



GOBIERNO DE PUERTO RICO

Compañía de Fomento Industrial

SECRETARIA
COMISION DE ENERGIA DE
PUERTO RICO

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30 de enero de 2018

Comisión Energía de Puerto Rico
Sr. José H. Román Morales
Comisionado Asociado, Presidente Interino

Sr. Ángel R. Rivera de la Cruz
Comisionado Asociado

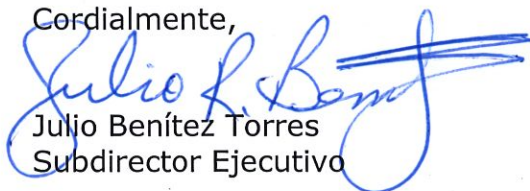
Re: Comentarios al Borrador del Reglamento sobre Desarrollo de Micro-redes

Es del interés del Departamento de Desarrollo Económico y Comercio (DDEC) y la Compañía de Fomento Industrial (CFI) participar en el proceso de comentarios y vistas públicas para el reglamento de referencia. Entendemos que el desarrollo de micro-redes es un componente vital para el sostenimiento de varios sectores de la industria manufacturera y el desarrollo económico de Puerto Rico, en general.

Deseamos colaborar con la Comisión para lograr tener una reglamentación que sea facilitadora y propulsora de un sistema de micro-redes resiliente, económico y de ventaja competitiva para los negocios que se sirven del mismo. Esto permitirá crear un nuevo ecosistema de negocios en la construcción, instalación y operación de sistemas de energía con un nuevo modelo de negocios.

Adjunto el borrador del reglamento y nuestros comentarios con el propósito de que sean considerados como parte del lenguaje del mismo.

Cordialmente,


Julio Benítez Torres
Subdirector Ejecutivo

Anejo



FOMENTO

**SNL and ORNL COMMENTS AND SUGGESTED
MODIFICATIONS TO:**

**CEPR PROPOSED RULES ON REGULATION ON
MICROGRID DEVELOPMENT**

1/25/2018

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REGULATION ON MICROGRID DEVELOPMENT

ARTICLE 1.- GENERAL PROVISIONS

Section 1.08.- Definitions.

A. For the purposes of this Regulation, the following terms will have the meaning established below, except when the context of the content of any provision clearly indicates something else:

1. "Alternative Renewable Energy" means ~~that~~ energy produced or generated from the following resources, as defined in Section 1.4 of Act 82-2010:
 - i. Conversion of municipal solid waste;
 - ii. Landfill gas combustion;
 - iii. Anaerobic digestion;
 - iv. Fuel cells generated from hydrogen gas; and

Comment:

Including fuel cells in the definition of Alternative Renewable Energy is consistent with Act 82-2010; however, they are a conversion devise and would be characterized as 'renewable' only to the extent that the fuel is derived from a renewable resource, such as hydrogen gas generated from wind or solar power plants.

- v. Any other energy that the Commonwealth Energy Public Policy Office may define in the future through regulations as alternative renewable energy.
2. "Ancillary services" mean the services necessary to support the delivery of electric power from generator to consumer while maintaining reliable operation of an interconnected transmission and distribution system.
3. "Combined heat-and-power" means equipment used to produce electric energy and forms of useful thermal energy (such as heat or steam), used for industrial, commercial, heating, or cooling purposes, through the sequential use of energy.
4. "Commission" means the "Puerto Rico Energy Commission" created by virtue of Act 57-2014.
5. "Cooperative" means a non-profit entity consisting of a group of customers who share ownership of a microgrid system.
6. "Community Solar" a voluntary program whereby a solar-electric system provides power and/or financial benefit to multiple community members in which community members may or may not own the system itself.

7. "Customer" means any natural person or legal entity who consumes or uses electric power or energy services.
8. "Distributed Generator" means any natural person or legal entity that owns an electric power generation facility in Puerto Rico connected to the distribution system or to a microgrid.
9. "Distribution Infrastructure" or "Distribution System" means the physical equipment used to distribute electric power at voltages below-up to 38,000 volts, including but not limited to poles, primary lines, secondary lines, service drops, and transformers.

Comment: This definition excludes 38,000-volt systems commonly used to deliver electricity to large industrial customers. 38,000-volt systems are also excluded from ~~the~~ definition of transmission. In the event that it becomes necessary to make a distinction between distribution and transmission for purposes of accessing utility infrastructure, the treatment of 38,000-volt systems should be better defined. Definition for Sub-transmission infrastructure should be supplied. See item 32 (provided).

