Via Electronic Mail

June 21, 2019

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

Re: Department of Energy Resources SMART Program Formal Review

Commissioner Judson:

Sunrun Inc., ReVision Energy, Vivint Solar, Inc. SunBug Solar and Trinity Solar request that the Department of Energy Resources ("Department") support certain changes to the SMART program recommended herein in the Department's forthcoming formal SMART program review. As discussed further below, we specifically urge the Department to (1) require utilities to utilize inverter data for tracking and monitoring SMART system production in lieu of requiring customers to install an additional production meter; and (2) adopt a resiliency adder that reflects the value of enhanced customer and grid resiliency for SMART systems configured with energy storage. Finally, we urge the Department to exercise its authority pursuant to 225 C.M.R. Section 20.00 et seq. to solely direct SMART program administration. While the Department of Public Utilities must approve tariff modifications, the Department should have sole oversight of program administration to, among other matters, ensure that administrative issues are addressed in a timely and efficient manner.

I. The Department Should Require Utilities to Utilize Inverter Data To Track SMART System Production.

The current utility metering requirements for SMART systems require the installation of an additional production meter and associated equipment for measuring system output.[1] The additional meter, wiring and installation costs are borne by the customer and are redundant to existing inverter metering capabilities. The requirement for a production meter and the added costs for complying with utility metering solutions adds substantial costs for system installation. For instance, compliance with one of the utility proposals could cost up to $1,700 per residential customer. Compliance with another could cost up to $780 per year per customer. This significantly reduces the SMART incentive funds available for offsetting the costs of the PV and storage systems and ultimately these costs are borne by ratepayers through the SMART incentive. The SMART storage adder was intended to bridge the gap between the cost of storage and the market revenues for which storage is currently eligible. Ratepayer funds for SMART were not intended to go toward redundant utility metering costs. Ultimately, this leads to less and much more expensive storage being deployed under SMART.

Allocating such substantial portions of the SMART incentive to metering compliance creates significant hurdles for SMART system deployment, particularly for residential behind-the-meter ("BTM") customers. Indeed, the current utility SMART system metering has prevented certain systems, such as certain DC-coupled batteries, from being deployed altogether, or from receiving all SMART compensation due under the tariff, given that all production cannot be metered by a single production meter without additional, redundant, and expensive equipment that may make residential projects uneconomic.

[1] *See* Department of Energy Resources, SMART Metering Requirements (Feb. 28, 2019) *available at* https://www.mass.gov/files/documents/2019/03/06/SMART%20Metering%20Requirements%2022819.pdf.

DC-coupled batteries, such as the LG Chem, are a preferred residential customer energy storage solution. For example, deployment figures in California show that LG Chem batteries will soon provide 50% or more of the residential market.[2] DC-coupled batteries also represent significant market share in Massachusetts. Preventing deployment by leading providers of DC-coupled systems removes a substantial portion of residential customers' preferred energy storage solution from entering the Massachusetts market. This reduces the ability to enhance customer and grid resilience, puts statewide storage deployment goals at risk, and reduces deployment levels for performance programs such the Clean Peak Standard, bring-your-own-device ("BYOD") programs, and others.

To put a finer point on this issue, the BYOD programs that are part of the utilities recently approved energy efficiency plans will suffer from low enrollment due to the financial burden of the additional metering requirements that are severely constricting energy storage deployments. The BYOD based energy efficiency programs are a cost-effective energy efficiency resource that will reduce ratepayer costs. However, if energy storage deployment remains hindered by high metering costs, these benefits will not be realized.

Importantly, while we highlight this issue as it relates to DC-coupling in residential applications, other developers installing other battery technologies in other market segments are similarly impacted by the current metering requirements.

Requiring utilities to utilize SMART system inverter data is a simple and cost-effective solution for system production reporting that will reduce costs for customers and the utility and ensure that SMART system reporting requirements are compatible with customer and market preferences. For instance, the SolarEdge inverter with the revenue grade meter data option is

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2 Self Generation Incentive Program Database Summary Report, April 29, 2019.

