Bloomenergy™

September 16, 2019

The Energy Master Plan Committee
New Jersey Board of Public Utilities
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Re: State Energy Master Plan Comments

Dear Master Plan Committee:

Please accept the following comments of Bloom Energy Corporation ("Bloom Energy") regarding the 2019 Draft New Jersey State Energy Master Plan ("EMP"). Bloom Energy is a manufacturer of solid oxide fuel cell systems that produce on-site power for many of the world's most demanding customers. The Bloom "Energy Server" fuel cell generates electricity through an electrochemical process without combustion and therefore does not produce the local forms of "criteria" air pollutants associated with combustion technologies or consume or discharge water. Bloom Energy Servers are designed in a modular fault-tolerant format that provides mission critical reliability with no downtime for maintenance. Bloom Energy systems have been proven resilient through disruptive events including hurricanes, earthquakes, utility outages, physical damage, and fire damage.

Bloom Energy has installed over 350MW of its solid oxide fuel cell systems for customers in eleven U.S. states as well as in Japan, South Korea, and India. A growing percentage of Bloom Energy's business is focused on grid-islanding and micro-grid projects that are designed to operate indefinitely in the event of an outage of the electric grid.

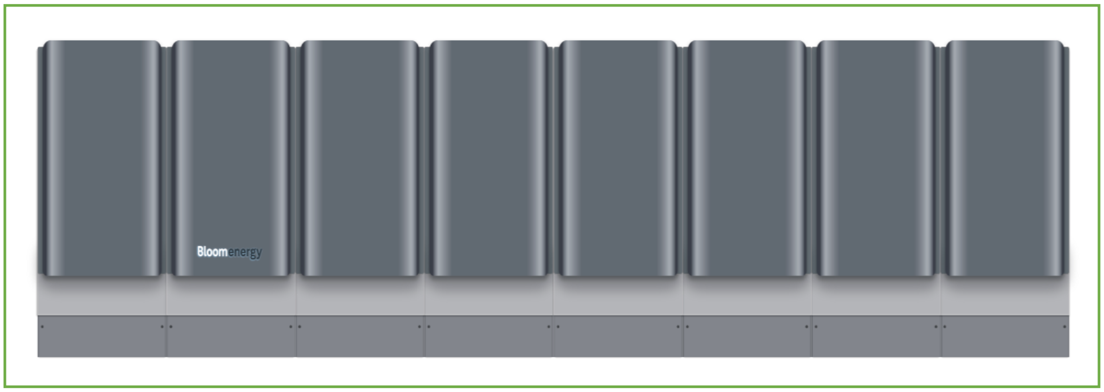

Figure 1- Bloom Energy Server

Bloom Energy's comments on the draft EMP are focused on:

(1) the need to make immediate emissions reductions as opposed to principally relying upon on longer term objectives,
(2) the ability to achieve immediate emission reductions and increased community resiliency through deployment of resilient distributed generation and microgrids,
(3) The potential for utility-owned or utility-directed distributed generation to advance the objectives of the EMP.

I. Immediate emission reductions

Bloom Energy supports Governor Murphy's goal of 100% clean energy by 2050 and the Global Warming Response Act greenhouse gas emission reduction targets of 80% below 2006 levels by 2050. However, these longer term objectives should not divert attention from the need to achieve immediate emission reductions while also ensuring resiliency for critical customers and the electric grid. The urgency of our changing climate requires that GHG reducing technologies be deployed as quickly as possible and that policy actions focus on proven emission reduction and resiliency capabilities rather than technology selection. Driven in part by climate change, weather related outages of the electric grid are up eighty percent over the last fifteen years – and over ninety percent of the electric outages in the United States are a function of failures of the distribution system.

