GOVERNMENT OF PUERTO RICO
PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU

IN RE: OPTIMIZATION PROCEEDING OF MINIGRID TRANSMISSION AND DISTRIBUTION INVESTMENTS	**CASE NO**.: NEPR-MI-2020-0016 **SUBJECT**: Compliance with March 24, 2021 Resolution

THE PUERTO RICO ELECTRIC POWER AUTHORITY'S RESPONSES IN COMPLIANCE WITH THE MARCH 24, 2021 RESOLUTION

COMES NOW the Puerto Rico Electric Power Authority through its legal representation and respectfully submits the responses to Attachment A- No Regrets Options DERs Questions listed in the *Resolution* entered by the Puerto Rico Energy Bureau of the Public Service Regulatory Board on March 24, 2021. Exhibit A.

RESPECTFULLY SUBMITTED.

In San Juan Puerto Rico, this 14th day of April 2021.

s/ Katiuska Bolaños-Lugo
Katiuska Bolaños-Lugo
kbolanos@diazvaz.law
TSPR No. 18888

DÍAZ & VÁZQUEZ LAW FIRM, P.S.C.
290 Jesús T. Piñero Ave.
Oriental Tower, Suite 8-C
San Juan, PR 00918
Tel. (787) 395-7133
Fax. (787) 497-9664

CERTIFICATE OF SERVICE

It is hereby certified that, on this same date, I have filed the above motion with the Office of the Clerk of the Energy Bureau using its Electronic Filing System at https://radicacion.energia.pr.gov/login, and a courtesy copy of the filling was sent via e-mail to mario.hurtado@lumamc.com; wayne.stensby@lumamc.com; Ashley.engbloom@lumamc.com; Legal@lumamc.com; margarita.mercado@us.dlapiper.com; Elias.sostre@aes.com; jesus.bolinaga@aes.com; cfl@mcvpr.com ; ivc@mcvpr.com; notices@sonnedix.com; leslie@sonnedix.com; victorluisgonzalez@yahoo.com ; jcmendez@reichardescalera.com; r.martinez@fonroche.fr ; gonzalo.rodriguez@gestampren.com;kevin.devlin@patternenergy.com; fortiz@reichardescalera.com ; jeff.lewis@terraform.com; mperez@prrenewables.com ; cotero@landfillpr.com ; geoff.biddick@radiangen.com ; hjcruz@urielrenewables.com ; carlos.reyes@ecoelectrica.com; brent.miller@longroadenergy.com ; tracy.deguise@everstreamcapital.com ; agraitfe@agraitlawpr.com ; h.bobea@fonrochepr.com ; ramonluisnieves@rlnlegal.com ; hrivera@oipc.pr.gov ; info@sesapr.org ; yan.oquendo@ddec.pr.gov ; acarbo@edf.org ; pjcleanenergy@gmail.com ; Jmadej@veic.org ; nicolas@dexgrid.io ; javrua@gmail.com ; JavRua@sesapr.org ; lmartinez@nrdc.org ; thomas.quasius@aptim.com ; rtorbert@rmi.org; tjtorres@amscm.com ; lionel.orama@upr.edu ; noloseus@gmail.com ; aconer.pr@gmail.com ; dortiz@elpuente.us ; wilma.lopez@ddec.pr.gov ; gary.holtzer@weil.com; ingridmvila@gmail.com ; rstgo2@gmail.com; agc@agcpr.com ; presidente@ciapr.org ; cpsmith@unidosporutuado.org ; jmenen6666@gmail.com ; cpares@maximosolar.com ; CESA@cleanegroup.org ; acasepr@gmail.com ; secretario@ddec.pr.gov; julia.mignuccisanchez@gmail.com ; professoraviles@gmail.com ; gmch24@gmail.com ; ausubopr88@gmail.com ; carlos.rodriguez@valairlines.com ; amaneser2020@gmail.com ; acasellas@amgprlaw.com ; presidente@camarapr.net ; jmarvel@marvelarchitects.com; amassol@gmail.com ; jmartin@arcainc.com ; melitza.lopez@aep.pr.gov; eduardo.rivera@afi.pr.gov ; leonardo.torres@afi.pr.gov ; carsantini@gmail.com ; directoralcaldes@gmail.co · imolina@fedalcaldes.com ; crivera@fedalcaldes.com; LCSchwartz@llb.gov; thomas@fundacionborincana.org ; cathykunkel@gmail.com ; joseph.paladino@hq.doe.gov; adam.hasz@ee.doe.gov ; Sergio.Gonsales@patternenergy.com ; energiaverdepr@gmail.com ; Arnaldo.serrano@aes.com; Gustavo.giraldo@aes.com; accounting@everstreamcapital.com; mqrpcorp@gmail.com jczayas@landfillpr.com, auriarte@newenergypr.com; Jeanna.steele@sunrun.com; mildred@liga.coop; rodrigomasses@gmail.com; presidencia-secretarias@segurosmultiples.com