ANSI C12.20 Class 0.5 (0.5% accuracy rating) certified and highly accurate and capable of fulfilling the function of a production meter.[3]

The charge/discharge operating profiles programmed during installation can be submitted to the utility to ensure the system is installed in accordance with the utility's approved interconnection application. The inverter's revenue grade metering is able to record power flow and transmit the meter data securely from server to server, thus removing the need for the installation of costly and redundant production meters. Using inverter data for SMART systems is consistent with how production data is tracked and reported for multiple utility programs in other states and would allow the ratepayer funds in the SMART program to contribute to the cost of deploying solar and storage, rather than the cost of utility metering. Indeed, as outlined in the table below, ISO-NE, the U.S. Department of Treasury, and numerous other states currently authorize the use of inverter data in lieu of a production meter.

Table 1: Examples of Programs that Utilize Inverter Data for System Production Information

State	**Program**	**Description**
California	Self-Generation Incentive Program ("SGIP")[4]	For storage systems of 30 kW or less, performance audit monitoring and verification may use data from metering systems built into the storage device. This is used to verify operation of the system in accordance with program requirements (*e.g.*, annual cycling requirements).

[3] *See, e.g.*, SolarEdge, Single Phase Inverter with HD Wave Technology Datasheet *available at* https://www.solaredge.com/sites/default/files/se-hd-wave-single-phase-inverter-with-setapp-datasheet-na.pdf.

[4] Self Generation Incentive Program Handbook, Section 5.5 (Dec. 18, 2017) *available at* https://www.selfgenca.com/documents/handbook/2017.

New York	NY-SUN Incentive Program[5]	Participanting solar systems must have monitoring equipment, which at the contractor's election may include a production meter, online monitoring system, inverter display recorded production, or another method.
Pennsylvania	Alternative Energy Portfolio Standard - SREC Generation[6]	All solar generation installed after May 18, 2017 requires production metering for SREC generation. Inverter readings qualify as metered data for this purpose.
Illinois	Adjustable Block Solar Incentive Program[7]	The ABP, a long-term SREC contract program, allows systems of 10 kW or less with inverters certified to +/- 5% accuracy with either web-based or digital output displays to qualify for production measurement. Inverters with integrated ANSI C.12 compliance qualify.
Vermont	Green Mountain Power ("GMP") BYOD Program[8]; GMP Resilient Home Pilot[9]	Under GMP's BYOD program, GMP dispatches and monitors performance of battery storage systems enrolled in the program remotely, including using the SolarEdge Monitoring Platform. Separate battery metering is not required for program participation. Participants in the BYOD program can also enroll in GMP's Resilient Home pilot program through which customer sited batteries provide whole-home backup power and act as the meter for the home; avoiding the need for traditional meters to measure power usage.

5 NY-SUN Upstate and Long Island Program Manual at 30 (Apr. 2019) *available at* https://www.nyserda.ny.gov/-/media/NYSun/files/Contractor-Resources/upstate-program-manual.pdf (note: this citation references the upstate and Long Island regional program segment but the rules are the same for the downstate New York segment).

6 Pennsylvania Pub. Utils Comm'n, L-2014-2404361, Second Amended Final Rulemaking Order at p. 111 (Oct. 17, 2016), *available at* http://www.puc.pa.gov/pcdocs/1483199.doc.

7 Illinois Power Agency, Adjustable Block Program Guidebook at 38 (May 31, 2019) *available at* http://illinoisabp.com/wp-content/uploads/2019/05/Program-Guidebook-2019_05_31.pdf.

8 Green Mountain, Power Bring-Your-Own-Device "BYOD" Access & Service Agreement (Mar. 2019) *available at* https://greenmountainpower.com/wp-content/uploads/2019/03/BYOD-Terms-and-Conditions-3-11-19.pdf.