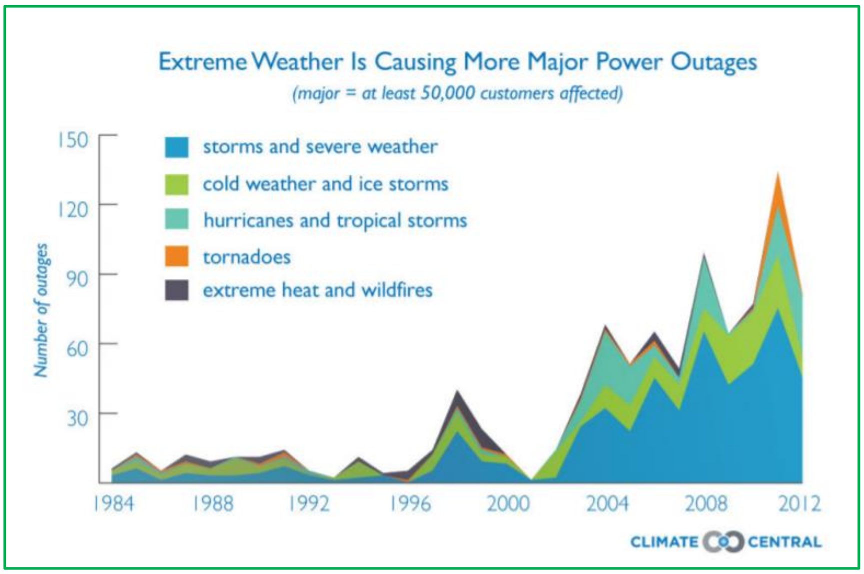

Figure 2 - Weather Related Power Outages
http://assets.climatecentral.org/pdfs/PowerOutages.pdf

The climate crisis is happening faster than even the most aggressive projections had predicted it would. According to the National Oceanic and Atmospheric Administration the four warmest years on record were the last four years.[1] Indeed, a recent Washington Post analysis found that New Jersey — which suffered unprecedented damage during Superstorm Sandy in 2012 — was one of the

[1] https://www.ncdc.noaa.gov/sotc/global/201713.

fastest-warming states in the nation.[2] In light of these developments New Jersey cannot afford to pursue only longer term plans to reduce emissions and increase resiliency.

Instead, the EMP should include an "Immediate Phase" focused on measures that can achieve a combination of rapid emission reductions and increased energy security in anticipation of unstable future weather patterns. The Immediate Phase should be comprised of those measures that science and data say can most effectively and rapidly reduce emissions and increase resiliency during the near term time frame while large scale renewables are being built out. In short, the EMP should address both the *causes* (increased concentrations of CO2 in the atmosphere) and the *consequences* (increasingly severe weather) of climate change.

One of the most effective ways to achieve immediate term emission reductions is through increased efficiency, including efficiency of the power generation that supplies the grid with electricity. The desire to reduce dependence upon fossil fuels should not impede the use of the most efficient generators to displace less efficient marginal fossil fueled generation. Simply put, displacing less efficient marginal generation with more efficient generation is one of the most effective ways to reduce fossil fuel use and achieve a combination of near term emission reductions and increased resiliency. A high efficiency natural gas powered fuel cell reduces greenhouse gases and other forms of air pollution in the same way that a wind or solar renewable generator does – by displacing dirtier power plants – and it can do so around the clock while simultaneously isolating customers from

[2] https://www.washingtonpost.com/graphics/2019/national/climate-environment/climate-change-america/?noredirect=on.

outages of the electric grid. The EMP should not be about renewables *versus* smarter and more efficient fossil fuel use, it should be about maximizing renewables *plus* smarter and more efficient fossil fuel use in the meantime.

A fundamental distinction between grid connected clean energy projects and distributed behind the meter clean energy projects is that grid connected projects are required to disconnect or cease operating during an outage of the electric grid. Therefore, an energy policy that is focused *exclusively* on grid connected projects is an energy policy that *requires* projects developed pursuant to that policy to be unavailable in the event of a widespread grid outage, irrespective of whether that outage is due to a cyber-attack, extreme weather, or some other unforeseen event. The EMP process presents an opportunity for New Jersey to adjust course and stake out a leadership role on the increased use of distributed generation as a means to achieve immediate term reductions of greenhouse gases and other pollutants while simultaneously increasing resiliency for customers and the communities in which they live.

II. Distributed Generation and Microgrids

There are multiple areas in which New Jersey energy policies currently inhibit the growth of resilient distributed generation and microgrids.

First, unlike in neighboring states, New Jersey utilities claim that BPU approved tariffs prohibit the deployment of multiple technologies behind a customer meter wherever one technology is entitled to net meter and others are not. This means that a very common form of microgrid (solar + storage + Fuel Cell/CHP), which is increasingly common in other jurisdictions, is effectively banned in New Jersey.

New Jersey utilities have even refused to interconnect fuel cells when the customer already has a net metered resource behind the meter, even though the fuel cell does not seek, and would not receive, net metering rate treatment. As a result, numerous microgrid projects at key economic and community hubs in New Jersey are precluded from developing a microgrid.

