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September 24, 2021

Michigan Public Service Commission
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Submitted via email at mpscedockets@michigan.gov

Docket: Case No. U-21122

RE: MPSC's Order and Notice of Opportunity to Comment dated August 25, 2021

To Whom It May Concern:

The Initiative on Climate Risk and Resilience Law (ICRRL) and two of its member organizations, Columbia Law School's Sabin Center for Climate Change Law (Sabin Center) and the Institute for Policy Integrity at New York University School of Law (Policy Integrity), submit these comments in response to the Order and Notice of Opportunity to Comment (Order) issued by the Michigan Public Service Commission (MPSC or Commission) on August 25, 2021 in Case No. U-21122. The Order invited comments on whether planning processes based on historical data are sufficiently robust to enable utilities to effectively prepare for the impacts of climate change.

ICRRL is a joint initiative of Columbia Law School's Sabin Center for Climate Change Law, Environmental Defense Fund (EDF), the Institute for Policy Integrity at New York University School of Law, and Vanderbilt Law School, focused on legal issues related to climate risk and resilience.[1] The Sabin Center develops and promulgates legal techniques to address climate change and trains law students and lawyers in their use. It has worked extensively on issues relating to climate resilience in the electricity utility sector and recently published a major report on the topic, co-authored by EDF, titled *Climate Risk in*

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

the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Electric Utilities (Resilience Planning Paper).[2] Policy Integrity is a non-partisan think tank dedicated to improving the quality of governmental decision-making through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity's work in the energy sector includes the report, *Toward Resilience: Defining, Measuring, and Monetizing Resilience in the Electric System* (Resilience Valuation Paper).[3]

ICRRL, the Sabin Center, and Policy Integrity share the Commission's view that "ratepayers have a right to expect utilities to anticipate extreme weather events, to provide a hardened grid that can withstand extreme weather, and to be prepared to restore power expediently when the grid fails."[4] We likewise share the MPSC's concern that utility "planning processes . . . rely heavily on historical data" that does not adequately reflect the realities of climate change.[5]

There is broad agreement among scientists that climate change is and will continue to increase the frequency and severity of extreme weather events, which, as demonstrated by the recent storms in Michigan and elsewhere in the U.S., pose a major risk to utility infrastructure.[6] That infrastructure is also at risk from other non-event-based climate impacts, including increasing average temperatures and changing precipitation patterns.

While electric utilities have always had to deal with weather and environment-related risks, climate change presents a new and fundamentally different problem for utilities. The impacts of climate change are likely to affect utility systems in multiple, compounding, and synergistic, ways, both because individual climate impacts may affect multiple parts of the system and because multiple impacts may occur simultaneously.[7] Other interdependent sectors, such as upstream energy production, water supply, transportation, and telecommunications, will also be affected by climate impacts in ways that can exacerbate effects on the electric system.[8]

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[2] Romany M. Webb et al., *Climate Risk in the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Electric Utilities*, 51 ENV'T L. (forthcoming 2021).
[3] BURCIN UNEL & AVI ZEVIN, INST. FOR POL'Y INTEGRITY, TOWARD RESILIENCE: DEFINING, MEASURING, AND MONETIZING RESILIENCE IN THE ELECTRICITY SYSTEM (2018), https://perma.cc/LT6K-BSY9.
[4] Mich. Pub. Serv. Comm'n, Order and Notice of Opportunity to Community, Case No. U-2122, at 3 (Aug. 25, 2021).
[5] *Id*. at 11.
[6] *See generally* Craig Zamuda et al., *Energy Supply, Delivery, and Demand, in* IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME II 179 (D.R. Reidmiller et al. eds., 2018), https://perma.cc/P9QM-YJHF; PETER CAMBELL JOHNSTON ET AL., CLIMATE RISK AND ADAPTATION IN THE ELECTRIC POWER SECTOR (2012), https://perma.cc/XC2Q-YVHK; Ariel Miara et al., *Climate and Water Resource Change Impacts and Adaptation Potential for US Power Supply*, 7 NATURE CLIMATE CHANGE 793 (2017), https://perma.cc/AA5T-TUEL; JUSTIN GUNDLACH & ROMANY WEBB, CLIMATE CHANGE IMPACTS ON THE BULK POWER SYSTEM: ASSESSING VULNERABILITIES AND PLANNING FOR RESILIENCE (2018), https://perma.cc/353Y-RSGB. The storms in Michigan in August 2021 clearly demonstrate the vulnerability of the state's electricity system. *See* Brad Devereaux, *Michigan's Top Utilities Blame Days-Long Power Outages on 'Significant' Storms*, MICHIGAN LIVE (Aug. 20, 2021), https://perma.cc/NAX7-Z6FT.
[7] *See generally* U.S. DEPT. OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 5–6 (2012), https://perma.cc/FMB6-RSRK.
[8] *Id*.

