UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

One-Time Informational Reports on	)	
Extreme Weather Vulnerability	)	Docket Nos. RM22-16-000 and
Assessments; Climate Change, Extreme	)	AD21-13-000
Weather, and Electric System Reliability	)	

INITIAL COMMENTS OF THE ENVIRONMENTAL DEFENSE FUND AND COLUMBIA LAW SCHOOL'S SABIN CENTER FOR CLIMATE CHANGE LAW

The Environmental Defense Fund ("EDF") and Columbia Law School's Sabin Center for Climate Change Law ("Sabin Center") appreciate 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 proceedings. In these Initial Comments, EDF and the Sabin Center support the Commission's proposal to require transmission providers to file one-time informational reports describing their current or planned policies and processes for conducting extreme weather vulnerability assessments. In promulgating a final rule, EDF and the Sabin Center recommend that the Commission supplement the list of questions to be answered in the one-time reports to add requests for information related to consideration of climate-related risks beyond extreme weather events and related to transmission providers' consideration of climate-related impacts to generating units and to the distribution system. EDF and the Sabin Center also recommend that the Commission establish a clear and coordinated process for further action. In support thereof, EDF and the Sabin Center state as follows:

I. BACKGROUND

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.[1] The technical conference was held on June 1 and 2, 2021. As summarized by the Commission, "[p]anelists and commenters agreed that electric system planning processes need adjustment to adequately address the threat posed by climate change and extreme weather."[2] There was also agreement on the importance of regular information sharing and coordination across jurisdictions and "that the Commission should play a role in facilitating information sharing among industry stakeholders and government agencies."[3] However, as the NOPR explains, the Commission does not currently have access to clear and consistent information on what transmission providers and other jurisdictional entities are currently doing "with respect to assessing and mitigating extreme weather risks."[4]

To address this issue, the Commission proposed, in the NOPR, to require transmission providers "to submit one-time informational reports describing their current or planned policies and processes for conducting extreme weather vulnerability assessments and mitigating identified extreme weather risks."[5] The NOPR contains a number of questions proposed to be addressed in the reports, divided into the topic areas of: "(1) Scope; (2) Inputs; (3) Vulnerabilities and Exposure to Extreme Weather Hazards; (4) Costs of Impacts; and (5) Risk Mitigation."[6]

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1 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.

2 NOPR at P 12.

3 *Id.*

4 *Id.* at P 14.

5 *Id.* at P 8.

6 *Id.* at P 23.

II. INITIAL COMMENTS

Given the need to better understand how the risks of extreme weather to the electric grid are evaluated and mitigated, EDF and the Sabin Center strongly support FERC's proposal to require transmission providers to report on whether and how they conduct extreme weather vulnerability assessments. The Commission should expand the scope of these reports to require transmission providers to also disclose their approach to assessing other climate-related risks to their assets and operations, including those caused by increasing average temperatures and other slow-onset phenomena associated with climate change, such as sea-level rise. In addition, the Commission should require transmission providers to report specifically on whether and how they account for the impacts of extreme weather and other climate-related risks on generator performance and availability. Transmission providers should also be required to report on if and how any assessments they conduct incorporate the impacts of extreme weather and climate-related risks on electric demand and on distribution system assets.

A. The One-Time Report Requirement Proposed in the NOPR Is an Appropriate First Step to Identifying Whether Transmission Providers Are Responding to Climate Risks

i. Increased Extreme Weather Events and Changing Baselines Due to Climate Change Will Compromise the Reliability and Operation of the Bulk Power System

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 transmission providers depend on to serve load. Extreme weather events such as drought, heat waves, wildfires, extreme cold, and flooding, are increasing in frequency, severity, and duration.[7] As more fully detailed in the comments filed jointly by EDF and the Sabin Center in advance of the June 2021 technical conference,[8] and in EDF's recent comment in Docket RM22-10,[9] those extreme weather events pose serious reliability and resilience risks for the bulk power system.[10]

In addition to increasing the frequency and severity of many types of extreme weather events, climate change is also altering baseline weather patterns and environmental conditions, resulting in increasing average air and water temperatures, changing precipitation patterns, and sea-level rise.[11] These changing baselines will impact the operation of transmission infrastructure, as well as generation and distribution assets, in ways that could impair the reliability of the electric system. In particular, the impacts of changing baselines on the electric system include:

- **Increasing average air temperatures:** According to the Fourth National Climate Assessment, annual average temperatures are forecasted to increase by 2.5°F

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[7] *See* Craig D. Zamuda et al., *Energy Supply, Delivery, and Demand, in* IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME II 174, 181 (D.R. Reidmiller et al. eds., 2018), https://perma.cc/ZP2G-JJRK; United States Government Accountability Office, Electricity Grid Resilience – Climate Change is Expected to Have Far-reaching Effects and DOE and FERC Should Take Actions 1 (March 10, 2021).

