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September 19, 2023

Via Electronic Mail board.secretary@bpu.nj.gov
Sherri L. Golden
Secretary of the Board
44 South Clinton Avenue
1ST Floor, P.O. Box 350
Trenton, NJ 08625-0350

Re: In the Matter of the New Jersey Energy Storage Incentive Program
BPU Docket No. QO22080540

Dear Secretary Golden:

Please accept for filing these responses being submitted on behalf of the New Jersey Division of Rate Counsel ("Rate Counsel") in accordance with the Notice and Request for Information issued by the Board of Public Utilities ("Board") in this matter on August 8, 2023. In accordance with the Notice, these comments are being filed electronically with the Board's Secretary at board.secretary@bpu.nj.gov.

Please acknowledge receipt of these responses.

Thank you for your consideration and attention to this matter.

Respectfully submitted,

Brian O. Lipman, Esq.
Director, Division of Rate Counsel

By: */s/ Sarah H. Steindel*
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SHS
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STATE OF NEW JERSEY

BEFORE THE BOARD OF PUBLIC UTILITIES

In the Matter of the New Jersey Energy Storage Incentive Program	**)** **)** **)**	**Docket No. QO22080540**

RESPONSES OF NEW JERSEY DIVISION OF RATE COUNSEL TO THE REQUEST FOR INFORMATION ON THE PROPOSED NEW JERSEY STORAGE INCENTIVE PROGRAM

SEPTEMBER 19, 2023

INTRODUCTION

The New Jersey Division of Rate Counsel ("Rate Counsel") thanks the Board of Public Utilities ("Board" or "BPU") for the opportunity to respond to Board Staff's August 8, 2023 Notice and Request for Information concerning the Straw Proposal[1] for the New Jersey Energy Storage Incentive Program ("NJ SIP" or "SIP"). Rate Counsel previously filed comments in this matter on December 14, 2022 in response to the Notice issued by the Board on September 29, 2022.

New Jersey has ambitious energy storage goals with a legislatively-mandated target of 2,000 megawatts ("MWs") of capacity by 2030. While Rate Counsel recognizes the potential benefits of energy storage, Rate Counsel has significant concerns with the Straw Proposal, which were explained in detail in the previously filed comments. In the comments below Rate Counsel will provide comment on the specific questions posed. Rate Counsel will not repeat all of the concerns and recommendations provided in Rate Counsel's earlier comments, but urges the Board to consider changes to the Straw Proposal in response to the input previously provided by Rate Counsel.

Staff has identified questions within the following five subject areas: (1) utility ownership/dispatch control; (2) installed storage targets, deployment timelines, and capacity blocks; (3) incentive structure; (4) overburdened community incentives; and (5) other questions. Rate Counsel offers its responses to Staff's questions in the following sections. Rate Counsel's lack of response to any question contained in the RFI should not be interpreted as agreement to any assertion in any question.

[1] In re the New Jersey Storage Incentive Program, BPU Dkt. No. QO2208540, Notice (September 29, 2022). The Straw Proposal is available on the Board's website at https://nj.gov/bpu/pdf/publicnotice/Notice_StakeholderMeetings_NewJerseyEnergyStorageProgram.pdf.

RATE COUNSEL RESPONSES

1.0 Utility Ownership/Dispatch Control

The Straw "does not propose to allow for utility ownership or operation of devices," but notes that "EDCs will play a key role in building the grid infrastructure necessary to enable the effective dispatch of energy storage devices." This proposal was intended to encourage private ownership and operation of energy storage devices and the development of a robust energy storage sector in New Jersey's restructured competitive market.

Question 1.1: *What are the advantages and disadvantages of utility control versus non-utility control of energy storage systems?*

Rate Counsel Response:

If a utility does not own storage assets, but is able to control their dispatch, this can create both advantages and disadvantages to the system and ratepayers. In terms of advantages, direct control of storage assets ensures a dependable response to a utility's signals during call events. A utility does not have to offer incentives for particular types of performance and specific times while trying to predict how much of a response to expect. The uncertainty about how storage may respond during a call event is greatly reduced. This allows a utility to use its knowledge of the power system to optimize the timing of storage charging and dispatch in the most efficient manner. This can include taking advantage of storage's ability to act as a source of energy, a load, or demand response, depending on what the system most needs at a given time. Direct utility control of storage assets also lends itself well to integrating storage into long-term, system-wide resource planning and to aggregating storage assets for the purpose of participating in wholesale markets because the asset's performance is known with a high degree of certainty in advance.

Direct utility control of storage, however, also brings disadvantages. First, it may affect the pace of storage deployment either positively or negatively; utility control may remove the

onus of operation from the storage owner, making it more attractive for some to build storage, but it likewise may disincentivize deployment by preventing the storage owners from operating in a way that maximizes their economic benefit. Greater utility control of storage assets also increases the potential for the exercise of market power, while stifling competition. Finally, utility control—particularly over behind-the-meter systems in the residential sector—increases concerns over customer autonomy. This sort of control requires further discussion about necessary consumer protections such as the ability to opt-out of utility control during emergency events.

Question 1.2: *For Distributed resource Performance-based Incentives, should responding to a utility signal be compulsory or voluntary?*

Rate Counsel Response:

For distributed resource performance-based incentives,[2] responding to a utility signal can either be compulsory or voluntary, so long as: (1) proper consumer protections are in place; (2) incentives match the service that distributed resource owners are willing to provide; and (3) most importantly, that distributed resource owners are able to choose between enrolling in a compulsory or voluntary program and are fully informed of the implications of their choice.[3] If, for example, a distributed resource owner opts into a compulsory response category, that choice, in theory, should be rewarded with a larger incentive payment and the owner should be informed at the time of their choice that they will no longer control their asset's response to a utility signal.

[2] The discussion here is about incentives generally. The setting of those incentives, however, is not addressed. That process, to the extent it is not market driven, must be data driven and precise to ensure that ratepayers do not overpay for storage resources.

[3] W. McNamara, H Pasell, Sandia National Laboratories; T. Olinsky-Paul, "Clean Energy States Alliance; States Energy Storage Policy: Best Practices for Decarbonization," (February 2023). Massachusetts, Connecticut and California employ performance payments for storage discharge performance to incentivize distributed storage participation. Pages 31-33.

