

February 3, 2018

Via Electronic Mail

Lcda. María del Mar Cintrón Alvarado  
Secretary  
Comisión de Energía de Puerto Rico  
268 Muñoz Rivera Avenue  
Seaborne Building Plaza (Old World Plaza Building)  
Plaza Level, Ste. 202  
San Juan, PR 00918

Re: Case Num. CEPR-IN-2018-0001 Regulation on Microgrid Development  
Comments of Bloom Energy Corporation

Dear Secretary Cintrón Alvarado:

Bloom Energy Corporation (“Bloom Energy”) hereby respectfully submits its Comments in response to the Commission’s proposed Regulation on Microgrid Development in the above-captioned proceeding on January 4, 2018 (“Proposed Rules”).

**Introduction**

Bloom Energy is a provider of a breakthrough all-electric solid oxide fuel cell technology that produces reliable power using a highly resilient and environmentally superior non-combustion process. Bloom Energy Servers have continued safe, reliable operation through hurricanes, earthquakes, and other natural disasters. Bloom's modular building block architecture is fault tolerant, helping to ensure the highest levels of power availability, and researchers at the University of Illinois Urbana Champagne determined that Bloom Energy Servers can achieve reliability as high as 99.999% when installed in Mission Critical configuration<sup>1</sup>.

---

<sup>1</sup> Dominguez-Garcia, A., Gross, G. & Krein, P. Analysis of Design Alternatives for Supplying Electric Power to Mission-Critical Loads in Data Centers: Reliability, Environmental, and Efficiency Aspects. Urbana, IL: Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign.

Bloom Energy Servers efficiently convert fuel into electricity through an electrochemical process without combustion. Bloom Energy Servers can generate electricity at efficiencies greater than 60%, leading to CO<sub>2</sub> reductions of as much as 58% compared to the grid in Puerto Rico<sup>2</sup>. By virtue of the non-combustion process, Bloom Energy Servers virtually eliminate emissions of criteria air pollutants including NO<sub>x</sub>, SO<sub>x</sub>, CO, VOCs, and particulate matter that are associated with combustion. The combination of a high efficiency non-combustion process and extremely high capacity factors results in more emissions avoided over time than other forms of micro-grid power generation.

Bloom's all-electric solution allows fuel cell systems to be deployed at sites where it is not necessary to match an on-site thermal load. Hence, any facility can benefit from reliable on-site distributed generation, not just those with a matching onsite thermal load.

It is critically important that Puerto Rico avoid limiting the potential solutions to its energy problems by specifying certain eligible technologies while excluding the most advanced forms of micro-grid power generation available today. Puerto Rico's regulations for microgrid development should be sure to include the most reliable, most efficient fuel cell technology that is being commercially deployed in microgrids in other parts of the world.

### **Bloom Energy Micro-grid Experience**

Bloom Energy is an industry-leading provider of microgrid solutions with over 38 MW of microgrids in operation around the world. Bloom Energy's experience with microgrid projects ranges from multi-MW hospitals and datacenters with some of the highest power quality requirements in the world to big box retail stores like Walmart & The Home Depot, which have a proven track record as vital community resources when recovering from hurricanes and winter storms.

Bloom Energy Servers have continued safe, reliable operation through numerous natural disasters including hurricanes, earthquakes, wildfires, and winter storms. In October 2012, the eye of Superstorm Sandy passed over Bloom Energy's installation in Brookside, Delaware; in October 2017, Bloom Energy Servers in Japan were subjected to 80 mph (130 km/h) winds in Super-Typhoon Lan; and in August 2014,

---

<sup>2</sup> Based on U.S. Energy Information Agency emissions factor for U.S. Territories.

[http://cloud.agroclimate.org/tools/deprecated/carbonFootprint/references/Electricity\\_emission\\_factor.pdf](http://cloud.agroclimate.org/tools/deprecated/carbonFootprint/references/Electricity_emission_factor.pdf)

Bloom Energy Servers were struck by a magnitude 6.0 earthquake in Napa, California. Each of these systems continued normal operations without a fault.

### **Technology Neutrality**

The Commission should avoid any approach that lists specific technologies that exclude all-electric fuel cells and instead either (a) list the capabilities and performance characteristics that will achieve Puerto Rico's energy and resiliency objectives, or (b) specifically add fuel cells to the list of supported technologies. For instance, if the Commission is interested in achieving greater efficiency it could specify a minimum efficiency requirement rather than specifying a technology or means to achieve that efficiency. The draft regulations appear to make combined heat and power (CHP) eligible and to exclude all-electric fuel cells without recognizing that CHP is less efficient and less reliable than all-electric fuel cells in the vast majority of situations.

