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

On November 13, 2023, 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 RFI was to obtain 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 in spring 2024. 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 December 8, 2023. The GEO received 18 responses from the following entities:

Competitive Energy Services
Key Capture Energy
Glenvale Solar
New Leaf & Bluewave
Clearway Energy Group
Nexamp
Form Energy
Rob Smart
Longroad Energy
Ulteig
Mason Station Redevelopment Co.
Clean Energy States Alliance
Maine Renewable Energy Association
Ocean Renewable Power Company
Plus Power
RENEW Northeast & American Clean Power Association
Northeast Clean Energy Council
Central Maine Power

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

Maine Governor's Energy Office (GEO)
Request for Information
Maine Energy Storage Program Development Pursuant to P.L. 2023, ch. 374

Issue Date:	November 13, 2023
Subject:	Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)
Response Due Date:	December 8, 2023
Submit Responses To:	caroline.colan@maine.gov

Description

This is a Request for Information (RFI) 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 RFI 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),[1] 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 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. 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'.[2] The GEO interprets "utility-scale energy storage" to mean energy storage resources connected in front of the meter.

In evaluating programs for the procurement of energy storage systems, per statute, 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;

[1] Public Law 2023, Chapter 374 (June 30, 2023).
[2] 35-A M.R.S. §2481.

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 intent of this RFI is to obtain 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.

Questions of Interest

Specifically, this RFI seeks input on the following questions. Respondents may respond to some or all of these questions, and may provide additional information they believe may be useful to the GEO in meeting its obligations regarding implementation of section 2 of LD 1850.

1) Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.[3] Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

2) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030[4] and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?

    a) Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"

    a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?

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[3] 38 M.R.S. §576-A.
[4] 35-A M.R.S. §3210.

b) Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program. [5]

4) Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."

5) Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."

6) How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?

7) How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?

8) How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.

9) Legislation directs the GEO to consider an index storage credit mechanism.[6] Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.

10) How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

11) Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above.
    a) To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.

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[5] In 2022 the GEO released the Maine Energy Storage Market Assessment, which utilized a number of cost-benefit tests to analyze the potential benefits of various energy storage applications. In 2023, the GEO released the Final Report of the Distributed Generation Stakeholder Group, which included in Appendix A an analysis defining and applying the so-called "Maine Test" to examine cost-effectiveness of distributed solar and energy storage resources. Commenters should identify which, if any, of the tests utilized in these reports should be utilized here and discuss any related considerations or modifications in the context of the Maine Energy Storage Program statutory objectives.

[6] LD 1850 notes that for the purposes of Section 2, "index storage credit mechanism" means 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.

12) Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.

13) Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

14) Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

Use

Information collected from this RFI 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 RFI only, and the GEO will not pay for information provided under this RFI and no project will be supported as a result of this RFI. This RFI 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 RFI. ***The GEO may publish responses to this RFI on its website. All responses to this RFI may be subject to the State of Maine Freedom of Access Act,[7] thus sensitive or confidential business information should not be provided in response to this RFI.***

[7] https://www.mainelegislature.org/legis/statutes/1/title1ch13sec0.html.

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.

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

[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,

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[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.

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Interconnection Requests for New England Control Area As of: 10/29/2023 12:00:00 AM ***ISO-NE Public***

Generation, Elective Transmission Upgrade and Transmission Service Requests

Jurisdiction: All **Status:** All

Position	Updated	Type	Requested	Alternative Name	Unit	Fuel Type	Net MW	Summer MW	Winter MW	County	State	Op Date	Sync Date	W/ D Date	Serv	SIS Complete	I39	TO Report	Dev	Zone	FS	SIS	OS	FAC	IA	Project Status
575	08/25/2017	G	11/03/2015	Casco Bay Energy Storage	OT	BAT	16	16	16	Cumberland	ME	12/31/2016	12/02/2016		NR	TRUE	TRUE	ISO-NE		ME		Document Posted			Executed	In Service
771	08/28/2018	G	07/26/2018	Battery Storage	OT	BAT	19	19	19	Penobscot	ME	06/01/2019	05/01/2019	08/28/2018	CNR	FALSE	FALSE		PD	BHE						
874	11/29/2021	G	04/08/2019	Cross Town Battery Storage	OT	BAT	175	175	175	Cumberland	ME	08/29/2025	05/30/2025		CNR	TRUE	TRUE	ISO-NE	PD	ME		Document Posted			Executed	
905	10/17/2023	G	08/01/2019	Battery Storage	OT	BAT	10	10	10	Cumberland	ME	06/01/2024	06/01/2024		NA	TRUE	TRUE	CMP		ME						
904	03/14/2023	G	08/01/2019	Battery Storage	OT	BAT	14	14	14	Kennebec	ME	01/25/2024	01/01/2024		NA	TRUE	TRUE	CMP		ME						
947	03/12/2020	G	01/07/2020	Battery Storage	OT	BAT	200	200	200	Androscoggin	ME	12/07/2022	12/07/2022	03/12/2020	CNR	FALSE	FALSE		PD	ME						
1015	10/03/2023	G	04/22/2020	Battery Storage	OT	BAT	112	112	112	Penobscot	ME	12/01/2024	09/01/2024	08/22/2023	CNR	TRUE	FALSE	ISO-NE	PD	BHE		Document Posted		Not Required		
1014	10/03/2023	G	04/22/2020	Battery Storage	OT	BAT	112	112	112	Penobscot	ME	06/01/2024	03/01/2024	08/22/2023	CNR	TRUE	TRUE	ISO-NE	PD	BHE		Document Posted				
1019	09/19/2023	G	04/24/2020	Battery Storage	OT	BAT	20	20	20	Penobscot	ME	04/01/2024	01/01/2024	09/19/2023	NR	TRUE	FALSE	ISO-NE	PD	BHE		Document Posted			In Progress	Under Study
1084	02/08/2021	G	11/04/2020	Battery Storage	OT	BAT	102	102	102	Kennebec	ME	12/01/2023	09/01/2023	01/27/2021	CNR	FALSE	FALSE		PD	ME						
1250	05/19/2023	G	04/14/2022	Battery Storage	OT	BAT	51	51	51	York	ME	11/01/2024	09/01/2024	05/18/2023	CNR	FALSE	FALSE			ME	Not Started					Under Study
921	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	9	9	9	York	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
920	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	12	12	12	York	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
919	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	5	5	5	Knox	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
918	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	5	5	5	Howard	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
917	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	8	8	8	Androscoggin	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
916	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	5	5	5	Cumberland	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
915	10/21/2019	G	08/29/2019	Solar and Battery	OT	SUN BAT	5	5	5	Oxford	ME	12/31/2020	12/01/2020	10/17/2019	NA	FALSE	FALSE		PD	ME						
1076	03/14/2023	G	10/02/2020	Bowman Street 115 kV SS - Augusta Area Stu	OT	SUN BAT	5	5	5	Kennebec	ME	06/27/2023	06/27/2023		NA	TRUE	TRUE	CMP	PD	ME						
1074	04/18/2023	G	10/02/2020	Bowman Street 115 kV SS - Augusta Area Stu	OT	SUN BAT	9	9	9	Kennebec	ME	03/28/2023	03/01/2023		NA	TRUE	TRUE	CMP	PD	ME						
1071	03/14/2023	G	10/02/2020	Bowman Street 115 kV SS - Augusta Area Stu	OT	SUN BAT	10	10	10	Kennebec	ME	12/30/2022	09/30/2022		NA	TRUE	TRUE	CMP	PD	ME						
1070	03/14/2023	G	10/02/2020	Augusta E. Side 115 kV SS - Augusta Area Stu	OT	SUN BAT	4	4	4	Kennebec	ME	12/13/2022	12/13/2022		NA	TRUE	TRUE	CMP	PD	ME						
1067	03/14/2023	G	10/02/2020	Augusta E. Side 115 kV SS - Augusta Area Stu	OT	SUN BAT	4	4	4	Kennebec	ME	05/03/2022	05/03/2022		NA	TRUE	TRUE	CMP	PD	ME						
1096	03/14/2023	G	02/04/2021	CMP Winslow 115 kV SS - Winslow-Lakewooc	OT	SUN BAT	19	19	19	Somerset/Kennebec	ME	04/30/2024	04/30/2024		NA	TRUE	TRUE	CMP	PD	ME						
1094	03/14/2023	G	02/04/2021	CMP County Road 115 kV SS - Winslow-Lakev	OT	SUN BAT	18	18	18	Kennebec	ME	04/30/2024	04/30/2024		NA	FALSE	FALSE		PD	ME						
1151	06/26/2023	G	08/04/2021	13665 Felt Road Solar	OT	SUN BAT	2			Oxford	ME	11/15/2024	11/15/2024		CNR	TRUE	TRUE	ISO-NE	PD	ME		Document Posted			Executed	Under Study
1239	02/23/2023	G	03/25/2022	Solar plus Battery	OT	SUN BAT	129	184	184	Oxford	ME	04/21/2026	04/07/2026		CNR	FALSE	FALSE		PD	ME	Document Posted	In Progress				Under Study
1242	03/14/2023	G	03/28/2022	Lewiston CMP Cluster 5	OT	SUN BAT	87	88	88	Oxford/Androscoggin	ME	06/30/2028	06/30/2028		NA	FALSE	FALSE		PD	ME						
1241	03/14/2023	G	03/28/2022	Sanford/Quaker Hill CMP Cluster 4	OT	SUN BAT	66	66	66	York	ME	06/30/2028	06/30/2026		NA	TRUE	TRUE	CMP	PD	ME						
1255	05/31/2023	G	05/02/2022	Detroit/Guilford/Belfast DG Area Study	OT	SUN BAT	104	104	104	Piscataquis/Penobscot/Somerset	ME	12/31/2027	12/31/2027		NA	TRUE	TRUE	CMP	PD	ME						
1254	03/14/2023	G	05/02/2022	Kimball DG Area Study	OT	SUN BAT	92	92	92	York/Oxford/Cumberland	ME	06/30/2028	06/30/2028		NA	FALSE	FALSE		PD	ME						
1261	01/17/2023	G	05/06/2022	Battery Storage Addition (to QP1086)	OT	SUN BAT	-	160	160	Oxford	ME	06/03/2026	05/20/2026		CNR	FALSE	FALSE		PD	ME	Document Posted	In Progress				Under Study
1295	08/09/2022	G	08/03/2022	Solar plus Battery	OT	SUN BAT	205	205	205	Aroostook	ME	11/28/2025	09/03/2025		CNR	FALSE	FALSE		PD	ME						
1383	07/25/2023	G	04/13/2023	Solar and Battery	PV	SUN BAT	139	139	139	Penoboscot	ME	12/31/2028	09/01/2028		CNR	FALSE	FALSE	ISO-NE	NA	BHE	In Progress					
888	03/04/2021	G	04/26/2019	Millinocket Battery additon	OT	WAT BAT	-	126	126	Penobscot	ME	12/30/2020	12/07/2020		CNR	TRUE	TRUE	ISO-NE	PD	BHE		Document Posted			Executed	Under Construction
1104	04/20/2023	G	03/11/2021	Bonny Eagle Energy Storage - Uprate	OT	WAT BAT	8	26	26	York	ME	04/20/2023	03/13/2023		CNR	TRUE	TRUE	ISO-NE	PD	ME		Document Posted			Executed	
1113	05/05/2023	G	03/24/2021	Rumford Uprate and Battery addition	OT	WAT BAT	9	53	53	Oxford	ME	05/05/2023	03/24/2023		CNR	TRUE	FALSE	ISO-NE	PD	ME		Document Posted			Executed	
748	08/28/2019	G	04/12/2018	Battery storage addition (see Q746)	OT	WND BAT	24.2999992	238.6000061	238.6000061	Franklin	ME	10/31/2021	08/01/2021	08/27/2019	CNR	FALSE	FALSE		PD	ME						
747	08/28/2019	G	04/12/2018	Battery storage addition (see Q745)	OT	WND BAT	24.3999996	265.6000061	265.6000061	Franklin	ME	10/31/2021	08/01/2021	08/27/2019	CNR	FALSE	FALSE		PD	ME						
666	04/12/2018	G	07/21/2017	battery storage additional (see Q664)	OT	WND BAT	0	238.6000061	238.6000061	Franklin	ME	10/31/2020	08/01/2020	04/12/2018	CNR	FALSE	FALSE		PD	ME		Not Started				Under Study
665	04/12/2018	G	07/21/2017	Battery storage addition (see Q663)	OT	WND BAT	0	265.6000061	265.6000061	Franklin	ME	10/31/2020	08/01/2020	04/12/2018	CNR	FALSE	FALSE		PD	ME		Not Started				Under Study
637	08/08/2019	G	04/13/2017	BSS CNR only (see Q577)	OT	WND BAT	0	270.4599915	270.4599915	Franklin	ME	10/31/2019	08/01/2019	08/08/2019	CNR	FALSE	FALSE		PD	ME						
636	08/08/2019	G	04/13/2017	BSS CNR only (see Q576)	OT	WND BAT	0	241.4900055	241.4900055	Franklin	ME	10/31/2019	08/01/2019	08/08/2019	CNR	FALSE	FALSE		PD	ME						
577	08/08/2019	G	11/12/2015	Battery Storage	OT	WND BAT	25.0799999	270.4599915	270.4599915	Frqanklin	ME	11/09/2019	08/01/2019	08/08/2019	NR	TRUE	FALSE	ISO-NE	PD	ME		In Progress				
576	08/08/2019	G	11/12/2015	Battery Storage	OT	WND BAT	52.2599983	241.4900055	241.4900055	Franklin	ME	10/31/2019	08/01/2019	08/08/2019	NR	TRUE	FALSE	ISO-NE	PD	ME		In Progress				

ID	Name	Type	Intermittent	Generating Fuel Type	Capacity Zone ID	Capacity Zone Name	State	Load Zone	Status	Lead Participant ID	Lead Participant Name	De-list Bid Type	De-list Bid MW	Summer Qual	Winter Qual	FCA Qual	Jun-26	Jul-26	Aug-26	Sep-26	Oct-26	Nov-26	Dec-26	Jan-27	Feb-27	Mar-27	Apr-27	May-27
40653	Madison BESS	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	Existing	133889	Madison ESS, LLC			4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95
40919	Resource Cross Town	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	Existing	132964	Energy Storage Resources, LLC			175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00
41566	Great Lakes Millinocket	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	Existing	132888	Brookfield Renewable Trading A			20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
44335	Bonny Eagle Renewable BES	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	Existing	50173	Brookfield White Pine Hydro LL			7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79	7.79
40905	Rumford BESS	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	New	129470	New England Battery Storage, L			4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99
44331	Rumford Renewable BES	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	New	132888	Brookfield Renewable Trading A			8.00	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93	6.93
44583	Sanford BESS (#40885)	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	New	129470	New England Battery Storage, L			4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99	4.99
44585	South Portland BESS (#40912)	Generator	No	Electricity used for Energy Storage	8503	Maine	ME	ME	New	129470	New England Battery Storage, L			10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

CES Attachment 3_ISONE SMD Hourly Data for Maine can be downloaded using this link:
https://www.maine.gov/energy/sites/maine.gov.energy/files/2024-01/CES%20Attachment%203_ISONE%20SMD%20Hourly%20Data%20for%20Maine.xlsx

185 FERC ¶ 61,044
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Willie L. Phillips, Acting Chairman;
James P. Danly, Allison Clements,
and Mark C. Christie.

ISO New England Inc. | Docket Nos. ER23-739-000
ER23-739-001
ER23-743-000
ER23-743-001

ORDER ACCEPTING TARIFF REVISIONS

(Issued October 19, 2023)

1. On December 29, 2022, pursuant to section 205 of the Federal Power Act (FPA)[1] and section 35.13 of the Commission's regulations,[2] ISO New England Inc. (ISO-NE), joined by the Participating Transmission Owners Administrative Commission on behalf of the New England Participating Transmission Owners (PTO) and the New England Power Pool (NEPOOL) Participants Committee (together, Filing Parties) filed proposed revisions to ISO-NE's Transmission, Markets and Services Tariff (Tariff) and Transmission Operating Agreement (TOA) to enable electric storage facilities to be planned and operated as transmission-only assets (i.e., Storage as Transmission-Only Asset or SATOA) to address system needs identified in the regional system planning process set forth in the Tariff.[3] In this order, we accept Filing Parties' proposal and direct them to notify the Commission of the actual effective date of the Tariff revisions no less than 30 days prior to the date the proposed Tariff revisions are implemented, as discussed below.

[1] 16 U.S.C. § 824d.

[2] 18 C.F.R. § 35.13 (2022).

[3] The proposed revisions to the Tariff and TOA are referred to collectively as the SATOA Revisions. ISO-NE states that it submitted the Tariff revisions in Docket No. ER23-739 and the TOA revisions separately in Docket No. ER23-743 due to technical limitations associated with the Commission's eTariff system. ISO-NE asks that the Commission treat the two submissions as a single filing. ISO-NE submitted both sets of revisions with "12/31/9998" effective dates.

I. **Background**

2. In *Nevada Hydro I*, the Commission denied a request that a pumped storage project (Lake Elsinore Advanced Pumped Storage project, or LEAPS) be treated as a transmission facility under the operational control of California Independent System Operator Corporation (CAISO) and that the cost of the project be included in CAISO's rolled-in transmission access charge.[4] The Commission stated that the purpose of CAISO's transmission access charge is to recover the costs of transmission facilities under the control of CAISO, not to recover the costs of bundled services.[5] The Commission found that it would not be appropriate for CAISO to assume operational control over the pumped-storage facility.[6] The Commission stated that, for these reasons, LEAPS' costs were not properly recovered through the transmission access charge. The Commission added that, absent information that justified treating LEAPS differently from the existing pumped hydro facilities in CAISO's footprint, allowing LEAPS to receive a guaranteed revenue stream through CAISO's transmission access charge would create an undue preference for LEAPS compared to these other similarly situated pumped hydro generators.[7]

3. Subsequently, in *Western Grid*, the Commission granted a petition for declaratory order from Western Grid, requesting that the Commission classify its electric storage resources as transmission for cost-based recovery purposes, finding (among other things) that when operated at CAISO's direction to provide voltage support and thermal overload protection for relevant transmission facilities, the electric storage resource would function as wholesale transmission facilities.[8]

4. In 2017, the Commission issued a policy statement providing guidance and clarification on, among other things, the ability of electric storage resources to receive cost-based rate recovery for certain services, such as transmission or grid support

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[4] *The Nev. Hydro Co.*, 122 FERC ¶ 61,272, at PP 82-83 (2008) (*Nevada Hydro I*).

[5] *Id*. P 83.

[6] *Id*. P 82.

[7] *Id*. P 83.

[8] *W. Grid Dev., LLC*, 130 FERC ¶ 61,056, at PP 45, 46, *order on reh'g*, 133 FERC ¶ 61,029 (2010) (*Western Grid*).

services, while also receiving market-based revenues for providing separate market-based rate services.[9]

5. In 2018, the Commission dismissed a petition requesting that the Commission find that the LEAPS project is a transmission facility consistent with *Western Grid* and the 2017 Policy Statement and that the project was entitled to cost-based recovery.[10] The petition was dismissed as premature as the project had not yet been studied in CAISO's regional transmission planning process, and the Commission concluded that it could not make a reasoned decision as to whether the project was a transmission project and thus eligible for cost recovery under CAISO's rolled-in transmission access charge.[11]

6. In 2020, the Commission accepted a proposal by Midcontinent Independent System Operator, Inc. (MISO) to revise its Open Access Transmission, Energy, and Operating Reserve Markets Tariff to allow electric storage resources that serve a transmission function to be approved as the preferred solutions to transmission issues identified in the MISO Transmission Expansion Plan and to have their costs recovered through cost-based transmission rates.[12]

7. In 2023, the Commission accepted a proposal by Southwest Power Pool, Inc. (SPP), under which an electric storage resource may be considered a transmission asset.[13] The Commission found that the framework will result in the selection of SATOAs only when those resources perform a transmission function.[14]

II. Filing

8. Filing Parties state that the SATOA Revisions add a definition of SATOA[15] and include facilitating Tariff language to address the cost allocation and recovery,

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[9] *Utilization of Elec. Storage Res. for Multiple Servs. When Receiving Cost-Based Rate Recovery*, 158 FERC ¶ 61,051, at P 9 (2017) (2017 Policy Statement).

[10] *Nev. Hydro Co.*, 164 FERC ¶ 61,197 (2018) (*Nevada Hydro II*).

[11] *Id.* P 22.

[12] *Midcontinent Indep. Sys. Operator, Inc.*, 172 FERC ¶ 61,132, *reh'g denied*, 173 FERC ¶ 62,022 (2020) (MISO Order).

[13] *Sw. Power Pool, Inc.*, 183 FERC ¶ 61,153 (2023) (SPP Order).

[14] *Id.* P 29.

[15] Filing Parties propose to define SATOA as "electric storage equipment that: (1) is connected to or to be connected to Pool Transmission Facilities in the New England

transmission planning, operation, interconnection, and market participation issues related to SATOAs.

9. Filing Parties state that the SATOA Revisions provide for the consideration of electric storage facilities as a regulated transmission solution in the Solutions Study[16] and the competitive solution processes to address transmission system needs identified in Needs Assessments and Public Policy Transmission Studies performed pursuant to Attachment K of the Tariff.[17] Filing Parties explain that if a SATOA is selected as the preferred regulated transmission solution via these processes for inclusion in the Regional System Plan, the SATOA will be categorized as a Pool Transmission Facility subject to ISO-NE's operating authority.[18]

10. Filing Parties state that ISO-NE will use its operating authority to manually dispatch the SATOA for the limited purposes of addressing the transmission system needs for which it was planned, avoiding or mitigating load shedding after all available dispatchable resources that can effectively provide relief to avoid or mitigate the load shedding have been dispatched, or providing support during system restoration.[19]

11. Filing Parties state that the proposed revisions prohibit SATOAs from participating in ISO-NE's markets other than for the limited purposes specified in the

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Transmission System at a voltage level of 115 kV or higher; (2) the ISO approved to be included in the Regional System Plan and RSP Project List as a regulated transmission solution and Pool Transmission Facility pursuant to the regional system planning processes in Attachment K of the [Tariff]; and (3) is capable of receiving energy only from the Pool Transmission Facilities and storing the energy for later injection to the Pool Transmission Facilities." Proposed Tariff, I.2 (148.1.0), § I.2.2.

[16] Unless indicated otherwise, all capitalized terms not defined herein shall have the same meaning given to them in the Tariff.

[17] Transmittal at 7-8 (citing Tariff, attach. K, (28.1.1) §§ 4.2, 4.3, 4A). Filing Parties explain that the Solutions Study process is used to develop transmission solutions to system reliability needs that are time sensitive, whereas the competitive solutions process is used to develop transmission solutions to market efficiency needs, public policy needs, and reliability needs that are not time sensitive. Time-sensitive reliability needs are those that are needed within three years or less from the completion of a Needs Assessment. *See* Tariff, attach K, § 4.1(i).

[18] Transmittal at 8 (citing Transmittal, § IV(C) (discussing Proposed Tariff, § II.51 (1.0.0)); *see also id.*, attach. (Brent K. Oberlin Testimony) at 11-12).

[19] Transmittal at 8.

rules.[20] Filing Parties note that these limitations on market activity help minimize market impacts and ensure a SATOA does not receive dual recovery of its costs via both cost-of-service rates and market-based rates.[21] Filing Parties explain that SATOAs will be considered Pool Transmission Facilities, and therefore a SATOA owner will be eligible for compensation through the Annual Transmission Revenue Requirements set forth in Attachment F of the Tariff. They further explain that any net costs and revenues a SATOA receives from the New England Markets for charging and discharging will be charged or credited, as applicable, to transmission ratepayers via the Annual Transmission Revenue Requirements in Attachment F of the Tariff.[22]

12. According to Filing Parties, the revisions include, among other rules: (1) an evaluation process that allows a SATOA to be included in the Regional System Plan as the preferred regulated transmission solution for a system need and ensures that SATOAs are reviewed with the same rigor as traditional wires-based transmission solutions;[23] (2) limitations on a SATOA's operations;[24] (3) restrictions on the market activities and, therefore, market impacts of a SATOA;[25] (4) a mechanism under which a SATOA owner recovers costs and returns incidental payments from consuming and injecting energy;[26] and (5) other conforming revisions necessary to recognize the SATOA as transmission and avoid confusion, including restrictions that exclude SATOAs from the

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[20] Transmittal at 9.

[21] *Id.*

[22] *Id.* (citing Proposed Tariff, § II.51).

[23] *Id.* (citing Proposed Tariff, § II.51.1; *see also* MISO Order, 172 FERC ¶ 61,132 at P 52 (finding that "MISO's proposed evaluation criteria establish a just and reasonable and not unduly discriminatory or preferential framework for SATOAs to be evaluated in the MTEP using the same qualification requirements that the Commission has already approved for existing transmission project types, plus appropriate additional criteria specific to the SATOA")).

[24] *Id.* (citing Proposed Tariff, § II.51.2).

[25] *Id.* (citing Proposed Tariff, § III.1 (68.1.0), § III.1.7.21; *id.* § III.3 (28.1.0), §§ III.3.2.1(b)(iv), III.3.2.1(b)(vi), III.3.2.2). Section III of the ISO-NE Tariff is referred to herein as Market Rule 1.

[26] *Id.* (citing Proposed Tariff, § II.51; *id.*, attach. F- app. E; *see also* 2017 Policy Statement, 158 FERC ¶ 61,051 at PP 16-17 (stating that crediting any market revenues back to the cost-based ratepayers is one possible solution to avoid double recovery of costs by electric storage facilities being compensated through cost-based rates)).

Interconnection Procedures applicable to market resources and elective transmission expansion.[27]

13. Filing Parties also assert that the instant filing is consistent with Commission precedent addressing SATOAs, because: (1) the SATOA will be operated in a manner that preserves ISO-NE's independence because the SATOA owner is responsible for maintaining the necessary state of charge to serve the transmission function;[28] (2) ISO-NE will exercise operating authority (i.e., functional control) of the SATOA for transmission purposes only[29] and will not be responsible for buying power to charge the SATOA; (3) any payments or charges received by a SATOA owner for charging and discharging to meet its transmission obligations are properly credited against the Annual Transmission Revenue Requirements; and (4) the project must be identified in ISO-NE's regional system planning process as the preferred solution to meet a system need.

14. Filing Parties further state that the proposed revisions clarify that, as a price taker in the Real Time Energy Market, a SATOA will pay or be paid the Locational Marginal Price for energy at the time of consumption or injection at its solely-assigned node[30] and will be unable to make bids or offers into the energy market; therefore a SATOA will be unable to set the market price.[31]

15. Filing Parties state that, during transmission solution development under the regional system planning process, ISO-NE will test the SATOA under Tariff section I.3.9

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[27] *Id.* at 9-10 (citing Proposed Tariff, Schedules 22, 23, 25; *see also generally* TOA and Non-Incumbent Transmission Developer Operating Agreement).

[28] *Id.* at 10 (citing 2017 Policy Statement, 158 FERC ¶ 61,051 at PP 25, 27; *see also* MISO Order, 172 FERC ¶ 61,132 at P 108).

[29] *Id.* (citing TOA, Schedule 1.01 (defining Operating Authority); *see also id.* §§ 3.02, 3.05 (describing the functions ISO-NE will perform with respect to each PTO's Transmission Facilities)).

[30] Filing Parties propose new section III.1.7.21 to Market Rule 1, providing that a node will be established for each SATOA.

[31] Filing Parties clarify that the SATOA Revisions do not contain revisions that explicitly prohibit a SATOA from submitting bids and offers in the New England Markets because the currently effective Tariff provisions already preclude a SATOA from doing so. Filing Parties explain that the currently effective Tariff provides which resources are permitted to submit bids and offers in the New England Markets and that the language enabling resources to submit bids and offers only applies market-based resources. Transmittal at 23 n.95.

to ensure that the SATOA does not have an adverse impact on the system or on any resources proposed under interconnection processes. If such impacts are discovered, Filing Parties state that the cost of impact mitigation will be in the SATOA project costs and will be considered part of the overall SATOA project. Filing Parties conclude that these requirements, collectively, foreclose any need to study the SATOA in the queue.[32]

16. Filing Parties request that the Commission accept the SATOA Revisions as filed, without modifications or conditions, with an effective date of "12/31/9998" to allow ISO- NE's staff sufficient time to develop, test, and implement the software system modifications necessary to implement the SATOA Revisions and to develop the processes necessary to implement the revisions. Filing Parties state that ISO-NE will submit a filing with the Commission specifying a precise effective date prior to implementation. Filing Parties further request that the Commission issue an order accepting the SATOA Revisions no later than March 29, 2023, to provide the regulatory certainty required for ISO-NE to begin committing resources to implement the SATOA software and processes to support a targeted July 1, 2024, effective date.[33] Filing Parties request waiver of the Commission's notice requirements to allow these Tariff revisions to be effective more than 120 days after the date of filing.

III. Notice and Responsive Pleadings

17. Notice of Filing Parties' proposed SATOA Revisions was published in the *Federal Register*, 88 Fed. Reg. 1214 (Jan. 9, 2023), with interventions and protests due on or before January 19, 2023. A notice of intervention was filed in Docket Nos. ER23-739-000 and ER23-743-000 by Massachusetts Department of Public Utilities. Timely motions to intervene were filed under Docket Nos. ER23-739-000 and ER23-743-000 by: Avangrid Networks, Inc.; Electric Power Supply Association; Eversource Energy Service Company; LSP Transmission Holdings II, LLC; and RENEW Northeast, Inc. Timely motions to intervene were filed under Docket No. ER23-739-000 only by: American Clean Power Association; Narragansett Electric Company; and Vistra Energy Corp. and Dynegy Marketing and Trade, LLC, jointly.

18. Timely motions to intervene and comments or protests were filed under Docket Nos. ER23-739-000 and ER23-743-000 by: Advanced Energy United; FirstLight Power, Inc.; New England Power Generators Association Inc. (NEPGA); New England States Committee on Electricity (NESCOE); the Union of Concerned Scientists; and Vermont Electric Power Company, Inc. and Vermont Transco (collectively, VELCO). Timely motions to intervene and comments or protests were filed under Docket No. ER23-739-000 only by National Grid USA (National Grid). ISO-NE, NEPOOL, and

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[32] *Id.* at 20-21.

[33] *Id.* at 21.

NEPGA filed answers under Docket Nos. ER23-739-000 and ER23-743-000. National Grid filed an answer under Docket No. ER23-739-000 only. On March 3, 2023, ISO-NE filed a second answer.

19. On May 15, 2023, Commission staff issued a deficiency letter requesting additional information about Filing Parties' filing (Deficiency Letter). On June 14, 2023, ISO-NE filed a response to the Deficiency Letter (Deficiency Response). Notice of the Deficiency Response was published in the *Federal Register*, 88 Fed. Reg. 40,254 (June 21, 2023), with interventions and protests due on or before July 5, 2023.

20. On July 5, 2023, Elevate Renewables F7, LLC (Elevate Renewables) filed a timely motion to intervene and comments.

21. On July 12, 2023, National Grid filed a motion to reject Elevate Renewables comments.

22. On July 27, 2023, Elevate Renewables filed a timely answer to National Grid's motion.

IV. Commission Determination

A. Procedural Issues

23. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2022), the notice of intervention and timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

24. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2022), prohibits an answer to a protest unless otherwise ordered by the decisional authority. We accept ISO-NE's, National Grid's, NEPGA's, and NEPOOL's answers because they have provided information that assisted us in our decision-making process. We also accept National Grid's timely submitted motion to reject for filing.

25. Pursuant to Rule 213(a)(3) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(3), answers to motions are permitted; therefore, we accept Elevate Renewables' answer to National Grid's motion to reject.

