STATE OF MAINE
OFFICE OF THE GOVERNOR
1STATE HOUSE STATION
AUGUSTA, MAINE
04333-0001

JANET T. MILLS
GOVERNOR

DAN BURGESS
DIRECTOR
GOVERNOR'S ENERGY OFFICE

Public comments submitted to the GEO in response to its Opportunity for Comment concerning P.L. 2023, chapter 374

On March 12, 2024, the Governor's Energy Office (GEO) issued a Request for Information (RFI) to seek public input to inform the GEO's implementation of section 2 of Public Law 2023, chapter 374, *An Act Relating to Energy Storage and the State's Energy Goals* (LD 1850). Section 2 of this legislation directs the GEO to evaluate designs for a program to procure commercially available utility-scale energy storage systems connected to the transmission and distribution systems, including, but not limited to, through the use of an index storage credit mechanism.

The intent of this Opportunity for Comment was to obtain public input regarding a draft of the GEO's evaluation of program designs and consideration of key program objectives. The GEO shall complete the evaluation required by law and provide its recommendations to the Public Utilities Commission (Commission) for a program to procure up to 200 megawatts of energy storage capacity. The Commission shall review the recommendations and determine whether the program recommended by the GEO is reasonably likely to achieve the objectives established by the law. Upon finding the proposed program reasonably likely to achieve those objectives, the Commission shall take steps to implement the program.

The GEO requested submissions by March 25, 2024 . The GEO received 13 responses from the following entities:

Competitive Energy Services
Glenvale Solar
Nexamp
Form Energy
Clean Energy States Alliance
Steve Ingalls
Plus Power
RENEW Northeast & American Clean Power Association
Northeast Clean Energy Council
Central Maine Power
ReVision Energy
Natural Resources Council of Maine, the Union of Concerned Scientists, and the Conservation Law Foundation
Longroad Energy

The OFC and all materials provided to the GEO in response to the OFC are included below.

Maine Governor's Energy Office
Opportunity for Comment
Maine Energy Storage Program Development Pursuant to P.L. 2023, ch. 374

Issue Date: March 12, 2024
Subject: Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine
Response Due Date: March 25, 2024
Submit Responses To: caroline.colan@maine.gov

Description

This is an Opportunity for Comment issued by the Governor's Energy Office (GEO). The GEO, established within the Executive Department and directly responsible to the Governor, is the designated state energy office tasked with a wide range of activities relating to state energy policies, planning, and development.

This Opportunity for Comment seeks public input to inform the GEO's implementation of section 2 of Public Law 2023, chapter 374, *An Act Relating to Energy Storage and the State's Energy Goals* (LD 1850), which was signed into law by Governor Janet Mills on June 30, 2023. This legislation builds upon the state's existing energy storage goals and makes clear Maine's intention to invest in energy storage infrastructure to increase grid reliability and support the integration of clean energy resources needed to meet the state's climate and clean energy goals in a cost-effective manner.

Section 2 of this legislation directs the GEO to evaluate designs for a program to procure up to 200 megawatts of commercially available utility-scale energy storage systems connected to the transmission and distribution systems. Energy storage is defined in Maine statute as 'a commercially available technology that uses mechanical, chemical or thermal processes for absorbing energy and storing it for a period of time for use at a later time'.[1]

In evaluating programs for the procurement of energy storage systems, the GEO shall consider programs that are likely to be cost-effective for ratepayers and that are likely to achieve the following objectives:

A. Advance both the State's climate and clean energy goals and the state energy storage policy goals established in Title 35-A, section 3145 through the development of up to 200 megawatts of incremental energy storage capacity located in the State;
B. Provide one or more net benefits to the electric grid and to ratepayers, including, but not limited to, improved reliability, improved resiliency and incremental delivery of renewable electricity to customers;
C. Maximize the value of federal incentives; and

[1] 38 M.R.S. §2481.

D. Enable the highest value energy storage projects, specifically energy storage systems in preferred locations, projects that can serve as an alternative to upgrades of the existing transmission system and projects of optimal duration.

The GEO issued a Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (the RFI) on November 13, 2023.[2] Eighteen entities responded to the RFI with information that informed the GEO and its consultants in the development of the attached Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine. The GEO is grateful for the information and recommendations provided in response to the RFI.

The intent of this Opportunity for Comment is to obtain additional public input regarding the GEO's evaluation of program designs and consideration of key program objectives. The GEO shall complete the evaluation required by law and provide its recommendations to the Public Utilities Commission (Commission) for a program to procure up to 200 megawatts of energy storage capacity. The Commission shall review the recommendations and determine whether the program recommended by the GEO is reasonably likely to achieve the objectives established by the law. Upon finding the proposed program reasonably likely to achieve those objectives, the Commission shall take steps to implement the program.

Opportunity for Comment

1. Comment on the attached Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine prepared by Synapse Energy Economics and Sustainable Energy Advantage, LLC dated March 12, 2024. Comments regarding the methodology, assumptions, and implications for program design are encouraged.
2. P.L. 2023 ch. 374 §2 sub-§1 (A) states in part that the energy storage program must be likely to achieve "the development of up to 200 megawatts of incremental energy storage capacity."
   a. How should the GEO consider the allocation of up to 200 megawatts of incremental energy storage capacity, e.g. between energy storage systems connected to the transmission system or the distribution system?
   b. Comment on the interplay between such allocations, if any, and the objectives established for the program in P.L. 2023 ch. 374 §2.
   c. Should any capacity be reserved for pilot programs or novel applications of commercially available technologies?

Use

Information collected from this Opportunity for Comment will be used by the GEO to inform the fulfillment of requirements under the Act, including the design of the Maine Energy Storage Program.

This is an Opportunity for Comment only. The GEO will not pay for information provided in response, and no project will be supported as a result of this Opportunity for Comment. This Opportunity for Comment is not accepting applications for financial assistance or financial incentives. The Commission may ultimately implement a program recommended by the GEO that is based on consideration of the input received from this Opportunity for Comment, as well as the RFI. ***The GEO may publish responses to this Opportunity for***

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[2] The RFI and all submitted responses are available online at https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/storage-procurement-study-1850

Comment on its website. All responses to this Opportunity for Comment may be subject to the State of Maine Freedom of Access Act, thus sensitive or confidential business information should not be provided in response to this Request.

DRAFT

Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Draft report prepared pursuant to P.L. 2023 Chapter 374

Prepared for the Maine Governor's Energy Office

March 12, 2024

AUTHORS

Synapse Energy Economics:
- Eric Borden
- Sabine Chavin
- Wooddynne Dejeanlouis
- Chelsea Mattioda
- Angela Zeng

Sustainable Energy Advantage:
- Stephan Wollenburg
- Raghu Palavadi Naga

485 Massachusetts Avenue, Suite 3 Cambridge, Massachusetts 02139

617.661.3248 | www.synapse-energy.com

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1. Introduction and Overview of Findings

The Maine's Governor's Energy Office (GEO) contracted Synapse Energy Economics and Sustainable Energy Advantage (the "Project Team" or "Team") to assess storage procurement options that meet the criteria of Public Law 2023, Chapter 374 "An Act Relating to Energy Storage and the State's Energy Goals" (LD 1850, hereafter "the Act"), which was enacted on June 30, 2023. Section 2 of this law directs the GEO to evaluate designs for a program to procure up to 200 megawatts (MW) of commercially available utility-scale energy storage connected to Maine's transmission and distribution systems and to submit recommendations to the Public Utilities Commission ("Commission"). The Commission is directed to review the GEO's recommendations and, if it finds that the proposed program is reasonably likely to achieve the objectives established in the Act, the Commission shall take steps to implement the program.

As demonstrated in this draft report, energy storage is capable of creating societal and ratepayer value that storage resources owners may not be able to monetize. As a result, providing carefully crafted policy support can yield net benefits, including to Maine ratepayers. This report provides an overview of the Project Team's preliminary inputs, assumptions, and findings incorporating stakeholder feedback, and will be followed by a more comprehensive report and analysis at the end of March 2024.[1] As detailed in this draft report, the Project Team recommends a storage incentive structure utilizing a fixed up-front incentive paired with a performance payment based on dispatch in critical hours.

P.L. 2023 ch. 374, Section 2 states in part:

In evaluating programs for the procurement of energy storage systems, the [GEO] shall consider programs that are likely to be cost-effective for ratepayers and that are likely to achieve the following objectives:

> *A. Advance both the State's climate and clean energy goals and the state energy storage policy goals established in Title 35-A, section 3145 through the development of up to 200 megawatts of incremental energy storage capacity located in the State;*
>
> *B. Provide one or more net benefits to the electric grid and to ratepayers, including, but not limited to, improved reliability, improved resiliency and incremental delivery of renewable electricity to customers;*
>
> *C. Maximize the value of federal incentives; and*

[1] The results shown herein represent the Project Team's draft findings to date, which are subject to revision including but not limited to as a result of comments submitted by stakeholders.

> *D. Enable the highest value energy storage projects, specifically energy storage systems in preferred locations, projects that can serve as an alternative to upgrades of the existing transmission system and projects of optimal duration.*[2]

The Act directs GEO to encourage interested parties to submit relevant information to inform the evaluation. GEO issued a Request for Information (RFI) seeking input from interested parties to inform the evaluation and received eighteen responses from a range of stakeholders.[3]The Project Team leveraged qualitative and quantitative analysis of the criteria established under the law, as well as stakeholder input provided in response to the RFI issued by GEO, to assess procurement options for transmission and distribution-connected storage.

The Project Team also thoroughly assessed whether storage tends to displace fossil fuel resources which generally leads to reduced greenhouse gas emissions – or at least does not increase greenhouse gas emissions – to address the comments of several stakeholders. The Project Team's analysis confirms a substantial correlation between wholesale energy prices and greenhouse gas emissions, supporting a conclusion that storage owners are economically motivated to charge during hours of high renewable generation (when prices and emissions are lower), and discharge during periods of scarcity (when prices and emissions are higher) since this maximizes arbitrage revenue. Thus, pursuing an emissions reduction strategy is compatible with optimizing wholesale market revenues.

This analysis also incorporates stakeholder comment themes including but not limited to:

- Designing program incentives based on dispatch duration in addition to or in alternative to capacity based;
- Applying a societal cost test in addition to a utility cost test when applying the statutory criteria to weigh program options;
- To consider a range of storage durations;
- and to consider a range of potential benefits, including those that may be determined by interconnection at the transmission or distribution systems.

A thorough discussion of assumptions and incorporation of stakeholder input will be included in the final report.

The qualitative assessment of potential procurement mechanisms resulted in the selection of an upfront incentive in performance requirement, as discussed below. The Project Team created a dispatch model,

[2] P.L. 2023 ch. 374 section 2.

[3] GEO issued an RFI to seek public input to inform GEO's implementation of section 2 of P.L. 2023, chapter 374 on November 13, 2023, the responses to which have been reviewed by the Project Team. All comments received in response to this RFI have been made available to the public on the GEO's website at: https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/storage-procurement-study-1850.

which simulates optimal charging and discharging of storage for each hour of the year over a 20-year period, to optimize storage performance under this procurement mechanism by maximizing (1) value to ratepayers and 2) market revenues. Utilizing this optimized dispatch, the Project Team then evaluated the cost-effectiveness of multiple sizes and durations of battery storage, based on an analysis of recent entrants and proposed projects currently in an advanced development stage in New England.

The Project Team assessed the cost-effectiveness of these resources through the lens of the Utility Cost Test (UCT) and a jurisdictional societal cost test (SCT). The model found that several transmission and distribution-connected storage scenarios are likely to be cost-effective for ratepayers.

Based on the analysis, the Project Team recommends transmission and distribution-connected storage resources be sought using a competitive solicitation framework that incorporates an upfront incentive and a requirement for dispatch at critical hours that will provide the greatest value to ratepayers.

2. EVALUATION OF STORAGE PROCUREMENT MECHANISMS

Storage incentive programs are becoming increasingly common as more states pass legislative storage targets. Across the country, states are using differing mechanisms and incentive policies to reach their goals. The Project Team reviewed potential procurement program designs and examined how they have been implemented or proposed in other states, along with any relevant lessons learned, and the implications of each mechanism for Maine.

The Project Team considered the following program designs to procure storage based on a review of existing state programs and responses to the RFI: upfront incentives with a pay for performance element, clean peak credits, index storage credits, and tolling agreements. Typical parameters for these program designs are summarized in Table 1, and described in more detail in Appendix A.

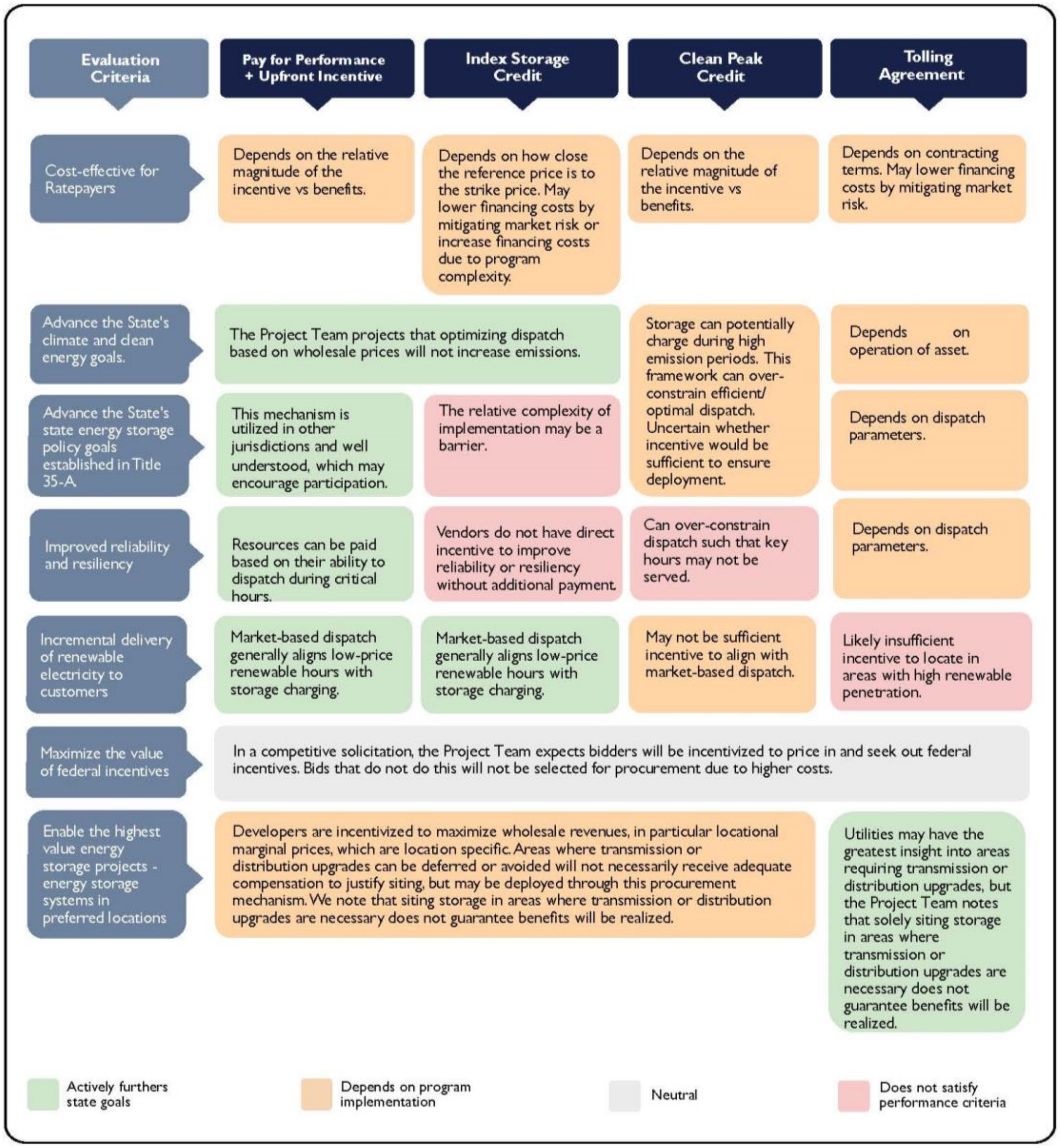
Table 1. Typical parameters for storage procurement mechanisms

	Pay for Performance + Upfront Incentive	Index Storage Credit	Clean Peak Credit	Tolling Agreement
Ownership	Third-party	Third-party	Third-party	Third-party
Dispatch control	Third-party and/or utility	Third-party	Third-party	Utility
Incentive Timing	Upfront and ongoing throughout project operations	Ongoing throughout project operations	Ongoing throughout project operations	Ongoing fixed payment
Dispatch logic	Depends on performance criteria	Maximize wholesale revenues	Scheduled based on system peaks / administratively determined	At the utility discretion depending on the purpose of procurement

Stakeholder feedback solicited through the RFI conducted by GEO raised several important issues which the Project Team considered in its evaluation of procurement mechanisms. The Project Team assessed each of the LD 1850 criteria above based on research of procurement mechanisms and stakeholder feedback from the RFI. The matrix in Figure 1 below provides a preliminary qualitative analysis of the LD 1850 criteria. The Project Team assumed all procurement mechanisms would be coupled with a competitive solicitation process.[4]

[4] This is often accomplished through a request for proposal (RFP).

