-3; NYISO Pre-Conference Comments at 4); *id.* at P 34 ("While these wide-area extreme events may not occur every year, their frequency and magnitude are expected to increase.").

48 *Id.* at P 34.

49 *Id.* at P 34 (citing NOAA Website, *Climate Data Online* (NOAA Website, Climate Data Online), https://www.ncdc.noaa.gov/cdo-web/).

50 *Id.* at P 34 (citing EPA Climate Change Indicators).

51 *Id.* at P 34 (citing NOAA Website, Climate Data Online).

deliver extreme cold to the United States and Canada, including the winter 2021 Texas cold wave;"[52] and

- "NOAA climate data indicates that the occurrence of significant cold weather events is trending higher nationwide."[53]

The sorts of extreme weather events not accounted for in planning scenarios have occurred multiple times in recent years and have resulted in reliability failures with tragic consequences. In February 2011, an arctic cold front impacted the southwest United States and resulted in 29,700 MW of generation outages, as well as natural gas facility outages and emergency power grid conditions resulting in firm customer load shed.[54] In January 2014, a polar vortex affected Texas, and the central and eastern United States, triggering 19,500 MW of generation outages and natural gas availability issues and resulting in emergency conditions including voluntary load management.[55] In January 2018, an arctic high-pressure system and below average temperatures in the south central United States resulted in 15,800 MW of generation outages and the need for voluntary load management emergency measures.[56] And in

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52 *Id.* at P 35 ("NOAA, Climate Program Office, *Research Links Extreme Cold Weather in the United States to Arctic Warming*, https://cpo.noaa.gov/Interagency-Programs/NIHHIS/ArtMID/6409/ArticleID/2369/Research-Links-Extreme-Cold-Weather-in-the-United-States-to-Arctic-Warming?msclkid=f9ad03bcc7c911ecba22ebf3e1ead5d9.")

53 *Id.* at P 35 (citing NOAA Website, Climate Data Online).

54 *Id.* (citing Report on Outages and Curtailments During the Southwest Cold Weather Event of February 1-5, 2011: Causes and Recommendations (Aug. 2011) (https://www.ferc.gov/sites/default/files/202007/OutagesandCurtailmentsDuringtheSouthwestColdWeatherEventofFebruary1-5-2011.pdf)).

55 *Id.* (citing NERC "*Polar Vortex Review*" (Sept. 2014) https://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf (hereafter Polar Vortex Review)).

56 *Id.* (citing See South Central United States Cold Weather Bulk Electric Systems Event of January 17, 2018 (July 2019), https://www.ferc.gov/sites/default/files/2020-07/SouthCentralUnitedStatesColdWeatherBulkElectricSystemEventofJanuary17-2018.pdf).

Winter Storm Uri, widespread generator and fuel supply shortages forced a combined 23,418 MW of manual firm load shed, the largest controlled firm load shed event in U.S. history.[57]

Load shed due to extreme weather events can create unacceptable loss of human life, as well as astronomical costs. As detailed in the FERC/NERC Report on Winter Storm Uri, at least 210 people died and more than 4.5 million people lost power during the event.[58] In addition to the value of the many lives lost and the days of miserable cold suffered by millions of Texans, analysts with the Federal Reserve Bank of Dallas estimated that the outages caused direct and indirect losses to the Texas economy of between $80 to $130 billion.[59]

A necessary first step to identifying corrective actions that will prevent such tragedies in the future is identifying the risks that these extreme weather events create. This analysis must be forward-looking: the increased frequency and severity of extreme weather events, as well as the changes in baseline temperatures and weather, must be incorporated into planning analyses. Sound planning must recognize the potential for multiple extreme weather events and compound electric system failures to occur at the same time and cause cumulative and overlapping impacts. And it must recognize the interdependence of the transmission system with other portions of the electric system, in particular generators and distribution systems.

i. FERC Should Require that NERC Develop and Mandate the Use of Consistent and Forward-Looking Planning Approaches

As noted in the NOPR, impacts of climate change on the bulk power system will vary by region.[60] However, the basic characteristics of the transmission system and the impacts of

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57 February 2021 Cold Weather Report.

58 February 2021 Cold Weather Report at 9.

59 *Id.* at 10.