B. Substantive Issues

26. As discussed below, we find that the proposed SATOA Revisions to establish a framework under which an electric storage resource may be considered a transmission asset are just and reasonable and not unduly discriminatory or preferential, and therefore we accept them. We direct Filing Parties to make a filing notifying the Commission of

the actual effective date of the proposed SATOA Revisions no less than 30 days prior to the date ISO-NE implements the proposed Tariff revisions.[34]

1. Evaluation and Selection of SATOA

a. Filing

27. Filing Parties explain that proposed section II.51.1 of the Tariff contains the rules for evaluating and selecting a SATOA under ISO-NE's regional system planning process. According to Filing Parties, section II.51.1 provides for a SATOA to be evaluated as a regulated transmission solution and identified as the preferred solution in accordance with the criteria, factors, and requirements in Attachment K of the Tariff, as well as those specific to SATOAs incorporated in sections II.51.1(a) through (h).[35] Filing Parties posit that if a SATOA offers the best combination of electrical performance, cost, future system expandability, and feasibility to comprehensively address a system need based on the proposed evaluation criteria (i.e., the traditional and SATOA-specific criteria), it will be selected as the preferred solution to address the system need.[36]

28. Filing Parties explain that SATOA-specific criteria incorporated in sections II.51.1(a) to (h) are as follows: section II.51.1(a) requires ISO-NE to consider the ability of a proposed SATOA to address the applicable system need in all hours that the need is determined to exist; section II.51.1(b) requires ISO-NE to evaluate the ability of a SATOA to provide or absorb reactive power regardless of whether the SATOA is injecting or consuming real power;[37] section II.51.1(c) limits the aggregate amount of SATOAs as regulated transmission solutions to 300 megawatts (MW) of charging capability and 300 MW of discharging capability; section II.51.1(d) limits the total

[34] Filing Parties should use the following eTariff Type of Filing Code: "150 Data Response/Supplement the Record." We grant Filing Parties' request for waiver of the Commission's 120-day advance notice requirement for good cause shown. *See* 18 C.F.R. § 35.3(a)(1) (2022).

[35] Transmittal at 14 (citing Tariff, attach. K, §§ 4.2(d), 4.3(h), 4A.8 (listing evaluation factors used to identify the preferred solution to address system needs)).

[36] *Id.* at 15 (citing Tariff, attach. K, §§ 4.2(a), 4.3(h), 4.3(j), 4A.9(a)); *see also id.*, Oberlin Test. at 6.

[37] Filing Parties note that SATOAs are often capable of producing reactive power much like a dynamic reactive transmission device; an electric storage facility that can provide reactive power continuously—24 hours a day, seven days a week—will be looked at more favorably than an electric storage facility that cannot. Transmittal at 14-15.

amount of SATOAs at a substation to 30 MW of charging capability and 30 MW of discharging capability;[38] section II.51.1(d) prohibits the evaluation or selection of a SATOA as the preferred solution to address violations of an Interconnection Reliability Operating Limit (IROL) or system needs related to an IROL;[39] section II.51.1(f) precludes the selection of multiple SATOAs to address a single system need or multiple needs in the same area due to contingencies involving the same or similarly situated elements; section II.51.1(g) requires that a SATOA only be evaluated or identified as the preferred solution to resolve a system need that is the result of a second contingency (N-1-1): a proposed SATOA shall not be evaluated or identified as the preferred solution to resolve an N-0 (all-lines-in) or N-1 (first contingency) system need;[40] and section II.51.1(h) allows ISO-NE to evaluate any additional considerations unique to SATOAs that may support comparative evaluation to other solutions to the system need.[41] ISO-NE states that, because these proposed revisions are technology neutral, this allows flexibility for the SATOA to propose innovative solutions and ISO-NE to account for them in considering the SATOA's ability to meet the system need.[42]

29. Filing Parties also propose to revise the Interconnection Procedures to clarify that they do not apply to SATOAs, since SATOAs are being developed as regulated transmission solutions pursuant to the regional system planning process in Attachment K. Specifically, Filings Parties propose to revise the definition of Generating Facility in Schedules 22 and 23 of the Tariff to state that a Generating Facility shall not include a

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[38] Filing Parties explain these limits are necessary to minimize the likelihood of sudden impacts on Area Control Error and generation dispatch and will reduce the burden on system operators manually dispatching SATOAs outside of the ISO-NE market systems. Transmittal at 15.

[39] Filing Parties state that precluding the use of a SATOA for addressing violations of an IROL or system needs related to an IROL avoids additional risk should the SATOA fail to enter into service when needed. Transmittal at 15-16.

[40] Filing Parties assert that limiting the selection of a SATOA to address lower probability, more infrequent contingencies (i.e., N-1-1 contingencies) decreases the likelihood of a SATOA frequently injecting real power, which could occur if a SATOA was needed to address an all lines in condition (N-0) or first contingency (N-1) if the failed element was one that takes significant time to repair, and minimizes frequent operation of SATOAs for real power injection. Transmittal at 16.

[41] *Id.* at 14-17.

[42] Deficiency Response at 11.

SATOA. Additionally, Filings Parties propose to revise Schedule 25 of the Tariff to state that an Elective Transmission Upgrade (ETU) shall not include a SATOA.[43]

b. Comments/Protests

30. National Grid believes it is important for any Commission order accepting these revisions to clarify that the changes to the Tariff do not prevent proposed storage projects that do not meet the narrow requirements of a SATOA from being considered and studied as participant-funded transmission projects or merchant transmission projects under relevant ISO-NE Tariff provisions including the ETU interconnection provisions of the Tariff.[44] To the extent the SATOA Revisions could be interpreted to preclude the consideration of non-SATOA storage projects as ETUs under the Tariff, National Grid protests such a limitation.[45] National Grid is concerned that, absent clarification from the Commission, the proposed SATOA Revisions could be misinterpreted as being the exclusive vehicle through which storage facilities in New England may qualify as transmission for any purpose under the ISO-NE Tariff.[46]

31. National Grid maintains that under the ISO-NE Tariff, ETUs can include participant-funded transmission facilities and merchant transmission facilities, while noting that, in the SATOA Revisions, ISO-NE proposes to revise Schedule 25 to "explicitly state that an [ETU] shall not include a SATOA" and to "preclude the application of the [Schedule 25] procedures to SATOA."[47] National Grid argues that interpreting the SATOA Revisions to preclude the development of storage projects as participant-funded transmission or merchant transmission facilities would improperly discriminate against the development of such projects.[48] National Grid states that if ISO-NE intended to prevent non-SATOA storage projects from being ETUs, ISO-NE has not justified such a limitation.[49]

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[43] Transmittal at 19-20.

[44] National Grid Comments and Limited Protest at 2.

[45] *Id.*

[46] *Id.* at 7.

[47] *Id.* at 9-10.

[48] *Id.* at 12.

[49] *Id.* at 13.

c. Answers

32. In their answers, ISO-NE and NEPGA contend that National Grid's request to amend the Tariff rules related to non-SATOA storage projects is outside the scope of the SATOA Revisions and must be rejected.[50] ISO-NE asserts that National Grid asks the Commission to go well beyond the scope of the instant proceeding to modify Schedule 25 in order to extend its application to storage, which presently falls under the Interconnection Procedures for Generating Facilities set forth in Schedules 22 and 23 of the Tariff in accordance with the Commission's Order Nos. 792 and 845.[51] ISO-NE argues that National Grid's suggested clarification or, alternatively, proposed modification to Schedule 25 of the Tariff is prohibited under the standard of review for FPA section 205 because the SATOA Revisions were filed pursuant to FPA section 205, which "gives a utility the right to file rates and terms for services rendered with its assets."[52] ISO-NE states that whether an intervenor suggests or even prefers an alternative proposal, the Commission must accept the SATOA Revisions if it finds them just and reasonable.[53] NEPGA states that the question before the Commission is whether it is lawful to allow a battery storage resource to qualify to meet transmission reliability needs as a Pool Transmission Facility according to the quantity and operational conditions filed by ISO-NE, not, as National Grid suggests, whether it might be lawful for a market asset (e.g., a battery storage resource offered as an ETU) to also qualify as a SATOA and Pool Transmission Facility.[54]

33. ISO-NE explains that, to the extent National Grid wishes to explore Tariff revisions that allow for the treatment of "non-SATOA storage projects" as ETUs, those changes should proceed through the stakeholder process, as required under the Commission-accepted Participant Agreement.[55]

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[50] ISO-NE First Answer at 3-5; NEPGA Answer at 1.

[51] ISO-NE First Answer at 4 (citing *Small Generator Interconnection Agreements & Procs.*, Order No. 792, 145 FERC ¶ 61,159 (2013), *order on clarification*, Order No. 792-A, 144 FERC ¶ 61,214 (2014); *Reform of Generator Interconnection Procs. & Agreements*, Order No. 845, 163 FERC ¶ 61,043 (2018), *order on reh'g*, Order No. 845-A, 166 FERC ¶ 61,137 (2019)).

[52] *Id.* (citing *Atl. City Elec. Co. v. FERC*, 295 F.3d 1, 9 (D.C. Cir 2002)).

[53] *Id.* at 5 (citing *S. Cal. Edison Co.*, 73 FERC ¶ 61,219, at 61,608 n.73 (1995)).

[54] NEPGA Answer at 2-5.

[55] ISO-NE First Answer at 5.

34. In its reply to ISO-NE and NEPGA, National Grid states that it simply requests that the Commission confirm that its precedent and policy allowing storage to be treated as transmission on a case-by-case basis will continue to apply if the changes proposed by ISO-NE in this proceeding are accepted.[56] National Grid asserts that its requested clarification is appropriate to reflect long-standing Commission precedent finding "electricity storage devices . . . do not readily fit into only one of the traditional asset functions of generation, transmission or distribution," and "[f]or this reason, the Commission has addressed the classification of energy storage devices on a case-by-case basis."[57]

35. National Grid asserts that its comments are within the scope of the current proceeding, and do not implicate the generator interconnection provisions under Schedules 22 and 23.[58] National Grid is concerned that the proposed changes to Schedule 25 may have broader implications, including barring storage-based ETUs from consideration as non-SATOA participant-funded transmission or merchant transmission solutions.[59]

36. In reply to NEPGA, National Grid claims that NEPGA's arguments falsely portray National Grid's intended aim of preserving opportunities, consistent with Commission precedent and policy, for storage facilities to be classified as transmission on a case-by-case basis in order to meet needs in New England.[60] National Grid clarifies that its comments do not suggest that storage projects proposed as ETUs would be market assets, nor does National Grid request that any storage project considered as an ETU also qualify as a SATOA or be treated as a Pool Transmission Facility.

37. In its Second Answer, ISO-NE reiterates its view that National Grid's requests are outside the scope of this proceeding and National Grid is attempting to have the Commission opine on a question that is irrelevant to this proceeding; namely, whether Schedule 25 and other relevant provisions of the Tariff allow non-SATOA electric

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[56] National Grid Answer at 1-3 (citing National Grid Comments at 10 (citing *Transmission Plan. & Cost Allocation by Transmission Owning & Operating Pub. Utils.*, Order No. 1000, 136 FERC ¶ 61,051, at PP 724-726 (2011) (permitting "a transmission developer, a group of transmission developers, or one or more individual transmission customers to voluntarily assume the costs of a new transmission facility")).

[57] *Id.* at 3-4 (citing *Western Grid*, 130 FERC ¶ 61,056 at P 44).

[58] *Id.* at 4.

[59] *Id.* at 5.

[60] *Id.* at 7-8.

storage facilities to be considered and studied as participant-funded transmission projects or merchant transmission projects under relevant ISO-NE Tariff provisions.[61] ISO-NE further maintains, however, the proposed revisions to Schedule 25 do not affect or determine whether non-SATOA electric storage facilities may be considered as participant-funded transmission projects or merchant transmission projects under Schedule 25 of the Tariff or other relevant Tariff provisions. Therefore, ISO-NE posits, National Grid's requests are not within the scope of this proceeding and should be rejected by the Commission.[62]

d. Deficiency Response

38. In the Deficiency Letter, Commission staff asked Filing Parties to explain how the SATOA Revisions, in conjunction with ISO-NE's existing regional planning process, ensure that a SATOA performs a transmission function. In response, ISO-NE states that the revisions are consistent with *AEP* because a SATOA will only be selected if it is studied and selected to address a specific transmission system need by providing a transmission function.[63] ISO-NE states that once selected, a SATOA will only perform transmission functions, i.e., the reliability functions provided by transmission assets over which ISO-NE has Operating Authority.[64]

39. In the Deficiency Letter, Commission staff asked Filing Parties to identify any specific information an electric storage resource must provide to be considered in the regional planning process and how that information bears on evaluation and selection of a SATOA. In reply, ISO-NE states that while the Tariff does not specify information provided for each type of transmission asset, examples of SATOA-specific information would include maximum charge rate, maximum discharge rate, MW capability, capability to provide or absorb reactive power, and replacement schedules for the electric energy storage.[65] ISO-NE further states that this SATOA-specific information would be used to determine whether a proposed SATOA is capable of addressing a N-1-1 contingency, and that ISO-NE would use an electric storage resource's reactive

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[61] ISO-NE Second Answer at 2-3.

[62] *Id.* at 5.

[63] Deficiency Response at 4 (citing *Am. Elec. Power Serv. Corp.*, 173 FERC ¶ 61,264 (2020), *order on reh'g*, 175 FERC ¶ 61,094 (2021) (*AEP*)).

[64] *Id.* at 4-5.

[65] *Id.* at 10.

capability information to evaluate the ability of a SATOA to provide or absorb reactive power regardless of whether the SATOA is injecting or consuming real power.[66]

e. Comments on Deficiency Response

40. Elevate Renewables supports ISO-NE's SATOA proposal and urges the Commission to accept it without condition or modification. With respect to National Grid's protest, Elevate Renewables states that ISO-NE has satisfied its FPA obligations, and, in any case, National Grid's request is beyond the scope of ISO-NE's proposal and would upset stakeholder consensus.[67]

i. Motion to Reject Elevate Renewables Comments

41. National Grid requests that the Commission reject Elevate Renewables' comments. National Grid states that, although styled as comments in support of ISO-NE's initial filing and subsequent Deficiency Response, Elevate Renewable's pleading is an impermissible and untimely answer to National Grid's January 19, 2023 protest submitted without requesting leave from the Commission to do so and far beyond the deadline for such answers.[68] National Grid avers that Elevate Renewable's comments raise matters beyond the scope of the questions posed in the Deficiency Letter or the information provided in the Deficiency Response.[69]

ii. Answer to National Grid's Motion

42. Elevate Renewables responds that National Grid's motion should be rejected because it is overly broad, as it seeks to have the Commission reject even the portion to which National Grid raises no objection.[70] Elevate Renewables states that there is nothing novel or inappropriate in Elevate Renewables' comments referencing pleadings that have been submitted to date on the ISO-NE proposal.[71]

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[66] *Id.*

[67] Elevate Comments on Deficiency Response at 5-8.

[68] National Grid Motion to Reject at 3, 4.

[69] *Id.* at 4-5.

[70] Elevate Renewables Answer at 6.

[71] *Id.* at 5.

f. Commission Determination

43. We find that Filing Parties' SATOA Revisions for electric storage resources to be considered transmission-only assets is just and reasonable and not unduly discriminatory or preferential. We deny National Grid's motion to reject, as discussed below.

44. Filing Parties' SATOA Revisions will result in the selection of SATOAs only when those resources perform a transmission function, consistent with Commission precedent.[72] Filing Parties' SATOA Revisions ensure that a SATOA will serve a transmission function because: (1) the SATOA definition requires that a SATOA be connected to the transmission system as a transmission facility and be capable of receiving energy only from Pool Transmission Facilities and storing the energy for later injection to Pool Transmission Facilities; (2) a proposed SATOA must be identified or selected in ISO-NE's transmission planning processes as the preferred solution to resolve a transmission issue; (3) there must be a need to resolve the transmission issue through the storage facility's function as a SATOA, as the transmission issue cannot be addressed by a market solution; (4) a SATOA will operate only as necessary to address the applicable system needs or concerns for which the SATOA was identified to address through a Needs Assessment, a Solutions Study, a Public Policy Transmission Study, the competitive solutions process in Attachment K of the Tariff, or a combination of these;[73] and (5) the SATOA will be under ISO-NE's operational control. We find that, in these circumstances, SATOAs are properly characterized as transmission assets, and the costs of a SATOA are appropriately recoverable through transmission rates.[74]

45. We agree with ISO-NE that National Grid's request for clarification regarding the applicability of Schedule 25 of the Tariff to *non*-SATOAs is outside the scope of this proceeding. As ISO-NE explains, the proposed revisions to Schedule 25 do not affect or determine whether non-SATOA electric storage facilities may be considered as participant-funded transmission projects or merchant transmission projects under

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[72] *See* SPP Order, 183 FERC ¶ 61,153 at PP 28-29; MISO Order, 172 FERC ¶ 61,132 at P 131; *Western Grid*, 130 FERC ¶ 61,056 at P 43; *see also AEP*, 173 FERC ¶ 61,264 at P 35 (finding that the storage facility at issue failed to perform a transmission function and therefore was not a transmission asset eligible to receive cost-of-service transmission rate recovery).

[73] Proposed Tariff section II.51.2 provides that SATOAs may also operate to absorb or provide reactive power, maintain its required state-of-charge, support the transmission system during restoration, or avoid or mitigate Load Shedding after all available Dispatchable Resources that can effectively provide relief to avoid or mitigate the Load Shedding have been dispatched.

[74] *See* SPP Order, 183 FERC ¶ 61,153 at PP 28-29.

Schedule 25 of the Tariff or other relevant Tariff provisions. The Commission's review under FPA section 205 is limited to determining whether the proposal as submitted is just and reasonable and not unduly discriminatory or preferential. Given that the SATOA Revisions have no bearing on treatment of non-SATOA storage facilities under the ISO-NE Tariff or TOA, we need not address such matters in this proceeding.

46. In response to National Grid's motion to reject Elevate Renewables' comments, we find that Elevate Renewables' response to ISO-NE's Deficiency Response appropriately addressed issues presented in that Deficiency Letter and Response. Elevate Renewables timely intervened and submitted comments germane to the subjects addressed in the Deficiency Letter and the Deficiency Response, which included the selection and evaluation of SATOAs. Accordingly, we deny National Grid's motion to reject Elevate Renewables' comments on the Deficiency Response.

2. <u>SATOAs for Non-Thermal Issues</u>

a. <u>Filing</u>

47. Filing Parties explain that in system planning, the real power (i.e., MW) from a SATOA will only be evaluated and selected to resolve post-second contingency (post N-1-1) thermal issues. If, however, once selected for inclusion in the Regional System Plan, the SATOA also has the capability to provide dynamic reactive power (i.e., megavolt amps reactive (MVAR)) while it is neither charging nor discharging (i.e., MW output equals zero), ISO-NE may use the SATOA's dynamic reactive capability to address stability and voltage concerns during N-0, N-1, and N-1-1 conditions.[75] According to Filing Parties, a SATOA will not be injecting real power onto the New England Transmission System if the SATOA is being used to address stability and voltage concerns during N-0 and N-1 contingency events. Filing Parties posit that when operating in this mode the SATOA would be operating identically to other transmission system equipment—e.g., STATCOM, static VAR compensator, or synchronous condenser.[76]

b. <u>Comments/Protests</u>

48. VELCO agrees that a SATOA should be allowed to be used as real power to resolve thermal violations identified as a need, which would also allow it to provide dynamic reactive power to address voltage violations.[77] VELCO asks, however, for a

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[75] Proposed Tariff, § II.51.2(a).

[76] Transmittal at 16 (citing Transmittal, Oberlin Test. at 10-11).

[77] VELCO Comments at 3.

"minor modification" to allow for the evaluation and selection of the SATOA as the preferred inverter-based solution for identified voltage needs, in addition to thermal needs.[78] In VELCO's view, the proposed Tariff revisions should be slightly modified to make it clear that a SATOA is allowed for dynamic reactive capability to address voltage violations when a voltage need is identified, even if a thermal need is not.[79] VELCO contends that, while other inverter-based solutions can provide dynamic voltage support, a SATOA is a superior solution in some cases as it offers multiple benefits. VELCO notes that, for example, unlike a static VAR compensator or static compensator, a SATOA can be used for voltage stability and to mitigate load shedding. VELCO explains that it believes "the use of SATOA for voltage support is a segment of the main use case (thermal violations) detailed by [ISO-NE] in its filing, and should be allowed to stand equally as a preferred solution."[80]

49. VELCO notes that the Vermont Needs Assessment conducted by ISO-NE will be completed in early 2024 and requests that a SATOA be an eligible solution to address needs identified by ISO-NE for Vermont.[81]

c. Answers

50. ISO-NE and NEPGA argue that VELCO's request for an alternative rate design must be rejected as a matter of law because the SATOA Revisions were filed pursuant to FPA section 205.[82] ISO-NE states that, whether an intervenor suggests or even prefers an alternative proposal, the Commission must accept the SATOA Revisions if it finds them just and reasonable, and ISO-NE contends that the SATOA Revisions are just and reasonable for all the reasons described in the filing.

51. NEPGA states that VELCO's request should be rejected on the basis that it is either beyond the scope of the proceeding or that the relief VELCO requests is impermissible, as it asks the Commission to both accept and direct significant changes to ISO-NE's FPA section 205 filing that go "in the opposite direction" of ISO-NE's proposal by "expand[ing] the scope" of battery storage resources eligible to serve as

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[78] *Id.* at 1-2.

[79] *Id.* at 4.

[80] *Id.*

[81] *Id.* at 5.

[82] ISO-NE First Answer at 8; NEPGA Answer at 5.

transmission assets, which is a "completely different strategy" than Filing Parties propose.[83]

52. ISO-NE further states that VELCO's proposal is a significant deviation from the SATOA Revisions proposed in the filing that would increase costs for customers and reduce the ability to use SATOAs for their intended operation.[84] ISO-NE avers that under VELCO's proposed modification, SATOAs would be used where there is no defined need for the capability to inject real power and, therefore, the additional equipment (i.e., electric storage facility) to allow for energy to be stored for later use would impose an unnecessary cost on the region without any defined benefit. ISO-NE also states that implementing the SATOA Revisions prior to July 1, 2024, is not possible given the time needed for ISO-NE staff to develop, test, and implement the software system modifications necessary to implement the SATOA Revisions and to develop the processes necessary to implement the revisions.[85]

53. NEPOOL reiterates that the instant filing is just and reasonable, and argues that Tariff modifications, such as those proposed by VELCO, should be vetted through NEPOOL Participant Processes before being filed with the Commission. NEPOOL maintains that, while it takes no position on the merits of VELCO's proposed modifications, the Commission should reject VELCO's request without prejudice and remind interested parties to use New England's stakeholder process when seeking Tariff modifications. NEPOOL concludes that the Commission should accept the SATOA Revisions without modification or condition.[86]

d. Commission Determination

54. We find that Filing Parties' proposal to evaluate and select real power (i.e., MW) from a SATOA only to resolve post-second contingency (post N-1-1) thermal issues is just and reasonable because, as ISO-NE explains, it allows ISO-NE to use a SATOA to

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[83] NEPGA Answer at 4-5 (citing *NRG Power Mktg., LLC v. FERC*, 862 F.3d 108, 115- 16 (D.C. Cir. 2017) ("FERC's modifications expanded the [Minimum Offer Price Rule] exemptions" and "expended the scope of the exemption not just beyond PJM's original filing, but beyond the scope of the exemptions as they had stood before PJM's filing.")).

[84] ISO-NE First Answer at 6-7.

[85] *Id.* at 8.

[86] NEPOOL Answer at 3-5 (citing, e.g., *ISO New England Inc.*, 147 FERC ¶ 61,173, at P 35 (2014) ("To the extent parties seek additional changes, we encourage them to do so through the stakeholder process.")).

resolve thermal system needs by injecting stored real power into the system, while also accounting for ISO-NE's concern that it may not be cost-effective to use SATOAs when there is no defined need for the capability to inject real power.[87] VELCO's suggestion to modify the proposal to allow for the evaluation and selection of a SATOA as the preferred inverter-based solution for identified voltage needs (e.g., a non-thermal issue) constitutes an alternative rate design that is outside the scope of this proceeding.[88]

3. 300 MW Aggregate and 30 MW Substation Limitation

a. Filing

55. Filing Parties propose Tariff language to limit the aggregate amount of SATOAs as regulated transmission solutions to 300 MW each of charging and discharging capability. Filing Parties also propose to limit the total amount of SATOAs at one substation to 30 MW each of charging and discharging capability.[89] Filing Parties assert that these limits are necessary to minimize the likelihood of sudden impacts on area control error and generation dispatch and will reduce the burden on system operators manually dispatching SATOAs outside of the ISO-NE market systems.

b. Comments

56. FirstLight and NEPGA support the proposal to limit the application of the proposed SATOA implementation to no more than 300 MW total and with each no greater than 30 MW at one substation. FirstLight avers that this allows the results of SATOA implementation to be observed in practice to determine how effective they are at avoiding interference with wholesale market price formation.[90] Advanced Energy United

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[87] *See* ISO-NE First Answer at 6-7.

[88] Under FPA section 205, the Commission limits its inquiry "into whether the rates proposed by a utility are reasonable—and [this inquiry does not] extend to determining whether a proposed rate schedule is more or less reasonable than alternative rate designs." *See ISO New England Inc.*, 114 FERC ¶ 61,315, at P 33 & n.35 (2005) (citing *Pub. Serv. Co. of N.M. v. FERC*, 832 F.2d 1201, 1211 (10th Cir. 1987); *Cities of Bethany v. FERC*, 727 F.2d 1131, 1136 (D.C. Cir. 1984), *cert. denied,* 469 U.S. 917 (1984)).

[89] Transmittal at 15; Proposed Tariff, § II.51.1(c).

[90] FirstLight Comments at 5.

suggests that the 300 MW aggregate limit on SATOA capacity and the 30 MW limit on SATOA charging and discharging should be revisited after gaining experience.[91]

c. Deficiency Response

57. In response to questions in the Deficiency Letter about the 30 MW SATOA limit at a substation and the aggregate 300 MW limit, ISO-NE explains the following:

> When a SATOA is placed into service, the result is that there is excess generation on the system. Until such time that adjustments are made to the dispatch, likely through automatic generation control, New England will be in an oversupply situation, causing Area Control Error. The larger the SATOA, either individually or total, the greater this error is. Fluctuations in Area Control Error from natural variation in load and variable generation output are frequently about 30 MW. Therefore, the addition of a 30 MW change from a SATOA would be consistent with the normal operation of the system and be manageable in the current automatic generation control construct. Moreover, if there is an issue with the dispatch or operation of a SATOA in trying to address a reliability concern, the impact would be limited to 30 MW and would be localized.[92]

58. ISO-NE further explains that each SATOA will be dispatched manually by ISO-NE operators outside of all internal systems and that the 300 MW aggregate limit, in conjunction with the 30 MW limit at a single substation, was selected to reduce the aggregate number of SATOAs on the system that the ISO's operators would need to dispatch at any given time. ISO-NE states that limiting the number of SATOAs prevents overburdening ISO-NE's operators during events that may have many transmission contingencies, such as major storms. ISO-NE explains that if too many N-1-1 operating concerns are addressed using SATOAs, operators will be dispatching many SATOAs manually during a complex event, which could lead to a high burden on operators during unusual operating conditions (i.e., many SATOAs simultaneously discharging).[93]

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[91] Advanced Energy United Comments at 5.

[92] Deficiency Response at 13.

[93] *Id.*

d. Commission Determination

59. We find that Filing Parties have justified their proposal based on their experience with the ISO-NE system and that the 300 MW aggregate and 30 MW substation limitations for SATOAs are just and reasonable. As ISO-NE explains in the Deficiency Response, the addition of a 30 MW change from a SATOA would be consistent with the normal operation of the ISO-NE system and manageable in the current automatic generation control construct.[94] We find persuasive ISO-NE's explanation that the 300 MW aggregate limitation is reasonable when considering the possible need to manually dispatch multiple SATOAs during a severe weather event when the system operator must be focused on transmission system reliability, and not on resolving large Area Control Errors caused by simultaneous deployment of SATOAs. In response to Advanced Energy United, we note that the Commission will address any future proposals to modify these limits when, or if, the Commission receives such a filing.

4. Other Comments

60. NEPGA asks that, in its order, the Commission recognize the risks ISO-NE seeks to mitigate and request that ISO-NE's Internal and External Market Monitors evaluate and report on the effectiveness of the SATOA limits and conditions and on the competitiveness of ISO-NE's solicitation of SATOAs in their annual reports filed with the Commission.[95] NEPGA further requests that the market monitors report other observations about the integration of SATOAs as solutions to regional transmission needs, including whether and how often SATOAs are selected through a competitive process.[96]

61. Specifically, NEPGA suggests that the market monitors report on how often SATOAs are included in the regional transmission plan through ISO-NE's Order No. 1000-compliant competitive process versus assigned to an incumbent transmission owner through the exception from competition for "immediate" reliability needs and how often SATOAs are considered as market-based alternatives to immediate need reliability projects.[97]

62. Advanced Energy United supports the filing and states that the SATOA proposal is a measured approach to allow energy storage to be considered as a transmission asset

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[94] *Id.*

[95] NEPGA Comments at 3.

[96] *Id.* at 8.

[97] *Id.*

to address system needs identified through regional planning processes.[98] Advanced Energy United states that the proposal addresses a current barrier to participation by energy storage in ISO-NE by allowing storage resources to serve as transmission assets when identified as the best-fit solution.

63. Notwithstanding its support for the SATOA Revisions, Advanced Energy United urges ISO-NE to view this proposal as a first step and encourages efforts to evaluate its efficacy moving forward. Advanced Energy United states that certain specific limitations will constrain utility of the SATOA and should be evaluated over time. As noted above, Advanced Energy United states that the 300 MW and 30 MW limits should be revisited once ISO-NE has gained experience with SATOA implementation.[99]

64. Advanced Energy United also contends that "dual use of storage to meet transmission and market needs would ensure optimal value in return for investment in storage while maximizing beneficial deployment of storage resources."[100] Advanced Energy United notes that enabling storage to eventually participate as both transmission and market resources in ISO-NE would offer useful capacity and support to mitigate shortfalls or constraints of various types. Advanced Energy United states that it welcomes future efforts to allow dual use of storage as transmission and a market resource and urges the Commission to provide encouragement and guidance to transmission providers towards this end.[101]

65. Advanced Energy United avers that without improvements to regional planning, storage as transmission solutions could be restricted to development by incumbent transmission owners even though such storage facilities are not subject to the same development timing constraints.[102] Advanced Energy United also encourages a Commission inquiry into whether storage as transmission solutions will be considered as non-transmission alternatives to meet identified needs, the step before a need is declared immediate and assigned to an incumbent transmission owner.[103]

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[98] Advanced Energy United Comments at 3.

[99] *Id.* at 2.

[100] *Id.* at 6.

[101] *Id.* at 6-7.

[102] *Id.* at 7.

[103] *Id.* at 7-8.

66. Union of Concerned Scientists supports ISO-NE's effort to address the issues identified in this filing.[104] However, Union of Concerned Scientists believes this is only a first step and that the New England region and the United States should make additional provisions for expanding the capabilities of the transmission system using storage.[105] Union of Concerned Scientists notes that the Large Generator Interconnection Process (LGIP) is the de facto means by which investors seeking to add new generation must expand the electric power system and that the generation sector is regularly required to make investments in transmission upgrades without cost-recovery assurances through the LGIP, but there is no provision for using storage to meet those transmission needs.[106] Union of Concerned Scientists urges the Commission to advance reforms to enable this type of storage deployment.[107]

67. NESCOE maintains that the eligibility of electric storage facilities as transmission-only assets should enhance the competitiveness of future solicitation processes, resulting in cost-effective transmission and customer benefits.[108]

68. FirstLight supports the filing, noting that it appropriately limits the operation of SATOAs and appears to minimize the risk of market harm. FirstLight would strongly oppose any efforts to expand SATOA operation to impact competitive market operation.[109]

69. NEPGA supports ISO-NE's proposed limitations on the pricing and dispatch of SATOAs as critical to this proposal.[110] NEPGA states ISO-NE's limit of dispatch to

[104] Union of Concerned Scientists Comments at 1.