In San Juan, Puerto Rico, this 14th day of April 2021.

s/ Katiuska Bolaños-Lugo
Katiuska Bolaños-Lugo

Exhibit A

Responses to Attachment A
No Regrets Options-DERs Questions 5 through 10

Attachment A-No Regrets Options - DERs – Questions and PREPA's Responses

5. What are the best "no regrets" distributed energy resource solutions for Puerto Rico? Why? How should they be deployed, implemented, or procured? Please be as specific in your response as is possible, including identifying ng the scale and type of distributed resource solution, and the likely physical locations (i.e., e.g., rooftops, substations, brownfields, green fields) and any other relevant attribute or consideration.

PREPA's Response:

DER have, by their small scale and location nature higher cost per MWh produced than those from utility scale resources (USR) that benefit from economies of scale, technologies (e.g. tracking) and optimized location. Hence DER options that likely to be "no regret" are those where the costs associated with bringing utility scale resources to the same delivery point (i.e. the load) with comparable levels of reliability and required resiliency are higher. The costs that Utility Scale Resource incur are largely the T&D costs and includes:

a) Interconnection costs to the transmission or subtransmission grid.
b) Transmission costs to transmission / distribution substations
c) Distribution feeders from the substation to the area where the DER is being deployed.
d) Transmission and distribution losses.
e) Voltage support and regulation (capacitor banks and voltage regulators).

T&D facilities have very important economies of scale thus the larger the load to be served and its density the lower the cost T&D per MWh delivered. On the other hand, the smaller the load served and/or its density the less likely that utility scale resources will be more economic than DER when the T&D costs are considered.

Considering this the best candidates for DER solutions one must consider the situations when regret would happen and based on this assess its likelihood. Hence regret could occur in those situations where:

a) The T&D costs were overestimated and a suboptimal DER solution was implemented.
b) The investment necessary to achieve comparable reliability and resiliency as the T&D + Utility Scale generation were underestimated.
c) The O&M and Administrative costs were underestimated as compared with the T&D + Utility Scale generation solution.
d) Situations where the DER solution underperformed either by their design not taking into account all variables with regards to the load served, by underperforming equipment (inverters, battery banks not performing as designed or failing prematurely) or potential impacts by severe weather events not properly considered in the analysis.

Considering the above the best "no regrets" solutions for Puerto Rico as very likely to be solutions centered on addressing the needs of the microgrids identified in the IRP. In this case regret would happen only in the unlikely case that transmission solution could be economically hardened to allow the interconnection of these relatively remote load pockets to larger utility scale generation. The table below provides an overview of the microgrids identified ranked as a function of the load.

This rank takes into account that while the load is relatively small for utility scale solutions and the investment in hardened transmission would be substantial, larger loads could benefit from local solutions as for example community solar and storage or local RICE.

Table 1: Microgrids identified.