Effectively mitigating and managing the risks posed by climate change will require a new approach to planning. In particular, it demands incorporating a dynamic and growing set of climate change-driven risks into planning efforts, and recognizing the value of being resilient to foreseeable causes of failure.[9] We recommend that the MPSC require electric utilities under its jurisdiction to regularly assess their climate-related vulnerabilities and identify measures to make their systems resilient to climate impacts. This comment letter draws on the Resilience Planning Paper to explain what climate resilience planning involves and why it is necessary to ensure the continued provision of reliable electricity services at just and reasonable rates. It also draws on the Resilience Valuation Paper to explain some of the options available for defining resilience needs and valuing investments intended to meet them.

Basing Planning Solely on Historic Data Is Inappropriate in the Age of Climate Change and Puts Customers at Risk

Because climate change is and will continue to alter weather patterns, basing utility planning solely on historic weather data increases the potential for electricity outages and other reliability issues, to the detriment of customers. Consider, for example, that climate change is leading to higher average and extreme temperatures, which are, in turn, driving increased demand for electricity.[10] At the same time, higher temperatures also reduce the operating efficiency of some generating plants and the carrying capacity of transmission and distribution lines, making it harder to supply electricity to customers.

As an illustration, most natural gas generating plants are designed to operate at 59^{o}F (15^{o}C), and may experience efficiency reductions of up to 1% for each 1.8^{o}F (1^{o}C) increase in temperature.[11] Higher water temperatures could similarly affect natural gas and other thermoelectric generating plants that require water for cooling.[12] Studies suggest that output from nuclear generating plants could decline by 0.5% for each 1.8^{o}F (1^{o}C) increase in water temperatures, for example.[13] In cases where water temperatures exceed technical specifications, plants may be forced to curtail output by larger amounts or entirely shut down.[14] Indeed, there were 17 instances of nuclear plants in the U.S. having to reduce output due to higher water temperatures in 2019, and 25 instances in 2020.[15] On one occasion in Michigan, a heat wave drove *air* temperatures within a nuclear

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[9] For a discussion of the definition of "resilience" in the context of electricity sector planning and an explanation of how it is distinct from "reliability," see UNEL & ZEVIN, *supra* note 3, at 4, 10–12.

[10] Zamuda et al., *supra* note 6.

[11] JAYANT SATHAYE ET AL., ESTIMATING RISK TO CALIFORNIA ENERGY INFRASTRUCTURE FROM PROJECTED CLIMATE CHANGE 9-50 (2011), https://perma.cc/EX2M-8828.

[12] Ethan D Coffel & Justin S. Mankin, *Thermal Power Generation Is Disadvantaged in a Warming World*, 16 ENV'T RSCH. LTRS. 024043 (2021).

[13] Ahmet Durmayaz & Oguz Salim Sogut, *Influence of Cooling Water Temperature on the Efficiency of a Pressurized-Water Reactor Nuclear Power Plant*, 30 INTL. J. ENERGY RSCH. 799 (2006).

[14] JAMES MCCALL, JORDAN MACKNICK & DANIEL HILLMAN, NAT'L RENEWABLE ENERGY LAB'Y, WATER-RELATED POWER PLANT CURTAILMENTS: AN OVERVIEW OF INCIDENTS AND CONTRIBUTING FACTORS 24–28 (2016) (listing heat-related events that caused curtailments, variances, and shutdowns).