[105] *Id.* at 2.

[106] *Id.* at 2-3.

[107] *Id.* at 3.

[108] NESCOE Comments at 2-3.

[109] FirstLight Comments at 6.

[110] NEPGA Comments at 2.

dealing with specific transmission contingencies and load shed, and limitation to the real time market are consistent with Commission precedent.[111]

a. Answers

70. ISO-NE requests that the Commission reject NEPGA's request for a reporting requirement. ISO-NE states that the Internal Market Monitor and External Market Monitor currently have the authority to evaluate and report on any potential price-suppression and risks to economic wholesale market outcomes that are the consequence of the pricing and operation of SATOAs.[112] ISO-NE contends that no additional directive is needed from the Commission to address NEPGA's concerns, as that authority and discretion to exercise that authority is already provided for under the Internal Market Monitor's and External Market Monitor's responsibilities under the Tariff.

b. Commission Determination

71. We do not direct ISO-NE to adopt any additional reporting requirements related to operation of SATOAs. ISO-NE has sufficiently demonstrated that the proposal as filed is just and reasonable within the context of ISO-NE's overall Tariff, including oversight by its Internal and External Market Monitors. Moreover, we acknowledge ISO-NE's representation that its market monitors already have the authority to evaluate and report on wholesale market outcomes that are the consequence of the pricing and operation of SATOAs.

72. We find that Advanced Energy United's comments pertaining to dual use of storage as a transmission asset and market resource and pertaining to changes to the regional transmission planning process are beyond the scope of this proceeding. Likewise, Union of Concerned Scientists' suggestion that the Commission consider reforms to allow generators to use storage to meet transmission upgrades required pursuant to the interconnection process is outside the scope of this proceeding. Consequently, we decline to address these issues here.

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[111] *Id.* at 5 (citing *ISO New England Inc.*, Revisions to Enable the Treatment of Storage as Transmission-Only Assets, Docket Nos. ER23-739-000 and ER23-743-000 (filed Dec. 29, 2022); Transmittal at 15-16, 18; *id.*, Oberlin Test. at 15-16, 21).

[112] ISO-NE First Answer at 9 (citing, e.g. Proposed Tariff, Market Rule 1 (47.0.), § III.A.2.1(b) ("The Internal Market Monitor and External Market Monitor will perform the following core functions: . . . (b) Review and report on the performance of the New England Markets to the ISO, the Commission, Market Participants, the public utility commissioners of the six New England states, and to other interested entities.")).

<u>The Commission orders</u>:

(A) The proposed SATOA Revisions are hereby accepted, as discussed in the body of this order.

(B) Filing Parties are hereby ordered to submit a filing, providing the actual effective date of the SATOA Revisions no less than 30 days prior to the date the proposed Tariff revisions are implemented, as discussed in the body of this order.

By the Commission.

(S E A L)

Kimberly D. Bose,
Secretary.

December 11, 2023

<u>Submitted via Email to caroline.colan@maine.gov</u>

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

RE: Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)

Dear Ms. Colan,

In response to the Maine Governor's Energy Office's ("GEO's") request for information regarding the development of the Maine Energy Storage Program pursuant to P.L. 2023, ch. 374 (LD 1850), Key Capture Energy ("KCE") provides the attached discussion paper and the following recommendations. Key Capture Energy also supports the response of RENEW Northeast and American Clean Power.

The attached discussion paper "Building the Grid of Tomorrow: How Indexed Energy Storage Contracts Can Deliver Low-cost, High-value Battery Storage" provides a description of a procurement mechanism that meets the description of the Index Storage Credit program referred to in LD 1850, as well as benefits of the program and contract design considerations.

KCE provides the following recommendations:

Consider the benefits of northern Maine storage. Participation in ISO-NE's Forward Capacity Auction (FCA) is an important source of revenue for battery energy storage projects. However, to be eligible for the FCA, resources must demonstrate deliverability to the ISO-NE system during peak scenarios. Resources located in northern Maine cannot deliver to ISO-NE during these scenarios due to transmission constraints, limiting their ability to access a key revenue stream and putting these resources at a competitive disadvantage with battery storage located in southern Maine, below the transmission constraints. However, energy storage located in northern Maine may provide important value to Maine ratepayers and help the state meet its climate goals by storing excess renewable energy that would otherwise be curtailed due to the transmission constraint and delivering that low-cost renewable power when transmission capacity is available. This service provides emissions and ratepayer benefits that are not fully compensated by ISO-NE wholesale markets. In order to achieve the goals of "improving incremental delivery of renewable energy to customers" and "provide one or more net benefits to the electric grid and ratepayers," the Energy Storage Program should provide opportunities for energy storage located in northern Maine that cannot access capacity market revenue.

Allow for larger procurements to support project diversity. Large projects benefit from economies of scale, and 100 MW to 200 MW storage projects are capable of utilizing interconnection capacity on many high voltage lines in Maine. In order to provide the flexibility to select a single project as large as 200 MW and support projects of diverse size, location, and use case, the RFP should include the possibility of selecting projects greater than 200 MW if doing so is cost-effective for Maine ratepayers and achieves the state's policy goals. The Maine Storage Program should seek multiple projects in diverse areas of the state to provide benefits across the overall system. This will likely require support for more storage than the currently anticipated 200 MWs.

Account for benefits to the regional grid. Energy storage connected to the transmission system and participating in ISO-NE wholesale markets provides significant benefits to Maine ratepayers. However, many of the benefits of these projects accrue to the entire ISO-NE system, not just Maine. To account for these benefits, the Maine Energy Storage Program should:

1. Assign a share of the ISO-NE system benefits to Maine ratepayers according to Maine's portion of ISO-NE costs, and
2. Consider cooperating with other states in ISO-NE through multi-state procurements, as Maine has done in the past with the Northern Maine Renewable Energy Development Program.

Support third party ownership of energy storage. Battery storage companies such as Key Capture Energy are putting private sector capital at risk to invest in battery storage projects in Maine. This third-party investment can reduce costs and risks for ratepayers, and Maine should continue to support a competitive market for battery storage.

Thank you for the opportunity to provide this information.

Sincerely,

Julian Boggs
Director, State Policy
Key Capture Energy

December 2023

Building the Grid of Tomorrow:

How Indexed Energy Storage Contracts Can Deliver Low-cost, High-value Battery Storage

information@keycaptureenergy.com
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States Need Battery Storage Systems to Achieve Clean Energy Goals

Across America, variable renewable energy is rapidly replacing fossil fuel generation on the electric grid. As dispatchable thermal resources retire, grid operators need resources that can deliver energy at all hours of the day – including when the sun is not shining and the wind is not blowing. Battery energy storage systems (BESS) on the electric grid can play a critical role in balancing the variable supply of renewable energy to meet the demands of our modern economy.

Unfortunately, market signals alone are not driving battery storage development at the pace needed to provide a smooth transition from dispatchable fossil generation to variable renewable energy. In most wholesale energy markets, revenues available to BESS are insufficient to support the construction and financing of projects. That is, the sum of capacity, energy, and ancillary services revenue are less than the total costs of the system – this is often described as the "missing money" problem. Revenues will potentially increase in future years, but the size and timing of those projected increases is uncertain. BESS with uncertain revenue have more difficulty leveraging debt financing or attracting tax equity investors that can monetize the full federal Investment Tax Credit (ITC) available to qualifying energy projects.

Today, the actual deployment of battery storage is overwhelmingly concentrated in two states – California, where the state has directed the procurement of gigawatts of battery storage in response to emergency grid conditions; and Texas, where characteristics unique to the Texas grid have created a market for battery storage without state support. Elsewhere in the United States, state policies are needed to deploy storage at the scale necessary to maintain a reliable grid while achieving clean energy and climate goals.

Battery Storage Incentives Require a Unique Approach

As fast-responding and dispatchable but duration-limited resources, BESS require active and sophisticated operation to provide their full value to the bulk electric system. BESS operators must ensure that the battery is charging and discharging at the most valuable hours and minutes of the day while managing the battery's limited state of charge. Effective BESS operation also involves managing physical battery operation to limit degradation, and avoiding outages, particularly during grid scarcity events when storage is most valuable. Because BESS can efficiently provide both energy and ancillary services, BESS operators must also choose daily which products the BESS will sell at what times.

Independent power producers and other energy sector companies have invested in cutting-edge software and techniques for optimizing the performance of BESS across multiple services and use cases to maximize the value of the assets.

Policymakers seeking to reap the full benefits of battery storage on the electric grid must carefully consider the impact of incentive mechanisms on the operation of BESS. Traditional incentive mechanisms for utility-scale generation resources, such as power purchase agreements, often provide a fixed value for each MWh produced by the facility. These mechanisms are inappropriate for the optimization choices involved in BESS operation. A properly designed BESS incentive mechanism will incentivize the asset to provide the service that is most valuable to the grid at any given time.

Options for bulk storage policy

Eleven states[1] have passed legislation setting some type of energy storage deployment goal or requirement. States have experimented with various mechanisms to address the missing money problem and bring BESS to market, with limited success to date.

1. Upfront incentives. States have provided fixed, upfront incentives to BESS, usually in the form of dollars per megawatt hour (MWh) installed. In New York, this took the form of the Market Acceleration Bridge Incentive. Fixed incentives are easy to implement, but they can be expensive and typically do not provide long-term revenue certainty to support financing. In theory, a gap analysis can identify the missing money gap between available wholesale market revenues and BESS costs and set the incentive to bridge that gap. In practice, the gap analysis is extremely difficult to conduct accurately because policymakers cannot perfectly predict either capital costs needed to build BESS or future market revenues needed to support a constructed project. Because a project built via an upfront incentive typically has significant risk if markets do not provide the anticipated revenue, very few tax equity investors or debt providers are willing to finance a project with this kind of merchant risk.

2. Tolling agreements. Tolling agreements are long-term contracts under which a counterparty (often an electric utility) provides a fixed monthly payment to a BESS owner in exchange for operational control of the battery. The amount of the monthly payment is typically set through a competitive solicitation, and the BESS owner is responsible for maintaining the asset and delivering charge and discharge when called.

Tolling agreements allow for tax equity financing of BESS because the fixed monthly payment fully covers the BESS revenue requirement and does not expose the BESS to merchant risk.

Over the last several years, tolling agreements have been used to finance BESS in states where utilities own and manage generation but have proven difficult to implement in in restructured electricity markets where utilities do not typically own generation. In New York, the state directed electric utilities to solicit storage through tolling agreements (called “bulk storage dispatch rights” agreements) in 2018 and has authorized three successive procurements over the years, but no storage has been deployed as a result of these solicitations. Additionally, tolling agreements do not provide the owners incentives to optimize the value of the BESS in the wholesale market, limiting the value of the BESS.

3. Clean peak. The Massachusetts Clean Peak Program supplements BESS revenue by providing an additional incentive or “Clean Peak Credit” for energy delivered during predefined “peak” hours. BESS can qualify for Clean Peak Credits by demonstrating that they charge during predetermined hours identified as times of high renewable energy production. However, the value of Clean Peak Credits is not designed to specifically provide sufficient revenue to cover BESS costs, leaving BESS exposed to “missing money” problems and challenges in raising debt or tax equity financing. Additionally, the fixed schedule could incentivize BESS to charge and discharge uneconomically – or even in a way that is at odds with the integration of renewable energy – depending on the daily and seasonal variability of electricity supply and demand.

These programs have not resulted in large-scale deployment of BESS, as evidenced by the general lack of storage deployment outside of

1 California, Connecticut, Maine, Maryland, Massachusetts, Michigan, Nevada, New Jersey, New York, Oregon, and Virginia

California and Texas. Lessons learned from experience with these mechanisms have demonstrated three principles that are necessary for successful state policies to deploy BESS cost-effectively and at scale. Going forward, state policies should:

1. Provide the long-term contracted revenue to support debt and tax equity financing

2. Align operators' incentives with providing the highest value service and avoid interfering with price signals provided by wholesale markets

3. Provide the "missing money" – or fill the gap between BESS costs and available revenue streams

Indexed Energy Storage Contracts

Absorbing lessons from other states and from its own early experience, New York has proposed a new contract mechanism to support the deployment of BESS and achieve its clean energy goals. This mechanism, which a pending proposal[2] from the New York state energy office and utility commission staff names the "Index Storage Credit," is novel in its application as a state-led solicitation. However, core features of the New York proposal have previously been incorporated in contracts offered by California utilities[3] to meet their resource adequacy obligations, and in commercial contracts in Texas.

This type of contract, referred to here as Indexed Energy Storage Contracts (or IESCs), strikes a balance between providing revenue certainty needed to finance BESS deployment at scale while minimizing ratepayer exposure to risk. IESCs provide necessary revenue to finance and construct BESS at least cost and lowest risk to ratepayers. The structure provides the BESS with the "missing money" to fill the gap between revenue requirements and available wholesale market revenues – and no more. The BESS owner/operator takes on the risk and responsibility of optimizing the system in the wholesale markets – including maintenance and managing state of charge.

I. Contract Structure

Each bid contains a strike price that approximates, with appropriate adjustments, the minimum revenue requirement of the project. Under the contract, the state procurement authority or utility would make a monthly payment to the BESS equal to the Strike Price minus a Reference Price. That Reference Price is based on an approximation of revenues that the BESS could theoretically earn in the energy and capacity markets.

In its simplest form, the monthly settlement will equal the following formula:

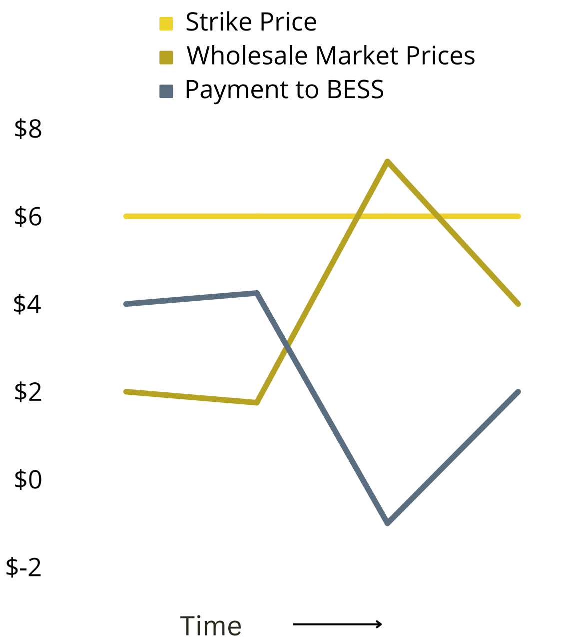
{Payment} =
{Strike price} - {Reference Prices}

If capacity and energy prices are high and/or volatile such that the Reference Price is higher than the strike price, this payment can be negative, resulting in a payment from the BESS operator to the state procurement authority or utility, which can then be returned or credited to ratepayers.

2 New York's 6 GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage, December 28, 2022, https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7D4753BA-916B-483E-9E35-6749B20384A6}

3 For example, PG&E's "Resource Adequacy Plus Energy Settlement" contracts

Structure of Indexed Energy Storage Contracts



Price numbers are **illustrative only** and non reflective of realistic strike price.

In states that already offer long-term contracts for renewable energy credits ("RECs") or Indexed RECs, an easy way to integrate IESCs into existing procurement practices is to create an indexed energy storage credit. Under this construct, BESS under contract produce 1 credit each day for each MWh of installed energy capacity and those credits are purchased under the long-term contract. The price at which the credits are purchased uses the same formula as an IESC without credits:

{Credit Price} = {Strike Price} – {Reference Prices}

These credits would not be tradeable, and the contracts fundamentally function the same way whether or not a "credit" is produced and priced or the purchase of the credit is just called a "payment" in the contract terms.

II. Reference Prices

The Reference Price under the long-term contracts consists of two separate references —an Energy Reference Price and a Capacity Reference Price—that aim to approximate revenues available to a BESS in the wholesale market.

a. Energy Reference Price

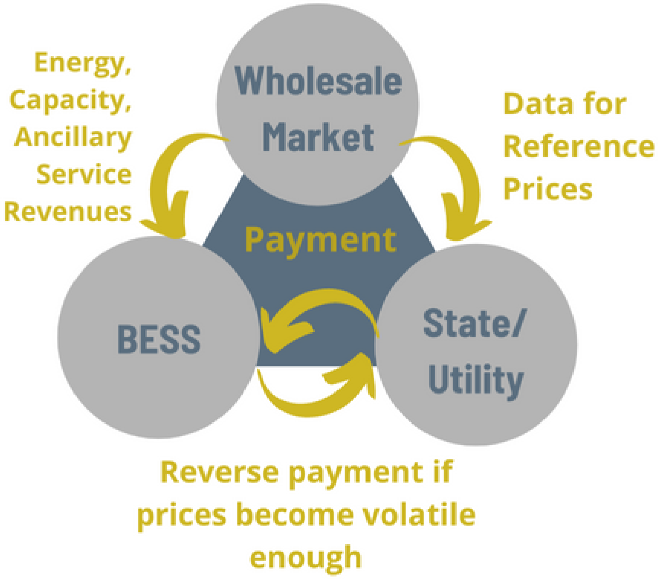
The energy reference price is a benchmark index that approximates the revenue that a BESS could have made in the day-ahead energy market if it operated with perfect foresight into market prices. In its simplest form, the energy reference price is calculated for each day as the difference between the average price of that day's highest-priced hours minus the average price of that day's lowest-priced hours. The energy reference price may be calculated at the node or the zone. The number of hours used in the calculation is equal to the duration of the BESS.

In the example of a 4-hour 10 MW BESS, if the 4 lowest-priced hours of the day-ahead energy market averaged $30/MWh, and the 4 highest-priced hours of the day-ahead energy market averaged $50/MWh, then the energy reference price for that day would be $20. The Energy Reference Price represents the revenues available for one full cycle of energy charge and discharge in a day, encouraging the BESS to charge during the lowest-priced hours and discharge during the highest-priced hours.

b. Capacity Reference Price

Policymakers also have the option of including a capacity reference in the IESC payment formula. The Capacity Reference Price approximates the revenue that the BESS could have made in the capacity market. The Capacity Reference Price is calculated for each resource by multiplying the most recent clearing price in the capacity auction by the applicable capacity accreditation for that resource type.

It should be noted that the IESC mechanism can work whether or not a Capacity Reference Price is included in the pricing formula. If the pricing formula excludes a Capacity Reference Price, strike prices would be lower by the projected value of capacity. However, the BESS would be exposed to the risk that capacity prices do not rise in the future, or that future capacity accreditation policies (i.e. Effective Load Carrying Capability) diminish the value of the capacity market for BESS.



III. Available Revenue vs Earned Revenue

A key feature of the IESC is that reference prices representing revenue available to the BESS are not the same as the revenue actually earned by the BESS. That is, the Reference Price represents a benchmark showing how much an ideal system could have made in the day-ahead energy and capacity markets. A BESS operating in the real-world is unlikely to earn the Reference Price due to a variety of factors that drive divergence between reality and the Reference Price. BESS owner/operators will price in these adjustments and their attendant risks when setting a strike price in their bid.

Some of these factors will reduce earned revenue relative to the Reference Price. BESS operators do not have perfect foresight into wholesale market prices and will invariably miss charging and discharging opportunities during the lowest- and highest-priced hours, respectively. In addition, a battery system will experience round-trip efficiency loss (see additional design considerations below) and forced and unforced outages. Performance risk is explained further below.

Other factors increase earned revenues higher relative to the Reference Price. As noted above, ancillary services, such as frequency regulation and reserves, are not included in the Reference Prices. However, the BESS would be free to operate in ancillary services markets, if doing so provides more value (and earns the BESS more revenue) than the energy market. This would allow the BESS to potentially earn more revenue than the energy Reference Price during those days. Sophisticated bidders can account for potential ancillary services revenues in the Strike Price of their bids, reducing the overall cost of the program for ratepayers.

Some factors apply in either direction. The most notable of these is so-called “basis” risk. BESS in wholesale markets are paid and charged for energy at the nodal price. If the energy reference price is calculated using a zonal or hub price for energy, the energy reference price may be higher or lower than the actual energy price available to the BESS at the node. A project sited at a high-value node that experiences greater price volatility than the zone or hub, may earn more revenue relative to the reference price. However, if grid congestion prevents price volatility at the hub from appearing in the energy prices at the node of the BESS, the BESS will be unable to earn revenue equal to the Reference Price even if it is perfectly scheduled.

IV. Allocation of Risk

A core advantage of the IESC is that it efficiently allocates risk. BESS owner/operators are exposed to performance risk, which they can mitigate through effective operation; and protected from structural market risk, which they cannot mitigate as individual market actors.

If a BESS under an IESC underperforms by failing to dispatch during the most valuable hours, it will fail to earn its expected revenue in thewholesale market and fail to meet the revenue requirement upon which the strike price was based. The Reference Price will still be subtracted from the Strike Price, whether or not it that amount was actually earned by BESS through wholesale market operation, insulating the state procurement authority or utility (and ultimately electric ratepayers) from the failure of the BESS to earn its expected revenue.[4]

The IESC mitigates the structural market risk for BESS, or the risk that future wholesale energy and capacity prices do not (now or in the future) support BESS revenue requirements. Unlike performance risk, market risk is nearly impossible for BESS owner/operators to mitigate on their own because it is driven by structural factors, such as market design and rule changes, penetration of renewables, retirement of incumbent generators, and other factors out of the BESS owner/operator's control.

For ratepayers, providing this support through the IESC acts as a hedge for overall electricity costs: if IESC payments to BESS are larger than anticipated because energy prices are not volatile and/or capacity prices are low, ratepayers benefit from the overall market dynamics. If energy prices are more volatile and/or capacity prices are higher than anticipated, then IESC payments to the BESS will be lower than anticipated or could even be reversed and credited to ratepayers.

V. Additional Design Considerations

Indexed Energy Storage Contracts are a novel type of contract, and as states and utilities implement them, they will be faced with additional design considerations and policy choices. The preferences of state policymakers and specific needs of the state will inform these choices. In the development and implementation of IESCs in New York and California, stakeholders have identified two design choices that will be universally important for any state or utility implementing IESCs to consider.

a. Round-trip Efficiency Adjustment

As previously noted, round-trip efficiency will result in a BESS earning less than the reference price. The closer that the reference price reflects truly available revenue, the more accurate bidding will be and the lower the risk premium will be. Since all known energy storage technologies carry some round-trip efficiency loss, the reference price formula in the contract can be adjusted to reflect a standard round trip efficiency loss.

b. Limit on Liability

To permit BESS owners and ratepayers to take advantage of both federal tax credits and capital available via debt financing,

4 Performance risk includes upside as well as downside for the owner/operator: if the owner/operator's optimization is effective enough to earn more revenue that the assumed by the reference price, the owner/operator will net that difference.

policymakers should include a limitation of liability in IESCs. This limitation of liability would apply when the monthly average reference price exceeds the strike price and the payment is reversed – that is, the BESS owner/operator pays the state procurement authority or utility. Such a limitation is important for investors – particularly the tax equity partners required to capture the federal investment tax credit – in securing financing for a BESS under an IESC.

The purpose of the limit is to protect capital providers against “black swan” events where reference prices are extremely high for a period of time during which the BESS operator is unable to capture the value of those reference prices through wholesale market operation. However, the limit does not need to prevent all negative payment back to the state procuring authority or utility. If market conditions, due to high renewable energy and/or variable demand lead to volatility in energy prices such that reference prices are consistently higher than the strike price, it is reasonable that the IESC should support a negative payment back to the state procurement authority or utility. In other words, any limitation should be designed to avoid only the most extreme negative payment events.

Policymakers may take any number of approaches to set an appropriate limitation on liability that provides value to ratepayers while encouraging tax equity and low-cost debt financing. One approach is to set the limit on liability at the negative value of the strike price. The strike price is the maximum theoretical amount that the state procurement authority or utility could pay the BESS, if the reference prices somehow fell to zero, so setting the limit on liability at that level provides contract symmetry.

Conclusion: Key Advantages of an Indexed Energy Storage Contract

Battery energy storage systems are necessary to support a reliable and stable grid as the nation transitions from dispatchable thermal resources like coal and gas power plants to variable wind and solar. In the absence of wholesale market products and pricing that support the deployment of battery storage, state policy must fill the gap. Indexed Energy Storage Contracts have several advantages for state policymakers and utilities as they consider mechanisms to support battery energy storage systems that are critical to meeting their clean energy and climate goals.

Value.

BESS operators are incentivized to optimize value and follow wholesale market price signals, providing the most valuable services to the grid.

Cost-effectiveness.

Payments are right-sized to ensure BESS owners can build and finance projects without over-charging ratepayers. In fact, ratepayers can receive payments from the BESS owner during high price volatility.

Risk Sharing.

BESS operators bear performance risk – if the facility fails to capture available wholesale market revenues, it will fall short of its revenue requirement and may even lose money on high volatility days when its performance is most needed by the grid.

IESCs provide the right balance of benefiting ratepayers while incentivizing enough BESS facilities to come online to meet the demands of a grid powered by variable sources like solar and wind.

Appendix I. Sample Payment Calculations*

Energy Reference Price – Sample Daily Calculation

Least Expensive		Most Expensive	
Hour	Energy Price	Hour	Energy Price
2 am	$1.2	5 pm	$3
3 am	$1	6 pm	$4
4 am	$0.8	7 pm	$5
5 am	$1	8 pm	$4
Average	$1	Average	$4

Energy Reference Price (ERP) = $4 – $1 = $3/MWh-Installed

The units of the Energy Reference Price are $/MWh-Installed, as in the nameplate energy capacity of the BESS in MWh.

Energy Reference Price – Sample Monthly Calculation

Day	ERP	Day	ERP	Day	ERP
1	$1	11	$3	21	$3
2	$1	12	$3	22	$3
3	$1	13	$3	23	$3
4	$1	14	$7	24	$3
5	$1	15	$10	25	$3
6	$1	16	$11	26	$3
7	$3	17	$3	27	$1
8	$3	18	$3	28	$1
9	$3	19	$3	29	$1
10	$3	20	$3	30	$1

In any given month, the energy reference price will vary day-to-day.

To calculate the monthly payment or settlment, multiply the average of the daily energy reference prices times the installed MWh capacity of the BESS, times 30 days.

*Numbers are **illustrative only** and have no basis in energy market prices or BESS costs

Sample Monthly Settlement Calculation

Assumptions
BESS Size: 25 MW/100 MWh
Strike Price: $6
Capacity Ref. Price: $2

Strike Price	$6/MWh-Installed	Contract price, approximating BESS revenue requirement
Average Daily Energy Reference Price	($3)/MWh-Installed	Revenue that a theoretical BESS could earn in day-ahead energy market
Capacity Reference Price*	($2)/ MWh-Installed	Revenue that a theoretical BESS could earn in capacity market
Payment / Day	$1/MWh-Installed	6 – 3 – 2 = 1
Total Monthly Payment	$3,000	100 MWh BESS installed capacity times 30 days per month

*Capacity market prices are generally in $/kw-mo, so these units will need to be converted in the contract.

Appendix II. Examples* of Risk Sharing

Example # 1 Low Volatility Day

Revenue Stream	Reference Price	Actual Revenues - Battery A	Actual Revenues - Battery B	Actual Revenues - Battery C
Capacity	$2	$2	$2	$2
Energy	$1	$1	$0.5	$0
Ancillary Services	N/A	$0	$0	$2
IESC Payment	**$5**	**$5**	**$5**	**$5**
BESS Owner Revenues	**$8**	**$8**	**$7.5**	**$9**

- Battery A participated in the day-ahead energy market and correctly anticipated the highest and lowest price hours.
- Battery B also participated in the day-ahead energy market but did not schedule its charging and dispatch to match the lowest and highest priced hours
- Battery C participated in the ancillary services market again, and was not available to charge and discharge during the lowest and highest priced hours. Battery C fell significantly short of its expected revenue because the ancillary services revenue was much lower than the energy arbitrage revenue.

Example # 2 High Volatility Day

Revenue Stream	Reference Price	Actual Revenues - Battery A	Actual Revenues - Battery B	Actual Revenues - Battery C
Capacity	$2	$2	$2	$2
Energy	$8	$8	$8	$0
Ancillary Services	N/A	$0	$0	$3.5
IESC Payment	**-$2**	**-$2**	**-$2**	**-$2**
BESS Owner Revenues	**$8**	**$8**	**$12**	**$3.5**

- Battery A participated in the wholesale energy market and correctly anticipated the highest and lowest price hours.
- Battery B also participated in the energy markets but scheduled based on real-time energy prices and successfully anticipated price swings.
- Battery C scheduled for an ancillary services market again. By failing to be available for energy arbitrage when it was needed, Battery C fell significantly short of its expected revenue.

*Numbers are **illustrative only** and have no basis in actual market price

Appendix III. Examples* of Capacity Index

Examples assume each ESS has the same strike price of 8$

Example # 1 High Capacity Prices

Revenue Stream	Reference Price	Actual Revenues - Battery A	Actual Revenues - Battery B	Actual Revenues - Battery C
Capacity	$3	$3	$3	$3
Energy	$1	$1	$0.5	$0
Ancillary Services	N/A	$0	$0	$2
Credit Price	**$4**	**$4**	**$4**	**$4**
BESS Owner Revenues	**$8**	**$8**	**$7.5**	**$9**

Example # 2 Low Capacity Prices

Revenue Stream	Reference Price	Actual Revenues - Battery A	Actual Revenues - Battery B	Actual Revenues - Battery C
Capacity	$1	$1	$1	$1
Energy	$1	$1	$0.5	$0
Ancillary Services	N/A	$0	$0	$2
Credit Price	**$6**	**$6**	**$6**	**$6**
BESS Owner Revenues	**$8**	**$8**	**$7.5**	**$9**

- Batteries follow same energy/ ancillaries strategy as "low volatility" day on previous page.
- Capacity prices for 5 hr ESS fall from $3/credit to $1/credit.
- The credit price increases from $4/credit to $6/credit, to make the ESS whole.

*Numbers are **illustrative only** and have no basis in actual market price

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December 8, 2023

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

Via email: Caroline.Colan@maine.gov

Subject: Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, Ch. 374 (LD 1850)

Glenvale welcomes the opportunity to respond to the Request for Information ("RFI") concerning energy storage solutions In Maine issued by the Maine Governor's Energy Office ("GEO"). Glenvale is developing several utility-scale energy storage projects in Maine, and seven utility-scale solar PV projects. Five of Glenvale's solar PV projects have executed energy contracts pursuant to Maine Public Utilities Commission ("MPUC") procurements, and these projects are estimated to save Maine consumers over $3.5 million per year when in service.[1]

We are enthusiastic about contributing our expertise and capabilities to the advancement of energy storage initiatives in this region. Glenvale believes that well-conceived, utility-scale energy storage projects can provide meaningful benefits to

[1] MPUC Docket 2022-00341. Request for Approval of Stranded Cost Revenue Requirements and Rates (3/1/23-2/28/26) Pertaining to Central Maine Power Company, Item No. 38, CMP Stipulation Exhibits.

Maine's consumers, similar to the impacts that utility scale energy procurements have had over the years.[2]

1. Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

Designing the Maine Energy Storage Program (the "Program") to facilitate the deployment and operation of front-of-the-meter energy storage resources ("ESR") presents a key strategic route for Maine's achievement of greenhouse gas emissions. ESR, balancing renewable generation and energy demand, will play a crucial role in grid stability, and climate action. By storing renewable energy generated during periods of low-demand and deploying it during higher demand periods, ESRs can reduce the utilization of peaker plants.

Maine benefits from an abundance of renewable energy potential and has material operating and planned MW of utility-scale solar PV, distributed solar PV, on-shore wind, hydro and biomass. Maine's historical peak load is 2.15 GW, and Glenvale estimates that Maine's typical daily shoulder-season load is 1.0 GW;[3] the New Brunswick interface imports an average of 0.23 GW[4], resulting in an energy requirement, net of imports, of approximately 0.75 GW at many times. Generation exceeding this amount must be exported, with a transportation potential limited to approximately 2 GW – generation in excess of 2.75 GW will need to be curtailed [5] or stored.