60 NOPR at page 37.

different extreme weather events on that system do not vary: among other effects, high temperatures can cause increased resistance, line sag, and high demand; extreme cold can cause system damage and fuel supply issues; hurricanes, tornadoes, and wildfires can cause damage to a variety of assets; and drought can result in capacity and operational limits of water-cooled thermoelectric generators and hydroelectric generators, as well as increased wildfire risk. As such, while each responsible entity's analysis should be based on the specific details of potential extreme weather events in its region and on the characteristics of its transmission system (and interconnected systems, including generators, distribution systems, and neighboring transmission systems), all responsible entities' analyses should be developed using a consistent framework. This is important for a number of reasons: (1) consistent analyses reduce the risk of any provider attempting to understate (or overexaggerate) risks to its system through divergent assumptions; (2) NERC, the Commission, state regulators, and other users of the analyses will not be required to independently evaluate the basic assumptions governing each analysis; (3) interconnected responsible entities will be able to combine their analyses to identify the impacts of extreme weather events with large geographic areas; and (4) the benefits of potential corrective actions can be compared across responsible entities, as well as in cases where a corrective action would benefit multiple responsible entities. The Commission should direct NERC to establish a framework for the development of benchmark planning cases and scenarios, which each responsible entity can use to create those cases in scenarios in combination with information about its region's weather patterns and its transmission system.

In developing benchmark planning cases and transmission planning analyses, NERC should consider general principles that have been identified to guide processes of climate resilience planning. Climate resilience planning is a two-stage process: first, climate threats are assessed using forward-looking, scientifically credible projections about the breadth of climate-related hazards on the horizon and vulnerabilities are identified; second, climate resilience plans are developed based on vulnerabilities identified.[61] Climate vulnerability assessments identify where and under what conditions electric utility assets are at risk from the impacts of climate change, how those risks will manifest, and what the consequences will be for system operation. A defined process for creating such vulnerability assessments should be the framework that NERC develops so that each responsible entity can develop consistent benchmark cases and scenarios.

In TPL-001-5.1, NERC should require assessment of a broad range of extreme weather events, including extreme heat, extreme cold, drought, wildfire, storms, hurricanes, and flooding, taking into account changing baseline conditions, including average temperatures and sea-level rise, based on a consistent, scientifically credible data set.[62] In assessing these impacts, it is important that both steady state and transient stability analyses are conducted because extreme weather events are more likely to cause dynamic failures and grid collapse that cannot be captured in steady state analyses. These analyses should assume multiple common mode failures in close time proximity, as occurred during Winter Storm Uri.

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61 A number of government, academic, and other bodies have published guidelines for effective climate resilience planning. *See, e.g.*, DOE Planning Guide, *supra* note x; KRISTIN RALFF-DOUGLAS, CAL. PUB. UTILS. COMM'N, CLIMATE ADAPTATION IN THE ELECTRIC SECTOR: VULNERABILITY ASSESSMENTS & RESILIENCE PLANS (2016), https://perma.cc/R6NW-F6GV; Gundlach & Webb, *supra* note 16, at 6-7. For an example of climate resilience project conducted at the grid-level, *see Grid Analysis and Design for Energy and Infrastructure Resiliency for New Orleans*, GRID MODERNIZATION LABORATORY CONSORTIUM, https://gmlc.doe.gov/resources/grid-analysis-and-design-energy-and-infrastructure-resiliency-new-orleans (last visited Aug. 22, 2022)

62 *See* section III.A, above.

The NERC framework should also include scenario analysis and an assessment of "best" and "worst"-case scenarios.[63] This "bounded parameters" approach can help manage uncertainty regarding future GHG emissions and climate change impacts.[64] This approach should be supplemented with probabilistic modeling, which can be helpful in assessing the likelihood of projected climate change impacts occurring.[65] EDF supports the modification of the traditional planning approach to incorporate the use of probabilistic modeling.[66]

In assessing vulnerabilities caused by these climate impacts, entities should utilize forward-looking data because historical weather patterns do not provide a sufficient indication of future climate impacts.[67] The NOPR notes that "benchmark events should be based on prior events (e.g., February 2011 Southwest Cold Weather Event, January 2014 Polar Vortex Cold Weather Event) and/or constructed based on meteorological projections."[68] However, due to the increasing frequency and severity of climate events, NERC should incorporate forward-looking data as part of its benchmark planning requirements.

