**STATE OF CONNECTICUT**
**PUBLIC UTILITIES REGULATORY AUTHORITY**

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| DEEP AND PURA JOINT | : | DOCKET NO. 19-06-29 |
| PROCEEDING ON THE VALUE OF | : | |
| DISTRIBUTED ENERGY | : | |
| RESOURCES | : | AUGUST 21, 2019 |

COMMENTS OF THE INSTITUTE FOR
POLICY INTEGRITY AT NYU SCHOOL OF LAW

The Institute for Policy Integrity at New York University School of Law ("Policy Integrity") appreciates the opportunity to submit the following comments to Connecticut's Department of Energy and Environmental Protection (DEEP) and Public Utilities Regulatory Authority (PURA) regarding proposed distributed energy resource (DER) value categories in response to the August 7, 2019 Notice issued in the above-captioned proceeding. Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy.[1]

1. Policy Integrity raises no objection to the quantitative or qualitative DER value categories that appear in the Notice. We laud DEEP/PURA for including "avoided emissions costs" that cover both greenhouse gas emissions and ambient air pollutants in the list of quantitative value categories and encourage DEEP/PURA to refer to the methodologies described in our reports, *Valuing Pollution Reductions: How to Monetize Greenhouse Gas and*

[1] This document does not purport to present New York University School of Law's views, if any.

*Local Air Pollutant Reductions from Distributed Energy Resources*,[2] and *Opportunities for Valuing Climate Impacts in U.S. State Electricity Policy*.[3]

2. In response to paragraphs (1)(d) and (1)(f) of the Notice, Policy Integrity proposes that DEEP/PURA consider adding "electricity system resilience" to severe disruptions to the list of quantitative value categories, and "community resilience" to severe disruptions to the list of qualitative value categories.

*Electricity System Resilience*

3. "Electricity System Resilience" refers to the electric grid's ability to resist, absorb, recover from, and adapt to high-impact, low-probability external shocks.[4] As we explain in our 2018 report *Toward Resilience: Defining, Measuring, and Monetizing Resilience in the Electricity System*, this definition is consistent with those put forward by both policymakers at the state and federal levels and academic researchers.[5]

4. Electricity system resilience is relevant to a study of the value of DER in Connecticut for several reasons. First, disruptions to the electricity system in Connecticut are

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[2] Jeffrey Shrader et al., *Valuing Pollution Reductions: How to Monetize Greenhouse Gas and Local Air Pollutant Reductions from Distributed Energy Resources* (Mar. 2018), https://policyintegrity.org/files/publications/Valuing_Pollution_Reductions.pdf.
[3] Denise A. Grab et al., *Opportunities for Valuing Climate Impacts in U.S. State Electricity Policy* (Apr. 2019), https://policyintegrity.org/publications/detail/opportunities-for-valuing-climate-impacts-in-u.s.-state-electricity-policy.
[4] Burcin Unel & Avi Zevin, Inst. for Pol'y Integrity, Toward Resilience: Defining, Measuring, and Monetizing Resilience in the Electricity System 1 (2018), https://policyintegrity.org/files/publications/Toward_Resilience.pdf.
[5] *Id.* at 4, fn 14 & 15; *see also* NYSERDA, Strategic Outlook 2019-2022, at 21; Grid Reliability and Resilience Pricing, Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures, 162 FERC ¶ 61,012, P 23 (Jan. 8, 2018); Nat'l Acad. of Sci., Eng'g & Med., Enhancing the Resilience of the Nation's Electricity System, at vii (2017), https://www.nap.edu/catalog/24836; Dep't of Energy, Transforming the Nation's Electricity System: the Second Installment of the Quadrennial Energy Review 4–3 (2017), https://energy.gov/sites/prod/files/2017/02/f34/Quadrennial%20Energy%20Review--Second%20Installment%20%28Full%20Report%29.pdf; A. Stankovic, IEEE Power & Energy Soc'y, The Definition and Quantification of Resilience (Apr. 2018); Mathaios Panteli & Pierluigi Mancarella, *The Grid: Stronger, Bigger, Smarter?*, IEEE Power Energy Mag., May–June 2015, at 58, http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7091066.

