January 26, 2021

VIA ELECTRONIC SUBMISSION

Jeffrey R. Gaudiosi, Esq.
Executive Secretary
Public Utilities Regulatory Authority
Ten Franklin Square
New Britain, CT 06051

Docket No.: 17-12-03RE03 – Public Utilities Regulatory Authority (PURA) – Investigation into Distribution System Planning of the Electric Distribution Companies—Electric Storage

Re: Comments of the Institute for Policy Integrity at NYU School of Law and WattTime

Dear Mr. Guadiosi,

In response to the Public Utilities Regulatory Authority ("PURA")'s January 5, 2021 Notice of Issuance of Straw Electric Storage Program Design and Request for Comments in the above-captioned proceeding, the Institute for Policy Integrity at NYU School of Law (Policy Integrity) and WattTime respectfully offer the attached comments.

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 participates regularly in proceedings before public utility commissions and has written numerous reports and articles on energy policy design.

WattTime is a non-profit entity that aims to provide research, education, and assistance on the environmental benefits of electricity use timing, and advocates for a data-driven approach to solving environmental problems.

Respectfully submitted,

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STATE OF CONNECTICUT
PUBLIC UTILITIES REGULATORY AUTHORITY

PURA INVESTIGATION INTO	:	DOCKET NO. 17-12-03RE03
DISTRIBUTION SYSTEM PLANNING	:	
OF THE ELECTRIC DISTRIBUTION	:	JANUARY 26, 2021
COMPANIES--ELECTRIC STORAGE	:	

JOINT COMMENTS OF INSTITUTE FOR POLICY INTEGRITY
AT NYU SCHOOL OF LAW AND WATTTIME ON STRAW PROPOSAL

In response to the Public Utilities Regulatory Authority ("PURA")'s January 5, 2021 Notice of Issuance of Straw Electric Storage Program Design and Request for Comments in the above-captioned proceeding,[1] the Institute for Policy Integrity at NYU School of Law (Policy Integrity)[2] and WattTime offer the following comments.

We recognize that energy storage will be a crucial part of the clean electricity grid of the future, and encourage PURA to continue making support for energy storage part of its overarching decarbonization agenda. However, we also urge PURA to more carefully consider the emission implications of its energy storage policies starting immediately, as energy storage systems can lead to increased emissions given the current mix of generation resources in ISO-NE.

In particular, we recommend that PURA takes into account the potential emissions consequences of energy storage operations in designing its performance-based incentive.

I. Energy Storage and Emissions

In addition to their value in providing energy management services and contributing to grid reliability, energy storage systems are key to reducing carbon emissions by supporting greater integration of variable renewable energy resources. However, unless policies affecting the deployment and use of energy storage resources are designed carefully, those resources' operation can end up increasing emissions.

Understanding how energy storage operations change emissions requires looking at the difference between the emissions caused when the system is charged and the emissions avoided when the system is discharged. And, to assess this emissions performance, Marginal Operating Emissions Rates (MOERs) should be used because they reflect the changes in emissions caused by adding or removing one additional unit of electricity demand at a particular time and location. The emissions intensity of electricity delivered at a specific time and place can vary widely. Every five minutes, the power plant supplying the last unit of electricity needed to satisfy

[1] Straw Electric Storage Program Design, Docket No. 17-12-03RE03 (Jan. 5, 2021) (hereafter Straw Proposal).

[2] No part of these comments purports to present the views, if any, of New York University or its School of Law.

demand can change; a change of the power plant supplying that unit generally means a change of emissions intensity. The MOER captures and reflects these changes. Understanding the MOERs of a grid is therefore important for understanding the emissions consequences of a policy that would increase or decrease load at any given time and location. The real world emissions impact of a particular change in load, for example flipping a light switch, can be determined using these time-varying MOERs.

Energy storage can increase emissions in the following two ways:

Charge and Discharge Timing. The timing of energy storage systems' charging and discharging determines much of their effect on emissions as measured by MOERs. If a battery is charged when the marginal load is being supplied by a carbon-intensive generation source and discharged when there is abundant renewable energy, it increases emissions by substituting carbon-intensive generation for clean energy. Conversely, if a battery charges when MOERs are low and discharges when they are high, emissions decrease.