Region	Microgrid	Load MW
Caguas	AIBONITO	13.2
Mayaguez	SAN SEBASTIAN	12.1
San Juan	VILLA BETINA	10.9
Caguas	BARRANQUITAS	9.2
Arecibo	JAYUYA	9.2
Caguas	SAN LORENZO	9.1
Arecibo	MOROVIS	8.8
Bayamon	COROZAL	8.7
Arecibo	UTUADO	7.2
Ponce	VILLALBA	7.2
Bayamon	NARANJITO	6.8
Mayaguez	LARES	6.6
Caguas	AGUAS BUENAS	6.4
Caguas	COMERIO	6.1
Carolina	VIEQUES	5.7
Caguas	OROCOVIS	5
Arecibo	CIALES	4.8
Ponce	PATILLAS	4.8
Mayaguez	COMBATE	4.5
Caguas	PUEBLITO DEL RIO	4.5
Caguas	ABANICO	4.5
San Juan	QUEBRADA NEGRITO	4.5
Ponce	ARROYO	4.5
Bayamon	BARRIO PIÑAS	4.4
Caguas	YABUCOA	4.2
Arecibo	FLORIDA	4.1
Arecibo	CHARCO HONDO	3.6
Arecibo	ADJUNTAS	3.3
Mayaguez	LAS MARIAS	3.2
Arecibo	DOMINGUITO	3.2
Bayamon	UNIBON	3.2
Carolina	CULEBRA	3
Caguas	RIO BLANCO	2.9
Ponce	MAUNABO	2.8
Caguas	NAGUABO	2.6
Mayaguez	MARICAO	2.3
Ponce	PEÑUELAS	2.3

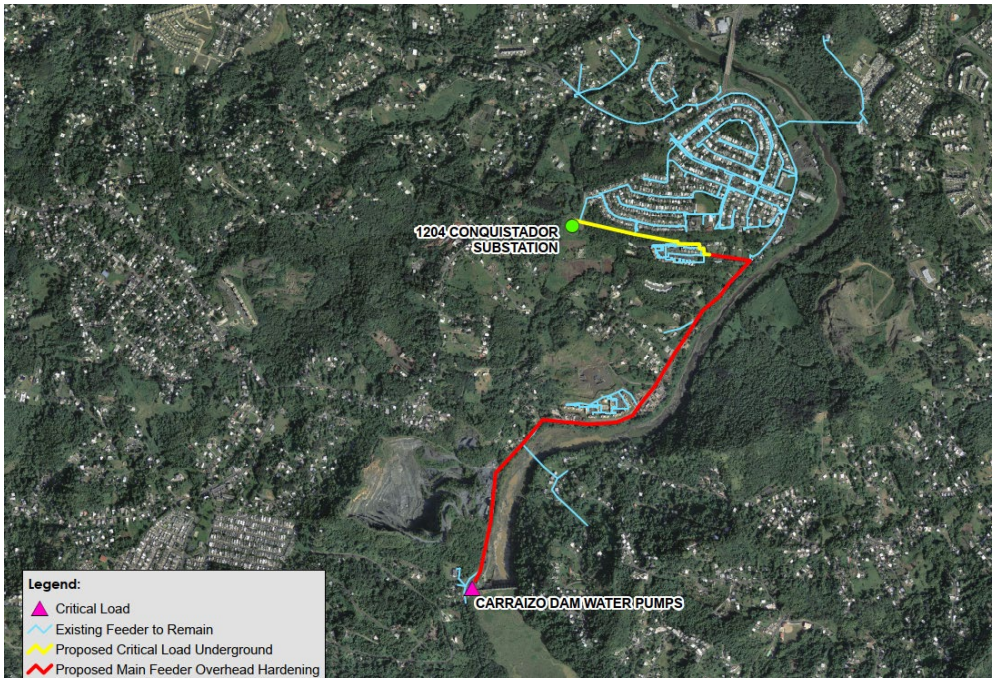
Region	Microgrid	Load MW
Arecibo	CAGUANA	2
Mayaguez	BOQUERON	1.9
San Juan	CARRAIZO	1.8
Arecibo	YAHUECAS	1.1
Mayaguez	CROEM	1
Mayaguez	LAS VEGAS	1
Mayaguez	MONTE DEL ESTADO	1
Mayaguez	BARTOLO	1
Mayaguez	INDIERA	1
Arecibo	DOS BOCAS	1
Arecibo	GUAJATACA	1
Ponce	PORTUGUES	1
Total		224.2