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[2] . MPUC Request for Proposals for the Sale of Energy or Renewable Energy Credits from Qualifying Renewable Resources (Tranche 1) issued February 14, 2020 and MPUC Request for Proposals for the Sale of Energy or Renewable Energy Credits from Qualifying Renewable Resources (Tranche 2) issued January 15, 2021.

[3] Taking ISO-NE's shoulder load of roughly 10 GW, and apply a 10% factor against this – Maine represents roughly 10% of ISO-NE'S historic peak load and energy use.

[4] In 2022 the average net hourly import was 228 MW, per ISO-NE data published 10/20/2023.

[5] Curtailment is the deliberate reduction of power generation below potential in order to balance supply.

Maine has four major electrically limited points, the New Brunswick interface, Orrington South, Surowiec South, and the NH/ME interface. The result is that Maine consists of three zones from a load and generation perspective, per Exhibit A.

Glenvale recommends two approaches in light of the prior considerations, such that the ESR support the deployment and deliverability of renewable energy.

A. The generation characteristics and planned and operation MW of the major renewable asset types should be assessed, to consider the effectiveness of intra-day storage that can maximize the deployment and utilization of all renewable energy assets. It is critical that Maine's fleet of diverse renewable energy generators have near 100% deliverability.
B. The location of Maine's planned and operational renewable energy fleet should be assessed, and ESR should be deployed in such duration, cycling plans, and locations that best enhance the proposed fleet. This will best support the greenhouse gas emission reductions codified in Maine law.

The Program can implement a competitive incentive structure that optimizes the public benefit of increased renewable energy adoption, and the following concepts may be helpful to that end:

a. Provide enhanced payments/incentives to projects that allow more renewable deployment (assuming price competition on a uniform scale, say $/kw-month)
b. Focus the Program on build-ready projects with minimal development risk - the merits of this argument need little explanation after the significant attrition of early-stage projects seen in the various distributed and utility scale programs in Maine in recent years. However, the Program has additional considerations that make build-readiness extra important:
    i. the pending implementation of FERC Order 2023 makes projects that are not build ready additionally risky and prone to delay;
    ii. the Program's goals, including delivering on the 2030 greenhouse gas emission reductions, require rapid deployment of major projects.
c. Target deployment of ESR to the export constrained parts of Maine identified in Exhibit A. Initially Glenvale believes the area north of Surowiec

will be constrained; subsequently, as onshore wind projects come online, the area north of Orrington will also be constrained.

d. Limit participation in the Program to projects co-located with, or contractually paired with, Class 1/1A renewable energy resources. This would ensure that only renewable energy is stored by ESR supported by the Program.
e. Provide enhanced payments/incentives or bid preference to ESR projects that are co-located with, or contractually paired with, renewable energy projects.
f. Ensure that the Program incentivizes ESR projects based on the MWH of energy storage potential, not just MW of the ESR's interconnection. The ISO-NE capacity market already incentivizes the deployment of 2-hr energy storage, particularly in southern Maine. While the enabling legislation focuses on MW rather than MWH, it is critical for greenhouse gas emission reductions that the Program promote the maximal MWH deployment, and also ensure the frequent usage of that storage capacity.
g. To incentivize the actual usage of ESR, Glenvale recommends the Program include a per MWH payment based on the roundtripped energy, in addition to any other contractual mechanisms considered. For instance, the energy storage contract could include a $25/MWH payment for every MWH of renewable energy stored and deployed, in addition to payments structured on a fixed payment per kw-month or kwh-month basis.
h. To optimize the outcome to Maine stakeholders and lower the cost for ratepayers, no restrictions or preferences should be placed on the size of the ESR projects, interconnection voltage, or other project features. Utility scale storage projects have lower costs per MWh and will therefore be more cost effective to Maine's ratepayers. Such preferences of limitations would limit competition and reduce the MPUC's ability to achieve the best value outcome for Maine ratepayers.

2. The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that

supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?

ISO-NE expects the region's electricity usage to grow 18.2% from 2022 to 2030. Applying this growth rate to Maine, we arrive at an expected 2030 load of 14,057 GWH.[6] The renewable energy requirements in 2030, at 80%, are 11,245 GWH - this consists of 50% Class 1/IA and 30% Class 2. The requirements in 2022 are an estimated 5,708 GWH, consisting of 18% Class 1/1A, and 30% Class 2. Maine needs to bring online an annual supply of over 5,500 GWH of renewable energy by 2030, the majority of which will be Class 1/1A. This will likely be a mix of onshore wind and solar PV, and both resources need daily and geographic balancing to ensure deliverability.[7]

Assuming incremental load-growth of 2% per annum through 2040, energy load will be 17,135 GWH and increased renewable requirements compared to 2022 will be 13,708 GWH.

Renewable resources have significant Intra-day profiles that differ from energy needs, and in the case of the expected growth in onshore wind and solar PV the differences are well understood. Glenvale believes that the energy-storage nominal fleet should equal the RPS requirement times the states peak load, for an average operable duration of four hours. For Maine in 2030, this would be 50% times 2.6 GW (or 10% of the regions expected peak demand),[8] for a total of 1.3 GW of energy storage.

In order to deploy 1.3 GW of projects in a seven-year period, the following thoughts come to mind:

A. The initial projects selected by the Program should be construction-ready and be well advanced in development. Otherwise, the prospect of achieving successful completion of a program in such a timeframe will be limited. Future procurements can consider earlier-stage projects.

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[6] Using an 18% growth factor to the 2022 New England load of 118,927 GWh (published 10/20/2023 on ISO-NE's website), and allocating 10% of this load to Maine (which was the percentage of regional load attributable to Maine in the prior two years – state-level load for 2022 was not available at time of writing).

[7] If 50% of the 5,500 GWH were supplied by Solar PV with a capacity factor of 21%, a total of 1.48 GW of new generation would be needed within Maine.

[8] ISO-NE 2023 CELT indicated a regional Summer Peak of 26,036 GW in 2030. In the calculation Glenvale uses the class 1/1A requirement in 2030, as the Class 2 supply and demand is relatively balanced.

B. Selecting construction ready projects also allows all stakeholders to learn from the first large-scale deployment and tune future procurements and deployments.
C. The 1.3 GW, and four hours of duration would also be able to support the geographic elements of the energy shifting problem, identified in Exhibit A. Glenvale stresses the importance of the following in using the Program to achieve Maine's legislated clean energy goals:
    a. Energy storage duration is as important as rated capacity. It is critical that the MWH that can be stored are sufficient to deploy the renewable energy needed. Glenvale strongly encourages the GEO to consider program design that regulates storage duration and incentivizes round-tripping the storage devices.
    b. Locating energy storage devices in those transmission constrained areas of the state is key to achieving the 2030 and 2040 goals. The 345 kV cannot move the amount of peak renewable energy needed to meet those goals, and it needs to be bolstered with energy storage. This is true north of Orrington South, and especially true north of Surowiec South.
    c. Matching energy storage with incremental planned generation is critical, and Glenvale encourages the GEO to consider a program that considers the value of this.

6. How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?

Within the Maine Energy Storage Program, the definition of "preferred location" revolves around areas with stressed grid infrastructure, high electricity demand, or vulnerability to disruptions. Determining preferred locations should Include analyzing Maine's capacity with future connected load and generation, similar, but in greater detail, to the mapping presented In Exhibit A. Glenvale believes the area north of Surowiec is critical and appropriately sited and sized ESR can alleviate future constraints.

8. How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.

Maine's abundance of renewable resources needs to be harnessed, and the optimal duration should consider how energy storage can ensure deliverability of hydro, biomass, wind and solar energy. while the technical assessment here should rest with the GEO and it's consultants, given the range or renewable assets types, seasonality, and the deliverability Issues, In particular at the Surowiec Interface, Glenvale suggests that an optimal duration Is one that ensures that peak solar and wind generation, occurring during low demand periods, can be stored, shifted within the same day, and be delivered to market. that would suggest that four- to six-hour energy storage resources would be optimal.

After the initial deployment, the Program should prioritize flexibility to accommodate evolving technologies and grid dynamics, recognizing that different grid applications may demand varying storage durations. Adaptability should be a core principle, allowing technological advancements and diverse grid needs to modify what we consider optimal energy storage.

9. Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.

Glenvale believes that key features of an effective contract mechanism for the Program include the following:

A. Provide sufficient revenue and certainty of revenue to allow for the securing of Project Finance.[9] Glenvale believes that 75 - 90% of an asset's lifetime income should be contractually firm to optimize project financing. The balance of forecasted revenue can be estimated and uncontracted.
B. Allow projects to competitively bid, in a transparent manner; this will allow the Maine ratepayers to achieve best value and allows developers to demonstrate the most efficient projects through transparent competitive means.

[9] Project Finance is the financing of long-term infrastructure projects using a non-recourse financial structure, with debt, tax-equity and sponsor equity invested into the project on a stand-alone basis.

C. Incentivize best-in-class operation of the asset. In the case of ESR, this requires the operator to be economically motivated to optimize the asset in a manner aligned with the ratepayers' interests. It may be prudent to ensure any index mechanism include an uncontracted tranche, or a bonus structure, such that the operator is incentivized to optimize operations.
D. As stated elsewhere, Glenvale believes that the contract mechanism should include at least some per MWH payment for renewable energy stored and deployed. This may be in addition to an index storage credit mechanism.

The GEO should ensure that the revenue contract is fully compliant with the investment tax credit, and the expectations of the project financing marketplace. Glenvale encourages the GEO to discuss the contemplated contract mechanism with investment banks and legal firms that specialize in energy storage project financings.

10. How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

The Program design should ensure no conflicts arise with eligibility for the federal Investment tax credit. During the legislative session some commenters expressed concern with elements of an Index credit program structure in this regard. Glenvale takes no position on the merit of the commenters position but notes that the importance of this matter requires diligence to be applied.

The Program should be complementary to bonus tax credits available under the Inflation Reduction Act 2022, and should also be complementary with grant, loan, credit support, and purchase programs available under the Bipartisan Infrastructure Act of 2021.

12. Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.

Barriers to utility-scale energy storage deployment in the Maine Energy Storage Program would be removed by implementing statewide permitting regulations and improvements to the interconnection study processes by ISO-NE and the utility.

Glenvale appreciates the opportunity to respond to this RFI and welcomes comments or questions from the GEO.

Respectfully,

s/s Aidan Foley, CEO
Glenvale, LLC

Exhibit A

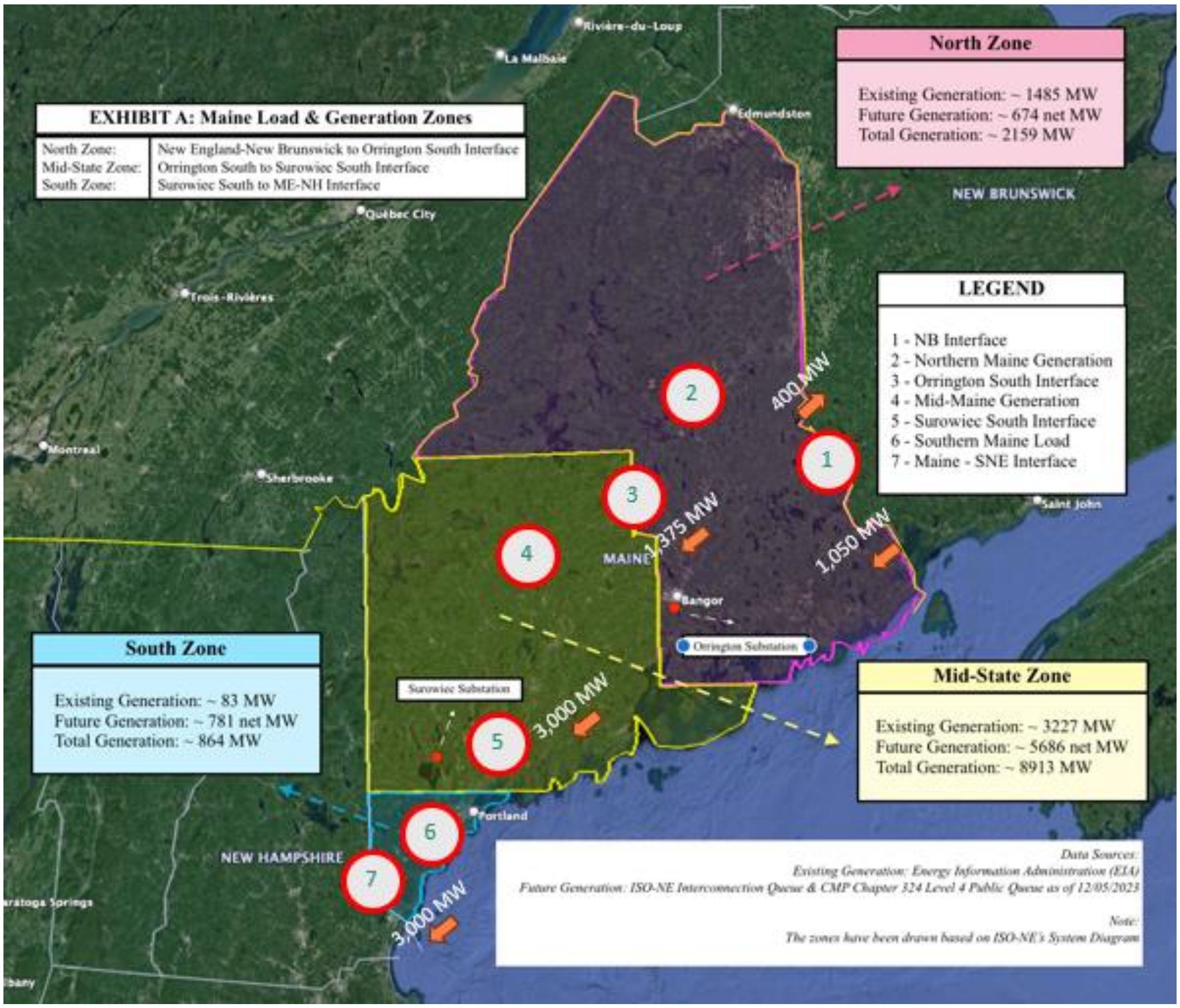


EXHIBIT A: Maine Load & Generation Zones
North Zone: New England-New Brunswick to Orrington South Interface
Mid-State Zone: Orrington South to Surowiec South Interface
South Zone: Surowiec South to ME-NH Interface
North Zone
Existing Generation: ~ 1485 MW
Future Generation: ~ 674 net MW
Total Generation: ~ 2159 MW
LEGEND
1 - NB Interface
2 - Northern Maine Generation
3 - Orrington South Interface
4 - Mid-Maine Generation
5 - Surowiec South Interface
6 - Southern Maine Load
7 - Maine - SNE Interface
South Zone
Existing Generation: ~ 83 MW
Future Generation: ~ 781 net MW
Total Generation: ~ 864 MW
Mid-State Zone
Existing Generation: ~ 3227 MW
Future Generation: ~ 5686 net MW
Total Generation: ~ 8913 MW
400 MW
1,375 MW
1,050 MW
3,000 MW
3,000 MW
Orrington Substation
Surowiec Substation
Rivière-du-Loup
La Malbaie
Edmundston
Québec City
NEW BRUNSWICK
Trois-Rivières
Montreal
Sherbrooke
Saint John
MAINE
Bangor
Portland
NEW HAMPSHIRE
Data Sources:
Existing Generation: Energy Information Administration (EIA)
Future Generation: ISO-NE Interconnection Queue & CMP Chapter 324 Level 4 Public Queue as of 12/05/2023
Note:
The zones have been drawn based on ISO-NE's System Diagram

December 8, 2023

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

RE: Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)

Dear Ms. Colan,

Thank you for the opportunity to respond to the Request for Information ("RFI") on the development of an Energy Storage Program for Maine. We are submitting these joint comments on behalf of New Leaf Energy and Bluewave, and we also support the comments filed by the Maine Renewable Energy Association, the Northeast Clean Energy Council, and RENEW Northeast. In an effort to avoid redundancy, we will not offer extensive responses to every question included in the RFI, but rather target our responses to adding specific detail beyond what these partners have included in their comments, along with a specific program design proposal included in our response to question 9.

New Leaf Energy is a developer of solar and energy storage headquartered in Lowell, Massachusetts. We have an active pipeline of both distribution- and transmission-connected battery energy storage in New England and around the country. We also have extensive experience developing distribution-connected solar in Maine.

As a pioneering clean energy developer, BlueWave has developed and built more than 150 MW of solar projects to date. BlueWave is also actively developing energy storage projects, including both transmission- and distribution-scale projects, to ensure our grid is reliable and efficient in a clean energy future. We have been deeply involved in developing solar in Maine and have an active storage pipeline.

Our companies have been advocating as far back as 2019 for Maine to establish a program for energy storage, and we strongly supported the passage of LD1850. We are excited to see the Governor's Energy Office moving forward to establish an energy storage program as called for in that law, as energy storage is an essential part of a decarbonized electricity system.

1. *Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.[3] Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?*

   Deployment of energy storage can lead to emissions reductions in a number of ways. First, and especially under a load reducer program as proposed below, storage is generally incentivized to charge during off-peak hours and discharge during peak hours, which can lead to overall emissions reductions since the marginal resources in peak hours that storage displaces are typically more emissions-intensive. In addition, as intermittent renewables reach a higher percentage of all electricity supply, the addition of incremental renewable generation depends upon energy storage. This is especially true in Maine, where the enormous potential for further development of large-scale solar and onshore wind is currently stymied by transmission constraints that impact economic viability. Finally, as Maine continues to successfully electrify the heating sector and electrification of the transportation sector takes hold, load on the distribution system will grow substantially. Energy storage is needed to mitigate those new distribution system peaks and reduce the need to build out distribution infrastructure to meet that demand.

2. *The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030[4] and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?*

   Storage can support incremental renewable energy delivery by alleviating transmission bottlenecks, allowing more power to flow through the same transmission infrastructure. Storage can also enable the more cost-effective deployment of new renewable energy resources. As discussed later in our comments, if storage is appropriately studied in the interconnection process and there is a signal given to charge and discharge to complement solar production, then storage can not only lower the cost of renewable deployment (by lowering interconnection costs) but can also create additional headroom to deploy more solar on existing infrastructure. Such a construct would require strong program design and a re-examination of the current interconnection process.

3. *How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?" a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests? b) Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.*

Energy storage is well-positioned to deliver significant benefits to both the distribution grid and to Maine ratepayers. As we propose, a grid services-style program provides compensation for energy storage operation that closely aligns with the benefits that ratepayers actually derive from such operation. Many of these benefits are immediately accrued, resulting in short-term benefits to ratepayers. While program design considerations will impact which cost-effectiveness tests are most relevant to the Maine Energy Storage Program, we point to the analysis conducted by Sustainable Energy Advantage and Customized Energy Solutions for the Connecticut Green Bank during consideration of a FTM storage program. The analysis found substantial benefits across different program designs and using different tests.[1] As we narrow down design options, choosing the appropriate tests on which to value the program will become important.

4. *Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."*
5. *Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."*

We support the comments filed by MREA, NECEC, and RENEW on the topics of reliability and resiliency, and add that a given capacity of storage made up of multiple, smaller distribution-connected ESFs can be more effective at providing reliability and resiliency benefits, by virtue of being more distributed and more likely to be located in the specific areas with reliability and/or resiliency challenges.

6. *How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?*

We do not recommend that any program proposed by the GEO be overly prescriptive about preferred locations. The Clean Peak program in Massachusetts attempted something along these lines, by creating a Distribution Circuit Multiplier to incentivize projects to locate on heavily-loaded circuits. While this idea makes sense in theory, in practice it has not proven effective as the utilities have not allowed projects to interconnect on Distribution Circuit Multiplier-eligible circuits without requiring significant upgrades – the very upgrades to which storage was intended to be an alternative. Instead, we recommend that the GEO design incentives that focus on broader categories of preferred locations. For distribution-connected storage, this might include locations close to load, which could have benefits for reliability/resilience and enabling electrification, or in areas with existing solar saturation (although the latter could have some of the same concerns as the Distribution

[1] See: https://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/434aa27c309ed0838525885d00643350/$FILE/FTM%20Energy%20Storage%20Projects%20in%20CT%20-%20BCA%2006102022.pdf. We expect an updated analysis to be filed with the CT PURA later in December in Docket 23-08-05, which may be informative. This analysis will likely show that an FTM storage program with performance compensation will deliver >3:1 ratepayer benefits:costs.

Circuit Multiplier program if Maine utilities do not conduct interconnection studies for energy storage in a appropriate manner).

7. *How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?*

   A program for distribution-connected storage registered as load reducers with ISO-NE (described in detail below) would have a direct impact of avoiding future expansions of the transmission system by reducing peak load on the distribution system.

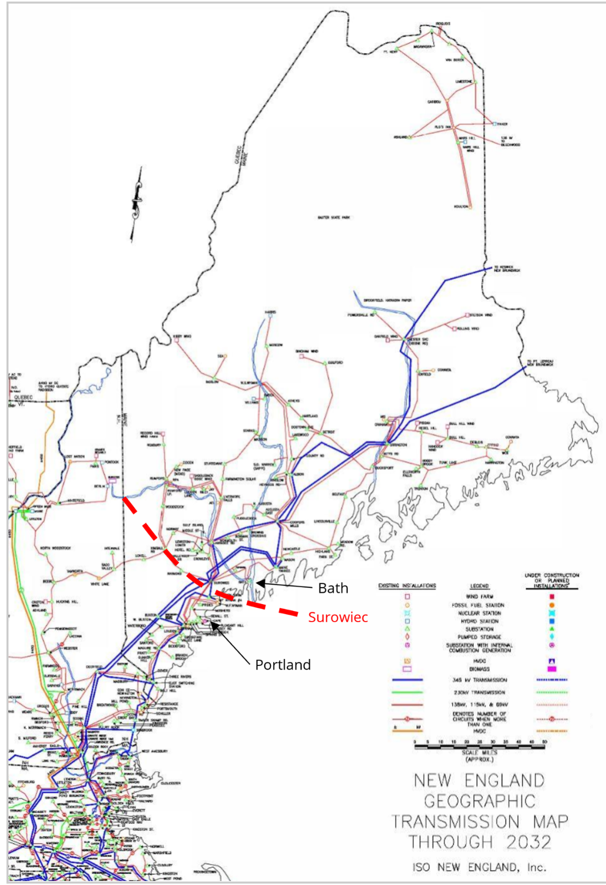
8. *How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.*

   In a fully decarbonized electric system, energy storage of various durations will be needed. However, any energy storage facility that is likely to be online in time to help achieve Maine's 2025 and even 2030 storage goals must begin the interconnection process very soon (especially for transmission-connected resources). We recommend that the program called for by Section 2 of LD1850 be focused on technologies that are currently commercially available, while longer-duration technologies can be addressed in the report called for by Section 3 of LD1850. More specifically, we do not recommend that any storage program proposed by the GEO be too prescriptive about storage duration (i.e. 2 vs. 4 hour). There are many different factors at play as the electrical system decarbonizes, and the most optimal duration today may not be the most optimal duration in five years. Rather than attempting to make that determination at a policy level, storage developers and operators are better positioned to weigh the different factors and make the most economic decisions.

9. *Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.*

   The index storage credit mechanism is an innovative policy concept that recognizes that storage can provide a number of different services to the grid. The indexed credit structure relies on wholesale markets to send signals about which services are most valuable at any given time, but provides a moderate amount of revenue predictability so that energy storage facilities (ESFs) are able to secure financing. The bulk of an ESF's revenue is intended to come from wholesale market revenues under this structure, with only a comparatively small revenue gap to be filled by a state incentive. While this mechanism is under development or under consideration in other states, its applicability in Maine is more challenging. Starting with Forward Capacity Auction 16 in 2021, resources located north of the Surowiec interface in Maine have been unable to qualify for capacity. Capacity revenues account for 25-40% of a transmission-scale ESF's wholesale revenues in

Massachusetts, but these revenues would be unavailable to a facility located in almost the entire state of Maine. The state incentive required to fill the revenue gap for a transmission-scale ESF located north of the Surowiec interface would be quite significant. An indexed storage credit mechanism is an elegant method for leveraging the wholesale markets to deploy transmission-scale storage, but in Maine the only projects that could be deployed cost-effectively would be confined to the far southern tip of the state.



However, there are a number of reasons why Maine is particularly well-suited for a storage program design geared toward distribution-connected resources. First, Maine already has a large pipeline of DG solar (525 - 1900 MW) relative to peak load (~1650 MW), but a weak transmission system. Distribution-connected storage is better suited to optimize distribution-connected generation while reducing strain on the transmission system. Second, Maine has unique challenges with reliability and resilience as a large, low-density state. Multiple, smaller ESFs located closer to load can be much more effective for supporting reliability and resilience than one or two very large ESFs. And third, the comparatively small number of ratepayers relative to the comparatively large extent of grid infrastructure means that Maine ratepayers shoulder a higher cost burden than other New England ratepayers. While transmission-connected storage, as noted above, may require extra state incentives compared to storage in other parts of New England, distribution-connected storage can be deployed in a way that leads to cost savings for ratepayers.

New Leaf and Bluewave propose that the GEO establish a program for distribution-connected standalone storage that would leverage DG storage's ability to reduce the effective peak load on the distribution system. Participating ESFs would be limited to 5 MW AC or less, and would register with ISO-NE as load reducers. When these projects dispatch during the monthly and annual peak hours, they would have the effect of directly reducing the amount that the distribution company is charged by ISO-NE for capacity (ICAP) and transmission (RNS), because those charges are calculated based on peak load. Compensation would equal the value of these avoided costs, plus the net of energy values (LMP) during battery charging and discharging. Load reducers are not permitted to participate in wholesale markets; all of these value streams would be calculated based on the effective ratepayer savings.

Specifically, we recommend a load reducer program be created in which utilities are directed to sign 10-year contracts with ESFs of up to 5MW each, which would be required to register as load reducers. Compensation would have two components: a set performance compensation level according to actual performance during monthly and annual system peak hours, and a backward-looking accounting of energy arbitrage values. Such a program structure would allow storage resources to deliver benefits to Maine ratepayers and to the grid by tying compensation to performance during critical periods. Importantly, provisions that provide enough revenue certainty for storage will allow resources to secure financing and actually deliver these benefits.

The set incentive component would be based on an estimate of RNS and ICAP charges for each distribution company, and could be recalibrated every 3-5 years. The RNS rate is set each year by ISO-NE and each utility's RNS charges are based on load during monthly peak hours on the local transmission network. ICAP charges are also set each year by ISO-NE, but are based on load during the annual system-wide peak hour, which may or may not coincide with the monthly local transmission network peak hour. ISO-NE and third-party analysts regularly prepare forecasts of RNS and ICAP costs, which have a relatively narrow band of uncertainty. Setting an incentive level based on expected RNS and ICAP costs therefore presents relatively little risk to ratepayers. Contracted ESFs would earn this incentive by dispatching during these monthly and annual peak hours. Compensation would equal the incentive amount multiplied by the average MW that a given ESF dispatched during those hours (as evidenced by ESF meter data).

Participating ESFs would be incentivized to operate more frequently than just during monthly and annual peak hours by receiving compensation for energy arbitrage as well. An ESF's compensation would equal the wholesale energy price during the hours it was discharging multiplied by the capacity at which it was discharging, minus the wholesale energy price multiplied by capacity for the hours at which it was charging. This would be calculated by the program administrator (which could be a contracted third-party entity), by comparing the ESF's meter data with the real-time locational marginal prices[2] (LMPs) for each hour. All of Maine is within a single load zone that has the same LMP. LMP data is downloadable from ISO-NE and this calculation could be easily automated. Even if not automated, these calculations are simple and fast to complete.

We have discussed elsewhere in these comments some of the additional benefits that distribution-connected storage can provide. When considering an incentive for distribution-connected storage, there are several reasons this proposed load reducer

[2] Note: The fundamental concept underlying this proposal is to compensate ESFs based on an actual or closely estimated accounting of ratepayer savings caused by the operation of the ESF. If the participating ESFs were instead participating in the wholesale energy market, they would pay or be paid for energy at the nodal price. However, distribution companies (and therefore ratepayers) pay for energy at the LMP.

program structure is advantageous. First, transmission costs are significant, and are predicted to grow substantially over time. Each megawatt of load that is served during peak hours by the dispatch of distribution-connected storage resources represents a significant cost savings to Maine ratepayers. These savings can only be realized if storage projects are registered as load reducers, but the value of those savings is **more than double** the amount that the same battery could earn in the **wholesale energy and capacity markets combined** if it were not registered as a load reducer. Put another way, the avoided transmission cost value stream has an enormous impact on project economics but is only available to <5MW, distribution-connected storage registered as load reducers.

Second, the dollar per MW value of avoided capacity cost is higher than the dollar per MW that a project can earn in the wholesale capacity market. In addition, since load reducers are not participating in capacity markets, they are not required to demonstrate deliverability, and therefore there are no geographic restrictions on where in Maine they can be located.

Third, in the long term, reducing peak loads is essential to minimizing the enormous burden of upgrading and expanding the distribution and transmission systems in order to enable electrification and transition to renewable energy. In addition to all of the benefits described above that storage can provide at a variety of sizes and with a variety of compensation structures, deploying storage that can function as load reducers has a huge added benefit to Maine ratepayers by reducing the need for future transmission buildout, which would otherwise come at a huge cost. ISO-NE's draft 2050 transmission report estimates that the cost difference between a 51GW peak system in 2050 versus a 57GW peak system is $7-10 billion, representing a 40-60% increase in cost to build out the transmission system to serve an additional 10% increase in peak load.[3] In addition to the cost of the transmission buildout required to serve a higher peak load, Maine knows more intimately than any other state in New England the siting challenges that would have to be overcome in order to achieve such a transmission buildout.

10. *How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?*

    Projects are incentivized to maximize the Investment Tax Credit (ITC) benefits available by preferential siting as the ITC is substantial. The program described above further maximizes federal incentives, as interconnection costs for projects smaller than 5 MW are ITC-eligible. This again delivers ratepayer value through the program.

11. *Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above. a) To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.*

[3] https://www.iso-ne.com/static-assets/documents/100005/2023_11_01_pac_2050_transmission_study_draft.docx, page 52.

12. *Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.*

    Many of the barriers to energy storage deployment were recognized in the Maine Energy Storage market assessment released last year. We echo the barriers outlined in that report and wish to emphasize two particular barriers that have the potential to severely impede the development of the energy storage market in Maine.

    First, rate design. For FTM energy storage, rate design is truly make or break for project economics. Central Maine Power's proposed Wholesale Distribution Tariff is particularly burdensome as it seeks to apply a lightly modified commercial and industrial tariff to energy storage. Such a design does not recognize the unique benefits and costs attributable to energy storage on the distribution grid and, if implemented, will stifle development and preclude storage from delivering benefits to Maine ratepayers.

    We encourage the GEO to convene a stakeholder process, including industry, state stakeholders, and the EDCs, to explore the appropriate design of an energy storage-specific rate. This will be necessary if a distribution storage program is to succeed and deliver benefits. We encourage the GEO to lean on the successes in other states, particularly Connecticut and Massachusetts, in driving rate designs that both appropriately recover distribution system costs, while allowing storage to deliver benefits to ratepayers.

    The other most significant barrier is interconnection. As the GEO is well aware, interconnection is too often a major barrier to the success of clean energy deployment. Storage faces many of the same interconnection challenges as solar. We will not rehash those concerns, but we do wish to raise two concerns unique to storage.

    The way that utilities study storage is often misaligned with actual and expected storage operation. While we do not know how the EDCs plan to study standalone storage in Maine, we have found in other jurisdictions that utilities will study storage as charging during times of peak load and discharging during the lowest system load, often including a worst-case scenario. This is highly unlikely to be the actual operational profile of any energy storage in Maine or elsewhere and we encourage a proactive effort to ensure that the operational assumptions in energy storage interconnection studies are in line with actual operational expectations. One step towards this goal is to allow projects to propose their own charging and discharging schedules (likely aligned with program requirements) and, thus, study based on those actual operational plans. A more sophisticated outcome would utilize DERMS to understand the real time operational considerations on a feeder and allow for additional storage capacity without upgrades to optimize the efficiency of the feeder.