[8] Docket AD21-13, Comments of the Environmental Defense Fund and Sabin Center for Climate Change Law (filed April 15, 2021).

[9] Docket RM22-10, Comments of the Environmental Defense Fund (filed August 26, 2022).

[10] *Id.*; *see also* 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; 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.

[11] *See* Zamuda, *supra* note 7, at 176, 191.

between 2021 and 2050.[12] However, some areas may be subject to significantly larger temperature increases. In parts of the northeast, for example, maximum summer temperatures are expected to increase by up to 6.7°F.[13]

Higher temperatures can reduce the efficiency of certain types of generators, increase transmission line losses, and accelerate the aging of transmission and distribution equipment.[14] Together, the impacts on generation, transmission, and distribution may make electricity more difficult to produce and deliver. Higher temperatures also increase electricity demand, sometimes above planned transmission, generation, and distribution asset capabilities, which can cause transmission or distribution asset overloads.[15] Furthermore, transmission providers and generation owners often use periods of mild temperatures to conduct maintenance, repairs, and upgrades of their assets to support reliability and resiliency during periods of higher demand and extreme weather events. Increasing average temperatures, as well as more frequent extreme weather events, will reduce the system's ability to accommodate simultaneous downtime of assets.[16] And high temperatures are occurring in extended heat waves that increase electrical asset stress and shorten asset life because the heat wave prevents regular night-time lower loading and cooling.

- **Increasing average water temperature:** Higher average air temperatures are leading to increased water temperatures,[17] which can compromise thermoelectric generator operation. Many thermoelectric generators, including natural gas, coal, and nuclear generators, are subject to thermal limits for wastewater discharge that may be exceeded as a result of increased water temperatures, forcing reduced

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12 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).

13 *See, e.g.*, *Rising Temperatures*, MASS. CLIMATE CHANGE CLEARINGHOUSE, https://perma.cc/9QMS-BCKE (predicting that maximum summer temperatures in Massachusetts will increase by 2.6 to 6.7 °F by 2050).

14 *See generally* Jayant Sathaye et al., Estimating Risk to California Energy Infrastructure from Projected Climate Change 25-27 (2011), https://doi.org/10.2172/1026811.

15 *See* Zamuda, *supra* note 7, at 181.

16 *See, e.g.,* 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.

17 *See* U.S. DEP'T OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 10–11 (2013), https://perma.cc/FMB6-RSRK (2013 DOE Report).

discharge of warm power plant cooling water.[18] Nuclear power plants that draw cooling water from rivers or oceans have already been limited by rising water temperatures.[19] For example, high water temperatures reportedly forced the Limerick Generating Station in Pennsylvania to curtail output on at least 79 separate occasions between 2008 and 2016.[20]

- **Changing precipitation patterns:** Warmer temperatures will cause precipitation patterns to change, including causing more precipitation to fall as rain rather than snow.[21] Shifts from snow to rain could impair the operation of hydroelectric power plants, particularly in areas that rely on snowmelt to augment stream flows in summer.[22] Changing precipitation patterns are also associated with drought events, which can affect the operation of hydroelectric and thermoelectric power plants.[23] An example of this occurred in California in summer 2021, when record dry conditions caused a five-month shutdown of a hydroelectric power plant for the first time since it began operating in 1967.[24]

- **Sea-level Rise:** Sea levels along the contiguous United States coastline increased by an average of 0.25-0.3 meters between 1920 and 2020.[25] Sea levels are expected to increase by the same amount again, on average, over the next thirty years (i.e., through 2050).[26] The extent of sea level rise will vary regionally, however, with the East and Gulf Coasts forecast to see higher rates of increase than other parts of the United States.