Figure 1. Preliminary evaluation of LD 1850 criteria for a storage procurement mechanism



Evaluation Criteria	Pay for Performance + Upfront Incentive	Index Storage Credit	Clean Peak Credit	Tolling Agreement
Cost-effective for Ratepayers	Depends on the relative magnitude of the incentive vs benefits.	Depends on how close the reference price is to the strike price. May lower financing costs by mitigating market risk or increase financing costs due to program complexity.	Depends on the relative magnitude of the incentive vs benefits.	Depends on contracting terms. May lower financing costs by mitigating market risk.
Advance the State's climate and clean energy goals.	The Project Team projects that optimizing dispatch based on wholesale prices will not increase emissions.		Storage can potentially charge during high emission periods. This framework can over-constrain efficient/ optimal dispatch. Uncertain whether incentive would be sufficient to ensure deployment.	Depends on operation of asset.
Advance the State's state energy storage policy goals established in Title 35-A	This mechanism is utilized in other jurisdictions and well understood, which may encourage participation.	The relative complexity of implementation may be a barrier.		Depends on dispatch parameters.
Improved reliability and resiliency	Resources can be paid based on their ability to dispatch during critical hours.	Vendors do not have direct incentive to improve reliability or resiliency without additional payment.	Can over-constrain dispatch such that key hours may not be served.	Depends on dispatch parameters.
Incremental delivery of renewable electricity to customers	Market-based dispatch generally aligns low-price renewable hours with storage charging.	Market-based dispatch generally aligns low-price renewable hours with storage charging.	May not be sufficient incentive to align with market-based dispatch.	Likely insufficient incentive to locate in areas with high renewable penetration.
Maximize the value of federal incentives	In a competitive solicitation, the Project Team expects bidders will be incentivized to price in and seek out federal incentives. Bids that do not do this will not be selected for procurement due to higher costs.			
Enable the highest value energy storage projects - energy storage systems in preferred locations	Developers are incentivized to maximize wholesale revenues, in particular locational marginal prices, which are location specific. Areas where transmission or distribution upgrades can be deferred or avoided will not necessarily receive adequate compensation to justify siting, but may be deployed through this procurement mechanism. We note that siting storage in areas where transmission or distribution upgrades are necessary does not guarantee benefits will be realized.			Utilities may have the greatest insight into areas requiring transmission or distribution upgrades, but the Project Team notes that solely siting storage in areas where transmission or distribution upgrades are necessary does not guarantee benefits will be realized.

Actively furthers state goals · Depends on program implementation · Neutral · Does not satisfy performance criteria

As the evaluation matrix above indicates, the Project Team found that an upfront incentive combined with a performance incentive corresponding to dispatch during the highest value hours to ratepayers is most consistent with RFI feedback and LD 1850 criteria.

The Project Team elected to model a performance requirement under which storage would be dispatched to achieve the greatest ratepayer value during critical hours for which there may be insufficient or inconsistent market price signals.[5] The specific program design would differ for transmission- and distribution-connected resources, as further described below.

3. Storage Dispatch Modeling

The procurement mechanism modeled by the Project Team was used to inform optimized dispatch of storage. For transmission-connected storage, the modeling primarily optimized storage around reducing future Pooled Transmission Facility (PTF) projects by discharging at the system peak; other hours seek to maximize revenues in the wholesale market. The modeling optimized distribution-connected storage to defer or avoid distribution peaks in the winter, while other hours were modeled to maximize revenues in the wholesale market. The optimized hourly dispatch (charging and discharging) informed both estimated market revenues and cost-effectiveness, discussed in Section 4.

3.1. Transmission-connected storage

For transmission-connected storage resources, the Project Team developed an hourly dispatch strategy that prioritized (a) responding to calls for discharging during critical hours (annual and monthly peak hours), followed by (b) maximizing energy and ancillary services revenues during all other hours. Hourly load data came from the Avoided Energy Supply Costs (AESC) 2024 study[6] to identify the hours during which discharging is most likely to be beneficial to the transmission system by reducing peaks in Maine. The time, frequency, and duration of these calls are varied over the study period, in response to shifting system peaks and anticipated changes in the ability to project the time of peak events. These calls are intended to reduce future PTF investment by reducing net load during annual and monthly system peaks.[7]

Assumed energy and reserve prices are based on future price trends from AESC 2024, and hourly profiles from ISO-NE's simulation data for 2021 from the Day-ahead Ancillary Services Initiative (DASI) impact analysis. Using a model that considers the day-ahead market price projections for energy and reserve prices, the Project Team produced estimates for wholesale market revenues that would accrue to 2-hour, 4-hour and 6-hour battery storage resources from 2027 through 2046, including energy arbitrage (revenue achieved by charging during low-price hours and discharging during higher-price hours) and reserves (in which resources sell their availability to provide energy on short notice). The

[5] Alternatively, a performance payment for dispatch at critical hours could be considered, subject to overall cost-effectiveness constraints.

[6] Synapse, *AESC 2024 Materials*, https://www.synapse-energy.com/aesc-2024-materials.

[7] The Project Team's interpretation of Section II.21 of the ISO New England Open Access Transmission Tariff suggests that the operation of these resources would not reduce Regional Network Service charges. https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_2/oatt/sect_ii.pdf.

Project Team supplemented the arbitrage and reserve revenue results from the model with additional revenue adjustments that account for potential real-time balancing revenues and revenues that could be earned during reserve scarcity hours.

In addition, the Project Team estimated the capacity revenues (from auctions and during Pay for Performance events) using capacity price projections from AESC 2024, with the seasonal components of the Qualified MRI Capacity values based on a review of the data from recent ISO studies and illustrative analysis by other entities.

3.2. Distribution-connected storage

The Project Team did not have access to utility-specific load profiles in Maine, nor did they have data on which specific distribution circuits may need upgrades due to capacity constraints in the near future. Given these limitations, the model utilized data from the National Renewable Energy Laboratory (NREL) "ResStock" dataset[8] and Synapse's proprietary heat pump load model, based on a weather year that aligned with assumptions in AESC 2024.

The Project Team simulated distribution feeders serving residential load with varying levels of space heating electrification. The analysis focused on residential load profiles because this class drives non-coincident peak load in Maine, and thus is likely to be responsible for peak load constraints on a majority of distribution feeders. For distribution-connected storage resources, an hourly dispatch strategy was developed that (a) prioritized responding to calls for discharging during critical peak hours, followed by (b) co-optimizing energy and ancillary services revenues during the non-critical hours.

Based on these load profiles, the illustrative distribution feeder is expected to peak in winter months. The model therefore assumes batteries must be held in reserve from December through February to be available to respond to dispatch calls to address the distribution system peak. For the remaining months, the Project Team simulated wholesale market revenues from energy arbitrage and ancillary services, as described in the transmission-connected resource methodology section. It is assumed that these distribution-connected resources do not take on a capacity supply obligation in order to ensure the operator can meet the requirements of the distribution system and because taking on a capacity supply obligation may preclude them from impacting Regional Network Service (RNS) charges (which are used to recover PTF costs from New England electric customers).

Because of the heterogeneity of load shapes on different parts of the distribution system, opportunities for storage to effectively defer investments will vary significantly. Furthermore, the Project Team did not have access to feeder-specific data that would enable directly modeling the use of storage to address particular distribution system peaks. Given this, the model assumes that 2-hour resources will yield a kilowatt (kW) deferral equal to 25 percent of nameplate capacity, 50 percent for 4-hour resources, and 75 percent for 6-hour resources. These assumptions are based primarily upon a review of the

[8] NREL, https://resstock.nrel.gov/datasets.

simulated feeder data, which included several significant peaks occurring during winter months, generally lasting approximately eight hours. As noted above, given the heterogeneity of loads on the distribution system, it is reasonable to expect there will be areas in which storage will be able to have a larger impact on the distribution system than assumed and others where the impact would be lower. These values are understood to be reasonable assumptions that help establish the potential distribution system value and provide a benchmark for the level of benefit that may be needed in order for a project to be cost-effective.

The Project Team acknowledges that realizing distribution system benefits from storage would likely require changes to current electric system practices (i.e. considering storage as a potential asset to the distribution system) and capabilities (e.g., distributed energy resource management systems). The benefits to the distribution system modeled here would likely not be realized in the absence of some or all of these elements.

4. Cost-Effectiveness Framework and Results

The optimized dispatch for transmission and distribution-connected storage provided annual charge and discharge profiles for which the Project Team calculated benefits and costs to assess cost-effectiveness. Based on stakeholder feedback in the RFI and statutory criteria, the Project Team selected the Utility Cost Test (UCT) and Jurisdictional Societal Cost Test (SCT)[9] for this assessment.

These two tests capture (1) the expected impact of storage on the utility system and on ratepayers and (2) the expected impact of storage on Maine.

[9] The National Standard Practice Manual (NSPM) recommends establishing a jurisdiction-specific test that reflects the applicable energy policy goals of the jurisdiction, as guided by statutes, regulations, commission orders, and stakeholder input. Any such test should adhere to fundamental BCA principles and should represent the "regulatory perspective," which is meant to represent the views of relevant policy decision-makers. See NSPM, Synapse Energy Economics, https://www.synapse-energy.com/national-standard-practice-manual-benefit-cost-analysis-distributed-energy-resources. This was also used in Synapse's evaluation of distributed generation successor programs in Maine, see https://www.nationalenergyscreeningproject.org/wp-content/uploads/2023/06/Maine-DG-Successor-Program-Evaluation_Synapse-Energy.pdf.

Table 2. Procurement program parameters

Benefits included	Costs included
Jurisdictional Societal Cost Test	
Market revenues[10] Reliability Avoided transmission and distribution (T&D) costs Energy DRIPE (positive and negative) Capacity DRIPE Greenhouse gas impacts (positive and negative)	Cost of storage Utility administration costs (if applicable)
Utility Cost Test (UCT): Perspective of utility / ratepayers	
Reliability Avoided capacity Energy DRIPE (positive and negative) Capacity DRIPE Avoided transmission and distribution (T&D) costs	Program incentive Utility administration costs (if applicable)

The Project Team utilized values, inputs, and assumptions from the AESC 2024 study to estimate the expected cost-effectiveness of storage in Maine. It is important to note that the intent of the project was to robustly assess cost-effectiveness of storage in Maine, not to precisely forecast storage prices and revenues or to precisely quantify the necessary upfront incentive. These aspects of program design should be administered by the Commission, subject to other considerations described below. The modeling assumed storage that is operational for a 20-year period beginning in 2027. Other modeling inputs and assumptions are provided below, with additional detail to be provided in the forthcoming final report.

Cost-effectiveness Results

Across the modeled combinations of capacities, durations, and interconnections that the Project Team assessed, all had a benefit-cost ratio (BCR) greater than one, which means benefits were greater than costs on a present value basis. In general, the modeling indicates systems with larger capacities tend to have greater BCRs than systems with smaller capacities. This is attributable to economies of scale in project costs. Larger storage systems have lower capital expenses on a unit cost basis than smaller projects, while at the same time most of the benefits (within a defined set of benefit categories) scale proportionally with the size of the system. There is not a monotonic relationship between storage duration and BCR; four-hour resources tended to have the highest BCR. This reflects a tradeoff between

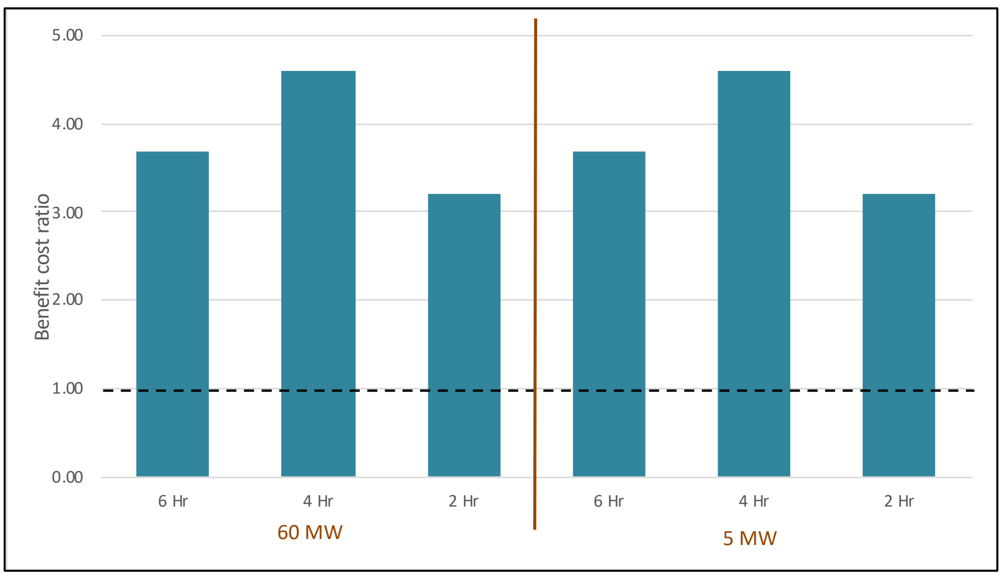
[10] Energy arbitrage, reserves, capacity revenues, and pay for performance. Our estimates include premiums to AESC prices based on real-time markets and scarcity event revenues.

higher costs for longer duration resources and how benefits for each category considered scale with different storage durations.

For transmission-connected storage, the Project Team assessed storage systems with capacities of 5 MW and 60 MW, with durations of 2, 4 and 6 hours, and assumed transmission-connected storage could participate in wholesale capacity and energy markets. For several of the transmission-connected systems the Project Team found that projected future wholesale revenues could exceed project costs on a present value basis; however, actual project developers may have higher costs of capital and shorter payback period expectations than have been accounted for in the BCA modeling.[11] In these cases, an upfront incentive was modeled based on a Connecticut battery incentive program.[12] Still, it is expected that wholesale market revenues can offset a large portion of project costs and this will be reflected in competitive bids.

The following figures display the overall BCR results for all transmission connected storage under the UCT and SCT.

Figure 2. Transmission-connected storage: Utility Cost Test results



[11] The Project Team assumes a nominal discount rate of about 4 percent, a default assumption provided in AESC 2024, and a twenty-year project life.

[12] Connecticut *Energy Storage Solutions,* https://portal.ct.gov/-/media/PURA/ESS-Commercial-and-Industrial-Fact-Sheet.pdf. The Project Team applies the $100/kWh incentive, intended for BCA purposes only.

Figure 3. Transmission-connected storage: jurisdictional Societal Cost Test results

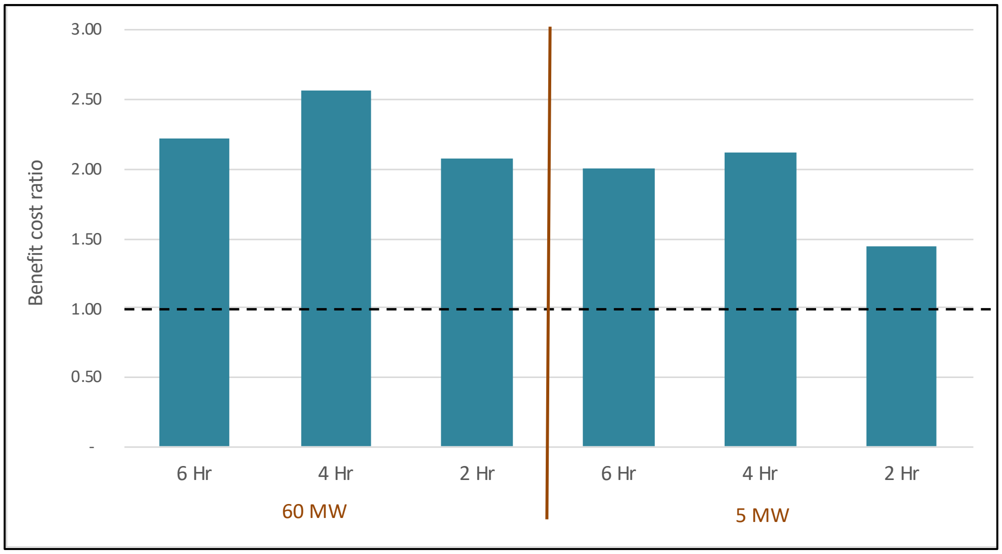
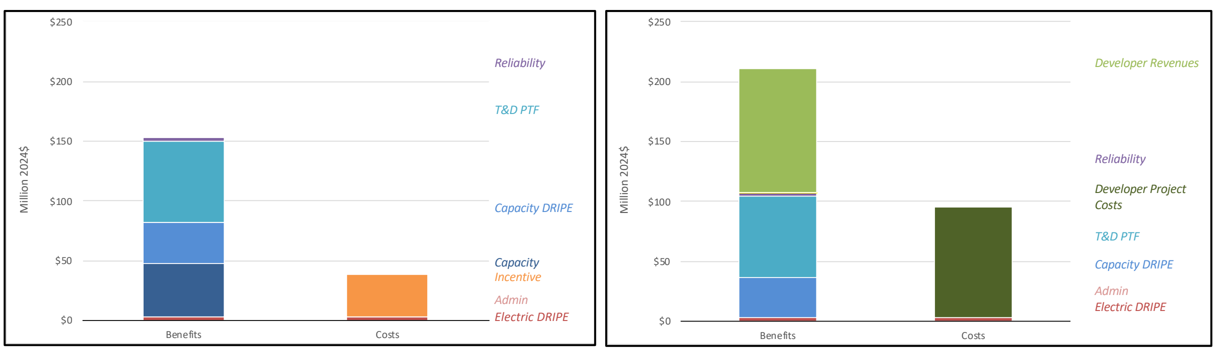


Figure 4 shows the breakdown of benefits and cost results for the 60 MW, 6 hour duration system. These charts indicate that transmission-connected storage systems can provide a wide range of benefits, largely driven by avoided marginal costs of pooled transmission facilities (PTF) in addition to avoided capacity costs.

