March 20, 2019

New Jersey Board of Public Utilities
Office of Clean Energy
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Re: New Jersey Energy Storage Analysis Request for Comments

Clean Energy Group is pleased to submit the following to the New Jersey Board of Public Utilities, Office of Clean Energy in response to its New Jersey Energy Storage Analysis Request for Comments. CEG will be happy to answer any questions related to our comments below and the attached documents. We look forward to continued opportunities to support the state in its energy storage initiative.

1. How might the implementation of renewable electric energy storage systems benefit ratepayers by providing emergency back-up power for essential services, offsetting peak loads, providing frequency regulation and stabilizing the electric distribution system;

Energy storage on both sides of the meter can provide a range of benefits. Applications can often be stacked so that a single renewable-storage system provides multiple benefits both to the customer and to the larger electricity system (the grid). However, this ability to stack applications can be either supported or hindered by market rules and regulations. It is important for states to consider how rules and regulations can best support and optimize the range of benefits storage can provide, especially but not limited to the monetizable benefits. To achieve this, the state needs an overarching storage initiative that requires collaboration between different involved agencies and regulatory bodies, so that rules and regulations work together across various programs and dockets. Please reference attached filings in MA NEM and capacity market dockets, as well as upcoming CEG report on storage in energy efficiency programs.

2. How might the implementation of renewable electric energy storage systems promote the use of electric vehicles in New Jersey, and what might be the potential impact on renewable energy production in New Jersey;

Storage should support the deployment and integration of renewables. Many PV installers are now adding storage to their product lists. Storage is important to add because of the duck curve problem first seen in CA and now appearing in New England as well. The peak shifting ability of storage should be incentivized so that more solar does not cause ramping problems. This can be achieved by a variety of policy tools including performance incentives, TOU rates, demand

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charges etc. but needs to be done with the performance attributes of storage in mind. For example, defining "peak" as all daylight hours is not useful, as this tends to decrease the value of any given "peak" hour to the point where storage is no longer cost-effective. A better alternative is to define "peak" as the top 10% of hours of the year, either based on demand or price. See upcoming CEG report on storage in MA EE plan.

EV use has run into a barrier in the form of high demand charges being levied on EV fast chargers in many areas of the country. This can be addressed by the addition of stationary energy storage at fast charging stations, so that the fast charger load is less peaky. The addition of energy storage at charging stations also confers a resiliency benefit in that EVs can charge when the grid is down. And home batteries, in conjunction with solar, allow EVs to be charged from PV even at night, meaning that homes can use excess PV generation where NEM caps have been reached.

3. What types of energy storage technologies are currently being implemented in New Jersey and elsewhere;

Industry standard is now lithium ion batteries. Lead acid is still out there but not gaining market share. Flow batteries are starting to show up as commercial products but lack real-world track records. In the realm of thermal storage, ice and hot water systems are well-understood technologies that offer real demand-reduction benefits.

4. What might be the benefits and costs to ratepayers, local governments, and electric public utilities associated with the development and implementation of additional energy storage technologies;

See MA State of Charge report, also see upcoming CEG report on storage in EE plans. Cost benefit analysis in both reports shows storage to be cost effective.

5. What might be the optimal amount of energy storage to be added in New Jersey over the next five years in order to provide the maximum benefit to ratepayers;

This will require a study to determine.

6. What might be the optimum points of entry into the electric distribution system for distributed energy resources (DER);

This would require a very granular study. MA did something like this in the State of Charge report, but at quite high cost. An alternate and less costly option is to get this information from the utilities. Or the state can require utility procurement with a minimum requirement for DER and limits to utility ownership (as CA did with its storage procurement mandate) and let the utilities figure out where to incentivize DER.

7. What might be the calculated cost to New Jersey's ratepayers of adding the optimal amount of energy storage;

There are too many variables to answer this, and it would depend on the outcome of a study to determine the optimal amount of energy storage. However, storage costs are declining.

8. What might be the need for integration of DER into the electric distribution system;

Integrating DER into the electric distribution system allows a great deal of flexibility and provides benefits both behind and in front of the meter. See NYS REV proceedings for discussion of storage on the distribution system.

9. How might DER be incorporated into the electric distribution system in the most efficient and cost-effective manner.

The state should encourage competition by incentivizing third party and customer ownership of DER, enabling aggregators to enter markets, limiting utility ownership and ensuring that DER can provide and be fairly compensated for the broadest possible set of benefits. Industry-friendly long-term supports such as rebates and incentives are more useful in growing the market than one-off or time limited supports such as grant programs and bridge funding. NJ should follow the lead of MA and move from grants to incentives, including a storage adder in existing renewables incentive programs, a storage rebate and/or incorporating storage into the state's energy efficiency fund to enable peak demand shifting. See CEG's upcoming report on energy storage in EE programs, also MA SMART solar docket.

10. In the context of the ESA, what might be the definition of Energy Storage?

The general definition is any technology capable of absorbing, storing and discharging energy at a later time.

11. What discharge time duration could be applied to the State goals of 600 MW of energy storage by 2021 and 2,000 MW of energy storage by 2030? Four hours? Ten hours? Other?

The question should be how will the state define "peak" with regard to peak-shifting policies such as a clean peak standard or other peak demand reduction goals. "Peak" should be defined relatively narrowly, for example, as the top 10% of the hours in a year, either by price or by demand, with discharge requirements limited to 4 hours maximum (three or fewer hours is preferable).

12. What storage systems should be counted towards the achievement of the State's goal? Existing systems? Those systems placed into operation after the May 23, 2018 enactment date of the statute?

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Those systems placed into operation after the May 23, 2018 enactment date of the statute.

13. How might Federal Energy Regulatory Commission's (FERC) Order 8412 and the associated PJM compliance filing3 affect the foregoing?

There are many ways in which PJM's compliance will affect the ability of energy storage to come to scale in New Jersey. For example, ISO-New England defines peak as a 2-hour duration period, while PJM defines it as a 10-hour duration period. The PJM definition is overly broad and not helpful given the operational attributes of energy storage. Also, defining so many hours as "peak" hours means that the value of reducing any given peak hour load is small. FERC's order should open markets and level the playing field, but individual ISO compliance is where the real change has to happen. States should communicate to PJM about market rules that need to change in order to support the growth of DER markets. Also, states should take market opportunities and barriers into account when designing incentive programs for DER.

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