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Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Comments of Sunverge Energy, Inc. on Solar Massachusetts Renewable Target (SMART) Program

Dear DOER,

Sunverge is pleased to offer the below comments on the SMART program, as directed by Michael Judge, Director, Renewable and Alternative Energy Development in an emailed Notice to stakeholders. Sunverge makes the following key points in its comments below regarding the implementation of SMART:

- Energy storage facilitates grid modernization and reduces the state's growing energy peak
- Utilities and third-party providers should participate in energy storage to maximize the benefits for consumers
- Energy storage maximizes the value of time varying rates for customers and utilities

I. Introduction

Sunverge is a California-based manufacturer of distributed energy storage solutions and energy management software. Sunverge's solutions optimize the value of solar power by leveraging the practical advantages of distributed generation and storage. Sunverge's energy management platform captures solar energy and stores it for use when it is needed most, thereby shifting electrical loads, flattening peak electricity demand, providing backup power, and maximizing return on renewable energy. As a manufacturer of energy storage systems and software, Sunverge supports policies that spur energy storage and the management of distributed energy resources. Sunverge currently manages 1,000 behind-the-meter ("BTM") storage systems totaling nine megawatts of capacity in fifteen states**,** Australia, New Zealand, Japan, and Canada.

II. Energy storage facilitates grid modernization and reduces the state's growing energy peak

Energy storage can play a key role in helping Massachusetts meet the state's growing peak and facilitate grid modernization. Energy storage delivers services across multiple domains, as outlined in the State of Charge Report. BTM energy storage facilitates the rollout of time varying rates ("TVR") and smart

meters outlined in D.P.U. 12-76C.[1] By charging from a solar photovoltaic ("PV") system during the day and consuming that energy during evening peaks, energy storage optimizes TVR rate structures and reduces the bill impact of TVR rates on consumers. Energy storage defers the need for transmission and distribution investment and reduces load on the grid. Further, BTM energy storage helps Massachusetts meet the goals outlined in the State of Charge Report of reducing outages, optimizing demand, and integrating distributed energy resources ("DERs").[2] BTM storage's impact on each of those areas is outlined below:

Table 1: BTM Energy Storage Achieves State of Charge Goals at the Customer and Grid Level

Goals for Energy Storage Outlined in State of Charge	Customer domain	Grid domain
Reducing outages	Back-up power	Voltage support, frequency regulation
Optimizing demand	Time varying rate bill management	T&D deferral
Integrating DERs	Increased PV self-consumption	Energy arbitrage

In meeting the State of Charge goals outlined above, energy storage mitigates Massachusetts' high energy costs, where "…peak demand continues to grow in the region at a rate of 1.5% per year resulting in added costs to ratepayers to maintain reliability."[3] SMART regulations should therefore be implemented to ensure energy storage helps Massachusetts modernize its grid and mitigates the state's growing peak.

[1] The Commonwealth of Massachusetts Department of Public Utilities, "Investigation by the Department of Public Utilities on its own Motion into Modernization of the Electric Grid". November 5, 2014. Available at: http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=12-76%2fOrder_1276C.pdf

[2] Massachusetts Department of Energy Resources & Massachusetts Clean Energy Center, "State of Charge", p. xix. 2016. Available at: http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf

[3] *Ibid.*, p. ii

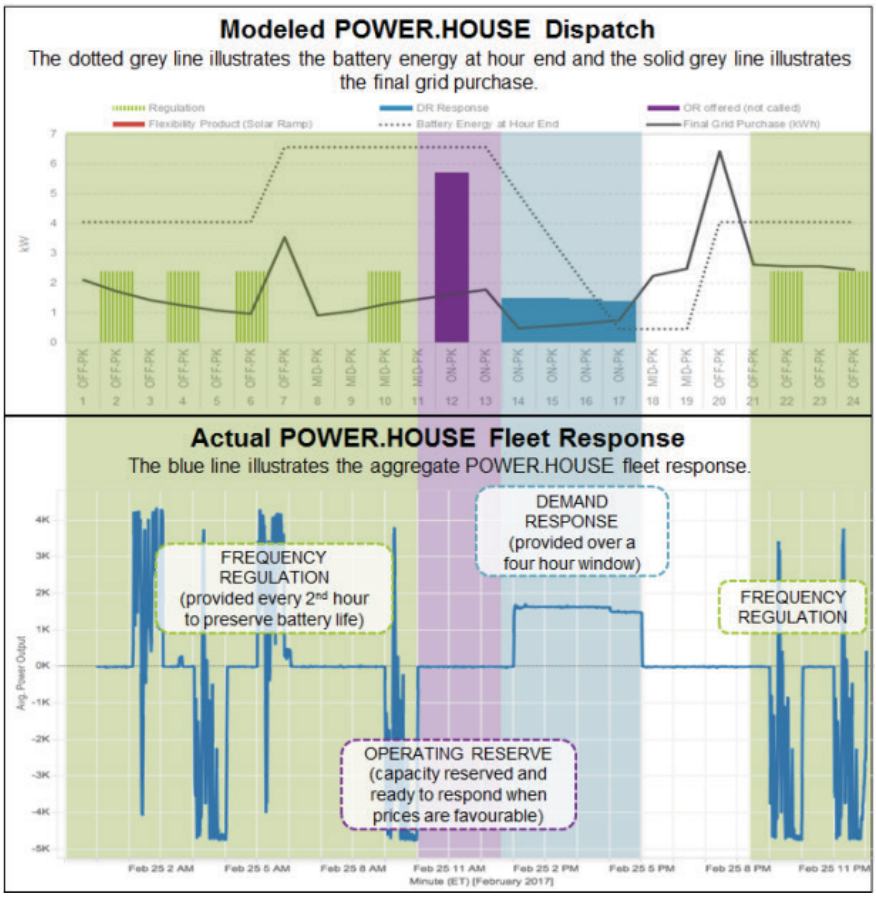
III. Utilities and third-party providers should participate in energy storage to maximize the benefits for consumers

SMART regulations should maximize the value energy storage can provide to the grid by encouraging participation by utilities and third-party energy service providers. Utilities and third-party energy service providers are central grid actors, and are well-positioned to ensure ratepayers, utilities, and the grid alike take full advantage of energy storage to reap the benefits of energy cost reduction, reduced peak capacity, ancillary services cost reduction, wholesale market cost reduction, T&D cost reduction, and integration of distributed renewable generation cost reduction as outlined in the State of Charge report.[4]

Energy storage has already demonstrated its ability to provide these benefits for customers and utilities alike in numerous field deployments. For example, Figure 1 below shows the modeled and actual dispatch profile of a set of Sunverge energy storage systems undertaking the following services during a twenty-four hour period in a deployment by Ontario, Canada-based utility Alectra: charging from the grid, spin/non-spin operating reserves, demand response, and frequency regulation.[5] By directly managing the storage assets, the utility was able to deliver a diverse set of services that maximized customer, utility, and grid benefits. The State of Charge report asserted that utility management of BTM storage can provide a cost/benefit ratio of 2.43, further demonstrating the value of this business model for Massachusetts.[6]

[4] *Ibid., at xii*
[5] Alectra Utilities, *Power.House Feasibility Study,* p. 11. (April 18, 2017). Available at: https://www.powerstream.ca/attachments/POWER_HOUSE_Feasibility_Study.pdf
[6] Massachusetts Department of Energy Resources & Massachusetts Clean Energy Center, "State of Charge", p. 110. 2016. Available at: http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf

Figure 1: Alectra/Sunverge Energy Storage System Measuring Incremental Services



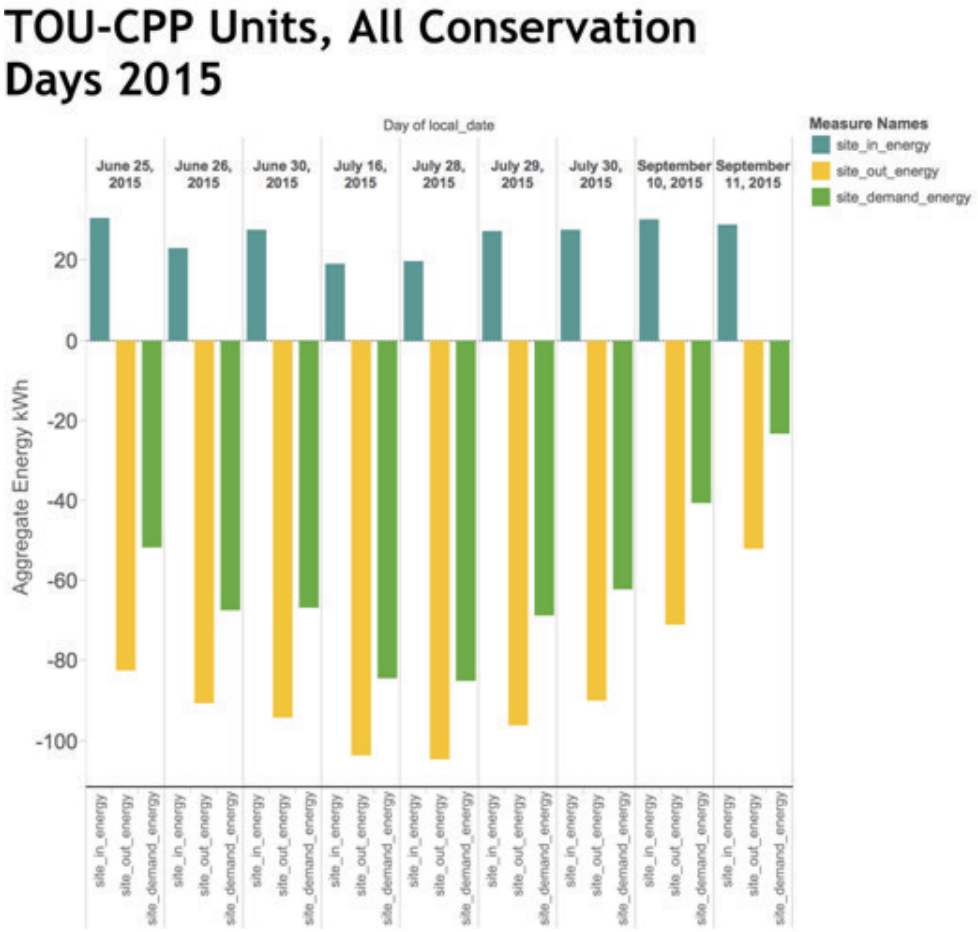
Beyond the benefits noted above, by managing the BTM energy storage systems as a fleet ,utilities and third-party energy providers can create a virtual power plant ("VPP") which can displace investment in traditional generation assets. Behind-the-meter storage can be located in areas of the grid where renewables integration, for instance, is causing the largest depreciation issues. Using the VPP to shape the load near vulnerable feeders and substations can provide valuable infrastructure relief. Further, The VPP platform can reduce demand by providing power locally behind-the-meter and thus reducing load required by homes within the VPP fleet, or the fleet can be utilized to provide power directly to the grid in areas of congestion. Implementing SMART regulations to facilitate utility and third-party ownership of BTM storage assets, which can be aggregated and managed as a larger energy resource, maximizes the benefits of energy storage to provide multi-faceted value for both customers and the grid.

IV. Energy storage maximizes the value of time varying rates for customers and utilities

As it implements SMART, Massachusetts should leverage energy storage to optimize TVR rate design to mitigate increasing peak-time energy costs. The State of Charge report notes that, "Over the last three years from 2013 – 2015 on average, the top 1% most expensive hours accounted for 8% ($680 million)

of Massachusetts ratepayers' annual spend on electricity. The top 10% of hours during these years, on average, accounted for 40% of annual electricity spend, over $3 billion."[7] Energy storage systems that utilize advanced software algorithms to facilitate intelligent charge and discharge of stored energy provide a win-win for customers and the grid, minimizing bill impacts of TVR while reducing peak demand. The two charts below show contrasting impacts for utility customers who have energy storage systems installed. Figure 2 shows the average energy impact for customers enrolled in TVR (herein called "TOU") and critical peak pricing ("CPP") programs in Sacramento Municipal Utility District's ("SMUD") territory. Figure 3 shows the average energy impact for customers who are not enrolled in TVR/CPP.[8] The green bar representing the demand profile of the homes demonstrates that those enrolled in pricing programs had significantly lower bill impacts.

