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Sherri L. Golden
Secretary of the Board
44 South Clinton Ave., 1st Floor
PO Box 350 Trenton, NJ 08625-0350

Re: New Jersey's Straw Proposal for the Energy Storage Incentive Program Request for Information – Docket No. QO22080540

Dear Ms. Golden:

WattTime and Hecate Grid respectfully submit the following comments to the New Jersey Board of Public Utilities (Staff) regarding the Request for Information (RFI) on the Straw Proposal for the New Jersey Energy Storage Incentive Program (NJ SIP). WattTime is a nonprofit entity that aims to provide research, education, and assistance on the environmental benefits of using electricity at particular times, and advocates for a scientifically verified approach to this topic. Hecate Grid is a leading independent power producer focused on developing, building, owning, and operating stand-alone energy storage projects in the US with a mission to be a leader in safely deploying energy storage projects to support the proliferation of renewable energy generation. We are pleased to see that the NJ SIP has a stated goal of ensuring “[...]that energy storage devices are deployed in a manner that decreases GHG emissions by tying operations to pay-for-performance metrics.”¹

Marginal emissions are the appropriate metric to determine Performance-based Incentives

Marginal emissions measure the change in emissions caused by a change in demand or generation making them the correct metric to accurately understand the emissions impact of energy storage charging and discharging behavior. There is clear academic consensus in support

¹ NJ SIP Straw Proposal Overview slide 13
https://www.njcleanenergy.com/files/file/Energy%20Storage/FY23/SIP%20Stakeholder%20Process%20Day%20202_presentation.pdf

of using marginal emissions data to assess and implement programs that change demand or generation, such as load-shifting decisions. This [WattTime blog post](#)² contains an extensive list of scientific and academic papers that describe the use of marginal emissions factors for evaluating the performance of load interventions, including research published in *Environmental Science & Technology*; the *Journal of Economic Behavior & Organization*; *Social Science Research Network*; and *The Electricity Journal*.

The PJM MER signal can be used to determine the NJ SIP Performance-based Incentives

WattTime supports the Straw proposal to use PJM’s “Marginal Emission Rate (MER) signal as a basis for Performance-based Incentives for Grid Supply energy storage systems.”³ The PJM MER signal is sufficiently developed to determine the NJ SIP Performance-based Incentives payments as it was created by the ISO, has a clear methodology, and is available in real time.

The [Marginal Emissions Rate – A Primer document](#)⁴ describes the methodology PJM uses to calculate marginal emissions at the nodal level, which is very similar to the process used to calculate Locational Marginal Price (LMP) but with specific modifications to determine the emissions (as opposed to price) of the marginal unit.

While there may be some limitations of the PJM MER as noted in the Primer, including extreme outliers in the data, based on WattTime’s discussions with PJM it may be possible to address those limitations in partnership with PJM. Some modifications to the signal may be necessary to make it appropriate for use with the Performance-based Incentives.

However, if the PJM MER is determined to be insufficiently developed, many additional marginal emissions data providers also exist, both paid vendors and free sources. Resources for the Future recently [published a report](#)⁵ for the U.S. Energy Information Agency reviewing available options for procuring reputable marginal emissions data. This report highlights

² Is your goal real-world impact? Then use marginal emissions. <https://www.watttime.org/news/is-your-goal-real-world-impact-then-use-marginal-emissions/>

³ RFI Notice Question 3.5 https://r20.rs6.net/tn.jsp?f=001la7bhjMj1ObjFVWTDlRA4HZ5VpYcERuj8kCG3FrX5ZUxT05quoqoLJYQLxaU2Ydxr-IBeXISObilktUyjpofeglm6jODx7f0DsbjMhyTr9JyU_EU0IsE0Koejm2Rmq7RdigaV6XUriPbpgBtXL166t5sh8Exxr6te1-L2ahPrhtG7ltS-wkRVQbDBhBj4c6qpPLB8LdKh9IWYvSjnPbOITbcSnnkKHsUaTTJ1NIKgyQ=&c=aeClqr7XOcBbWz6lefjV9SSS3qoXkszOvWiGFehoSBLyHya9NOd_Xw==&ch=vY7NZNqymbLwJwtA4WL3SwvZHkF03UWK2wHbAcj2VLy2UK0XF15Yg==