costly for all customer classes.[6] Second, as the state recognized even before Hurricane Irene struck in 2011,[7] climate change will make precipitation, storms, coastal flooding, and heat waves in Connecticut—all sources of strain and potential disruption to the electricity system[8]—more frequent and severe over the coming years, with adverse implications for electricity service.[9] And third, DERs' potential to enhance electricity system resilience has been recognized by Connecticut's legislature through the Microgrid Program,[10] by the CT Green Bank through its Microgrid Financing Program,[11] and in the Connecticut Comprehensive Energy Strategy, which refers to the resilience benefits of distributed generation and microgrids.[12] Crucially, however, recognition of the potential for DER—and especially distributed generation and microgrids—to improve resilience has not yet led Connecticut state agencies to develop a rubric for valuing electricity system resilience.

5. Several publicly available methodologies are available to value DERs' potential contribution to improved resilience.[13] Policy Integrity, drawing on work done by researchers at

[6] Pat Knight et al., Avoided Energy Supply Components in New England: 2018 Report 217-33 (Mar. 30, 2018) (estimating VoLL for electricity customers in New England); *see also* Anna Chittum & Grace Relf, Valuing Distributed Energy Resources: Combined Heat and Power and the Modern Grid (Apr. 2018), https://perma.cc/GV7E-UBL6 (describing gaps in standard approaches to valuing resilience and suggesting alternatives).
[7] *See* Governor's Steering Committee on Climate Change (GSC) Adaptation Subcommittee, Connecticut Climate Change Preparedness Plan 90, 98 (2011), https://perma.cc/4B36-62NZ.
[8] Alyson Kenward & Urooj Raja, Climate Central, Blackout: Extreme Weather, Climate Change, and Power Outages (2014), https://perma.cc/S5Z4-SMN9 (finding that about 80% of outages from 2003 to 2012 resulted from damage done by extreme weather to transmission and distribution facilities).
[9] Connecticut Department of Energy and Environmental Protection, Connecticut's Comprehensive Energy Strategy 45 (2018), (". . . extreme weather, sea level rise and coastal flooding due to climate change are all threats to the grid system.")
[10] An Act Concerning the Use of Microgrid Grants and Loans for Certain Distributed Energy Generation Projects and Long-Term Contracts for Certain Class I Generation Projects, Conn. Pub. Act No. 16-196 (June 9, 2016); An Act Enhancing Emergency Preparedness and Response, Conn. Pub. Act. 12-148 § 7 (June 15, 2012).
[11] CT Green Bank, Connecticut Green Bank Microgrid Financing Program (2017), https://www.ctgreenbank.com/microgrids/.
[12] Connecticut Comprehensive Energy Strategy, *supra* note 9, at 29 (specifically recognizing resilience benefits of fuel cells), 34 (similar for distributed generation more generally), 80-82 (microgrids).
[13] *See generally* National Association of Regulatory Utility Commissioners, The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices (2019).

Sandia National Laboratory,[14] presents one such methodology in *Toward Resilience*, which is mentioned above. This report does not exclusively contemplate the use of DER to improve resilience, but the methodology it proposes is suitable for the analysis of whether, how, and how much DER contributes to the resilience of the electric system in a given jurisdiction.

6. Publications citing Policy Integrity's *Toward Resilience* report, as well as the research on which it is based, include:

- *Utility Investments in Resilience of Electricity Systems*, authored by researchers at the Lawrence Berkeley National Laboratory and commissioned by a group of leading organizations in the electricity field;[15] and
- *The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices*, authored by Converge Strategies and commissioned by the National Association of Regulatory Utility Commissioners.[16]

*Community Resilience*

7. "Community Resilience," measures a community's capabilities to prepare and plan for, absorb, recover from, and adapt to low-probability, high-impact, adverse events.[17] As