    Storage also has an opportunity to complement, and perhaps enhance, solar development if the interconnection process and the incentive program are aligned in recognizing that value. Under the status quo, we are concerned that storage deployed in solar saturated areas would face burdensome interconnection costs and timelines (due to cluster studies). Ideally, however, storage sited in solar saturated areas would alleviate the need for upgrades, would shorten interconnection timelines for all resources, and would lower interconnection costs for all resources. We encourage the GEO to explore how the program design could lead to an interconnection process that more fully accounts for state policy and to explore program designs that would enable the EDCs to count on storage as a tool to alleviate solar saturation.

13. *Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.*

    In any program with limited capacity, New Leaf advocates for high project maturity requirements for reserving capacity. Specifically, requiring site control, ISA, and non-ministerial permits ensures that projects that reserve capacity are ready to begin construction and deliver benefits to ratepayers in a timely manner. Allowing more early-stage, speculative projects to reserve capacity or to submit bids in a procurement guarantees a certain level of delay and churn as some projects inevitably face challenges and withdraw.

    A procurement model is appropriate for transmission-scale resources, where a small number of projects will receive contracts and small differences in cost between projects can have a relatively large impact on ratepayers. For a load reducer program as proposed above, however, there is no need to require price competition among projects because compensation is based on the avoided costs that those projects effect by their operation. That is, there is no price premium being paid to projects, and therefore there is no need to create competition to ensure the premium is as cost-effective as possible. If a load reducer program is implemented, we recommend that program capacity be reserved on a first-come, first-served basis controlled by high project maturity requirements.

14. *Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program*.

    Connecticut is in the process of developing a distribution-connected, front-of-the-meter storage program that structures incentives based on performance during peak hours. ESFs in this program will not be registered as load reducers and instead will be expected to participate in wholesale markets, but the program design is structured to incentivize operations in a similar manner as our proposal above. Extensive cost-benefit analysis has shown that the proposed Connecticut program delivers net benefits to ratepayers, even without accessing the avoided transmission value stream.

    Several municipal utilities in Massachusetts are currently operating or contracting with third-party owned batteries as load reducers in order to realize transmission, capacity, and energy savings. Municipal utilities such as MMWEC have been operating batteries in this manner for a number of years and have a track record that demonstrates both the relative ease of accounting and administration and significant cost savings.

Thank you for the opportunity to submit our input in response to this Request for Information. We are eager to continue collaborating with the Governor's Energy Office as a storage program proposal is prepared over the coming months.

Sincerely,

Jessica Robertson

Director of Policy and Business Development, New England
New Leaf Energy
jrobertson@newleafenergy.com
607-592-3349

<u>/s/ Sean Burke</u>

Sean Burke

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December 8, 2023

Via e-mail

Caroline Colan
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Introduction

Clearway Energy Group (Clearway) appreciates the opportunity to respond to the Maine Governor's Office of Energy (GEO) Request for Information (RFI) as outlined in LD 1850, *An Act Relating to Energy Storage and the State's Energy Goals* (Storage Legislation), with these initial comments. Clearway is a leading developer, owner, and operator of utility-scale onshore wind, solar, and energy storage assets across 26 states, with significant project development interests in Maine. Our experience bringing over 7 GW of clean energy projects into operation through more than $11.8 billion in financings means Clearway is well versed in financing underwriting requirements and risk appetites within the tax equity and broader financing community. Clearway's experience in the energy storage sector includes deployment of a total of 45 MW (140 MWh) of distributed storage paired with solar projects in Massachusetts, 75 MW (300 MWh) of utility-scale storage in Hawaii, and four utility-scale storage projects under construction in California totaling 613 MW (2,542 MWh). As a long-term owner-operator of clean energy projects, Clearway approaches project development and state-led procurements with careful consideration of long-term technical and financial performance.

Deploying 400 megawatts of energy storage resources by 2030 as called for in LD 1850 would strengthen Maine's grid and represent meaningful progress toward a more flexible and resilient energy system. For that vision to become reality, the GEO must create an incentive design that attracts and selects energy storage projects that will result in actual deployment. We offer our comments through that lens: ensuring solicitations result in financeable long-term revenue contracts in the near term so that Maine can be confident in meeting its energy storage target set by Governor Mills' Storage Legislation.

While we have not responded to each of the questions enumerated in the RFI, we are submitting these comments to address what we believe to be the spirit of those questions, which is, "How can the GEO meet its obligations under statute, cut greenhouse gas emissions, and enhance grid reliability, and how can we achieve these goals quickly while protecting the ratepayer." Our comments cover topics addressed by questions number 2, 3, 4, 5, 9, and 14.

We look forward to continuing the dialogue with the GEO on these crucial policies that will strengthen Maine's energy future.

The GEO Should Leverage Proven Long-Term Fixed-Price Agreements to Ensure Cost-Effective Projects Are Built

To ensure that the Maine energy storage program succeeds in not just the selection of development-stage energy storage projects but rather in the economic *deployment and operation* of energy storage projects, Clearway encourages the GEO to consider procurement design elements that create a guaranteed long-term revenue stream for project owner-operators. Energy storage is in its early years of deployment; long-term financing partners (e.g., tax equity) are still getting accustomed to underwriting this asset class. Particularly in the early years of state support for storage deployment, the goal should be certainty of deployment through simple, transparent, tried-and-true contracting mechanisms. Long-term contracts with a guaranteed revenue stream—for example, partial or full tolling agreements—are most efficiently financed and therefore accelerate the deployment of this relatively nascent energy storage asset class. Full tolling agreements ascribe guaranteed revenue to projects for their contribution to system reliability and are most successful in mitigating post-contract award attrition, attracting capital, and achieving permanent financing, and ensuring reliable operations over the life of the projects.[1]

Under any contracting scenario, projects will be built with a similar cost of procurement and construction, and projects will generate similar revenues in the wholesale markets. However, tolling agreements can reduce ratepayer cost and risk by:

[1] While it is true that some capital is available for storage projects with higher risk revenue profiles (e.g., heavy merchant market revenue), this capital is limited, thereby limiting the scalability of storage incentive programs that require this type of capital.

- Allowing for better financing terms and lower financing costs because of reduced risks from guaranteed revenues to project owners. This will lead to lower bids overall, all else held equal.
- Still allowing for efficient wholesale market participation via dispatch from the load-serving entity or off-taker, which will directly offset the tolling costs.
- Reducing the rate of contract termination and/or project abandonment by bidding, negotiating, and contracting around *a clear revenue profile* that can be modeled and financed against, ensuring project owner-operators will be profitable over the lifetime of the contract.

For these reasons, Clearway strongly encourages the GEO, in its solicitation, to replicate proven long-term contract structures (e.g. 20 years) which are simple, efficient, and financeable. The GEO should also significantly weight non-price factors in the development of incentive design and, later, in the evaluation of bids. Among other factors, bids should be evaluated based on demonstrated experience with procurement, construction, and operation of storage.

California's Experience Deploying Utility-Scale Storage at Scale Can Be Replicated in Maine

As a case study, California's Resource Adequacy (RA) program enables long-term, bilateral, fixed-price contracts between load-serving entities and storage project owner-operators. Specific contract types are not prescribed; however, transacting on full tolling agreements is highly efficient. Clearway is currently developing and constructing utility-scale standalone storage projects in California and has executed full tolling agreements as well as RA-only (partial tolling) contracts. Through full tolling agreements, load-serving entities pay a fixed monthly charge for all RA (capacity), energy, and ancillary services benefits of a project, so long as such projects reasonably perform as expected, and benefit from all storage revenues in exchange for a fixed monthly charge to the project owner. The load-serving entity dispatches the battery into the market to best serve the needs of the grid within defined operational limitations set by the project owner. The negotiated tolling rate approximates the total value of the project to the grid over the operational life of the system. In an RA-only contract, load- serving entities pay a fixed monthly charge for all RA (capacity), while energy and ancillary services remain uncontracted and available for the owner-operator to bid into the market on a merchant basis. The availability of long-term, bilateral, fixed-price revenue contracts—both full tolling arrangements as well as RA-only contracts—has helped California lead the nation in scaling energy storage deployment that provides long-term benefit to the grid.

This approach can be replicated in Maine, with utility-scale energy storage projects receiving a full tolling agreement from the State and contracted through the load-serving entity or utility. The load-serving entity can dispatch the project into the ISO-NE market to best serve the needs of the grid, and have the battery participate in ISO-NE's energy, capacity, and ancillary services markets. The revenues that the project receives from the ISO-NE markets can be returned to the ratepayers. This way, the project owner receives a fixed monthly payment (in $/kW-month) based on its negotiated rate and allows the ratepayers to retain the value of dispatching the battery into the ISO-NE market, even when that value is in excess of the tolling rate. In sum, ratepayers receive the full set of benefits from the market with minimal risk. The tolling agreement may include performance guarantees, specifying the required availability, efficiency, and reliability of the battery project. Penalties or bonuses may also be tied to meeting or exceeding these benchmarks to hold the project owners accountable.

Conclusion

Clearway urges the GEO to take an approach to storage deployment focused on simplicity, efficiency, and financeable in the near-term. Contracting structures that rely on storage owner-operators to take significant revenue risk (such as an indexed storage credit program) should not be considered at this time. Financing options are limited for this type of risk profile, thus limiting program scalability. Meanwhile, any available financing comes at a premium, which translates to increased costs for ratepayers vis a vis simpler, more proven contract structures. Energy storage is an emerging asset class and is at a different stage of maturity than solar and wind, and incentive designs will need to reflect these differences in order to meet the state's deployment goals.

Clearway appreciates the opportunity to offer these comments and looks forward to working with GEO staff to shape and execute a successful energy storage program. Please do not hesitate to contact me with additional questions.

Sincerely,

Shaun Chapman
Head of External Affairs, East
Clearway Energy Group
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718-541-9322

December 8, 2023

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: Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)

Dear Ms. Colan,

Nexamp appreciates the opportunity to comment on the RFI from the Governor's Energy Office regarding the development of a Maine Energy Storage 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.

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 much of the recommendations included in comments from NECEC, specifically their discussion on the need for a Wholesale Distribution Tariff, comments on the benefits of distribution sited storage, and participant eligibility.

Questions of Interest:

1) Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.3 Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

2) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 20304 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?

a) Comment on how the Maine Energy Storage Program should define and operationalize “incremental delivery of renewable electricity to customers.”

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to “provide one or more net benefits to the electric grid and to ratepayers?”

Nexamp Response: The Maine Energy Storage Program should be designed in a way that takes advantage of the progress being made in Maine in the renewable energy space. For example, Maine is a leader in the solar PV space. The new Energy Storage Program should allow for storage to be retrofitted to existing solar systems and systems currently in development. Co-located solar + storage can provide necessary curtailment of solar PV during peak production hours to reduce strain on the grid, and discharge during high demand, low solar production time periods. The same concept can be used with other passive renewable energy technologies, such as offshore wind. Storage reduces the strain on the grid and alleviated interconnection issues and smooths out renewable intermittency which is a critical component to reaching the state’s renewable penetration targets and realizing a future based on renewable generation.

a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?
b) Comment on cost-benefit test or tests (e.g., ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.

4) Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize “improved electric reliability.”

Nexamp Response: Although the terms are sometimes used interchangeably because they are closely connected, reliability and resiliency have different definitions. Electric reliability is the probability that the electric grid will be operational when a customer flips their switch on. Electric resiliency is the ability of the grid to restore after an incident that causes an outage, weather related or otherwise. Energy storage can be operationalized to improve both system reliability through peak shaving on stressed systems to avoid rolling blackouts, microgrids designed to be located at critical facilities to keep them energized in emergency events, microgrids located on radial circuits with long restoration timelines (reducing outage duration), and storage cited behind the meter at customer locations serving as backup power. It should be noted that energy storage has the highest potential to improve localized reliability and resiliency at the distribution level but can also be applied to the transmission system. All these applications can also be implemented to avoid costly traditional system upgrades (see response to question 7).

5) Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize “improved electric resiliency.”

Nexamp Response: See response to question 4.

6) How should “preferred location” be defined in the context of the Maine Energy Storage Program? How should “preferred locations” be identified, by whom, and at what time?

Nexamp Response: A “preferred location” should be defined as a location where energy storage will most benefit Maine ratepayers and grid infrastructure. Maine utilities would be best positioned to identify preferred locations where storage will most benefit the electric grid, either where hosting capacity is insufficient, or reliability needs are identified. By appropriately siting storage, it can serve traditional utility functions such as load management, voltage regulation and reliability applications, as well as the ability to improve hosting capacity and allow for increased renewables on the system. Other resources may also be leveraged to identify preferred locations, for example equity considerations and locations identified as "energy communities" through the Inflation Reduction Act may also serve as preferred locations.

7) How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?

Nexamp Response: Energy storage systems are a proven technology that can serve as a "non-wires alternative" (NWA), which is a program where an alternative technology is evaluated to replace or defer a traditional "poles and wires" utility infrastructure investment- this in effect is the definition of "serve as an alternative to upgrades of the existing transmission system". Grid needs such as load serving capacity and some reliability and resiliency needs are best suited for NWA solutions. Currently in Maine, NWA investigation and evaluation is required by statute under MRS Title 35-A, §3132, all transmission and distribution investments undertaken by Maine investor-owned utilities, CMP and Versant, are required to be reviewed for NWA solutions unless they meet specific exclusion criteria under MPUC Chapter 319. Since the statute was enacted in 2019, there has not been a successful NWA project implemented in Maine. While Nexamp believes it is appropriate for the utilities to identify system upgrades for NWA consideration, the lack of a successful NWA project in Maine shows that the current construct of the program has limitations and the exclusion criteria allowing projects to forgo NWA evaluation is too broad. Nexamp recommends a reevaluation of the NWA statute in Maine and also recommends energy storage systems that bid into NWA solicitations be able to utilize energy storage incentives through the forthcoming Maine Energy Storage program.

8) How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.

Nexamp Response: It may be unnecessary to define a specific duration required for a storage program in order to allow the program to evolve as needed as system conditions change in the future. It is worth noting that storage programs are moving towards 4-hour durations to maximize system benefits. Nexamp recommends targeting incentive design to enable 4-hour duration projects to move forward and to maximize system benefits. A 4-hour duration is in line with NYISO program expectations.

9) Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.

Nexamp Response: Since the Maine Energy Storage Program will target both transmission and distribution FTM storage applications, it should consider additional contract mechanisms to an index storage credit mechanism if the goal is to incentivize both transmission and distribution connected energy storage systems. Successful energy storage incentive programs, like NYSERDA's in New York, have multiple mechanisms available to different types of storage projects, taking the unique characteristics and revenue streams of transmission versus distribution sited projects into account.

While an index storage credit mechanism works well for transmission level projects, distribution level projects are often exposed to demand and base energy charges that create a disadvantage when developing a strike price compared to a transmission level project. A competitive solicitation within an index storage credit program would yield a majority, or exclusively, transmission level projects, which likely would not address electric infrastructure needs on the distribution level. Distribution sited storage provides important benefits to the electric infrastructure, including but not limited to, peak load reduction and load management, smoothing of renewable generation, resiliency, and reliability benefits, and allowing for more renewable integration at a more local level.

For distribution level projects some form of an upfront or on-going incentive payment tied to an energy storage system's energy capacity (kWh) would allow developers more flexibility in project siting within the varying levels of the electric infrastructure. A distribution level energy storage program should allow for open ISO market access while also compensating for the locational benefits that distribution sited storage provides. In addition to a workable incentive program, Maine also needs a Wholesale Distribution Tariff (WDT) that treats storage resources appropriately to their impact (both costs and benefits) to the electric grid (see response to RFI question 12 for more information on the need for a WDT).

10) How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

Nexamp Response: The Maine Energy Storage Program should be aligned with the timing and requirements of the investment tax credit available through the Inflation Reduction Act in terms of procurement timing, COD, and project life.

11) Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above.

   a) To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.

12) Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.

Nexamp Response: There are currently multiple barriers to the deployment of utility scale energy storage in Maine. The most challenging barriers are (1) lack of appropriate energy storage specific tariffs that recover the true cost of energy storage systems and consider the added benefit of these systems to electric grid infrastructure, (2) siting and permitting, and (3) interconnection studies and processes. These barriers can be avoided through a thoughtfully designed program and coordination with stakeholders.

(1) Appropriate tariff structure: The lack of appropriate energy storage specific distribution rates in Maine is an economic barrier to the implementation of an energy storage program. The closure of Case 2021-00273 and conclusion that CMP will file its B-ES Rate with FERC, which is in essence, the application of its current large commercial tariffs to energy storage systems and not representative of the true cost of energy storage to the transmission system. Additionally, a storage specific Wholesale Distribution Tariff, similar to what is being developed through collaborative process in Massachusetts and Connecticut, where the incremental cost of storage and the net benefits of storage to the grid are required to considered (see NECEC response to RFI Question 12 for further detail).

(2) Siting and permitting: Siting and permitting at the local level can be a significant barrier to energy storage deployment. Guidance and best practice resources should be issued to inform local communities how to safely site and permit energy storage resources. For example, the Maine Audobon created a template solar ordinance to assist communities- a similar resource on storage could be beneficial.

(3) Interconnection and interconnection studies processes: Currently in Maine, renewable projects over 1MW AC go through distribution cluster study processes, which experience multi-year delays and exorbitant upgrade costs. Consideration should be given to how pairing solar + storage projects are treated as a system size from an interconnection study perspective. Close attention must also be given to how energy storage is studied in interconnection processes (as charging load, out of service, or discharging), as one of the main benefits of energy storage is its dispatchability and alleviation of peak load on the electric system.

13) Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

Nexamp Response: Participant and project qualifications can be defined specific to each storage procurement in the Maine Energy Storage Program. Participant qualifications may include criteria like previous experience in Maine or New England and a resume of operational energy storage projects, company financing status and ability to finance projects, and safety record. Project qualifications may include criteria such as product specifications and compliance with codes and standards, and project maturity requirements and proposed ownership model. Reasonable project maturity requirements to reserve incentives for FTM storage are interconnection application submittal and demonstration of site control or a deposit. Regarding ownership models, Nexamp stresses that outside of limited circumstances, EDC ownership of a dispatchable resource that could be in direct competition with independently owned energy resources would create an uneven playing field that would discourage private investment. Maine utilities are fully funded by Maine ratepayers and have a regulated return on equity (ROE) for their investments. Maine's electric distribution companies should remain focused on planning, upgrading, and operating the distribution and transmission system to accommodate deep penetration of competitive distributed energy resources ("DERs") including stand-alone storage and solar-storage hybrid resources. Nexamp supports EDCs being allowed to explore innovative programs such as the current NWA program and being encouraged to consider competitively sourced, distribution-level non-wires solutions before making a traditional investment to meet a distribution need. But we also believe this is possible without the need for EDCs to own energy storage assets.

14) Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

Nexamp Response: Nexamp recommends that the Maine Energy Storage Program review current and developing energy storage programs in New York and Massachusetts which have successfully implemented programs and have substantial amounts of energy storage operating in their states, as well as review program development and stakeholder comments from entities such as SEIA in New Jersey, Connecticut, and Maryland. Nexamp also echoes the resources provided by NECEC in their response to this RFI question.

December 8, 2023

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

Submitted electronically to Caroline.Colan@Maine.gov

Re: Request for Information Maine Energy Storage Program Development

Dear Ms. Colan,

Form Energy, Inc. ("Form Energy") appreciates the opportunity to comment on the Maine Governor's Energy Office ("GEO") request for information ("RFI") 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 greenhouse gas reduction goals while supporting critical grid reliability and resiliency needs.

Well-designed state programs have the potential to accelerate the timeframe for storage technologies to deliver these public benefits. To ensure the deployment of diverse storage classes in Maine, Form Energy encourages the GEO to establish procurement targets and incentive structures designed specifically for long-duration storage (>10 hr duration) and multi-day storage (>24-hr storage), in addition to short-duration (<10 hr duration) targets. This will help build a more diverse storage portfolio in Maine, which studies have shown can lower electric system costs, reduce greenhouse gas emissions, ensure critical reliability and resiliency, and avoid resource overbuild and related land use impacts.

About Form Energy

Form Energy, Inc. ("Form Energy") is a U.S. energy storage technology and manufacturing company that is commercializing a new class of multi-day energy storage systems that will enable a reliable and fully renewable electric grid year-round. Our first commercial product is an iron-air battery capable of continuously discharging electricity for 100 hours at a total installed cost per unit of energy that is less than 1/10th of today's lithium-ion battery technology. Form's battery can achieve these low costs by using iron, one of the most abundant and cheapest minerals. Our iron-air battery is modular, safe, and can be sited anywhere on the grid. Form's first project will be a 1.5 MW, 150 MWh pilot project with utility Great River Energy in Minnesota. This pilot project will demonstrate the repeatable, scalable building block of our system, and how it can provide firm energy delivery to address grid reliability needs. We expect this project to go online in 2025, immediately followed by larger systems with partners across the country, totaling 5 GWh of announced projects online as soon as 2026.

Multi-day storage is a diverse resource class that includes iron-air batteries like Form'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 energy delivery at rated capacity over consecutive days, 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 ancillary services; and a physical hedge to protect market participants and retail customers from price shocks.

Below we have provided responses to those questions for which we have relevant information to provide.

Responses to Questions of Interest

1) *Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?*

Energy storage resources balance and firm intermittent renewable energy resources, which allows for a more rapid integration of the large quantities of clean energy resources that Maine and New England need to achieve deep decarbonization and a shift away from polluting fossil fuel generators. Form Energy's recent whitepaper, "Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England[1]" shows that with the right mix of short- and long-duration energy storage technologies, including significant quantities of multi-day storage, the region can achieve a zero-carbon energy future at a fraction of the cost of using short-duration storage alone and for only slightly higher cost than the current policy scenario, which maintains significant fossil capacity through 2050. Short-duration storage is terrific for responding quickly to balance solar resources and shave peak loads. However, another analysis[2] Form Energy conducted for New York in 2020 shows that high levels of peaker replacement can only occur economically with long-duration energy storage. Many of these plants, which are used to support a reliable grid, are called upon to operate for more than 4 hours at a time and cannot be fully replaced with short duration energy storage alone. As peaker plants are often located in environmental justice communities, their replacement with non-polluting resources is critical for protecting the health of already overburdened residents.

[1] Form Energy. 2023. Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England.
[2] Form Energy. 2020. Solving the Clean Energy and Climate Justice Puzzle: How multi-day energy storage can cost-effectively replace long-running peakers in New York State.

In order to maximize the emission reductions from the clean energy resources the state is building, Maine's energy storage procurement program should focus on deploying a diverse mix of storage resources that includes both short and long duration technologies. We recommend that in the initial procurement, the program aim to procure at least 50 MW of multi-day storage.

2) *The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?*

    a. Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."

Adding energy storage to the power grid at key locations can help reduce costs related to transmission congestion and curtailment of existing renewable energy resources. Such congestion, if not addressed, according to ISO New England (ISO-NE) studies, will significantly reduce the value of energy produced by the Northern Maine resources procured in the recently completed solicitation 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.[3]

3) *How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"*

    a. What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?

The program should be sure to capture and quantify the significant reliability, portfolio cost savings, and emissions reduction benefits of energy storage in calculating the cost-benefits to ratepayers. Any cost-benefit analysis should also be sure to recognize that stand-alone energy storage is eligible for the federal Investment Tax Credit (ITC). This update will show significant improvement in the cost benefit analysis for stand-alone energy storage.

[3] *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

4) *Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."*

New England is vulnerable in the winter to energy price spikes associated with constraints in the delivery of natural gas, leaving consumers on the hook for high natural gas costs. Recent winter cold spells have shown that a large portion of the region's winter peak energy needs are typically fulfilled by old generating units fueled by coal and oil.[4] We have also seen that natural gas generation and the pipeline system are vulnerable to severe winter cold and storms.[5]

Form Energy's New England analysis shows that 3 GW of multi-day storage plus short duration storage serves as a winter reliability solution for the region at a fraction of the cost of short-duration storage alone.[6] In order to achieve this level of deployment, New England States must act quickly to advance the commercial deployment of these emerging resources to GW-scale before 2030. Maine's Energy Storage Program should ensure that long duration storage resources are procured in the first round of procurements and that the results of the pending long duration storage study are used to further define the optimal mix of storage types that will support the State's long-term goals. We recommend an initial procurement of at least 50 MW of multi-day storage in the Maine Energy Storage Program to support these resources.

5) *Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."*

Locating storage resources on areas of the grid that are more vulnerable to disruption due to extreme weather, grid constraints, or other causes may be able to provide local resilience when other smart-grid technologies are in place. Further study is likely needed to better understand these potential benefits and how a state procurement program could best capture them.

6) *How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.*

Short duration (<10 hr), long-duration storage (>10 hr), and multi-day storage (>24 hr) are separate resource classes, with different cost, efficiency, and duration attributes, each specializing in different grid services that together will enable a reliable, affordable zero-carbon grid. Notably, long-duration and multi-day storage are at a different stage of

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[4] RENEW Northeast, Benefits of Wind Energy for Winter 5-7 (February 1, 2023), https://renewne.org/wp content/uploads/2023/02/Wind-in-Winter-RENEW-FINAL-2023-02-01.pdf

[5] North American Electric Reliability Corp., December 2022 Winter Storm Elliott Grid Operations: Key Findings and Recommendations (September 21, 2023), https://www.ferc.gov/news-events/news/presentation-ferc-nercregional-entity-joint-inquiry-winter-storm-elliott. (highlighting Winter Storm Elliott in December 2022 as the fifth cold-weather outage event in 11 years).

[6] Form Energy. 2023. Clean, Reliable, Affordable: The Value of Multi-Day Storage in New England.

commercial maturity than short-duration storage, and they face different market barriers than short-duration storage, chiefly that existing wholesale market services and state programs do not yet fully value the reliability benefits of long-duration and multi-day storage and their ability to lower system costs over the long-run.

All durations of storage are needed to enable a cost-effective and reliable clean energy transition in Maine. In Form Energy's New England analysis, we used our own technology-agnostic capacity expansion model optimized across 8,760 hours to determine the least cost mix of resources that could help New England states achieve future emission reduction and clean energy goals while also providing a cost-effective winter reliability solution by 2030. What we found was that a mix of short duration, long duration, and multi-day storage provided the most cost effective means of achieving all of these outcomes.

Because longer duration technologies are still maturing commercially, state policy programs like Maine's Energy Storage Program should aim to support their successful development early in order to capture all of these benefits for Maine. As such, we recommend at least 50 MW of the 200 MW procurement be reserved for storage capable of providing energy for long durations.

7) *Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.*

Form Energy generally believes an index storage credit mechanism can be an effective mechanism to support emerging long-duration and multi-day energy storage. One attractive attribute of this mechanism is that it can provide a means for energy storage resources of diverse type and duration to participate equally. To ensure that long-duration and multi-day storage can participate effectively in this program, we offer the following recommendations.

- Multi-day energy storage should be explicitly eligible to participate in the ISC Program

We recommend that any index storage credit mechanism explicitly ensure that energy storage of any duration, including storage with durations greater than 24-hours, are eligible to participate, not solely short duration storage. For example, in *New York's 6 GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage*, the state highlights that the central feature of the Index Storage Credit program is a mechanism to credit energy storage resources based on the amount of MWh of energy storage *capacity* that is operational on a given day, which Form Energy supports. This approach has the potential to incentivize the longer-durations of energy storage that is needed to meet the state's long-term grid reliability requirements, and it can remedy existing capacity market barriers to multi-day energy storage, which do not recognize the incremental reliability services that multi-day storage provides.

- Credits should be awarded for every MWh of rated energy storage capacity available

We recommend that energy storage systems should produce credits based on the total system duration in MWh without limit, and that projects should be evaluated principally based on the price bid per credit. This approach can help ensure competitive-neutrality between storage resources, regardless of storage duration.

- Reference price periods should be defined based on the duration of the resource

We recommend that to accommodate energy storage technologies with different durations and efficiencies, it is reasonable for the periods used to evaluate the reference price to vary based on the x-hour duration of the resource.

Under any index storage credit program, the state should have flexibility to separately procure long and multi-day storage resources if the program ends up preferentially favoring short-duration storage. The purpose of an index storage credit program should be to support the rapid commercial scale-up of energy storage resources with diverse durations by providing revenue stability and promoting competition to safeguard ratepayers in an administratively efficient manner. However, there is still much uncertainty about how well these programs will work in practice. Given this uncertainty, it is prudent to allow the state flexibility to separately evaluate and procure different classes of energy storage based on duration. It is unclear at present where best to draw the line between different storage classes.

8) *How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?*

Act now. States tend to backload procurement programs with ramping of procurements over time. The further out that regulators push procurement timelines, the more these projects are at risk of not maximizing currently available federal incentives. Otherwise, developers have a strong interest in qualifying for the ITC and its bonus credit adders.

Since 2021, the U.S. Department of Energy has received expanded authority and funding that could assist New England to increase grid resiliency. Both the Infrastructure Investment and Jobs Act of 2021 (also termed the Bipartisan Infrastructure Law), and the Inflation Reduction Act of 2022 contain new substantive provisions that have already produced awards to projects that will increase reliability and the integration of clean energy. Maine should monitor for opportunities in future rounds of federal programs for grants and loans that can support energy storage development.

9) *Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.*

ISO-NE's capacity and ancillary services markets do not differentially value and compensate multi-day storage or firm zero carbon resources for their reliability services. At present, Form Energy's 100-hour iron-air battery receives the same capacity accreditation as an 4-hour battery, despite providing an obviously higher degree of firm capacity and ability to deliver firm energy supply over sequential day periods.

Additionally, ISO-NE's market does not have any ancillary service markets that could compensate resources, like multi-day storage, that can guarantee firm energy delivery over sequential days during periods of grid stress (extreme weather, renewable energy lulls, fossil fuel shortages, or other grid outages). Consequently, multi-day storage is disadvantaged in existing storage procurement programs and in the market relative to short-duration storage.

Making matters worse, capacity revenue will be unavailable to storage resources north of the Surowiec-South interface and will not be qualified to sell their capacity into the Forward Capacity Market (FCM), so procurement pricing must account for that revenue gap in order to make projects financially viable.

Markets also do not provide a means for multi-day storage to directly access both transmission enhancing value and energy value. Form Energy conducted a study[7] with National Grid ESO, the United Kingdom's grid operator, demonstrating that multi-day energy storage has significant potential to cost-effectively mitigate wind energy curtailment as an alternative to transmission system upgrades. This type of renewable integration and transmission- enhancing value directly correlates with the northern Maine wind curtailment and congestion problems the state faces. This value is also additional to the energy capacity value that Form Energy identified in our New England analysis. At present, it is not possible for storage developers to capture this value; only utilities are positioned to realize these dual benefits for ratepayers and to value projects accordingly.

10) *Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.*

Form Energy does not support any restrictions on participation that would stifle competition or bar new entrants from the market.

We appreciate the opportunity to provide these comments to you and look forward to continuing to work with the State of Maine GEO on developing this exciting new program. Please do not hesitate to reach out to me if you have any questions or concerns.

Sincerely,

Sarah Jackson
Policy Manager, Eastern Region
Form Energy
sjackson@formenergy.com

[7] Form Energy. 2021. *Energy Storage to Support the UK Transmission Grid.* https://formenergy.com/insights/energy-storage-to-support-the-uk-transmission-grid/

Comments submitted by Rob Smart

Questions of Interest

NOTE: The following comments assume an aggregation of behind-the-meter batteries located at residential and/or commercial locations that is controlled by a single instance of a virtual power plant (VPP) software platform.

1) Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.[3] Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions? **While there is absolutely a place for utility-scale energy storage, the RMI value stack for those sites is limited to transmission-level benefits only, adding no value at the distribution and behind-the-meter levels. Building from behind-the-meter provides the potential to use those batteries, especially in aggregation, at all three levels of the value stack – BTM, distribution, and transmission.**

   Perhaps the fastest way to increase total battery capacity is to increase the number of incentive-paying uses of the battery (see RMI energy storage value stack as reference), which is currently limited in Maine to Efficiency Maine Trust's BYOD demand response program, but the residential version of that DR program pays about 40% of the incentive rate of the Connected Solutions program offered in MA and RI. With increased incentive dollars/programs, individual batteries can be optimized to maximize impacts for the owner and grid. Where possible, batteries should be paired with solar PV, so that the primary charging source of these batteries is from a local clean energy source, which will also increase the resilience value for the residence or business and increase clean energy production.

2) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030[4] and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals? **See above.**

   a) Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?" **A near-term opportunity could be to utilize the DOE GRIP 2.0 program that Generac has discussed with GEO to pull together the state, non-profits, industry, and utilities to prioritize objectives and build out associated cost-benefit models. Given the mix of parties engaged, benefits will extend beyond typical utility models to also address**

equity, diversity, etc. And then, like Generac's MASS GRIP program, you might bring in an organization like the Fraunhofer Institute to manage the measurement, verification, and reporting of results.

a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?

b) Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program. [5]

4) Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability." **A key area that Generac wants to focus on is utilizing BTM energy storage to improve reliability at the transformer to substation level, especially as the electrification of residences and businesses accelerates. We are in preliminary conversations with a MA utility about how we might roll "local grid value" into our $50M DOE GRIP grant for MA, which could be instructive on how to replicate that in ME. A key part of the conversation is understanding the traditional costs of building up infrastructure, which will inform the potential incentive values that could be paid to battery owners. If improving local grid reliability is possible, then that will add more incentive value for battery owners, which will make batteries more affordable, which will increase installations and capacity.**

5) Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency." **See above.**

6) How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time? **Given these comments are on residential and C&I battery installations, preferred locations start at anywhere in Maine, but should be prioritized based on measures of need and impact. That will likely start with underserved and disadvantaged communities, including those impacted by the "side effects" of peaker plants. By designating geographic areas, and utilizing an aggregation or VPP structure, it will be important to target individual homes, multi-family residences, and essential community businesses, which will greatly improve community-scale and local grid resilience.**

7) How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time? **See above.**

8) How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program. **For residential batteries, which are limited to 20kWhs of total capacity, longer-duration events (i.e., greater than three hours) mean lower average discharge rates, which means less incentive value to the battery owner. Events less than three hours would be optimal for performance-based incentive**

programs, e.g., Connected Solutions and EMT's BYOD program. C&I batteries are much larger, so they are not constrained in the same way.

9) Legislation directs the GEO to consider an index storage credit mechanism.[6] Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms. **No comment.**

10) How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities? **One easy way is to prioritize underserved and disadvantaged communities, which adds 10 percent to the federal ITC (40% in total). Pursuing DOE GRIP grants might be another way to tap into billions of federal dollars (see GRIP Topic 3).**

11) Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above. **Each program has variables that can be compared and ranked, resulting in optimization models that dynamically weigh those variables and act in the best interest of the parties involved. This is where DERMS/VPP software platforms would come into play.**

    a) To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.

12) Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design. **No comment on utility-scale. For behind-the-meter energy storage systems, there are the typical barriers, e.g., interconnection requirements, varying AHJ knowledge, etc. There are also emerging issues, e.g., residential energy storage fire codes that tack on prohibitively high expenses, in most cases, to build required structures within homes. At some point in the future, residential batteries will be able to be installed outdoors in cold climates, but until then this is becoming a significant issue in regions implementing national fire codes for stationary batteries.**

13) Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

14) Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program. **Connected Solutions in MA and RI is a time-tested demand program that will be quite valuable to study. Beyond that, there are not many other programs that align with the recommendations mentioned in these comments. There are handfuls of progressive utilities that are thinking way ahead of the industry, e.g., Green Mountain Power, which could provide excellent feedback.**

longroad ENERGY

December 8, 2023

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: **RFI on Maine Energy Storage Program Development**

Ms. Colan:

Longroad Energy submits these comments in response to the Request for Information (RFI) issued by the Governor's Energy Office (GEO) on November 13, 2023, 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.

Responses to Questions

1. Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.3 Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

Longroad Response: *Storage is economically motivated to charge during hours of oversupply (when prices are suppressed), and discharge during periods of scarcity (when prices are elevated) since this maximizes capture of arbitrage revenue. As a result, storage tends to displace ("dispatch into") the most expensive generation on the margin of the supply stack, which tends to be carbon-intensive resources with variable fuel costs like coal, oil, and natural gas; whereas, renewable generation, which has no variable fuel costs, tends to be higher up the merit order (i.e., lower cost) and therefore less likely to be displaced by storage dispatch.*

2. The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2034 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development

of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?

Longroad Response: *Among other uses, storage provides a means for shifting energy from lower value hours to higher value hours (i.e., arbitrage). Since lower priced hours are typically characterized by either low load and/or generation oversupply, and since oversupply conditions generally occur during periods of high renewable generation, storage assists with the incremental delivery of renewable generation by providing a load sink for such renewable generation during hours of oversupply.*

a. Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."

Longroad Response: *Choosing a program design that encourages the adoption of least-cost storage resources, and the operation of those resources in the most economic manner, should naturally promote the incremental delivery of renewable electricity for reasons mentioned directly above since maximizing arbitrage value is generally compatible with shifting and lower carbon resources (e.g., renewables lacking variable fuel costs) to higher-priced hours when more carbon-intensive generation (e.g., gas peaking plants) is most likely to be displaced by storage dispatch.*

3. How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"

a. What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?

Longroad Response: *We encourage the State to design a program that promotes the development of least cost storage resources (i.e., resources that provide the maximum benefit at a minimum cost to rate payers). Generally, this will include larger scale storage systems, which benefit from economies of scale, interconnected to the transmission system.*

b. Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.

Longroad Response: *In designing a program, we encourage the state to engage a qualified consultant to assist with the quantification of the net benefits offered by storage resources including, but not limited to, capacity value, ancillary service value, arbitrage revenue, price suppression, reduced curtailment of renewable energy, and societal benefit of carbon emissions reductions.*

4. Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."

Longroad Response: *Storage inherently improves reliability by providing additional source (generation) for serving load, and sink (load) for absorbing generation during periods of oversupply. By providing source of generation, storage helps reduce the region's reliance upon natural gas, helping to dampen the impacts of supply constraints which are particularly salient during winter conditions. The ISO-NE's efforts to reform capacity accreditation (Resource Capacity Accreditation project) for the 28/29 Capability Year is expected to recognize the reliability benefits offered by storage.*

Further, storage can provide Ancillary Services including spinning reserves, ramping, voltage support and frequency regulation.

5. How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?

Longroad Response: *The identification of preferred locations for storage resources may best be left to developers in a competitive market, since developers are rationally and economically motivated to identify the most viable sites by vetting land positions for permitting, construction, and interconnection feasibility. It is therefore not advisable to inhibit such processes by limiting procurement to specific locations unless such locations were made available to the market through a competitive auction process.*

6. How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?

Longroad Response: *ISO-NE recently received FERC approval for its Longroad Tariff provisions pertaining to Storage As Transmission Only Assets (SATOA). Such provisions require that SATOA be identified as part of an ISO-NE planning or generation interconnection study, and operated by a Participating Transmission Owner. Furthermore, since the primary purpose of SATOA is to improve transmission system reliability, SATOAs will not permitted to compete in the electricity markets and would consequently have a very limited impact on wholesale prices.*

7. How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.

Longroad Response: *Since system needs are a function of load growth, transmission topology, and generation mix – optimal duration will continue to evolve over time. The State should consider setting a minimum eligible duration in consultation with system planners, though in the future.*

8. Legislation directs the GEO to consider an **index storage credit mechanism**. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.

Longroad Response: *A basic storage tolling structure wherein projects receive a long-term, fixed-price based on system capacity (i.e, $/kW-mo) enables efficient project financing and is therefore likely to provide Maine's customers with the lowest cost of storage (i.e., on a $/MWh delivered basis). While less favorable from this perspective, an Index Storage Credit program is also workable as it guarantees long-term contracted revenue, though the associated market and operational risks result in a higher cost of storage capacity.*

Some modest adjustments to the Index Storage Credit structure would potentially improve financing efficiency, including accounting for State of Charge (SOC) limitations in the Day Ahead settlement calculation (i.e., Reference Energy Arbitrage Price), since SOC limitations create a disconnect between the REAP benchmark revenue and what is practically achievable. While such differences can be at least partially offset by Real Time (RT) and Ancillary Service (A/S) market revenues, though thin A/S demand and limited RT price volatility diminish available upside.

9. How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

Longroad Response: *The Inflation Reduction Act allows for storage equipment to claim the Investment Tax Credit without being co-located with a renewable energy generating project (i.e. solar or wind). The key to maximizing availability of federal incentives is ensuring projects can start construction prior to 2033, after which the tax credit rates can begin to phase out. To ensure projects can start construction by this deadline, RFPs need to be issued and contracts executed in a timely and efficient manner as procurement of storage equipment, finalizing development plans, and raising third party financing are all required to begin construction and can require multiple years to complete once a revenue contract is executed.*

10. Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

Longroad Response: *Besides offer prices, we encourage the State to evaluate proposals against fundamental criteria underpinning project viability (e.g., technology suitability and safety, attainable schedule, permitting/constructability), as well as developer credentials including experience developing, financing, constructing, and operating energy generation facilities.*

Sincerely,

Chad Allen
Director, Development
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We listen. We solve.®

John Fernandes
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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 the Development of the Maine Energy Storage Program

Ms. Colan:

Pursuant to P.L. 2023, ch. 374 (LD 1850), Ulteig is pleased to provide the following responses to the Governor's Energy Office (GEO) Request for Information (RFI) on energy storage. Ulteig appreciates the opportunity to share this information and invites any additional questions or calls for clarity.

Sincerely,

John Fernandes
Director – Regulatory & Legislative Affairs
Ulteig

We listen. We solve.®

Re: Request for Information Regarding the Development of the Maine Energy Storage Program

I. Company Background

Ulteig offers engineering design and consulting services across the Lifeline Sectors® of Power, Renewables, Transportation, and Water. For nearly eight decades, Ulteig has been working with commercial firms, utilities, and government agencies to design and deploy sustainable, essential infrastructure in North America.

Ulteig has assisted both our commercial and utility clients in the assessment of energy storage opportunities across various applications and alternative technologies to traditional electrochemical batteries. Ulteig's technical capabilities include energy market modeling, site injection capacity analysis, and system layout and configuration. The company is intimately familiar with utility planning models and has supported many of these clients with their energy transition needs.

Ulteig's Director of Regulatory & Legislative Affairs, John Fernandes, is a recognized thought leader in energy storage, providing his expertise to the US Department of Energy, FERC, Government Accountability Office, and US Trade and Development Agency. John has served as Chair of storage task forces for the Energy Storage Association (ESA) and the Midcontinent Independent System Operator (MISO).

II. Answer to Questions

Ulteig offers the following responses to the questions posed in the GEO's RFI.

1) Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

The ability of storage to help integrate renewables and enable greenhouse gas (GHG) reductions is well captured in the GEO's 2022 Maine Energy Summary and Assessment and the 2022 Energy Storage Market Assessment. Storage can shift renewables, maximizing the economic value and mitigating curtailments. Storage can smooth the intermittency, improving grid stability and overall reliability under renewable-heavy supply scenarios.

What is commonly overlooked when it comes to storage mitigating GHG emissions, though, is storage optimizing thermal resources. Storage can be paired with a thermal plant to decrease cycling on an individual unit, allowing the plant to run at an optimal heat rate, thereby potentially improving the overall emissions profile of the facility. This can be a rather niche application regarding specific plant type and operating profiles, but it is a business case worth exploring, especially considering the flexibility offered by a traditional grid-scale storage plant to provide other services and benefits under any one application. Storage can also charge from the lowest-cost, lowest-emissions marginal resources, even if that resource happens to be thermal, and discharged later to displace the use of more carbon-intensive fossil plants.

2) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 20304 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?
a) Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."

The 2022 Storage Market Assessment affords laudable attention to time-of-use (TOU) dynamics for customer-sited storage. TOU structures do not necessarily have to be limited to retail tariffs and applications. The state of Maine could come up with a valuation and compensation mechanism that requires storage to charge from renewable resources (or per the answer to Question 1 – the lowest-emission marginal resource) and then discharge during a desired deliverability period. The value of the delivered energy does not have to decrease with increased renewable or storage penetration as is seen with Effective Load Carrying Capability (ELCC), and it does not have to be tied to LMP from ISO New England. There may have to be consideration given to resources under dispatch from the ISO. Such a mechanism could capture incremental and even localized delivery of low-emissions or renewable energy to electricity customers.

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"

If the overall objective for the state is to reduce GHG emissions, then that is a viable starting point in terms of net benefits for the Energy Storage Program. The state could then quantify / calculate the total bill savings for any new, non-renewable power plant that was deferred or deemed unnecessary as well as any grid infrastructure that that would have been needed to support these new facilities. Conversely, a points system could be created to value any new renewable build-out that was enabled by energy storage facilities that maintain power quality or mitigate congestion. Other benefits such as the flexibility of storage to provide multiple services or a decreased environmental footprint required to build storage as an alternative to other grid infrastructure can be included in the point system.

a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?
b) Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.

Ulteig references throughout this submittal several benefits that can be considered when evaluating the merits of energy storage on the project and program levels.

4) Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."

There are a number of commonly recognized industry metrics used to measure or evaluate electric reliability. Perhaps the most common are the System Average Interruption Duration Index (SAIDI), average duration of interruptions per customer, and the System Average Interruption Frequency Index (SAIFI), average number of interruptions per customer. These standards would be an acceptable starting point for the Program, especially in instances and applications where storage is being deployed specifically to mitigate outages.

However, "reliability" can be put into other terms. The need for system operators to deploy technologies to manage power quality or grid stability can be a function of reliability. The ability of storage to provide such benefits while also offering flexibility for other services can become a measure of the cost of maintaining reliability and be included in a cost-benefit analysis as indicated above.

Ulteig adds one important consideration to this feedback: flexibility should be given to any entity first becoming familiar with the operation of energy storage. An initial "testing period" should be defined where any outages or other service quality issues that result from the trial of an energy storage facility are not counted against the grid operator in the aforementioned metrics. These types of penalties would act as a disincentive for utilities to deploy storage in unique and especially complex applications.

5) Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."

Taking the language in-part from Sandia National Labs, we will define resiliency for the purpose of these comments as the ability to "minimize the consequences" of events that cause significant disruptions to electric service and grid integrity. The Energy Storage Market Assessment provided ample and accurate discussion regarding the resiliency capability of BTM storage in the event of outages. The application does not need to be limited to BTM resources, though. Appropriately sized and designed grid-connected storage can island entire sections of the electric system, allowing load centers to maintain some level of service, especially for security and emergency operations, while restoration efforts are underway.

To operationalize this use case, the state could start by identifying what municipal functions are most critical, whether for standard day-to-day activities or post-event recovery. The Program could then prioritize localities by population density, economic exposure, environmental or cultural significance, or other benchmarks most important to Maine. Once these criteria are established, energy storage projects, possibly as part of microgrids, could be designed (solicited by the state) to meet the energy and duration requirements for the objectives.

Puget Sound Energy's Glacier demonstration project is an example of such an application:
https://www.pse.com/en/pages/grid-modernization/glacier-demo-project.
National Grid's Nantucket Island Energy Storage System, as assessed by Pacific Northwest National Labs, provides grid contingency ride-through in the event of a transmission system outage:
https://energystorage.pnnl.gov/pdf/PNNL-28941.pdf

6) How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?

Preference for a location for a storage facility should be a function of the benefit that is realized by the siting decision. For example, locating a storage plant in one locality could avoid the need to build a different type of energy infrastructure in an environmentally or culturally sensitive area. With their comparatively modest physical footprint, storage projects can be built in load centers with high population density with limited impact to the public and, again, less infrastructure to operate the resource. Building assets close to load centers can also address congestion and the subsequent pricing impacts of serving load during times of high system utilization.

Administrators of the Energy Storage Program can receive feedback from Maine electric customers and other citizens or entities that would be directly impacted by the construction of energy infrastructure. Some of the metrics to consider may be time-specific (i.e., siting to decrease peak energy prices), but some may be static and permanent (environmental or cultural sensitivity).

7) How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?

While there are not necessarily well-established, industry-wide practices for utilizing storage as a grid asset, there are common themes that have come out of efforts to establish such a model for both transmission and distribution applications. The need for which a system upgrade or expansion is required should be well defined by the appropriate grid owner / operator. There should subsequently be traditional solutions identified that would address this need. Energy storage alternatives can then be evaluated against these benchmarks, first, in the ability of the storage alternative to meet the technical requirements; second, in the cost of the project over the life of the asset. Consideration can then be given for other benefits such as time to deployment, environmental footprint, and flexibility to offer other services, which may likely favor the storage alternative.

Current processes of going through the appropriate distribution company, transmission company, and the ISO do not need to be changed or circumvented. Storage Program personnel could act as intervenors, ensuring appropriate consideration is being given to energy storage proposals and affording appropriate funding or rate recovery for priority projects.

8) How should “optimal duration” be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of “optimal duration” should be operationalized in the Maine Energy Storage Program.

Optimizing the sizing of any energy storage project should be carried out via site and technology-specific project modeling that assesses the operation of the system on at least an hourly basis. Ulteig takes a multi-stage approach when assisting clients on storage development. First, the injection limits of the site are determined based upon specific ISO and local utility planning criteria. In parallel, a simulation of the energy market is run to understand the hourly operation profiles (charge - discharge) and locational marginal pricing (LMP) at the nodal level. The project developer may then choose to run an electric rate optimization utilizing specific contractual arrangements and / or market settlement considerations. An “optimal duration” will economically meet a specific need or provide a specific service, and flexibility on size can be built in for “stackable” or future benefits.

9) Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.

Ulteig has no comments on this question at this time.

10) How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

The state should maintain that any project that is eligible to receive credits, funds, or other benefits available through the federal government should not be precluded from doing so unless such an allowance has a quantifiable negative impact on Maine ratepayers.

11) Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above.
a) To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.

Please see Ulteig’s commentary on Question 12 below. The deregulated structure could present a conflict when considering a single energy storage facility for both grid and supply services.

In order to provide long duration reliability or resiliency benefits, storage projects may be required to sit idle for long periods of time, necessitating a financial structure that may not align with the arbitrage model traditionally applied to storage. Any billing or crediting mechanism that is not based on consumption and injection may appear arbitrary, especially in the context of an organized market.

None of these potential conflicts should require the state to deprioritize any of the objectives so far laid out by the GEO.

12) Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.

While not at all a barrier to deployment, consideration may have to be given as to the ownership, operation, and overall dispatch management of an energy storage system in a deregulated state like Maine. Storage acting strictly as a generation-type asset, offering capacity, energy, and ancillary services can be limited to commercial ownership. However, as a storage plant is considered for grid operations, it may be appropriate or even necessary for the plant to be under utility ownership. This may get complicated if the project is partially leveraged to offer supply-type services to maximize its value and minimize its impact to ratepayers.

The deregulated state of Maryland has been assessing various storage ownerships structures and business models under a pilot program (Order No. 89240 – Case No. 9619 – Order Establishing an Energy Storage Pilot Program), and the Texas legislature has contemplated bills to allow utility contracting under transmission or distribution applications with third party participation for generation services (ERCOT market participation).

13) Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

Energy storage is a well-defined sector of the energy economy with many experienced developers deploying viable projects around the world. If experience as a qualification is incorporated into the Program, the state could consider total number of projects instead of installed capacity (thus not over-qualifying any entity that has only successfully deployed a single, large asset). However, weight could be given to project size and complexity if that is the need being addressed by one particular solicitation, for example, when contemplating a microgrid for community resiliency.

14) Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

Several projects have been cited throughout the document. ConEdison in the deregulated state of New York has leveraged a number of storage projects in applications that match or parallel many that have been discussed in Ulteig's responses to the GEO's RFP.
https://www.coned.com/en/about-us/media-center/news/2023/06-20/new-con-edison-battery-system--is-the-largest-in-new-york-city

Mason Station Redevelopment Co. LLC
63 Federal Street
Portland, ME 04101
www.masonstation.com

Maine Governor's Energy Office December 8, 2023
Attn: Caroline Colan
Re: ME GEO RFI Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)
Via email to caroline.colan@maine.gov

Dear Caroline,

Thank you for the opportunity to provide information to the GEO regarding the advancement of battery energy storage systems in Maine and ISO-NE. Mason Station Redevelopment Company, LLC ("MSRC") was established for the adaptive reuse of the former coal/oil power plant in Wiscasset, Maine. MSRC is owned and operated by Maine-based renewable energy professionals with significant experience developing clean energy projects in Maine, New England, and throughout the country. It is likely that a grid-tied energy storage resource could play a major role in the redevelopment of Mason Station and a state-led procurement program such as that conceived in LD 1850 could help accomplish that goal.

Please find our responses to the RFI below and feel free to contact us at any time should you have further questions.

1) *Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.*[1] *Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?*

   Response:

   Lack of adequate transmission capacity is one of the biggest challenges facing the deployment of renewables nationwide, including here in Maine. Energy storage projects, including standalone batteries (i.e., not co-located with renewables), can help mitigate transmission constraints and help renewables bring energy to the market more reliably and during periods of greatest demand. One of the best ways to encourage energy storage development is by implementing a mechanism for storage projects to enter into long-term Energy Storage Agreements (ESAs) with owner-operators. The owner-operators would then work with the ISO and with CMP and Versant to assure storage is being dispatched in a manner that allows the lowest *carbon* generation options.

2) *The State of Maine has significant clean energy goals, including an 80-percent renewable portfolio standard by 2030*[2] *and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?*

[1] 38 M.R.S. §576-A.
[2] 35-A M.R.S. §3210.

a) *Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."*

Response:
Long term ESAs for independently owned batteries will result in the development of new storage. Owners would then develop a dispatch schedule with the transmission owners and the ISO to maximize the generation and delivery of renewables on the grid.

3) *How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"*
   a) *What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?*
   b) *Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.*[3]

Response:

The cost of relying on natural gas peaker plants should be evaluated and contrasted with using storage and local generators to meet those same goals.

4) *Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."*

Response:

Storage creates redundancy and additional sources of distributed generation on the grid that can result in increased reliability. The GOE could evaluate storage reliability at different scales, for example in the context of regional reliability issues (storm prone areas and black start capabilities) and more macro grid resiliency value (improving power flow/reducing loading on higher voltage portions of the system).

5) *Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."*

Response:

The definition should consider not just physical issues but also price and supply resiliency. One of the value propositions of storage that is often ignored is the ability to normalize pricing and provide strategic supply during outlier events. For example, in high energy demand events (cold snaps etc.) the grid is using the highest priced generators (e.g., Cousins Island oil plant) to meet capacity needs; storage can provide the same value proposition as peakers but at a lower price. Further, during regular daily peaks, storage

[3] In 2022 the GEO released the Maine Energy Storage Market Assessment, which utilized a number of cost-benefit tests to analyze the potential benefits of various energy storage applications. In 2023, the GEO released the Final Report of the Distributed Generation Stakeholder Group, which included in Appendix A an analysis defining and applying the so-called "Maine Test" to examine cost-effectiveness of distributed solar and energy storage resources. Commenters should identify which, if any, of the tests utilized in these reports should be utilized here and discuss any related considerations or modifications in the context of the Maine Energy Storage Program statutory objectives.

can help levelize LMP at volatile nodes which provides not just physical resiliency but economic resiliency so rate-payers aren't exposed to the full impact of pricing volatility.

6) *How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?*

   Response:

   Similar to a solar project, the viability of an energy storage project depends largely on its ability to interconnect to the transmission system. The ability to connect, and the ability to connect to important parts of the transmission system should be the only criteria for siting.

7) *How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?*

   Response:

   These should be defined jointly by the developer, transmission owners and ISO.

8) *How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.*

   Response:

   The optimal duration is generally 4 hours or more.

9) *Legislation directs the GEO to consider an index storage credit mechanism.*[4] *Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.*

   Response:

   Long-term energy storage agreements will result in the lowest cost most financeable projects. Developers will not invest in projects that cost tens of millions without long-term contracting mechanisms.

10) *How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?*

    Response:

    Procurement should be timed so that selected projects are eligible to participate in related federal programs.

[4] LD 1850 notes that for the purposes of Section 2, "index storage credit mechanism" means 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.

11) *Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above.*

    a) *To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.*

    Response:

    The program should focus on large-scale, higher voltage projects that can help reduce the reliance on gas and oil peaker units.

12) *Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.*

    Response:

    Economic viability of storage systems is the single biggest issue holding back the wide spread deployment of storage, storage cannot be financed or developed without long-term tolling agreements or guaranteed revenue streams. Merchant storage is not financeable.

13) *Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.*

    Response:

    Large-scale (>50 MW/200 MWh) proposed by competent developers that have built renewables in New England.

14) *Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.*

    Response:

    Connecticut and New York have viable programs.

Again, we appreciate this opportunity and are happy to answer any follow-up questions to the best of our ability.

Sincerely,

Ryan Gahagan, President
Aaron Svedlow, Vice President

Mason Station Redevelopment Co.
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SUBMITTED ELECTRONICALLY

December 8, 2023

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

Re: Request for Information (RFI) Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)

Dear Ms. Colan:

The staff of the Clean Energy States Alliance (CESA), a national nonprofit organization, is pleased to submit these comments in response to Maine Governor's Energy Office (GEO) Request for Information, Maine Energy Storage Program Development Pursuant to P.L. 2023, ch. 374.

The Clean Energy States Alliance is a leading bipartisan coalition of US state energy agencies working together to advance the rapid expansion of clean energy technologies and to bring the benefits of clean energy to all. CESA's members include many of the nation's most innovative, successful, and influential leaders of clean energy market development, bringing the benefits of clean energy to millions of homes and businesses across the country. CESA supports its members in the development and implementation of innovative state clean energy policies and programs, with an emphasis on renewable energy, energy storage, energy equity, and resiliency. CESA and its members perform an essential role in transitioning the nation to affordable, clean energy technologies. Since its creation in 2002, the members of CESA have led transformational change in energy generation in the US, providing leadership and funding to establish clean energy markets across the country. The comments do not necessarily represent the views of individual CESA member organizations or of CESA's funders.

Energy storage procurement for fossil fuel peaker plant replacement

One of the prominent markets for today's commercialized lithium-ion batteries is providing capacity services – essentially, competing with traditional fossil fuel peaker plants. Batteries can provide these services quite competitively, both in technical and economic terms – and they are doing so, across the US and around the globe. Given the fact that Maine has only a handful of fossil fuel peaker plants, this seems to present an opportunity target for energy storage procurement in Maine. Therefore, CESA proposes that Maine include peaker plant replacement/displacement as a central goal of its energy storage procurement program.

Replacing fossil fuel peakers with battery storage has many benefits, including the following:

- Batteries ramp up and down instantaneously, providing faster and more accurate signal-following services than gas and oil peakers

- Batteries are pollution-free and can be charged from renewable sources. Fossil fuel peakers not only emit greenhouse gases, but they also emit local pollutants such as SOx, NOx, and fine particulates, which pose human health threats as well as causing environmental damage
- Because they are usually sited close to load, peaker plants can often be found in highly populated areas. This increases the health impacts of their emissions, and also creates environmental equity challenges, since low-income populations are more likely to bear the brunt of health impacts, such as asthma, that result from fossil fuel air emissions
- As opposed to fossil fuel peakers, which typically operate only a small fraction of the time, batteries can provide additional community benefits – for example, they can provide clean back-up power when sited behind customer meters or on an islandable distribution circuit
- Adding batteries and renewable generation, which are often developed in tandem, will help Maine reach state policy goals, such as its 100% clean energy goal

CESA's sister organization, the nonprofit Clean Energy Group (CEG), has done a lot of work on the subject of batteries for fossil fuel peaker replacement. CEG's Phase Out Peakers project provides free resources on this topic that may be of value to the Maine GEO, including:

- Phase Out Peakers webpage: https://www.cleanegroup.org/initiatives/phase-out-peakers
- The Peaker Problem (report): https://www.cleanegroup.org/publication/peaker-problem
- Peaker plant mapping tool: https://www.cleanegroup.org/initiatives/phase-out-peakers/maps

In addition to these existing free resources, CESA, with foundation support and in partnership with a well-known energy analytics firm, is in the process of producing analysis specific to Maine, with recommendations on how a modest procurement program could result in the development of energy storage systems capable of displacing fossil fuel peaker services in the state. CESA anticipates having this analysis complete by early February 2024, and we will be happy to provide it to GEO at no cost, to help inform the design of a new Maine energy storage procurement program.

In short, fossil fuel peaker plants, typically the most costly and polluting power sources on the grid, are often located in populated areas where they create environmental and human health impacts – and these impacts are disproportionately borne by low-income and underserved communities. Lithium-ion batteries are a proven, cost-effective clean resource that can replace fossil fuel peaking services and out-compete fossil peakers in wholesale energy markets. With the right procurement program design, Maine could displace a significant portion of its fossil fuel peaker plant fleet. CESA urges the Maine GEO to pursue a peaker replacement strategy, and to consider CESA's forthcoming analysis and policy recommendations when designing Maine's energy storage procurement program.

In addition to our comments on peaker replacement above, CESA would like to offer the following stakeholder input on questions presented in Maine's energy storage procurement RFI. CESA's comments follow the numbered questions from the RFI. Not all questions are being addressed in these comments.

1) Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

Energy storage is a multi-use resource. Therefore, obtaining specific outcomes from energy storage procurement requires either A) performance mandates or B) performance-based incentives directing specific storage performance to support the desired outcomes. In other words, some sort of legal/regulatory requirement or incentive payment will be needed to make sure the procured resources are dispatched in such a way that greenhouse gas emissions reductions result.

Other state programs have used various methods to align energy storage use with GHG emissions reduction goals. Maine GEO should look at the following programs:

a. California SGIP program – initially, SGIP incentivized storage installation without regard to how the installed resources would be used. After analysis shows that GHG emissions actually increased as a result, the program was amended to make half the incentive dependent on storage being dispatched on a California ISO emissions signal. This ensured that batteries incentivized under the program would charge during low emissions hours (or from renewable sources) and discharge during high emissions hours, thus displacing the most polluting generators. Subsequent analysis showed that emissions rates decreased once this program amendment was made.
b. Massachusetts Clean Peak Standard – this program is set up much like a traditional renewable portfolio standard, but is focused on the peak demand hours. The intent is to use renewable generation and energy storage to displace dirty peaker plants. Utilities are required to procure an increasing percentage of peaking power from clean resources each year. NOTE – the MA CPS is a "passive dispatch" program, meaning that participants are only required to charge and discharge during defined hours, not in response to a signal in real time, and batteries are not required to charge from renewables in order to qualify. Because of this, some critics have charged that the program is not as effective as intended. This is due to the fact that natural gas is usually on the margin in New England, so much of the time stand-alone storage in the CPS is merely shifting gas generation from one time of day to another. A better-designed clean peak program might be more effective.

In general, the "low hanging fruit" for GHG emissions reduction is peaker plant replacement, and batteries are ideally suited to achieve this. Fossil fuel peakers are among the dirtiest generators on the grid, and also the most expensive. Maine should design a procurement program that mandates or incentivizes new energy storage resources to provide peaking services, in competition with fossil fuel peakers. More details on this recommendation appear above.

2) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?

One way to support renewable and clean energy goals in an energy storage procurement program is to offer incentive adders for storage co-located with renewable generation (or storage contractually purchasing renewable generation). The Massachusetts SMART solar incentive has a similar design, offering an incentive adder for energy storage developed with eligible solar PV. Offering an adder for storage to charge from renewables encourages the development of renewable generation, and ensures that the stored power is “clean.” This can increase its value, for example in a REC or clean peak program.