Figure 4. Transmission-connected storage: UCT (left) and jurisdictional SCT (right) results for the 60 MW, 6 hour battery



For distribution-connected storage, systems with capacities of 1 MW and 5 MW and durations of 2, 4 or 6 hours were modeled.

Figure 5. Distribution-connected storage: Utility Cost Test results

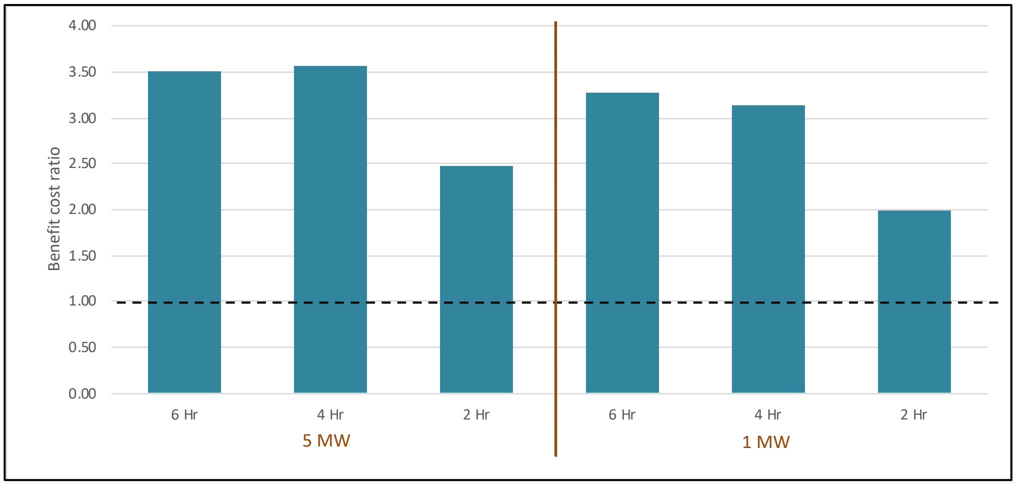
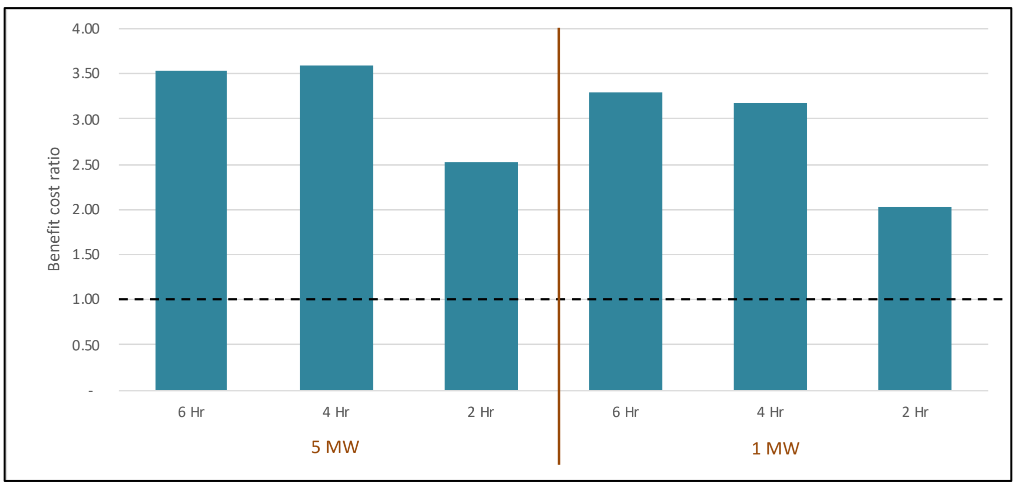


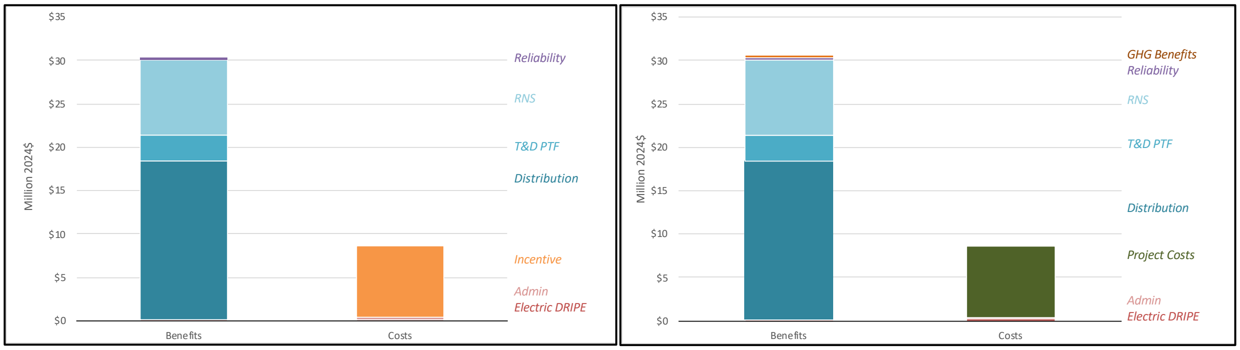
Figure 6. Distribution-connected storage: jurisdictional Societal Cost Test results



Distribution-connected storage was assumed to not participate in wholesale markets, and therefore was able to capture avoided Regional Network Service (RNS) costs when dispatched during Maine monthly peak hours. These avoided transmission costs, and avoided distribution costs based on AESC 2021 values[13], are the primary drivers of benefits.

[13] Midpoint value of $246.79/kW-year. See AESC 2021, p. 251, Table 108, https://www.synapse-energy.com/sites/default/files/AESC%202021_20-068.pdf.

Figure 7. Distribution-connected storage: Utility Cost Test (left) and jurisdictional Societal Cost Test (right) results for a 5 MW, 6 hour battery



5. FINDINGS AND RECOMMENDATIONS

The Project Team found up to 200 MW of storage in Maine is likely to be cost-effective for ratepayers, from both utility ratepayer and societal perspectives. This conclusion is based on storage procurement that adheres to the following criterion:

1. A competitive solicitation overseen by a neutral third party.
2. An upfront incentive with a performance requirement that allows for storage dispatch during critical periods that best achieve ratepayer value. The specific purpose and strategy of calling events will differ for the distribution and transmission-connected resources.
3. Ongoing review and evaluation of actual program performance and impacts.

The analysis suggests that both transmission and distribution-connected resources can be cost-effective but does not identify an optimal share of the total 200 MW that should be procured. The benefits and costs for both transmission and distribution connected storage depend on specific locational parameters.

Appendix A. ASSESSED PROCUREMENT OPTIONS

Tolling Agreements

An energy storage tolling agreement procurement mechanism operates similarly to a standard tolling contract for traditional power plants.[14] Under this mechanism, a project owner is responsible for obtaining site control, permits, interconnection rights, equipment, construction contracts, and an agreeable operation date with the buyer of the system, often a utility. The utility pays for the electricity used to charge the battery storage system and receives the right to charge or discharge the system for energy, capacity, and ancillary services in the wholesale markets to maximize revenue. The project owner receives a fixed payment from the utility, often in the form of a capacity and variable O&M payment. A "partial tolling agreement" strikes a balance between utility-owned storage and a third-party owned project by allowing the project to "operate on a merchant basis" on most days in exchange for utility control on the most valuable days of the year.

Clean Peak Credit

Clean Peak Energy Credits provide incentives to clean energy technologies, including energy storage, for each megawatt-hour of energy generated during seasonal peaks.[15] Storage projects would receive a fixed level of compensation for discharging at pre-determined "peak hours."[16] Under this procurement mechanism, energy storage projects will sell their Clean Peak Credits (CPCs) to the state's energy agency or to obligated entities satisfying a clean peak portfolio requirement. In return, storage projects will receive the monetary equivalent of their credits based on a predetermined dollar amount ($/CPC * CPC).[17] Energy storage projects are required to serve an increasing portion of load during peak hours to capacity, energy, and ancillary service markets. Storage projects would also receive revenue from wholesale markets based on their services.

Upfront Incentives with Pay for Performance or Operational Requirements

Under a pay for performance mechanism, projects receive ongoing payments throughout their lifetime based on their ability to satisfy specified performance metrics. These metrics are often either based on the resource's ability to dispatch during critical hours, or based on the net system emissions impact that the resource's dispatch has on the grid. Pay for performance programs are often paired with an upfront incentive to help partially de-risk capital costs, which lowers financing costs. Transmission and distribution storage systems may have different performance criteria since they tend to provide disparate services to the grid.

[14] Renew Northeast, https://renewne.org/public-act-21-53-procurement-for-energy-storage/.
[15] NYSERDA, https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program.
[16] NYSERDA, https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program p.42.
[17] NYSERDA, https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program p.42.

Several states, including Connecticut, New Jersey, and California, have either proposed or implemented storage programs with pay for performance elements.

Index Storage Credit

An Index Storage Credit (ISC) mechanism seeks to establish certainty around a project's revenue stream by providing gap payments between a revenue requirement that a project developer deems necessary for economic viability and the achieved wholesale market revenue.

With an ISC mechanism, storage project developers submit "Strike Price" bids through a competitive solicitation process. These Strike Price bids should reflect the project's revenue requirement. Using one or more price indices, a "Reference Price" is calculated to indicate an approximation of available market revenue that projects could reasonably expect to earn. If the Reference Price is less than the Strike Price, meaning the available market revenue is less than the project needs to be economically viable, projects will get paid the difference. If the Reference Price is greater than the Strike Price, meaning available market revenue exceeds the project's minimum needs, the project will pay the difference to the program administrator (typically a utility or state entity)

March 25, 2024

By email to caroline.colan@maine.gov

Caroline Colan
Legislative Liaison and Energy Policy Analyst
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Subject: **Comments to Draft Assessment of Storage Procurement Mechanisms**

Ms. Colan:

Longroad Energy submits these comments in response to the "Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine" issued by the Governor's Energy Office (GEO) on March 12, 2024, seeking public input to inform the GEO's implementation of Section 2 of Public Law 2023, Chapter 374, *An Act Relating to Energy Storage and the State's Energy Goals*.

We appreciate this opportunity to provide feedback on the GEO's efforts and believe that transmission interconnected energy storage can provide meaningful benefits to Maine and the greater New England region by improving grid reliability, decreasing curtailment of renewable resources, and reducing greenhouse gas emissions.

The report evaluated four different incentive types against utility and jurisdictional/societal cost benefit tests:

- Pay For Performance (PFP) + upfront incentive
- Index Storage Credit
- Massachusetts Capacity Performance Standard (CPS)
- Tolling agreement

While the study concluded that a PFP type incentive with a fixed upfront incentive would be most effective for achieving Maine's goals, estimating a total benefits ratio of 3-5x with over one-third of the benefits attributable to Transmission and Distribution (T&D) deferral. We note that such benefits can be challenging to quantify unless examined as an alternative to new transmission or distribution build as part of formal study processes. Further, ISO-NE recently introduced specific tariff rules for evaluating storage as a transmission only asset (SATOA), including the prohibition on wholesale market participation and requirement for utility ownership.

The report lacks any specific recommendations for structuring a PFP program, including but not limited to the following considerations:

- how to appropriately size an upfront incentive to support a competitive market
- whether performance hours would be determined in advance (*ex ante*) or on a lookback (*ex post*) basis
- what minimum number of annual hours should qualify for performance payments

- whether payment rates would be fixed or varied, and how rates would be determined including total aggregate annual payments

PFP incentives like ERCOT's Performance Credit Mechanism are typically settled *ex post*. Under this structure, operators cannot have full visibility into which hours to dispatch in order to receive performance payments and thus market performance risk cannot be fully mitigated. In contrast, Massachusetts' CPS clearly defines the hours for which storage systems receive payment for dispatch, and as a result reduces market performance risks.

The effectiveness of any PFP program will depend significantly on how much revenue certainty is provided. A program that is weighted more heavily towards the upfront incentive would reduce risks for the development community by providing more revenue certainty, whereas a program weighted more heavily towards the performance component would increase developer risk, particularly if performance hours are determined *ex post*. Still, a PFP program could succeed if the range of possible outcomes were bounded. For instance, if projects were guaranteed a minimum performance incentive for achieving a minimum availability requirement (or minimum generation dispatch) during predetermined windows (e.g., MA CPS). Such a program might also provide incremental performance payments for dispatch during some top percentage of scarcity and/or carbon intensity events on an *ex ante* basis.

While a PFP program may be feasible depending on structure, Longroad encourages further consideration of a tolling structure, wherein projects receive a long-term, fixed-price incentive based on system capacity (i.e. $/kW-mo), which enables efficient project financing and would therefore likely provide Maine's customers with the lowest cost of storage resources.

Sincerely,

Charlie McClelland
Director, Transmission
Longroad Energy

cc (via email):
Matt Kearns, Chief Development Officer
Tom Siegel, VP, Transmission
Chad Allen, Director, Development

Colan, Caroline

From:	Eben Perkins <eperkins@competitive-energy.com>
Sent:	Tuesday, March 19, 2024 7:31 PM
To:	Colan, Caroline
Cc:	Andy Price; Matt Gamache
Subject:	RE: Energy Storage Opportunity for Public Comment
Attachments:	CES_Response to GEO RFI_Maine Energy Storage Procurement Design_20231208.pdf
Follow Up Flag:	Flag for follow up
Flag Status:	Flagged

Good evening, Caroline.

In response to question #2 in the opportunity for comment, we're resending our December comments which provide detailed responses to the first two parts of question #2. Please see below in red and attached. We'd be glad to discuss further with the GEO team upon request.

a. How should the GEO consider the allocation of up to 200 megawatts of incremental energy storage capacity, e.g. between energy storage systems connected to the transmission system or the distribution system?
CES recommends the GEO follows the procurement allocation detailed in our initial comments:

To achieve LD 1850's core goal of supporting cost-effective energy storage projects that maximize value for ratepayers, CES recommends the GEO designs the initial 200 MW storage solicitation with three categories: 1) up to 25 MWac of incremental behind-the-meter energy storage capacity, with a minimum system size of 4.99 MWac per location; 2) up to 100 MWac of incremental energy storage capacity located in the Portland Area, with a preference for storage systems located in the Elm Street and South Portland load pockets; and 3) at least 75 MWac of incremental front-of-the-meter energy storage capacity located in rural communities throughout Maine (i.e., towns with a population of 10,000 or less), with a preference for storage systems that are located on qualifying brownfield properties.

b. Comment on the interplay between such allocations, if any, and the objectives established for the program in P.L. 2023 ch. 374 §2.
See attached, we address each component of section 2 of L.D. 1850 in our initial comments.

c. Should any capacity be reserved for pilot programs or novel applications of commercially available technologies?
No. CES recommends the GEO focuses on commercialized lithium-ion technologies that can maximize near-term ratepayer benefits.