As part of the standards development process, NERC should develop a framework for benchmark case and scenario development, taking advantage of the expertise in climate risks and

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63 Romany M. Webb et al., Climate Risk in the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Electric Utilities, 51 ENVTL. L. REV. 577, 588(2021), available at https://law.lclark.edu/live/files/32603-51-3-webbpdf.

64 *Id.*

65 *Id.* at 588-89 (2021).

66 *See* NOPR at pages 51-53 (discussing whether probabilistic modelling should be included as part of the planning approach under the reliability standard)

67 *See* Webb et al., *supra* note 63, at 586; *See also* U.S. Dep't of Energy, A Review of Climate Change Vulnerability Assessments: Current Practices and Lessons Learned from DOE's Partnership for Energy Sector Climate Resilience 12 (2016).

68 NOPR at P 51.

resiliency both within the government, including at the Department of Energy,[69] the National Labs, NOAA, and the EPA, and within the private sector, to develop a framework and procedures for development and analysis of consistent and robust benchmark cases and scenarios. Responsible entities would then follow this framework, but should also be permitted to develop further cases and scenarios for supplemental analyses.

ii. Planning Must Incorporate the Impacts of Extreme Weather Events on Generators, on Distribution Systems, and on Neighboring Transmission Systems

The operation of the transmission system is intertwined with and dependent on the operation of systems and assets it is interconnected with, including generators, distribution systems, and neighboring transmission systems. The impacts of extreme weather events on a transmission provider's ability to provide safe and reliable service at just and reasonable rates depends significantly on the availability and operation of generators, the needs and capabilities of distribution systems, and the available transfer capability from neighboring transmission systems. As such, planning for extreme weather events must consider the impacts those events

69 The Commission should work with the Department of Energy to identify funding that may be available to support this effort. In particular, given the core role of interregional transmission in addressing extreme weather risks discussed in Section III.D below, the Commission and the Department of Energy should consider whether a portion of the funding in recently enacted Inflation Reduction Act "to conduct planning, modeling, and analysis regarding interregional electricity transmission and transmission of electricity that is generated by offshore wind" should be used to support this effort. Inflation Reduction Act of 2022, H.R. 5376, 117th Congress (2022), https://www.democrats.senate.gov/imo/media/doc/inflation reduction act of 2022.pdf.

The Commission should also consider any relevant synergies with other processes related to system planning; EDF and co-filers recommended in comments in RM21-17 that the Commission identify and/or direct the development of databases with data relevant for transmission planning, some of which may also support extreme weather scenario analysis. Docket RM21-17, Comments of Public Interest Organization (filed August 17, 2022).

will have on the availability and operation of generators, electric demand and interfaces with the distribution system, and the availability of neighboring transmission systems to provide support.

In particular, responsible entities should evaluate the risk of correlated generator outages related to extreme weather events. Thermoelectric resources, which are often presumed by planning exercises and even by market rules to have essentially guaranteed availability, have experienced significant and correlated outages in both extreme heat and extreme cold events. Extreme heat can put particular stress on water-cooled thermoelectric resources, both due to increased ambient water temperature and related droughts.[70] Extreme cold has also resulted in correlated outages due to a number of factors, including fuel shortages due to a lack of firm supply and equipment freezing.[71] As noted by Commissioner Clements, reforms to capacity market rules would also support this sort of consideration and ensure that those markets are actually procuring the needed resources for reliability; market operators should adopt ELCC approaches for all resources that recognize that correlated outage risks applies, albeit in different ways, to all generation resources.[72]

In evaluating relevant distribution system impacts, responsible entities should focus both on the impacts on electric demand that the extreme weather event will have and on the capability of the distribution system assets, including demand response, distributed storage and generation, and utility-scale storage, to mitigate reliability risks. While extreme heat and cold are particularly

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70 Argonne National Laboratory, *Impacts of Long-Term Drought on Power Systems in U.S. Southwest* (2012), available at https://www.energy.gov/sites/prod/files/Impacts%20of%20Long-term%20Drought%20on%20Power%20Systems%20in%20the%20US%20Southwest%20%E2%80%93%20July%202012.pdf.

71 February 2021 Cold Weather Report at 11-12.

72 NOPR at page 88 (Clements, concurring).

likely to cause high demand, it is also important that transmission providers coordinate with distribution system operators to maximize the use of distributed resources to mitigate those demand spikes, as well as other reliability issues, especially where such approaches offer more effective and cost-efficient means of ensuring reliability. Planning must also consider changes to baseline and peak demand in an increasingly electrified economy.