⁴ Marginal Emissions Rate - A Primer document <https://www.pjm.com/-/media/etools/data-miner-2/marginal-emissions-primer.ashx#:~:text=The%20marginal%20emissions%20rate%20for%20rate%20for%20the%20given%20location.>

⁵ Options for EIA to Publish CO2 Emissions Rates for Electricity. https://www.rff.org/publications/reports/options-for-eia-to-publish-co2-emissions-rates-for-electricity/?_gl=1*hmXmqi*_ga*MjM1MTkwNzUyLjE2OTE1Mjk4OTM.*_ga_HNHQWYFDLZ*MTY5MjA1MTYzMi40LjAuMTY5MjA1MTYzOS4wLjAuMA

multiple providers of marginal emissions data, including WattTime. At various times Stanford University and the US EPA have all also provided free marginal emissions datasets that include New Jersey.

Consistent with this clear scientific consensus and the capabilities of energy storage developers, WattTime encourages the Staff to use marginal emissions data, whether from PJM or another provider, to assess program emissions performance and determine Performance-based Incentives.

Energy storage developers are capable of responding to an emissions signal to reduce emissions from energy storage

Many energy storage developers are already familiar with responding to marginal emissions signals to manage charging to reduce emissions. This occurs both in regulatory programs such as the [California Public Utility Commission's Self-Generation Incentive Program](#)⁶ (SGIP) and increasingly through voluntary public adoption by many energy storage companies. As such, most energy storage developers are already capable of co-optimizing energy storage system charging and discharging for both cost and emissions. For wholesale energy storage, LMP and emissions can be co-optimized; for behind the meter storage systems, demand charges and TOU rates can be co-optimized with emissions.

WattTime partnered with [Hecate Grid](#)⁷ to assess a project located in New Jersey with and without responding to an emissions signal. Using the 1-year rolling historical PJM marginal emissions signal (NJ-HUB clipped hourly), the Hecate Grid analysis shows a battery energy storage system could have provided carbon abatement by charging and then discharging from low to high marginal emissions periods while co-optimizing for energy revenue. The analysis also showed that an energy storage system co-optimized for emissions reduces substantially more emissions than an energy system optimized solely for revenue maximization.

As modeled, a 100MW/400MWh system, under the current PJM marginal emissions methodology, could have abated CO₂ emissions. The amount of emissions abated depends on the incentive level and MER signal methodology. Based on this analysis, an incentive-only emissions abatement performance structure, as defined by the Straw proposal where operators are rewarded for their level of abatement up to and over a benchmark, would assist in incentivizing a shift in dispatch towards emissions abatement while still allowing BESS operators to achieve required returns from energy market arbitrage.

⁶ California SGIP <https://www.cpuc.ca.gov/sgip>

⁷ Hecate Grid <https://www.hecategrid.com/>

As these results show, co-optimization based on the PJM MER signal is not only possible but it benefits the operator, the grid, and achieves emissions reductions.

A Peak Demand Reduction program may not achieve the emissions reduction goals of the SIP

Question 3.6 of the RFI asks, “Is there a different methodology that can be used to determine Performance-based Incentives, such as a Peak Demand Reduction program?”⁸, but does not consider whether a Peak Demand Reduction program would meet the emissions reduction goals of the SIP.

Fundamentally, energy storage reduces emissions by charging during periods of low grid emissions and discharging during periods of high grid emissions. The amount of emissions reduction is determined by the difference in emissions between the emissions caused by charging and the emissions displaced by discharging. A peak reduction program only focuses on constraining charging and discharging to specific periods which may not align with the highly dynamic emissions of the electric grid. Furthermore, the high and low emissions periods throughout the day can change very dynamically and may not consistently align with the pre-determined windows defined in a Peak Demand Reduction program.