The Straw Proposal currently states that while each EDC will be required to develop a system for calling on storage resources, many of which are expected to respond automatically, responses to utility calls should nevertheless be voluntary.[4] This means that customers may always opt-out of a particular call. Staff notes that one reason why it recommends this approach is because many customers invest in storage resources to provide backup energy in the case of reliability events, and in order for customers to rely on their storage devices they may want to prevent their storage device from being drained immediately in advance of a potential grid event.[5] We agree with this reasoning and support staff's insistence that the distributed resource performance-based incentive have a voluntary option. However, we would add that if a distributed resource owner wishes to cede their ability to opt-out of events, they should be able to, in return for a larger performance-based incentive. This compulsory-response option should also include additional consumer protections, such as a limitation on the maximum quantity of a specific distributed storage asset that the utility can drain (e.g., 50 percent of maximum charging capacity).

Question 1.3: *For Grid Supply resources Performance-based Incentives, should responding to a market signal be compulsory or voluntary?*

Rate Counsel Response:

Many utility-scale energy storage developers appear to be pursuing revenue stacking opportunities, from participation in ancillary services, arbitrage, and capacity auctions. For commercial and residential energy storage installations, market participation opportunities may rely on third-party aggregation opportunities or for Grid Supply performance-based incentives. Responding to a utility signal can either be compulsory or voluntary, so long as incentives match the service that grid-supply resource owners are willing to provide, and most

[4] Straw Proposal, p. 26.
[5] Ibid.

importantly, that resource owners are able to choose between enrolling in a compulsory or voluntary program and are well-informed of the implications of that choice. If, for example, a resource owner opts into a compulsory response category, that choice should be rewarded with a larger incentive payment and the owner should be informed at the time of their choice that they will no longer control their assets' response to a utility signal.

2.0: Installed Storage Targets, Deployment Timelines and Capacity Blocks

The Straw set annual installed energy storage targets that increase over time (see section V. D. of the NJ SIP Straw Proposal for details).

Question 2.1: *How should capacity blocks be structured and proportioned, both within each component of the NJ SIP (Grid Supply and Distributed) and relative to each other?*

Rate Counsel Response:

See Rate Counsel's December 14, 2022 comment at page 10-13 and 19-22.

Question 2.2: *Should the proposed first-come, first-served application process be changed to a "First- Ready, First-Served" process?*

Rate Counsel Response:

Given the readiness provisions built into the current process, Rate Counsel believes this shift is unnecessary. Currently, the Straw Proposal provides that block allocations be established on a first-come, first-served basis based on the date stamp of when the Program Administrator receives a completed application. The application, however, requires storage projects to meet substantive maturity requirements, which in effect constitute "readiness." Though we are not necessarily against an approach that explicitly requires an additional degree of readiness, it is unclear how a "first-ready, first served" process would differ from the current process.

The current application's maturity requirements mean that for an application to be complete, it must be sufficiently advanced in PJM's interconnection queue or another state jurisdictional queue, or for net metered projects, and that it demonstrate conditional approval of a utility interconnection request. In addition, projects must pay a participation fee of $1,000 per MW of nameplate capacity—a fee that helps to ensure that projects are real, not speculative. Taken together, these requirements currently signal a degree of readiness. Importantly, however, they do not signal that a project is 100 percent certain. This is important because the goal of the Straw Proposal's incentives is to encourage additional storage development that would not have occurred otherwise. Requiring projects to be 100 percent certain prior to applying to a fixed incentive block, therefore, would mean that projects that would have been built without fixed incentive payments would receive payments anyway.

> **Question 2.3**: *How should the program be designed to avoid or minimize interconnection delays? Should the interconnection process be modified for accommodating energy storage and if so, how?*

Rate Counsel Response:

The Interstate Renewable Energy Council (IREC) recently developed a report containing recommendations specifically designed to remove barriers to energy storage interconnection on the distribution system. This report, titled "Building a Technically Reliable Interconnection Evolution for Storage" (BATRIES) is publicly available.[6] Rate Counsel believes this is a good starting point for stakeholder input and discussion on any storage-focused updates to the interconnection process in New Jersey.

3.0: Incentive Structure

> *The NJ SIP Incentives are proposed to be comprised of two incentive payments, a Fixed Incentive and a Performance-based incentive (see section V.E. of the NJ SIP Straw Proposal for details).*

[6] Available at https://irecusa.org/programs/batries-storage-interconnection/.

Question 3.1: *Incentives are meant to cover a portion of the fully installed cost of an energy storage system. What is the fully installed unit cost (in $/kWh) for energy storage systems at present, and estimated to be each year through 2030? How do New Jersey-specific costs vary from these estimates? Please provide links to your references.*

Rate Counsel Response:

As discussed in detail at pages 10 to18 of Rate Counsel's December 14, 2022 comments in this matter, it appears that no additional incentives are needed at this time to subsidize the installed costs of grid supply projects, and, to the extent a fixed incentive may be needed, a competitive process would be a better mechanism for determining incentive levels, at least for grid supply projects. As discussed in Rate Counsel's earlier comments, the competitive process should be administered by a professional solicitation manager, which would undertake efforts to facilitate and maximize participation in the solicitations and to assure that only competitive bids received incentives. If a similar process is employed in the SIP, a solicitation manager and/or a program administrator should be responsible for monitoring and tracking the progress of the program, and would therefore be in the best position to determine the appropriate data sets for the energy storage costs based on actual data as the SIP progresses. The following information is subject to these concerns.

The fully installed unit cost of storage systems at present in $/kWh depends on the capital cost to build the storage system and the cost of energy going into the storage system. One reliable source for the capital cost of energy storage systems is the National Renewable Energy Laboratory's (NREL) Annual Technology Baseline (ATB).[7] NREL's ATB is updated annually and forecasts new resource costs across a range of technologies from the present year to 2050. For utility-scale battery storage applications, the 2023 ATB includes cost and performance for

[7] National Renewable Energy Laboratory ("NREL") Annual Technology Baseline, https://atb.nrel.gov/. The 2023 Electricity Annual Technology Baseline data is excel workbook available at https://data.openei.org/files/5865/2023_v2_Workbook_07_20_23.xlsx.

battery storage across a range of durations (2–10 hours). It represents lithium-ion batteries (LIBs) - primarily those with nickel manganese cobalt (NMC) and lithium iron phosphate (LFP) chemistries only at this time, with LFP becoming the primary chemistry for stationary storage starting in 2021. There are a variety of other commercial and emerging energy storage technologies; as costs are characterized to the same degree as LIBs, that will be added to future editions of the ATB. For each year, NREL estimates the capital cost in dollars per kilowatt to build in that year. Over time, NREL's cost forecasts typically decrease due to technological innovation, economies of scale, and other factors. The 2023 capital cost forecasts for different types of lithium-ion battery storage are shown below in Table 1.