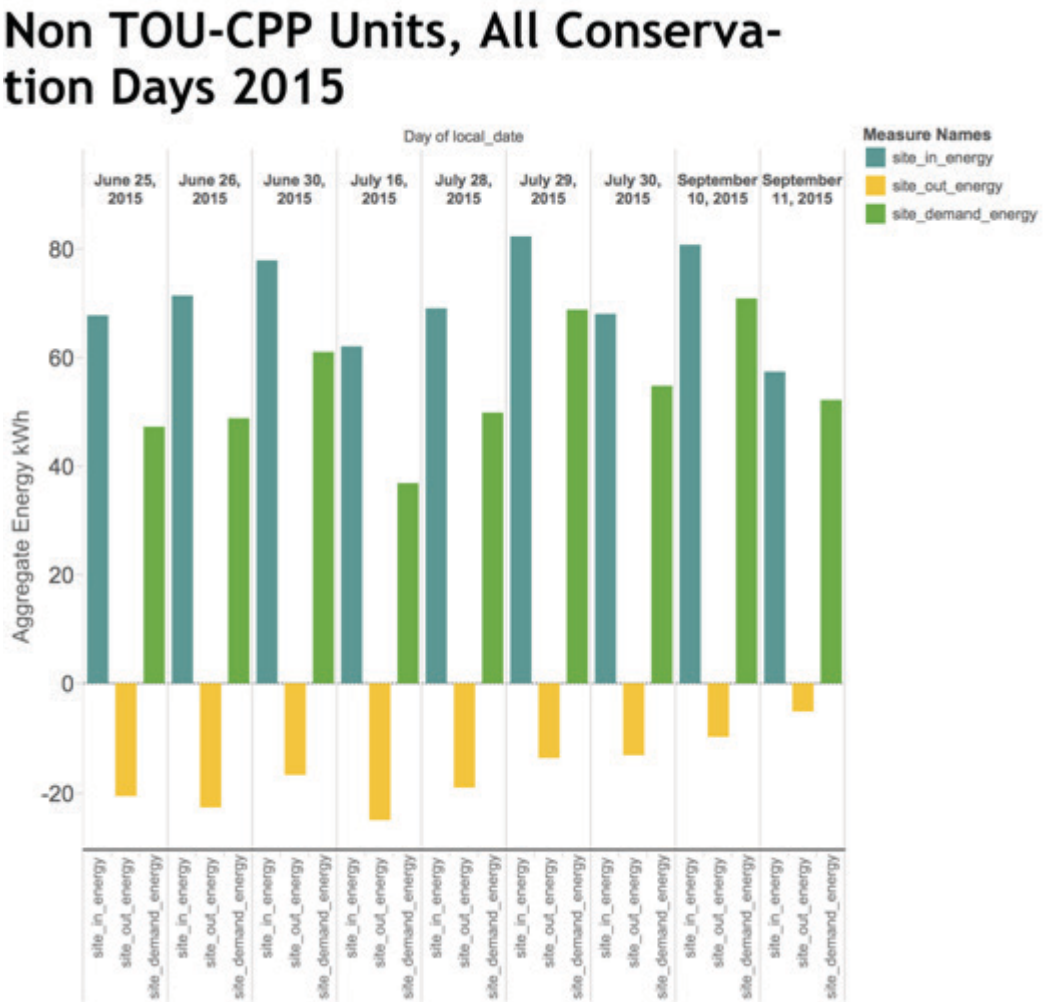
Figure 2: SMUD customers with energy storage enrolled in TVR/CPP



[7] Massachusetts Department of Energy Resources & Massachusetts Clean Energy Center, "State of Charge", p. ii. 2016. Available at: http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf

[8] St. John, Jeff, Greentech Media, "How Solar, Batteries, and Time-of-Use Pricing Can Add Up to Value", October 21, 2015. Available at: https://www.greentechmedia.com/articles/read/How-Solar-Batteries-and-Time-of-Use-Pricing-can-Add-Up-to-Value

Figure 3: SMUD customers with energy storage not enrolled in TVR/CPP



Implementing SMART regulations to optimize TVR rate design and energy storage for consumers benefits utilities and the grid by reducing peak demand, better integrating renewable resources to avoid the "duck curve," and planning the grid more efficiently. Further, increasing customer acceptance of TVR reduces utility costs by decreasing calls to utility call centers. This is particularly important given the highly variable levels of acceptance of TVR across different customer groups. For example, according to a recent survey conducted by Deloitte of 1,500 US energy customers, 47 percent of millennials are interested in using a time-of-use rate compared with only 28 percent of baby boomers.[9] An effective SMART program ensures a

[9] Deloitte, "Deloitte Resources 2017 Study Energy management: Sustainability and progress", p. 16. 2017. Available at: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-deloitte-resources-2017-study-energy-management.pdf

TVR rollout that benefits customers and utilities alike, reducing energy costs for all customers and mitigating reliability issues that stem from Massachusetts's growing peak.

V. Conclusion

Sunverge appreciates the opportunity to provide comments on the SMART program, and commends the DOER for its efforts to continue its track record of implementing innovative programs that benefit Massachusetts energy customers. As a leading residential BTM energy storage solution provider, Sunverge looks forward to participating in the development of the SMART program.

/s/ Serj Berelson

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