[14] Eric Vugrin et al., Sandia Nat'l Lab., Resilience Metrics for the Electric Power System: A Performance-Based Approach (2017), https://perma.cc/Z6CB-DK4J.
[15] Randolph Elliot & Scott Aaronson, Lawrence Berkeley Nat'l Lab., Utility Investments in Resilience of Electricity Systems 94 (Apr. 2019), https://perma.cc/7SWH-ESQV. That report was commissioned by the Organization of MISO States, National Rural Electric Cooperative Association, Edison Electric Institute, and the National Association of State Utility Consumer Advocates.
[16] Wilson Rickerson et al., Converge Strategies, LLC, The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices 38 (Apr. 2019), https://perma.cc/P7YZ-STEY.
[17] National Academies of Sciences, Engineering, and Medicine, Building and Measuring Community Resilience: Actions for Communities and the Gulf Research Program 12-13 (2019); Nat'l Inst. Sci. & Tech (NIST), Community Resilience Planning Guide for Buildings and Infrastructure Systems, vol. 1, at 13 (2016), https://perma.cc/68TB-5B98; K.B. Wells et al., *Applying community engagement to disaster planning: Developing the vision and design for the Los Angeles County Community Disaster Resilience initiative*, 103 Am. J. Pub. Health 1172, 1172 (2013), doi 10.2105/AJPH.2013.301407 (describing community resilience as "community capabilities that buffer it from or support effective responses to disasters"); National Research Council, Disaster Resilience: A National Imperative 1 (2012) (defining resilience as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt

the National Academies of Sciences put it in its 2019 report, *Building and Measuring Community Resilience: Actions for Communities and the Gulf Research Program*, "the resilience of a community encompasses all of the resources and assets available in the community."[18] Community resilience thus overlaps with but is decidedly broader than electricity system resilience.[19] One of the important reasons for investing in electricity system resilience is to ensure that vulnerable populations can endure the aftermath of a disruptive event,[20] in part by ensuring that local critical facilities that rely on electricity remain operational (or quickly return to operation). Measuring community resilience in addition to electricity system resilience ensures that important indicators and outcomes are not missed, such as the availability and performance of, cooling centers during heat waves, shelters during severe storms or floods, solar- or battery-powered mini-fridges used for storing medications, or support networks for the disabled.

8. Multiple state and local governmental bodies in Connecticut have adopted policies and undertaken measures (listed in bullets below) to support DER deployment based on the reasonable assumption that doing so will improve community resilience. Thus, Connecticut governments have effectively concluded that DER is doubtless a potential source of resilience benefits, even though measuring those benefits can be challenging. These decisions to promote community resilience by encouraging DER development would benefit from a standard approach to estimating the benefits of deploying particular DER in a particular location. A standard approach could help to both identify locations where DER could improve community resilience

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to adverse events"); *see also* Connecticut Institute for Resilience & Climate Adaptation (CIRCA), National Disaster Resilience Competition, https://perma.cc/28QF-2KHA (accessed Aug. 12, 2019) (defining a "resilient community").

[18] National Academies of Sciences (2019), *supra* note 17, at 16.

[19] For a discussion of the distinction and overlap, see Justin Gundlach, *Microgrids and Resilience to Climate-Driven Impacts on Public Health*, 18 Houston J. Health Pol'y & L. 77, 86-100 (2018).

[20] *See, e.g.*, Eric Williams et al., Assoc. for Neighborhood & Housing Development, Inc., Social Resiliency and Superstorm Sandy: Lessons from New York City Community Organizations 5 (2014), https://perma.cc/77E3-EJ7Q (describing effects of extended power outages on elderly and medically compromised individuals).

*and* prevent the potentially costly deployment of DER to locations where other solutions would be more cost-effective. Community resilience is, therefore, relevant to a study of DER in Connecticut.