9 *See* Green Mountain Power, News, GMP Pioneers Patent-Pending System Using Energy Storage to Make Meters Obsolete, https://greenmountainpower.com/news/gmp-pioneers-patent-pending-system/.

New Hampshire	Liberty Utilities Residential Storage Pilot[10]	Liberty's initial utility-owned storage version of this program uses Tesla Powerwalls and the accompanying GridLogic platform for remote dispatch and monitoring. Separate battery metering is not required for program participation.
Federal	Treasury 1603 Grant Program[11]	The 1603 Grant Program requires annual production reporting for five years by grant recipients. Recipients may use inverter readings if the inverter has a display showing total production to date.
ISO-NE	On-Peak and Seasonal Peak Demand Resources[12]	Solar resources enrolled as this type of resource are subject to minimum measurement requirements and providers must submit plans specifying how these requirements will be met. The requirements are technology agnostic and governed by accuracy and certification parameters. Providers may submit alternative plans that are consistent with these generalized parameters for ISO-NE approval. Thus separate revenue grade metering is not required if the minimum requirements can be met through other equally reliable means.

As energy storage and other DERs are integrated into grid operations through traditional programs such as SMART and new programs, such as BYOD, Clean Peak Standard, and other pay for performance programs, it is essential to have system measurement solutions that do not require customers to purchase and install costly and redundant production meters. Indeed, Edison Electric Institute President Tom Kuhn lauded the progress of Green Mountain Power's

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[10] New Hampshire Pub. Utils Comm'n, Docket No. 17-189, Supplemental Testimony of Heather Tebbetts at 19 (Feb. 9, 2018) *available at* http://www.puc.state.nh.us/Regulatory/Docketbk/2017/17-189/MOTIONS-OBJECTIONS/17-189_2018-02-09_GSEC_STESTIMONY_TEBBETTS.PDF.

[11] U.S. Dept. of Treasury, Treasury1603: Recommendations for Annual Report Production Documentation *available at* https://www.treasury.gov/initiatives/recovery/Documents/Recomendations for annual production - 2013 Feb.pdf.

[12] ISO New England Manual for Measurement and Verification of On-Peak Demand Resources and Seasonal Peak Demand Resources (Effective Oct. 2018) *available at* https://www.iso-ne.com/static-assets/documents/2018/10/manual_mvdr_measurement_and_verification_of_onpeak_and_seasonal_peak_demand_resources_rev07_20181004.pdf.

innovative Resilient Home Pilot Program in bringing inverter based metering solutions to customers - and entirely eliminating and replacing utility meters.

> It is great to see how much progress is being made by EEI's member companies to innovate and transform to deliver a clean energy future for customers. Green Mountain Power is part of revolutionizing the business, and is proving that out-of-the-box thinking is not only critical for achieving clean energy goals, but also possible. This innovation is a huge jump forward into the resilient, distributed energy grid we need as we move to provide more renewable energy for customers, and it also shows that electric companies are a key part of that solution.[13]

Utilizing inverter metering technology is a viable and cost-effective means to track and deliver SMART system production data and is not without precedent in Massachusetts. Indeed, the Department currently utilizes inverter data to track cycling requirements for the SMART storage adder and utilities similarly utilize inverter data for storage systems under BYOD pay for performance programs. SMART and BYOD programs provide ratepayer funds for eligible systems and are approved by the Department of Public Utilities. The utility production metering requirements insert metering redundancies and substantial inefficiencies in the use of program funds - and currently are completely blocking deployment of some systems.

These inefficiencies should be corrected to ensure that ratepayers funds are utilized to maximize resource deployment and not siphoned off to comply with out-moded utility metering practices. The current use of inverter data by the Department and utilities in Massachusetts further underscores that the use of inverter data is a simple, viable and cost-effective solution to the current costly and redundant requirement for customers to install additional production meters. As discussed above, this requirement is cost-prohibitive and an inefficient use of ratepayer funds.

