



February 15, 2018

VIA E-FILING

Judith F. Judson, Commissioner
Department of Energy Resources
100 Cambridge St., Suite 1020
Boston, MA 02114

Re: Energy Storage Annual Report
Fitchburg Gas and Electric Light Company d/b/a Unitil

Dear Commissioner Judson:

On behalf of Fitchburg Gas and Electric Light Company d/b/a Unitil ("Unitil" or "the Company"), enclosed please find the Company's Energy Storage Target Annual Report for the year ending December 31, 2017.

Please do not hesitate to contact me directly if you have any questions or concerns about this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Gary Epler".

Gary Epler
Attorney for FG&E

Attachment

cc: Will Lauwers, Emerging Technology Director

<p style="text-align: center;">MA DOER Energy Storage Target Annual Report January 1, 2017 – December 31, 2017</p>
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I. Introduction

On June 30, 2017, the Massachusetts Department of Energy Resources (“DOER”) adopted an aspirational statewide energy storage target for electric distribution companies (“EDC” or “utility”) to procure 200 Megawatt hours (“MWh”) of viable and cost-effective energy storage systems (“ESS”) by January 1, 2020.¹ The purpose of the target is to “serve as a demonstration phase to further the Commonwealth’s knowledge of the potential for this technology” and “learn about the most cost-effective and viable deployment of energy storage...”² Fitchburg Gas and Electric Light Company d/b/a Unitil (“Unitil”) fully supports the Commonwealth’s target, and agrees that there is an array of potential benefits from increased energy storage deployment.

Unitil is pleased to submit this Energy Storage Target Annual Report (“Report”) to the DOER for the year ended December 31, 2017.

II. Reporting Requirements

An Act Relative to Energy Diversity, Chapter 188 of the Acts of 2016 requires that, “Not later than January 1, 2020, each electric company entity shall submit a report to the department of energy resources demonstrating that it has complied with the energy storage system procurement targets and policies developed by the department....”³ The DOER requested that the EDCs submit annual reports ahead of the statutory reporting date of January 1, 2020.⁴ Initially, the DOER contemplated that the EDCs would begin reporting annually on January 1, 2018; in recognition of the time needed to collect data through year-end, the DOER subsequently extended the reporting date from January 1 to February 15 for 2018 and 2019.

Unitil, like the other EDCs, will submit an annual Report by February 15, 2018, February 15, 2019, and January 1, 2020 for the DOER to use to inform state policy on the cost-effectiveness and viability of ESS in a variety of ownership models and use cases. This is the first annual Report and covers the period January 1, 2017 through December 31, 2017.⁵

To ensure that the Commonwealth can best leverage any findings and lessons learned from this target, over the course of the three years, the DOER expects to be informed of:

¹ On June 30, 2017, the DOER sent a letter to Conference Committee Members announcing the adoption of a statewide ESS target (“Letter to Conference Committee Members”).

<https://www.mass.gov/files/2017-07/letter-to-legislature-notice-of-energy-storage-target-adoption%206-30-17.pdf>

² See Letter to Conference Committee Members.

³ Section 15(c) of Chapter 188 of the Acts of 2016 (An Act to Promote Energy Diversity).

⁴ See Letter to Conference Committee Members.

⁵ Limited data and information on ESS in Massachusetts is available for this first annual report.

- How many MWh and MW each EDC procured;
- The types of energy storage procured;
- The cost-effectiveness of the various energy storage projects undertaken;
- Wholesale market opportunities identified and monetized;
- How market barriers to the adoption of energy storage were addressed and resolved; and
- Recommendations, if any, for energy storage programs and policies going forward.⁶

After review of the submitted Reports, the DOER will determine if an additional ESS target for EDCs will benefit EDC customers.⁷

A. Data Collection

Unitil will seek to obtain uniform data and information for EDC-owned and non-EDC-owned ESS projects through the distributed generation (“DG”) interconnection process. For purposes of annual Reports to the DOER, the EDCs have started to request data and information for ESS projects they do not own from customers and developers of existing ESS projects already connected to their distribution systems, and will request such data and information from customers and developers of new projects going forward. The collected data and information will be used to demonstrate measurable progress towards the achievement of the ESS procurement target and policies adopted by the DOER. These data and information include:

- Amount of ESS Procured (MWh_{ac} and MW_{ac});
- Eligible Sources of ESS Procurement (e.g., SMART program);
- ESS Specifications (e.g., technology type, manufacturer);
- Operational Information (e.g., installation type, system configuration); and
- Applications/ Intended Use Cases (e.g., Peak Shaving/ Load Leveling).⁸

The EDCs intend to include the above-mentioned data and information on EDC-procured ESS projects in their annual reports to the DOER. (Procured projects and projects in the pipeline, as of December 31, 2017, are listed in Attachment A of this Report.) However, for non-EDC-owned projects, such data and information must be obtained from customers and developers, who currently are not required to provide such data and information under the current DG interconnection tariff. The EDCs may be unable to obtain some or all of this customer data and information and the level and type of data and information included for each such project may vary in the Reports.