10. "Distributed Renewable Energy" means a Distributed Generator powered by sustainable renewable energy or alternative renewable energy supplying electric power to an electric power service company or generated for self-consumption or for sale to third-parties. Community Solar projects are considered distributed renewable energy at the residential level.

11. "Electric Power Distribution" or "Distribution" means the delivery of electric power from any electric substation or generator to any customer or consumer at voltages below 38,000 volts through Distribution Infrastructure throughout the Commonwealth.

Comment: See previous comment about the treatment of 38,000-volt systems.

12. "Electric Power Generation Company" means any natural person or legal entity engaged in the production or generation of electric power in the Commonwealth of Puerto Rico. This term shall include co-generators already established in Puerto Rico that supply energy to a utility company PREPA through a Power Purchase Agreement, and renewable energy producers.
13. "Electric Power Grid" means the electric power transmission and distribution infrastructure of the Commonwealth of Puerto Rico currently operated, supported, and administered by the Puerto Rico Electric Power Authority ("PREPA").
14. "Electric Power Service" or "Energy Service" means any service provided to a Customer in Puerto Rico by a certified electric power company.

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15. "Energy Producer" means any natural person or legal entity that owns an electric power production facility in Puerto Rico that is an eligible business in accordance with to the provisions of Act No. 73-2008, known as the Economic Incentives Act for the Development of Puerto Rico.
16. "Electric Bill" means the document sent periodically by the Electric Service Company to a Customer listing all the components, charges, or rates that make up the final consumption cost each Customer must pay.
17. "Electric Service Company" means any natural person or legal entity engaged in the generation, billing, or resale of electric power. In the case of PREPA, it shall also include transmission and distribution.
18. "Energy Storage" means any resource capable of receiving electric energy from the grid or any other generation resource, to store for later injection of electricity back to the grid or to any load, regardless of where the resource is located on the transmission system, distribution system, or behind a customer's meter.
19. "Green Energy" refers jointly to Sustainable Renewable Energy, Alternative Renewable Energy and Distributed Renewable Energy.
20. "Grid Services" include ancillary services and other services such as demand response.
21. "Interconnection" or "Electric Interconnection" means the connection of power plants to the same electric power transmission and/or distribution systems.
22. "Interconnection Charge" means the fair and reasonable amount of money that a person shall pay ~~to a utility company~~ PREPA for the right to connect his/her facility to the Electric Power Grid.
23. "Load" means a customer's use of energy and/or grid services.
24. "Meter" means the equipment used to measure consumption and/or generation of energy at the point of connection between an individual customer and a distribution network. Meters may, but are not required, to be equipped with advanced communications and control capabilities.
25. "Microgrid," means a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to a utility company PREPA's grid. The goal of microgrids is to reduce energy consumption based on fossil fuels through local renewable energy generation and strategies to reduce energy consumption. A microgrid can connect and disconnect from a utility company PREPA's grid to enable it to operate in both grid-connected or off the grid.

Comments:

The goal of microgrids should go beyond "to reduce energy consumption based on fossil fuels through local renewable energy generation and strategies to reduce energy consumption" should be expanded to include higher energy resiliency, potentially more cost-effective operation, better sustainability, operational flexibility, etc.

26. "Municipality" means the local government legal entity, composed of a Legislative and an Executive Power, subordinate to the Constitution of the Commonwealth of Puerto Rico and its laws, that is responsible for a geographical demarcation with all of its wards ("barrios"), and which has a specific name.
27. "Net Meter" means a tool used to measure and register the two-way flow of power (bidirectional), that is, supplied and received energy in kilowatt-hour by a customer who has a distributed generation system interconnected to a utility company the power grid ~~of PREPA~~.
28. "Person" means natural person or legal entity created, organized, or existing under the laws of the Commonwealth of Puerto Rico, the United States of America, any state of the union, or any foreign state or country.
29. "Power Purchase Agreement" or "PPA" means any agreement or contract approved by the Commission whereby an electric power generation company is bound to sell electric power to a person, and such person is, in turn, bound to acquire said electric power at a just and reasonable rate.
30. "PREPA" means the Puerto Rico Electric Power Authority, a corporate entity created by virtue of Act No. 83 of May 2, 1941, as amended.
31. "Sustainable Renewable Energy" refers to that energy generated from renewable resources as defined in Section 1.4 of Act 82-2010, including:
 - i. Solar energy;
 - ii. Wind energy;
 - iii. Geothermal energy;
 - iv. Renewable Biomass Combustion;
 - v. Renewable Biomass Gas Combustion;
 - vi. Combustion of biofuel derived solely from renewable biomass;
 - vii. Qualified hydropower;
 - viii. Marine and hydrokinetic renewable energy, as defined in Section 632 of the "Energy Independence and Security Act of 2007" (Public Law 110-140, 42, U.S.C. § 17211);
 - ix. Ocean thermal energy; or
 - x. Any other clean and/or renewable energy that the Commission may