Furthermore, responsible entities cannot assume in their planning that any extreme weather event will be limited to their footprint and that neighboring transmission providers will be unaffected. While, as described further in Section III.D below, transfer capability within and between regions can be an important tool to address extreme weather risk and impacts, planning dependent on the availability of transfer capability must include an analysis of how much capacity will be available not just in ideal scenarios but also during wide-area extreme weather events. While hurricanes, and in some cases tornadoes and wildfires, can impact multiple transmission providers and occasionally even multiple regions, their potential scope is limited as compared to that of extreme heat and cold waves, which can simultaneously impact entire regions of the country and often at least portions of neighboring regions.[73] The development of a consistent planning framework, as described in Section III.B.i above, would allow responsible entities to easily share their own analyses with each other, which responsible entities should then use to consider different scenarios regarding the availability of transfer capability based on extreme weather events with different geographic scopes.

As discussed in the NOPR, wide-area planning conducted above the level of individual transmission providers is also necessary to analyze the impacts of regional and multi-region extreme weather events. Regional reliability coordinators should have the initial responsibility to

[73] February 2021 Cold Weather Report at 11-12.

perform wide-area planning. However, in recognition of the fact that reliability coordinators have significantly different geographic footprints, the Commission should also require analyses to be developed for the Eastern Interconnection and the Western Interconnection through collaboration of the reliability coordinators in each interconnection; these analyses should evaluate the impacts of extreme weather events that impact an entire region or multiple regions within an interconnection. As further discussed in Section III.D below, these analyses should identify the role of interregional transfer capability, between regions within the interconnections and between the interconnections (including the Texas Interconnection), to mitigate the effects of extreme weather events, and should be used to identify required minimum interregional transfer capabilities between each region.

iii. Drought Events Should Be Included in Planning Requirements

Drought events can have significant impacts on the capacity and operation of water-cooled fossil and nuclear generators and other water-cooled assets, as well as hydroelectric generators. As described above, the availability and capacity of generators must be a significant input into extreme weather planning analyses. Drought events are also highly correlated with high temperature and wildfires. Therefore, a failure to consider drought events as part of extreme weather scenario planning could result in an overestimate of generation availability during an extreme heat event and understate the risks of that event. As such, the Commission should require that NERC include drought events in TPL-001-5.1 and, consistent with the discussion above, direct NERC to incorporate drought events into its framework for developing benchmark cases and scenarios.

iv. Planning Requirements for Wildfires, Hurricanes, and Tornadoes Should Also Be Updated to Account for Increasingly Frequent and Severe Events

While the current NERC planning requirements mandate steady state planning analyses that consider the impacts of wildfires and "[s]evere weather, e.g., hurricanes, tornadoes, etc.," they contain limited details on the minimum requirements for such analyses and do not require scenario planning. The Commission should direct NERC to include these extreme weather events in the benchmark case and scenario planning framework that it will develop based on the recommendations in Section III.B.i above. As with extreme heat, cold, and drought events, planning regarding wildfires, hurricanes, tornadoes, and other "severe weather" should be based on realistic forecasts considering future-looking data, should be consistent across responsible entities, should include scenarios involving multiple simultaneous extreme weather events, and should include consideration of impacts on generators, distribution systems, and neighboring transmission systems.

C. Responsible Entities Must be Required to Take Corrective Action where Planning Reveals Failure to Meet Performance Requirements

Under the currently effective Reliability Standard TPL-001-4, planning coordinators and transmission planners are required to evaluate possible actions to reduce the likelihood or mitigate the consequences of extreme events but are not obligated to develop corrective action plans.[74] That approach was developed within the context of "extreme events" also being "low probability events" and may have been reasonable within the context of low probability events. As the Commission has explained previously, the extreme event Transmission Planning "Reliability Standard should not require improvements for low probability events that cannot be

[74] NOPR at P 83.

justified."[75] In ruling on the prior iteration of TPL-001-5, the Commission determined not to direct NERC to develop and submit modifications to the Reliability Standards to require corrective action plans to address protection system single points of failure in combination with a three-phase fault if planning studies indicated potential cascading. The Commission explained it was "persuaded by NERC and other commenters of the improbability of single points of failure in combination with three phase faults resulting in cascading outages."[76]

Here the need to develop corrective action plans is significantly greater given that extreme weather events are both high probability and high impact. As described in Section III.A above, the NOPR cites substantial evidence of the increasing frequency and severity of extreme weather events. The impacts on human life and health of these events are undeniable, as are the economic harms.