Efficiency losses. Energy losses occur during both charging and discharging energy storage systems, as well as during transmission and distribution. As a result, a greater amount of total electricity generation is needed to provide the same amount of final electricity injection using storage. And so, if storage is charged from fossil-fueled sources, the electricity eventually discharged by the storage resource will be even more emissions intensive than what the fossil-fueled sources would have injected directly into the system. In addition, depending on the magnitude of these losses, energy storage can increase emissions even when the MOERs at the time of charging are lower than the MOERs at the time of discharging.[3]

II. Potential Effects of the Proposed Electric Storage Program Design

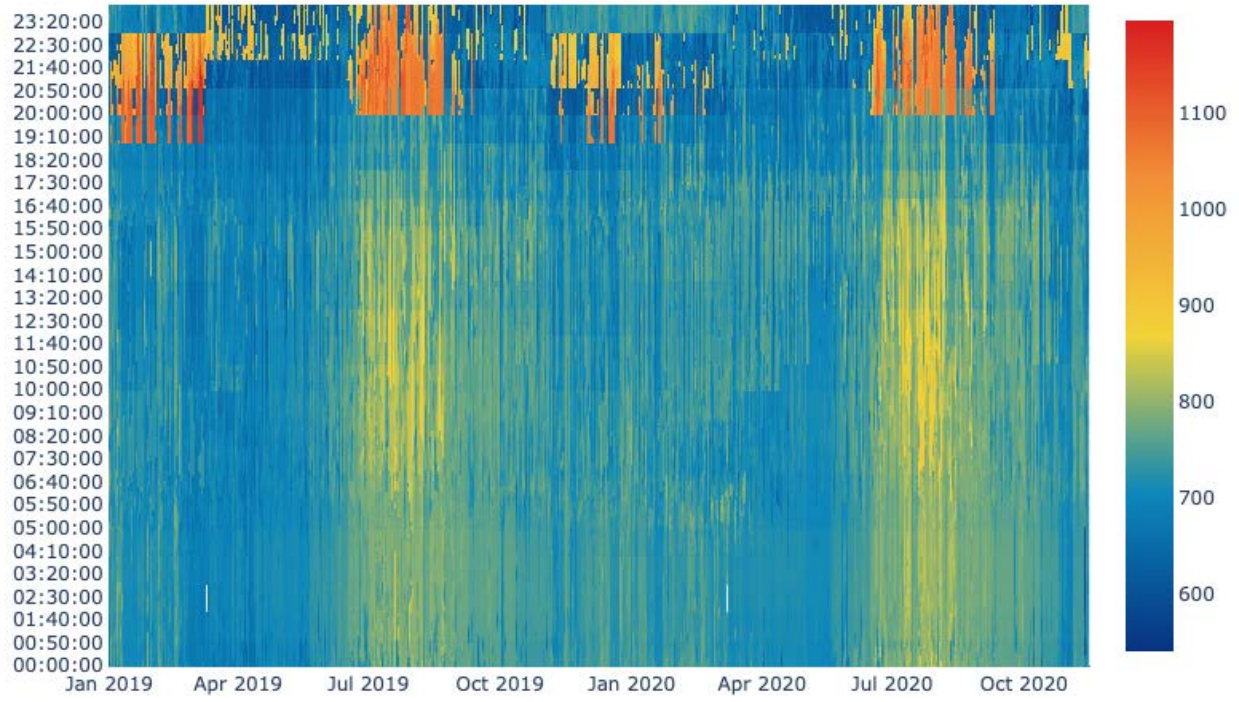
The proposed program design includes two types of incentives, an upfront incentive and a performance-based incentive. The latter is based on a storage unit's performance in reducing the summer peak demand. Specifically, a unit would be eligible for incentives if it discharges during peak periods (2pm-7pm) between June 1st and Sept 30th. As a result, during the summer months, storage units are expected to charge outside of that time frame--either at night, in the morning, or both, depending on the prices.