define in the future through regulation or order as renewable energy.

32. Sub-transmission infrastructure – means the physical equipment used to transmit and provide electrical power at voltages of 38,000 volts, including but not limited to poles, lines, and transformers.

33. "Transmission Infrastructure" and "transmission system" mean the physical equipment used to transmit electric power at voltages of at least 115,000 volts, including but not limited to poles, lines, and transformers.

32.34. Utility Company- a legal entity that owns or operates infrastructure for transmission or distribution of electric power.

ARTICLE 2.- MICROGRID CATEGORIES

Section 2.01.- Microgrid Classification.

- D. Microgrids can operate off grid or interconnected with other microgrids or a utility company, that produce energy primarily for consumption by the owner(s) of the system shall be referred to as "self-supply" systems. Self-supply microgrids may not sell energy and/or other grid services outside of their self-supply system to entities other than PREPA the utility company. This does not means the system shall be interconnected to the utility.

Comment: There should be no limitations from the state over the marketability of interconnections of systems and to offer excess loads between systems. Interconnection between microgrids will provide resiliency for the systems. The meaning of "primarily for consumption by the owner(s)" should be defined more quantitatively.

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ARTICLE 3.- MICROGRID TECHNICAL REQUIREMENTS

Section 3.01.- Microgrid Composition

A microgrid shall consist, at a minimum, of generation assets, loads and distribution infrastructure. Microgrids shall include sufficient generation, storage assets and advanced distribution technologies² to serve load under normal operating and usage conditions. If a microgrid includes metering technologies, all members of each customer class must be equipped with comparable metering infrastructure. Microgrids must qualify as either "renewable," "combined heat-and-power," or depending on its functions. Functions may be community, public purpose or critical microgrids or "hybrid" depending on the composition of the generation assets on the system.

Comments:

For the purposes of rulemaking, other jurisdictions have defined microgrids by function and not by generator asset type. Types such as such as "community microgrids," "public purpose microgrids," and "critical services microgrids" have been used in Maryland and Rhode Island. Reference: <http://www.energy.ri.gov/documents/SRP/RI-microgrid-exec-summary-170331.pdf>.

We suggest that the commission consider how the rules might be tailored depending on the function of the microgrid.

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Section 3.02.- Renewable Microgrids

A. "Renewable" microgrids have the following qualifications:

1. The primary energy source of the system ~~must~~ could be a renewable energy resource(s) as defined in Section 1.08 of this Regulation.

Comments:

It should be clarified that the phrase "renewable energy resource(s)" refers to the 2 definitions in Section 1.08: Alternative Renewable Energy (1.08 A 1) and Sustainable Renewable Energy (1.08 A 31).

2. "Primary energy source" means that:

- a. 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); and
- b. The installed renewable energy generating capacity (in MW) of the system exceeds the expected peak load of the microgrid.

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Comments:

Summary of 2 categories of objection:

- 1) 75% threshold is too high based on the installed base of micro grids in the U.S. This high threshold makes the technical and economic feasibility of microgrids very difficult to meet.*
- 2) Unrealistic to require microgrid solutions to provide 5 times more renewable energy than will be required by all other energy sources in PR in 2020 per act 82-2010. Commercial/industrial consumers will likely find this requirement too great a burden to overcome.*

Objection 1:

We understand the policy goal to encourage renewables, however, these requirements leave out valuable opportunities for microgrid deployment to support other goals such as resiliency and rapid recovery.

The record of MG implementation in US does not substantiate or support such renewable energy thresholds.