Table 1. Overnight Capital Cost to build Lithium Ion Battery Storage (2021 $/kW)

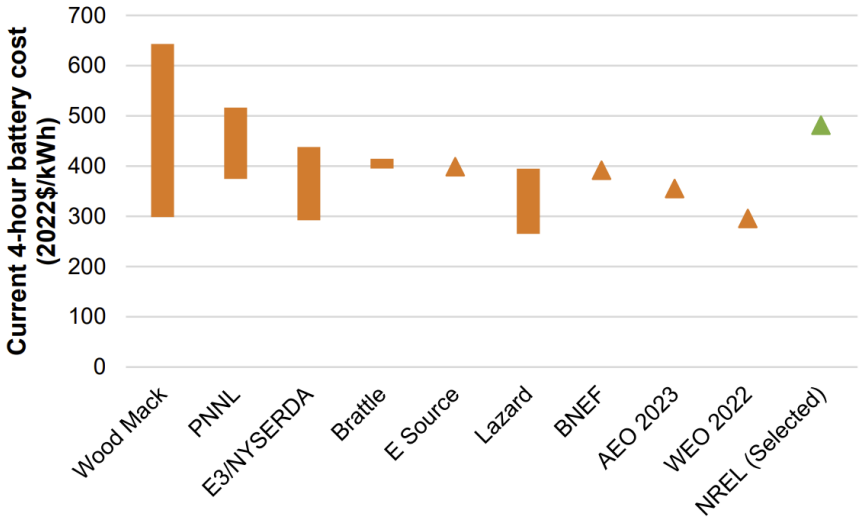
		2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Utility Scale Battery Storage	2 Hour	$1,022	$980	$862	$839	$817	$794	$771	$749
	4 hour	$1,716	$1,639	$1,436	$1,390	$1,343	$1,297	$1,250	$1,204
	6 Hour	$2,409	$2,298	$2,010	$1,940	$1,870	$1,800	$1,729	$1,659
	8 Hour	$3,102	$2,956	$2,584	$2,490	$2,396	$2,302	$2,208	$2,114
	10 Hour	$3,795	$3,615	$3,158	$3,040	$2,923	$2,805	$2,687	$2,569
Commercial Battery Storage	1 Hour	$1,473	$1,377	$1,320	$1,277	$1,236	$1,197	$1,162	$1,128
	2 Hour	$1,714	$1,596	$1,528	$1,474	$1,423	$1,374	$1,331	$1,289
	4 hour	$2,197	$2,035	$1,946	$1,869	$1,796	$1,729	$1,668	$1,610
	6 Hour	$2,679	$2,473	$2,363	$2,264	$2,170	$2,083	$2,005	$1,931
	8 Hour	$3,162	$2,911	$2,781	$2,658	$2,544	$2,438	$2,342	$2,252
Residential Battery Storage	5kW - 12.5kWh	$3,508	$3,326	$3,158	$3,061	$2,974	$2,898	$2,823	$2,756
	5 kW - 20kWh	$4,328	$4,075	$3,837	$3,707	$3,591	$3,490	$3,393	$3,304

Source: NREL ATB 2023, Moderate Scenario, market case. Available at https://atb.nrel.gov/electricity/2023/data.

NREL's ATB 2023 also includes a national estimate of the cost of battery storage in dollars per kilowatt hour, which combines the capital cost estimates above with a forecast of the cost of energy. This forecast is not New Jersey specific. Multiple other recent studies also attempt to

estimate the range of costs in dollars per kWh of battery storage, as shown in figure 1 from NREL's 2023 Battery Storage Cost update:

Figure 1. Current battery storage costs from recent studies



More information about these sources can be found at https://www.nrel.gov/docs/fy23osti/85332.pdf

These differences in cost, and the range of costs within each source, reflect different assumptions about factors including the cost of electricity and rate of cycling. It is important to note that, while longer-duration batteries have a higher capital cost per kilowatt, they have a lower cost per kilowatt-hour, because the longer duration in hours increases the size of the denominator, by increasing the number of hours of dispatch. Conversely, on a $/kW basis, shorter (2-hour) duration batteries will typically have a lower capital cost compared to longer (6-hour) duration batteries.[8]

[8] NREL, "Cost Projections for Utility-Scale Battery Storage: 2023 Update NREL/TP-6A40-85332," (June 2023), available at https://www.nrel.gov/docs/fy23osti/85332.pdf.

Question 3.2: *What are the best public data sets for energy storage costs?*

Rate Counsel Response:

One of the best publicly available sources for energy storage costs is the annually updated NREL ATB, referenced above. The 2023 ATB, in turn, relies upon a large list of publications, many of which are also publicly available. These include the Energy Information Administration's Annual Energy Outlook for 2023, International Energy Agency's World Energy Outlook 2022, and Wood Mackenzie 2022. In general, the data the U.S. Environmental Protection Agency ("EPA") uses to model the U.S. power grid is also worth noting. In this case however, the inputs to EPA's latest national electric grid modeling are based on NREL's 2021 ATB. For New Jersey, therefore, the more recent 2023 ATB should be preferred to EPA's model inputs.

There are some commercially available sources of information; however, Rate Counsel suggests that if these are used by the Board, the differences in cost estimates between these sources and the sources discussed above be clearly articulated and provided to stakeholders for comment.

Question 3.3: *Should Fixed Incentives be assignable to an aggregator? Why or why not?*

Rate Counsel Response:

Rate Counsel does not oppose the assignment of fixed incentives to an aggregator, under certain conditions since aggregation can facilitate economies of scale and thereby reduce the average (per unit) energy storage development costs. Rate Counsel recommends that limits be placed on individual aggregators for NJ SIP participation in order to alleviate market power concerns. Rate Counsel suggests that a single owner (to include all affiliates) be limited to no more than 400 MW (representing 20 percent of the two gigawatt 2030 capacity goal).