Further identification of no regret candidates can be done by analyzing individual feeders and considering the investment necessary to provide resiliency for example to the critical loads and adequate service to the priority and balance of the loads (i.e. adequate balance between investments and restoration times). The investment in the distribution network plus an allocation of the investment at the transmission / sub-transmission level should be expected to be higher than the expected investment in providing a local DER solution.

We provide below a couple of examples where the DER solution could be superior subject to further review.

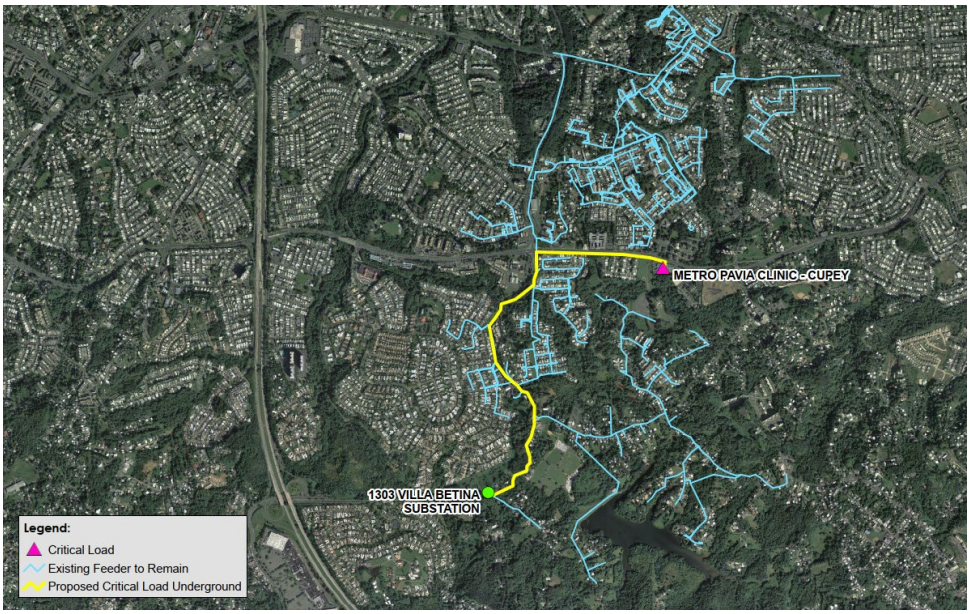
Feeder 1204-03 to supply the Carraizo Dam Water Pumps. In this case a DER solution could be investigated given the distance of overhead to be hardened and its exposure to weather. However, location of the DER may be an issue. See figure below:

Figure 1: Feeder 1204-03



Feeder 1303-2, in this case the underground will provide also resilient service to residential loads and balance of loads but the undergrounding to supply the critical load should be compared with the investment in a local DER to give continuity and assess the possibility of using hardened overhead instead.