### **Recommended Changes to Proposed Rules**

The Proposed Rules as written would preclude all-electric fuel cells running on natural gas from providing microgrid services in the Commonwealth. Bloom Energy Servers consistently and reliably produce clean electricity that significantly reduces CO<sub>2</sub> emissions while virtually eliminating local forms of air pollution.<sup>3</sup> Allowing all-electric fuel cells as a primary power source for a microgrid would enable the most reliable, most efficient generation technology to serve as the backbone for microgrids in Puerto Rico and enable more of the island's population to benefit from microgrid development by removing the need to find a matching thermal load. Fuel Cells also provide the additional benefit of completely avoiding the most harmful emissions to human health—particulate matter, VOCs, SO<sub>2</sub>, and NO<sub>x</sub>. In fact, fuel cells are defined as "Alternative Renewable Energy" in Puerto Rican statute because of these benefits.

The Commission should therefore amend the section titled "Combined Heat-and-Power Microgrids" (Section 3.03) to be "Clean, Efficient Generation Microgrids" or "Combined Heat-and-Power and Fuel Cell Microgrids".

---

<sup>3</sup> Combustion CHP can be expected to produce NO<sub>x</sub> emissions at a rate of 1.6 lbs/MWhr or more—at least 160 times more NO<sub>x</sub> emissions than an all-electric fuel cell.

Section 3.03 and 3.04 of the Proposed Rules should be amended as follows:

### **Section 3.03.- Combined Heat-and-Power or Fuel Cell Microgrids**

- A. “Combined heat-and-power” (CHP) microgrids have the following qualifications:
1. The useful thermal energy output of the system must be no less than fifty percent (50%) of the total energy output during the 12-month period beginning with the date the facility first produces electric energy, and any calendar year subsequent to the year in which the facility first produces electric energy.
  2. The fuel input, minus the useful thermal energy output, shall be no more than 7,000 Btu per kWh of generator output, averaged over the 12-month period beginning with the date the facility first produces electric energy, and any calendar year subsequent to the year in which the facility first produces electric energy.

B. “Fuel Cell” microgrids have the following qualifications:

1. The fuel input shall be no more than 7,000 Btu per kWh of generator output, averaged over the 12-month period beginning with the date the facility first produces electric energy, and any calendar year subsequent to the year in which the facility first produces electric energy.

B-C. CHP microgrids must demonstrate compliance with the qualifications in part (A) of this section, and Fuel Cell microgrids must demonstrate compliance with the qualification in part (B) of this section. The acceptable forms of demonstration vary by system classification and are described in the relevant Articles below.

C-D. Any microgrid registered as “CHP” that is found by the Commission to be noncompliant with the qualifications in part (A) of this Section, may be subject to a Notice of Non-Compliance pursuant to Chapter IV of Regulation 8543 and may, as a result of such non-compliance, lose its status as a licensed microgrid system or be subject to any other administrative sanction or penalty deemed appropriate by the Commission.

### **Section 3.04.- Hybrid Microgrids**

- A. Each hybrid system must show that the renewable portion of its generation capacity will comply with the requirements in Section 3.02 and that the combined heat-and-power or fuel cell portion of its generation capacity will comply with the requirements in Section 3.03 of this Regulation.

- B. Each hybrid microgrid application must explain how the renewable, CHP or fuel cell, and any storage and backup capacity will operate and show that the operation complies with the requirements and the qualification procedures described in Sections 3.02 and 3.03 of this Regulation.

References to CHP microgrids in Articles 4-9 of the Proposed Rules should also be updated to reflect the inclusion of fuel cells.

If the Commission believes it is more expedient, a separate microgrid definition for all electric fuel cells that operate with a heat rate of no greater than 7,000 Btu/kWh without a matching thermal load could be created with the same effect.

### **Conclusion**

Bloom Energy Servers can provide a more reliable, cleaner energy solution for Puerto Rico and can exceed the heat rate requirements in the Proposed Rules. All electric fuel cells should be eligible to register as microgrids so that Puerto Ricans have as many reliable, resilient microgrid options at their disposal.

Very truly yours,

/S/

Josh Richman  
Vice President, Business Development & Regulatory Affairs  
Bloom Energy Corporation  
1299 Orleans Dr.  
Sunnyvale, CA 94089  
[Josh.Richman@bloomenergy.com](mailto:Josh.Richman@bloomenergy.com)  
[www.bloomenergy.com](http://www.bloomenergy.com)