Government of Puerto Rico
Puerto Rico Energy Commission

IN RE: Regulation on Microgrid Development	**Case No.** CEPR-MI-2018-0001

Comments of Sierra Club of Puerto Rico on the Proposed Regulation on Microgrid Development

I. Introduction

Sierra Club of Puerto Rico applauds the initiative of the Puerto Rico Energy Commission ("Commission") to explore the regulation of microgrids in Puerto Rico. This is a groundbreaking and innovative opportunity to address, in part, the condition of the electric system of the Puerto Rico Electric and Power Authority ("PREPA"), improve resiliency, and accelerate electric sector innovation in both Puerto Rico and beyond. Thank you for this opportunity to comment on, and seek to improve, the Proposed Regulation on Microgrid Development ("Proposed Regulation") to facilitate a robust environment for the development and expansion of local generation and ensure that this regulation does not inadvertently undermine either the regulatory duties of the Commission or the intent of the relevant Puerto Rico statutes in improving the performance and outcomes of the island's electric sector. We appreciate the leadership of the Commission on this issue, as we believe a strong and independent commission that looks to the future is in the best interests of Puerto Rico.

Sierra Club of Puerto Rico recognizes that there are few, if any, existing robust structures upon which to rely when formulating regulations for the formation and governance of microgrids. We believe that the silver lining to the destruction caused by Hurricanes Irma and Maria is that Puerto Rico can be a leader across the hemisphere in the creation and regulation of a 100 percent clean and renewable electric system, with microgrids as a key component. The intent of our comments are to ensure that the Proposed Regulation does not inadvertently leave out critical oversight requirements, facilitate regulatory loopholes, or result in customer inequities without recourse.

II. Value Proposition and Principles for Microgrids in Puerto Rico

The inability of PREPA to provide safe, clean, reliable, and affordable energy to the people of Puerto Rico has highlighted the need for alternative energy options. The devastation of Hurricane Maria has left Puerto Rico at a unique crossroads, with the opportunity to rebuild more robust and resilient structures, exert non-centralized control over energy control, and reduce the island's reliance on imported fossil fuels. Microgrids, or local generation and load grid structures interconnected to the larger grid by a controllable access point, and possessing the ability to operate independently of the larger grid, offer the opportunity for Puerto Rico to accomplish multiple goals at once: advance the technology serving Puerto Ricans, exert local control over energy sources and reliability, and isolate critical infrastructure from larger grid failures.

Today, many months after the devastation of the two hurricanes, communities across Puerto Rico are still without electric power. Even after local structures and distributions are repaired, many of these communities are dependent on the rebuilding of distribution and transmission lines many miles away. A microgrid system of electricity delivery would make these communities much less vulnerable to being completely cut off from electric power because of system failures a long distance away caused by storm events.

However, while microgrids represent a decentralization of the grid construct and should be encouraged to innovate, they should not become an avenue to escape critical oversight of safety, environmental compliance, reliability, affordability, and equity. Our comments below highlight key areas in which the Commission's Proposed Regulation could be strengthened to allow for innovation and scalability while still ensuring that basic principles of regulation are adhered to.

Sierra Club of Puerto Rico believes there are minimum guidelines for the regulation of microgrids that must be reflected in the crafting and execution of the Proposed Regulation:

- **Microgrids should not be used as a mechanism to escape the regulatory compact.** Microgrids, even those granted substantial autonomy, still serve energy to captive customers. Puerto Rico and federal laws were established to help protect ratepayers against abuses or neglect. The microgrid structure should not be used to justify a lack of oversight.

- **Microgrids must pose a benefit for each customer covered under the microgrid structure.** While much of the Proposed Regulation envisions small individual or community microgrids, the Proposed Regulation clearly allows for the creation of larger municipal or third-party microgrids that capture ratepayers inside an electrical region. Ratepayers that join or are joined to a microgrid must not see a degradation of service, higher rates or bills through reclassification, or onerous new terms of service.

- **Microgrids must not create ratepayer inequities.** Utilities are required to provide reliable service at fair, just and reasonable rates. These same principles must be applied to microgrids.

- **Microgrids should not create additional burdens for non-microgrid customers.** The creation of microgrids should leave all other customers neutral or better off from a financial and reliability perspective. Microgrids should not impose additional costs or degrade the service of other customers. Non-microgrid users should not subsidize microgrid users, indirectly or otherwise.

- **Microgrids should not be used as a mechanism to bypass environmental requirements.** Puerto Rico's renewable portfolio standard and other environmental regulations should not be undermined through the creation of microgrid entities. Regulations should set a strong preference for generation technologies like solar photovoltaics and rechargeable batteries over technologies like diesel and incineration, which create air pollution and public health impacts in communities and keep the island dependent on fossil fuels.

- **Microgrids should not be used as a mechanism to bypass debt obligations.** If PREPA's transition charge remains, the formulation of a microgrid should not be used to reduce pre-existing exposure to wires charges.

- **Standard contract terms should be formulated for interactions with PREPA.** As long as they are connected to PREPA's grid, microgrids will likely purchase and sell energy, capacity, and other services to PREPA. The formulation of standard rates or contract terms will allow microgrid developers to have financial confidence.

III. The Energy Commission Must Exercise Strong Regulatory Oversight for Microgrids

The Proposed Regulation must clearly define the Commission's regulatory and oversight responsibilities with respect to the general legal framework for microgrids, and in specific areas where it has shared authority with PREPA, as explained in detail below.

