September 27, 2021

Federal Energy Regulatory Commission
Office of the Secretary
888 First Street NE
Washington, DC 20426

Via the FERC eFiling Portal

Re: FERC's Request for Comments Following the Technical Conference on Climate Change, Extreme Weather, and Electric System Reliability (Docket No. AD21-13-000)

To Whom It May Concern:

Columbia Law School's Sabin Center for Climate Change Law ("Sabin Center"), Environmental Defense Fund ("EDF"), the Institute for Policy Integrity at New York University School of Law ("Policy Integrity"),[1] and the Initiative on Climate Risk and Resilience Law ("ICRRL") submit these comments in response to the Notice Inviting Post-Technical Conference Comments issued by the Federal Energy Regulatory Commission ("FERC" or "Commission") on August 11, 2021.

The Sabin Center develops and promulgates legal techniques to address climate change and trains law students and lawyers in their use. The Sabin Center has worked extensively on issues relating to climate resilience in the electricity sector and, in collaboration with EDF, recently published a major report on the topic.[2] EDF is a non-partisan, non-governmental environmental organization representing over two million members and supporters nationwide. Since 1967, EDF has linked law, policy, science, and economics to create innovative and cost-effective solutions to today's most pressing environmental problems. Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decision making through advocacy and scholarship in the fields of administrative law, economics, and public policy. ICRRL is a joint

[1] This document does not purport to present New York University School of Law's views, if any.
[2] Romany M. Webb et al., *Climate Risk in the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Utilities*, 51 ENV'T L. (forthcoming 2021).

initiative of EDF, the Sabin Center, Policy Integrity, and Vanderbilt Law School, focused on legal efforts on climate risk and resilience, particularly at the intersection of practice and scholarship.[3]

EDF and the Sabin Center previously submitted joint comments in response to FERC's Supplemental Notice of Technical Conference issued on March 15, 2021; Policy Integrity submitted separate comments.[4] As indicated in those comments, EDF, the Sabin Center, and Policy Integrity strongly support FERC's efforts to better understand the climate-related risks facing the electricity sector, and assert that effectively mitigating and managing those risks requires a new approach to electric system planning. Additionally, our organizations recommended that FERC consider action to push regulated entities to engage in a process of climate resilience planning, whereby they regularly assess climate-related vulnerabilities and evaluate measures to reduce those vulnerabilities.

We reiterate that recommendation here. To that end, we provide additional information on the process for climate resilience planning (including identifying relevant tools and data) and explain how FERC could support it. We also emphasize that such planning is indispensable to ensure that electricity service continues to be safe, reliable, and available at just and reasonable rates to the end-use consumer. The information provided here is relevant to several of the questions posed in FERC's August 2021 Notice, particularly questions 1, 2, 6, and 9.

I. The Process for Climate Resilience Planning Is Well-Established and the Tools Needed for it Already Exist

Climate resilience planning is a two-stage process, involving the development of (1) climate vulnerability assessments and (2) climate resilience plans. Broadly, 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 themselves, and what the consequences will be for system operation. Drawing on the findings of climate vulnerability assessments, climate resilience plans evaluate measures to mitigate or manage climate-related risks. Both the climate vulnerability assessment and climate resilience plan must be regularly reviewed and updated as new information becomes available.

Several government, academic, and other bodies have published guidelines for effective climate resilience planning in the electricity sector.[5] Key recommendations include:

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[3] This document does not necessarily represent the views of each ICRRL partner organization. For more information about ICRRL, see https://icrrl.org.

[4] Comments of Env't Def. Fund and the Sabin Ctr. for Climate Change L., *Climate Change, Extreme Weather, and Electric System Reliability*, Docket No. AD21-13 (Apr. 15, 2021); Comments of the Institute for Policy Integrity at N.Y.U. School of L., *Climate Change, Extreme Weather, and Electric System Reliability*, Docket No. AD21-13 (Apr. 14, 2021).

[5] *See, e.g.*, U.S. DEP'T OF ENERGY, CLIMATE CHANGE AND THE ELECTRICITY SECTOR: GUIDE FOR CLIMATE CHANGE RESILIENCE PLANNING (2016), https://perma.cc/6B6Q-EH7P; Kristin RALFF-DOUGLAS, CAL. PUB. UTILS. COMM'N, CLIMATE ADAPTATION IN THE ELECTRIC SECTOR: VULNERABILITY ASSESSMENTS & RESILIENCE PLANS (2016), https://perma.cc/R6NW-F6GV; JUSTIN GUNDLACH & ROMANY WEBB, CLIMATE CHANGE IMPACTS ON THE BULK POWER SYSTEM: ASSESSING VULNERABILITIES AND PLANNING FOR RESILIENCE (2018), https://perma.cc/MK9K-LBGJ; Webb et al., *supra* note **Error! Bookmark not defined.**.