Question 3.4: *Should a Distributed energy storage resource that can provide grid services have the ability to opt in to either the Grid Supply or the Distributed storage program, for both the Fixed and Performance-based incentives?*

Rate Counsel Response:

Consistent with Rate Counsel's recommendations that the Board should utilize a market-based approach that is clear, fair, and technology-neutral, Rate Counsel believes that distributed energy storage resource owners should be able to opt in to either the Grid Supply or the Distributed energy storage program, for both the Fixed and Performance-based incentives, provided that the storage resource satisfies the required conditions.

Question 3.5: *The Straw proposes the use of the PJM Marginal Emission Rate ("MER") signal as a basis for Performance-based Incentives for Grid Supply energy storage systems. Is or will the PJM MER be sufficiently developed to use to calculate NJ SIP Performance-based Incentives?*

Rate Counsel Response:

PJM's Marginal Emissions Rate (MER) should not be used as a basis for the New Jersey performance-based Incentives for Grid Supply energy storage systems because it does not provide enough information to storage owners to plan their dispatch.[9] Although PJM's MER could be used to retrospectively pay storage owners for avoided-emissions performance, doing so would likely be paying for incidental emissions reductions that would have happened anyway. The goal of pay-for-performance incentive is to influence storage operator's charging and discharging behavior to achieve emissions reductions. For this to work, storage owners must know in advance what the marginal emissions rate of the grid will be, so that they can modify their dispatch and collect the incentive payment. Although the MER records recent marginal emissions rates, it explicitly does not provide real-time marginal emissions information or information about what the marginal emissions rate will be at any time in the future. PJM

[9] The PJM Data Miner tool allows retrieval of historical marginal emissions rates (CO_2, SO_2, NO_X) for individual load nodes on the wholesale grid, available at https://dataminer2.pjm.com/feed/fivemin_marginal_emissions.

explicitly warns that the dispatch stack is not organized according to emissions intensity and that "Because of this, marginal units – and the marginal emissions rates based on them – cannot provide any prediction of the results of an action."[10] This means that even if storage owners want to take advantage of the pay-for-performance incentive by dispatching in a way that minimizes emissions, they cannot use the MER to do so. Contrary to the intent of the pay-for-performance incentive, relying on the PJM MER signal could increase emissions, if storage owners use it improperly as a predictive tool of what marginal emissions will be when they dispatch.

To be used as a basis for the performance-based incentive, a market signal must publish real-time marginal emissions rates, as well as a reasonable prediction of what marginal emissions rates will be in the near future. California's Self-Generation Incentive program shows how this could work. In that program, real-time marginal emissions rates are published two- to three-minutes before the timestamp for which they are valid, and marginal emissions rates forecasts that describe the next 72 hours are updated every five minutes.[11] This information allows storage operators to plan their dispatch according to a reliable, data-informed expectation of future prices and to therefore respond to an incentive like the pay-for-performance proposal.

Last, although marginal emissions and energy prices are not perfectly correlated, there will likely be instances when storage assets dispatch based on energy price arbitrage alone but also yield some incidental emissions reductions. To maximize and ensure the efficiency of the pay-for-performance incentive, these emissions reductions should not be counted toward the

[10] PJM, Marginal Emissions Rate Primer, (March 16, 2022), https://www.pjm.com/-/media/etools/data-miner-2/marginal-emissions-primer.ashx, page 2. "The marginal units in one five-minute interval might be completely different from the marginal units in the next five-minute interval. Because of this, marginal units – and the marginal emissions rates based on them –, cannot provide any prediction of the results of an action."

[11] California Self-Generation Incentive Program Greenhouse Gas Signal, available at http://sgipsignal.com/api-documentation.

reductions eligible for payment, since they would have happened anyway and require no additional above-market incentive.

Question 3.6: *Is there a different methodology that can be used to determine Performance-based Incentives, such as a Peak Demand Reduction program?*

Rate Counsel Response:

The Straw Proposal anticipates that the Board will hire a Program Administrator to track and administer the performance-based incentive portion of the NJ SIP based on PJM's marginal carbon emissions data. Where such data is readily available, time-of-use marginal emissions rates may be preferable for the pay-for-performance mechanism than historical marginal emission rates, but both have limitations based on our understanding of available marginal emissions data sets provided by PJM and the methodologies used calculate them. Average and marginal emission rates for electric generation can be calculated on a marginal, average, or time-of-use basis where quality-assured emissions data is available and can be reconciled with real-time generation data for individual generating resources within an entire balancing authority or subregion.[12] Marginal emissions, which the Straw Proposal proposes to use for the pay-for-performance incentive, are calculated using the emission rate of the marginal resource, which is the electric generation resource used to meet additional small changes in system load. There are potential shortcomings with reliance on historical marginal emissions data as this historical data may not capture intra-hour dual fuel operations, transmission losses or operational constraints not tracked in available data sets. Depending upon the congestion present RTO-wide or within a sub region, there can be multiple marginal units, separated by a

[12] Within its real-time energy market, PJM defines the marginal units as the units that set the locational marginal price in each five minute interval. When there is congestion, there can be more than one marginal unit during a five-minute period. The data are aggregated to an hourly level. The share of each fuel in each hour is calculated based on the number of five minute intervals that a unit burning each fuel type is marginal or jointly marginal. See https://www.pjm.com/markets-and-operations/energy/real-time/historical-bid-data/marg-fuel-type-data.aspx

transmission constraint, for each time increment tracked.[13] In September 2021, PJM added additional functionality to various data streams for average and marginal emissions rates in its marginal emission data mining tool, providing continuously updated 5-minute marginal emissions rate at a pricing nodal level, which PJM notes are based on the average annual emission rates for each generator, partly on individual electric generating unit historical emissions data reported to the EPA[14], and not the specific generator output emissions for each 5-minute time period.[15] Since the marginal emission rate available for each 5 minute increment by pricing node in PJM data mining tool are based on historical average emissions information for electric generating units associated with each pricing node, each increment accurately reflects average historical emissions performance based on changes in system load, and not necessarily actual emissions for that price increment, especially when there is a change in system load between 5 minute increments that results in a change in the marginal unit fuel type. Hence the marginal emissions data the Straw Proposal proposes to use for the pay-for-performance incentive to measure greenhouse gas emissions reductions associated with deployment of energy storage may not be showing actual carbon intensity of current system load, but the likely carbon intensity based on historical performance of operating electric generating units, as impacted by transmission constraints, excluding the impact of any net imports into the PJM balancing area.[16]