Unfortunately, intermittent DERs, even when paired with batteries, cannot support a microgrid for a prolonged outage without the assistance of some form of fossil fueled generation. A fuel cell can deliver baseload power in both normal operation and island mode while integrating with other on-site generation sources, like solar and batteries, in order to provide uninterruptible power and enable a microgrid to operate indefinitely during an extended grid outage. The BPU should quickly dispense with this issue by clarifying that New Jersey EDCs are permitted to use a net generator output metering arrangement that differentiates between the sources of generation within a resilient behind the meter project or microgrid.

Second, the state's microgrid program has to date consisted largely of feasibility studies rather than the deployment of actual micro-grid projects themselves. The EMP process should include a careful review of the actual progress, or lack of progress, achieved by the NJ BPU microgrid program over the years since its inception. To the extent that the program is not achieving the development of actual installed and functioning microgrids the EMP should direct specific action to correct that record in advance of future weather events and/or cyber-attacks. The most obvious measure would be to direct a sufficient level of funding to the program to enable the actual development of operating microgrids.

Third, the Board should expand incentives for microgrids beyond traditionally defined critical infrastructure and artificial distinctions such as "town centers." Many of the state's most critical facilities and those that would provide important public services during an outage of the electric grid (e.g. telecommunications facilities, supermarkets, large retail stores, etc.) do not appear to be covered by the current microgrid program. It is essential that the Board's distributed generation programs encourage increased deployment of reliable, on-site power that is capable of isolating critical facilities – both public and private – from the effects of the rapidly increasing number of weather-related outages. To enhance the resilience of New Jersey communities, the Board should expand the microgrid program to include not only traditional critical facilities such as shelters, government buildings, and "town centers" but also private facilities that serve important public services like telecommunications hubs, supermarkets, large retail stores, and data centers.

Fourth, the Board should implement a revenue decoupling mechanism designed to sever the link between the utility's sales and revenue. A decoupling mechanism would remove the disincentive to promote conservation, energy efficiency, and customer-sited DERs that the utilities face because of their current rate design. Under decoupling, utilities would recover their costs through rates designed on a revenue per-customer basis, rather than on the basis of revenue per-kWh sold. Decoupling mechanisms balance the interests of utilities and customers because they compare the utility's allowed revenue to its actual revenue during a billing month, places the difference in a deferral account, and recovers or refunds the balance through a periodic rate adjustment. By removing the utilities' disincentive to promote conservation and energy efficiency, decoupling helps align the interests of the utility, its customers, clean technologies, and the state.

Fifth, fuel cells are currently limited to a small subset of the BPU distributed generation incentive program. This limitation should be removed and fuel cells should be given more attention as a mechanism to reduce emissions from the fossil sector and enhance resiliency without making a long term commitment to fossil fuels. There is a fundamental difference between a large fossil fueled combustion power plant and a distributed non-combustion solid oxide fuel cell. The combustion plant locks in its initial technology for the duration of the project, likely 30 or 50 years. On the other hand, a solid oxide fuel cell can be constantly upgraded over time to incorporate new capabilities during the life of the project. The fuel cell can deliver its electricity to an end-user during outages of the distribution system *and* avoid the need for diesel back-up generators.[3] The distributed fuel cell will avoid line losses and essentially eliminate emissions of criteria air pollutants. The fuel cell can very efficiently charge electric vehicles with its native DC output. The fuel cell can be re-located if the needs of a customer or the distribution system change over time. Finally, a fuel cell installed *today* can, with minor modifications, accommodate new fuels in the future - including both renewable gas ("biogas") and renewable-derived hydrogen.

There is great value in a platform that can accommodate future technological advances. Fifteen years ago, the iPhone did not exist. Thirty years ago, the world-wide-web did not exist. Technological change is happening faster every day, and in this environment, it is especially important not to pick specific winners and

[3] It is an underappreciated fact that all grid dependent strategies, including 100% large scale renewables, almost always involve the use of diesel back-up generators. Diesel back-up generators operate not only during blackouts, but are also tested regularly throughout the year.

losers and to instead set objectives and allow new technologies to evolve to achieve those objectives.[4]

III. Utility Owned/Directed Distributed Generation

The EMP process should also consider and seek to replicate innovative new policies that have proven successful in other jurisdictions. One of the most prominent of these is the Brooklyn Queens Demand Management (BQDM) Initiative recently undertaken by Consolidated Edison of New York (Con Ed). In 2014, as the economy rebounded in Brooklyn and Queens, the electrical load was surging and would soon surpass the capabilities of the local distribution network. Con Ed estimated that its network would be overloaded by 52 megawatts by 2018 and that the cost of upgrading the network using the traditional "poles and wires" utility model would exceed $1.2 billion dollars.