The Commission Must Assess and Approve or Deny Microgrid Proposals in Light of its Statutory Authority

The Proposed Regulation sets forth various requisites for all types of microgrids, including registration requirements for cooperative, municipal, and third-party microgrid proposals;[1] electric generation, fuel usage and thermal energy consumption requirements; rate requirements; payment of fees for use of PREPA infrastructure within

[1] See proposed Section 7.01. As currently drafted, registration requirements do not apply to individual, self-supply microgrids. The Commission must correct this omission.

the boundaries of a microgrid, and reporting requirements. (Proposed Chapter II). Specifically for small and large municipal microgrids and third party microgrids, the Proposed Regulation also requires the submission of a form customer contract and a sample bill for approval by the Commission as part of registration applications (Proposed Sections 6.03, 6.09).

The Proposed Regulation requires the Commission to review all applications for registration "for completeness and compliance with this Regulation" pursuant to the Uniform Administrative Procedure Act of the Government of Puerto Rico. (Proposed Section 7.02(A)). This means that the Commission will review such applications to ensure that they meet the regulatory thresholds on renewable generation, fuel usage, and thermal energy consumption requirements; payment of fees to PREPA in accordance with proposed Appendix A; and other issues set forth in the regulation. The Proposed Regulation then provides that the Commission will review the application and authorize, require more information, or deny the applicant's request to operate as a microgrid "on the basis of system location, cost, composition, or other considerations." (Proposed Sections 7.02(B)-(C)).

As currently drafted, the Proposed Regulation appears to grant the Commission authority to engage in compliance review *ex-post* rather than exercise its regulatory authority set forth in its enabling statute. By way of example, the Proposed Regulation requires the registration applications to contain a "certification of inspection," signed by a licensed electrical engineer, which certifies that the microgrid--presumably already built, given the manner in which the proposal is worded--complies with applicable environmental, safety, and siting laws and regulations. While an electrical engineer (and also an expert electrician, as required under Act 133-2016, Section 9) must certify that an electrical installation of a project already built meets the specifications required by PREPA and the Energy Commission's regulations, prior to construction the Commission must review and verify compliance with applicable legal requirements at the project planning stage, not after a microgrid has already been built and resources spent on the project. *See, e.g.* Act 57-2014, Section 6.3(s) (requiring the Commission to "[t]ake any necessary action … to … ensure that every certified electric power company complies the Federal and Commonwealth environmental regulations, and with any applicable Federal law.")

Another example is the requirement that sample contracts for municipal and third-party microgrids contain certain provisions to ensure the Commission's approval. The Proposed Regulation simply requires contracts to include a term, rates and charges, dispute resolution mechanisms, assignment, and service termination provisions. (Proposed Section 6.09). The Regulation must clarify that the Commission will review those contracts to ensure that they meet applicable statutory and policy requirements, detailed below.

Yet another example relates to the provisions on submission of operational plans by renewable microgrids, which appears to be optional. (*See, e.g.*, proposed Section 5.03.A.1: "[m]icrogrid applications *may* include an operational plan describing the type

of generation assets on the system and how they will be used to meet anticipated demands." (emphasis added)). In order to properly assess the functioning of a proposed microgrid, the Commission will need to review an operational plan in advance, in light of electric demand, reliability concerns, concerns about reasonableness and fairness of rates for consumers, and the need to diversify Puerto Rico's energy mix.

The language of the regulation thus must be strengthened to ensure that the Commission is able to exercise its statutorily-mandated authority and to implement the public policy on the electric power service of Puerto Rico set forth in the various statutes underlying this regulation, which require guaranteeing energy supply at affordable prices for consumers, a safe and reliable electricity infrastructure, and a diversified energy mix that includes renewables. (Act 57-2014, Section 1.2.)

Specifically this means, for example, that the Commission must assess how technical proposals would meet--or hinder the achievement of--the Renewable Energy Portfolio. (Act 82-2010; Act 57-2014, Section 6.3(r)). This also means that the Commission must review and assess rate proposals to ensure the proposed rates to be charged to microgrids customers are fair and reasonable (Act 57-2014, Section 6.3(c)), and it must, if applicable, modify the rates to be charged by microgrid owners (Section 6.3(k)).

Further, the grounds for denial of a registration application such as "other considerations" (Proposed Section 7.02(c)) must be listed expressly, in light of the Commission's powers set forth in Act 57-2014, which grants Energy Commission its statutory authority, and Act 133-2016, which authorizes the construction of microgrids and enables the Commission to establish their regulatory framework.

The Commission Must Avail Itself of Complaints by Microgrid Customers

The Proposed Regulation provides that all bill objections and suspension of service procedures must be conducted pursuant to the Procedure for Bill Review and Suspension of Electric Service set forth in Regulation 8863, "or any future regulation approved by the Commission to that effect." (Proposed Section 6.08). In order to provide regulatory clarity for the development of microgrids in Puerto Rico, the Commission must either determine that Regulation 8863 applies to microgrids or it must issue a new regulation prior to the effective date of the final microgrid regulation.