[15] Matthew Bandyk, *For Nuclear Plants Operating on Thin Margins, Growing Climate Risks Prompt Tough Choices*, UTIL. DIVE, (Sept. 10, 2020), https://perma.cc/B63Q-77VC.

facility's containment vessel above safe levels, prompting a complete shutdown.[16] Transmission and distribution infrastructure is also at risk from rising temperatures and other climate change impacts. For example, a recent study by distribution utility Consolidated Edison Company of New York, Inc. (Con Ed) found that higher temperatures would adversely affect the operation of cooling equipment across its system.[17]

As the foregoing discussion suggests, basing electric system planning solely on historic weather data is likely to result in utility assets being designed, installed, or operated in ways (and locations) that make them vulnerable to climate change-amplified weather and environmental shifts. This will, in turn, impair utilities' ability to deliver reliable electricity services and increase the costs faced by customers. Given the long-lived nature of many utility assets, failing to plan for future climate impacts is likely to cause utilities to incur avoidable costs, possibly in the form of retrofits or early retirement of assets, both of which ultimately burden customers. Consequently, and as further explained in the Resilience Planning Paper, effective planning is critical to ensure that utilities fulfil their duty to provide reliable services at just and reasonable rates.[18]

Relatedly, failing to integrate climate considerations into planning also increases the risk that utilities will be ill-equipped to deal with acute events, such as weather-induced outages. As the MPSC has itself recognized, climate change is already increasing the frequency and severity of extreme weather events, and will continue to do so in the future.[19] Despite that, however, utilities often base their emergency or disaster response plans on historic data that reflects the incidence and severity of past events. This has led some utilities to inadequately prepare for storms and other events. As an example, in 2017, DTE Electric Company (DTE) struggled to promptly restore electricity after tropical storm-force winds resulted in extensive tree damage to its system. DTE subsequently told the MPSC that it prepared for 40-50 mile per hour winds, which it anticipated would result in outages affecting 50,000-100,000 customers, but actually saw wind gusts of 68 miles per hour, leading to service disruptions for 800,000 customers.[20] Utilities in other states have had similar experiences. For instance, in advance of Superstorm Sandy in 2012, Con Ed prepared its facilities for a storm surge of approximately 11 feet—the highest previously recorded—but the actual surge was 14 feet, resulting in the destructive inundation of a substation and widespread power outages.[21] More recently, utilities in Texas, with insufficiently winterized electricity infrastructure, were similarly unprepared for Winter Storm Uri. Uri brought record cold temperature that resulted in widespread power outages and left millions of Texans without access to electricity for days.

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[16] McCall et al., *supra* note 14, at 25 tbl.A-1 (noting shutdown of Donald C. Cook nuclear plant after the air temperature in the facility's containment building rose above 120ºF).
[17] ConEdison, Climate Change Vulnerability Study 32–33 (2019), https://perma.cc/UWA7-6324.
[18] Webb et al., *supra* note 2, at 16–23.
[19] Mich. Pub. Serv. Comm'n, *supra* note 4, at 4, 6.
[20] Letter from Andrea Hayden, DTE Electric Co., to Kavita Kale, Mich. Pub. Serv. Comm'n (May 15, 2017), https://perma.cc/ACE9-DNCD.
[21] Dave Carpenter et al., *ConEd Prepared for Big Storm, Got an Even Bigger One*, NBC 4 New York (Oct. 31, 2021), https://perma.cc/3SZL-L4FA.

Utilities Must Engage in Climate Resilience Planning to Ensure They Are Adequately Prepared for the Impacts of Climate Change

To address risks posed by climate change, electric utilities must adopt new planning processes. We recommend that all utilities engage in a process of climate resilience planning. As discussed in detail in the Resilience Planning Paper, this sort of planning generally involves a two-stage process:

1. a climate vulnerability assessment, which uses forward-looking climate projections (discussed below) to identify where and under what conditions assets and systems are at risk from the impacts of climate change; and
2. a climate resilience plan, which evaluates measures to reduce the risk to vulnerable assets and systems.