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18 *Id.*

19 *Id.*

20 Alan Neuhauser, *Nuclear Power, Once Seen as Impervious to Climate Change, Threatened by Heat Waves*, U.S NEWS AND WORLD REPORT (July 1, 2019), available at https://www.usnews.com/news/national-news/articles/2019-07-01/nuclear-power-once-seen-as-impervious-to-climate-change-threatened-by-heat-waves.

21 *See* D.R. Easterling et al., *Precipitation Change in the United States, in* CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME I 207, 207, 217 (D.J. Wuebbels et al. eds., 2017), https://perma.cc/MV9S-NMAS.

22 *See* U.S. DEP'T OF ENERGY, CLIMATE CHANGE & THE ELECTRICITY SECTOR: GUIDE FOR CLIMATE CHANGE RESILIENCE PLANNING 10-11 (2016), https://perma.cc/29MD-XWEE (DOE Planning Guide)

23 Gundlach & Webb, *supra* note 10, at 8-10; *see also* 2013 DOE Report, *supra* note 17, at 10-11; Melissa R Allen-Dumas et al., *supra* note 10, at 10-11.

24 Alexandra Meeks and Dakine Andone, *California hydropower plant forced to shut down as water levels fall at Lake Oroville*, CNN (Aug. 6, 2021), https://perma.cc/E5FA-VNYL

25 W.V. SWEET ET AL., GLOBAL AND REGIONAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES xii (2022), https://perma.cc/NC98UD9Y.

26 *Id.*

> Sea level rise can put infrastructure at risk of nuisance flooding (i.e., flooding that occurs during high tides), storm surge, and permanent inundation.[27] NOAA estimates that the frequency of "major" nuisance flooding events (i.e., when coastal water levels exceed four feet above the mean higher high water level) will increase by 400 percent between 2020 and 2050.[28] That could have major implications for coastal energy facilities. Past studies have identified almost 300 energy facilities in coastal areas of the contiguous U.S. that are within four feet of ordinary high tide levels.[29] Those and other facilities could also be impacted by higher storm surge. A Department of Energy ("DOE") study found that by 2060, sea level rise could increase the number of energy facilities exposed to storm surge from category 1 hurricanes from 711 to 1,025 facilities, representing a 67% increase.[30]

These impacts of changing baselines are in addition to, and may be compounded by, the impacts of more frequent and severe extreme weather events, including extreme heat and cold events.[31]

Both changing baselines and extreme weather events can also lead to higher demand for electricity that can further increase risks to the transmission system. In this regard, a 2018 Sabin Center study found that:

> [D]isruptions [to generation and transmission] would occur alongside higher peaks in electricity load—potentially high enough to strain transmission and generation facilities' capacities. PJM experienced an instance of this in 1999, when a heat wave caused load to exceed projections by 10% and several transmission problems followed, including transformer failures and—as a result of an increase in imported energy—a depression in voltage.
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> These strains create a pincer effect: higher load peaks amid higher temperatures increase the likelihood of bumping into technical and operational limits on the supply side, at the

27 *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), https://perma.cc/AAA7-P448.

28 *See* Sweet et al., *supra* note 25, at xiii.

29 *See Vulnerability of U.S. Energy Infrastructure to Coastal Flooding*, NAT. ACAD. OF SCI., ENG'G, AND MED., https://perma.cc/4ERX-8NW5 (last visited Apr. 27, 2022).

30 JAMES BRADBURY ET AL., CLIMATE CHANGE AND ENERGY INFRASTRUCTURE EXPOSURE TO STORM SURGE AND SEA-LEVEL RISE 3, 15 (2015), https://perma.cc/3WKY-CVY9.

31 The risks posed by extreme weather events were discussed in the comments previously filed by EDF and the Sabin Center in Docket No. AD21-13.

same time as higher temperatures also tighten those limits by reducing the efficiency and capacities of transmission and generation facilities.[32]

ii. Climate Resilience Planning Is Necessary to Assess and Respond to the Risks of Extreme Weather Events and Other Climate-Related Risks

To address these increased risks to reliability and resiliency discussed in Section II.A.i *supra*, all transmission providers should engage in a process of climate resilience planning, whereby they regularly assess climate-related vulnerabilities and evaluate measures to reduce those vulnerabilities. Compared to other planning processes typically employed by public utilities, climate resilience planning involves longer-term planning horizons, uses forward-looking projections rather than historical data, and specifically considers the vulnerability of infrastructure to climate impacts and potential resilience enhancements.[33]