Regulation 8863 requires customers to exhaust the procedure set forth therein for review of electric bills by the service company prior to requesting the Commission's review. (Regulation 8863, Sections 1.03, 2.02, Article 4.) This regulation sets forth specific requirements for customers disputing a bill before the relevant electric service company, such as paying outstanding balances, as well as requirements for the electric service company to investigate and resolve these complaints within a specified period of time and a procedure for reconsideration of such decision. (Sections 4.7-4.14). The regulation also sets forth a formal bill dispute mechanism before the Commission, requiring it to review such a dispute *de novo* and to provide the complainant with a

hearing. (Section 5.04-5.05). Electric service companies are also precluded from charging customers for bills that are being disputed before the Commission. (Section 5.02). The Commission's decision is judicially reviewable. (Section 5.06).

The Commission must assess whether these procedural requirements (such as the prohibition for service companies to collect payments for bills that are being challenged before the Commission) are workable for the different types of microgrids being proposed--for example, whether an internal dispute procedure must be available to resolve complaints by small cooperatives, or whether these disputes should be brought directly before the Commission.

In addition, the Proposed Regulation requires sample contracts for municipal and third-party microgrids to contain a dispute resolution mechanism (except regarding bill objections). We note that the parties to a microgrid contract may not have leeway to resolve their disputes among themselves, as Act 57-2014 provides for "primary and exclusive" jurisdiction of the Commission over "any case or dispute related to the rates or charges imposed by any independent power producer." (Section 6.4(a)(1)).

Furthermore, the Proposed Regulation is silent on the authority of the Independent Consumer Protection Office with respect to microgrids. The Independent Consumer Protection Office advocates and represents customers before the Commission in all matters respecting rates and charges, including electric bill disputes. (Act 57-2014, Section 6.44 (c)).

The Proposed Regulation Must Set Forth Procedures for Rate Review and Discriminatory Treatment

The Proposed Regulation allows any owner or customer of a municipal or third-party microgrid to request the Commission to conduct a rate review of the service provided by that microgrid on the basis of unjust or unreasonable rates (both by owners and customers), undue burden or inadequate service (by customers), or insufficient cost recovery (by owners). (Proposed Section 6.14.A.2.) It does not make this procedure available to other types of microgrids, such as those owned by cooperatives. The Commission must correct this gap and provide this opportunity to all types of microgrids it includes in the final regulation, in light of its statutory non-discrimination obligations. (Act 57, Section 6.3(e)).

In relation to non-discrimination, the Proposed Regulation allows individual customers in the immediate vicinity of the microgrid, who do not have access to PREPA service, to take service from the microgrid. The Proposed Regulation then provides microgrid owners with mechanisms to demonstrate non-discrimination; i.e., by submitting maps of the proposed microgrid boundaries showing the loads to be interconnected to the system. The Commission has the discretion to review those maps and make a discrimination determination. (Proposed Section 6.10). The Proposed

Regulation, however, does not define what constitutes discrimination,[2] and is silent on the mechanisms available to those "outside" customers to allege discrimination and the relevant procedure before the Commission. In addition, if the regulation will make such a mechanism available to outside customers, then the Commission's review role must be mandatory, not discretionary.

IV. Lack of Oversight at Municipal Microgrids Raises Practical Concerns

The Proposed Regulation authorizes single municipalities, groups of municipalities, other administrative divisions of the Commonwealth, and third-party for-profit and non-profit entities to build and operate microgrids. (Proposed Section 6.01). The regulation imposes requirements for registration, energy source and fuel consumption requirements; contract terms; reporting; billing, bill disputes and suspension of service requirements; fees for use of PREPA infrastructure; rate requirements; and non-discrimination obligations. (Article 6).

The Proposed Regulation May Inadvertently Allow for the Creation of Non-Voluntary Public Power or Third-Party Utilities

By providing for the creation of local power generation and delivery entities governed by either local governments, agencies, or third-parties, this framework appears to allow and enable municipalities and rural locations to become public power service companies with relatively minimal oversight from the Commission.

The resulting potential problems are widespread:

- Does a municipality or rural authority have the right to incorporate, through a microgrid application, local consumers, and do those local consumers have the right to opt out of such contract?

- Does a third-party have the right to incorporate, through a microgrid application, local consumers, and do those local consumers have the right to opt out of such contract?

- In the case that an early adopter small local microgrid or distributed energy resource (DER) customer then becomes absorbed by a larger municipal or rural microgrid, are the contracts of the smaller local microgrid or DER customer usurped, or absorbed as a resource of the larger microgrid?

[2] We note that Act 57 requires the Commission to "guarantee nondiscrimination in the offering or provision of electric power service by reason of race, color, sex, sexual orientation, gender identity, birth, origin, social status, physical or mental disability, political or religious beliefs, military or veteran status, or for being a victim or being perceived as a victim of domestic violence, sexual assault, or stalking." Section 6.3(e).

- Are microgrid consumers protected if a large-scale defection results in higher net rates for PREPA customers?

These questions raise both jurisdictional and regulatory concerns. Under the Proposed Regulation, a customer may be included involuntarily in a municipal or third-party microgrid, locked into a twenty-year contract (Section 6.11(A)), and charged an exit fee for termination of service (Section 6.11(C)). The only recourse would be waiting for a three-year period for rate review before the Commission (Section 6.14(A)(1)). In that interim period, customers may be re-classed (Section 6.05(A)), or billed on an unfamiliar or unfair metric (Section 6.05(D)), or be subject to unjust or unreasonable rates. The Proposed Regulation provides for a protection in which the "average rate at which energy and grid services are sold shall not exceed PREPA's average rate of 20.22 cents per kilowatt-hour as of June 2017." (Section 6.05(B)). However, the Proposed Regulation does not specify if that average applies to a single customer or the microgrid as a whole. As a consequence, individual rate classes could be subject to rates well in excess of their rates under PREPA's service, while others could see a substantial benefit.