[13] PJM Marginal Emissions https://www.pjm.com/markets-and-operations/m/emissions. PJM provides additional detail in the RTO-wide emissions reports and more granular historical data.
[14] Environmental Protection Agency, Emissions & Generation Resource Integrated Database (eGRID), https://www.epa.gov/egrid.
[15] PJM Marginal Emissions Rate Primer, https://www.pjm.com/-/media/etools/data-miner-2/marginal-emissions-primer.ashx.
[16] PJM Marginal Emissions Rate Primer, https://www.pjm.com/-/media/etools/data-miner-2/marginal-emissions-primer.ashx. Power flows between PJM and adjacent control areas (such as NYISO, MISO, TVA etc.) also affect power dispatch and such power imports can, at times, be the marginal resource. PJM has no detailed information on the generation sources for such imports, and as such, these are considered to have a zero emissions rate by PJM.

In lieu of engaging a program administrator to track and administer the performance-based incentive portion of the NJ SIP based on PJM's marginal carbon emissions data, the SIP could instead rely on-peak and off-peak marginal emission rates for the RFC East balancing area, which includes New Jersey, calculated and updated in the EPA Emissions & Generation Resource Integrated Database (eGRID).[17] While eGRID does not provide real-time marginal emission rates, it does provide highly accurate on-peak and off-peak marginal emission rates that show temporal difference in carbon intensity and over time show the shifts in the PJM generation mix serving New Jersey. For the first six months of 2023, in the real-time PJM energy market, natural gas-fired units were 83.4 percent of the marginal resources while coal units were 9.0 percent.[18] In PJM in 2022, in the real-time PJM energy market the marginal resource was most often natural gas (>75 percent), followed by coal (~10 percent), wind (~12 percent) and other resources (< 5 percent).[19] The carbon intensity of a balancing area such as PJM can vary continuously in response to changes in generation at the minute or second timescale. Hourly emission factors may not capture the full variability in grid carbon intensity.[20] The marginal emission rate may be higher or lower than the average emission rate of the grid at a given time, which includes generation by a mix of emitting and non-emitting resources.

[17] Environmental Protection Agency, Emissions & Generation Resource Integrated Database (eGRID), https://www.epa.gov/egrid. Latest available data from calendar year 2021 (released January 30, 2023). Includes average emission for RFC East subregion of PJM, 672.8 CO_2 lbs/MWh, 0.337 SO_2 lbs/MWh, and 0.296 NO_X lbs/MWh.

[18] Monitoring Analytics "2023 Quarterly State of the Market Report for PJM: January through June 2023," (August 10, 2023) Section 1 at p. 21, available at https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2023/2023q2-som-pjm-sec1.pdf.

[19] Monitoring Analytics "2021 State of the Market Report for PJM" April 5, 2022) at 17, available at https://www.pjm.com/-/media/committees-groups/committees/mc/2022/20220506-som/20220427-2021-state-of-the-market-report-presentation.ashx.

[20] Gregory J. Miller, et al. "Hourly Accounting of Carbon Emissions from Electricity Consumption 2022," Environ. Res. Lett. 17 044073, DOI 10.1088/1748-9326/ac6147.

Any pay-for performance incentive should quantify the emissions of the electricity the storage resource consumes which is drawn from the grid as a whole and often cannot be traced to a single marginal resource. This is why a time of use-based emission rates may likely be a preferable since they are calculated similar to an annual average emissions rate (and thereby appropriately reflecting all resources utilized from the grid), but are calculated at a more precise time scale. A time of use approach using these overall emission rates will more appropriately account for the fact that different generation plants are used at different times of the day to meet load requirements. This, in turn, will lead to a more accurate measure of the emissions created, or avoided, by an energy storage device's charging and discharging decisions.

Rate Counsel recommends that an aggressive benchmark be set, particularly if the Board opts against a competitively bid fixed incentive structure and uses an administratively determined approach, as offered in the Straw Proposal. Rate Counsel prefers that the Board not use "performance hours" as outlined in the Straw Proposal, but instead focus simply on the intensity of avoided GHG emissions regardless of the hours in which those emissions occur. Further, to the extent any forecasts are used for baseline emissions levels, Rate Counsel recommends that "natural" emissions improvements in regional GHG emissions be factored into the projected baseline emissions levels—much like they are in the analysis of utility-sponsored energy efficiency programs. The Board's current methods for evaluating energy efficiency cost effectiveness recognize the emissions efficiency improvements over time that arise from the greater development and use of clean energy technologies. If these efficiency improvements are not considered, then storage devices will likely be over-incented at ratepayers' expense.

Rate Counsel also notes that the Straw Proposal essentially delegates the design of performance-based incentives for distributed storage resources to the electric distribution companies ("EDCs"). Staff proposed that each EDC adopt a simple dollars-per-kWh payment, either system-wide or varying based on geographic location, which would be paid to storage resources responding to a call to either inject energy into the grid or reduce the customer's consumption. Under Staff's proposal, the payments would be made to participants responding to the calls, but responses to calls would be voluntary. Each EDC would be required to develop a system for issuing and communicating calls.[21]

Rate Counsel believes this guidance is too broad and recommends Board Staff provide more detail on these performance-based incentives that will be constructed and managed by the EDCs. The Straw Proposal does not specify any methodologies for the determining the incentive levels, but instead directs the EDCs to develop a payment structure that maximizes environmental benefits, minimizes distribution investment, minimizes stresses on the EDC's distribution system, and reduces operating costs.[22] This is simply too general. Further, the process by which EDCs will offer this is not clear. Instead, the pay-for-performance incentive should be a tariff offering that is reviewed by the Board and other stakeholders.

Question 3.7: *If a Peak Demand Reduction program were to be developed, how should it be structured? What other states have similar programs that New Jersey should use as a benchmark?*

Rate Counsel Response:

Rate Counsel does not support a peak demand reduction program. As discussed in the response to Question 3.6 above, Rate Counsel recommends a pay-for-performance mechanism using time-of-use emissions rates as an alternative to the mechanism described in the Straw

[21] Straw Proposal, pp. 25-26.
[22] Id., p. 25.