1. Climate vulnerability assessments should be based on forward-looking climate projections that reflect anticipated future conditions in the relevant local area. As discussed in our previous comments, assessments cannot be based solely on historic weather data, which does not account for future climate change. Because the extent of future climate change is uncertain, assessments should be based on multiple climate projections, reflecting a reasonable range of scenarios, including a 'worst' case scenario consistent with RCP8.5.[6]

2. Climate vulnerability assessments and resilience plans should take a long-range, 50-year plus view that accounts for the full range of climate impacts that are expected to occur within the useful life of existing assets and new assets under development. Each asset should be assigned a risk profile, based on the likelihood and consequences of it being impacted. Using these profiles, regulated entities should prioritize specific vulnerabilities and responsive resilience measures.

3. Climate resilience plans should be developed in a manner consistent with relevant federal and state greenhouse gas emissions reduction goals or requirements. The evaluation of possible resilience measures should seek to avoid forms of maladaptation that exacerbate the climate crisis.[7] To that end, measures should be scored based on their carbon intensity or the associated greenhouse gas emissions, and those that increase emissions should not be pursued.

4. The planning process should be highly collaborative, recognizing interactions within the electricity system (e.g., between transmission and distribution) between that system and other sectors (e.g., natural gas, water), and with the land use decisions of state and local governments. All stakeholders should have an opportunity to participate in resilience planning. In particular, efforts should be made to involve disadvantaged and vulnerable communities, which are often disproportionately affected by electricity outages and other reliability issues.

Electric industry participants have already begun engaging in climate resilience planning. Most notably, in 2019, Consolidated Edison Company of New York, Inc. ("Con Ed") published a comprehensive climate vulnerability assessment that evaluated risks to its assets and operations from anticipated changes in temperature, humidity, precipitation, extreme events, and sea levels from 2020 through 2080.[8] Building on that assessment, in 2020, Con Ed developed a climate change implementation plan which identified changes to its planning, engineering, operations,

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[6] Representative Concentration Pathways (RCP) describe different pathways of GHG emissions and atmospheric concentrations, air pollutant emissions, and land use through 2100; RCP8.5 is the high baseline emissions scenario. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014 SYNTHESIS REPORT 8 (2014), https://perma.cc/5KSD-E44J.

[7] *See* U.N. Env't Programme, *Maladaptation to Climate Change: Avoiding Pitfalls on the Evolvability Pathway*, *in* FRONTIERS 2018/19: EMERGING ISSUES OF ENVIRONMENTAL CONCERN 66, 68 (2019) (describing multiple forms of maladaptation to climate change); I.R. Noble et al., *Adaptation Needs and Options*, *in* CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY. PART A: GLOBAL AND SECTORAL ASPECTS. CONTRIBUTION OF WORKING GROUP II TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 833 (C.B. Field et al. eds. 2014).

[8] CONEDISON, CLIMATE CHANGE VULNERABILITY STUDY (2019), https://perma.cc/UWA7-6324.

and emergency response practices to manage climate-related risks.[9] These documents provide a model for others in the electric industry.

While Con Ed's work demonstrates the feasibility of climate resilience planning, many other electric utilities and system operators have yet to engage in such planning, with some claiming that local climate impacts are too speculative or uncertain to plan for. There is, of course, some uncertainty about future climate impacts because they will depend on the extent of future greenhouse gas emissions.

But that uncertainty is no reason to avoid climate resilience planning, and the presence of uncertainty does not undo the fact that well-established modeling techniques can be used to generate sophisticated projections of likely future conditions based on historic and anticipated future emissions. While most models produce coarse-resolution projections (e.g., showing conditions within a grid cell that may be 60 square miles or more in size), downscaling techniques can be used to refine those projections to estimate climate impacts at finer geographic scales (e.g., in increments of one square mile or less). Probability distributions can be attached to the projections, enabling an assessment of the relative likelihood of different climate outcomes. These models thus provide decision-useful information that electric utilities and system operators can employ in planning. In short, as Con Ed's experience demonstrates, utilities and others can use the output of climate models to identify and evaluate climate-related risks to their assets and operations.