The Proposed Regulation neither provides protection nor recourse against unfair cost allocation (i.e. disproportionately burdening a rate class) or discriminatory collection metrics (i.e. creating a customer or demand charge that penalizes low-use customers). Again, no recourse is available to captured customers until the three year waiting period has passed.

Finally, while the Proposed Regulation seeks to protection against unreasonable rate increases by holding to PREPA's "whole-system average rate" (Section 6.06(C)), it is feasible that PREPA's rates could increase substantially if large numbers of customers defect to local municipalities or third-party providers. In that case, rates for PREPA's remaining customers could climb substantially, allowing opportunistic or for-profit microgrid operators to increase rates beyond reasonable cost recovery.

Finally, the lack of a clear regulatory framework for large municipal or third-party microgrid providers raises the concern that municipalities may create microgrid structures that undermine Act 57-2014's policy purposes, including ensuring diversity of energy resources and high-efficiency generation in the island. Section 1.2(g).

The Proposed Regulation should:

- Clearly establish the Commission's regulatory authority to require just, reasonable, and non-discriminatory rates,

- Allow customers to opt-out of municipal or third-party microgrids, or require that they be entered into voluntarily, on an opt-in basis, and

- Require that microgrids contribute to compliance with the statutory requirements of Act 57-2014

The Proposed Regulation Strains the Commission's Ability to Exercise its Statutory and Regulatory Duties

Even with a sufficient regulation to enable oversight, the open-ended ability to form microgrids through application alone raises a practical concern that the Commission, as funded and staffed, may not have the human, financial or logistical resources to adequately exercise its duties with a large number of providers. In addition to approving registration applications, the Commission has the statutory obligation to guarantee capacity, reliability, safety, efficiency, and reasonability of electricity rates. Act 57-2014, Section 6.3(c). If municipalities or third party owners become microgrid operators, the Commission will be required to oversee the quality and reliability of the services provided by these entities (Section 6.3(d)), ensure that microgrid plans are compliant with overarching energy plans of Puerto Rico (Section 6.3(h)); approve, and, if necessary modify the rates they charge to customers (Section 6.3(k)); and oversee compliance with interconnection regulations (Section 6.3(t)).

The Commission may choose to allow itself to limit the number of simultaneous applications for large municipal or third-party microgrids, or require a more substantial filing fee to ensure adequate regulatory oversight. Environmental regulators across the U.S. charge air and water permitting fees to regulated entities as a mechanism for ensuring that staffing levels are adequate to provide regulatory oversight.[3]

V. The Proposed Regulation is Unclear with Respect to the Role of the Commission, PREPA, and Microgrid Owners in a Number of Areas

Interconnection

As currently drafted, the Proposed Regulation fails to clearly define the Commission's regulatory and oversight responsibilities in key areas where it has shared authority with PREPA. One of these areas pertains to interconnection of the microgrids to PREPA's transmission and distribution infrastructure, where PREPA has regulatory authority but subject to the Commission's oversight.

On this issue, the Proposed Regulation only provides that cooperative, municipal, and third party microgrids "can interconnect with PREPA's system in accordance with applicable regulations adopted by PREPA." (Sections 4.05 (small cooperatives); 5.07 (large cooperatives); 6.05 (municipal and third party systems). The Proposed Regulation fails to include, for example, requirements to ensure that their use of the larger grid does not impact stability or voltage control.

[3] See, e.g., Regulatory Fees for Permitted or Registered Sources. http://www.dec.ny.gov/chemical/35484.html

By statute, PREPA is required to establish the procedures for interconnection of distributed generation facilities of up to 5 MW in accordance with the Small Generator Interconnection Procedures (SGIP) and the Small Generator Interconnection Agreement (SGIA) set forth in Order No. 2006 of the Federal Energy Regulatory Commission (FERC), as amended by FERC and also by the Energy Commission. PREPA is also required to approve expedited processes for the interconnection of distributed generators of capacity less than 1 MW (Act 133-2016, Section 9). However, the Commission also has substantial authority with respect to interconnection. It is required to review any technical and other interconnection requirements established by PREPA and to oversee their compliance (Act 57-2014, Section 6.3(t)); it must assess and make determinations regarding the interconnection of distributed generators to PREPA's infrastructure (Act 133-2016, Section 6.3(qq)); and may also require reliability studies for the interconnection of generators with capacity of less than 1 MW (Act 133-2016, Section 9). Many of the microgrids built under this regulation (at the very least "small" microgrids) are likely to fall under this category.

The Commission also has authority to regulate the wheeling mechanism. (Id., Section 6.3(f), 6.30). Act 57 expressly grants it jurisdiction over disputes regarding wheeling or interconnection between PREPA and "any person that is connected, or wishes to connect to the electric power grid" in Puerto Rico (Section 6.4(a)(5)), and disputes between PREPA and independent power producers over the reasonableness of interconnection charges or the terms of a power purchase agreement (Section 6.4(a)(6)). The Proposed Regulation must thus address the Commission's relevant authority with respect to interconnection.