Proposal. Rate Counsel is aware that California and Texas have peak demand reduction program, but does not believe these programs are useful as models for New Jersey due to the barriers to the participation of storage in the PJM energy, capacity and ancillary services markets. In addition, the Texas program was not implemented with the goal of reduction emissions. In that program, an expedited interconnection process (referred to as "connect and manage"), was paired with ancillary market changes adopted in June 2023, allowed it to deploy up to 4.8 GW in battery storage over this summer to deal with peak demand episodes. ERCOT, is now considering rolling back battery eligibility for future years, as Texas policy promotes natural gas as the primary standby power source for summer peak demand episodes.

Question 3.8: *What degree/percentage of Peak Demand should be targeted for reduction? What effect would such a program have on GHG emissions?*

Rate Counsel Response:

See Rate Counsel's responses to Questions 3.6 and 3.7 above.

Question 3.9: *The Straw proposed that each EDC establish its own level of Performance-based Incentives. Should EDCs establish EDC-specific performance incentives, or should the incentive be standardized and common to all EDCs?*

Rate Counsel Response:

As discussed at page 32 of Rate Counsel's previously filed comments, Rate Counsel understands that there may need to be differences in the EDCs' payment structures based on their individual system needs. However, the Board, with an opportunity or review and public comment, should develop detailed guidance on the methodologies to be used by the EDCs in developing their incentive structures.

Question 3.10: *Should energy storage owners be permitted to opt in, or be subject to utility control, in order to be eligible for Distributed performance incentives?*

Rate Counsel Response:

Please refer to Rate Counsel's response to Question 1.2. That said, Rate Counsel opposes conditioning the performance incentives available for energy storage owners on any particular relationship with the EDC. Rate Counsel believes that a market-based approach in which storage owners have maximum flexibility in the achievement of incentives is optimal.

Question 3.11: *How should incentives be structured for thermal storage systems?*

Rate Counsel Response:

Rate Counsel recommends a competitive bidding-based (market-based) approach to the acquisition of thermal storage assets. However, the Board should not be creating segmented market and individual segment targets. Instead, there should be a technology-neutral approach, where resource owners are free to choose the best technology for given conditions. Market segmentation results in the Board picking energy storage "winners and losers." This process should be determined instead by the market through competitive bidding. Administratively determined mechanisms and highly segmented markets will only further serve to increase ratepayer costs.

Question 3.12: *Under what circumstances, if any, should Distributed resources be able to opt into Grid Supply Performance-based Incentives?*

Rate Counsel Response:

Rate Counsel recommends that distributed resources be eligible to opt into grid supply performance-based incentives if they provide "grid services," as defined by the SIP. Rate Counsel recommends that the Board establish procedures whereby the EDC servicing a distributed storage resource certifies that grid services are being provided.

Question 3.13: *Large projects and long duration projects have the potential to qualify for significant incentives. Should incentive caps be applied in this program? If so, how (for example, by customer, project, developer, duration or meter), or other method?*

Rate Counsel Response:

As discussed above and in Rate Counsel's earlier comments, Rate Counsel believes that the Board should use market-based mechanisms and competitive processes, like competitive bidding, to protect ratepayers from bearing the cost of excessive financial incentives. Further, Rate Counsel seeks to encourage the achievement of economies of scale that can result in decreased storage costs. However, Rate Counsel believes that, to the extent the Board uses fixed incentives, they should be capped during the nascent stages of the New Jersey energy storage market. As such, Rate Counsel suggests that the Board, or any consultant/independent program administrator working on the Board's behalf, establish a fixed incentive cap by assessing the reasonable development costs for "standard" storage projects of different sizes, including a fair rate of return. The fair rate of return established for the standard projects (in various size increments) would then be applied to storage projects of a similar size and would serve as an absolute dollar cap for the fixed financial incentive.

Question 3.14: *Should a cap be set such that the sum of federal and state incentives does not exceed a certain amount? If so, please provide details.*

Rate Counsel Response:

As previously noted, Rate Counsel favors a market-based approach that uses competitive processes, rather than non-market-based mechanisms to avoid over-incenting energy storage installations participating in the SIP. However, Rate Counsel supports setting an incentive cap based on a cost-of-service method. This cost-of-service method should account for all eligible federal and state incentives and how such incentives, including the ones in the SIP, impact a "fair" rate of return for energy storage developers as discussed previously.

Question 3.15: *What provisions should be included in the program for monitoring, reporting and evaluation in order for deployed projects to maintain eligibility for incentives that are paid over-time?*

Rate Counsel Response:

As discussed at pages 36-38 of Rate Counsel's December 14, 2022 comments in this matter, robust reporting requirements are essential to assure attainment of the policy objectives and cost-effectiveness of the NJ SIP. The proposed SIP needs to be strengthened to, at minimum, mandate full cost disclosure for any storage project participating in the program. This is especially the case if the Board proceeds with Staff's proposal to provide administratively determined fixed incentives. As the Board has seen in other incentive programs, setting administratively determined incentives is an imperfect process. Robust financial reporting requirements will give the Board the information it needs to review and adjust financial incentives. Financial information that is voluntarily provided by developers as part of the stakeholder processes is not a substitute for mandatory and detailed reporting on energy storage project cost and performance. Detailed financial reporting should be a mandatory quid pro quo for private, for-profit companies that seek to receive subsidies that are funded by mandatory contributions from captive ratepayers. The reporting should include all financials of the entity receiving a subsidy. To the extent the Board finds that the subsidy results in excessive returns, the subsidies can be reduced moving forward to ensure that ratepayers do not overpay in perpetuity.

Rate Counsel has no objection to this information being provided on a confidential basis by any individual project, so long as the Board reports aggregate information, on a quarterly basis, in evaluating the overall SIP's effectiveness. Aggregate information should be provided in a fashion that describes average costs per storage project type/technology but does not disclose information specific to any single project. The Board can exercise its discretion to

withhold public reporting of aggregate information for specific type of energy storage categories if the aggregated information is sparse and may result in inadvertent disclosure of individualized data.

Further, program reporting requirements should include Board access to all operational information about the energy storage device/project participating in the program, particularly if these projects are receiving a performance-based incentive. However, project performance information should still be provided regardless of whether a performance-specific incentive is in place. Storage unit utilization and performance is important in understanding how storage, in general, and a project, individually contributes to better resource utilization on the distribution grid, as well as how that storage device is financially incented. As noted above, Rate Counsel has no objection to individual projects requesting and receiving confidential treatment of their project information. However, Rate Counsel believes that the Board should report aggregate information about project performance on a quarterly or annual basis and make that information publicly available.