It should be noted that while increased extreme weather events and changing baselines will affect transmission providers throughout the country, the specific risk profiles and potential impacts will vary by region. For example, drought-related disruptions are likely to be a particular problem in the west and southeast, including areas overseen by the California ISO, Midcontinent ISO, and Southwest Power Pool.[34] Western areas will also be especially affected by wildfires.[35] Eastern areas are at greater risk from heavy rainfall events, flooding, and heavy wind events, although these may also occur in other areas.[36] Because of these regional differences in climate

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32 Gundlach & Webb, *supra* note 10, at 13.

33 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, 592 (2021), https://perma.cc/WV5Y-U2HL.

34 Gundlach & Webb, *supra* note 10, at 5-6, 24-25.

35 *Id.*

36 *Id.*

impacts and regional variations in bulk power system design and operation, transmission providers may face unique sets of climate-related risks; the best approaches to mitigating and managing those risks will therefore also vary. As a result, each transmission provider must conduct a climate vulnerability assessment tailored to its unique situation. However, all transmission providers should follow certain general principles in assessing and planning for the impacts of climate change.

Climate resilience planning is generally viewed a two-stage process, in which the planner first develops a climate vulnerability assessment that identifies relevant forward-looking climate threats and risks and then prepares a climate resilience plan that evaluates ways to mitigate those risks.[37] Climate vulnerability assessments identify where and under what conditions electricity systems are at risk from the impacts of climate change, how those risks will manifest, and the likely consequences for system operation. Drawing on the findings of climate vulnerability assessments, climate resilience plans evaluate measures to mitigate or manage climate-related risks. Several government, academic, and other bodies have published guidelines for effective climate resilience planning in the electricity sector.[38] They recommend (among other things):

1. Climate vulnerability assessments should be based on forward-looking, scientifically credible climate projections that reflect anticipated future conditions in the relevant local area.

2. Climate vulnerability assessments and resilience plans should take a long-range view that accounts for the full range of climate change impacts that are expected to occur within assets' useful life.

3. Climate vulnerability assessments and resilience plans should recognize interactions within the electricity system (e.g., between transmission and generation) and between that

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37 Webb et al., *supra* note 33, at 592.

38 *See, e.g.*, DOE Planning Guide, *supra* note 22; 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 10; Webb et al., *supra* note 33.

system and other sectors (e.g., natural gas and water). They should also recognize likely distribution system and load impacts (such as very high customer demands or destruction of distribution assets or customer facilities) that would have a significant impact on the bulk power system.

4. Climate resilience plans should avoid maladaptive outcomes and, to that end, be developed in a manner consistent with relevant federal, state, and local greenhouse gas emissions reductions requirements.

5. Climate vulnerability assessments and resilience plans should be reviewed and updated regularly as new information becomes available.

Climate resilience planning performed in accordance with recommended best practices can deliver significant benefits, both for transmission providers and the system as a whole. Climate resilience planning enables transmission providers to identify climate-related threats that may be missed through traditional planning processes, including because those processes use historic weather data that does not accurately reflect the future with climate change. It also ensures that providers do not invest in long-lived assets without considering the impacts of future climate-driven extreme events and changing baselines on those assets, and enables providers to develop a variety of resilience measures, from asset hardening to distributed energy resources to operational adjustments, thereby lessening the need for costly future retrofits and possibly reducing the severity of future outages.[39] A 2020 study found that, unless resilience is built-in from the start, spending on transmission and distribution infrastructure could increase by up to twenty-five percent per year by 2090 due to the impacts of climate change.[40] The study further found that designing new infrastructure based on projected climate conditions over its full useful life "roughly halves the expected costs of climate change experienced in 2090."[41]

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[39] Webb et al., *supra* note 33, at 593.

[40] Charles Fant et al., *Climate Change Impacts and Costs to U.S. Electricity Transmission and Distribution Infrastructure*, ENERGY, Mar. 2020, at 1, 1, 7.

[41] *Id.* at 7.