Eben Perkins, *Chief Strategy Officer*
207.838.1310 | eperkins@competitive-energy.com
competitive-energy.com

From: Maine Governor's Energy Office <geo@maine.gov>
Sent: Tuesday, March 12, 2024 12:26 PM

December 8, 2023

Caroline Colan
Legislative Liaison and Energy Policy Analyst
Maine Governor's Energy Office
62 State House Station
Augusta, Maine 04333

RE: REQUEST FOR INFORMATION REGARDING DEVELOPMENT OF THE MAINE ENERGY STORAGE PROGRAM PURSUANT TO P.L. 2023, CH 374 (LD 1850)

Dear Caroline,

Competitive Energy Services ("CES") appreciates the opportunity to respond to this Request for Information ("RFI"). LD 1850, *An Act Relating to Energy Storage and the State's Energy Goals*, directs the Governor's Energy Office ("GEO") to evaluate designs for a program to procure commercially available utility-scale energy storage systems connected to Maine's transmission and distribution systems. The law is a critical first step in building an energy storage market in Maine that helps advance our beneficial electrification efforts and that supports a more reliable, resilient grid for the future. It is key that the GEO designs this initial energy storage procurement to maximize value for ratepayers and to deploy storage technology in a way that reflects Maine's unique grid conditions. To achieve these goals, we cannot simply copy other states' approaches and templates for energy storage procurement. In the following sections we detail recommendations on how to fully leverage the value of the 200 MW of incremental energy storage capacity called for by LD 1850.

CES was founded in 2000 and is based in Portland, ME. Our mission is to help end users effectively navigate energy markets and policy to purchase and use energy in a way that meets their financial, operational, and sustainability goals. We have built our reputation over the last two decades on a foundation of trusted partnership with our clients, where our hard work, independence, and innovative thinking are essential to our customers' success. CES is proud to work with over 750 end users across 16 states and provinces, including the State of Maine, the University of Maine System, and many of Maine's largest municipal, commercial, and industrial energy users. We manage the strategic procurement of more than $2 billion of annual energy purchasing on behalf of our clients as well as offering a wide range of energy consulting services with a primary focus on developing and executing decarbonization strategies.

CES is not an energy storage developer. We do not finance or own energy storage assets. Our interest in LD 1850 and this RFI lies in "getting it right". Our Maine clients will ultimately pay for implementation of LD 1850 through stranded cost charges covering the net cost of the 200 MW of state-sponsored energy storage contracts. Therefore, our priority is that the energy storage procurement is structured in a way that best meets Maine's grid needs and maximizes value for Maine ratepayers both over the near term and the long term.

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We have four primary recommendations in designing the procurement for 200 MW of incremental utility-scale energy storage capacity called for by LD 1850:

First, LD 1850 has a clear directive to identify cost-effective energy storage projects that maximize value for ratepayers. To achieve this goal, a significant share of the 200 MW must be deployed in areas of Maine's transmission system where incremental storage capacity can help defer near-term capacity expansion needs driven by beneficial electrification. Examining CMP's and Versant's systems, the Portland Area is the next frontier of major load-driven transmission investment in Maine. There should be a primary focus on developing significant new storage capacity in this area. We recommend that the GEO not focus on renewable energy curtailment mitigation as a primary deployment objective. This issue requires transmission expansion to be resolved; focusing these initial energy storage projects on mitigating generation curtailment in rural areas would be a wasted band-aid for this problem and would dilute the benefits delivered to ratepayers. Further, in the near term, mitigating generation congestion will act to increase the locational marginal electricity prices ("LMPs") in Maine's load zone, while reducing LMPs in the rest of New England. We do not believe that the legislature had this outcome in mind when it passed LD 1850.

Second, LD 1850 explicitly calls for developing incremental energy storage capacity located in Maine. The legislation is clearly seeking project additionality, meaning that the program must target new energy storage projects that would not be developed but for the award of a contract through the procurement program. Energy storage projects that have acquired a capacity supply obligation through ISO New England's forward capacity market and active projects co-located with generation enrolled in net energy billing should not be eligible to participate in the 200 MW solicitation. These projects do not offer incremental storage capacity.

Third, the term "utility-scale" is not defined in LD 1850 or elsewhere in Maine law. In the RFI, the GEO states that it interprets the term utility-scale energy storage to mean energy storage resources connected in front of the meter. We respectfully disagree and ask that the GEO consider large-scale behind-the-meter energy storage project opportunities, which offer greater ratepayer benefits than front-of-the-meter projects.

Fourth, LD 1850 seeks energy storage projects that maximize the value of federal incentives. This objective can be achieved by giving preference to storage projects that are sited on qualifying brownfield properties, which may produce the energy community bonus adder for the investment tax credit available to the project.

To achieve LD 1850's core goal of supporting cost-effective energy storage projects that maximize value for ratepayers, CES recommends the GEO designs the initial 200 MW storage solicitation with three categories: 1) up to 25 MW_{ac} of incremental behind-the-meter energy storage capacity, with a minimum system size of 4.99 MW_{ac} per location; 2) up to 100 MW_{ac} of incremental energy storage capacity located in the Portland Area, with a preference for storage systems located in the Elm Street and South Portland load pockets; and 3) at least 75 MW_{ac} of incremental front-of-the-meter energy storage capacity located in rural communities throughout Maine (i.e., towns with a population of 10,000 or less), with a preference for storage systems that are located on qualifying brownfield properties.

CES is available to discuss these recommendations and our comments upon request. I can be reached by phone at 207-838-1310 or by e-mail at eperkins@competitive-energy.com.

Eben Perkins
Chief Strategy Officer

LD 1850 Objective #1: Developing Incremental Energy Storage Capacity

LD 1850 states "in evaluating programs for the procurement of energy storage systems, the office (i.e., the GEO) shall consider programs that are likely to be cost-effective for ratepayers and that are likely to achieve the following objectives: A) Advance both the State's climate and clean energy goals and the state energy storage policy goals established in Title 35-A, section 3145 through the development of up to 200 megawatts of incremental energy storage capacity located in the State; B) Provide one or more net benefits to the electric grid and to ratepayers, including, but not limited to, improved reliability, improved resiliency and incremental delivery of renewable electricity to customers; C) Maximize the value of federal incentives; and D) Enable the highest value energy storage projects, specifically energy storage systems in preferred locations, projects that can serve as an alternative to upgrades of the existing transmission system and projects of optimal duration."

The first objective, to develop up to 200 MW of incremental energy storage capacity in Maine, clearly aims to enable new energy storage projects in the state that would not exist but for the procurement program. The GEO's March 2022 Energy Storage Market Assessment identified roughly 50 MW of operational storage projects and 225 MW of "planned" projects in Maine. ISO New England's current interconnection queue identifies significant additional operational or planned battery capacity. As shown in Attachment 1, there are over 800 MW of operational and planned standalone energy storage systems in Maine and additional planned battery systems that will be co-located with solar PV, hydro, or wind generation across the state.

As shown in Figure 1, there are 235 MW of battery storage systems in Maine that hold a capacity supply obligation ("CSO") as of ISO New England's Forward Capacity Auction #17 ("FCA17"). Detailed results of FCA17 are provided in Attachment 2. ISO New England held FCA17 in March 2023, which established CSOs for over 31,000 MW of power supply resources across New England from June 2026 to May 2027. The battery projects in Figure 1 must be available to deliver power to the grid during this commitment period or must transfer their CSOs for this 12-month period to other resources through the reconfiguration auction process; otherwise, the projects are subject to financial penalties during pay-for-performance events.

Figure 1. Energy Storage Projects in Maine with Capacity Supply Obligations

ID	Name	Status	Lead Participant Name	Summer Qual (MW)	Winter Qual (MW)
40653	Madison BESS	Existing	Madison ESS, LLC	4.95	4.95
40919	Resource Cross Town	Existing	Energy Storage Resources, LLC	175	175
41566	Great Lakes Millinocket	Existing	Brookfield Renewable Trading A	20	20
44335	Bonny Eagle Renewable BES	Existing	Brookfield White Pine Hydro LL	7.794	7.794
40905	Rumford BESS	New	New England Battery Storage, L	4.99	4.99
44331	Rumford Renewable BES	New	Brookfield Renewable Trading A	8	6.926
44583	Sanford BESS (#40885)	New	New England Battery Storage, L	4.99	4.99
44585	South Portland BESS (#40912)	New	New England Battery Storage, L	10	10

To ensure the storage procurement program enables incremental energy storage capacity being developed in Maine, the battery projects in Figure 1 that have been awarded CSOs as of FCA17 should not be eligible to participate in the 200 MW solicitation. In a similar vein, battery storage capacity that is actively being developed and co-located with generation projects enrolled in Maine's net energy billing program should not be eligible to participate in the procurement. These storage projects are being developed due to the financial incentives offered by net energy billing, and do not offer the project additionality that LD 1850 is seeking.

LD 1850 Objective #2: Delivering Net Benefits to the Electric Grid and to Ratepayers

The legislation's second objective for the storage procurement program is to provide one or more net benefits to the electric grid and to ratepayers, including, but not limited to, improved reliability, improved resiliency, and incremental delivery of renewable electricity to customers. To meet this goal, it is necessary to examine and compare the different values that energy storage applications can provide. These vary depending on how a storage system is configured and interconnected to the grid, where the system is located in Maine, and how the system is operated once it is in place.

We are concerned that the GEO plans to exclude large-scale behind-the-meter storage opportunities from consideration. By large-scale, we mean battery systems with nameplate power capacity of at least 4.99 MW_{ac} that could be installed at large distribution customer, sub-transmission customer, or transmission-level customer facilities. In the RFI, the GEO states that it interprets the term utility-scale energy storage to mean energy storage resources connected in front of the meter. Applying this same definition to generation facilities would mean that ND Paper's 80 MW cogeneration plant in Rumford would fall in the same category as a 5-kilowatt rooftop solar PV system at our home.

LD 1850 calls for the procurement of commercially available utility-scale energy storage systems connected to Maine's transmission and distribution systems. The law is silent on how these utility-scale systems can be configured for interconnection.[1] Seeing as the term utility-scale is not defined in Maine law, it is important to recognize that there are varying definitions of utility-scale used across the industry and government. For example, the U.S. Energy Information Administration and the Solar Energy Industries Association define utility-scale generation as resources greater than 1 MW.[2][3] The National Renewable Energy Laboratory considers utility-scale projects to be over 5 MW, while the U.S. Department of Energy defines utility-scale projects using a 10 MW threshold. [4][5]

All these definitions refer to minimum system sizing, not to whether a resource is interconnected behind-the-meter at a customer's facility or in front of the meter directly to a utility's distribution or transmission system. The Maine legislature, like these entities, clearly understood that whether battery storage is located behind or in front of a retail meter, it provides the same benefits to the electric grid. The flow of electricity is determined by physics; the physical location of a meter is determined by electric utility tariffs. We strongly recommend the GEO takes a similar approach in interpreting utility-scale storage.

The GEO should include a pathway for large-scale behind-the-meter storage projects to participate in the initial 200 MW solicitation because 1) these projects provide clear, easy-to-report ratepayer benefits by enabling direct reductions in the host customer's transmission, capacity, and market energy costs for grid electricity purchases and 2) large customers may be able to bid in lower strike pricing than front-of-the-meter projects because behind-the-meter storage operations can realize financial benefits from use cases that reduce

[1] In a similar vein, Maine's goal for energy storage development is at least 300 megawatts of installed capacity by December 31, 2025 and at least 400 megawatts of installed capacity by December 31, 2030. This goal makes no distinction between front-of-the-meter and behind-the-meter storge systems; all energy storage resources located in Maine can contribute towards meeting these installed capacity targets.

[2] https://www.seia.org/initiatives/utility-scale-solar-power

[3] https://www.eia.gov/tools/faqs/faq.php?id=427&t=8

[4] https://energy.lbl.gov/publications/system-level-performance-and

[5] https://www.energy.gov/scep/slsc/renewable-energy-utility-scale-policies-and-programs

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retail supply and delivery costs and direct participation in ISO New England's various markets. This potential value stacking is not available to front-of-the-meter storage projects. The additional value streams available for a large-scale behind-the-meter battery system may enable a large CMP or Versant customer to require less "missing money" from a state-sponsored storage contract awarded in the GEO's procurement. The level of missing money will dictate the stranded costs for other ratepayers over the life of the storage contract. Based on LD 1850's clear directive to find cost-effective energy storage opportunities through the procurement program, it would be a mistake to exclude behind-the-meter battery systems from consideration at the outset of the program.

Another added benefit offered by behind-the-meter storage projects is that operations will better target load reduction during the local utility's coincident peak loads throughout the year. If a battery system is installed behind-the-meter, the customer has a strong financial incentive to discharge during the local utility's peak monthly load hour to generate transmission savings for the customer (and for the utility). This is a notably different operating dynamic than front-of-the-meter energy storage systems where there are no transmission-related savings. Such installations will only be focused on ISO New England market signals and use cases. During a period in which capacity market values are suppressed, which dilutes ratepayer benefits from front-of-the-meter storage deployment, maximizing ratepayer savings through these behind-the-meter value streams is most important.

We recommend the storage procurement program includes an option for up to 25 MW_{ac} of incremental behind-the-meter energy storage capacity, with a minimum system size of 4.99 MW_{ac} per location. If bid pricing received is not competitive with front-of-the-meter storage offers, then the GEO could choose not to award in this category. Behind-the-meter energy storage projects should be required to meet the same additionality requirements as front-of-the-meter projects.

In designing the storage procurement, the GEO needs to carefully considers what it means for energy storage systems to enable "incremental delivery of renewable electricity to customers." We expect renewable energy generation owners will interpret this requirement from LD 1850 to mean energy storage resources in Western, Northern, or Eastern Maine should be targeted and operated to soak up and store excess renewable generation that would otherwise be curtailed during select hours of the year, and to later deliver this renewable energy to the grid when the delivery constraints no longer exist.

We believe that this is a too narrow interpretation of the environmental benefits of storage and is a highly inefficient use of ratepayer investment in energy storage technology in the near term. Instead, the criteria for incremental delivery of renewable electricity should focus on whether operations of an energy storage system can reduce greenhouse gas emissions from marginal combustion sources in ISO New England's generation fleet. This is the template of Massachusetts' Clean Peak Energy Standard. Under this approach, storage systems across Maine can be operated to charge from the grid when renewable generation levels are higher in the supply mix (i.e., overnight and during midday hours) and to discharge during higher-demand periods (i.e., weekday evenings) to reduce higher marginal emissions in the supply mix.

In considering whether energy storage can mitigate renewable generation curtailment across rural swaths of Maine, it is necessary to evaluate 1) whether storage resources can be effectively operated to actually perform this function if the system is not directly co-located with the generation being curtailed and 2) what the net financial benefit of mitigating curtailment is for ratepayers. Understanding this financial benefit requires

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assessing the cost of increasing LMPs in Maine through curtailment mitigation. As shown in Attachment 3, which presents hourly LMPs in Maine over the last five years, the Maine load zone has seen roughly 200 hours of negative Maine zonal LMPs. These hours only covered 0.5% of the total period while producing nearly $3 million in value for ratepayers due to negative LMPs. As noted earlier, reducing congestion has the near-term effect of increasing LMP prices for ratepayers in the constrained zone.

This is not to say that negative LMPs are a good thing for Maine over the long term. As the PUC directs CMP and Versant to execute more renewable energy purchasing contracts over time, these new projects will need to be operated in a way where ratepayers do not see increasing costs due to projects generating during negative LMP events. The key takeaway here is that this problem of excess renewable generation will ultimately need to be solved by additional transmission build out to resolve bottlenecks on the grid, not by using energy storage as a band aid. The proposed Northern Maine Transmission project is an example of the need for such transmission build-out.

The key opportunity for the storage procurement to deliver benefits to Maine ratepayers is the deferral of utility investment in future transmission upgrades. The Boothbay Non Transmission Alternative ("NTA") Pilot Project demonstrated there is significant potential value by deferring transmission upgrade needs across CMP's and Versant's service territories through targeted load management measures such as energy storage. In the coming sections, we offer a detailed recommendation on how to maximize deferral value through the initial 200 MW. To put this recommendation into context, we need to first examine and understand the current regulatory framework for allowing energy storage technology to be used for this purpose.

On October 19, 2023, the Federal Energy Regulatory Commission ("FERC") accepted revisions to ISO New England's Transmission, Markets, and Services Tariff to allow energy storage to be regulated transmission assets. A copy of FERC's order is included in Attachment 4. The cost of these Storage as Transmission-Only Assets ("SATOAs") can be socialized regionally and treated as Pool Transmission Facilities ("PTF"). While the creation of the SATOA option is a positive and long overdue step towards fully leveraging the value of energy storage for ratepayers, ISO New England's tariff provisions have significant shortcomings that restrict how SATOAs can be used. The ISO has intentionally turned a Swiss army knife into a butter knife.