As discussed at Page 38 of Rate Counsel's December 14, 2022 comments, all reporting and monitoring functions performed by an independent program administrator subject to Board oversight, publicly available reports should be prepared on an annual basis.

Question 3.16: *How can BPU structure NJ SIP Performance-based Incentives to both promote value stacking and prevent double compensation?*

Rate Counsel Response:

As detailed at pages 4-5 and 14-18 of Rate Counsel's December 14, 2022 comments, Rate Counsel has strongly urged the Board to use competitive processes to determine incentive levels, and has provided documentation that a competitive process should be feasible at least for grid supply projects. See also Rate Counsel's responses to Questions 3.13 and 3.14 above.

4:0 Overburdened Community Incentives

The Straw proposed three methods to support OBCs with energy storage incentives.

- *An incentive adder in kWh*
- *A separate incentive block*
- *An additional up-front incentive*

Question 4.1: *Staff is considering establishing both an adder and a capacity block for OBCs. What size should the capacity blocks be over time as a percentage of the overall Distributed segment? How much should the adder be in 1) $/kWh or 2) as a percentage of the base incentive?*

Rate Counsel Response:

For the reasons detailed in Rate Counsel's December 14, 2022 comments at pages 20-23, the Board should approach incentive for storage in overburdened communities with caution. It is important to assure that such projects be subject to strict qualifications to assure that they provide significant localized benefit, and do not simply result in the siting of additional undesirable infrastructure in already overburdened communities. As detailed in Rate Counsel's earlier comments, if the Board chooses to provide additional incentives for projects in overburdened communities, Rate Counsel recommends setting up a separate capacity block. Rate Counsel does not support the use of "adders" or additional up-front payments because of their potential for windfalls to developers rather than benefits to overburdened communities. However, if the Board chooses to implement such additional incentives, they should be based on demonstrated higher costs, and tied to specific localized benefits.

Question 4.2: *How can BPU assure that the incentive structure chosen will in fact provide benefits to OBCs?*

Rate Counsel Response:

See the response to Question 4.2 above and pages 20-23 of Rate Counsel's December 14, 2022 comments. If the Board decides to proceed with a separate block for projects in overburdened communities, as recommended by Rate Counsel, the qualifications should be

carefully drawn to assure that they provide the localized community benefits that the Board aims to achieve. These projects should be required to evaluate and document a specific localized benefit such as reduced pollutant levels and/or increased distribution level reliability (lower feeder-specific outages, etc.) that specifically benefit the overburdened community in which they are located. Rate Counsel understands this adds additional administrative work, but these steps are necessary to assure that these projects benefit overburdened communities rather than merely saddling them with additional unwanted infrastructure.

5:0 Other Questions

Question 5.1: *What actions, if any, should BPU take to improve access to the energy storage value stack as part of implementing the NJ SIP?*

Rate Counsel Response:

It is unclear whether any actions are required by the BPU at this time to improve access to the energy storage value stack under the NJ SIP. As discussed in more detail at pages 2, 10-12 and 18-19 of Rate Counsel's December 22, 2022 comments in this docket, there are many other sources of value for storage projects, including the energy, capacity, and ancillary services markets offered by PJM Interconnection LLC ("PJM"), tax benefits, subsidies under the recently enacted federal Inflation Reduction Act ("IRA"), and the incentives that are available for solar-plus-storage projects under the Board's Competitive Solar Incentive ("CSI") program.

Question 5.2: *How will Federal Energy Regulatory Commission ("FERC") Order 2222 affect New Jersey's energy storage market? What changes should the Board make to the NJ SIP to take advantage of PJM's pending implementation of FERC Order 2222?*

Rate Counsel Response:

FERC Order No. 2222, issued on September 17, 2020, requires that ISOs amend their tariffs to allow distributed energy resource ("DER") aggregations to participate and compete in

wholesale electricity markets. FERC accepted PJM's second Order No. 2222 compliance filing on May 30, 2023 with a compliance deadline of February 2, 2026.[23] It is unclear whether any changes to the NJ SIP are required in response to the FERC approval of DER aggregations spread across system pricing nodes (for capacity and ancillary service markets only) or the rejection of PJM's proposal to limit aggregations to a single pricing node when participating in PJM's energy market. Most analysts expect that energy storage project developers will simply take advantage of new market opportunities as they arise within PJM over the next several years.[24]

Question 5.3: *Are modifications to the NJ SIP needed to maximize the ability of energy storage developers to access federal investment tax credits or other federal incentives?*

Rate Counsel Response:

The Inflation Reduction Act of 2022 created and expanded tax credits for investment in energy storage technology including an investment tax credit (ITC) for standalone storage projects at a base rate of 6% and additional bonus rate of 30% for energy storage projects that meet certain apprentice labor and prevailing wages requirements.[25] Across the United States as of July 1, 2022, utility-scale energy storage installed capacity reached 12.69 GW of installed capacity and another 3.55 GW is expected to be added by the end of the 3rd quarter of 2023, with

[23] R. Tapio, A. Orrell, "Pacific Northwest National Laboratory, FERC Order No. 2222 and Considerations for Distributed Wind," (July 2023), PNNL-34472. PJM filed an additional compliance filing on June 14, 2023 (Accession No. 20230614-5084), pp. 6-7, available at https://www.osti.gov/servlets/purl/1993622.

[24] B. Plumer, New York Times, "The U.S. Has Billions for Wind and Solar Projects. Good Luck Plugging Them In," (February 23, 2023, updated June 20, 2023). https://www.nytimes.com/2023/02/23/climate/renewable-energy-us-electrical-grid.html; Troutman Pepper, Taking Charge: Inside the U.S. Battery Boom (May 17, 2023) https://www.lexology.com/library/document.ashx?g=8487ae5f-6972-4fb3-aaa0-27b5d6146cf6.

[25] Pub. L. No. 117-169, § 13102, 136 Stat. 1818, 1913-21. The IRA Section 48E investment tax credit is available for standalone energy storage technology projects with a minimum capacity of 5 kWh. The credit is calculated as a percentage of the eligible cost of the energy storage equipment. The base value of the Section 48E ITC is 6%.