Additionally, effective climate resilience planning should prevent maladaptive outcomes. Maladaptation occurs where measures taken "address the symptom of a particular risk while also exacerbating its underlying cause."[42] In the context of electricity system resilience, guarding against maladaptation requires that climate resilience planning include measures that are consistent with reducing greenhouse gas emissions that exacerbate climate risk.[43]

iii. The Commission Has Ample Legal Authority Not Only to Require One-Time Reports but Also to Direct Corrective Actions if the Reports Reveal Deficiencies

The Federal Power Act vests the Commission with multiple, overlapping means of ensuring reliable service at just and reasonable rates. Section 304 of the Federal Power Act ("FPA") allows the Commission to order reports as "necessary or appropriate to assist the Commission in the proper administration of" the FPA.[44] This clearly covers the modest proposal set forth in the NOPR. The Commission only proposes that transmission providers describe in one-time reports what they plan to do with respect to various issues—"transmission providers are not required to speculate on how they would conduct extreme weather vulnerability analysis where they have no plans to do so."[45]

After gathering and reviewing the reports, the Commission also has broad authority to issue further requirements or corrective actions in the event the reports reveal deficiencies. For example, Section 215 of the FPA tasks the Commission with oversight of the reliability of the bulk power System. Specifically, that section requires a Commission-certified Electric

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[42] Webb et al., *supra* note 33, at 584-585. One example of maladaptation is to build and operate more coal plants to deal with heat wave-caused generation shortfalls.

[43] *Id.*

[44] 16 U.S.C. § 825c.

[45] NOPR at P 22, n.40.

Reliability Organization ("ERO") (i.e., NERC) to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval. Pursuant to Section 215(d)(5), 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.[46]

In addition to its authority under Section 215, the Commission also has authority to act pursuant to Sections 205 and 206 of the FPA to address extreme weather events and other climate change impacts that not only place the reliability of electric service at risk but also implicate Commission-jurisdictional rates. As the Commission recognizes in the NOPR, "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."[47]

The Commission need not look further than Winter Storm Uri for evidence of the connection between the grid's inability to perform reliably during extreme weather events and the requirement that rates be just and reasonable. As the NOPR states, "[d]uring Winter Storm Uri, both the Midcontinent Independent System Operator and the Southwest Power Pool experienced prices exceeding the $2,000/MWh cap on incremental energy offers."[48] This establishes the clear nexus between the way the grid currently responds to extreme weather

46 16 U.S.C. § 824o(d)(5).

47 NOPR at P 13.

48 *Id.* at P 16, n.35 (citing FERC Staff, *2021 State of the Markets Report*, p. 30 (issued Apr. 21, 2022)).

events and the justness and reasonableness of rates that fall under the Commission's purview under the FPA.

In sum, Congress clearly provided the Commission with a number of tools beyond just reporting requirements to address the threats posed by climate change to the reliability of the bulk power System. In the event the one-time reports reveal deficiencies and risks to reliability, the Commission has several strong legal bases from which to order corrective actions.

B. The "Scope" Section and Other Relevant Questions Should be Expanded to Include Assessment of Climate-Related Risks Other than Extreme Weather

As described in Section II.A.i above, climate change is altering baseline weather conditions in ways that will have significant impacts on the bulk power system separate from, and in addition to, the impacts of extreme weather events. The reasons identified in the NOPR for requiring transmission providers to report their processes for assessing the risks posed by extreme weather apply equally to these other climate-related phenomena. Like extreme weather events, changing baselines also present significant risks to the reliability of the transmission system, but little is currently known about how transmission providers assess and plan for those risks. Understanding that "is critically important" and "will enhance the Commission's ability to fulfil its obligations under the" Federal Power Act.[49]

To address this, the Commission should modify several questions in the "Scope" section to ensure that the one-time reports capture whether and how transmission providers assess climate-related risks other than extreme weather, and should modify other questions in the NOPR as needed for consistency. In particular, Q1 should be expanded to require transmission

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[49] *Id.* at P 13.

providers to include a description of *all* climate change impacts for which they conduct, or plan to conduct, vulnerability assessments.

C. The "Scope" and "Inputs" Sections Should Be Expanded to Address Assessment Frequency and Data Sources

When describing their process for determining the scope of vulnerability assessments, transmission providers should be required to specifically report on the frequency with which assessments are conducted or updated. To be effective, climate vulnerability assessment must be an ongoing process, in which risks are regularly re-evaluated to incorporate changing conditions and new information. Understanding whether and how transmission providers update their assessments is therefore essential for FERC to evaluate the adequacy of their approach.