First, SATOAs are not allowed to participate in ISO New England's markets. Since these storage systems would likely be discharged during high-demand periods that drive the underlying transmission reliability need, the systems also offer significant capacity value that would need to be procured through the forward capacity market. Despite this overlapping benefit, SATOAs have essentially been barred from market participation, requiring redundant generation capacity to be procured and paid for through the forward capacity market.

Second, ISO New England has put in place highly restrictive conditions for siting SATOAs. The ISO requires that SATOAs be directly interconnected to the grid at 115 kV or 345 kV, has imposed a 30 MW deployment limit per substation, and has imposed a 300 MW aggregate limit for SATOAs in New England. These restrictions prevent storage systems interconnected behind large customer loads and to networked 34.5 kV systems, like that of the Portland Area, even though discharging these resources within a load pocket would produce the same load relief as an energy storage system connected to the local high-voltage system.

Third, ISO New England has significantly limited what types of grid contingencies a SATOA can address. SATOAs are only allowed to resolve post-second contingency (N-1-1) thermal issues; ISO prohibits a SATOA from being used to address first contingency (N-1) or maintenance outage needs. Furthermore, multiple SATOAs cannot be selected to address a single system need or multiple needs in the same area due to contingencies involving the same or similarly situated elements. In other words, SATOAs cannot be used to kill multiple birds with one stone. In a networked transmission system like that of the Portland Area, these restrictions significantly undermine the usefulness of energy storage for supporting transmission reliability.

While these shortcomings are disappointing, they are not surprising. To be accepted by the ISO's Participants Committee, the SATOA option had to be watered down and weakened to gain approval from transmission owners and incumbent generators. What we are left with is a flawed tool for grid planning and operations, which, as Advanced Energy United succinctly put it in its comments to FERC, prohibits the dual use of storage to meet transmission and market needs that would ensure optimal value in return for investment while maximizing beneficial deployment of storage resources. The limitations of SATOAs makes it even more important that the GEO structures its storage procurement to 1) strategically deploy the initial 200 MW in areas of Maine that have upcoming transmission investment needs and 2) allow energy storage operations to fully maximize ISO New England market value and transmission deferral value. Given the current regulatory and market structures, this can best be accomplished through behind-the-meter installations.

LD 1850 Objective #3: Maximizing Federal Incentive Value

The legislation's third objective for the storage procurement program is to maximize the value of federal incentives. This goal is important, because higher levels of federal financial support for energy storage projects could produce lower bid pricing and ultimately lower stranded costs for ratepayers. To support this objective, the GEO can include selection criteria for a portion of the 200 MW procurement that focuses on supporting projects that maximize the value of the federal investment tax credit ("ITC") or the clean electricity investment credit ("CEIC"). To this end, we recommend focusing on the energy community bonus adder created by the Inflation Reduction Act of 2022 (the "IRA").

The ITC/CEIC credit rate can be increased by 10% above the base 30% credit rate for energy storage projects, assuming prevailing wage and apprenticeship requirements are fulfilled during construction, if a project meets certain domestic content sourcing. On May 12, 2023, the IRS issued Notice 2023-38, which provides initial guidance on these requirements. The IRS' domestic content criteria is satisfied if a taxpayer meets two conditions in equipment sourcing: 1) the steel and iron requirement and 2) the manufactured product requirement. To fulfill the first requirement, 100% of construction materials that are structural in nature and are comprised of iron or steel must have all steel and iron manufacturing processes take place in the United States, except metallurgical processes involving refinement of steel additives. To fulfill the second requirement, a specified percentage of manufactured products (measured in product cost) that are components of the energy storage system must be produced in the U.S.[6]

The ITC/CEIC credit rate can be increased by an additional 10%, for a maximum credit rate of 50% of installed system cost, if an energy storage project is sited in an energy community. On April 4, 2023, the IRS issued Notice 2023-29, which provides initial guidance for projects seeking the energy community bonus adder. An energy community must meet at least one of the following conditions: (i) a brownfield site, (ii) a metropolitan or non-metropolitan statistical area which has, or had any time during the period beginning in 2010, 0.17% or more direct employment or 25% or more local tax revenues, in either case related to the

[6] The applicable adjusted percentages of domestic content for manufactured products increase over time: 40% for projects that begin construction prior to January 1, 2025; 45% for projects that begin construction during 2025; 50% for projects that begin construction during 2026; and 55% for projects that begin construction after December 31, 2026.

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extraction, processing, transport, or storage of coal, oil or natural gas, or has an unemployment rate above the national average for the previous year, or (iii) a census tract, or a census tract that is adjoining to, in which a coal mine has closed after 1999 or a coal-fired electric generating unit was retired after 2009. The U.S. Department of Energy has created an online mapping tool the presents energy communities around the country.[7] According to the mapping tool, there are no municipalities in Maine that qualify as an energy community under the (ii) and (iii) clauses of the above definition. Therefore, storage projects would need to be located on a qualifying brownfield property in Maine to qualify for energy community bonus adder.

We recommend the GEO not include domestic content as a selection criterion for the 200 MW procurement. While meeting the IRS' domestic content requirements would increase the value of federal incentives available for a battery project, the current battery storage supply chain makes it very difficult to cost effectively achieve the IRS' requirements for domestic content. In contrast, siting a battery project on a qualifying brownfield property can potentially maximize federal incentives, while also providing local tax revenues and a productive use of property that likely would not be developed or otherwise reused.

LD 1850 Objective #4: Enabling the Highest Value Energy Storage Projects

The legislation's fourth objective for the storage procurement program is to enable the highest value energy storage projects, specifically energy storage systems in preferred locations, projects that can serve as an alternative to upgrades of the existing transmission system, and projects of optimal duration. To achieve this goal, the GEO needs to consider where CMP and Versant have upcoming transmission investment needs. Looking out over the next decade, these investment needs will be driven by 1) where the utilities have recently upgraded capacity in their Local Network Service and/or Regional Network Service infrastructure and 2) where load growth from beneficial electrification is likely to occur sooner and fastest. Considering these two factors, we believe that the Portland Area is where we need targeted, proactive energy storage development. Strategically deploying a significant portion of the 200 MW from the forthcoming storage solicitation in the Portland Area is the best way to achieve this objective required by LD 1850.

We expect the Portland Area to be at the leading edge of beneficial electrification due to municipal policies that seek accelerated emissions reductions. In May 2020, the Cities of Portland and South Portland released a joint climate action and adaptation plan titled *One Climate Future: Charting a Course for Portland and South Portland.*[8] Developed through a multi-year community engagement and study effort, the plan includes four core elements: buildings and energy use, transportation and land use, waste reduction, and climate resiliency. Beneficial electrification is at the heart of *One Climate Future*; the plan sets a goal for Portland and South Portland to run all municipal operations on 100% renewable energy by 2040 and to "power everything possible with electricity— including cars, buses, ferries, as well as building heating systems."

The Portland Area is Maine's most populous region and a key center of economic activity for the state, so the success of the Portland Area's beneficial electrification efforts is critical to helping Maine meet its greenhouse gas reduction goals. In 2019, Governor Mills signed legislation that increased Maine's renewable portfolio standard to 80% by 2030 and set a goal of 100% by 2050. This policy and the state-sponsored renewable energy procurements that have followed are expected to produce significant progress in decarbonizing the State's electricity supply, delivering one pillar of beneficial electrification. For the other pillar of beneficial

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[7] https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a2ce47d4721a477a8701bd0e08495e1d

[8] A copy of *One Climate Future*, the cities' progress reporting, and other associated materials and resources are available online at: https://www.oneclimatefuture.org/

electrification, transitioning heating and transportation systems to electric sources, residents and businesses will need to invest in electrification conversions at an increased pace over the next decade and will need to know that CMP's grid serving the Portland Area can provide a reliable, resilient platform that supports and enables electric load growth in the region.

Electrically, the Portland Area is defined as that portion of CMP's 115 kV and 34.5 kV electric transmission system that supplies the cities and towns of Portland, Cape Elizabeth, Cumberland, Falmouth, Gorham, Westbrook, Yarmouth, North Yarmouth, Freeport, and Gray. This region includes over 200,000 residents, 15% of Maine's total population. The backbone 115 kV network that supports the Portland Area is fed by three 345 kV sources that are part of New England's bulk power system. The Portland Area includes over 30 distribution substations and has a peak load over 400 MW, roughly 25% of CMP's annual peak demand across its service territory covering southern, central, and western Maine, and fully 20% of the peak load of the entire State of Maine.

CMP has long maintained that major transmission upgrades are needed in the Portland Area to support grid reliability. Starting in 2008 with its proposal for the Maine Power Reliability Program ("MPRP")[9], CMP has sought to make significant transmission capacity upgrades in the Portland Area, including a new 115 kV line serving Downtown Portland and adding a redundant feed to the radial sub-transmission line that currently serves Freeport. In 2010, the Commission approved the MPRP but excluded CMP's proposed upgrades in the Portland Area to further evaluate whether non-wires alternatives ("NWAs") could meet CMP's reliability concerns at a lower cost than a traditional transmission upgrade.

Over the last decade, CMP has completed a series of follow up studies of the Portland Area.[10] In 2018, CMP recommended over $200 million in transmission investment for the Portland Area, concluding that NWAs alone could not be developed cost effectively at the scale needed to address the company's reliability concerns. As this capital investment is recovered over 40 years by CMP, the total revenue requirement of the transmission upgrades would approach $1 billion, with an estimated 50% of the total covered by electric ratepayers in Maine.[11] While CMP's transmission upgrade plan for the Portland Area lies dormant at present, the need for reliability upgrades has not changed and, in fact, will become more acute as load grows due to beneficial electrification. Make no mistake – a proposal from CMP for expensive grid upgrades in the Portland Area will come back to the Public Utilities Commission for consideration.

CES proposes that we fully leverage the opportunity afforded by LD 1850 to proactively defer these upcoming investment needs in the Portland Area. To do so, the storage program could include a target of up to 100 MW_{ac} of incremental energy storage capacity located in the Portland Area, with a preference for systems located in the Portland Area's Elm Street load pocket and South Portland load pocket. Storage deployment needs to be targeted in these load pockets due to the configuration of CMP's 115 kV and 34.5 kV networks and the varying impact grid contingencies have throughout the networked system. In other words,

[9] The $1.4 billion MPRP was the largest transmission project in Maine's history, with approximately 350 miles of new high voltage transmission lines and five new substations.

[10] These studies are available in Docket Number 2011-00138. In May 2011, CMP finalized the MPRP Portland Area NTA Analysis. In May 2015, CMP completed the 2015 Portland Area Needs Assessment. In February 2018, CMP completed the Portland Area Analysis Solutions Assessment.

[11] CMP's proposed transmission investment includes Pool Transmission Facility ("PTF") components that would be regionally socialized and Non-PTF components that would be recovered from CMP ratepayers.

the value of energy storage is not equal in the Portland Area. For example, Plus Power's proposed 175 MW_{ac} battery system that would be interconnected to CMP's Moshers 115 kV substation in Gorham is not in the right location to directly address the core reliability issues driving CMP's $200+ million investment plan.

To be able to deliver energy into the Elm Street load pocket, a battery system would need to be interconnected to one of the following CMP substations: Lambert Street (34.5 kV/12.5 kV), Falmouth (34.5 kV/12.5 kV), East Deering (34.5 kV/12.5 kV), Elm Street (115 kV/34.5 kV and 115 kV/12.5 kV), Gray (34.5 kV/12.5 kV), Freeport (34.5 kV/12.5 kV), or Wyman (34.5 kV Section 198 feed to Elm Street).

To be able to deliver energy into the South Portland load pocket, a battery system would need to be interconnected to one of the following CMP substations: Highland (115 kV/12.5 kV), Pleasant Hill (115 kV/34.5 kV and 115 kV/12.5 kV), Cape (115 kV/34.5 kV), Cape Elizabeth (34.5 kV/12.5 kV), Red Brook (34.5 kV/12.5 kV), Rigby (34.5 kV/12.5 kV), or the Tank Farm (34.5 kV).

Recommended Next Steps

To achieve LD 1850's core goal of supporting cost-effective energy storage projects that maximize value for ratepayers, CES recommends the GEO designs the initial 200 MW storage solicitation with three categories: 1) up to 25 MW_{ac} of incremental behind-the-meter energy storage capacity, with a minimum system size of 4.99 MW_{ac} per location; 2) up to 100 MW_{ac} of incremental energy storage capacity located in the Portland Area, with a preference for systems located in the Elm Street and South Portland load pockets; and 3) at least 75 MW_{ac} of incremental front-of-the-meter energy storage capacity located in rural communities throughout Maine (i.e., towns with a population of 10,000 or less), with a preference for storage systems that are located on qualifying brownfield properties.

These three categories will enable the procurement of a variety of energy storage projects across Maine that meet the four procurement objectives set forth in LD 1850. If the GEO does not receive sufficient proposals to meet the 25 MW or 100 MW procurements targets in the first two program categories, additional storage capacity can be awarded in the third procurement category to support more than 75 MW_{ac} of energy storage projects located in rural communities throughout the state.

A key component of designing the procurement program is to clarify the duration requirements for participating storage projects. Duration refers to a storage system's energy capacity and the period over which a system can be discharged to deliver power to the grid or host customer. Since a system's energy capacity drives installed cost, this is an issue that needs to be thoughtfully considered to maximize the value and usefulness of deployed storage projects while minimizing stranded costs for ratepayers. We recommend the GEO not impose a single uniform design specification for all storage projects that participate in the solicitation. Project developers should be given flexibility to design and offer storage projects that they believe will meet the GEO's various objectives for operations and value for ratepayers. That being said, there should be a set of guardrails established for storage system specifications and proposed duration. Specifically, participating storage projects should have a nameplate energy capacity that offers between four and six hours of discharge at the system's evaluated power capacity. While ISO New England currently measures an energy storage system's power capacity over two hours for the purposes of establishing CSOs, this duration measure is expected to increase as the ISO works through its current capacity accreditation process. To enable transmission investment deferral, we expect battery systems will need to have between four and six hours of discharge duration.

Another key component of the procurement program is the structure of awarded contracts. LD 1850 does not dictate the procurement program design and contracting structure that the GEO must use, but rather requires that contracts be cost effective. The legislation requires the GEO to consider an index storage credit mechanism. This is defined as "a mechanism for setting contract prices for energy storage capacity using the difference between a competitively bid price, or strike price, and daily reference prices calculated using an index designed to approximate wholesale market revenues available for each megawatt-hour of capacity and including a mechanism to provide for a net payment from the operator of the storage capacity project to ratepayers in the event the reference price exceeds the strike price."

CES has reviewed New York's Energy Storage Roadmap, which appears to be the origin of the index credit mechanism concept. This mechanism is unnecessarily complex and will be time-consuming and costly to implement and manage. We recommend using a simpler capacity-based contract structure with pay-for-performance terms. A capacity-based contract could be structured to require the project owner to maximize wholesale market value from storage system operations, and this value could be returned to ratepayers as the index storage credit mechanism aims to do by designating an appropriate lead market participant. We do not see the need for a daily reference price construct to be used, this significantly complicates administration of the contract and creates room for potential mistakes.

CES would be glad to discuss this approach with the GEO in more detail upon request.

148 Middle Street - Portland, ME | 207.772.6190 | competitive-energy.com

SUBMITTED ELECTRONICALLY

March 25, 2024

Ms. Caroline Colan
Maine Governor's Energy Office
caroline.colan@maine.gov

Re: Comments by Clean Energy States Alliance (CESA) Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine; Maine Energy Storage Program Development Pursuant to P.L. 2023, ch. 374

Dear Ms. Colan:

The Clean Energy States Alliance (CESA) is pleased to submit these comments to the Maine Governor's Energy Office (GEO) in response to Maine's Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine.

Founded in 2002, CESA is a leading US coalition of state energy organizations working together to advance the rapid expansion of clean energy technologies and bring the benefits of clean energy to all. CESA is a national, member-supported nonprofit that works with its members to develop and implement effective clean energy policies and programs. It should be noted that these comments are submitted by CESA staff and do not necessarily reflect the views and opinions of CESA's members or its funders.

Regarding Question 1, "Comment on the attached Draft Assessment of Storage Procurement Mechanisms and Cost effectiveness in Maine prepared by Synapse Energy Economics and Sustainable Energy Advantage, LLC dated March 12, 2024. Comments regarding the methodology, assumptions, and implications for program design are encouraged," we submit the following comments:

CESA agrees with the Maine GEO Project Team's recommendation of "a storage incentive structure utilizing a fixed up-front incentive paired with a performance payment based on dispatch in critical hours." The up-front incentive will help energy storage developers to manage the capital costs of building new projects, while the performance payment (or requirement) will ensure that storage installed under this procurement program is operated in such a manner as to provide grid services supportive of Maine's climate and clean energy policy goals.