The NOPR's proposal to direct NERC to modify Reliability Standard TPL-001-5.1 to require corrective action plans that include mitigation for any instances where performance requirements for extreme heat and cold events are not met is an important means of protecting against significant reliability risk and is justified by the demonstrated likelihood and harms of extreme weather events. As the Commission recognizes, "[w]ell planned mitigation and corrective actions that account for some of these contingencies will minimize loss of load and improve resilience during extreme heat and cold weather events."[77] The NOPR strikes the

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[75] *Mandatory Reliability Standards for the Bulk-Power System*, 117 FERC ¶ 61,084 at P 1112 (2006) (proposing to approve Reliability Standard TPL-004-0 – System Performance Following Extreme BES Events, which is a predecessor to the currently effective TPL-001-4 standard).

[76] Transmission Planning Reliability Standard TPL-001-5, 170 FERC ¶ 61,030 at P 23 (2020).

[77] NOPR at P 84.

appropriate balance by requiring corrective action plans but allowing responsible entities with the flexibility to determine the best actions to include in their corrective action plan to remedy any identified deficiencies in forecasted performance. For these reasons, the Commission should therefore adopt this proposal in its Final Rule issued in this proceeding.

D. The Commission Should Direct NERC To Establish a Presumptive Minimum Interregional Transfer Capability Standard To Address Extreme Weather Risks

The Commission lists several examples of actions that could be included in a corrective action plan—such as planning for additional contingency reserves, implementing new energy efficiency programs to decrease load, increasing intra- and inter-regional transfer capabilities, transmission switching, or adjusting transmission and generation maintenance outages based on longer-lead forecasts.[78] Many of these options will likely be appropriate for some or even most responsible entities. But the benefits associated with increasing interregional transfer capability set it apart from the other actions. Consequently, interregional planning and interregional transmission should be prioritized as a corrective action measure. Indeed, based on the evidence described above that increasingly frequent and severe extreme weather events have caused and will cause system failures in absence of further action, the Commission should direct NERC to set a presumptive standard for interregional transfer capability and to require responsible entities to develop plans for meeting that standard.

The NOPR devotes several paragraphs to the benefits associated with increases in interregional transfer capability. The Commission explains that "[i]ncreasing interregional transfer capability may be a particularly robust option for planning entities attempting to mitigate

[78] NOPR at P 84.

the risks associated with concurrent generator outages over a wide area."[79] The Commission then details the important role interregional transfers played during Winter Storm Uri:

> For example, during the 2021 Cold Weather Event in Texas and the South Central United States, SPP and MISO imported power from other balancing authorities to make up for their increasing load levels and generation shortfalls, because the eastern part of the Eastern Interconnection did not have the same arctic weather conditions. Specifically, MISO was able to import large amounts of power from neighbors to the east (e.g., PJM), and SPP was able to transfer some of that power through MISO into its region. Those east-to-west transfers into MISO peaked at nearly 13,000 MW. PJM had additional energy available to be transferred but could not facilitate the transfer due to internal congestion in neighboring systems.[80]

EDF submits that this experience constitutes substantial evidence of the benefits increased interregional transfer capability can provide.

In addition to the affirmative benefits provided by increased interregional connectivity, reductions to interregional transfer capability can pose significant reliability risks. As the NOPR acknowledges, during the August 2020 California Heatwave Event, there was a reduction in the transfer capability through the Northwest AC Intertie by as much as 1,250 MW.[81] The transfer capability of the intertie linking Canadian and U.S. power systems was also reduced by up to 750 MW due to other planned maintenance outages, further limiting the ability to transfer energy from the north to the load centers in the south.[82]

Objective, third-party analyses—not cited in the NOPR—show how additional transmission capacity could have reduced customer costs by billions. After the 2000-01 California power crisis, the California Independent System Operator Corporation ("CAISO") acknowledged that "the crisis and its extremely high costs could have been avoided if more

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[79] *Id.* at P 85.

[80] *Id.* at P 86 (citations omitted).

[81] *Id.* at P 87.