There are a number of publicly accessible repositories of downscaled, probabilistic data on key climate parameters relevant to electric system planning (e.g., temperature and precipitation).[10] The following examples have been developed and published by the federal government:

- The U.S. Department of Energy has partnered with the National Aeronautics and Space Administration and National Oceanic and Atmospheric Administration to make available zip code-level temperature projections and county-level precipitation and sea level rise projections, which are specifically tailored for use in electric resilience planning.[11]
- The U.S. Geologic Survey, in partnership with the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University, has designed a "Regional Climate

[9] CONEDISON, CLIMATE CHANGE IMPLEMENTATION PLAN (2020), https://perma.cc/8J4S-NWSU.

[10] The various projections published by governmental and other actors cover a range of climate variables. In some cases, there are multiple projections for a single variable, often with different spatial scales. Electric utilities and others in the industry should use projections with spatial scales that best align with their planning processes. As noted above, industry participants should employ multiple projections, which reflect a range of climate scenarios, including a possible "worst" case.

[11] DOE's goal "is to provide utility companies with access to climate data they can use in building climate resilience." The data are provided in formats that can be readily inputted into models and other systems used in utility planning. *See Energy Data Gallery*, U.S. CLIMATE RESILIENCE TOOLKIT, https://toolkit.climate.gov/topics/energy/energy-data-gallery (last updated Sept. 24, 2019).

Change Viewer" that includes downscaled projections for over 60 climate variables, including air temperature, precipitation, and soil moisture.[12]

- The Bureau of Reclamation, in partnership with multiple universities and non-governmental organizations, has published downscaled projections for climate change impacts on hydrology, ecosystems, and energy demands across the United States.[13]

State government examples of downscaled data include:

- In California, there is the Cal-Adapt tool, which was developed by researchers at the University of California Berkeley, with support from the California Energy Commission and California Strategy Growth Council.[14] It provides projections for average annual maximum and minimum temperatures, precipitation and drought, extreme weather, wildfire and sea level rise in California under two climate change scenarios (i.e., reflecting different greenhouse gas emissions levels).[15]

- Downscaled projections for New York have similarly been published by the New York City Panel on Climate Change and New York State Energy Research and Development Authority.[16]

Projections for many other regions are available in academic publications[17] and commercial databases.[18]

As these examples demonstrate, downscaled, probabilistic climate data is available in forms readily applicable to the electricity sector. It is imperative that regulated entities employ such data to evaluate climate-related risks to their operations and develop strategies for mitigating and managing those risks.

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[12] *Regional Climate Change Viewer*, U.S. GEOLOGICAL SURV., http://regclim.coas.oregonstate.edu/visualization/rccv/index.html (last visited Sept. 13, 2021);

[13] U.S. Bureau of Reclamation et al., *Downscaled CMIP3 and CMIP5 Climate and Hydrology Projections*, https://gdo-dcp.ucllnl.org/downscaled_cmip_projections/#Welcome (last visited Sept. 13, 2021).

[14] *About Cal-Adapt*, CAL-ADAPT, https://cal-adapt.org/about/ (last visited Sept. 12, 2021).

[15] *Climate Tools*, CAL-ADAPT, https://cal-adapt.org/tools/ (last visited Sept. 12, 2021).

[16] Radley Horton et al., *Climate Change Adaptation in New York City: Building a Risk Management Response, Chapter 3: Climate observations and projections,* 1196 ANN. N.Y. ACAD. SCI. 41 (2010); N.Y.C. PANEL ON CLIMATE CHANGE, CLIMATE RISK INFORMATION 2013: OBSERVATIONS, CLIMATE CHANGE PROJECTIONS, AND MAPS (2013), https://perma.cc/YX5L-7UDK; Radley Horton et al., *New York City Panel on Climate Change 2015 Report, Chapter 1: Climate Observations and Projections*, 1336 ANN. N.Y. ACAD. SCI. 18 (2015), Jorge F. Gonzalez et al., *New York City Panel on Climate Change 2019 Report, Chapter 2: New Methods for Assessing Extreme Temperature, Heavy Downpours, and Drought*, 1439 ANN. N.Y. ACAD. SCI. 30 (2019).

[17] *See, e.g.*, Liang Ning, *Probabilistic Projections of Climate Change for the Mid-Atlantic Region of the United States: Validation of Precipitation Downscaling during the Historical Era*, 25 J. CLIMATE 509 (2012).

[18] *See, e.g.*, FOUR TWENTY SEVEN, PHYSICAL CLIMATE RISK APPLICATION (2020), https://perma.cc/V5ZM-37XL.

II. FERC Can Support Climate Resilience Planning Through a Variety of Avenues

FERC can support climate resilience planning at all levels of the electricity system through its core statutory and regulatory roles at the interstate level, as well as through advisory or collaborative roles with state authorities and among other federal agencies.