CESA also applauds the Maine GEO for assessing cost-effectiveness of energy storage resources using both the Utility Cost Test (UCT) and a jurisdictional societal cost test (SCT). The use of the SCT is particularly important because it shows the value of societal benefits, such as reduced greenhouse gas (GHG) emission impacts, that may not be captured in the UCT and may not be monetizable by energy storage owners. These non-monetizable benefits are nonetheless valuable and can help provide the basis for incentive rate setting.

CESA would encourage the Maine GEO to additionally consider the societal benefits of non-GHG air emission reductions that may be achieved if energy storage capacity is procured with the intent of displacing fossil fuel peaker plant capacity. There are several aging gas peakers in Maine that should retire soon; replacing these with energy storage will significantly reduce production of nitrogen oxides, sulfur oxides and fine particulates, which cause both environmental and human health damage. Because peaker plants are often located close to densely populated areas, these benefits can be substantial.

In addition, because low-income and historically underserved communities are often overburdened with polluting resources like fossil fuel peakers, replacing these aging, inefficient peaker plants with clean battery storage provides additional equity benefits. The value of these environmental, human health and equity benefits is significant and should be considered in Maine's application of the SCT. Please refer to CESA's report titled "Energy Storage Procurement for Peaker Replacement in Maine" for more information on the importance and value of these peaker-replacement benefits. This report was submitted to the GEO on February 9, 2024, as stakeholder input.

Regarding Question 2, "P.L. 2023 ch. 374 §2 sub-§1 (A) states in part that the energy storage program must be likely to achieve "the development of up to 200 megawatts of incremental energy storage capacity." a. How should the GEO consider the allocation of up to 200 megawatts of incremental energy storage capacity, e.g. between energy storage systems connected to the transmission system or the distribution system? b. Comment on the interplay between such allocations, if any, and the objectives established for the program in P.L. 2023 ch. 374 §2. c. Should any capacity be reserved for pilot programs or novel applications of commercially available technologies?", we submit the following comments:

Regarding the allocation of 200 MW of procured energy storage capacity between transmission-connected vs. distribution-connected systems, CESA notes that it is generally better to support a diverse energy storage market, meaning both transmission- and distribution-connected systems should be procured. While it may seem that larger, transmission-connected systems are more cost-effective, we note that distribution-connected systems may offer a larger range of locationally-determined benefits because they are sited closer to load. Some of these locational benefits may not be monetizable in existing markets – for example, resilience and emissions-reduction benefits to the surrounding community; however, such non-monetizable benefits should still be considered when assessing the costs and benefits of distribution-connected systems. This is especially true when Maine's program objectives can be achieved by distribution-connected energy storage systems.

Regarding the question of reserving capacity for pilot programs or novel applications, CESA suggests the following:

1. As mentioned above, Maine has a very good current opportunity to procure battery storage capacity to replace aged, soon-to-retire, gas peaker plants. This can be economically achieved with commercially available lithium-ion battery systems, as shown in CESA's analysis and report referenced above. Therefore, CESA encourages Maine GEO to consider devoting a significant portion of the upcoming 200 MW procurement program to this application.
2. In the future, longer duration energy storage systems will be needed to support the advancement of state decarbonization goals. Currently, Maine has statutory greenhouse emissions reduction targets requiring a 45 percent reduction in carbon emissions below 1990 levels by 2030, at least 80 percent reductions by 2050, and carbon neutrality by 2045. Sandia National Laboratories is currently seeking state partners for long duration and non-lithium energy storage demonstration projects, a program in which CESA is a partner. CESA encourages Maine GEO to consider opportunities to leverage federal support for a long duration, non-lithium energy storage demonstration project. Such a project would require reserving only a small fraction of the 200 MW procurement target and would help to inform future advances in energy storage for longer-duration applications in Maine.

Conclusion

Overall, CESA supports the findings and recommendations of the Maine GEO's project team, including the following:

- Up to 200 MW of storage in Maine is likely to be cost-effective for ratepayers, from both utility ratepayer and societal perspectives
- Both transmission and distribution-connected resources can be cost-effective
- A procurement program should include a competitive solicitation overseen by a neutral third party
- Storage incentives should include both an upfront incentive and a performance incentive and/or requirement that allows for storage dispatch during critical periods that best achieve ratepayer value
- A procurement program should include ongoing review and evaluation of actual program performance and impacts

CESA commends the Maine GEO on its work in developing this Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine. CESA will be happy to discuss or answer questions about these comments with Maine GEO upon request.

Respectfully submitted,

Todd Olinsky-Paul
Senior Project Director
Clean Energy States Alliance

CENTRAL MAINE POWER COMPANY
Comments Regarding Draft Assessment of
Storage Procurement Mechanisms and Cost-Effectiveness in Maine

I. INTRODUCTION

Central Maine Power Company ("CMP" or the "Company") thanks the Governor's Energy Office (the "GEO") for this opportunity to offer comments regarding the Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine (the "Draft Assessment") to assist the GEO in its ongoing evaluation of project designs and key program objectives. As, CMP serves as the Transmission Owner, Operator and Reliability Coordinator for the state of Maine working with the Independent System Operator of New England ("ISO-NE)", the Company takes great interest and responsibility in ensuring that investments on the grid are utilized to operate the grid efficiently, safely, and in the manner that best interests CMP customers. Utility control of battery storage systems is crucial for advancing those goals. Below, CMP comments on some of the questions raised by the GEO in the Draft Assessment, but notes that the Maine Public Utilities Commission ("MPUC" or the "Commission") Report on Utility Control or Ownership of Energy Storage (the "MPUC Report") in Docket No. 2023-00316 also provides further summary of CMP comments on this issue. In the MPUC Report, the Commission summarized that there are benefits to utility ownership and control in situations where the investment is prudent, the least-cost alternative for serving a distribution need and would benefit ratepayers. (Report at 16). For the reasons addressed in the MPUC Report, CMP advocates that the GEO consider whether certain utility owned procurement mechanisms should also be evaluated for the project.

II. CMP COMMENTS

a. Utility Coordination and Visibility

CMP appreciates the GEO's recognition in its' Draft Assessment of the need for utility dispatch control in the selected Upfront Incentive procurement mechanism. CMP's first priority and obligation is ensuring proper mechanisms are in place for centralized utility control, visibility, and management of storage assets to maintain a safe and reliable grid for our customers. Utility control allows the utility to coordinate dispatch sequences to avoid system constraints, ensure safety, and allow for the best use of batteries on the system. Engaging with the utility for coordination of certain front of the meter systems can provide siting assistance as the utility can identify locations on the grid where batteries can be most utilized. This ensures that customers receive the most cost-effective deployment while maintaining reliability. CMP appreciates that utility control has been recognized in the Draft Assessment and stresses that utility control is a crucial part of any battery storage program with reliability and resilience objectives, or when customers are funding incentives.

b. Transmission or Distribution Allocation

In the GEO's Notice, the GEO requested comments regarding, "How should the GEO consider the allocation of up to 200 megawatts of incremental energy storage capacity, e.g., between energy storage systems connected to the transmission system or the distribution system?" In response to this question, CMP comments that storage systems on the transmission system would be best utilized as a capacity resource and that connecting to the transmission system also provides less concerns with siting and may be most cost effective on the larger scale.

c. CMP Utility Load Profile

In Section 3.2 of the Draft Assessment the GEO noted that the "The Project Team did not have access to utility-specific load profiles in Maine, , nor did they have data on which specific distribution circuits may need upgrades due to capacity constraints in the near future" CMP takes the opportunity to direct the GEO to CMP's online hosting capacity map which can be found at: ArcGIS Web Application. This map can provide the project team with the estimated remaining load capacity on the distribution circuits and substation transformers, which may assist with the evaluation.

III. CONCLUSION

CMP appreciates the opportunity to provide comment on the Draft Assessment and remains available to assist the GEO with its project evaluation or answer any questions the GEO may have.

Respectfully Submitted,

/s/*Katherine McDonough*

Katherine McDonough
Counsel for Central Maine Power Company

March 25, 2024

Caroline Colan
Legislative Liaison and Energy Policy Analyst
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

By email to caroline.colan@maine.gov

Subject: Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Ms. Colan:

Form Energy, Inc. ("Form Energy") appreciates the opportunity to comment on the Maine Governor's Energy Office ("GEO") "Draft Assessment of Storage Procurement Mechanisms and Cost-Effectiveness in Maine" pertaining to the development of the Maine energy storage program pursuant to section 2 of Public Law 2023, Ch 374. Energy storage technologies can provide a range of services that can benefit customers and help Maine achieve its climate and clean energy goals while supporting critical grid reliability and resiliency needs.

As Maine is uniquely challenged by transmission constraints that will continue to limit the economic viability of new and existing clean energy resources if not addressed, the law rightly directs the GEO to consider programs that can:

1. Advance both the State's climate and clean energy goals and the state energy storage policy goals,
2. Provide one or more net benefits to the electric grid and to ratepayers, including, but not limited to, improved reliability, improved resiliency and incremental delivery of renewable electricity to customers,
3. Maximize the value of federal incentives, and
4. Enable the highest value energy storage projects, specifically energy storage systems in preferred locations, projects that can serve as an alternative to upgrades of the existing transmission system and projects of optimal duration.

Mechanisms used to procure storage in Maine should maximize delivery of these critical public benefits by ensuring a diverse mix of storage resources, including short- and long-duration technologies, as well as multi-day storage like Form's iron-air batteries.

Multi-day energy storage is a diverse resource class of storage technologies that can discharge at rated capacity for at least 24-hours without recharge. This class includes iron-air batteries like Form Energy's, as well as hydrogen energy storage, thermal storage, compressed air energy storage, and other novel technologies. In addition to being able to provide guaranteed firm zero-emission energy capacity over consecutive days during periods of grid stress, multi-day storage can also provide other benefits and services to the grid, including: flexible, dispatchable capacity to provide hourly and sub-hourly load balancing; rapidly-deployable solutions to uneconomic grid congestion and renewable energy curtailment; resilience for critical loads; black start and other existing ancillary services; and a physical hedge to protect market participants and retail customers from price shocks.

Despite the fact that multi-day energy storage can deliver this variety of services, the draft assessment unfortunately considers only a more limited set of resources–2-, 4-, and 6-hour storage. It also seemingly fails to consider Maine's transmission constraints, which act as a barrier to renewable resources gaining full access to wholesale markets, which means that significant value is being left on the table. Long duration and multi-day storage will be critically important in the coming years as the grid transitions to one powered predominantly by intermittent resources. These storage types help integrate and balance intermittent clean energy by storing it during times of oversupply and discharging during periods of undersupply.

Even as load grows due to electrification and demand from data centers and manufacturing, climate change will continue to cause extreme weather that will impact the availability of energy resources, especially in the winter during periods of prolonged cold. Recently, ISO-NE said that "resource adequacy concerns are already greatest around periods of prolonged cold, and that will remain true for the foreseeable future" and that short duration batteries "may be depleted quickly and then struggle to recharge during the winter months."[1] Maine should support the development of long duration and multi-day storage technologies now so that the transition to a net zero economy will be a resilient and reliable one.

The draft assessment's recommendation of a fixed incentive of undefined design plus a performance incentive limited to what is essentially a clean peak program could cause the state to miss out entirely on many of the benefits it seeks by failing to generate incremental value for long duration and multi-day storage, therefore leading to the procurement of only short duration lithium ion batteries. First, while shaving peak hours each month will help reduce certain costs for consumers, it will not achieve all of the objectives set forth above by section 2 of Public Law 2023, Ch 374. For example, in their 2022 *Pathways Study: Evaluation of Pathways to a Future*

[1] See *New England could see resource adequacy troubles even with billions in investments: ISO-NE* Utility Dive, March 19, 2024.

Grid, ISO-NE and the Analysis Group found that "dispatchable resources powered by 'clean' fuels would contribute greatly (and be potentially necessary) to *integrating renewables* and *maintaining reliable system operations* in a highly decarbonized system, similar to the function currently played by gas-fired resources."[2] (emphasis added)

Further, short duration energy storage resources alone cannot substitute for the fossil-fueled peakers and mid-merit resources the state is ultimately seeking to replace as it transitions to zero-carbon electricity. WIth the inclusion of long duration and multi-day storage, however, these resources can be allowed to retire while maintaining reliability.

One way to address our concerns with the recommendations in the Draft Assessment would be for the upfront fixed incentive to be based on the amount of energy (MWh) the system can provide rather than just capacity (MW). This is how the New Jersey Board of Public Utilities has been designing its incentive program for energy storage.[3] This is more likely to properly demonstrate the cost differences between short duration and longer duration technologies. It would also help the state identify resources capable of cost-effectively delivering energy across multi-day periods of grid stress or across consecutive shorter-duration grid stress events.

If the Draft Assessment's recommended structure is maintained and does not include a per MWh fixed incentive, we encourage the GEO to reserve at least 50 MW of the program for pilot or demonstration projects for long duration and multi-day storage technologies. This would ensure that the program results in long-duration and multi-day energy storage projects that will unlock the customer benefits described above, even if the format for the incentive is not more holistically revised. A category for long-duration and multi-day energy storage would also help send a signal to investors and developers that Maine is ready to create a market for these important emerging technologies.

Thank you for this opportunity to provide comments on the Draft Assessment of Storage Procurement Mechanisms and Cost-Effectiveness.

Sincerely,

Sarah Jackson

Sarah Jackson
Policy Manager, Eastern Region
Form Energy

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[2] See *Pathways Study: Evaluation of Pathways to a Future Grid*, April 2022 at ES-8.
[3] See New Jersey Energy Storage Incentive Program Straw Proposal

Natural Resources Council of Maine
3 Wade Street • Augusta, Maine 04330 • (207) 622-3101 • Fax: (207) 622-4343 • www.nrcm.org

clf
conservation law foundation
For a thriving New England

Union of Concerned Scientists

By E-mail: caroline.colan@maine.gov

Caroline Colan
Legislative Liaison and Energy Policy Analyst
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

March 25, 2024

Subject: Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Caroline Colan,

We write today on behalf of the Natural Resources Council of Maine (NRCM), the Union of Concerned Scientists (UCS) and the Conservation Law Foundation (CLF) to offer comments on the Governor's Energy Office Draft Assessment of Storage Procurement Mechanisms and Cost-Effectiveness in Maine.

NRCM is Maine's leading environmental advocacy organization with more than 25,000 members and supporters. NRCM has been working for more than 60 years to protect, restore, and conserve Maine's environment, and is deeply engaged in the state's climate and clean energy policy and planning, including Maine's programs to support community solar projects.

UCS is the nation's leading science based non-profit organization with more than a half a million supporters nationally and more than 2,500 in Maine. UCS advances equitable science-based solutions to some of the world's most pressing problems, including working to ensure that Maine and the rest of the country meets its climate and clean energy goals.

Founded in 1966, CLF is a non-profit advocacy organization with 5,000 members across New England, including approximately 500 in Maine. CLF works to solve the environmental problems threatening the people, natural resources, and communities of New England. CLF's advocates use law, economics and science to design and implement strategies that conserve natural resources, protect public health, and promote vital communities in our region.

1) Comments on Synapse/Sustainable Energy Advantage Draft Assessment of Storage Procurement Mechanisms and Cost-Effectiveness in Maine

Overall, the draft assessment provides a strong analysis of the cost-effectiveness of storage in Maine and shows positive benefit-cost ratios (BCRs) in all cases for both transmission- and distribution-connected storage projects of different sizes and durations for both the utility cost test (UCT) and the societal cost test (SCT).

To improve the draft assessment, the Governor's Energy Office and Synapse/Sustainable Energy Advantage should:

- Assess the potential resiliency benefits that storage and clean energy microgrids can provide in avoiding or reducing the duration of outages, as was done in E3's 2022 Maine Energy Storage Market Assessment for GEO[1];
- Assess the potential environmental and health benefits of reducing criteria pollution from fossil fuels (including gas and oil), in addition to the greenhouse gas emissions included in the SCT;
- Assess transmission-connected storage systems with capacities larger than 5 megawatts (MW) and 60 MW, including projects with capacities of 100, 125, 150 and 175 MW;
- Assess the potential grid benefits of pairing and/or co-locating transmission- and distribution-connected storage with large- or small-scale clean energy projects; and
- Assess the system benefits of locating storage in areas away from grid constraints, of locating storage near areas of congestion, and of reducing potential curtailment of wind and solar.

In finalizing the draft assessment, the Governor's Energy Office and Synapse/Sustainable Energy Advantage should address the following questions:

- What sources were used to determine energy storage costs and performance? Were projected cost reductions included? We would recommend using projected cost reductions from the National Renewable Energy Laboratory's 2023 Annual Technology Baseline.[2]
- Does the analysis include federal investment tax credits and other incentives for storage?
- What CO2 prices were used to calculate GHG benefits?
- Why is the BCR higher for the UCT than for the SCT?
- What are reliability benefits and electric DRIPE so small?
- Why are incentives netted out for the UCT, but not for the SCT?