- The state legislature adopted laws to enable microgrid development to improve community resilience;[21]
- the CT Green Bank provides financial support for microgrids for the same reason;[22] and
- at least the following three localities have, in the course of examining options for improving community resilience, adopted recommendations regarding DER deployment:
    - the Eastern Connecticut State University & Town of Windham's 2017 community resilience workshop emphasized the value of the municipal microgrid and university-based heating capacity and recommended expansion of the microgrid's scope and capacity,[23]
    - the City of Stamford's 2015 community resilience workshop recommended installing solar distributed generation at city shelters,[24] and
    - the Town of Madison highlighted the vulnerability of its electricity distribution system to storms and the importance of distributed generation—both freestanding and as part of a microgrid—for continuity

[21] Conn. Pub. Acts No. 16-196 & 12-148 § 7, *supra* note 10.
[22] CT Green Bank, *supra* note 11.
[23] Eastern Connecticut State University & Town of Windham Community Resilience Building Workshop Summary of Findings 15 (May 2017), https://perma.cc/598V-Q85T.
[24] Nature Conservancy & Western Conn. Council of Gov'ts, City of Stamford Community Resilience Building Workshops Summary of Findings 12 (July 2015), https://perma.cc/2Z6G-HAUD.

in the operation of nursing homes and a gas station during long power outages.[25]

9. Several tools and published analyses measure the ability of DER to improve community resilience. The following are examples from San Francisco, Chicago, and New York State:

- In 2018, San Francisco's Department of the Environment published a simple analysis of DER deployment to city shelters and libraries.[26] That study yielded quantitative estimates of savings from avoided hospital care, avoided mortality among vulnerable populations, avoided reliance on disaster service workers, and revenues from excess generation supplied back to the grid under normal conditions.[27] It also noted that the deployment of DER would yield the qualitative benefits of assured communications and peace of mind on the part of those taking shelter.[28]
- Commonwealth Edison of Illinois developed a set of 15 metrics in 2017 to evaluate community resilience (as well as 28 for energy system resilience and 13 for critical infrastructure resilience) as part of its plan for a microgrid demonstration project.[29] Commonwealth Edison is expected to issue a report on project performance that uses those metrics sometime in 2020.

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[25] A.W. Whelchel & A. Ryan, Nature Conservancy, Town of Madison Community Resilience Building Workshops Summary of Findings 16, 19 (Dec. 2014), https://perma.cc/JR79-PFMS.
[26] Abigail Rolon et al., Arup for San Francisco Dep't of the Env't, Solar and Energy Storage for Resiliency (Dec. 2018), https://perma.cc/9FFU-MV9R (estimating resilience value to the city and county of San Francisco of adding solar plus storage installations to local shelters and libraries).
[27] *Id.* at 12-16.
[28] *Id.* at 16.
[29] *See* Illinois Commerce Comm'n, Order 17-0331, Petition Concerning the Implementation of a Demonstration Distribution Microgrid (Feb. 28, 2018). To access the metrics themselves, see, Case 17-0331, ComEd Ex. 3.01, https://www.icc.illinois.gov/docket/files.aspx?no=17-0331&docId=255296.

- The New York Prize program provides applicants seeking funding for microgrid demonstration projects with a tool to assess the costs and benefits of the proposed project.[30] That tool seeks to capture quantitative information about the operations of local fire stations, emergency medical services providers, hospitals, police stations, wastewater management services, drinking water access.

10. In conclusion, Policy Integrity, first, enthusiastically supports DEEP/PURA's inclusion of avoided emissions costs in the list of quantitative and qualitative value categories it intends to examine in its study of DER's value; and second, encourages DEEP/PURA to make use this proceeding to fill an important analytical gap in policies currently in force in the state of Connecticut that seek to improve resilience through the deployment of DER. By including electricity system resilience among the quantifiable benefits of DER deployment, and community resilience among its qualitative benefits, DEEP/PURA would establish a standard basis for appropriately compensating DER that improves resilience either in the electricity system or particular communities or both. That step would appropriately compensate DER, help guide its deployment, and thereby improve electricity system and community resilience across the state.

Respectfully submitted,

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[30] New York State Energy Research & Development Authority, NY Prize: Resources for Applicants, https://www.nyserda.ny.gov/All-Programs/Programs/NY-Prize/Resources-for-applicants (accessed Aug. 14, 2019).

CERTIFICATION OF SERVICE

I, the undersigned, hereby certify that on August 21, 2019 an electronic copy of the above COMMENTS was sent by email to all participants of record listed in the joint PURA/DEEP web filing system for docket number 19-06-29.

Respectfully submitted,

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