B. Eligible Sources of Procurement

⁶ See Letter to Conference Committee Members.

⁷ See Letter to Conference Committee Members.

⁸ *State of Charge* report, issued on September 16, 2017. According to the report, a use case is defined as an integrated set of grid services performed by a technology at a distinct site or location on the grid.
<http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf>.

As a threshold matter, based on the DOER Letter to Conference Committee Members, the EDCs have jointly identified several sources of ESS that would count towards the statewide EDC procurement target. Sources that currently qualify as “procured” by EDCs include, but are not limited to:

- Utility-owned ESS for transmission and distribution operation and management for the benefit of customers (“Utility-Owned T&D”);
- Utility-owned ESS for research and development purposes, such as those projects supported by U.S. Department of Energy grants, or utility-scale solar plus storage projects developed to support research programs (“Utility-Owned R&D”);
- ESS to be paired with newly authorized large-scale energy procurements featuring 9,450,000 MWh of clean energy and 1,600 MW of offshore wind generation under Sections 83C and 83D of the Green Communities Act (“Section 83C or 83D”);
- Customer-owned ESS enrolled in an EDC’s energy efficiency/ demand response demonstration project or program (“Energy Efficiency/DR program”);
- Customer-owned ESS enrolled in the EDC’s Solar Massachusetts Renewable Target (“SMART”) program that qualify for the SMART storage adder (“SMART program”); and
- Customer-owned ESS funded by the DOER’s or Massachusetts Clean Energy Center’s (“MassCEC”) Advancing Commonwealth Energy Storage (“ACES”) and Peak Demand Reduction Grant programs, which include projects to which the EDC has provided in-kind and/or financial support (“DOER/ MassCEC Funded Projects”).⁹

C. Project Eligibility Criteria

In order to determine when an ESS would count toward the EDC procurement target, different criteria would apply, depending on whether the ESS is customer-owned or utility-owned.

i. Utility-Owned ESS

ESS projects owned by the EDC are different from developer/customer-owned projects in that the EDC commits to building them once contracted. The EDCs note that as with any large project, it is possible for issues outside of the EDCs’ control to arise after contracting, such as permitting challenges, which may delay or prevent the completion of a project.

Utility-owned ESS will count towards the target once: 1) the EDC has contracted for construction services for the project, such as part of an EDC-led competitive procurement; or 2) a state or federal agency has awarded grant funding for the project (e.g., U.S. Department of Energy ARRA grants).¹⁰

⁹ Any ACES or Peak Demand Reduction Grant project where the EDC is the award recipient or the EDC partner on the project.

¹⁰ The EDC will not wait for the EDC-owned ESS to be installed/ commissioned before counting them towards the target. In the event a project is unable to be installed or commissioned, the EDCs will remove the project from its reported progress towards the target.

i. Customer-Owned ESS

Customer-owned ESS qualify as eligible sources of procurement if the EDC provides in-kind assistance, assumes operational responsibility for or contributes financial support for an ESS installation; the ESS facility is enrolled in a state-agency grant program that is funded by Alternative Compliance Payments¹¹; or the EDC provides an incentive payment directly that is funded by distribution customers (e.g., the storage adder under the SMART tariff).

Customer-owned ESS would count towards the target once: 1) the customer has enrolled in an EDC program (e.g., Energy Efficiency/ DR demonstration project or SMART program), or the customer has been awarded state-agency grant funding (e.g., ACES program); and 2) the customer has submitted its application to the EDC for DG interconnection.

D. Applications and Intended Use Cases

Based on the *State of Charge* report and the EDCs' own expertise, the EDCs have identified the following primary applications and use cases for ESS. This list may be modified as the EDCs monitor relevant industry trends and gain further hands-on experience with energy storage.

- i. Wholesale Market (i.e., Energy, Capacity, Ancillary Services): ESS have the potential to participate in all major categories of the wholesale market.
- a. In the wholesale energy market, ESS may be able to produce revenue by arbitraging hourly electricity prices, charging when the wholesale price is low and discharging when the wholesale price is high.
 - b. ESS may participate in the ISO-NE Forward Capacity Auction and earn revenue by contributing to ISO New England's installed capacity.
 - c. ESS may also be able to generate revenue by participating in the ancillary services market (e.g., black start and frequency regulation).

While energy arbitrage, capacity, and ancillary service revenues have the potential to be monetized for the benefit of the ESS owner, individual customers may potentially benefit from reduced system costs.

- ii. Peak Shaving / Load Leveling: ESS can store energy during hours of low demand and discharge energy when the system is peaking. This may reduce the entire system peak and result in lower utilization of inefficient and expensive gas and oil units.
- iii. Generation Support (e.g., Peaker Replacement): ESS can discharge when the system is peaking, thus acting in place of peaking capacity. ESS have the potential to be cleaner and more reliable than a traditional combustion turbine unit.

¹¹ See Letter to Conference Committee Members.