.43 GW in PJM currently installed increasing to 1.02 GW by the end of 2024.[26] The majority of utility-scale energy storage development to date in the United States is concentrated in California and Texas, driven by opportunities for value stacking in those energy markets.[27]

Rate Counsel recommends the Board be cautious to avoid providing unnecessary incentives for projects that qualify for incentives under the IRA. Recent estimates indicate the IRA contributed to an increase in utility-scale energy storage from $9.1 billion in 2021-2022 to $14 billion in 2022/2023.[28] Under the IRA, clean energy projects, including storage projects, eligible for an investment tax credit or production tax credit can earn an additional 10 percent adder if they are located in an "energy community." Staff should evaluate any incentive overlap between overburdened communities and "energy communities" and consider adjustments to project qualification criteria. Where there is overlap, Staff should put into a place a mechanism that would automatically reduce state incentives. In this regard, Rate Counsel notes that IRA Section 48 now includes a federal investment tax credit for standalone energy storage technology with a minimum capacity of 5 kWh placed into service after December 31, 2022.[29]

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[26] S&P Global Commodity Insights, US Battery Storage: Capacity Tops 12.5 GW in Q2; 3.5 GW planned in Q3 (August 25, 2023, https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/082523-us-battery-storage-capacity-tops-125-gw-in-q2-35-gw-planned-in-q3.

[27] Energy Information Administration, "Battery Storage in the United States: An Update on Market Trends," (July 24, 2023), available at https://www.eia.gov/analysis/studies/electricity/batterystorage/; S&P Global, "Battery Stampede Spurs Sunny Storage Economics in ERCOT," (May 4, 2023), available at https://www.spglobal.com/marketintelligence/en/news-insights/research/battery-stampede-spurs-sunny-storage-economics-in-ercot; Reuters, Insight: Texas battery rush: Oil state's power woes fuel energy storage boom (May 31, 2023), available at https://www.reuters.com/business/energy/texas-battery-rush-oil-states-power-woes-fuel-energy-storage-boom-2023-05-31/

[28] Rhodium Group & MIT Center for Energy and Environmental Policy Research (September 13, 2023), available at https://rhg.com/wp-content/uploads/2023/09/The-Clean-Investment-Monitor_Tracking-Decarbonization-in-the-US.pdf, page 9.

[29] McGuireWoods, "Inflation Reduction Act Creates New Tax Credit Opportunities for Energy Storage Projects, "(December 27, 2022), available at https://www.mcguirewoods.com/client-resources/Alerts/2022/12/inflation-reduction-act-creates-new-tax-credit-opportunities-for-energy-storage-projects. "Energy storage installations that are placed in service *after* Dec. 31, 2022, and begin construction *prior to* Jan. 1, 2025, are entitled to the existing ITC under Section 48(a). Energy storage installations that begin construction after Dec. 31, 2024, will be entitled to credits under the technology-neutral ITC under new Section 48E. The base ITC rate for energy storage projects is 6% and the bonus rate is 30%. The bonus rate is available if the project is under 1MW of energy storage capacity or if it meets the new prevailing wage and apprenticeship requirements."

Question 5.4: *What provisions, if any, should be established for interconnection of zero-export energy storage facilities (that is, energy storage facilities that do not inject power back into the grid and only supply power to on-site load)?*

Rate Counsel Response:

Non-exporting limitations generally allow DERs (most commonly PV solar paired with storage) to receive expediting hosting capacity screening and approval by an EDC conditioned on installation and use of technological cap on ability of the DER system to export any generated electricity to the distribution grid beyond a specified amount (which could be set to zero kWh). The Interstate Renewable Energy Council Building a Technically Reliable Interconnection Evolution for Storage (BATRIES: Storage Interconnection Reform) provides a comprehensive review of existing technical standards and recommends best practices for the design of interconnection standards for energy storage projects. The IREC BATRIES report identifies two methods to control export allowing evaluation of an energy storage project as either a non-export (zero export) or limited export (maximum export value):

- A non-export ESS (or import only mode under the UL 1741 Certification Requirement Decision for Power Control Systems) is one that implements advanced controls to forbid itself from exporting to the grid. It may be charged either by onsite generation (e.g., solar) or from the grid. A non-exporting system may be utilized to meet tariff compliance (such as net energy metering, or NEM) or to align with interconnection pathways for non-exporting systems.
- A limited-export ESS is one that implements controls to set maximum export power to a specified magnitude lower than the full nameplate capacity. Such a system can export to the grid and can serve onsite load during discharging. While charging, either the grid or onsite generator can power the ESS. Depending on the intended use case and how much

backfeed the grid can accommodate, the system is designed to allow a certain level of export.

NREL notes that California, Connecticut, Hawaii, Nevada, New York, and North Carolina have explored the more technical aspects of interconnection requirements.

Question 5.5: *What specific best practices regarding rates and tariffs from other states should be incorporated?*

Rate Counsel Response:

Rate Counsel believes this question is premature. Tariff provisions will need to be developed base on the parameters of the NJ SIP as adopted by the Board. Rate Counsel notes also that interconnection requirements and related rate design issues (such as allocation of responsibility for grid enhancements) are being considered as part of the Board's ongoing Grid Modernization proceeding, which is the appropriate forum for addressing those issues.

Question 5.6: *Should energy storage be utilized and compensated in the Triennium 2 Energy Efficiency/Demand Response proceeding as an allowable Demand Response resource? If so, what changes, if any, should be made to the NJ SIP design to avoid potentially providing double compensation for the same service?*

Rate Counsel Response:

Rate Counsel believes the appropriate forum for addressing these issues is the proceedings to consider the utilities' proposed Triennium 2 Energy Efficiency/Demand response programs which are expected to be file on October 1, 2023.

Question 5.7: *How should energy storage systems be metered and measured? Can an inverter serve this function? What role should advanced metering infrastructure ("AMI") play in the NJ SIP?*

Rate Counsel Response:

Rate Counsel has no comments on this issue at this time. However, Rate Counsel cautions against reliance on AMI, as it appears adding functionality to existing AMI will come at additional cost to ratepayers.

Question 5.8: *Please provide any other comments on the NJ SIP.*

Rate Counsel Response:

Rate Counsel has no further comments at this time.