As discussed above, stand-alone storage charging from the grid does not necessarily support or promote renewable generation. However, there may be specific times when standalone storage could support renewables – for example, if there is excess wind power at night in some areas, which would otherwise be curtailed, storage charging during those hours could reduce the need for wind curtailment. This may be worth investigation, but it would likely be a relatively small market opportunity.

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to “provide one or more net benefits to the electric grid and to ratepayers?”

> **a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests? 3 38 M.R.S. §576-A. 4 35-A M.R.S. §3210.**
>
> **b) Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.**

Clean Energy Group, in collaboration with the Applied Economics Clinic, has recently published a report advancing a framework and best practices for states engaged in benefit-cost analysis for energy storage. In general, we suggest that states use the SCT as the main test, with the UCT and RIM as supplemental tests. In this scenario, the SCT is used to establish basic cost effectiveness; the UCT establishes whether utility cost recovery is sufficient; and the RIM establishes whether benefits are coming at the expense of cost-shifting between stakeholder groups. For more information, see our report, *Energy Storage Benefit-Cost Analysis: A Framework for State Energy Programs*, at https://www.cleanegroup.org/publication/energy-storage-benefit-cost-analysis-a-framework-for-state-energy-programs.

4) Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize “improved electric reliability.”

See response to #5 below

5) Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize “improved electric resiliency.”

Without knowing whether utilities in Maine will be able to own energy storage, it is difficult to answer the reliability question. Energy storage for increased grid reliability is often placed on utility substations where, for example, additional hosting capacity is needed to accommodate a large amount of variable generation. Third party storage developers could theoretically provide reliability benefits, but it is unclear how they would be compensated for that service. If the state and the utilities were to publish maps showing where storage for reliability services should be placed on the grid, and incentivize storage developers for doing this, there might be some storage assets developed as a result – but there would likely be siting issues (are utilities able to have privately owned storage assets on their substations?).

Resiliency is a different matter. Distributed storage behind customer meters often provides a resilience benefit to the host facility. It is also possible for front-of-meter storage to provide resilience benefits, but this is again easier if the utility can own the storage asset and use it to island distribution grid circuits that are prone to outages. For examples of this, see Green Mountain Power's Resilience Zones program at https://greenmountainpower.com/news/green-mountain-power-microgrid-in-panton-vermont-featured-on-pbs-nova.

12) Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.

There are many barriers to deployment of energy storage. One notable barrier is the interconnection process, which may result in high costs, long wait times, and delays during interconnection studies. While interconnection barriers may apply to all kinds of distributed energy resources, there are particular interconnection barriers that specifically impact energy storage. Clean Energy Group has recently published a report on this topic, *The Interconnection Bottleneck: Why Most Energy Storage Projects Never Get Built,* available at https://www.cleanegroup.org/publication/the-interconnection-bottleneck-why-most-energy-storage-projects-never-get-built. The report explains the interconnection barriers affecting energy storage and makes recommendations for states to help reduce those barriers.

14) Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

In designing its energy storage procurement, Maine should look at California's energy storage procurement. There are a number of elements of California's program that are worth emulating:

a. Storage is required to be procured in different locations on the grid (each regulated utility must procure a specific amount of transmission-sited, distribution-sited and customer-sited storage). This ensures that energy storage as a resource will be used in a wide variety of applications in various locations on the grid, and that customers will be able to participate. It also makes a space for aggregators to enter the market.
b. Utility ownership of storage is limited to a percentage of the total procurement target. This ensures that third parties can own storage.
c. Large hydroelectric storage (greater than 50 MW) is not eligible. This prevents one or two big pumped hydro projects from fulfilling the procurement mandate, to the exclusion of other technologies and applications.

As mentioned above, Maine should also consider adopting some version of the Massachusetts Clean Peak Energy Standard, in order to focus new energy storage assets on providing peak demand capacity services.

Clean Energy States Alliance appreciates this opportunity to submit comments in response to Maine's energy storage RFI. We will be happy to answer any questions and can provide additional resources as needed.

Respectfully submitted,

Todd Olinsky-Paul

Todd Olinsky-Paul
Senior Project Director
Clean Energy States Alliance

Maine Renewable Energy Association

Caroline Colan
Governor's Energy Office
62 State House Station
Augusta, Maine 04330

December 8, 2023

Re: Request for Information, Maine Energy Storage Program Development

Dear Ms. Colan:

On behalf of the Maine Renewable Energy Association (MREA), thank you for the opportunity to inform the Governor's Energy Office's (GEO) implementation of section 2 of Public Law 2023, chapter 375, *An Act Relating to Energy Storage and the State's Energy Goals,* which was signed into law by Governor Janet Mills on June 30, 2023. MREA's varied members, including wind, solar, biomass, and hydro power 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 to support the integration of clean energy resources needed to meet the state's climate and clean energy goals, as well as the myriad of public benefits provided by energy storage. *See* ***RFI Questions 1, 2****.*

Maine needs an energy storage program to incentivise the expansion of this important resource and growing industry. In some regions of the country, standalone storage is viable based on wholesale revenue alone, because energy price volatility allows energy storage to earn significant revenues from energy arbitrage. But ISO-NE currently has minimal energy price volatility, meaning that capacity revenues must make up a substantial portion of a project's value stack. However, a great deal of Maine (i.e., the majority of energy storage projects that seek to locate north of the Surowiec Interface) cannot presently sell into the capacity market and thus have a much larger revenue gap. Long-term contracts, provided by procurement, provide predictability that can give developers and investors confidence in investing in energy storage in Maine. In turn, projects can attract lower-cost financing and be more cost-effective overall. ***RFI Questions 12****.*

MREA members have discussed what would attract them to develop energy storage in Maine and how to structure a program or procurement that maximizes benefits to the electric grid and to ratepayers. The following rose to the top of those conversations:

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- **Energy storage provides a wide variety of benefits. The Maine Energy Storage Program should not be overly prescriptive as to the benefits sought, and instead should set up a compensation structure that allows project owners to optimize operations to maximize a project's benefits. Any Requests for Proposals should ask for a full accounting of a project's benefits and otherwise let the market "decide".** *See **RFI Question 3**.* That said, Maine may particularly benefit from projects that provide the following benefits:

    - **Transmission Congestion Relief.** Energy storage installed downstream of congested transmission corridors can be discharged during congestion periods to reduce congestion, creating value because grid-operators charge utilities to use transmission corridors during congested periods. Many existing renewable energy resources in Maine are challenged or may soon be challenged by transmission constraints or economic curtailment. ISO-NE studies have shown that congestion will significantly reduce the value of energy produced by recently procured northern Maine resources and by existing renewable energy resources, as well as lead to curtailed energy production from those resources.

      Notably, this would lessen the greenhouse gas emission reduction benefits desired from the procurements, potentially the economic viability of uncontracted renewable energy resources, and stifle the development of new renewable energy resources that would otherwise be viable. Such constraints may increase as the region looks to interconnect offshore wind resources. *See **RFI Questions 1, 2, 3**.*

    - **Transmission and distribution investment deferral or avoidance.** Energy storage can shave the peak of a projected system load and reallocate demand on the system to non-peak periods. This can provide a means to defer, reduce the size of, or avoid the need for investments in transmission and distribution system upgrades. Distribution and transmission upgrades have been a barrier for some distributed generation renewable energy projects. As electrification leads to load growth, distribution-connected storage in particular can be helpful serving that load while reducing the need for or size of grid upgrades. *See **RFI Questions 2, 3, 7**.*

    - **Wholesale market arbitrage.** In some areas in Maine, energy storage can be used to purchase wholesale electricity at times when the locational marginal price is low and sell electricity back at times when the locational marginal price is high. While New England overall does not see much energy price volatility, transmission constraints and the large volume of contracted resources, such as the New England Clean Energy Connect project, can lead to localized negative pricing and curtailment of renewables in some locations in Maine. *See **RFI Question 3**.*

    - **Resiliency.** Maine weather is becoming increasingly extreme and erratic, with increasing outage events. Maine is also not a densely populated state. Distribution-scale energy storage, located closer to load centers, can distribute vulnerabilities. *See* ***RFI Question 3****.*

- ➢ While some projects provide demonstrable benefits in a comparable manner, the program may integrate the awareness that some types of projects may not be competitive with each other. For example:

    - **Transmission-scale projects** benefit from economies of scale and thus are more competitive on price than distribution-scale projects. They also, as described above, provide unique benefits including transmission congestion relief, which is a present and likely future need for Maine. *See* ***RFI Questions 2, 11****.*

    - On the other hand, **distribution-scale projects** provide unique, important benefits, including distribution investment deferral and avoidance, resiliency, among others. Some MREA members have advocated for the inclusion of a distribution scale-specific program, as a part of the Maine Energy Storage Program, using a "load reducer" model. In such a program, projects would be limited to 5 MW, would register with ISO-NE as load reducers, and would accordingly not be permitted to participate in wholesale markets. Instead, projects would be compensated based on the avoided costs that they effect by dispatching during monthly and annual peak hours, and by operating on a more regular basis to capture energy arbitrage opportunities. The avoided transmission costs in particular represent a significant savings to Maine ratepayers that are only available in a load reducer model. This is a model that is already being used by municipal utilities in Massachusetts and elsewhere. *See* ***RFI Questions 11, 14****.*

- ➢ **Evaluate proposals based, in part, on project viability.** Viability includes technology suitability and safety, an attainable schedule, interconnection viability, permitting and construction viability, as well as developer credentials including experience developing, financing, constructing, and operating facilities. *See* ***RFI Question 13****.*

- ➢ **Many MREA members agree that an index storage credit mechanism is suitable for the Maine Energy Storage Program, however some members have warned that its implementation may be unduly complicated.** Many MREA members that operate regionally or nationally agree that an index storage credit mechanism is an effective, competitive manner to provide required revenue, while providing flexibility through short- and long-term market changes and avoiding paying above market required incentives. New York is actively developing an "Index Storage Credit" program. Notably, other arrangements, such as energy storage tolling agreements, capacity sales agreements, and hybrid (or “partial tolling”) agreements might also be suitable. *See **RFI Questions 9, 14***.

- **Maine’s investor-owned utilities should not take part in the Maine Energy Storage Program or otherwise own or operate energy storage projects beyond what is codified in existing law.** MREA does not believe that utilities need to build, own, and operate energy storage projects. The private marketplace is ready, willing, and able to serve that role. Furthermore, excluding investor-owned utilities from the program sends an important signal to potential bidders that they will not be forced to compete with utilities who may be able to seek cost recovery for overages.

- **Consider the impact of delivery tariffs on energy storage projects.** Maine does not have energy storage-specific distribution rates. Instead, energy storage projects are subject to the same rates as other large commercial customers. This may be a barrier to some projects and the implementation of the Maine Energy Storage Program. As GEO designs the program, it should consider whether it makes economic sense to subject program participants to the expense of a delivery tariff.

In closing, MREA recommends the development of a program that seeks multiple projects in diverse areas of the state to provide varied benefits across the electric grid and to ratepayers. A successful, initial 200 MW program and/or procurement will hopefully lead to additional capacity allocations, which will likely be necessary for Maine to reach its 400 MW goal by 2030 and experience the full suite of benefits afforded by energy storage. Additional energy storage, because of its unique ability to stabilize energy prices by increasing the demand for renewable energy generation when it is available and moving that energy supply into high demand periods, will spur the development of additional renewable energy resources, moving Maine even further toward its clean energy and greenhouse gas emission reduction goals. *See **RFI Questions 1, 2***. We look forward to continuing to engage with GEO and the Maine Public Utilities Commission as Maine develops an energy storage procurement.

Sincerely,

Eliza Donoghue, Esq.
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December 7, 2023

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

Dear Caroline,

Thank you for this opportunity to provide a response to the Request for Information (RFI) issued by the Governor's Energy Office (GEO) on November 13, 2023. Ocean Renewable Power Company (ORPC) is a developer of marine energy technologies and projects that generate electricity from river and tidal currents without dams or impoundments. Headquartered in Portland, we have an engineering laboratory in Brunswick, a tidal energy test site in Eastport, and a river energy test site in Millinocket. We employ 30 people in Maine and maintain an extensive in-state supply chain. Additionally, we operate subsidiaries in Canada, Ireland and Chile to facilitate the export of our Maine-created technology and know-how to global regions.

We've focused our responses to the RFI on specific questions 3a, 4 and 10.

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"

    a) What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?

Response: We recommend that the GEO prioritize inputs and data sources that document how storage in combination with marine energy devices provide technical and cost benefits to grid operations.

Globally there is increased understanding of how the predictability of marine energy devices strengthens grid operations by overcoming fluctuations in intermittent renewables such as solar and wind, while also helping to provide voltage control and reactive power support.[1]

[1] H. M. Tróndheim, B. A. Niclasen, T. Nielsen, F.F.D. Silva and C. L. Bak, "100% Sustainable Electricity in the Faroe Islands: Expansion Planning Through Economic Optimization," IEEE Open Access Journal of Power and Energy, vol. 8, pp. 23-34, 2021, http://doi.org/10.1109/OAJPE.2021.3051917

These overall grid benefits have been recognized in a modeling study published by the Pacific Northwest National Laboratory[2]*, and published field results from various European projects.*[3] *The projects in Europe, in particular, are providing data-confirming net value benefits to the grid for storage and marine energy combinations.*

There are multiple examples of tidal energy systems which have been deployed to provide power to islanded grids in Europe. Sabella has operated a 1 MW turbine providing electricity to the island of Ushant off the coast of France since 2015, and demonstrated innovations which have greatly improved power quality and grid stability.[4] *Nova Innovation's Shetland tidal array in Scotland comprises six 100 kW turbines and incorporates a battery energy storage system to provide baseload power to the island of Yell, including an EV charging station.*[5] *Separate studies undertaken in support of Minesto's tidal energy deployments in the Faroe Islands*[6] *and through the EU-funded EVOLVE Project have demonstrated that the integration of wave and tidal stream energy can lead to power system benefits for 100% renewable islanded systems, compared with only making use of more established technologies such as solar and wind, and can also reduce the overall amount of generating capacity and storage required.*[7] *For example, EVOLVE used historical demand and renewable availability profiles from the Orkney Islands as a case study, and found that scenarios including wave and tidal stream had the following benefits compared with scenarios which included only wind and solar:*

- *30% less installed capacity and 50% less storage to meet demand.*
- *Up to 20% lower total system cost (capital and operational costs) when including ocean energy within a 100% renewable mix, due to the additional value of complementary generation profiles.*
- *Improved grid efficiency, with decreased or curtailed need for excess generation storage, and lower hour-to-hour variations in power production.*

The European Marine Energy Centre (EMEC) in Scotland's Orkney Islands has overseen the deployment and operation of more tidal energy devices than any other entity in the world. To overcome the severe constraints of managing power output from its tidal energy test site to the microgrid on the island of Eday, EMEC has successfully demonstrated innovations, including installing a 1.8 MWh flow battery to smooth tidal device generation and create continuous, on-demand electricity to turn into hydrogen using EMEC's 670 kW hydrogen electrolyser.[8]

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[2] Pacific Northwest National Laboratory, https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31123.pdf, November 2021;
[3] Ocean Energy Europe, "Sabella Tidal Stream Turbine Injects Electricity Again Into the Ushant Grid," March 6, 2022.
[4] Ocean Energy Europe, "Sabella Tidal Stream Turbine Injects Electricity Again Into the Ushant Grid," March 6, 2022.
[5] TETHYS, "Nova Innovation – Shetland Tidal Array," https://tethys.pnnl.gov/project-sites/nova-innovation-shetland-tidal-array
[6] Tróndheim et al, op. cit. 2.
[7] EVOLVE Energy, "The system benefits of ocean energy to islanded power systems," EVOLVE technical note, https://evolveenergy.eu/project-outputs/
[8] The European Marine Energy Centre Ltd., "Eday Flow Battery Project," https://www.emec.org.uk/projects/hydrogen-projects/eday-flow-battery-project/

4) How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?

Response: A preferred location should be defined as an area in which energy storage is part of a solution that addresses an identified need (or multiple needs), and that also includes a public and private partnership for accomplishing the project.

Preferred locations can be identified through feasibility studies or other pre-project methodologies, with priority given to communities that have completed an analysis made possible with previous public funding.

Examples of location considerations would include, but not be limited to: single line terminus areas with high exposure to inclement weather, the need for backup power, and the opportunity an investment in storage and related capitalization presents for local economic development in regions experiencing economic hardship, enhancing opportunities to expand energy conservation programs or increased participation in programs operated by the Efficiency Maine Trust. One example of this approach is in eastern Washington County, where there is reliability and resiliency risk associated with a single transmission line that terminates at the end of a seven-mile peninsula comprised of several islands connected via causeway. The local community qualified for federal Department of Energy assistance to work in partnership with the regional utility, a marine energy developer and an NGO to determine the feasibility and pre-engineering required for a microgrid that would be powered by renewable energy with tidal energy providing baseload electricity. The microgrid would strengthen the rural terminus of the regional utility, restore backup power to that area of Maine and create a foundation for economic growth in an area that needs investment. The work undertaken also identified scenarios that identify how the predictability of tidal power could deliver similar system benefits as the European studies cited previously, including lowering storage requirements and reduction in CO_2 *intensity of the local generating capacity.*

10) How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

Response: The Maine Energy Storage Program can fit into federal programs in multiple ways. The federal government provides on-going support for multiple renewable energy programs. According to a 2018 DOE study, the government spent $50 billion on solar and wind alone between 2005 and 2015, a major reason why those sources of energy became commercially viable.[9] *With federal investment among all energy infrastructure now at historic levels, we urge the GEO to continue its efforts with the Department of Energy regarding all federal funding*

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[9] Kutak Rock and Scully Capital Services, "Examination of Federal Financial Assistance in the Renewable Energy Market," Kirshenberg et al., October 2018.

opportunities in Maine, especially those that involve partnerships of state government with multiple stakeholders such as communities, developers, utilities, NGOs and others. Additionally, we urge the GEO to help facilitate projects that advance the combination of storage with complementary forms of renewable energy, such as marine energy, as this approach broadens the range of federal incentives and opportunities available. This approach can lead to innovative problem solving and implementation of high impact projects that otherwise may not be possible.

Thank you again for this opportunity to provide responses to the RFI. I look forward to participating in further discussion about Maine's energy storage policies.

Regards,

John Ferland
President

PLUS POWER

December 8, 2023

<u>By email to caroline.colan@maine.gov</u>

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

SUBJECT: RFI on Maine Energy Storage Program Development

Dear Ms. Colan:

Plus Power wishes to submit these comments in response to the Request for Information (RFI) issued by the Governor's Energy Office (GEO) on November 13, 2023, 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* (LD 1850). Plus Power is an independent power producer developing transmission-connected battery energy storage facilities, with 10 gigawatts of facilities in the interconnection queues in 28 U.S. states. In Gorham Maine, we are developing the 175 MW / 350 MWh Cross Town Energy Storage facility, which will benefit Maine and ISONE with energy and capacity services. We appreciate the opportunity to offer our comments so that Maine can most efficiently and effectively deploy battery energy storage early and cost-effectively for ratepayers.

Plus Power strongly supports the initiative to evaluate designs for a program to procure energy storage systems and will limit its feedback here to the discussion of incentive designs.

1. RESPONSES TO QUESTIONS

9. Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an Index Storage Credit mechanism, or other contract mechanisms, to achieve the Maine energy storage program objectives, including any advantages or disadvantages relative to other potential mechanisms.

There are different approaches to incent and remunerate for battery storage systems' many different services. Plus Power is in fact already engaged in many of the structures that RENEW presents in many other U.S. states. In order to achieve wider storage deployment, long-term contracts can more easily attract and secure finance and investment due to their clarity and certainty.

- Long-term contracts, such as tolling agreements, provide utility-scale standalone storage resources with the predictability and transactional simplicity needed to engage finance and investment. Tolling agreements allow EDC's to dispatch standalone storage resources in energy and ancillary service markets, while concurrently deriving capacity value.

- Hybrid (or seasonal) toll agreements allow a developer to balance a facility's predicted operation for an EDC with new market opportunities as they evolve for flexible, dispatchable, resources. For example, the ISONE *2021 Economic Study: Future Grid Reliability Study Phase I* report[1] projected the need to grow the ISONE ancillary services market in the future with services like regulation and ramping to accommodate higher renewable energy penetration. A hybrid agreement would enable a plant to commit to services needed to achieve objectives of the Act and attract necessary, separate revenue from additional future services in the market.

- Indexed energy storage agreements and index credit mechanisms may in future prove a useful tool to encourage storage deployment. However, Plus Power notes that it has not deployed at present, so there are no specific models or results to review. An objective for Maine in storage deployment should be to attain as wide a deployment result as possible. That helps ensure a wider range of projects large and small, it helps more developers continue to grow their acumen, and builds economies of scale to bring down costs for ratepayers. At this time, the index credit mechanism appears much more complicated than other structures. The complexity may be difficult for the state to administer, and could inhibit finance and investment interest and limit the field of developers who are willing to take its risks.

12. Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.

The Maine Energy Storage Program will benefit from tight procurement Requests for Proposals that help weed out bids winning a place in the program but that may not execute. For example, requiring a reasonable but substantial security deposit can foretell real "skin in the game" to develop that project.

Beyond procurement and incentive barriers, lithium-ion based battery storage also requires expanded education to build confidence in the community and first responders. Plus Power strives for best in class safety design, development, and training procedures. The American Clean Power

[1] ISONE, *2021 Economic Study: Future Grid Reliability Study Phase I* (July 29, 2022), https://www.iso-ne.com/static-assets/documents/2022/07/2021_economic_study_future_grid_reliability_study_phase_1_report.pdf

Association and others are greatly enhancing their educational materials to educate communities on the predictable risks of lithium-ion and best practices to mitigate those risks. Perhaps there is a role for the GEO to play in education and training to help address permitting barriers.

13. Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

Plus Power believes that RFPs for procurement should require, and score on, a developer's experience building facilities that are close to the size of the bid project, in order to ensure the bidder has enough experience to reliably and safely deploy if selected.

14. Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

Utility-scale battery storage facilities can perform many energy, capacity, and ancillary services over the 20-year life of the system. But current system costs remain high in a supply-constrained environment, and "revenue stacking" is often necessary in the Northeast for projects to deploy, particularly while developers are waiting for new market service policies to unfold. The Massachusetts Clean Peak Standard is another program example intended to recognize and remunerate for a battery storage's additional value of delivering clean energy to specifically reduce the fossil fuel emissions during the daily and seasonal peak. The Commonwealth will perform a review of the program in 2024, which may assist the Maine GEO as it prepares Maine's energy storage RFP and incentive designs.

Sincerely,

Polly Shaw
Chief External Relations Officer

December 8, 2023

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: RFI on Maine Energy Storage Program Development

Ms. Colan:

RENEW Northeast, Inc. (RENEW)[1] and American Clean Power (ACP) submit these comments in response to the Request for Information (RFI) issued by the Governor's Energy Office (GEO) on November 13, 2023, seeking public input to inform GEO's implementation of section 2 of Public Law 2023, Chapter 374, *An Act Relating to Energy Storage and the State's Energy Goals*. Thank you for the opportunity to offer these comments.

Energy storage can cost-effectively provide new capacity to the grid and complement renewable energy resources by absorbing their excess low-cost energy and storing it for later use when demand is high and generation is expensive, effectively smoothing daily price spikes and reducing congestion from high renewable areas to high demand areas. Storage can help lower the cost of Renewable Energy Certificates (RECs) by minimizing curtailment and increasing the demand for renewable energy. Over the long term, storage can improve the economic outlook though better price stabilization which increased the likelihood of financing for renewables. By improving the economics of renewable energy, storage can potentially allow Maine to meet its renewable energy targets sooner and at lower REC prices and overall cost. Stand-alone storage systems offer operational and locational flexibility benefits and need not be paired with a renewable energy system.[2]

[1] The comments expressed herein represent the views of RENEW and not necessarily those of any particular member of RENEW.
[2] Gorman, Will, et. al., *Motivations and Options for Deploying Hybrid Generator-Plus-Battery Projects within the Bulk Power System*, 33 Electricity Journal 13 (2020), https://reader.elsevier.com/reader/sd/pii/S1040619020300312?token=FC470992266AB10C90E5D53ECAD69746B465DEF4C977B49E90B9662824B65D95B902CA9CE9F65ECBF56F803DE52FD134

The modeling conducted for the Massachusetts 2016 State of Charge report revealed that energy storage would result in significant cost savings to ratepayers coming from:

- Reducing the price paid for electricity, capacity, and ancillary services
- Lowering peak demand by nearly 10 percent
- Deferring transmission and distribution investments
- Reducing GHG emissions (reducing the effective cost of compliance)
- Reducing the cost to integrate renewable generation
- Deferring capital investments in new capacity
- Increasing the grid's overall flexibility, reliability and resiliency

Storage offers health benefits by displacing resources that emit particulate matter, SOx, NOx, and other EPA-identified pollutants. Studies have shown that in the near-term, the benefits of reducing these kinds of pollutants that are associated with carbon emissions, but not captured in the social cost of carbon are significant, because of the benefits to human health resulting from reducing these emissions. The real health benefits of these projects to Maine residents should be considered in evaluating net benefits. Maine should consider avoided pollutants and associated health benefits for all project configurations. It should perform an analysis that considers the potential peaker emissions-reduction benefit for all storage resources. Maine could develop an estimate of health benefits by including consideration of the emissions profile of marginal resources that would be displaced by additional storage in each hour.

I. Responses to Questions

1. **Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?**

By accelerating the switch from fossil fuels to energy storage at peak times and other times of grid stress, Maine can reduce emissions, improve the environment, and attract new investment and jobs to the state at the same time. Storage can improve public health outcomes by replacing both baseload fossil fuel power plants and dirty peaking power plants.[3] Peakers are relatively inefficient and used infrequently during times of high electricity demand, and emissions from peakers directly harm local air quality.[4] In addition, peakers are most often sited in disadvantaged communities and used on days when air quality is already poor.[5] But storage

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[3] Collingsworth, Jessica, Steve Clemmer, Paula Garcia, James Gignac, J.C. Kibbey, Sandra Sattler, and Youngsun Baek. 2018. Soot to Solar: Illinois' Clean Energy Transition. Cambridge, MA: Union of Concerned Scientists. http://www.ucsusa.org/resources/soot -solar-0

[4] Milford, Lew, Seth Mullendore, Todd Olinsky-Paul, and Robert Sanders. 2018. Jump-Start: How Activists and Foundations Can Champion Battery Storage to Recharge the Clean Energy Transition. Montpelier, VT: Clean Energy Group. http://www.cleanegroup.org/ceg-resources/resource/jump-start-battery-storage

[5] Mullendore, Seth. 2016. "Energy Storage for Public Health: A Smarter Way to Deploy Resources." Clean Energy Group (Blog). August 22, 2016. http://www.cleanegroup.org/energy-storage -public-health-smarter-way-deploy-resources

can provide the same grid services as a peaker plant with enhanced efficiency and without the associated emissions.

2. **The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 20304 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?**

    a. **Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."**

Adding energy storage to the power grid at key locations can help reduce costs related to transmission congestion and curtailment of existing renewable energy resources. Such congestion, if not addressed according to ISO New England (ISO-NE) studies, will significantly reduce the value of energy produced by the Northern Maine resources procured in the recently completed solicitation 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]

3. **How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"**

    a. **What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?**

RENEW's supports the use of the inputs provided in the Maine Energy Storage Market Assessment report (MESMA) that was prepared for GEO.[7] The report needs an update, though, to capture that stand-alone energy storage is eligible for the federal Investment Tax Credit (ITC) and not just storage paired with solar. This update will show significant improvement in the cost benefit analysis for stand-alone energy storage.

[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

[7] Energy+Environment Economics, *Maine Energy Storage Market Assessment* 34-35 (March 2022), https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/GEO_State%20of%20Maine%20Energy%20Storage%20Market%20Assessment_March%202022.pdf

b. Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.

To evaluate projects, Maine could adopt a benefit cost ratio by dividing a calculation of the project's NPV along various benefits by the NPV of the cost of the bid.[8] 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.

4. Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."

New England is vulnerable in the winter to energy price spikes associated with constraints in the delivery of natural gas, leaving consumers on the hook for high natural gas costs. Recent winter cold spells have shown that a large portion of the region's winter peak energy needs are typically fulfilled by old generating units fueled by coal and oil.[9] We have also seen that natural gas generation and the pipeline system are vulnerable to several winter cold and storms.[10] By accelerating the switch from fossil fuels to energy storage at peak times, Maine can increase reliability by lessening its dependence on these volatile commodities. Storage can avoid the need for new capacity investments to meet peak conditions even as retirements of older thermal generating units occur, and loads increase due to heating and transportation electrification.

Storage provides system operation benefits as storage's ramping capabilities give system operators better tools for matching load, and fast-responding storage units could play a role in

[8] 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/

[9] RENEW Northeast, *Benefits of Wind Energy for Winter* 5-7 (February 1, 2023), https://renewne.org/wp-content/uploads/2023/02/Wind-in-Winter-RENEW-FINAL-2023-02-01.pdf

[10] North American Electric Reliability Corp., *December 2022 Winter Storm Elliott Grid Operations: Key Findings and Recommendations* (September 21, 2023), https://www.ferc.gov/news-events/news/presentation-ferc-nerc-regional-entity-joint-inquiry-winter-storm-elliott. (highlighting Winter Storm Elliott in December 2022 as the fifth cold-weather outage event in 11 years).

reducing the cost of needed reserves. Pairing storage with fossil fuel generating resources can enhance system black start capabilities.

5. **Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."**

In the event of an outage, customer sited storage can provide backup power. As a storage resource must be fully charged before an outage, though, it could prevent the storage resource from fully participating in the ISO markets to maximize revenue.

6. **How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?**

Locating storage resources on areas of the grid that are more vulnerable to disruption due to extreme weather or other causes may be able to provide local resilience when other smart-grid technologies are in place. 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.

7. **How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?**

See response to question 3.

8. **How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.**

GEO should consider which technologies are demanded by the unique dynamics of the energy system in Maine through production cost modeling.

9. **Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.**

Long-term contracts for energy storage resources will provide those large-scale resources with opportunities in Maine to receive the long-term commitments that are needed for project financing. Section 2 of Chapter 374 directs GEO to evaluate designs for a program to procure energy storage systems. The GEO investigation should consider the form of contracting best suited to specific energy storage technologies and the capabilities the state is seeking to achieve.

Storage deployment has advanced in recent years through the increase in utility procurement of energy storage projects and products. The variety of offtake revenue contracts for energy storage projects has expanded rapidly. For large or transmission-level resources, arrangements have taken the form of energy storage tolling agreements, capacity sales agreements, hybrid agreements, and indexed agreements. RENEW members may comment individually on each model.

- The *energy storage tolling agreement*, like a standard tolling contract for a traditional plant, gives the EDC capacity, energy and other products like ancillary services. The seller develops, owns, operates and maintains the storage project while the EDC off-taker typically controls when to charge and discharge the resource, pays for charging energy from the grid to the resource, and acts as scheduling coordinator or market participant for the resource in the wholesale markets. The project owner receives a fixed payment from the EDC. Tolling agreements are used by many utilities in vertically integrated markets that own generation.

- Under a *capacity sales agreement*, the capacity and capacity attributes of the energy storage project are sold to the EDC. The owner-operator owns the facility's other products like energy and ancillary services, and keeps full authority over charging and discharging. Capacity sales agreements are a popular contract used by California utilities to achieve resource adequacy requirements.

- A *hybrid agreement*, which is also known as partial tolling agreement, strikes a middle ground between a full tolling agreement and a market project by granting the EDC operational control during the most valuable days of the year for achieving public policy goals, while allowing the project to operate on a merchant basis in the wholesale markets on all other days. For example, it could provide the EDC's the right to dispatch the energy storage resource during a limited number of peak hours during a season or at other predetermined periods to meet objectives under the Act. It could provide a balance between benefits and risks for ratepayer, though it must be structured to provide enough revenue certainty to the project in order attract lower-cost capital. While the EDCs are sharing the cost of the energy storage facility, the third-party owner assumes the market risks when the EDCs does not have dispatch rights.

