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Subject: Comments on Long Duration Energy Storage Study

Director Meserve:

RENEW Northeast, Inc. ("RENEW")[1] submits these comments in response to the Massachusetts Department of Energy Resources' (DOER) invitation to comment on the scope of a study DOER will perform in compliance with Section 80 of Chapter 179 of the Acts of 2022, *An Act Driving Climate Policy Forward* (Section 80). 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.

RENEW is a non-profit association uniting environmental advocates and the renewable energy industry whose mission involves coordinating the ideas and resources of its members with the goal of increasing environmentally sustainable energy generation in the Northeast from the region's abundant, indigenous renewable resources. RENEW members own and/or are developing large-scale renewable energy projects, energy storage resources and high-voltage transmission facilities across the Northeast. They are supported by members providing engineering, procurement and construction services in the development of these projects and members that supply them with multi-megawatt class wind turbines. Its members are developing stand-alone transmission-interconnected energy storage systems and energy storage systems virtually or physically paired with renewable energy resources. RENEW seeks to promote policies that will increase energy diversity, promote economic development, and achieve the Massachusetts' policy goals including those found in the Renewable Portfolio Standard ("RPS"), and the Global Warming Solutions Act ("GWSA").

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

I. Designing the Study to Achieve the Statutory Storage Objectives

DOER in consultation with the Massachusetts Clean Energy Center (MassCEC) seeks to retain a consultant to meet the requirements in Section 80 for a study exploring the use of procurements to secure up to 4,800 gigawatt hours of stored energy from renewable generation delivered to periods of high demand each year from both new and existing mid-duration and long-duration energy storage systems.

While studying all energy storage technologies will help Massachusetts evaluate its options, the study should consider the benefits of procuring immediately operational and commercial-ready technologies paired with later procurements of emerging technologies.

The study should also be limited to non-emitting energy storage systems that are connected to the power grid at the transmission level and large systems (over 10 to 20 megawatts) connected to the distribution system and that do not already have existing opportunities to secure incentives (e.g., small storage paired with solar in the SMART program). Large-size storage and storage virtually or physically paired with large-scale renewable energy resources are also collectively the least-cost form of clean peaking resources as shown in Lazard's latest annual Levelized Cost of Storage Analysis (LCOS 7.0).[2] Lazard's analysis on storage costs is consistent with the 2016 energy storage report by the DOER on storage that showed large storage systems have benefit/cost ratios significantly better than small "Behind-the-Meter projects".[3]

For new resource deployment, medium duration (4-hour) battery energy storage is today the resource that is economically and technologically mature enough for significant and immediate deployment. Adding a major component of battery energy storage to the power grid that is stand-alone or paired with Class I renewable resources and small hydropower can provide significant cost, reliability, and environmental benefits to the people of Massachusetts as the level of renewable energy rises each year. Just next year, Vineyard Wind 1 will begin adding 800 megawatts of offshore wind energy to New England's power grid. Overall, the study should evaluate the locational value of storage to integrate forecasted wind and solar additions.

New England is fortunate to have more than 1,800 megawatts of existing energy storage capacity already installed and operating in the region in addition to numerous state-sponsored programs designed to incentivize additional new storage development. Over 90 percent of the existing storage resources are in Massachusetts. The energy markets designed and operated by ISO New England (ISO-NE), however, were not designed to leverage all the value that energy storage resources like pumped hydro can provide to the grid with a significant amount of storage

[2] Lazard, *Levelized Cost of Storage Analysis (LCOS 7.0)* 4 (2021), https://www.lazard.com/media/451882/lazards-levelized-cost-of-storage-version-70-vf.pdf
[3] Massachusetts Department of Energy Resources et. al. (DOER), *State of Charge Massachusetts Energy Storage Initiative* xvi (2016) ("*State of Charge*"), https://www.mass.gov/doc/state-of-charge-report/download

remaining unused and available to the region. The study should examine ways to optimize existing energy storage and opportunities to lock in this value for the long-term.

With new technologies on the horizon that have the capability of delivering electricity for 100 hours or longer, the study should examine the best procurement arrangements to help them become commercially viable and, once deployed, increase grid reliability particularly during prolonged winter cold spells when the region's fossil-fueled generators face shortages of natural gas.

The study should examine Tariff rates for distribution-voltage, front-of-the-meter storage. This may help illustrate how reforming charging costs for storage can expedite the deployment of storage. It should also consider reforms to current the ISO-NE practice of studying proposed storage projects in the interconnection queue at full charge during peak load. This practice prevents storage from locating near load to reduce system demands.

While Massachusetts is conducting this energy storage study, RENEW observes that Connecticut will be performing a similar study in parallel. RENEW encourages DOER to share notes with Connecticut on its study and even explore a multi-state solicitation, given that the benefits of large-scale storage would be regional, and smaller states have a greater incentive to participate in a regional effort than to pursue individual storage policies.

II. Existing Studies to Consider

RENEW recommends the DOER study examine peaker replacement strategies in other jurisdictions. One helpful thought paper, which was prepared for the New York Battery and Energy Storage Technology Consortium for peaker replacement on Long Island, New York, could serve as a guide.[4] That study identified peakers for replacement with energy storage in three phases of near term, medium term, and long term. A selection of peakers to be replaced with storage in each phase was identified based on NOx emission regulation, dispatch duration, load pocket location, and availability of additional clean resources.