Under the Federal Power Act ("FPA"), FERC must "ensure the [bulk power system] operates in a manner that yields reliable electricity services at rates that are just, reasonable, and not unduly discriminatory or preferential."[19] Fulfilling this duty requires understanding and addressing the risks climate change poses to the system.[20] As an initial matter, FERC consider requiring regulated entities to use the wealth of available data to produce a comprehensive climate vulnerability assessment.[21] Furthermore, FERC might also consider how to address the increasing frequency and severity of different extreme weather events, as well as changing weather baselines, in its oversight of the North American Electric Reliability Corporation's reliability standards.[22] Building on these analytical foundations, FERC could then direct Independent System Operators and Regional Transmission Organizations and other owners of interstate transmission infrastructure over which it has authority to address identified vulnerabilities or consider revising its regulations on wholesale energy markets and natural gas infrastructure as well as its transmission planning policies.[23]

In addition to exercising its authority over regulated entities, FERC should consider engaging with entities not subject to its regulatory jurisdiction where possible and appropriate. Given that the vast majority of forced outages are on distribution systems, the public utility commission (PUC) in each state remains the key authority and forum when it comes to issues of managing the grid's climate risk exposure.[24] While some PUCs have taken action to require or encourage climate vulnerability studies and resilience planning, others have not yet meaningfully engaged in these processes and could benefit from FERC's analytical resources and expertise.[25] FERC can play a useful role by coordinating and collaborating with these entities, such as through the creation of

[19] *See* GUNDLACH & WEBB, *supra* note 5, at 3.
[20] *Id.*
[21] *Id.*
[22] *See, e.g.*, Order Approving Cold Weather Reliability Standards, 176 FERC ¶ 61,119 (Aug. 24, 2021).
[23] *Cf.* BURCIN UNEL, INST. FOR POL'Y INTEGRITY, A PATH FORWARD FOR THE FEDERAL ENERGY REGULATORY COMMISSION: NEAR-TERM STEPS TO ADDRESS CLIMATE CHANGE (2020), https://perma.cc/5W42-MLR7 (recommending avenues available to FERC to facilitate a clean energy transition).
[24] Webb et al., *supra* note **Error! Bookmark not defined.**; U.S. DEP'T OF ENERGY, TRANSFORMING THE NATION'S ELECTRICITY SYSTEM: THE SECOND INSTALLMENT OF THE QUADRENNIAL ENERGY REVIEW at S-12 (2017), https://www.energy.gov/sites/prod/files/2017/01/f34/Transforming%20the%20Nation%27s%20Electricity%20System-The%20Second%20Installment%20of%20the%20Quadrennial%20Energy%20Review--%20Full%20Report.pdf ("Electricity outages disproportionately stem from disruptions on the distribution system (over 90 percent of electric power interruptions), both in terms of the duration and frequency of outages, which are largely due to weather-related events. Damage to the transmission system, while infrequent, can result in more widespread major power outages that affect large numbers of customers with significant economic consequences.").
[25] *See* GUNDLACH & WEBB, *supra* note 5, at 2–4, 21–22.

joint task forces.[26] FERC could also coordinate with other federal entities to offer technical assistance to state PUCs.[27]

At the federal level, FERC should consider opportunities to coordinate and collaborate with other federal agencies to support efficient and effective climate resilience planning across the government and economy. For example, FERC has important subject matter expertise to provide to interagency working groups (IWGs) on climate risk, adaptation, and resilience topics (as well as decarbonization and other climate change mitigation-focused topics).

III. Consumer Cost Impact Considerations Are Central to Effective Climate Resilience Planning

As recent events in Texas and elsewhere have made unmistakably clear, electricity outages are costly, sometimes deadly events.[28] Left unabated, climate change will only increase the frequency and severity of blackouts, and "[i]n the absence of concerted action to improve [climate] resilience, energy system vulnerabilities pose a threat to America's national security, energy security, economic well-being, and quality of life."[29] For these reasons, energy regulators should take seriously the impacts of climate change and direct regulated entities to take measures that address their vulnerabilities to such impacts. However, because these directives can be issued only on the basis of existing statutory obligations, such as FERC's mandate to ensure that rates are just and reasonable, FERC and other regulators must strike a balance: require measures that protect ratepayers physically and financially, but also ensure that investments are net beneficial and cost-effective.[30] Comprehensive climate resilience planning can help to facilitate that.

