

February 2, 2018

José H. Román Morales
Associate Commissioner & Interim President
Puerto Rico Energy Commission
Seaborne Building
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Plaza Level Suite 202
Hato Rey, PR 00918

Mr. José H. Román Morales:

We are pleased to provide our comments on the draft regulation for microgrids. While this is a challenging time for the people of Puerto Rico, we believe that with a few clarifications and corrections, these regulations will provide a firm foundation for microgrid development and business model innovation, which will allow Puerto Rico to achieve a modern energy system that is based on clean and renewable energy and resilient to future storms. This modern energy system will promote broad economic development across many of Puerto Rico's key industries, and further enhance the island's recovery from Hurricanes Irma and Maria.

We respectfully submit the following comments for the commission's consideration.

Sincerely,
Tesla, Inc.

1. Definitions and Scope of the Regulation

- Microgrid definition (1.08.B.25 & 3.01) - We suggest refining the definition to include off-grid microgrids that are not intended to connect to PREPA's grid.
- Please confirm that the scope of the regulation does not include third-party owned systems that serve a single customer; for example, behind the meter facilities where the single customer enters into a PPA contract with the system owner.
- We recommend expanding small microgrid definition (Section 2.01.C.2) to at least twenty (20) customers and at least 500kW of total generating capacity. We recommend considering the following in determining the optimal category size:
 1. reporting costs for 'large cooperative systems' could be onerous for systems below 20 customers and 500kW,
 2. with less than 20 customers, the usage pattern of a single customer may have significant impacts on the system's ability to achieve the 75% Renewable Energy threshold.
- There is currently no link between the definition of Small and Large microgrid systems (Section 2.01) and the definition of Small and Large Cooperative Systems. We recommend including an explicit reference for clarity.
- Please consider revising the definition of Hybrid Microgrids (Section 3.04) to be less restrictive. Under the current regulation, for a CHP microgrid, "the useful thermal energy output of the system must be no less than fifty percent (50%) of the total energy output", and a Renewable Microgrid requires "Seventy-five percent (75%) of the total energy input of the system (in MWh) on an annual basis must be from a renewable energy resource(s)". Since PV does not produce thermal energy as a byproduct, it would not be mathematically possible to achieve a PV-led hybrid microgrid. We recommend reducing the requirements to 60% renewable...40% CHP
- We recommend removing Fuel Cells from the the definition of "Alternative Renewable Energy" as it applies to this regulation, because Fuel cells are a generator type and not a fuel type.

2. Commercial Considerations

- We recommend using a cost-benefit analysis in determining the maximum rate that can be charged to microgrid customers, instead of using the average PREPA rate. For example, the cost-benefit analysis for a remote community could be based off of the distribution replacement and maintenance cost over a twenty (20) year period. By definition, many of the customers who will be served by microgrids will also be among the most expensive for PREPA to serve, making the average PREPA rate an inaccurate benchmark.
- Please clarify that the 75% renewable requirement applies for each year (Section 3.02.A.2.a), as has been done for the thermal percent requirement for CHP Microgrids (Section 3.03.A.1).
- Please clarify whether the fee paid to PREPA (Section 5.05) includes PREPA's cost to segregate the microgrid portion of the distribution system, or if that cost falls on the microgrid owner. In

the latter case, the regulation should set some limit on these costs as it could otherwise be unbound.

- PREPA interconnection requirements should be defined or the regulation should provide sufficient criteria to ensure that interconnection costs are not prohibitive.
- Please identify the agency that will review annual reports and enforce compliance with the regulation.
- Please clarify whether PREPA is or is not required to serve a microgrid customer who terminates their microgrid service (Section 6.11.C).
- We recommend that the commission clarifies that the ‘reasonable exit fee’ will ensure financial viability for the microgrid owner in the event of a customer’s service termination.

3. Technical Considerations

- We recommend clarifying “total energy input” (3.02.A.2.a & 3.02.A.4) in order to avoid ambiguity in interpretation of scenarios likely to be encountered in microgrid deployments:
 1. We suggest defining as ‘total energy input’ as ‘kWh of electricity delivered to loads’
 2. Please confirm that energy value used for determining energy input from fossil fuel is the total heat content (as defined in Table G1 of U.S. Energy Information Administration Annual Energy Outlook), such that the heat rate of a fossil fuel generator is not considered when determining the energy input from fossil fuel. This is consistent with the calculation in Appendix B.
 3. Please clarify how to treat PV curtailment due to export limitation and/or battery charge limits. Given this this curtailment occurs on the DC side of the PV inverter, any curtailed PV production will not be registered on meters.
 4. Please clarify treatment of parasitic losses in battery. We suggest treatment of parasitic loss as an additional system load.
 5. Please clarify how net metering to the grid is treated for the purposes of calculating renewable and non-renewable contributions to a grid-connected microgrid.
- The monthly diesel fuel consumption limit for Diesel Generators of 12.5 gallons of diesel fuel per month per kilowatt of photovoltaic capacity” (5.03.A.3 & 6.04.A.3) appears to represent a different approach from the formula used to assess the performance of oil and natural gas generators. We recommend comparing the monthly fuel consumption to ‘monthly site load in kWh’ instead, as this allows a more direct comparison to the percent of load served by the diesel generator.
 1. Making some assumptions regarding typical solar insolation and diesel generator efficiency, 1 kW PV would produce approximately 135 kWh/mo and 12.5 gal diesel would generate approximately 160 kWh/mo. Assuming no PV curtailment, this would correspond to an electrical contribution (as measured in kWh) from renewables of less than 50%.

2. Please clarify whether “photovoltaic capacity” should be interpreted as the combined DC capacity of the photovoltaic modules or the combined AC capacity of the photovoltaic inverters. If AC capacity is to be used, please clarify how this interpretation is impacted if the battery storage and photovoltaic modules are DC-coupled behind the same inverter.
 3. Given that this formula ties the allowable fuel consumption to installed capacity of the photovoltaic system rather than the actual energy output of that system, it may remove the regulatory incentive for operators to maintain the photovoltaic system in good working order.
- Oil & NG Generators
 1. Please confirm that “oil” does not include diesel in the context of this regulation. Listing diesel in “Conversion Factors Table” of Appendix B may cause confusion.
 2. The phrase limiting fossil fuel consumption to “the minimum amounts of fuel required to alleviate or prevent outages of electrical service to microgrid customers” is more severe wording than the 25% value used in other parts of the regulation. Please clarify which limitation would govern if they were to conflict.
 - Photovoltaics in a Hybrid microgrid
 1. Please clarify CHP definition of “useful thermal energy output” to avoid ambiguity in interpretation.
 - Microgrids must “maintain monthly records of fuel consumption, and submit an annual fuel consumption report”
 1. Given that fuel consumption by a diesel generator can be difficult to meter due to the design of fuel recirculation, we suggest that records of fuel deliveries be allowed to determine diesel consumption.
 - Codes/ Standards
 1. Please clarify that revisions to codes and standards will take effect once adopted by the appropriate regulatory authority. We suggest clarifying that successor codes or standards must be adopted by the appropriate regulatory authority in order to take effect.
 2. We suggest addition of phrase “as applicable” in recognition of the fact that some regulations are only applicable when a system is connected to the utility grid.