As FERC notes, in order to evaluate the adequacy of transmission providers' vulnerability assessments one must understand both the assessment process and the inputs used. As discussed in our previous comments, climate vulnerability assessments cannot be based solely on historic weather data, but must incorporate forward-looking projections that account for the anticipated impacts of climate change on loads and electric system assets and dynamics.[50] Since the impacts of climate change will vary regionally, transmission providers should use localized or downscaled projections, reflecting anticipated future conditions in their specific operating area. Localized projections are publicly available for many areas but some situations may require custom modeling.[51] Recognizing this, the Commission is proposing to require

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50 Docket AD21-13, Post-Technical Conference Comments of Environmental Defense Fund, Sabin Center for Climate Change Law, Institute for Policy Integrity, and Initiative on Climate Risk and Resilience Law (filed September 27, 2021).

51 Several existing publicly available sources of downscaled climate data were identified in our previous comments. Examples include: *Energy Data Gallery*, U.S. CLIMATE RESILIENCE TOOLKIT, https://toolkit.climate.gov/topics/energy/energy-data-gallery (last updated Sept. 24, 2019); *Regional Climate Change Viewer*, U.S. Geological Surv.,

transmission providers to report on how they determine whether existing projections are adequate and evaluate the robustness of those projections.

Notably, however, the Commission is not proposing to require transmission providers to submit any information about the sources or data underlying the projections they use. Nor is the Commission proposing to require transmission providers to disclose whether they have an established process for identifying or generating new or updated projections that are more robust than those used previously. Such information is essential to evaluate the adequacy of transmission providers' vulnerability assessments and we therefore recommend that the Commission require its inclusion in the one-time reports.

The Commission should also require more information from transmission providers about when, where, and how they use scenario analysis. As explained in our previous comments, scenario analysis can be a useful tool in vulnerability assessments. Because the extent of future climate change is uncertain, assessments should consider a range of possible outcomes, including a worst-case scenario (i.e., reflecting future high greenhouse gas emissions). The information the Commission proposes to request from transmission providers about their use of scenario analysis will not enable the Commission to determine whether a worst-case scenario has been analyzed. To enable this determination, we recommend that the Commission request information on whether and how transmission providers determine which scenarios to use in their assessments.

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http://regclim.coas.oregonstate.edu/visualization/rccv/index.html (last visited Aug. 26, 2022); U.S. Bureau of Reclamation et al., Downscaled CMIP3 and CMPI5 Climate and Hydrology Projections, https://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html (last visited Aug. 26, 2022).

D. The "Scope" and "Vulnerabilities and Exposure to Extreme Weather Hazards" Sections Should Be Expanded to Include Assessments of the Impacts of Climate-Related Risks on Generator Performance and Availability

As described in Section II.A.i above, the same climate-related risks that directly impact the transmission system also indirectly affect its operations through impacts on generating units. To effectively plan for climate-related risks, transmission providers must evaluate how those risks will impact generator performance and availability. The Commission should modify questions in the "Scope" and "Vulnerabilities and Exposure to Extreme Weather Hazards" to request information on whether and how transmission providers incorporate risks to interconnected generating units in their assessments. In particular, Q2 and Q4 should specifically request information on whether the transmission provider includes generation assets and operations in its assessments and whether the transmission provider considers interdependencies of its assets with independently-owned generation assets. Q14 and Q15 should also be modified to specifically request information on whether generation assets are included.

Asking these questions is particularly important because relationships between transmission providers and generation owners take a number of different forms that could affect whether and how the transmission provider assesses climate risks to associated generating units A number of transmission providers also own generating units and therefore may directly incorporate risks affecting those resources into any planning or assessment exercises they conduct. Other transmission providers, including RTOs and ISOs, operate markets that generation owners participate in and may consider the risks to generating units as part of assessing those markets and their participants.[52] Other transmission providers depend on those

[52] Market operators may assess generating unit reliability not only through planning exercises but also through establishment and implementation of market rules. For

markets and may rely on the market operators' assessments or conduct independent reviews of market performance. In other cases some or all of the generating units that serve load on a particular transmission system may be owned by independent generation owners that sell electricity outside of a market construct; interconnected transmission owners may also assess risks to those generating units, either on their own or in collaboration with the generation owners. Understanding if and how transmission providers currently include generating units in assessments will enable the Commission to determine whether further action is needed to ensure that the generation sector is fully included in transmission providers' climate resilience planning.