[82] *Id.*

interregional transmission capability had been available to the state."[83] CAISO estimated "that if significant additional transmission capacity had been available during the California energy crisis from June 2000 to June 2001, electricity customer costs would have been reduced by up to $30 billion over the 12-month period during which the crisis occurred."[84] In Texas, analyses show that 1,000 MW of additional transmission capacity between Texas and the Tennessee Valley Authority would have provided nearly USD $1 billion dollars of value over just a few days during Winter Storm Uri, with similar additional capacity between Texas and most other adjacent regions offering more than $100 million in potential benefits:[85]

TABLE 2. *Savings per additional GW of transmission, February 12-20, 2021*

Receiving region – delivering region	Savings per GW of additional transmission capacity (millions of $)
ERCOT – TVA	$993
SPP South – PJM	$129
SPP South – MISO IL	$122
SPP South – TVA	$120
SPP S – MISO S (Entergy Texas)	$110
MISO S-N (Entergy Texas - IL)	$85
MISO S (Entergy Texas) – TVA	$82

Given the magnitude of benefits, it is unsurprising that diverse entities have weighed in at FERC in support of prioritizing interregional transmission.[86] There was also a strong consensus

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83 Brattle Group, A Roadmap to Improved Interregional Transmission Planning 24-25 (November 30, 2021), https://www.brattle.com/wp-content/uploads/2021/11/A-Roadmap-to-Improved-Interregional-Transmission-Planning_V4.pdf.

84 *Id.* at 25, n.24 (citing CAISO, Transmission Economic Assessment Methodology (TEAM), June 2004, p. ES-9).

85 Resilient Transmission Study at 11.

86 Fourth Meeting of Joint Federal-State Task Force on Electric Transmission, Docket No. AD21-15 Transcript at 8:12-14 (July 20, 2022) ("Tr.") ("32 parties filed comments in

recommending action on this issue at the Joint Federal-State Task Force on Electric Transmission:

- "There is overwhelming and continually growing body of evidence that materially expanding import and export capabilities among the regions will produce immense economic reliability and public policy benefits, and adding this extra transmission capacity to our grid will help solve the long-term planning and generator interconnection challenges that we face as well."[87]

- "I would support I think a presumptive minimum level of transfer capability that's been discussed as well…And I think that FERC has an important and unique role here in setting that."[88]

- "We saw the benefits of transfer capability with Winter Storm Uri. It's not a mystery anymore. We have a good solution, or a potentially good solution."[89]

- "But to pick up on a theme that Chair Brown Dutrieuille just mentioned, I think minimum transfer capability is going to be important."[90]

In addition to the strong support from state commissions, other industry players have expressed similar support.[91]

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response to the A-NOPR [in Docket No. RM21-17], explicitly implicating the need for interregional transmission to become a priority").

87 Tr. at 13:15-22 (Kansas Commissioner French).

88 Tr. at 55:13-14 and 55:18-19 (Michigan Chair Scripps).

89 Tr. at 75:15-17 (Arkansas Chair Thomas).

90 Tr. at 77:16-18 (Maryland Chair Stanek).

91 *See, e.g.*, Office of Energy Policy and Innovation's and Office of Electric Reliability's Winter Energy Market and Reliability Assessment, 2021-2022 at 20 ("[H]aving available interregional transfer capacity of electricity is critical to supporting neighboring regions during extreme weather events and can have a significant impact on both market and reliability outcomes during extreme cold and winter storms.") (October 12, 2021); Docket No, RM21-17, Department of Energy's Initial Comments in Response to Advanced Notice of Proposed Rulemaking at 26 ("[R]eforming interregional coordination is consistent with ensuring efficiency and cost-effectiveness principles, and with the Commission's authority to ensure just and reasonable rates.") (October 12, 2021); Docket No, RM21-17, Public Interest Organizations' Initial Comments in Response to Advanced Notice of Proposed Rulemaking at 99 ("Reforms to how interregional transmission is planned are critical to ensuring the energy transition is

In comparison to the support for, and breadth of benefits associated with, increased interregional transfer capability, the NOPR contains a comparatively tepid proposal to "encourage NERC to consider establishing requirements that appropriately recognize the value of interregional transfer capability."[92] The obligations the Federal Power Act impose on the Commission demand more. In the Final Rule, the Commission should provide more detailed guidance to NERC on the requirements necessary to recognize the value of interregional transfer capability.