Both the utility and the New York PSC agreed that there was a less expensive way to serve Con Ed's customers. Instead of asking ratepayers to cover the costs for a traditional utility infrastructure approach, Con Ed provided targeted incentives for 52 megawatts of energy efficiency and distributed energy resources and successfully avoided the system capacity upgrades - for a cost of just $200 million.

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[4] The term "fossil fuel infrastructure" should not be viewed as a monolithic sector. There are wide variations in efficiency, emission rates, flexibility, and capabilities. The EMP should focus future fossil fuel infrastructure efforts on the lowest emitting "soft" infrastructure options that are capable of evolving to incorporate new capabilities and/or moving to different locations instead of "hard" infrastructure options that commit for the long term to a present location and set of capabilities that may be outdated within the project life.

The BQDM program demonstrates that ratepayer, utility shareholder, public safety, customer, and community interests can all be unified in a way that benefits every stakeholder. Absent the forward thinking BQDM program, Con Ed ratepayers would have been required to foot the bill for the traditional utility solution. Instead, ratepayers were protected from unnecessary expense while utility shareholders and executives were comfortable with the "rate base and regulated return on investment" business model to which they are accustomed. The citizens of Brooklyn and Queens did not experience the brownouts and blackouts that had been predicted and emissions and other environmental impacts were reduced as compared to the traditional utility solution. Importantly, the program turned the assumption that emission reductions have to *cost* money on its head – instead emission reductions were achieved at a *savings* of nearly $1 billion.

The EMP process should include a review of the Con Ed BQDM program and an exploration of whether similar emission reductions can be achieved at negative cost to ratepayers in New Jersey. This could involve utility-directed customer side deployments like the BQDM approach or it could involve utility-owned projects where those projects are used for a distribution system purpose and can be shown to reduce costs for all ratepayers and/or the projects increase resiliency for important community assets.

IV. Specific Recommendations for Inclusion in the EMP

Issue or Policy	Status Quo	EMP Recommendation
Interconnection	Fuel cells/CHP are unable to co-locate with solar in NJ due to policies that appear to prohibit the deployment of a net metering technology and a non-net metering technology behind a single customer meter.	BPU should clarify that EDCs are allowed to use a net generator output meter that differentiates between the electricity generated by each technology.
Microgrid Program	The NJ microgrid program has to date consisted mainly of feasibility studies.	The EMP Committee should recommend a well-funded and effectively managed microgrid program that results in rapid deployment of microgrids.
Incentive Eligibility	Fuel Cells without heat recovery are limited to a very small subset within the BPU's CHP/FC incentive program.	BPU should remove the artificial limit on fuel cells and expand its programs for resilient behind the meter generation on a technology neutral basis.
RDM/Utility Energy Efficiency Programs	New Jersey utilities operate under a traditional "cost-of-service" rate design that premises utility profits on selling more energy. This regulatory framework provides a "throughput incentive" to the utilities to	The Board should implement a revenue decoupling mechanism to sever the link between a utility's sales and revenue. By removing the utility's disincentive to promote conservation and energy efficiency,

	increase sales and resist efforts that would decrease sales, which directly conflicts with state goals to conserve energy, reduce peak demand, and transition to a clean energy future.	decoupling helps align the interests of the utility, its customers, clean technologies, and the state.
Criteria Pollutants	BPU programs do not take into account or provide value for avoided local air pollution.	The State should include avoided criteria air pollutants as a principal consideration in its Clean Energy Programs. As it stands these forms of air pollution are not considered for purposes of funding or project selection. This has resulted in a predictable bias in favor of higher emitting technologies. In light of the increased penetration of distributed generation, especially in urban areas, it is especially important to begin taking criteria pollutants into account.
Diesel Generators	100% renewable strategies almost always involve the use of diesel back-up generation. Diesel back up generation operates more often than commonly believed and can contribute to higher NOx emissions and Particulate Matter "hotspots" in urban environments.	Those technologies or configurations that can obviate the need for diesel back-up generation should be credited for that displacement during both program development and project reviews.

Bloom Energy very much appreciates the opportunity to provide input towards the development of the 2019 Energy Master Plan and we look forward to continuing to participate in this important process.

Very truly yours,

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