As FERC steers stakeholders through decisions about the immense investments in transmission that are needed to ensure a reliable and resilient system amidst energy transition,[31] climate resilience planning can play meaningful and complementary roles. In addition to identifying where new investments would enhance system resilience, it can also identify solutions that are less capital intensive, faster to implement, and more easily reversed or adjusted as new information comes to light. Indeed, climate resilience planning most often recommends changes to

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[26] *See, e.g.*, Press Release, Fed. Energy Reg. Comm'n, FERC, NARUC to Establish Joint Federal-State Task Force on Electric Transmission (June 17, 2021), https://perma.cc/JV3W-7H8V.

[27] *See, e.g.*, U.S. Dep't of Energy, *Technical Assistance to State Public Utility Commissions*, ELEC. MKTS. & POL'Y, https://perma.cc/SNY8-MT9V (last visited Sept. 16, 2021).

[28] Joshua W. Busby et al., *Cascading Risks: Understanding the 2021 Winter Blackout in Texas*, 77 ENERGY RES. & SOC. SCI. 102106 (2021); *see also* LITOS STRATEGIC COMMC'N, THE SMART GRID: AN INTRODUCTION 5 (2008), https://perma.cc/74VV-XN7E (report authored for the U.S. Department of Energy under a federal contract).

[29] U.S. DEP'T OF ENERGY, *supra* note 5, at i.

[30] Michael Panfil & Rama Zakaria, *Uncovering Wholesale Electricity Market Principles*, 9 MICH. J. ENV'T & ADMIN. L. 145, 173–77 (2020) (describing FERC's obligation to ensure just and reasonable rates as being designed to favor rate-decreasing outcomes).

[31] *See generally* Transcript of Technical Conference to Discuss Climate Change, Extreme Weather, & Electric System Reliability, Docket No. AD21-13 (June 2, 2021); *see also* Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection, 176 FERC ¶ 61,024, P 5 (2021) (describing broad scope of inquiry).

operational approaches and/or planning standards,[32] and is a good way to identify non-wire solutions for transmission, like battery storage or dynamic line ratings, as preferred options.[33]

Additionally, climate resilience planning can protect ratepayers by guarding against various forms of maladaptation. Maladaptive actions can "constrain the options or ability of other decision makers now or in the future to manage the impacts of climate change, thereby resulting in an increase in exposure and/or vulnerability to climate change."[34] As climate change intensifies, risks to electricity assets will similarly rise, making it increasingly difficult to find climate resilience solutions that are less capital intensive and therefore less costly to consumers.[35] Action must, therefore, be taken now to avoid exposing consumers to the most severe cost outcomes and maintain reliable electric service at just and reasonable rates.

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Thank you for the opportunity to submit these comments. Please contact us if you have any questions.

Sincerely,

/s/ Romany Webb

Romany Webb
Sabin Center for Climate Change Law
Columbia Law School
rmw2149@columbia.edu

/s/ Michael Panfil

Michael Panfil
Stephanie Jones
Environmental Defense Fund
mpanfil@edf.org
sjones@edf.org

/s/ Justin Gundlach

Justin Gundlach
Sarah Ladin
Institute for Policy Integrity
at New York University School of Law
justin.gundlach@nyu.edu
sarah.ladin@nyu.edu

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[32] *See generally* ALISON SILVERSTEIN ET AL., A CUSTOMER-FOCUSED FRAMEWORK FOR ELECTRIC SYSTEM RESILIENCE (2018), https://perma.cc/ZL7W-QZ9H; *see id*. at 63 fig.19 (primarily identifying operational and planning changes that can lead to more climate resilience).

[33] *See, e.g.*, ENV'T L. & POL'Y CTR., BEYOND WIRES: USING ADVANCED TRANSMISSION TECHNOLOGIES TO ACCELERATE THE TRANSITION TO CLEAN ENERGY (2021); Transcript of Technical Conference to Discuss Climate Change, Extreme Weather, & Electric System Reliability at 169-70, Docket No. AD21-13 (June 1, 2021) (Panelist Alison Silverstein discussing non-wire solutions).

[34] Webb et al., *supra* note **Error! Bookmark not defined.**, at 4.

[35] U.S. GOV'T ACCOUNTABILITY OFF., GAO-21-346, ELECTRICITY GRID RESILIENCE: CLIMATE CHANGE IS EXPECTED TO HAVE FAR-REACHING EFFECTS AND DOE AND FERC SHOULD TAKE ACTIONS 15–21 (2021), HTTPS://PERMA.CC/8FMH-U7LV (cataloging the effects unmitigated climate change will have on the energy system); *id.* at 22–26 (noting that these effects will spiral into "increasing costs to consumers").