E. The "Scope" and "Inputs" Sections Should Be Expanded to Include Assessments of the Impacts of Climate-Related Risks on Electric Demand and Distribution Systems

As described in Section II.A.i above, the stresses that climate-related risks place on the bulk power system can be compounded by high levels of electric demand that are often correlated with those risks. At the same time, distribution system operators may have capabilities and vulnerabilities that could mitigate or worsen bulk system performance during extreme weather events. The Commission should modify questions in the "Scope" and "Inputs" sections to explicitly request information on whether and how transmission providers are coordinating with distribution system operators or otherwise considering electric demand levels and distribution system impacts in their assessments. In particular, Q4 should be expanded to request specific information on whether and how the transmission provider considers interdependencies with the distribution system and an additional question should be added to the "Inputs" section

example, capacity accreditation processes pass judgment, explicitly or implicitly, on the vulnerability of the asset to risks during the relevant period. Market operators should identify whether or not these and similar processes consider climate-related risks to generator performance and availability.

requesting information on methods, processes, and data sources the transmission provider uses to determine anticipated electric demand.

F. The Commission Should Establish a Clear and Coordinated Process for Further Action

The instant NOPR is the latest in a series of actions the Commission has proposed to take to address the threats posed by climate change, as well as transmission system planning more generally.[53] As the evidence in these dockets shows, several gaps have been identified in the way we plan for and respond to events and conditions that can compromise the reliability of the grid. Solutions such as the NOPR proposes—to better understand how transmission providers are planning for extreme weather events—will help to address these deficiencies (particularly if the Commission adopts the suggestions above). While this small step will facilitate better planning and responses to extreme weather events, as observed by Commissioner Clements, further "action is necessary on several fronts to better facilitate cost-effective solutions."[54]

As a first step, the Commission should adopt, with slight modification, the NOPR's proposed process for review of the reports, which will allow for stakeholder comment. The NOPR "propose[s] to require that these one-time informational reports be filed 90 days after the publication of any final rule in this proceeding in the *Federal Register*. We also propose to seek

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53 *See, e.g.*, *Climate Change, Extreme Weather, and Electric System Reliability*, Docket No. AD21-13-000, Technical Conference (June 1-2, 2021); *Transmission System Planning Performance Requirements for Extreme Weather*, 179 FERC ¶ 61,195 (2020) (proposing to direct NERC to submit modifications to Reliability Standard TPL-001-5.1 (Transmission System Planning Performance Requirements) within one year of the effective date of a final rule in this proceeding to address reliability concerns pertaining to transmission system planning for extreme heat and cold weather events that impact the reliable operations of the bulk power System).

54 *Transmission System Planning Performance Requirements for Extreme Weather*, 179 FERC ¶ 61,195 (2020) (Commissioner Clements Concurrence, P 12).

public comment on the reports 30 days after they are filed."[55] As the Commission has acknowledged, allowing for additional stakeholder review will help to ensure that any final decision is adequately supported by the record and establishes rules and policy that result in just and reasonable rates.[56] However, given the number of transmission providers required to submit these one-time reports, stakeholders will need more than 30 days to review all of the reports and prepare comments. The Commission should therefore allow at least 60 days for stakeholders to review the reports and submit comments. Review of the reports and consideration of stakeholder comments will enable the Commission to identify any deficiencies in transmission providers' existing planning processes. This will, in turn, allow the Commission to determine what further action is necessary and appropriate to address the threats posed by climate change and how best to coordinate action in this proceeding with action in related proceedings, as well as with state regulators.

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55 NOPR at P 10.

56 See the Commission's Fiscal Year 2022-2026 Strategic Plan at 21, *available at* https://www.ferc.gov/media/ferc-fy22-26-strategic-plan ("FERC ensures that interested stakeholders have the opportunity to provide their views, and that the Commission's ultimate decisions are adequately supported by the public record. Stakeholder engagement and transparency help FERC establish rules and policy that result in just, reasonable, and not unduly discriminatory or preferential rates, terms, and conditions.").

III. CONCLUSION

EDF and the Sabin Center respectfully recommend that the Commission adopt the proposals in the NOPR with the modifications recommended herein.

Respectfully submitted,

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Dated: August 30, 2022