However, a quick analysis of the ISO-NE's MOERs for Connecticut shows that such a charging pattern could lead to increased emissions. Figure 1 below shows the heatmap of ISO-NE MOERs between January 2019 and November 2020. MOERs are calculated using WattTime's independently validated, 5-minute marginal emission rate data for the ISO-NE Connecticut sub region. WattTime's marginal emissions model is an extension of the method of

[3] MADISON CONDON, RICHARD REVESZ & BURCIN UNEL, INST. FOR POL'Y INTEGRITY, MANAGING THE FUTURE OF ENERGY STORAGE: IMPLICATIONS FOR GREENHOUSE GAS EMISSIONS (2018), https://policyintegrity.org/publications/detail/managing-the-future-of-energy-storage.

Callaway et al. (2017)[4] and was independently validated by the nonprofit Rocky Mountain Institute.[5] Based on this heatmap, MOERs are mostly flat during day times, while there are some bumps during the night time due to imports.

Figure 1. Heatmap of 5 min MOERs in ISONE CT



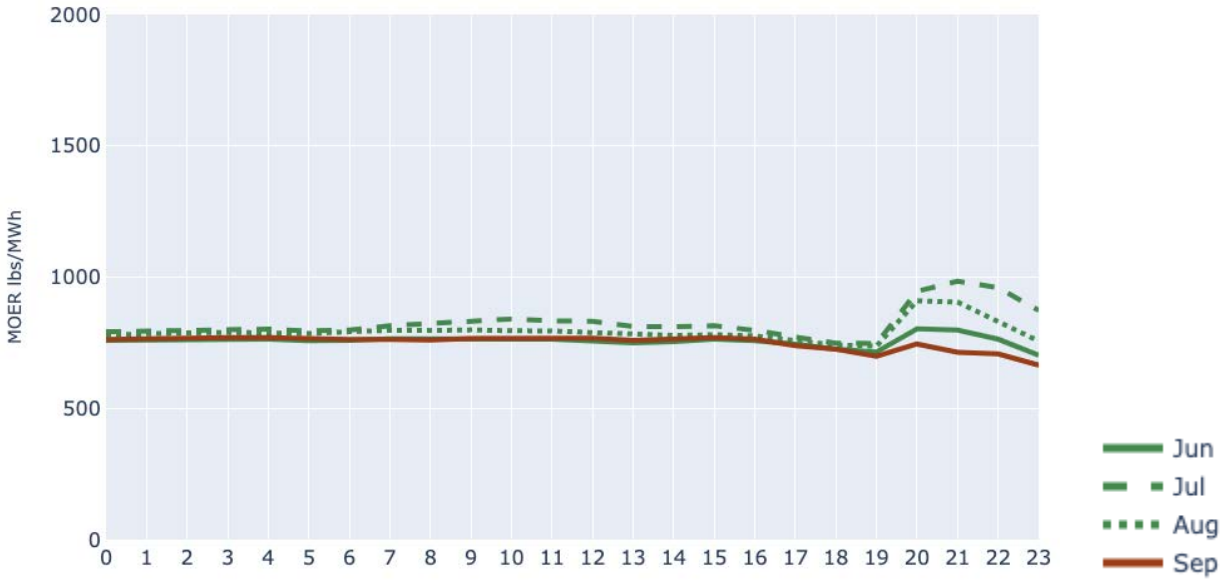
Source: *WattTime Analysis*

This pattern is more apparent in Figure 2, below, which shows average hourly MOERs in summer months. These figures imply that a storage unit that charges during the night time and discharges from 2pm–7pm would lead to increased emissions because the night-time MOERs are higher than the MOERs during the peak period. In addition, even storage units that charge during the day time are likely to lead to higher emissions due to energy losses.

[4] Duncan S. Callaway, Meredith Fowlie & Gavin McCormick, *Location, Location, Location: The Variable Value of Renewable Energy and Demand-Side Efficiency Resources*, 5 J. ASS'N ENVTL. & RES. ECONOMISTS 39 (2018).