Local Infrastructure

The Proposed Regulation must clarify which entity owns or operates the infrastructure of the microgrid when PREPA's infrastructure is used. For the purpose of clarity, consider all grid infrastructure that operates or supports the microgrid and is before the point of interconnection with PREPA to be "behind" the interconnection point. Is a microgrid operator required to purchase or lease all PREPA infrastructure "behind" the interconnection point? And if not, which entity is required to maintain this infrastructure, or the connected elements, and which entity bears responsibility for system failures if that infrastructure fails?

We recommend that the Proposed Regulation clarify that all infrastructure behind the interconnection point becomes the responsibility of the microgrid operator, regardless of whether it is owned by PREPA or the operator, and PREPA infrastructure behind the interconnection point used by the microgrid operator must be leased or purchased by the microgrid operator. Finally, property leased from PREPA must be maintained and operated in accordance with Good Utility Practice.

Local Reliability and Service Provision by Microgrids

The Proposed Regulation must clarify who is responsible for maintaining local reliability (i.e. behind the point of connection with PREPA)--the microgrid operators or PREPA. Presumably, if the customers of a microgrid are its direct owners, the obligation to maintain local reliability and the operations of the microgrid may reasonably fall on its owners, as might be the case for the electrical system within a single facility.

However, in the case of municipal (or other administrative jurisdiction) microgrids, with captive customers who may not necessarily be interested in participating in the project, the municipality must have sufficient technical expertise to ensure that customers are not left in a worse-off position with respect to the reliability of their service than when they received the entirety of their electric power services from PREPA. As noted previously, the Commission must also clarify its oversight role regarding reliability of these systems. Act 57, Section 6.3(f).

Similarly, if a microgrid fails, or provides erratic or destabilizing service, what are the provisions for disconnection by PREPA? Is PREPA required to provide service to a microgrid region in which local generation has failed? And if so, is PREPA required to maintain sufficient capacity to serve attached microgrids, or does PREPA only provide system-balancing resources?

We recommend that the Proposed Regulation clarify that once established, a microgrid is considered a separate electrical entity for which PREPA provides balancing energy and reserve sharing, but does not maintain capacity or resource adequacy, unless expressly agreed to by PREPA and the microgrid operators. Otherwise, PREPA will potentially be in the position of holding capacity well in excess of Puerto Rico's needs. By the same token, we recommend that the Proposed Regulation clarify that the microgrid operator becomes responsible, in full, for the provision of reliable electric power and maintenance of all infrastructure behind the interconnection point.

Service Provision from PREPA to Microgrids

The Proposed Regulation is silent on the question of PREPA's obligations to provide service to microgrids, and under what conditions, if at all. Likewise, the Proposed Regulation fails to specify whether microgrid operators have the responsibility to serve their customers on a regular basis, or only under peak or emergency circumstances, with PREPA otherwise providing electric service to the members of a microgrid. It is possible that such arrangements could change on a case by case basis, with some microgrids maintaining only emergency capacity, while others are nearly fully independent. If the intent of this regulation is to provide maximum flexibility for microgrid arrangements, the Commission should specify that a contract between PREPA and the microgrid operators will establish the terms of supply, responsibility for

reliability, and conditions of an emergency disconnect from the larger PREPA system, subject to the Commision's approval.

VI. The Proposed Regulation is Unclear on the Question of Financial Interaction Between Microgrids and PREPA

The Proposed Regulation is silent on the financial relationship between PREPA and the microgrids, including the rate at which electricity can or should be sold to PREPA, the value of deferred or avoided central-station capacity, and the value local grid stability services provided back to PREPA. It is not clear if microgrids are treated as Qualified Facilities (QF) under the Public Utility Regulatory Policies Act of 1978 (PURPA), as independent power producers (IPP), or as electric utilities which are expected to conduct bilateral trades or establish wholesale market prices with PREPA. Smaller microgrids may even seek to establish as net metered facilities. The Commission should provide guidance for the different expected scales of microgrid.

It appears that under almost all circumstances, both renewable and CHP-based microgrids could be established as QFs, in which case the Commission should act to establish standard terms of contract between the microgrids and PREPA, as well as avoided rates. Those avoided rates should include both the marginal avoided cost of energy, as well as avoided capacity (when applicable) and any other ancillary services (such as local storage) provided to PREPA by the microgrid.

The Proposed Regulation also does not establish the rates at which microgrid entities are to buy power from PREPA. We note that if microgrid owners and operators are assigned responsibility for their own local reliability and assigned the cost of PREPA infrastructure behind the interconnection point, PREPA's charges for services rendered should probably be lower than full retail rates. While the Commission does not necessarily need to establish the specific rules of microgrid engagement with PREPA, we believe that small and mid-sized microgrid entities will be benefited substantially through standard contractual agreements between microgrids and PREPA.

Separately, we note that the Proposed Regulation does not specify the process for municipalities to terminate their relationship with PREPA in light of their special status set forth under Act 57-2014, which exempts PREPA from paying municipal and Commonwealth taxes in exchange for certain payments to offset this benefit. (Section 22(a)). Specifically, the law requires PREPA to set aside a percentage from the gross revenues generated from the purchase of fuel and electric power, and the sale of electric power to customers, to be distributed among municipalities as payment in lieu of taxes. Such municipalities are also required to reduce their energy consumption (Section 22(b)(3)). The final regulation must provide that municipalities wishing to form microgrids will no longer be subject to such requirements, and PREPA will no longer enjoy local tax exemptions with respect to these entities.