We agree with the finding in the draft assessment that a storage incentive structure/procurement mechanism utilizing a fixed up-front incentive paired with a performance payment based on dispatch in critical hours is the best option out of the four proposed approaches. Procurements are likely to be more cost-effective if Maine uses competitive solicitations, and winning bidders should receive long-term contracts that help ensure long-term commitments that are needed for project financing.

2) Comments on achieving the development of up to 200 MW of incremental energy storage capacity

a. How should GEO consider the allocation between transmission and distribution connected systems?

At this time, we do not recommend a specific allocation, but consideration of allocation could be informed through a competitive solicitation that allows both types of systems to bid and to then use the program objectives and/or criteria to make those determinations. For example, the allocations could be based on project bids with the highest BCR and/or the

[1] See https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/GEO_State%20of%20Maine%20Energy%20Storage%20Market%20Assessment_March%202022.pdf.
[2] See https://atb.nrel.gov/electricity/2023/utility-scale_battery_storage.

greatest ratepayer benefits and based on projects located in or benefitting disadvantaged communities and/or other high value locations.

b. Interplay between such allocations, if any, and the program objectives

In making such allocations, the GEO should consider the important program objectives set forth by the Legislature in P.L. 2023, Chapter 374, § 1.

c. Should any capacity be reserved for pilot programs or novel applications of commercially available technologies?

Yes, we urge the GEO to reserve capacity for pilot projects that result in equitable energy storage deployment and provide economic and environmental benefits for tribal, island, remote and other disadvantaged communities. These pilot projects should also include an opportunity for developing storage projects that are co-owned by tribes and other local communities in Maine.

As an example, Minnesota is pursuing innovative storage and renewable energy projects with the Red Lake Indian Reservation and a disadvantaged community in Northeast Minneapolis that could be replicated in Maine.[3] The Island Institute is also collaborating with NREL and the U.S. Department of Energy on clean energy resilience projects in Eastport and Isleboro through the Energy Initiatives Transition Partnerships Project that include adding battery storage for back-up power or more renewables for local generation.[4]

Consistent with the federal Justice40 Initiative, and since most if not all projects will be receiving federal tax credits and incentives, we recommend that 40% (or 80 MW) of the procurements be dedicated to projects installed in or that benefit disadvantaged communities.[5] The GEO should also ensure that these pilot projects are developed consistent with the recommendations of the Maine Climate Council Equity Subcommittee.[6] We refer the GEO to a policy brief and policy principles that UCS has developed in connection with equitable policy design for energy storage.[7] These documents show how well-designed and implemented policies that bring storage into disadvantaged communities can reduce local air pollution, energy costs, and power outages, as well as provide local economic development benefits.

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[3] See https://www.cleanenergyeconomymn.org/success-stories/red-lake-solar-project; see also https://energynews.us/2021/09/24/minneapolis-battery-pilot-will-test-vision-for-sharing-solar-power-with-neighbors/.

[4] See https://www.islandinstitute.org/2021/07/13/energy-resilience-projects-begin-in-eastport-and-islesboro/.

[5] See https://www.whitehouse.gov/environmentaljustice/justice40/.

[6] See https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/Maine%20Climate%20Council_Equity%20Subcommittee%20Final%20Report_March%202023.pdf.

[7] See https://www.ucsusa.org/sites/default/files/2019-11/Ensure-Energy-Storage-Policies-Equitable-Brief.pdf; see also https://www.ucsusa.org/sites/default/files/attach/2019/05/equitable-policy-storage-principles.pdf.

Respectfully submitted,

Rebecca Schultz
Natural Resources Council of Maine
3 Wade Street
Augusta, ME 04330
Tel: (207) 430-0175
Email: rschultz@nrcm.org

Steve Clemmer
Union of Concerned Scientists
2 Brattle Square, 6th Floor
Cambridge, MA 02138
Tel: (978)-844-4531
Email: sclemmer@ucsusa.org

Sean Mahoney
Vice-President & Senior Counsel
Conservation Law Foundation
53 Exchange Street
Portland ME 04101
Tel: (207) 210-6439
Email: smahoney@clf.org

Glenvale SOLAR

SENT VIA EMAIL TO: caroline.colan@ maine.gov

March 25, 2024

To: Governors Energy Office
62 State House Station
Augusta, Maine 04333
Attn: Caroline Colan
From: Glenvale LLC

RE: Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Ms. Colan,

Glenvale LLC, a developer of utility scale solar and energy storage projects, is pleased to offer comments on the Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine.

Glenvale wants to express support for the efforts to advance long-duration energy storage technologies. These technologies hold potential for addressing challenges associated with variability in renewable energy generation. By enabling the storage of excess energy generated during peak production, long-duration energy storage systems can ensure a more reliable energy supply.

As one of Maine's largest solar and energy storage developers, we have suggestions regarding the effective deployment of long-duration energy storage through this procurement.

1. **Geographic targeting:** As one of the objectives of the initiative is incremental delivery of renewable electricity to customers, this is a great opportunity to target the limitations of the Surowiec South Interface. Surowiec is a bottleneck, which now, and more so in the future, limits the amount of renewable energy generated in Maine. With so much solar already operating in Maine, locating most of the MW north of the interface will allow for incremental renewable energy delivery in late afternoon. In Section 5. Findings and Recommendations (p. A-13), the Project Team suggests that benefits depend on specific locational parameters. Glenvale believes that for Maine to maximize benefits to ratepayers, the procurement should consider locational benefits of projects by considering locating energy storage in transmission constrained areas of the state. Glenvale's response to the GEO's December 2023 RFI articulates this point in more detail.[1]
2. **Incentive Framework:** Glenvale supports the recommended combination of an upfront incentive with a performance-based incentive ("PBI"); the PBI can be designed so that the objective of additional renewable electricity delivery is achieved. A more detailed framework for an incentive program, with quantitative values with guidelines on payment rates per kW/kWh, and

[1] Glenvale response to RFI Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, Ch. 374 (LD 1850), dated December 8. 2023.

payment events would be helpful – Glenvale recommends PBIs that incentivize frequent events, so that maximal additional delivery of renewable energy is achieved.

3. **Competitiveness and Ratepayer Benefit:** Glenvale supports the recommendation for a competitive procurement; this provides an opportunity for the market to offer innovative solutions that are in ratepayers' best interests. The many responses to the December RFI indicated robust commercial interest in Maine storage. A simple procurement that minimizes specifications on technologies, project types, and deployment models will allow developers to focus on least cost solutions that provide the best outcome for ratepayers.
4. **Project Advancement & Readiness:** In order to achieve the most value from this initial 200 MW program, Glenvale recommends that the procurement have threshold requirement regarding project readiness. Projects' status with regard to interconnection request, and the completion of their system impact studies should be considered; projects that are permitted and construction ready should be prioritized. Speculative projects, early in the permitting or interconnection study process would be better suited to later procurements.

In conclusion, Glenvale recommends Maine focus on key actions that will contribute to the state achieving its goals: 1) target geographic areas that have the highest need and benefit, 2) conduct a competitive procurement with supportive PBIs that will drive developers to offer solutions with the highest value to ratepayers, and 3) consider project readiness as a procurement evaluation criterion to support timely energy storage deployment.

Glenvale appreciates the opportunity to offer our input in this process and is available for questions or comments.

Sincerely,

/s/
Aidan Foley
Chief Executive Officer
Glenvale LLC

March 25, 2024

Via electronic filing: caroline.colan@maine.gov

Ms. Caroline Colan
Legislative Liaison and Energy Policy Analyst
Governor's Energy Office
62 State House Station
Augusta, ME 04333

RE: Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Ms Colan,

Nexamp appreciates the opportunity to comment on draft Assessment of Storage Procurement Mechanisms (Draft) dated March 12, 2024, from the Governor's Energy Office regarding the development of a 200 MW Maine Energy Storage Procurement Program. The development of energy storage serves as a crucial element in driving the interests of Mainers, ultimately fostering a clean energy economy that is equitable, sustainable, inclusive, and resilient for communities across the state. Nexamp strongly supports the state's energy storage development goals.

As the largest developer, owner, and operator of community solar assets in the U.S., Nexamp has been at the forefront of efforts to make clean energy affordable, accessible, and gainful for all Americans. Many of our community solar projects contain energy storage and we also are developing a significant standalone energy storage pipeline across various jurisdictions. By managing all aspects of a project's lifecycle in-house—from development, engineering, and construction through operations and customer management—Nexamp brings rapid renewable energy deployment and high-quality jobs to the communities it serves. In 2015, Nexamp launched the first open-to-all community solar program that eliminates credit checks, up-front fees, and long-term commitments to help customers save up to 20% on annual electricity costs. Today, Nexamp serves over 4,600 active customers across Maine, with several gigawatts of capacity across almost twenty states from Maine to Hawai'i.

We echo and support the recommendations included in comments from Maine Renewable Energy Association (MREA) and NECEC. We would like to emphasize the following from the MREA/NECEC comments:

On page A-7 of the Draft, the authors state that they did not have access to “utility-specific load profiles in Maine” to perform their analysis. Nexamp would urge the GEO to work with the utilities and the MPUC to make this data accessible to the authors for a robust study and accurate program development. The utilities can provide historic interval data on feeders that are outfitted with SCADA and should provide that data where available. The utilities already file a large amount of valuable data on system loading and peaks and load forecasting through various MPUC reporting requirements, including the Non-Wires Alternative Docket No 2020-00152.

Nexamp echoes the concerns expressed with the language on page A-8 of the Draft stating that “realizing distribution system benefits from storage may require changes to current electric system practices and capabilities…” and the point made by MREA/NECEC that these changes are not a requirement for a successful storage program that brings benefit to the distribution system. There is no reason to delay a storage procurement program until a full utility wide DERMS system is implemented, or other changes are made. Other states, for example New York, Connecticut, and Massachusetts, have successfully implemented energy storage procurement and/or incentive programs that bring benefits to the distribution grid while still tackling broader scale DERMS implementation and other process changes to more accurately consider storage’s impact on the grid. Demand response programs using a variety of technologies have long proven to benefit the distribution system and provide needed peak load relief. ESS developers and owners have the systems and expertise required to coordinate storage dispatch in ways that bring about grid benefits.

Nexamp also agrees with the MREA/NECEC comment that much of the 200 MW program size should be allocated to the distribution system, where it can relieve system stress in constrained areas and areas of rapid demand growth more directly. Nexamp does not see a need for reserving any of the 200 MW program size for pilot programs or novel applications of commercially available technologies at this point in time, as the planned program size is relatively small.

Please do not hesitate to reach out if there are any questions.

Thank you,

Lisa Boba
Energy Storage Manager
Nexamp
lboba@nexamp.com

REVISION ENERGY

Caroline Colan
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

March 25, 2024

Re: Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Ms. Colan:

ReVision Energy was founded right here in Maine twenty years ago, ReVision is a local, employee owned, certified B Corporation clean energy construction company with over 480 employees across our five branches in New England, with nearly 270 co-owners in Maine at our Montville and South Portland locations. Our mission is to make life better by building our just and equitable electric future. We carry out this work by installing tens of thousands of kilowatts of residential solar each year, in addition to constructing commercial and community solar, as well as installing whole home electrification products including batteries, heat pumps, and EV chargers. In the past year, we have expanded our commercial energy storage program, collaborating closely with entities including Efficiency Maine Trust to develop behind-the-meter battery solutions for commercial customers that will serve both end consumers and the State's energy storage objectives.

ReVision, as a mission driven company to build our just and equitable electric future, has a considerable interest in working to advance our state's storage goals to develop at least 300 MW of installed storage capacity by the end of 2025, and at least 400 MW by the end of 2030. For that reason, we strongly support the development of a robust program to procure up to 200 MW of commercially available energy storage systems, and we believe such a program could garner considerable lessons learned to procure additional capacity given the ability storage has to significantly advance increased usage of intermittent renewable energy sources.

We appreciate the Governor's Energy Office's (GEO) efforts on the release of the "Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine" (Draft), dated March 12, 2024, pursuant to LD 1850 (2023). However, we note our concern that the Draft is a very general and ultimately states that Maine should pursue a competitive procurement with an up-front incentive and performance payments based on a brief cost-effectiveness analysis with little detail in programmatic design. In the absence of such details, it is challenging to provide specific feedback into a storage program's establishment. We also note that the submission of recommendations without parameters to the Public Utilities Commission (PUC) may ultimately slow down the development of the program and thus the achievement of desired goals. Should the PUC immediately advance such recommendations, stakeholder feedback on such a solicitation must be guided by stakeholder feedback.

We understand there has been consideration of both transmission-level and distribution-level storage assets. Given the total size of the solicitation is 200 MW and based on the current market, we recommend the program focuses on distribution-level projects. Prior to submission to the PUC, we ask GEO to define what size distribution-level projects would be eligible to participate as the Draft only outlines estimated system sizes for transmission level projects, and we recommend such projects up to 10 MW. Particularly, ReVision is interested in how distribution-level program design could take into account interconnection limitations developers have experienced trying to interconnect system sizes over 1 MW. Additionally, such a program with a performance based incentive structure should be limited solely to third parties, and not open to utility participation.

Regarding program design, we recommend evaluation of two options for distribution-level programs—first, a bulk standalone energy storage program with assets owned and operated by developers, in contract with transmission and distribution utilities to lease the use of the battery within specific operating hours. While we understand this program model is different from the Draft's proposal, we maintain the position that such a model should be considered as an option, as such a program would be the most cost effective from the utility's standpoint given the avoidance of infrastructure upgrades. Second, in alignment with the Draft's proposal for an upfront and performance based incentive structure, we encourage GEO to create a program in which aggregators could pool portfolio capacity of residential and commercial behind the meter solar and storage projects, with all such assets operated based on parameters defined by utility needs. This program, essentially a Virtual Power Plant (VPP) structure, would award third party aggregators performance based incentives based on meeting the parameters set, thus benefiting rate payers by avoiding expensive utility upgrade costs and meeting the State's objective for utilizing deployed energy storage assets. Although it leverages a different ownership structure, Green Mountain Power in Vermont has noted great success using a VPP model. Per a recent Utility Dive article, "When electricity demand peaks, GMP networks residential battery capacity, along with utility-scale batteries and car chargers, into a virtual power plant of about 50 MW, according to the utility. The VPP has saved GMP customers up to $3 million a year for the last few years, the utility said."[1] While such an aggregation of assets may not be initially included in program scoping, such an ability could enable competition for different market actors who can ultimately compete to ensure the greatest ratepayer benefit. Such a grouping would require parameters regarding the types of events the systems are intended to address, as well as the duration of call events.

The Massachusetts Department of Energy Resources and the Massachusetts Clean Energy Center recently released a report, Charging Forward: Energy Storage in a Net Zero Commonwealth,[2] which included a study on the state's existing energy storage market and an assessment of the potential use cases and benefits of mid- and long-duration energy storage. Regarding standalone bulk storage programs, their study demonstrated the Commonwealth must accelerate so "sufficient capacity is online toward the end of this decade to provide cost and emissions reductions. (Report, Page 15)" Further, the report evaluates the benefits of coupling short duration assets with long duration assets, noting the opportunity to "reduce the hours over which energy storage must discharge to reduce peak" (Report, Page 12) and pairing energy storage systems with renewables for a diversity of benefits (noting the paired capacity value can exceed the sum of individual capacity value). Such commentary advocates for the inclusion of both bulk energy storage (functioning with a 4-6 hour dispatch) paired at the distribution level, and a VPP component for behind the meter assets with 2-4 hour dispatches creates an efficient balance for mitigating constraint and managing peak grid demand. We encourage the GEO to review the programmatic considerations and analysis within Charging Forward in ultimate program design.

Finally, ReVision wishes to emphasize the importance of utility data transparency for expeditious deployment. Transmission and distribution utilities must be required to compile the data needed to identify the most beneficial sites to host such assets. This is critical—we have watched other

[1] https://www.utilitydive.com/news/vermont-puc-green-mountain-power-gmp-battery-storage-programs-tesla/692052/

[2] https://www.mass.gov/guides/charging-forward-energy-storage-in-a-net-zero-commonwealth

jurisdictions launch programs in which there was no analysis or publication of which areas of the grid were in most critical need to guide development leading to the most ratepayer benefit, and it ultimately led to significant delays in value as utilities did not have enough information to quantify the impacts energy storage systems ultimately could have on cost savings or overall goals. Such data must come from the utility to ensure a meaningful program and could alleviate potential challenges with interconnection. In that regard, we recommend considerable thought as to how to address interconnection, particularly around larger system sizes (1 MW and greater) to ensure projects are not caught in lengthy cluster studies thus delaying programmatic goals. Should this data aggregation take time, we believe the opportunity for co-location of distribution-connected solar could be a short term solution. Given this is an area where there already is extensive data due to solar interconnection in the state (as to where there are constrained areas of the grid), such an allowance could result in faster deployment of storage at the program's outset. Such a program design, starting with co-location while quickly moving to identification of target sites by utilities, could be the fastest pathway to getting energy storage systems installed and operated to address the state's needs.