Broadly, 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 themselves, and what the consequences will be for system operation.[22] Based on that information, electric utilities can then develop climate resilience plans, outlining measures to reduce their vulnerabilities.[23] Such efforts can take a number of forms, including both measures to prevent or minimize damage to vulnerable assets (e.g., investments in asset hardening[24] or relocation) and to manage the consequences of such damage when it occurs (e.g., investments in system recoverability).[25] In developing climate resilience plans, electric utilities match risks to responsive measures, compare the expected net effects of those measures and, on that basis, determine whether, when, and how to invest.[26] The results of the climate resilience planning process can also inform decisions about investments in new assets.[27] Notably, planning processes that engage with a wider array of stakeholders than customarily participate in electricity regulatory proceedings, such as local government officials and community leaders, can help to illuminate the nature and extent of unmet needs and the value of addressing them.

It is imperative that all electric utilities begin the process of climate resilience planning now. While the value of resilience needs is somewhat idiosyncratic to a given system, region, or community,[28] there is no question that its value is greater than zero and will

[22] U.S. DEP'T OF ENERGY, CLIMATE CHANGE AND THE ELECTRICITY SECTOR: GUIDE FOR CLIMATE CHANGE RESILIENCE PLANNING, at iii (2016), https://perma.cc/6B6Q-EH7P.
[23] *Id*.
[24] Hardening measures include adding barriers to protect equipment vulnerable to flooding, adding or improving cooling systems to protect equipment vulnerable to high heat, and reinforcing assets vulnerable to wind damage. *See* Zamuda et al., *supra* note 6, at 188–89.
[25] While various steps can be taken to lessen the risks posed by climate change, it would be cost prohibitive, and is likely unnecessary to, design a system that is completely immune from climate impacts. *See* KRISTIN RALFF-DOUGLAS, CAL. PUB. UTILS. COMM'N, CLIMATE ADAPTATION IN THE ELECTRIC SECTOR: VULNERABILITY ASSESSMENTS & RESILIENCE PLANS 22 (2016), https://perma.cc/R6NW-F6GV.
[26] U.S. DEP'T OF ENERGY, *supra* note 22; Ralff-Douglas, *supra* note 25.
[27] Webb et al., *supra* note 2, at 18–20 (discussing how climate resilience planning can inform assessments of the prudence of utility investments).
[28] *See* CAITLIN MURPHY ET AL., NAT'L RENEWABLE ENERGY LAB'Y, ADAPTING EXISTING ENERGY PLANNING, SIMULATION, AND OPERATIONAL MODELS FOR RESILIENCE ANALYSIS 3 (2020), https://perma.cc/XQ8S-VDEB

grow as climate change spurs more frequent and severe extreme events. Reducing climate-related threats to existing assets may require material investments in hardening and relocation—projects that typically have long-lead times and must therefore be planned now to avoid future reliability issues.[29] Electric utilities must also plan for the impacts of climate change on new assets, many of which will remain in operation for several decades, during which time climate impacts will become increasingly severe.[30] As noted above, considering those impacts in advance of extreme events enables electric utilities to build in resilience, thereby lessening the need for costly retrofits in the future, as well as the potential for future outages.[31]

The Process for Climate Resilience Planning Is Well-Established and the Necessary Tools Already Exist

There are some, albeit limited, examples of electric utilities engaging in climate resilience planning. Most notably, in 2019, Con Ed published a comprehensive climate vulnerability assessment that evaluated risks to its assets and operations from climate change-induced changes in temperature, humidity, precipitation, extreme events, and sea levels over seven time periods from 2020 through 2080.[32] Building on that assessment, in 2020, Con Ed developed a climate change implementation plan which identified changes to its planning, engineering, operations, and emergency response practices to manage climate-related risks.[33] Those documents provide a model for other electric utilities.[34]

Additional guidance on climate resilience planning is provided in reports published by the U.S. Department of Energy and others. Those reports generally recommend that electric utilities take a long-range, 50-plus year view and plan for the impacts of climate change over the anticipated useful life of existing assets and new assets under development.[35] Furthermore, electric utilities should not necessarily limit their review solely to assets they own or operate, particularly where their ability to deliver reliable electricity services depends on facilities owned or operated by third-parties, such as generators.

("Universally agreed upon metrics and values for resilience are currently lacking, primarily because each quantity depends strongly on circumstances, goals, and perspectives.").