VI. The Proposed Microgrid Definitions are Problematic and Create Loopholes

The Proposed Regulation provides several definitions of microgrids based on different criteria, including ownership structure, size, and whether they engage in sales of power or other grid services to entities other than PREPA. (Proposed Section 2.01(A)). As discussed below, several of these definitions are arbitrary and not meaningful in practice, and others may also be inconsistent with applicable statutory requirements.

Microgrid Classifications Based on Size are Inconsistent in their Terms

The Proposed Regulation classifies microgrids based on size as (i) individual systems (i.e., those with one or two customers who are also owners); (ii) small systems (i.e., those with between three and ten customers or customer-owners and total generating capacity of no more than 250 kW); and (iii) large systems (i.e., those with more than ten customers or generating capacity over 250 kW).

As an initial matter, we note that these definitions are inconsistent in their terms, resulting in important ambiguities. The "large" system definition, unlike the "small" system definition, does not expressly include "customers or customer-owners." If that difference were to be given effect, a microgrid with eleven or more customer-owners would not fall into any of the categories established by the Proposed Regulation. The Commission should amend Section 2.01(C)(3) to make clear that "[l]arge systems are those with more than 10 customers *or customer-owners* or generating capacity over 250 kW."

Similarly, the Proposed Regulation limits individual systems to "customer-owners," but defines "small" systems as those with "at least three … customers." It therefore offers no category for a system with one or two customers, who are not also owners. We suggest amending Section 2.01(C)(2) to establish that "[s]mall systems are those with: (i) at least three (3) and no more than ten (10) customer-owners and a total generating capacity of no more than 250 kW"; or (ii) no more than ten (10) customers and a total generating capacity of no more than 250 Kw.

Furthermore, the definition of an "individual" system does not include any restrictions on nameplate capacity. The number of customers is a less relevant metric than total nameplate capacity. Classifying very large systems with just one or two customer-owners as an "individual" system, without more, would allow such systems to avoid all requirements under the regulation (proposed Section 2.01(E)(1)).

We agree that for small individual "self-supply" entities reporting requirements should be *de minimis* to encourage both innovation and resiliency at the fringes of PREPA's operating system. However, the Commission should not knowingly establish a loophole for large customers to self-supply while connected to the grid, free of regulatory oversight. For example, under the Proposed Regulation, an industrial customer with a large diesel reciprocating engine could seek to interconnect as an

individual system (Section 2.01(C)(1)), self-dispatch when economically advantageous, potentially sell as a generator into PREPA on an ongoing basis, and remain outside the jurisdiction of the Commission's resource planning and the intent of this regulation to harness renewable energy resources.

The Commission should therefore amend its Section 2.01(C)(1) to clarify that "[i]ndividual systems are those with one or two customer-owners, and generating capacity of no more than 250 kW." It should further clarify that it maintains its authority over approval, registration, rate reviews, and reliability of these systems.

Several Categories of Microgrids are not Regulated

Under the Proposed Regulation, the Commission does not regulate microgrids operated by PREPA. (Proposed Section 2.01.E.6). The Regulation must establish some parameters for PREPA's microgrids, as by law it is required to exercise oversight over rates and reliability, as explained above. Specifically with respect to PREPA, the Commission is also required to oversee compliance with its integrated resource planning. (Act 57-2014, Section 6.3(h)).

The Proposed Regulation also contemplates the creation of microgrids not provided for under any of the existing classifications. (*See* proposed Section 2.01.E.7: "[t]he requirements for systems of types not listed above are the same as those for third-party systems except as determined by the Commission …"). The Regulation must close any loophole and clearly provide all possible microgrid classifications and their applicable requirements in their regulation.

VII. The Proposed Regulation Should not Undermine Renewable Standards

Certification of Substantial New Combined Heat and Power Could Undermine Puerto Rico's Renewable Energy Goals

In 2010, the Legislature passed Act 82, with the aim of achieving "twenty percent (20%) sustainable renewal energy production in Puerto Rico" and "dramatically" reducing Puerto Rico's "dependence of fossil fuels." Act 82-2010 (S.B. 1519), Statement of Motives. The Act recognized that continued dependence on fossil fuels would render Puerto Rico "dangerously vulnerable" to "energy instability, flight of capital" and "climate change." Id.

Act 82 establishes "requirements and specific percentages" of renewable energy, for PREPA and other "retail electricity suppliers." *Id.* Act 82 only applies that percentage to suppliers who sell "more than fifty thousand (50,000) megawatt hours (MWh) of electric power to electric power consumers during the preceding calendar year." Act 82, Section 1.4(28). Most microgrids will not meet that threshold.

The proposal's provisions for renewable microgrids should aid, rather than hinder, achievement of Act 82's fundamental purpose: expanding the availability of non-fossil-fuel energy in Puerto Rico. We note, however, that "combined heat and power" microgrids would not advance that goal if this Regulation provides incentive for their widespread proliferation. Indeed, should the proposal lead to the addition of significant *new* CHP capacity, it could undermine achievement of Act 82's goal, by enabling the creation of several retail energy suppliers reliant upon fossil fuels, each too small to be subject to Act 82's renewable portfolio standard. We urge the Commission to therefore carefully scrutinize proposed CHP microgrids—especially those involving newly created fossil-fuel capacity—and to refuse to certify such microgrids should they threaten to undermine Act 82's renewable-energy goals.