As a starting place, FERC could direct NERC to incorporate a minimum presumptive standard of ten percent, whereby every region would have interregional transmission capability equal to at least 10% of its peak load, updated every 10 years.[93] The presumptive 10 percent value is supported by SPP's experience during Winter Storm Uri. As explained in SPP's comprehensive review of that event:

> The second interruption of service lasted three hours and 21 minutes and was required to lessen regional electricity use by 6.5%. As before, SPP spread the impact out across the region, asking TOPs to decrease their use by a proportional share of this total 6.5% reduction. The most a single entity had to shed in this event was about 227 MW, again about 17% of the total by which SPP needed to lessen total regional energy use.[94]

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successful…FERC needs to create an effective interregional transmission planning process.") (October 12, 2021); Docket No, RM21-17, Resale Power Group of Iowa's Initial Comments in Response to Advanced Notice of Proposed Rulemaking at 15 ("Given the lack of progress in interregional planning to date and its tremendous potential, RPGI supports the Commission mandating joint planning processes that would be charged with planning all 'backbone' facilities, i.e., those high voltage (345 kV and greater) interregional transmission lines necessary to move electric supplies over very long distances.") (October 12, 2021).

92 NOPR at P 88.

93 FERC could also accommodate divergence on a case-by-case if warranted by particular circumstances and supported by evidence.

94 Southwest Power Pool, A Comprehensive Review of Southwest Power Pool's Response to the February 2021 Winter Storm at 29 (July 19, 2021), *available at* https://spp.org/documents/65037/comprehensive%20review%20of%20spp's%20response%20to%20the%20feb.%202021%20winter%20storm%202021%2007%2019.pdf.

The ten percent presumptive value is also supported by the European Union's interregional interconnection targets, which require that each country have in place transmission interties that allow at least 10% of the electricity produced by its power plants to be transported across its borders to neighboring countries.[95]

EDF recommends that ten percent be adopted as a presumptive value subject to upward or downward adjustment based on the results of the extreme weather planning exercises discussed above. As described above, the Commission should direct NERC to establish consistent frameworks for analyzing extreme weather risks. After identifying the impacts of various extreme weather scenarios under the current system configuration, incorporating the impacts of extreme weather events on generation availability and electric demand, an evaluation should be conducted at the regional and interconnection level of what amount of interregional transfer capability would be necessary to mitigate those impacts, as well as the degree to which adding further interregional transfer capability beyond that minimum would be expected to lower costs. Those evaluations should then inform any upward or downward variation in the applicable minimum level of interregional transfer capability.

E. The Commission Should Coordinate with State Regulators on Consistent Approaches to Climate Resiliency Planning and Corrective Actions

As described above, the same extreme weather events and changing baselines will impact transmission and other bulk-system assets subject to Commission regulation as well as state-regulated distribution system assets, including through direct impacts on the assets and through increases in demand. The ability of providers and regulators to understand those impacts will be

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95 European Commission, Electricity Interconnection Targets, *available at* https://ec.europa.eu/energy/topics/infrastructure/electricity-interconnection-targets_en. The EU has set an interconnection target of **at least 15% by 2030**. *Id.*

maximized when transmission providers and distribution system operators are conducting consistent and even coordinated analyses. Coordination may also reveal ways in which corrective actions could support both the transmission and distribution systems.

The Commission, as well as NERC, should consider the most effective means of coordinating with state regulators to encourage consistent and coordinated extreme weather resiliency planning, as well corrective actions and policy reforms that ultimately have the greatest impact on reliability for electric customers. The current Joint Federal-State Task Force on Electric Transmission has been an effective means of fostering engagement between FERC and state regulators and the Commission should consider scheduling a Joint Task Force meeting focused on extreme weather planning and corrective actions. NERC and the Commission should also consider other means of coordinating with state regulators, including through NARUC. Furthermore, the Commission should consider whether additional action might be appropriate to coordinate corrective actions, including the development of additional interregional transfer capability, such as the convening of joint boards with state regulators to consider particular areas needing such capacity or proposed interregional transmission projects.[96]

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[96] 16 U.S.C. § 824h; 18 C.F.R. § 385.1304.

IV. CONCLUSION

EDF respectfully recommends that the Commission direct NERC to modify Transmission Planning Reliability Standard TPL-001-5.1 consistent with the discussion above.

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Respectfully submitted,

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