This is demonstrated in the academic study, “(Not So) Clean Peak Energy Standards”⁹ which showed that the Massachusetts Clean Peak rules would likely lead to an increase in emissions from energy storage due to predefined static charging and discharging windows.

This is also consistent with past evaluations of similar programs. For example, during the annual performance evaluation, the SGIP found that energy storage systems without a direct requirement or incentive to reduce emissions led to an [increase in emissions](#).¹⁰ To solve this issue, the program rules were changed to include a performance-based incentive that was paid based on actual emissions performance.

⁸ RFI Notice

https://r20.rs6.net/tn.jsp?f=0011a7bhjMj1ObJFVWTdIRA4HZ5VpYcERuj8kCG3FrX5ZUxT05quoqoLJYQLxaU2Ydxr-IBeXISOilkUyjpofeglm6jODx7f0DsbjMhyTr9JyU_EU0IsE0Koejm2Rmq7RdigaV6XUriPbpgBtXL166t5sh8Exxr6te1-L2ahPrhtG7ltS-wkRVQbDBhBj4c6qpPLB8LdKh9IWYvSjnPbOITbcSnnkKHsUaTTJ1NIKgyQ=&c=aeClqr7XOcBbWz6lefjV9SSS3qoXkszOvWiGFehoSBLyHya9NOd_Xw==&ch=vY7NZNqymbLwJwtA4WL3SwvZHzKf03UWK2wHbAcj2VLy2UK0XFI5Yg==

⁹ Shrader, J. G., Lewis, C., McCormick, G., Rabideau, I., & Unel, B. (2021). (Not So) Clean Peak Energy Standards.

¹⁰ California solves batteries’ embarrassing climate problem <https://www.vox.com/energy-and-environment/2019/12/2/20983341/climate-change-california-batteries-emissions-watttime>

Include an annual emissions performance review if the Performance-based Incentives are not Emissions Based

If a Peak Demand Reduction program is adopted rather than the use of a marginal emissions signal for determining the Performance-based Incentives, then WattTime urges Staff to conduct an annual emissions evaluation to help determine whether the SIP is meeting its emissions-reduction goals.

The SGIP used a similar process to track compliance with the emissions reduction requirement. The SGIP's [annual energy storage review](#)¹¹ led to the discovery that the structure of the incentive program was increasing emissions from energy storage. The program was then ordered to hold public working groups to identify potential solutions to ensure storage systems reduced emissions. This led to a change in incentive structure that tied the incentives to emissions performance. The SGIP was then able to ensure that energy storage systems were in fact reducing emissions in line with the statutory emissions reductions requirements for the program.

Incentive caps should not be applied

Question 3.13 asks whether incentive caps should be applied to large or long duration projects. Hecate Grid does not believe an incentive cap or any form of disincentive structure should be applied to storage projects with longer or shorter durations than the 4-hour battery capacity referenced in the Fixed Incentive. All projects should be rewarded equally for meeting the performance targets set by the respective incentive structures, up to the point where the BPU conclusively meets their own goals.

WattTime and Hecate Grid appreciate the opportunity to submit these comments to NJ's SIP and applauds the Staff for considering emissions-based incentives for energy storage incentives. We are committed to offering significant technical assistance to the design of an emissions abatement incentive structure which rewards BESS operators for their performance. The incentivization of BESS operators to co-optimize abatement and revenue leads to greater participation of BESS in the New Jersey region and a cleaner, more efficient grid. As the Performance-based Incentive undergoes refinement, we look forward to collaborating closely with the BPU to design a program which is fair, targeted, and rewarding.

¹¹ 2017 SGIP Advanced Energy Storage Impact Evaluation https://www.cpuc.ca.gov/-/media/cpuc-website/files/uploadedfiles/cpuc_public_website/content/utilities_and_industries/energy/energy_programs/demand_side_management/customer_gen_and_storage/2017-sgip-aes-impact-evaluation.pdf

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