The Renewable Energy Definitions are too Broad and Inconsistent with Statutory Purposes

The definitions of qualifying renewable energy under the Proposed Regulation are too broad, and some of them are inconsistent with statutory purposes. The Proposed Regulation qualifies as "alternative renewable energy" the conversion of municipal solid waste (i.e., incineration), landfill gas combustion, anaerobic digestion, and fuel cells. It also qualifies as "sustainable renewable energy" solar, wind, geothermal, bioenergy, qualified hydropower, and marine and hydrokinetic energy. (Proposed Section 1.08).

We urge the Commission to withdraw municipal solid waste, landfill gas, and fuel cells (which burn primarily natural gas) as qualifying renewable energy sources under the Proposed Regulation. The burning of solid waste (a.k.a. garbage) creates large amounts of ash that will need to be disposed of. In addition, garbage incineration creates air pollution, including fine particulate matter (PM), heavy metals like mercury, and dioxins and furans. Largely because of public opposition no new garbage incinerators have been opened in the U.S. since 1995. In fact, most of the U.S. is moving in the opposite direction by closing down incinerators and rejecting proposals to build new ones. From 2012-2017, existing incinerators were closed down in Florida, Maryland, Michigan, Maine, South Carolina, Illinois, and other states. Proposals to build new incinerators were rejected in Utah, Maryland, Texas, Colorado, Hawaii, Nevada, Minnesota, New York, Wisconsin, California, and Virginia.[4] For the last 30 years, recycling programs across the U.S. have greatly increased and landfills have had to follow tighter and tighter regulations to protect air and groundwater.

If garbage incinerators are too polluting for the rest of America, and if no other state has moved forward with new incinerator construction project in over 20 years, the Commission should not create an incentive for their construction in Puerto Rico by including solid waste incineration as a category of renewable energy. Puerto Ricans deserve an island-wide comprehensive solid waste management plan, with a focus on recycling, waste reduction, and if necessary modern and protective landfills, and

[4] GAIA. Incinerators Blocked / Closed, U.S. & Canada, 2012-2017. http://www.no-burn.org/incinerators-blocked-closed-u-s-canada-2012-2016-2/

incentives that result in garbage incinerator construction will undercut that long-term need.

The Proposed Regulation offers individual customers, small groups, and larger municipal customers the opportunity to accelerate the development of energy generation independent of the remainder of Puerto Rico. In exchange for the rapid deployment of these smaller systems, the Commission is offering microgrids a reduced level of regulatory oversight and substantial flexibility in operations, structure, and compensation. However, the Proposed Regulation should not offer a regulatory escape for traditional generating sources under the guise of a renewable microgrid. Proposals for grid-connected incinerators and landfill gas generators should be reviewed and assessed in their proper context, through standard permitting and contracting. Large industrial or commercial facilities should be afforded the opportunity to acquire and use fuel cells as backup generation or even supplemental generation, but not at the expense of Puerto Rico's renewable energy standard.

Neither should the Proposed Regulation allow large hydropower projects to qualify as "qualified hydropower." Act 82-2010 defines "qualified hydropower" as "the energy generated from: (i) an increased efficiency or increased generating capacity achieved at a hydroelectric facility built before the effective date of this Act; or (ii) a hydroelectric facility built after the effective date of this Act." The Commission must take into account that these are microgrids (not large independent power production projects). This regulation must not provide incentives for new large hydropower developments and neither must it reward large old dams that disrupt hydrological systems, destroy habitats, and jeopardize protected species. Most states disqualify old dams and certain technologies (such as impoundment) under their Renewable Portfolio Standards,[5] which reflects awareness of the adverse impacts of large hydropower.

The Alternative Forms of Demonstration of Qualifying Composition for Renewable Microgrids are Inconsistent and Miscalculated

The Proposed Regulation provides for three alternative forms of demonstration with the renewable designation. (Section 5.03(A)). These forms are either (A) a demonstration of compliance with Section 3.02, (B) a limit on monthly oil or gas consumption as calculated through the attached Appendix B, or (C) a limit of 12.5 gallons of diesel fuel consumed per month per kW of installed solar. Unfortunately, these definitions are internally inconsistent and are calculated differently from each other. In particular, the third alternative, a limit of 12.5 gallons of diesel fuel consumed per month per kW of solar, allows about 300% more diesel to be consumed than would be expected for a 75% renewable energy-powered system defined in Section 3.02. Calculations in Appendix B suggest a monthly fuel limit about 1/3 of that allowable under Section 3.02, as we describe below. The regulation must use a consistent

[5] Clean Energy States Alliance. April 2013. Environmental Rules for Hydropower in State Renewable Portfolio Standards. https://www.cesa.org/assets/2013-Files/RPS/Environmental-Rules-for-Hydropower-in-State-RPS-April-2013-final-v2.pdf

method of calculation and alternative compliance to avoid confusion and selective use of metrics.