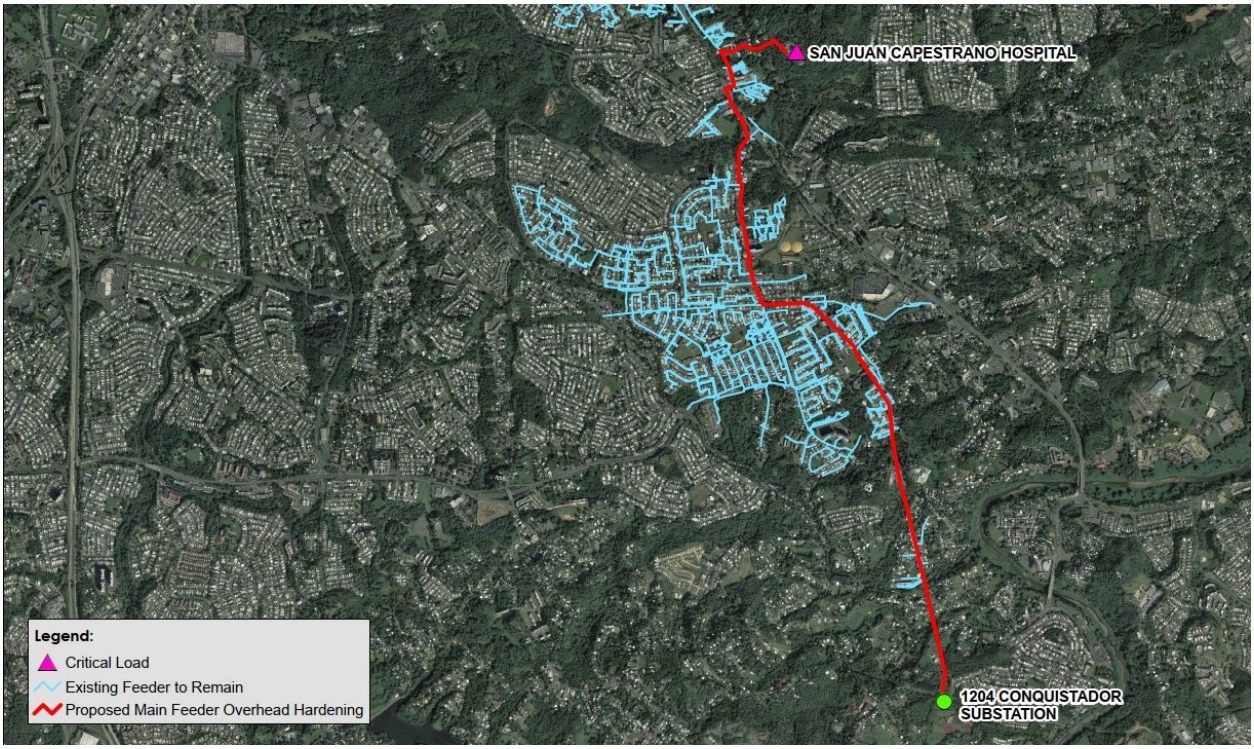
Figure 2: Feeder 1303-2



Feeder 1204-5 is another candidate to review. The substation is rather remote and the proposal is to harden overhead, which is likely to be the best solution, as it would also provide a point of

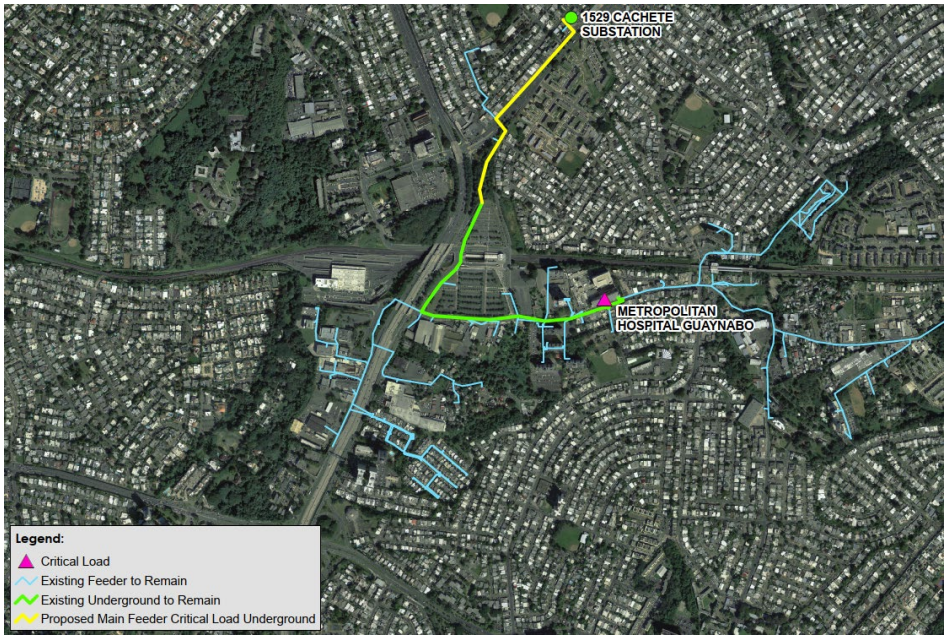
resilient service from which to the bulk of the load of the feeder could be reconnected to. However, the critical load (Hospital) could benefit from a local DER solution for continuity of service.