[5] JAMIE MANDEL & MARK DYSON, ROCKY MTN. INST., WATTTIME VALIDATION AND TECHNOLOGY PRIMER (2017), https://perma.cc/7CWA-BGWK.

Figure 2. Hourly MOERs in Summer Months



Source: *WattTime Analysis*

III. Suggestions

PURA's sixth Program Objective calls for "maximiz[ing] long-term environmental benefits of electric storage by reducing emissions associated with fossil-based peaking generation,"[6] yet, as we explain above, the program's design could result in energy storage resources' installation and operation leading to *increased* emissions. PURA and the Program Administrators (that is, the Connecticut Green Bank and Electric Distribution Companies) should, therefore, carefully consider the emission implications of the program's performance-based incentives for storage operations.

In addition, Section III.O of the Straw Proposal directs electricity distribution companies (EDCs) to investigate the relationship between reduced emissions from fossil-fueled peaking facilities and the hours and locations at which storage resources operate.[7] That investigation is to include an examination of how well "[a]dditional or different performance-based incentives, for which either the EDCs or the CGB shall recommend a methodology for determining the appropriate adder level," would avoid "in-state fossil peaking generation."[8]

In light of the emissions-reduction program objective and the directive to investigate options for achieving emissions reductions, we make the following two recommendations.

[6] Straw Proposal at 2.

[7] *Id.* at 19.

[8] *Id.* at 21.

1. Take note of other states' experiences

California discovered in the course of implementing Self-Generation Incentive Program (SGIP)[9] that the program, as initially designed, increased rather than decreased system-wide emissions intensity.[10] California adjusted SGIP accordingly to require energy storage systems receiving an incentive to reduce emissions on an annual basis evaluated against grid marginal emissions, based on when systems charge and discharge.[11] To aid energy storage developers, the California Public Utilities Commission ordered the development of real-time marginal emissions signal with 5-minute granularity and 72-hour rolling forecasts was developed for integration into control systems.

New York, encouraged by stakeholders to learn from California's experience,[12] paid close attention to how its own program's features would affect marginal emissions rates before finalizing its design.[13] In addition, research on Massachusetts' Clean Peak Standard shows that the policy, as designed, is ineffective in emission reductions.[14]

2. Prescribe granular data collection and reporting

The Straw Proposal directs the Program Administrators to collect and share data on, among other things, "aggregate avoided emissions (CO2, NOx, SOx)," and for an Evaluation, Measurement, and Verification (EM&V) Consultant to establish a "metric" for the same.[15] PURA should direct the Program Administrators and the consultant to collect and devise a metric for not only "aggregate" emissions data, but also more granular data that captures variations across time, place, and circumstances particular to different categories of energy storage

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[9] *See* Decision Modifying the Self-Generation Incentive Program and Implementing Senate Bill 412, Cal. Pub. Utils. Comm'n, D. 11-09-015, at 16 (Sept. 16, 2011) (". . . we reject Staff's recommendation to use a cost-effectiveness screen, we focus only on the [greenhouse gas emissions reduction] screen."), https://perma.cc/V7CF-KML3.

[10] Cal. Pub. Utils. Comm'n Staff, Revised Self-Generation Incentive Program Greenhouse Gas Staff Proposal 5 (Dec. 31, 2018), https://perma.cc/SW79-9MPS ("Subsequent SGIP storage impact evaluations have found that SGIP storage has led to a net increase in greenhouse gases . . . .").

[11] Cal. Pub. Utils. Comm'n, Decision Approving GHG Reduction Requirements for the Self Generation Incentive Program Storage Budget (Aug. 9, 2019) https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M310/K260/310260347.PDF.

[12] Comments of Policy Integrity, N.Y. Pub. Serv. Comm'n Case 18-E-0130, In the Matter of Energy Storage Deployment Program (Sept. 10, 2018), https://policyintegrity.org/documents/Policy_Integrity_Comments_on_Energy_Storage_Roadmap_w_Attachment.pdf; Joint Comments of Azure Mountain Power et al., N.Y. Pub. Serv. Comm'n Case 18-E-0130, In the Matter of Energy Storage Deployment Program (Sept. 10, 2018), https://policyintegrity.org/documents/Smart_Dispatch_and_EValue_Coalition_Comments.pdf.