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[13] *See* Green Mountain Power, News, GMP Pioneers Patent-Pending System Using Energy Storage to Make Meters Obsolete, https://greenmountainpower.com/news/gmp-pioneers-patent-pending-system/.

We urge the Department to revise the SMART program rules to require utilities to immediately begin accepting inverter data as an alternative to the current requirement that customers install an additional production meter. As an initial step, we recommend the Department require utilities to institute billing protocols and functionalities necessary to facilitate inverter data intake through monthly data batching in Comma-separated Value (.csv) file format for immediate implementation. As a permanent solution, we recommend the Department require utilities to institute such billing upgrades and other functionalities necessary to facilitate API connection with the utility.

Instituting these revisions will ensure uniformity in the measurement of system production for SMART program implementation, align Massachusetts with ISO-NE policies and other states,[14] and reduce costs for program participants to ensure that SMART incentive funds are maximized for system deployment.

II. The Department Should Adopt An Adder For SMART Systems That Provide Resiliency Benefits.

The concept of resiliency in electrical system planning has gained significant attention in recent years in the context of electrical infrastructure and the provision of essential services in the wake of extreme weather events.[15] Following Hurricane Irene in 2011 and Superstorm Sandy in 2012, both of which caused substantial damage and left thousands without power in Massachusetts and along the East Coast, federal and state government agencies gave close

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14 *See e.g.,* Table 1.

15 *See, e.g.,* J. Van Nostrand, Keeping the Lights on During Superstorm Sandy: Climate Change Adaptation and Resiliency Benefits of Distributed Generation, 23 NYU Envtl. L. Journal 92, 112-14 (2015) ("Van Nostrand") (discussing various federal and state agency reports and utility proceedings assessing resiliency value and incorporating concepts of resiliency into electric system planning and operation).

attention to incorporating resiliency into the electric system.[16] The incorporation of distributed energy resources ("DERs"), particularly solar and energy storage, were given particular attention as these resources have the unique advantage of being located closer to load centers and have the ability to maintain key loads to contribute to system and host customer resilience.[17]

Indeed, the Department included the possibility of integrating a resiliency multiplier in the its recently released Clean Peak Standard Straw Proposal[18] and we commend the Department's proposal. While we urge the Department to continue exploring the possibility of incorporating a resiliency multiplier as part of the Clean Peak Standard, we further urge the Department to adopt a resiliency adder under the SMART program for broader applicability.

Resiliency is a critical climate change adaptation strategy in the face of increased frequency of extreme weather events. Including a resiliency adder under the SMART program would enhance the financeability of resiliency technologies, particularly energy storage systems. Adding a backup function to a home or business can add significant increased costs to the installation and operation of certain resources and a resiliency adder would provide an additional value stream to incentivize greater adoption of solar and energy storage resources to provide customer and system resilience.

We recommend for the Department's consideration in developing a SMART program resiliency adder recent reports on the economic benefits of customer and grid resiliency and

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16 *See, e.g.*, Executive Office of the President, Economic Benefits of Increasing Electric Grid Resilience to Weather Outages (2013) ("Executive Office of the President"), available at https://www.energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf; New York Pub. Serv. Comm'n, Case No. 13-E-0030, Order Approving Electric, Gas and Steam Rate Plans in Accord with Joint Proposal (Feb. 21, 2014), available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={1714A09D-088F-4343-BF91-8DEA3685A614}.

17 *See, e.g.,* Van Nostrand at 113-114.