- iv. T&D Asset Deferral: Strategic deployment of ESS has the potential to defer or eliminate transmission and distribution upgrades in specific locations. The potential for transmission and distribution deferrals need to be studied on an individual basis in consideration of local circumstances and system characteristics.
- v. Power Quality (e.g., Voltage/VAR Support): ESS can provide voltage/VAR support. Reactive power cannot be efficiently transmitted over long distances, which makes distributed ESS an attractive alternative to traditional voltage/VAR support supplied by generating units in some locations.
- vi. Customer Bill Savings (e.g., Demand Charge Management): Individual customers can utilize ESS to shave the peaks and fill the troughs of their load. By reducing peak load, customers may be able to mitigate their installed capacity tag. Commercial and industrial customers may also have the potential to realize bill savings by lowering their peak demand and avoiding a demand charge. Customers with time varying rates can also use ESS to perform arbitrage by charging the ESS during less expensive off-peak times and discharging for their own use during more expensive peak periods.
- vii. Renewable Energy Integration (e.g., Ramping, Smoothing): ESS can quickly follow the variable and unpredictable generation of an intermittent renewable resource making it smooth and dispatchable. ESS can thus support the further integration of renewable resources.
- viii. Renewable Energy Shifting: ESS have the potential to store energy generated by renewable resources when system demand is low and discharge when system demand is high.
- ix. Reliability and Resiliency: ESS can support reliability and resiliency by locally providing energy during an outage event.
- x. Microgrid: ESS can help promote a cost-effective and reliable microgrid. By storing energy produced by renewable resources or by combined heat and power (CHP) for use when those assets are not generating, ESS can support microgrid “islanding” and going off the main grid at time when there is an electric distribution system outage or when it would be otherwise advantageous to the microgrid operator.

E. Target Results

See Attachment A for data and information regarding EDC-procured projects and projects in the pipeline.

i. Procured Projects

As of December 31, 2017, Unitil has no procured projects.

ii. Project Pipeline

As of December 31, 2017, Unitil had approximately 8 MWh and 2 MW of ESS in the project pipeline.¹²

(1) Customer-Owned DOER/ MassCEC Funded Projects

ACES Projects: A project that was sponsored and supported by Unitil was awarded ACES funding. This project will be owned by NuGen Capital and will be operated in partnership with Unitil. This project represents approximately 8 MWh of energy storage.

F. Cost-Effectiveness and Viability

Information regarding cost-effectiveness and viability will not be provided in this first Report due to lack of information and experience. This information will be provided in the future as the EDCs continue to implement ESS projects.

G. Market Barriers and Solutions to the Adoption of Energy Storage

Information regarding market barriers and solutions to the adoption of ESS will not be provided in this first Report due to lack of information and experience. This information will be provided in the future as the EDCs continue to implement ESS projects.

H. Recommendations for Future Energy Storage Programs and Policies

Recommendations for future ESS programs and policies will not be provided in this first Report due to lack of information and experience. Recommendations will be provided in the future as the EDCs continue to implement ESS projects.

¹² The exact amounts of energy and power of the proposed projects in AC and DC ratings could not be confirmed at the time of report submittal, but will be known as the projects move from the pipeline to the procured list.

Procured Energy Storage Projects																										
Project Procurement									Energy Storage											Generation						
DG WR Number	Common Project Name	Source of Procurement	Other - Source	Program Status	Interconnection Status	Customer Type	City/Town	Year Procured	Technology Type	Other - Technology	Manufacturer	Energy kWh (DC)	Capacity kW (DC)	Energy kWh (AC)	Capacity kW (AC)	Installation Type	Application/ Intended Use #1	Application/ Intended Use #2	Application/ Intended Use #3	Other - Application/ Intended Use	DG WR Number	Storage Co-Located with DG/ Generation?	System Configuration Type	DG/ Generation Type	Capacity kW (DC)	Capacity kW (AC)
	N/A																									

Energy Storage Projects in Pipe Line																										
Project Procurement									Energy Storage											Generation						
DG WR Number	Common Project Name	Source of Procurement	Other - Source	Program Status	Interconnection Status	Customer Type	City/Town	Year Procured	Technology Type	Other - Technology	Manufacturer	Energy kWh (DC)	Capacity kW (DC)	Energy kWh (AC)	Capacity kW (AC)	Installation Type	Application/ Intended Use #1	Application/ Intended Use #2	Application/ Intended Use #3	Other - Application/ Intended Use	DG WR Number	Storage Co-Located with DG/ Generation?	System Configuration Type	DG/ Generation Type	Capacity kW (DC)	Capacity kW (AC)
	NuGen	MA - DOER/ MassCEC Funded Projects		Awarded		Commercial	Lunenburg	2018	Lithium Ion			8,000	2,000				Wholesale Market (i.e., Energy, Capacity, Ancillary Services)	Peak Shaving/ Load Leveling	Renewable Energy Integration (e.g., Ramping, Smoothing)			Yes	AC Coupled			
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8,000