Section 3.02(A)(2)(a) of the Proposed Regulation defines a renewable microgrid as having a primary energy source of renewable energy, where "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)." As an initial matter of clarification, in energy systems, the term "energy input" (or heat input) is usually reserved for fuel consumption, and recorded in British thermal units (Btu), or in rare cases therms, joules, or calories. In contrast, "energy generation" (or just energy) typically refers to the electrical energy produced, measured in kilowatthours (kWh) or megawatthours (MWh). In this case, the definition in 3.02.A.2.a should likely be changed to "energy generation of the system (in MWh)" for clarity. This ambiguity appears to have resulted in a calculation error in Appendix B, supporting Section 5.03(A)(2).

The "renewable microgrid" alternative demonstration offered in Section 5.03(A)(3) for diesel backup generation represents a miscalculation or mischaracterization of the above relationship, likely caused by an error in not including the inefficient conversion of diesel fuel ("input") to usable electrical energy ("generation"). As a brief demonstration, Section 5.03.A.3 considers the amount of diesel fuel that can be used to back up a 1 kW solar photovoltaic system. Over a year, that 1 kW system would produce approximately 2,190 kWh of electrical energy (assuming a 25% capacity factor). For solar to provide 75% of energy use, the whole microgrid could only produce 2,920 kWh (2,190 kWh divided by 0.75), and the energy produced by the diesel generator could only amount to 730 kWh. Considering that a diesel-powered reciprocating engine has a heat rate conversion of about 9,000 btu/kWh,6 we would require 6,570,000 btus (6.6 MMBtu) of diesel fuel energy input to produce 730 kWh. Using the Commission's conversion of 0.138 MMBtu/gal, we arrive at an annual consumption of 47.8 gallons per year, or almost exactly four (4) gallons of diesel fuel per month. The Commission should re-adjust the default conversion of 12.5 gallons in 5.03(A)(3) to 4.0 gallons.

Appendix B, which forms the basis of the "renewable microgrid" alternative demonstration in Section 5.03(A)(2) is also in error, but from the inverse direction. The basis of the error is two-fold. First, the workbook provides for the fraction of fossil fuel on a heat input basis (in MMBtu) rather than an energy output basis (in MWh) as required under Section 3.02(A)(2)(a). Second, the workbook converts solar energy to MMBtu equivalencies through a direct conversion of electrical energy to thermal units considering a perfect conversion at 100% efficiency, or a heat rate of 3,412 Btu/MWh

[6] US EPA CHP Partnership. Catalog of CHP Technologies. Section 2. Technology Characterization – Reciprocating Internal Combustion Engines. Table 2.2 Gas Spark Ignition Engine CHP – Typical Performance Parameters. https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_2._technology_characterization_-_reciprocating_internal_combustion_engines.pdf; or Questions and Considerations for RICE Generation Facilities. Power Engineering. April 18, 2017. http://www.power-eng.com/articles/print/volume-121/issue-4/features/questions-and-considerations-for-rice-generation-facilities.html

(see cell D12).[7] Since conversion from solar energy (in MWh) to an equivalent heat input (in MMBtu) is not required to meet the definition of 3.02(A)(2)(a), we instead need to convert the energy of the diesel generator, which is closer to 9,000 Btu/MWh. As a result of this error in the workbook, the fuel consumption limit is closer to about 1/3 of the actual fuel consumption required to reach a 75% renewable energy basis. The Commission should adjust the Appendix B calculations to (a) calculate renewable energy as a fraction of energy generation (in kWh or MWh), and (b) ensure that the workbook accounts for fossil generator inefficiencies.

The Implementation of Microgrids on Puerto Rico is Generally Consistent with the Recommendations of the Puerto Rico Energy Resiliency Working Group

On December 11, 2017, a blue-ribbon expert panel called the "Puerto Rico Energy Resiliency Working Group (PRERWG)" released a report, Build Back Better: Reimagining and Strengthening the Power Grid of Puerto Rico.[8] The authors of the report included representatives from the New York Power Authority, Puerto Rico Electric Power Authority, Puerto Rico Energy Commission, Edison International, Electric Power Research Institute (EPRI), US Department of Energy, Brookhaven National Laboratory, and several other utilities and national laboratories. The report presented a comprehensive plan for the building of a new power grid in Puerto Rico. The new and stronger electric system recommended for the island includes generation that is cleaner than the dominant sources on the island today – fuel oil and coal -- and largely consists of renewable sources of energy like solar and wind. We believe the development and proper regulation of microgrids in Puerto Rico are consistent with the recommendations of PRERWG, and can assist in the adoption at scale of renewable energy sources like solar photovoltaics.

Respectfully submitted,

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[7] See American Physical Society (APS) notes energy unit conversion. https://www.aps.org/policy/reports/popa-reports/energy/units.cfm. "At 100% efficiency, the conversion from heat to electricity is at a rate of 3412 Btu per kWh. Actual generation efficiencies, limited by the Second Law of Thermodynamics and design practicalities, fall short of this. More specifically, for U.S. power plants during recent years the average heat input per kWh of net generation was in the neighborhood of 10,300 Btu/kWh for fossil-fuel steam plants and of 10,700 Btu/kWh for nuclear plants, corresponding to thermal conversion efficiencies of 33% and 32%, respectively."

[8] Puerto Rico Energy Resiliency Working Group. 2017. Build Back Better: Reimagining and Strengthening the Power Grid of Puerto Rico. Executive Summary. https://www.governor.ny.gov/news/governor-cuomo-announces-plan-transform-puerto-ricos-electric-power-grid-withstand-future