Based on the GTM Research study in 2015 titled: "North American Microgrids 2015: Advancing Beyond Local Energy Optimization", the leading seven states in install microgrid capacity: New York, Georgia, Texas, California, Maryland, Oklahoma and Alaska have installed approximately 890 MW of operational microgrid generational capacity. In each of these states the aggregate capacity of wind and solar and hydro energy sources for microgrids is less than 20%. Since capacity factors are almost always much less than 1 for renewable sources the % aggregate energy from wind and solar and hydro energy sources is even smaller than 20% which is significantly below the 75% target proposed in this rule.

Therefore, the rule as written will be applicable to only a very small subset of available microgrid opportunities in PR. This will be especially true for microgrids that will be islanding and need to maintain these high levels of renewable energy.

Objection 2:

ACT 82-2010 sets a goal for the energy mix of Puerto Rico (PR) in the future. The proposed rule requires microgrids to have 5 times more renewables than will be required by all other energy sources in PR in 2020. It is doubtful that such a criterion is both technically and economically feasible due to issues of land use/available foot print around load pockets, LCOE of energy and the need for operational flexibility and reliability.

The threshold for RE should be more realistic as even the RPS threshold of 15% in 2020 may be problematic considering location, land availability and that first adopters in the PR will likely make

resiliency and reliability high priorities



3. Use of any grade of fuel oil or natural gas by a microgrid is limited to those purposes identified in 18 C.F.R. §292.204(b)(2).³ In particular, such use should be limited to the minimum amounts of fuel required to alleviate or prevent outages of electrical service to microgrid customers.

4. Use of any grade of fuel oil or natural gas by a microgrid may not, in the aggregate, exceed twenty-five percent (25%) of the total energy input of the system 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.

Comments:

It is not clear whether the definition of microgrids covered by this rule should follow the definition of Qualifying Facilities (QF) according to 18 C.F.R. §292.204(b)(2) and section 3(17) (B) of the Federal Power Act. A 3rd party microgrid that never intends to sell back to the utility, (will always be a net consumer of electricity) or is completely isolated from the utility may not need to be defined as QF nor see value in seeking qualification as a QF.

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Section 3.03.- Combined Heat-and-Power 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.

Comments:

The problem with this formulation is that it doesn't allow much design flexibility. For instance, if the developer wanted to configure a system to maximize electrical output, the amount of useful thermal energy would be reduced.

Suggestion: Replacing "useful" with "available", or adding clarifying terms like "prior to heat transfer to the thermal load." Definition should be changed to allow for design flexibility. For example, it could require that at least 50% of the waste heat be recovered as usable thermal energy.

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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.

Comment: We believe this is reasonable. 7000 Btu = 2.05 kWh. So, assuming the 50% thermal above, that means the unit must be ~25% or higher efficiency in its conversion to electricity, which seems reasonable for existing high efficiency generators.

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³ Use of oil, natural gas and coal by a facility, under section 3(17) (B) of the Federal Power Act, is limited to the minimum amounts of fuel required for ignition, startup, testing, flame stabilization, and control uses, and the minimum amounts of fuel required to alleviate or prevent unanticipated equipment outages, and emergencies, directly affecting the public health, safety, or welfare, which would result from electric power outages. Such fuel use may not, in the aggregate, exceed twenty-five percent (25%) of the total energy input of the facility 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.

- B. CHP microgrids must demonstrate compliance with the qualifications in part (A) of this section. The acceptable forms of demonstration vary by system classification and are described in the relevant Articles below.
- C. Any microgrid registered as "CHP" that is found by the Commission to be non-compliant 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 (Critical)

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 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 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.

A. Critical Microgrids have the following classification. It is a microgrid of an existing operation that based on the location it is no possible to provide a source of renewable energy merge by more than 20%. This kind of microgrid shall operate off grid from the utility company in order to be excluded from 18 C.F.R. §292.204(b)(2) as Qualifying Facilities (QF).

Comments:

The hybrid definition appears to be redundant as microgrids qualifying under 3.02 or 3.03 are already covered by this rule, and requirements not different. This definition could be revised to include microgrid configurations that have other desirable attributes including frequency regulation and black start capability but do not fit into the renewables or CHP criteria described above.

Section 3.05.- Codes and Standards

Microgrids shall be compliant with existing safety standards; namely, IEEE Standard 1547 for design; UL Standard 1703, UL Standard 1741, National Electric Safety Code, IEEE Standard 2030-7-2017, IEEE Standard 2030-2011, or IEEE Standard 1547 for equipment; and the National Electric Code, or any successor code or standard, as such code or standard may be revised, amended or updated from time to time.