18 Clean Peak Straw Proposal at Slide 24.

studies conducted to estimate the value of resiliency on a more granular level. On a broad scale, the U.S. Department of Energy and the President's Council of Economic Advisors examined the economic benefits of grid resiliency in a 2013 report. That report found the annual cost of weather-related outages ranged from $18 billion to $33 billion, with much higher costs in years with major storms.[19] According to the report, grid outages resulted in significant economic losses, including "lost output and wages, spoiled inventory, delayed production, inconvenience, and damage to the electric grid."[20]

Other studies have taken broad economic impact data such as that discussed above and developed methodologies to quantify more granular monetary valuations of reliability and resiliency benefits, or termed another way, the benefit of uninterrupted power supplies. For instance, a recent report titled "Energy Storage: the New Efficiency" includes a white paper from the Applied Economics Clinic ("AEC") providing valuation estimates of the cost per kWh of power outages as a "value of lost load" ("VoLL"). VoLL estimates the costs of supply interruptions for energy customers, in the reliability and resilience context.[21] Among other things, the AEC white paper estimated the non-energy benefits of storage in Massachusetts using Lawrence Berkeley National Laboratory's VoLL estimates for residential customers. A summary table from the AEC white paper estimating costs to customers from lost power is reproduced below.

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19 Executive Office of the President at 23.

20 *Id.* at 24.

21 *See* Clean Energy Group, Energy Storage: The New Efficiency, How States can use Energy Efficiency Funds to Support Battery Storage and Flatten Costly Demand Peaks, Appendix 3, Applied Economics Clinic, Massachusetts Non-Energy Benefits of Battery Storage White Paper (Apr. 2019) ("AEC White Paper") *available at* https://www.cleanegroup.org/wp-content/uploads/energy-storage-the-new-efficiency.pdf.

Table 5: Estimated cost per event, average kW and unserved kWh, residential (2018$)[22]

	Momentary	**30 Minutes**	**1 Hour**	**4 hours**	**8 Hours**	**16 Hours**
Cost Per Event	$4.19	$4.83	$5.47	$10.20	$18.46	$34.77
Cost per Average kW	$2.49	$3.11	$3.54	$6.65	$12.13	$22.75
Cost per Unserved kWh	$33.16	$6.33	$3.54	$1.72	$1.50	$1.40

It is also important to note the AEC white paper's findings regarding health and safety related benefits of resiliency. The paper highlights that more resilient power supplies enable providers of safety and health services—like hospitals or community health centers—to continue to provide services that are highly valuable to society during outages associated with natural disasters, and noted this as "a distinct non-energy benefit that may not be adequately accounted for in VoLL."[23]

The AEC white paper also noted the "additional value of avoided power outages for customers who are elderly, disabled or have serious health conditions and rely on electronic devices are more vulnerable to power outages than the average customer."[24] The paper cited research finding that "in the United States—among the 175 million people covered by employer-

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22 AEC White Paper at 15.

23 *Id.* at 14.

24 *Id.*

sponsored health insurance—approximately 218 per 100,000 people are "electricity dependent residing at home."[25]

Further emphasizing the non-energy health benefits of improved resilience, the AEC white paper cited Massachusetts' investor-owned utilities' obligation "to maintain lists of health critical customers (called "life support customers" in Massachusetts) who cannot have their power shut off, and are prioritized in power restoration efforts, because they are reliant on electrical medical devices, and to be without power would be harmful or life threatening."[26] The adoption of resilient technologies by vulnerable populations would provide critical electricity service during power outages, and potentially life-saving benefits.

We urge the Department to adopt a resiliency adder in the forthcoming SMART program revisions and respectfully submit that the AEC white paper, and other resources cited in that paper, could provide a useful guide for the Department's development of such an adder.

III. Conclusion

The Department's forthcoming formal review of the SMART program should include a review of existing metering requirements and consideration of a resiliency adder. We urge the Department to institute SMART program revisions consistent with the recommendations herein to (1) allow customers to utilize inverter data in lieu of a production meter and (2) adopt a resiliency adder for customers who install solar paired with energy storage systems. Finally, the Department should exercise its authority pursuant to 225 C.M.R. Section 20.00 et seq. such that the Department has sole oversight of SMART program administration in order to, among other matters, ensure that administrative issues are addressed in a timely and efficient manner.

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25 *Id*.
26 *Id*.

Respectfully submitted,

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