[13] N.Y. Pub. Serv. Comm'n, Order Establishing Energy Storage Goal and Deployment Policy at 29 (Dec. 13, 2018) (endorsing development of valuation methodology that captures location-specific marginal CO2 emissions rates); New York State Energy Storage Roadmap and Department of Public Service/New York State Energy Research and Development Authority Staff Recommendations, App'x A 56 (June 2018), https://perma.cc/GQR2-SRJJ ("The analysis . . . presented in the Roadmap considers the carbon offset from energy storage as the delta between the marginal emissions rate (MER) when storage charges and discharges.").

[14] Jeffrey Shrader et al., *(Not So) Clean Peak Energy Standards* (Dec. 2019), https://ssrn.com/abstract=3502271.

[15] Straw Proposal at 13, 14.

installation. Without such data, it will be difficult if not impossible to understand what causes some storage resources to help achieve the program's emissions-reduction objective and others to impede it.

Gathering granular data is something that the Straw Proposal directs EDCs to eventually do anyway. Specifically, they are to investigate the relationship between reduced emissions from fossil-fueled peaking facilities and the hours and locations at which particular storage resources operate.[16] That investigation is to include an examination of "[a]dditional or different performance-based incentives, for which either the EDCs or the CGB shall recommend a methodology for determining the appropriate adder level."[17]

Multiple existing resources can guide EDCs in the conduct of the sort of granular data collection and analysis that they must eventually undertake, and could begin undertaking immediately. Policy Integrity has published the following reports that themselves serve as guides, in addition to identifying resources and rubrics that are useful for this purpose:

- *Valuing Pollution Reductions: How to Monetize Greenhouse Gas and Local Air Pollutant Reductions from Distributed Energy Resources*;[18]
- *Making the Most of Distributed Energy Resources: Subregional Estimates of the Environmental Value of Distributed Energy Resources in the United States*;[19] and
- *Managing the Future of Energy Storage: Implications for Greenhouse Gas Emissions*.[20]

In addition, California's experience with a real-time marginal emissions signal shows that such collecting and using such granular data is feasible.[21]

For these reasons, PURA should consider replacing the Straw Proposal's references to "aggregated avoided emissions" with "avoided emissions at the most granular level practicable," and EDCs and an EM&V Consultant should plan, upon the launch of the program, to begin gathering, analyzing, and reporting granular emissions data, rather than adopting an initially coarse approach that obscures key insights and eventually replacing that approach well after other aspects of the program have taken shape.

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[16] *Id.* at 22

[17] *Id.*

[18] JEFFREY SHRADER, BURCIN UNEL & AVI ZEVIN, INST. FOR POL'Y INTEGRITY, VALUING POLLUTION REDUCTIONS: HOW TO MONETIZE GREENHOUSE GAS AND LOCAL AIR POLLUTANT REDUCTIONS FROM DISTRIBUTED ENERGY RESOURCES (2018), https://policyintegrity.org/publications/detail/valuing-pollution-reductions.

[19] MATT BUTNER, ILIANA PAUL & BURCIN UNEL, INST. FOR POL'Y INTEGRITY, MAKING THE MOST OF DISTRIBUTED ENERGY RESOURCES: SUBREGIONAL ESTIMATES OF THE ENVIRONMENTAL VALUE OF DISTRIBUTED ENERGY RESOURCES IN THE UNITED STATES (2020), https://policyintegrity.org/publications/detail/making-the-most-of-distributed-energy-resources.

[20] CONDON, REVESZ & UNEL, MANAGING THE FUTURE OF ENERGY STORAGE, *supra* note 3.

[21] For details, see California Self-Generation Incentive Program: Greenhouse Gas Signal, http://sgipsignal.com/.

CERTIFICATION OF SERVICE

I, the undersigned, hereby certify that an electronic copy of the above COMMENTS was sent to all participants of record via the PURA web filing system on January 26, 2021.

Respectfully submitted,

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