- *Indexed energy storage agreements* provide payments to energy storage systems to bridge the gap between wholesale market revenues and the project's revenue requirement. Under this type of contract, the counterparty, such as an EDC, makes a monthly payment to the resource equal to the bid price minus a reference price. That reference price is based on an approximation of revenues that the energy storage system could have earned in the wholesale markets.

10. How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?

States tend to backload procurement programs with ramping of procurements over time. The further out that regulators push procurement timelines, the more these projects are at risk of not maximizing currently available federal incentives. Otherwise, developers have a strong interest in qualifying for the ITC and its bonus credit adders.

Maine's long-standing pro-competition law was based on the principle that private investors have a greater incentive to lower costs than utilities under cost-of-service regulation and they and their shareholders and not consumers should bear the risks of generation ownership. The expansion of the federal Investment Tax Credit to storage would also be much more efficiently captured by private, non-utility owners.

Since 2021, the U.S. Department of Energy has received expanded authority and funding that could assist New England increase grid resiliency. Both the Infrastructure Investment and Jobs Act of 2021 (also termed the Bipartisan Infrastructure Law, and the Inflation Reduction Act of 2022 contain new substantive provisions that have already produced awards to projects that will increase reliability and the integration of clean energy. Maine should monitor for opportunities in future rounds of federal programs for grants and loans that can support energy storage development.

11. **Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above.**

    a. **To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.**

    See response to question 3.

12. **Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.**

Energy storage system development today faces difficulty especially in New England in securing offtake agreements. Projects with merchant exposure have a difficult if not impossible time securing efficient monetization of the IRA tax credits without long term commitments.

Wholesale market revenues are insufficient to recover investments. Maine will need to identify benefits from energy storage that are not priced or monetizable in existing markets. Capacity revenue will be unavailable to storage resources north of the Surowiec-South interface will not be qualified to sell their capacity into the Forward Capacity Market (FCM).

The commercial operation date (COD) requirements in a contract for energy storage must recognize the length time for a project to pass the interconnection queue and local and state permitting. While new battery storage facilities do not take long to construct, both the estimated cost and time to construct interconnection facilities and network upgrades identified in the ISO New England interconnection study process appear to have grown substantially in recent years. Recent timelines for standard upgrades such as reconductoring a short portion of a transmission line have reached five years with little to no explanation from ISO New England for the extended timeframe.

13. Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

Procurements should be designed to prevent unsophisticated bidders from offering unrealistic bid prices and winning contracts for projects that can never be built at those prices. Maine should require a bid deposit (e.g., $10,000/ MW) be in place until a project reaches its COD at which time the deposit is refunded. Bidders should be required to demonstrate having achieved defined thresholds on site control, status of interconnection agreements, and local and state permits. Bidders should be give two options: (1) site control, local permit applications filed, the interconnection application filed, and a deposit of $7,000/MW capped at $700,000 per project; or (2) site control, local permit applications filed, system impact study being complete and a deposit of $3,500 capped at $350,000.

14. Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

Connecticut and Massachusetts have been conducting studies on energy storage that might be of assistance to GEO as it prepares Maine's energy storage RFP. Rhode Island has recently finalized a report on energy storage. Given that the benefits of large-scale storage would be regional, the New England states should share information with each other as they pursue individual storage policies.

Sincerely,

Francis Pullaro
Executive Director
RENEW Northeast, Inc.

Noah Roberts
Director, Energy Storage
American Clean Power Association

Via electronic filing: caroline.colan@maine.gov

December 12, 2023
Ms. Caroline Colan
Legislative Liaison and Energy Policy Analyst
Governor's Energy Office
62 State House Station
Augusta, ME 04333

RE: Request for Information Regarding the Development of the Maine Energy Storage Program Pursuant to P.L. 2023, ch. 374 (LD 1850)

Dear Ms Colan,

On behalf of the Northeast Clean Energy Council ("The Council" or "NECEC"), thank you for the opportunity to respond to the Request for Information ("RFI") on the development of an Energy Storage Program for Maine.

The Council leads the just, equitable, and rapid transition to a clean energy future and a diverse climate economy. We are the only organization in the Northeast that covers all of the clean energy market segments, representing the business perspectives of investors and clean energy companies across every stage of development. Council members span the broad spectrum of the clean energy industry, including energy efficiency, clean transportation, wind, solar, energy storage, microgrids, fuel cells, and advanced and "smart" technologies.

The Council is dedicated to growing the clean energy economy in Maine and across the region, in pursuit of our mission to create a world-class and equitable clean energy hub in the Northeast. The Council's 250+ members include companies based in Maine and those from elsewhere who do business or hope to make future investments in the state. Approximately a dozen of our members ("the coalition") have contributed to this response.

The recent passage of LD1850 by the legislature and its enactment by Governor Mills strengthened the state's energy storage target to *at least* 400 MW by 2030, and signaled the state's commitment. Storage is a complementary technology that can enable increasing amounts of intermittent renewables like solar and wind, and can help avoid the need to build and operate expensive, fossil-fuel-based "peaker" power plants during times of high demand in summer and winter. Storage reduces transmission costs including managing congestion and provides grid resiliency, backup power and grid stabilization.

Comments

For Maine to continue to advance its clean energy and climate goals, the development of energy storage must be a key component of the state's policies and Programs. As we will elaborate under point 12, an appropriate wholesale distribution tariff is essential to meeting Maine's storage goals.

We are pleased to see the Governor's Energy Office move forward, and offer the following input to a number of the questions posed in the RFI:

1) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front-of-the-meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?

The need for firm and flexible capacity during volatile periods will continue to grow as Maine relies less on fossil generation and more on renewable energy. This dynamic is especially relevant in Maine and the ISO-NE market, given state policy priorities and requirements that will support the continued buildout of renewable energy and the phase-out of fossil-fuel infrastructure. Storage can smooth out the variable generation of existing renewable resources and allow the grid to integrate more renewables in the future, leading to a cleaner grid overall.

Peak periods—along with volatility—will continue to grow, and storage is a necessary tool to enable a grid that relies less on dirty peaking fossil resources and more on renewable energy. Storage can shift clean energy from times of low demand and high renewable generation to times of peak demand and low renewable generation. Maine policymakers can ensure storage is used in the most beneficial manner in terms of overall emissions, by sending market signals to shift clean energy to times of highest demand. An example of such a market signal is the Program that is proposed in question 9.

2) The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030 and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?

- *Comment on how the Maine Energy Storage Program should define and operationalize "incremental delivery of renewable electricity to customers."*

During real-time operation, "incremental delivery" is the quantity of renewable energy that avoided curtailment due to the existence of energy storage. Curtailment occurs when utility operators respond to a power quality condition or pending circuit overload by disconnecting or otherwise limiting the production of renewable generation resources. Curtailment rarely happens today, but will be a growing concern as Maine progresses towards the 100% clean energy target.

Taking a longer view, “incremental delivery” can be defined as the additional nameplate capacity of renewable energy resources that are successfully developed as part of a grid planning process that values and incentivizes beneficially sited storage assets.

While there are quantitative methods to calculate and implement a strict definition of “incremental delivery,” the Program rules should be drafted with a more holistic and qualitative recognition of the potential for energy storage to increase clean energy adoption.

3) How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to “provide one or more net benefits to the electric grid and to ratepayers?”

- *What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?*
- *Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.*

Given Maine’s focus on addressing climate change and the emphasis placed on non-energy benefits, we encourage the use of the cost-effectiveness framework provided in the *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources* (NSPM for DERs) in developing a new Program for FTM storage.

We are pleased that the Governor’s Energy Office commissioned Synapse Energy Economics to develop a Report on January 6, 2023 analyzing the cost-effectiveness of distributed generation in Maine. As part of this process, we note that technical workshops using the NSPM framework were held to develop a Maine Test (Appendix A3 Final report), and that page 33 of the report references the inclusion of energy storage.

4) Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize “improved electric reliability.”

For a storage Program to have a meaningful impact on electric reliability, it should be focused on the electric distribution system, rather than the regional transmission grid.

The transmission system is more reliable than the distribution system, i.e., it experiences fewer events that result in power outages to end-users (customers). While many NECEC members are working to develop transmission-connected storage, the reliability of the transmission system is under the jurisdiction of the Federal Energy Regulatory Commission (FERC) and is managed by ISO-NE.

During real-time operation, electric reliability (as measured by standard metrics such as System or Customer Average Interruption Duration Index “SAIDI” or “CAIDI”) is heavily influenced by weather-driven events: high winds, wet snow, ice, etc.

When power outages occur, the utilities attempt to restore power rapidly. The initial response is to isolate the impacted area by opening a circuit switch, and repowering as many customers as possible by rerouting power flow from an alternative source. Crews are then dispatched to repair the damaged equipment such that the circuit can be restored to the normal configuration.

Energy storage can assist restoration and, thus, improve reliability. An energy storage resource that is located on the isolated section of the circuit could be used to provide a short-term “island” or “micro-grid” to re-energize the circuit. The resource could also be used to supplement the alternate utility source, in the event the source could not reliably supply the incremental load.

The Program should incentivize distribution-connected storage assets that are widely dispersed across the distribution system. If reliability is highly prioritized among the benefits storage can provide, the Program could provide enhanced incentives to locate on sections of circuits with poor reliability and limited ties to alternative utility sources. However, the design of any such incentive should consider whether projects in those locations might encounter additional interconnection or deliverability challenges that would increase costs or even threaten project viability.

Reliability can also refer to the long-term capability of utility infrastructure to meet load growth and customer demands for uninterrupted power. Within this perspective, the Program could be used in coordination with traditional distribution system planning to identify and solicit for storage assets in areas with forecasted load growth.

In general, the existence of an operating storage asset on the distribution network should be viewed as a “call option” on a future reliability asset. Even in areas that have not been identified as candidates for a Non-Wires Alternative, a third-party owned and operated storage asset—either planned or already in-service—could be approached in the future with an opportunity to execute a contractual agreement to provide “dispatch on-demand” services to the local utility.

5) Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize “improved electric resiliency.”

The first five questions in the RFI ask for input regarding how the Maine Energy Storage Program can satisfy certain public policy objectives. As acknowledged in later questions, these public policy objectives are sometimes in conflict and require tradeoffs. Below the Council proposes a distribution-scale energy storage performance compensation Program that draws upon successes in other jurisdictions to contribute to many of the public policy objectives enumerated in the RFI.

The resiliency of an electric delivery system refers to its resistance to failure under extreme conditions and its ability to be quickly restored. As with reliability, the resiliency of the New England transmission system is under the jurisdiction of FERC and is managed by ISO-NE.

The Maine Energy Storage Program should create incentives to identify and partner with end-use customers that would most benefit from improved resiliency. For example, solar + storage microgrids can be used to seamlessly restore power to emergency facilities and other critical infrastructure (food, gasoline, shelters).

Larger-scale micro-grids can also be incentivized and developed in coordination with the utility as part of long-term distribution planning efforts. Larger micro-grids can be used to restore power to radial sections of delivery circuits that suffer from frequent and prolonged outages.

6) How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?

Ideal storage locations include those that:

1. Cannot host incremental renewable energy due to lack of sufficient delivery infrastructure;
2. Suffer from poor reliability metrics;
3. Would benefit from improved resilience; and/or,
4. Are located near load centers.

The Program should require the utilities and/or the Program Administrator to perform and publish a periodic screening assessment that examines each of these categories. Program incentive levels could be linked to the results of this assessment, i.e., higher incentive for locations that achieve multiple objectives. In addition, storage developers should be able to independently demonstrate how a particular project location satisfies Program objectives and eligibility for incentives.

7) How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?

Energy storage systems are a proven technology that can serve as a "non-wires alternatives" (NWA, or NWS), where the effectiveness of an alternative technology is compared to traditional "poles and wires" utility infrastructure investment. This in effect is the definition of "serve as an alternative to upgrades of the existing transmission system."

Currently in Maine, third party NWA investigation and evaluation is required by statute under MRS Title 35-A, §3132. All transmission and distribution investments undertaken by Maine investor-owned utilities, CMP and Versant, are required to be reviewed for NWA solutions unless they meet specific exclusion criteria under MPUC Chapter 319. Since the statute was enacted in 2019, there has not been a successful NWA project implemented in Maine.

While Maine has a history of successful NWA implementation with the Booth Bay project—which avoided a transmission line rebuild saving Maine ratepayers over $12M[1]—the lack of a successful NWA project since then shows a need for reform to the current program.

Energy storage as a load reducer is especially suited to serve as an alternative to upgrades to the existing transmission (or distribution system) when those upgrades are addressing load serving capacity and/or reliability system needs.

A Program design in which distribution-connected storage projects are not registered at ISO-NE but rather serve as load reducers (as described in detail below) would have the effect of reducing peak load on the distribution system. As the transmission system is planned and sized in order to serve peak load, a Program that reduces peak load would reduce the need for future transmission upgrades.

8) How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.

While we understand that the GEO has been directed to conduct a study on long-duration energy storage, we encourage Maine to maintain optionality in its program design. Technology is advancing so rapidly that even three-five years from now, we could see new products introduced that serve different market and energy needs.

We do not believe that a single optimal duration needs to be established at this point, but rather, the Program should invite all durations that satisfy the Program's objectives. To illustrate, we note that the GEO's 2040 modeling seems to show that the Program might invite LDES procurements and deployments (12-24 hours, for example) as potential replacement for thermal resources and at least as a hedge against relying on the zero-carbon fuel market maturing.

9) Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.

NECEC understands the RFI may be referencing a storage credit mechanism similar to NYSERDA's proposed "Index Storage Credit," in which projects bid a strike price and winning projects are compensated or charged for realizing wholesale market revenues that are below or above the strike price, respectively. **While NECEC believes this may be a workable model for transmission-scale resources, we would like to highlight that an index storage credit is not the best model to create a market for distribution-level projects because it is based solely on wholesale market signals.**

[1] Waiting for load growth: Maine's Boothbay project shows how non-wires alternatives head off expensive grid upgrades | SEPA (sepapower.org)

One of the major benefits of distribution-connected FTM storage is to improve distribution-grid conditions; this model may not realize all of those benefits without a concrete linkage to distribution system conditions that may not necessarily align with wholesale market signals.

In addition, transmission constraints prevent projects located north of the Surowiec Interface from accessing the wholesale capacity market, which makes up a significant portion of the revenue stack. An indexed storage credit Program would therefore likely only be cost-effective for projects located south of the Surowiec interface (more or less south of Bath).

Another mechanism that we encourage the GEO should consider is a Program for distribution-connected storage projects that function as load reducers and, thus, do not register with ISO-NE.

These projects would be limited to 5MW AC and would not be permitted to participate in wholesale markets. Instead, by dispatching during monthly and annual peak hours, these storage projects would directly cause significant capacity market and transmission tariff savings for the distribution companies.

A Program could be structured to compensate projects based on the value of these avoided costs, plus the net energy value from the storage operations during non-peak hours. While capacity and energy avoided costs would be comparable with energy and capacity revenues that non-load reducers could earn in the wholesale markets, avoided transmission costs are a substantial value stream that does not have a wholesale market equivalent, and are expected to grow significantly over time.

By reducing effective load on the distribution system during peak hours, storage projects operating as load reducers can generate substantial ratepayer savings. By structuring a Program so that projects are directly compensated based on the ratepayer savings they cause, Maine can realize the additional benefits energy storage provides with little to no net cost to ratepayers.

In addition to the immediate cost savings to ratepayers, a load reducer Program has the important benefit of reducing the need for future transmission expansions to accommodate electrification and the transition to renewable generation. ISO-NE’s draft 2050 Transmission Study identifies that the cost of the transmission buildout required increases by 40-60% to serve an additional 10% increase in peak load by 2050.

An additional 6GW of peak load in 2050 will require an additional $7-10 billion of transmission investment. Energy efficiency, demand response, and time-of-use rates are all important tools to minimize peak load, and distribution-connected front-of-meter storage can be an important contributor as well.

12) Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the Program design.

One of the "key barriers" to the deployment of energy storage systems in Maine is the lack of an appropriate wholesale distribution tariff (WDT) for ESFs participating in the wholesale markets of ISO-NE. As noted by the GEO in the RFI:

> Supporting the development of fair and transparent charging tariffs for wholesale storage resources that are connected to the distribution system but participating in ISO-NE wholesale markets. This has been cited by several stakeholders as a key barrier to distribution-connected wholesale storage. (RFI at 66)

The lack of appropriate energy storage-specific distribution rates in Maine is an economic barrier to the implementation of an energy storage Program. The closure of Case 2021-00273 and conclusion that CMP will file its B-ES Rate with FERC, which is in essence the application of its current large commercial tariffs to energy storage systems, is problematic and not representative of the true cost of energy storage to the distribution system.

The GEO in its 2023 Report to the Joint Standing Committee on Energy, Utilities and Technology similarly confirmed the importance of an appropriate WDT:

> Docket No. 2021-00273, a request for approval of electric delivery rate schedule for energy storage facilities filed by Central Maine Power, was opened for reconsideration in February of 2023. The GEO continues to monitor ongoing efforts of the PUC such as these that could impact the advancement of Maine's energy storage goals." (Report at 7)[2]

Most importantly, the GEO in the RFI further recognizes that "Storage deployment will generate distinct costs and benefits to participants, ratepayers, and society" (RFI at 32). With respect to storage-specific costs, the Maine PUC in Docket No. 2021-00273 has similarly ordered Central Maine Power (CMP) to (i) "identify the costs [of storage] to the distribution network not recouped; " (ii) identify CMP's unrecouped "net costs" and (iii) develop a [WDT] rate "without unduly impeding the participation of ESFs in power markets and other uses of such systems that provide benefits to the electric grid." [3]

Notwithstanding such provisions, however, CMP has stated its intent to file its existing retail B-ES Rate with the FERC as its WDT, without any apparent intention to identify or reflect the distinct and technology-specific costs and benefits of serving ESFs, or any otherwise unrecouped "net costs" of that service, or to undertake any consideration of whether such rate would "unduly impede" ESF market participation.[4]

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[2] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/FINAL_LD2030%20Report.pdf.
[3] Examiner' Report in Docket No, 2021-000273 July 24, 2023, p. 19.
[4] CMP submittal 10-13-23.pdf

Rather, the B-ES Rate would apply generally applicable commercial rates, as determined for generic commercial consumers with no reference to or consideration of the distinct usage patterns or system costs specific to wholesale ESF transactions, with such rate adjusted only for the exclusion of ISO-NE and state retail Program charges.[5]

NECEC urges the GEO to engage on the WDT issue and, if CMP files the B-ES rate as proposed, intervene at the FERC to assure that any WDT appropriately identifies and reflects the distinct costs and benefits of storage and enhances Maine's storage policies.

The Council encourages the Governor's Energy Office to establish a stakeholder process, similar to the ongoing processes in Massachusetts and Connecticut, to develop an energy storage-specific rate design that appropriately charges energy storage for its use of the distribution system, while recognizing the benefits that energy storage provides and not unduly impeding participation in the wholesale markets. This process has yielded progress in other states that may be instructive in Maine as well.

13) Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.

NECEC members believe that the Program should be limited to competitive market participants and thereby place all development and investment risk upon private investors, and not upon utility ratepayers. The private investors in storage development are in the business of evaluating and assuming the relatively high level of project risk in this early-stage market sector, including the risk of cost overruns, delays, and supply chain disruptions.

Utility ratepayers, however, are not well positioned to be exposed to those risks, and the fundamental rationale for Maine's restructuring of the electricity market was to insulate ratepayers from project risk and shift those risks to private investors. The very same concerns that preclude franchised utilities from the deregulated and competitive generation market apply with equal force to the newly formed competitive storage markets.

And recent experience of utility projects resulting in abandonment and massive cost overruns demonstrates that developing complex and early-stage projects in competitive markets is not within the core competency of today's utilities. (The potential for utility ownership of storage as a "transmission alternative" asset, however, presents different issues outside the scope of the Program that are properly being addressed elsewhere in other proceedings.)

14) Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.

[5] (Rate B=ES states that "Eligible energy storage facilities taking service at sub-transmission or transmission voltage levels will continue to take service under CMP's LGS-TOU and LGS-T-OU electric delivery rate schedules except that regional network Service and Local Network Service charges will be reduced to zero….")

NECEC recommends that the Maine GEO review available work and comments that have been filed in other states that either have implemented, or are in the process of developing, similar energy storage incentive Programs. New Jersey Docket QO22080540 recently issued an RFI asking many similar questions on designing an energy storage procurement Program.

NECEC recommends the GEO reference the joint RFI response submitted by SEIA, NJ SEC, Advanced Energy United, and Vote Solar for valuable insight into industry recommendations for a successful competitive procurement program[6].

On behalf of all of our members who are or seek to deliver storage solutions in Maine, thank you for your consideration of these comments. Should you have any questions, we would be happy to join a meeting to discuss the information and ideas that we have offered above.

Sincerely,

Natalie H. Treat

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[6] SEIA NJSEC United VOTESOLAR NJ Energy Storage RFI Comments Docket No. Qo22080540.pdf, filed 09/19/2023, https://publicaccess.bpu.state.nj.us/DocumentHandler.ashx?document_id=1315021

Maine Governor's Energy Office (GEO)
Central Maine Power Response to Request for Information
RE: Maine Storage Program Development Pursuant to P.L. 2023, Ch. 374

Specific Responses to Questions of Interest:

1) Question: *Maine law requires greenhouse gas emission reductions of 45 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.[3] Comment on how the Maine Energy Storage Program could be designed to support deployment and operation of front of the meter energy storage resources in a manner that enables reductions in greenhouse gas emissions?*

   Response: The Maine Energy Storage Program should consider focusing on incentivizing front of the meter energy storage to be located in areas of high demand or co-locating storage with renewable resource that reduce greenhouse gas emissions to benefit all of Maine. Energy storage can be utilized to increase the amount of renewable energy that can be interconnected to the electric grid, especially in areas where the interconnection of additional renewable energy resources may adversely impact power quality or reliability for the systems customers. Targeting front of the meter storage locations that can help increase the amount of renewable energy resources (solar/wind) allowing additional renewable resources to be interconnected above what the current transmission or distribution system allows, would incrementally increase the delivery of clean renewable energy. A potential program design could include a location-based incentive or auction to encourage front of the meter installations in areas of the electric system that are constraining renewable resource interconnections and that otherwise require significant investment to unlock generation capacity. The program could also include a performance incentive to encourage asset availability during times of need.

2) Question: *The State of Maine has significant clean energy goals, including an 80 percent renewable portfolio standard by 2030[4] and a goal of 100 percent clean energy by 2040. Comment on how the Maine Energy Storage Program could be designed to encourage the development of front of the meter energy storage resources in a manner that supports incremental delivery of renewable electricity to customers, or otherwise supports the achievement of these goals?*

   Response: Please See Response to #2.

3) Question: *How should the Maine Energy Storage Program value and prioritize net benefits to the electric grid and to ratepayers to "provide one or more net benefits to the electric grid and to ratepayers?"*

   a) *What inputs or data sources should the GEO prioritize, if any, in implementing any cost-benefit test or tests?*

Response: Based upon CMP and their affiliates' experience in conducting benefit-cost analyses for energy storage and other technologies providing benefits to the grid, GEO should consider prioritizing benefits such as reliability and resiliency based avoided costs, avoided energy, capacity costs, transmission and distribution benefits, monetized reliability, and energy storage's effect on wholesale energy prices through its ability to act as a demand response resource (commonly referred to as Demand Reduction Induced Price Effects or DRIPE).

b) *Comment on cost-benefit test or tests (e.g. ratepayer impact measure test, societal cost test) that the GEO should utilize in developing the Maine Energy Storage Program.* [5]

Response: At a minimum, the GEO should consider the Ratepayer Impact Measure (RIM) and Participant Cost Test (PCT) when evaluating the Maine Energy Storage Program. The RIM test should be utilized for program design and is in the best interest of the ratepayers (utility customers). The PCT should be utilized to determine whether the program design is economically viable to ensure developers are incentivized or compensated appropriately. A PCT at or around 1.0 can be vital to participation and its effect on meeting goals as it assists a developer's ability to secure financing which is often needed to overcome the upfront capital costs of grid-scale BESS projects. Cost-benefit tests such as the Societal Cost Test (SCT), Total Resource Cost Test (TRC), and Utility Cost Test (UCT) or Program Administrator Cost Test (PACT) can be informative and should be utilized in a supportive manner to quantify the benefit to specific stakeholder groups, and to quantify non-energy related benefits such as emissions reduction as appropriate.

4) *Question*: *Comment on how the Maine Energy Storage Program could enable improved electric reliability in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric reliability."*

Response: The Maine Energy Storage Program, and energy storage facilities in general, could improve electric reliability by supporting the anticipated transition from a daytime summer peak to a winter peak when solar generation is unavailable. To effectively address reliability, it is important to note that winter peaks and summer evening peaks would not represent a load spike over a single hour but would be sustained for multiple hours. The Maine Energy Storage Program should be able to dispatch adequate energy in the evening through 10 pm. Improved electric reliability should mitigate an existing or forecasted reliability criteria violation with appropriate margin for load growth in the 10-year long-term planning horizon. The GEO could utilize ISO-NE's Storage as a Transmission Only Asset" (SATOA) study here, as this is designed to address regional reliability needs.

5) *Question*: *Comment on how the Maine Energy Storage Program could enable improved electric resiliency in Maine and how the Maine Energy Storage Program should define and operationalize "improved electric resiliency."*

Response: The Maine Energy Storage Program should define and operationalize "improved electric resiliency" as the reduction of the frequency and duration of outages during severe weather conditions and major storms. The Maine Energy Storage Program could enable improved electric resiliency by providing a battery powered microgrid solution to restore power in the event that CMP loses the source (radial Transmission line or Substation) during a storm event. The program could also enable the development of smaller battery powered microgrids to back up critical facilities during major weather events and then expanding the initial critical facility microgrid to provide backup power to additional adjacent customers. Such a solution was presented and approved in United Illuminating Company's ("UI") service territory by the Public Utilities Regulatory Authority ("PURA"). A variation of that resiliency and reliability solution could be to locate storage on a portion of a distribution circuit with reliability challenges to back up downstream customers.

6) Question: *How should "preferred location" be defined in the context of the Maine Energy Storage Program? How should "preferred locations" be identified, by whom, and at what time?*

Response: Identification of "preferred locations" of individual energy storage projects is currently addressed by the Utility during its reliability planning, where current or future grid constraints are identified. Utilizing utilities Hosting Capacity Maps or Maine's Integrated Grid Plan (IGP) in Docket No. 2022-0322 could be other avenues used to identify "preferred locations" for energy storage.

7) Question: *How should "serve as an alternative to upgrades of the existing transmission system" be defined in the context of the Maine Energy Storage Program? How should such upgrades be identified, by whom, and at what time?*

Response: The ratepayer cost impacts of energy storage projects that defer, reduce, or eliminate the need for transmission or distribution system upgrades should be considered and appropriately weighted based on the cost test selected for this program (see question 3). The utility should consider energy storage resources as alternative solutions when analyzing transmission and distribution upgrades and should pursue the energy storage resource if it is the most cost-effective option, considering all benefits made available by the program and in alignment with the rate case approval process. This is currently already performed by CMP through an internal review process and through the external NWA process in coordination with the OPA and EMT.

8) Question: *How should "optimal duration" be defined in the context of the Maine Energy Storage Program? Comment on whether and how any definition of "optimal duration" should be operationalized in the Maine Energy Storage Program.*

Response: Any definition of "optimal duration" should be influenced by the energy storage system use case being addressed in the Maine Energy Storage Program. For example, "optimal duration" could be defined as optimizing the duration of the energy storage system to meet the storage need being delivered. When evaluating designs for the Maine Energy Storage Program, consideration should be given to short term and long term needs of the T&D system. Short duration (4 to 8 hour) energy storage is the most prevalent commercial technology available today and helps with intraday balancing. As Maine transitions from summer to winter peaking energy usage, which often coincides with lower renewable output, the need for longer duration energy storage resources will increase. The Maine Energy Storage Program should account for this anticipated future requirement and include options for future long duration energy storage technologies.

9) Question: *Legislation directs the GEO to consider an index storage credit mechanism. Comment on the suitability of an index storage credit mechanism, or other contract mechanisms, to achieve the Maine Energy Storage Program objectives, including any advantages or disadvantages relative to other potential mechanisms.*

Response: Through its New York based affiliates, CMP is familiar with the Index Storage Credit (ISC) program currently under development by the New York State Energy Research and Development Authority (NYSERDA). The primary benefits of the ISC are to incentivize or influence BESS charging and discharging at the most opportune times (specific to energy arbitrage) and to provide economic certainty to both the developer and utility customers. However, CMP believes that the ISC design may be challenging to administer and has concerns around the ability to forecast long term revenue streams appropriately and accurately for a technology that is still a nascent entrant in the wholesale power markets and could pose undue long-term risk to utility customers.

An in-depth analysis of multiple bulk storage program design mechanisms was completed recently and included in the 'New York's 6 GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage' report[1]. In the report, multiple program design options are discussed for transmission and distribution connected FTM energy storage (referred to in the report as "bulk storage"). Bulk storage program design considerations include; upfront rebates and incentives, index storage credits, clean peak credits, utility ownership, utility dispatch rights and utility owned transmission & distribution services. The GEO could also consider the recently released ISO-NE SATOA program that could provide additional opportunity to leverage as a program design option.

CMP recommends convening a robust working group to discuss the merits and challenges of each incentive or compensation design and their effects on the intended use cases of the Maine Energy Storage Program to ensure optimal design and participation.

10) Question: *How should the Maine Energy Storage Program be designed to maximize currently available federal incentives and opportunities?*

Response: Many of the funding programs through the Bilateral Infrastructure Law BIL (e.g., Grid Resilience and Innovation Partnerships or GRIP) require concepts that are new and innovative in nature, often combining the academic, industry, government, research, and innovative technology sectors together to create a project that identifies and seeks to solve a problem, or group of problems, related

[1] See at 39, New York's 6 GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage.

to modernizing the electrical grid for the benefit of society. GEO should consider some of these common, overarching objectives (e.g., resilience in disadvantaged communities, integration of grid-scale renewable generation) in the design of the program and how it might be structured to remain adaptable to applicable funding opportunities while also encouraging industry participation through economic viability.

As federal funding is never guaranteed and comes with a multitude of additional considerations, CMP recommends that the program ultimately be designed to meet the energy needs and policy goals of the state of Maine, while leaving the opportunity to explore federal funding on a case-by-case basis.

11) Question: *Comment on any tradeoffs or potential conflicts that exist between the multiple program objectives established by the act and contemplated in questions 1-10 above.*

a) To the extent tradeoffs or potential conflicts are identified, comment on which program objectives, if any, should be prioritized or deprioritized in the design of the Maine Energy Storage Program, and why.

No Response

12) Question: *Comment on barriers to deployment of utility-scale energy storage systems that should be considered in the design of the Maine Energy Storage Program, and any recommended solutions or mitigating measures that could be incorporated into the program design.*

No Response

13) Question: *Comment on appropriate participant and project qualifications that should be incorporated into the Maine Energy Storage Program design.*

Response: Project requirements must ensure they meet the use the storage system is designed for. Some High-level project qualifications to consider include: (specific values are defined by the need of the program)

- Rated dispatchable capacity for required hours
- Minimum number of charge and discharge cycles per year
- Minimum average state of charge
- Minimum battery system round trip efficiency
- Battery technology
- Battery depth of discharge
- System warrantee
- Battery system end of life disposal plan

14) Question: *Comment on any utility-scale energy storage systems or procurement systems in other jurisdictions that may have relevant considerations for the Maine Energy Storage Program.*

Response: CMP suggest that the GEO review the utility-scale storage program "Energy Storage Solution" launched in Connecticut administered by Connecticut Green Bank, Eversource, and UI.