Comments: This standard list is incomplete and needs to add a focus on the

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microgrid standards and technical guidelines. Having the system meet NESC and RUS standards also increases opportunity for additional financing opportunities.

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Suggestion:

- ❖ Include NESC standards as well as the current RUS standards.
- ❖ IEEE 2030.7-2017 - IEEE Approved Draft Standard for the Specification of Microgrid Controllers
- ❖ IEEE Std 2030-2011 - IEEE Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), End-Use Applications, and Loads

ARTICLE 6.- REQUIREMENTS FOR SMALL MUNICIPAL SYSTEMS, LARGE MUNICIPAL SYSTEMS, AND THIRD-PARTY SYSTEMS

Section 6.05.- Rate for Service

- A. System owners must charge uniform rates across all customers of the same customer class of a single microgrid system. Within a customer class, rate structures such as inclining- or declining-block, time-of-use, and seasonal pricing may be used.
- B. The average rate at which energy and grid services are sold shall not exceed utility company PREPA's average rate of 20.22 cents per kilowatt-hour as of June 2017. Rates may vary in the case where resiliency and power quality are the drivers to operate the microgrid.

Comment:

- Microgrids with resiliency and higher power quality have value that may justify an average rate higher than the current energy priced service provided by the utility company PREPA.
- Microgrid costs may be higher depending on the specific location-specific and limiting them to an average rate across all of the utility company PREPA territory may not provide sufficient incentive for microgrids to be deployed in some locations.

Suggestion:

- ❖ Remove rate cap requirement and allow the market place to determine the cost for a high value offering that goes beyond "typical" PREPA service. Or consider allowing commercial and industrial customers with sophisticated legal and accounting resources an exception from this requirement as they have the means to successfully negotiate a rate that meets their needs.
- C. The rate charged by system owners for energy and grid services may escalate yearly at a rate no greater than one-quarter ($\frac{1}{4}$) of the percentage change in average fiscal-year "Other Goods and Services Consumer Price Index" from the Government Development Bank⁵ over the FY 2017 average of 116.4. However, in no event shall the rate exceed the greater of (1) the maximum rate established in in part (B) of this section or (2) the whole-system average rate charged by a utility company PREPA, as measured over the most-recent twelve-month period for which sufficient data is available.

Comment:

This provision has the effect that rate changes are required to lag PREPA's yearly escalation, preventing microgrid owners from following market fluctuations.

- D. For non-metered systems, system owners may charge for energy and grid services on an alternative basis (for example, per kilowatt of installed or diversified load, or per month). In this case, microgrid owners must provide, along with their applications, calculations supporting this alternative charge, demonstrating that it does not exceed

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the maximum rate established in parts (B) and (C) of this section.

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Section 6.10.- Non-Discrimination

Comments: This section must be eliminated. The state must not intervene in the energy business. Microgrids operate within a defined geographical area and customers will have the free will of deciding if they will participate or not on the microgrid. To impose a Microgrid owner to enter in business with certain clients would constitute an undue burden to the business.

A. Microgrid owners covered under Article 6 of this Regulation are prohibited from discriminating against individual customers in the immediate vicinity of the microgrid if those customers do not have access to PREPA service and would like to take service from the microgrid.

Comments:

This requirement could be problematic for microgrid owners and existing customers, due to technical and cost considerations. The item "C" below is important.

B. In order to demonstrate non-discrimination:

1. Microgrid owners must submit a map of the proposed microgrid boundaries showing the loads to be interconnected to the system.
2. The Commission at its discretion may review the maps and determine whether or not the proposed system boundaries constitute discrimination.

C. Microgrid owners may request reconsideration of a Commission determination of discrimination, in which case they shall demonstrate either of the following:

1. That based on cost, it is not feasible to connect the customers who have been excluded. In this case, the microgrid owners shall be required to submit a calculation showing that providing service to a specific customer would exceed the average cost of providing service to the other customers of the same customer class such that the average rate charged to the excluded customer would not permit the microgrid owner to recover its costs plus a reasonable return, if applicable.
2. That it is technically not feasible to connect the customer. In this case, the microgrid owner shall be required to submit an affidavit signed by a licensed professional engineer describing the technical barriers that prevent delivery of service to a specific customer.

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