We thank the Governor's Energy Office for the opportunity to offer these comments, and we are available to answer any questions. We appreciate your time and consideration of this feedback to develop an effective storage program in our state, essential to ensuring our state can meet its codified climate goals.

Sincerely,

Lindsay L. Bourgoine
Director, Policy & Government Affairs
ReVision Energy

Maine Renewable Energy Association

necec
Your Partner in the Clean Energy Economy

Caroline Colan
Governor's Energy Office
62 State House Station
Augusta, Maine 04333

March 25, 2024

Re: Opportunity for Comments Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Ms. Colan:

On behalf of the Maine Renewable Energy Association (MREA) and the Northeast Clean Energy Council (NECEC or the Council), thank you for the opportunity to comment on the "Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine" (Draft), dated March 12, 2024. MREA's and NECEC's varied members, including wind, solar, biomass, and hydro power developers and generators, as well as energy storage developers and operators and suppliers of goods and services to the renewable energy industry, have a shared interest in Maine's investment in energy storage infrastructure. Energy storage will accelerate the integration of the clean energy resources needed to meet the state's climate and clean energy goals, and enable a myriad of public benefits. MREA and NECEC strongly support Maine's goals to develop at least 300 MW of installed storage capacity in the State by the end of 2025 and at least 400 MW by the end of 2030. A program to procure up to 200 MW of commercially available utility-scale energy storage systems (ESS) is important to achieve those goals. We are grateful for the work done by the Governor's Energy Office (GEO) to date to advance such a program.

Overall, the Draft's finding and recommendation that the Maine Public Utilities Commission (Commission) pursue a competitive solicitation that utilizes a fixed up-front incentive paired with a performance payment based on dispatch in critical hours is supported by MREA's and the Council's members. However, we expected – and this may yet come to be – that the Draft would include a detailed quantitative framework of the incentive program, including, for example, payment per KW and/or KWh, how "events" are called, and how performance payments are determined. While we appreciate that the Commission may be suited to determine these important details, we are concerned that without a specific recommendation from GEO, the Commission may not be able to first determine, consistent with their charge from Public Law 2023, chapter 374, whether the program recommended by GEO is reasonably likely to achieve the objectives established by the law. This may delay the program and interfere with Maine's ability to meet its ESS goals.

In addition to that general comment, we offer the following specific comments:

(1) On page A-7, the Draft states that the authors did not have access to "utility-specific load profiles in Maine", "data on which specific distribution circuits may need updates due to capacity constraints in the near future", and "feeder-specific data that would enable directly modeling the use of storage to address particular distribution system peaks". Storage can provide significant benefits to the distribution system regardless of whether it is deferring a specific circuit upgrade based on its location. Furthermore, the Massachusetts Clean Peak Distribution Circuit Multiplier demonstrates the difficulty of implementing such a concept for both storage developers and program administrators. MREA and NECEC recommend that Maine implement a distribution storage incentive even in the absence of feeder-specific data, however, if that data becomes available it may be used to provide preferential treatment in a competitive solicitation to well-situated projects.

(2) On page A-8, the Draft states that realizing distribution benefits from storage may require changes to current electric system practices and capabilities, including considering storage as a potential asset to the distribution system and distributed energy resource management systems. These possible changes are not a reason to delay program implementation. MREA and NECEC are confident that ESS owners will develop and utilize a robust system to coordinate dispatch in order to deliver the reliability and resiliency expected from the technology. Other states with similar distribution system capabilities as Maine have recognized and compensated the value of distribution-connected energy storage (e.g., Massachusetts provides additional compensation in the Clean Peak Standard through the Distribution Circuit Multiplier and Connecticut is developing a front of the meter distribution storage program with robust ratepayer benefits). A "fully functional" demand response management system is not a prerequisite for the program.

(3) Please explain the nearly identical benefit-cost ratios for a 5 MW and 60 MW transmission-connected project (see page A-10). MREA and NECEC members have expressed doubt that a 5 MW transmission-connected battery is a credible scenario, due to high interconnection upgrade costs.

(4) On page A-11, the Draft states, "These charts indicate that transmission-connected storage systems can provide a wide range of benefits, *largely driven by avoided marginal costs of pooled transmission facilities* (PTF) in addition to avoided capacity costs (emphasis added)." MREA and NECEC members would benefit from a description of a scenario in which a current ESS project is used to defer a Regional Network Service (RNS) upgrade project, including what ISO-NE tariff-based approach the ESS project used in the RNS update planning process. Please also describe, in the final Draft, how the proposed state-jurisdictional program would coordinate with the ISO-NE tariff.

Finally, given the small size of the program (200 MW) and the stated benefits of ESS connected to the distribution system (see MREA's response to the GEO's RFI, dated December 8, 2023), MREA and NECEC recommend a generous allocation for distribution-connected projects. We recommend that the program allow co-located distribution-connected projects, particularly given that those areas of the grid have been extensively studied as a part of solar interconnection, which may serve to advance Maine toward its storage goals in a timely manner.

Thank you for your consideration of our comments. We look forward to remaining engaged in this important effort.

Sincerely,

Eliza Donoghue, Esq.
Maine Renewable Energy Association

Natalie Hildt Treat
Northeast Clean Energy Council

PLUS POWER

201 Spear St, Ste 1000
San Francisco, CA 94105
P: 832-585-1238
pluspower.com

March 25, 2024

Sent by email to caroline.colan@maine.gov

Caroline Colan
Legislative Liaison and Energy Policy Analyst
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

SUBJECT: Comment On Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Dear Ms. Colan,

Plus Power extends its appreciation to the Governor's Energy Office for the opportunity to comment on the methodology, assumptions, and implications for program design in the Synapse Energy Economics study, the draft "Assessment of Storage Procurement Mechanisms and Cost-Effectiveness in Maine" ("Draft Assessment"), issued on March 12, 2024. Plus Power is a leading developer, owner, and operator of standalone battery energy storage with a facility in development in Gorham, Maine.

Plus Power supports the Draft Assessment's conclusion that the procurement of energy storage is likely to be cost-effective for Maine consumers using competitive solicitations. Plus Power adds that the success of the program's attractiveness and its cost-effectiveness would be maximized by the use of long-term contracts that make project financing more feasible.

A. Considerations for selection for energy storage systems based on size, level on the grid, and duration

All sizes of battery storage will be valuable to Maine's needs, serving to address current or future congestion on both the distribution and transmission grids. The scale afforded by a utility-scale battery storage system does help maximize ratepayer savings by charging during low energy prices and discharging during high prices, thus helping to reduce wholesale price shocks. Similarly, the scale benefits of transmission-connected battery storage help avoid the construction of costly transmission upgrades for power reliability. When considering how to allocate the program, Plus Power respectfully requests that the program does not inadvertently constrain its potential success by creating artificially-delineated sub-carveouts of allocations based on project size, and instead lets applicants compete. The program should prioritize incentives for projects that are further along in development and ready to contribute to Maine's needs and goals, or that are better geographically positioned to help mitigate Maine's transmission constraints.

Plus Power questions the Draft Assessment's conclusion of four hours as the ideal duration, followed by 6 hours as the second best, noting that analyses can vary dramatically based on assumptions of the market and of the facility's planned uses. For utility-scale battery storage facilities, our analysis shows that the most economically optimal duration is a two-hour system.

B. Performance requirements on storage dispatch during critical periods

One of the barriers in Maine to storage deployment is the nascent state of state or regional policies that recognize and remunerate for the different services offered by battery storage. Plus Power agrees with the Draft Assessment recommendation that the energy storage procured should have incentives to dispatch during critical periods. We believe that the Massachusetts Clean Peak Standard is an innovative new program that can incent flexible resources, such as battery energy storage, to help deliver clean energy resources at the daily peak in order to reduce reliance on fossil fuel peaker plants. The success of the Massachusetts program is currently limited in part by siting and permitting barriers that are creating supply delays. However, the program is a step in the right direction to articulate and compensate for another of the many specific services that battery storage can offer the market. While administration of such a program will be more complex than a standard incentive deployment program, the Massachusetts program does offer a model to follow.

Thank you for your office's robust support of battery energy storage and the opportunity to provide comment on this Draft Assessment.

Sincerely,

Polly Shaw
Chief External Relations Officer

PO Box 383
Email: fpullaro@renew-ne.org
Web: renew-ne.org

March 25, 2024

By email to caroline.colan@maine.gov

Caroline Colan
Legislative Liaison and Energy Policy Analyst
Maine Governor's Energy Office
62 State House Station
Augusta, ME 04333

Subject: Opportunity for Comment Regarding Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness in Maine

Ms. Colan:

RENEW Northeast, Inc. ("RENEW")[1] submits this letter in response to the Governor's Energy Office ("GEO") Opportunity for Comment issued March 12, 2024, seeking public input on the Draft Assessment of Storage Procurement Mechanisms and Cost-effectiveness ("Draft Assessment") regarding the methodology, assumptions, and implications for program design. GEO also posed several questions on how to allocate up to 200 megawatts of energy storage in the planned procurement. Thank you for the opportunity to offer these comments.

RENEW strongly supports the Draft Assessment's conclusion that the procurement of energy storage is likely to be cost-effective for Maine consumers particularly if Maine uses competitive solicitations.[2] An important criterion to add to the recommendations is that the winning bidders receive long-term contracts as it is necessary if developers are to secure the financial commitments that are needed to build projects. GEO should use its judgment in selecting the form of financial incentives for the contracts. Individual RENEW members may express their opinions as to the pros and cons of different incentive models.

A. Considerations for selection for energy storage systems based on size, level on the grid, and duration

In considering how GEO should evaluate projects of different sizes connected to either the transmission system or the distribution system, RENEW recognizes energy storage can offer benefits at both levels. Larger battery energy storage systems are likely to offer considerable

[1] The comments expressed herein represent the views of RENEW and not necessarily those of any particular member of RENEW.
[2] A-13.

value for consumers as they have the lowest levelized cost among storage resources,[3] and can potentially alleviate transmission constraints that are causing significant curtailment of renewable energy resources in Maine. Locating storage resources on areas of the distribution system that are more vulnerable to disruption due to extreme weather or other causes may provide local resilience benefits particularly once other smart-grid technologies are in place. RENEW encourages GEO to design its RFP to be receptive to proposals from "novel applications of commercially available technologies," such as long-duration energy storage. Any bids received from long-duration energy storage developers would give GEO an opportunity to assess whether there is a role for the technology to enhance power system reliability during prolonged winter cold spells when the natural gas pipeline system is constrained.

As RENEW stated in its December 8, 2023, comments, Maine's evaluation of bids could use a benefit cost ratio that involves dividing a calculation of the project's NPV along various benefits by the NPV of the cost of the bid.[4] For transmission interconnected resources, GEO should consider the levelized costs and net market revenues for these resources, and then compare them against energy and capacity price forecasts. It should also assess the going-forward costs and environmental harm of peakers in the ISO New England system and the extent to which new energy storage resources can produce declines in fossil-fueled peaker use. Finally, it should account for the savings attained from avoiding reliability-based transmission upgrades costs and reducing the amount of renewable energy resource curtailment due to grid constraints.

B. Performance requirements on storage dispatch during critical periods

The Draft Assessment recommends that the energy storage procured have incentives to dispatch during critical periods.[5] The Massachusetts Clean Peak Standard is an example of a program designed to encourage clean energy resources like energy storage to deliver clean energy during a daily peak to reduce the cost and emissions that arise from dispatching fossil fuel peaker plants. This approach has advantages and disadvantages. Without a marginal price of carbon, Massachusetts set discharge windows, which is an inexact science. RENEW recommends any requirements for dispatch in specific time periods be kept simple and workable for participants to facilitate energy storage being able to charge and discharge economically. Alternatively, addressing critical peaks can be addressed by simply allowing energy storage operators to respond to wholesale market prices as it will signal them to charge at periods of low prices, which will likely correspond to periods of low demand, and to discharge at peak periods when prices are high.

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[3] Lazard, *Levelized Cost of Storage Analysis (Version 8.0)* 19 (April 2023), https://www.lazard.com/media/2ozoovyg/lazards-lcoeplus-april-2023.pdf

[4] Economists have offered the use of the SCT, UCT, and RIM to conduct the BCA. The analysis in these reports have been limited to recommendations on conducting benefit-cost analyses of distributed energy resources. *See e.g.,* Applied Economics Clinic, *Energy Storage Benefit-Cost Analysis* (December 2022), https://www.cesa.org/resource-library/resource/energy-storage-benefit-cost-analysis-a-framework-for-state-energy-programs/; National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (August 2020), https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/

[5] A-13.

C. Addressing long standing transmission bottlenecks

The Draft Assessment did not address the ability of energy storage to address grid constraints. Adding energy storage to the transmission system at key locations can potentially help reduce costs related to transmission congestion and curtailment of existing renewable energy resources. Such congestion, if not addressed, according to ISO New England studies, will significantly reduce the value of energy produced by Northern Maine renewables resources that could be procured future solicitations and by existing clean energy resources in Maine as well as lead to curtailed energy production from these resources. This, in turn, could lessen the greenhouse gas reduction benefits desired from this procurement, and potentially the economic viability of uncontracted renewable resources in Maine.[6] The benefits from avoided transmission costs should be considered based on several factors including where storage is placed to resolve a specific constraint and eliminate or minimize the need for reliability upgrades. Land-use and location issues should also be considered to ensure cost-effective and responsible development.

Thank you for your support of energy storage deployment in Maine and considering public input on the design of the procurement.

Sincerely,

Francis E Pullaro

Francis Pullaro
President

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[6] *See* e.g., ISO New England, 2016/2017 Maine Resource Integration Study 43-45 (March 12, 2018), https://smd.iso-ne.com/operations-services/ceii/cluster-studies/final_maine_resource_integration_study_report.pdf (Critical Energy Infrastructure Information access required); and ISO New England, 2019 Economic Study: Economic Impacts of Increases in Operating Limits of the Orrington-South Interface (October 30, 2020), https://www.iso-ne.com/static-assets/documents/2020/10/2019-renew-es-report-final.docx

Colan, Caroline

From: Steve I <sjiemail@yahoo.com>
Sent: Tuesday, March 19, 2024 6:22 PM
To: Colan, Caroline
Subject: Fw: News and Updates

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Good morning Caroline,

I am supportive of the Energy Storage Program concept. In terms of which storage procurement mechanism to select, I would say I lean towards the Pay for Performance + Upfront Incentive model, as it seems to be the most straight forward model option. I would be opposed to an incumbent T&D (CMP and Versant) owning these, as my view is transmission scale energy storage facilities too closely resemble the generation model that T&D's in Maine are prohibited from owing. I could however see an exception being made for a consumer owned T&D's.

One thing that I would like to add, that really isn't touched on (or perhaps I missed it in the jargon in the draft report) is the benefit this may have to address some of the issues with the North-South interface that have been discussed in the ISO-NE 2050 study. Specifically, well placed transmission scale energy storage may be able to absorb some of the peak power generation that will occur from onshore wind and solar and offshore wind. This then may be able to reduce the need to require these generation sources to curtail their production or otherwise cause too much strain on the North-South interface. This may also help to mitigate the need for significant upgrades to the transmission system south of Pownal and Gorham. This would all presumably be beneficial to ratepayers too. Strategically located energy storage systems at the following locations could provide beneficial support to balancing the ISO-NE grid:

1) At a future Haynesville substation to support the Northern Maine Renewable Energy program
2) The existing Chester substation
3) The existing Orrington substation
4) The existing Pittsfield/Detroit substation
5) The existing Albion substation
6) The soon to be upgraded Lewiston substation
7) The existing Coopers Mils substation
8) Perhaps the Maine Yankee substation, but less clear
9) The existing Pownal substation
10) If a POI for offshore wind is located in Maine, then at the relevant substation

I purposefully did not include the Gorham substation, as my understanding is an energy storage facility is under construction to support that substation. Obviously in all of these situations there would need to be sufficient suitable land area to accommodate such a facility.

Thank you for the opportunity to provide this feedback.

Steve Ingalls
Stetson, ME

----- Forwarded Message -----
From: Maine Governor's Energy Office <geo@maine.gov>
To: "sjiemail@yahoo.com" <sjiemail@yahoo.com>
Sent: Tuesday, March 19, 2024 at 04:54:03 PM EDT
Subject: News and Updates