By accelerating the switch from fossil fuels to energy storage at peak times, Massachusetts 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.[5] Peakers are relatively inefficient and used infrequently during times of high electricity demand, and emissions from peakers directly harm local air quality.[6] In addition, peakers are most often sited in

[4] Strategen Consulting, LLC, *Long Island Fossil Peaker Replacement Study* 39 (2020), https://www.strategen.com/strategen-blog/long-island-fossil-peaker-replacement-study
[5] 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
[6] 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

disadvantaged communities and used on days when air quality is already poor.[7] But batteries, when charged with much cleaner energy sources, can provide the same grid services as a peaker plant without the associated emissions. To understand the value of storage, the study should examine the opportunity costs of energy storage over oil and natural gas peakers based on sound energy and capacity price forecasts and emissions data.

III. A Schedule of Procurements Starting in 2023 Is Necessary to Keep Pace with Emissions Reductions Requirements

Given these overwhelming benefits of storage for consumers, the environment, and reliability, RENEW Northeast urges DOER to examine in the study the benefits of having the first procurement for energy storage occur in 2023 to keep the Commonwealth on a trajectory to achieve its 2025 and 2030 greenhouse gas (GHG) emissions reduction requirements.[8] 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. Due to these delays, having the first of a series of procurements by 2023 is necessary to ensure Massachusetts stays on track to reduce emissions. Not waiting to contract with existing energy storage facilities can also maximize the benefits of new renewable energy resources being added to the grid next year especially offshore wind.

IV. Study How Competition Can Maximize Consumer Benefits

The DOER study should examine how procurement design can best benefit consumers. States like New York have determined energy storage resources are provided more cost-effectively by private developers on a competitive basis rather than by utilities through guaranteed rate-of-return regulation. The New York Public Service Commission recently concluded that "competitive ownership of energy storage assets . . . is a core principle and the existing limitations on utility ownership of energy storage should be maintained if possible."[9] A competitively developed project that is willing to cap the total cost exposure to consumers will ultimately be more beneficial to customers than a project that retains the ability to seek recovery of all costs, including any overruns, without limitation.

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[7] 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

[8] Massachusetts Executive Office of Energy and Environmental Affairs, 2025 and 2030 GHG Emissions Limit Letter of Determination (June 30, 2022), https://www.mass.gov/doc/2025-and-2030-ghg-emissions-limit-letter-of-determination/download

[9] Case 18-E-0130, *Energy Storage Deployment Program*, Order Directing Modifications to Energy Storage Solicitations 10 (April 16, 2021).

Massachusetts long-standing pro-competition law enacted over twenty years ago 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.

V. Study the Many Types of Agreements

The DOER study should consider the form of contracting best suited to specific energy storage technologies. Storage deployment has advanced in recent years through the increase in utility procurement of battery storage projects and products. The variety of offtake revenue contracts for battery storage projects has expanded rapidly and typically involve an agreement as contemplated under the Act. For large or transmission-level resources, arrangements have taken the form of energy storage tolling agreements, capacity sales agreements and hybrid power purchase agreements.

The energy storage tolling agreement, like a standard tolling contract for a traditional plant, gives the electric distribution company (EDC) capacity, energy and other products like ancillary services. The seller develops, owns, operates and maintains the battery project while the EDC off-taker typically controls when to charge and discharge the battery, pays for charging energy from the grid to the battery, and acts as "scheduling coordinator" or "market participant" for the battery in the wholesale markets. The project owner receives a fixed payment from the EDC.

The capacity sales agreement is a variant of the energy storage tolling agreement. Under a capacity sales agreement, the capacity and capacity attributes of the battery 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.

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 battery 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 battery facility, the third-party owner assumes the market risks when the EDCs does not have dispatch rights.

The DOER study should also evaluate potential benefits from a solicitation program that would provide a hedge for available wholesale revenues for transmission-scale energy storage. This mechanism will enable storage to be privately financed with the most efficient state incentive, while ensuring that storage is operated in alignment with wholesale market signals and

retaining the operational risk with the project owner. New York is expected to release soon a report on this "indexed" approach.

The study should examine whether consumers benefit from giving storage developers the flexibility to offer proposals that are standalone or paired with renewable energy systems to meet different needs defined by DOER. On the one hand, a cost-benefit study of storage in Nevada notes that the costs of co-located storage may be lower than those of stand-alone storage, while in some instances costs for stand-alone storage "will tend to be lower due to decreased flexibility in operations and siting."[10] On the other hand, another study confirms the operational and locational flexibility benefits of stand-alone storage systems.[11] Particularly relevant for Massachusetts' procured renewable resources, stand-alone storage adds new capacity to the grid to complement renewable energy capacity, can provide substantial capacity within load pockets due to its relatively small footprint, and absorb low-cost excess renewable energy from the grid without charging restrictions. Through the study results, DOER will gain an understanding of its options that will inform the design of a procurement.

VI. Conclusion

Thank you for the opportunity to offer these comments.

Sincerely,

Francis E Pullaro

Francis Pullaro
Executive Director

[10] The Brattle Group, *The Economic Potential for Energy Storage in Nevada*, 3 n.8 (Oct. 1, 2018), https://brattlefiles.blob.core.windows.net/files/14618_economic_potential_for_storage_in_nevada_-_final.pdf. Since the time of that study storage has become eligible for a federal Investment Tax Credit like solar. Consequently, that advantage might be reduced or eliminated.

[11] 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