[29] *See generally* Romany Webb, *Ensuring Electricity System Resilience in the Face of Climate Change: Report of a Workshop Co-Hosted by the Sabin Center for Climate Change Law*, CLIMATE L. BLOG (Apr. 17, 2019), https://perma.cc/J7HF-9FCU.

[30] CRYSTAL RAYMOND, SEATTLE CITY LIGHT CLIMATE CHANGE VULNERABILITY ASSESSMENT AND ADAPTATION PLAN 1 (2015), https://perma.cc/LYQ6-ZT3L (recognizing that "[d]ecisions are being made today that will shape the resources and infrastructure of the utility for decades into the future when the impacts of climate change will intensify").

[31] *Id.* (concluding that "[i]t will be easier and more cost-effective to consider the impacts of climate change in the planning and design of new infrastructure and power resources now than it will be to retrofit infrastructure or replace resources once the impacts of climate change intensify").

[32] CONEDISON, *supra* note 17.

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

[34] *See, e.g.*, N.C. Utils. Comm'n, Order Accepting Stipulations, Granting Partial Rate Increase, and Requiring Customer Notice, Docket No. E-2, sub 1219 & 1193, at 28 (Apr. 16, 2021) (approving stipulation that Duke Energy "will convene a Climate Risk & Resilience Working Group, governed by several parameters set out in the Stipulation").

[35] U.S. DEP'T OF ENERGY, *supra* note 22, at 44, 80, 83.

Electric utilities should consider the full range of climate impacts expected to occur within their respective service territories during the planning period. As discussed above, this task requires forward-looking climate projections, not just historic weather data. To use a concrete example: an assessment of flood risk for a given asset cannot rely solely on the National Flood Insurance Maps published by the Federal Emergency Management Agency, as these presently reflect historical patterns and do not incorporate the effects of climate change.

Notably, some utilities have expressed concern that climate projections are too uncertain or not sufficiently granular to use in planning. There is, of course, some uncertainty inherent to projections because future climate impacts will depend on the extent of future greenhouse gas emissions. However, using well-established modeling techniques, scientists can project 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), those projections can be refined through downscaling 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, and thus providing decision-useful information that electric utilities can employ in planning. In short, and as Con Ed's experience demonstrates, utilities 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).[36] For example, 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 suitable for use in electric resilience planning.[37] Other federal agencies, including the U.S. Geologic Survey and Bureau of Reclamation, have also published local and regional climate projections.[38]

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[36] The various projections published by government 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.

[37] 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* U.S. Climate Resilience Planning Toolkit, *Energy Data Gallery*, https://toolkit.climate.gov/topics/energy/energy-data-gallery (last updated Sept. 24, 2019).

[38] U.S. Geological Survey, Regional Climate Change Viewer, http://regclim.coas.oregonstate.edu/visualization/rccv/index.html (last visited Sept. 13, 2021); 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); Great Lakes Integrated Sciences and Assessments, Great Lakes Regional Climate Change Maps, https://glisa.umich.edu/great-lakes-regional-climate-change-maps/ (last visited Sept. 21, 2021).

For the above reasons, ICRRL, the Sabin Center, and Policy Integrity urge the MPSC to take steps to ensure that electric utilities better prepare for the impacts of climate change, including by engaging in climate resilience planning. Utilities must act now to ensure continued reliable electricity service at just and reasonable rates in a world that will be altogether different than the one we have (until recently) known.

Thank you for the opportunity to submit these comments. The Resilience Planning and Valuation Papers, as well as other relevant resources, are attached for your convenience. Please contact us if you have any questions.

Respectfully,

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Attachments (5)

(1) Romany M. Webb, Michael Panfil, and Sarah Ladin, *Climate Risk in the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Utilities* (2020).
(2) Burcin Unel and Avi Zevin, *Toward Resilience: Defining, Measuring, and Monetizing Resilience in the Electricity System* (2018).
(3) Justin Gundlach and Romany Webb, *Climate Change Impacts on the Bulk Power System: Assessing Vulnerabilities and Planning for Resilience* (2018).
(4) U.S. Department of Energy, *Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning* (2016).
(5) Kristin Ralff-Douglas, California Public Utilities Commission*, Climate Adaptation in the Electricity Sector: Vulnerability Assessments and Resilience Plans* (2016).