Figure 3: Feeder 1204-5



Feeder 1529-15 on the other hand is one example where the utility scale solution is likely to be superior. Note that there is already an existing underground, and that the density is high.

Figure 4: Feeder 1529-15



Similarly, feeder 1117-11 is another case where the density is high and there is an existing underground system, so the utility scale solution is likely to be superior.

Figure 5: Feeder 1117-11

provide the minimum level of resiliency that these loads.

6. How should the resiliency value of specific distributed resource solutions be gauged?

PREPA's Response:

To gauge the resiliency value of the DER, first its availability after a major event should be considered. Note that DER by its nature is local and does not benefit from diversity, that is

extended cloud cover over one location is not compensated by the clearer skies over another. Another aspect to be considered is the dependence on local distribution lines, for example a resource may be shared by multiple loads and the distribution system must also be resilient. Hence the first step in this process is to identify the amount of load that would be served by the solution and the expected restoration times (if any) after the event. The next step is to assess its value and to address this the question of value to whom must be addressed. We expect that the answer to this is "the value to the end customer that will otherwise sustain the outage", and for this case the Value of Lost Load (VoLL) could be used. Note that this value is different by the type of customer that is affected and the duration of the outage. The value is hence the energy supplied by the DER x VoLL as applicable.

7. How can the Energy Bureau support the most rapid deployment of distributed energy solutions for increased resiliency?

PREPA's Response:

The most rapid deployment of resiliency to most customers should be the goal and to achieve this the use of all available alternatives should be considered. This includes in addition to DER, utility scale resources. PREPA's experience on restoration and the studies carried out for the IRP, showed the importance of having local utility scale resources to support the recovery of most customers; case in point the generation distributed along the island (Yabucoa, Daguao, Palo Seco, Cambalache, Mayaguez, Costa Sur, Aguirre, etc.) that has been crucial in restoration. The Energy Bureau support in having dependable generation at these locations together with dependable transmission will go long ways to provide resiliency. For DER, in our opinion, the Energy Bureau should focus on those locations where DER is very likely to be a superior solution and promote its development. As part of Question 5 we provided some guidelines that could be used to identify these locations.

8. What is PREPA's role or LUMA's role in facilitating DERs for resiliency? Please comment on each of the following ng potential roles for PREPA or LUMA

    a. Should PREPA or LUMA be responsible for analysis of microgrid options? Why or why not?

PREPA's Response:

PREPA and should be responsible for analysis of microgrid options through the completion of the LUMA transition, at which point LUMA, in consultation with PREPA, should assume this responsibility. The entity responsible for planning, operation and maintenance of the T&D system is and will be in the best position of any stakeholder to evaluate microgrid design, prioritization and deployment options. Today that entity is PREPA; with the completion of the transition under the terms of the Puerto Rico Transmission System Operation and Maintenance Agreement among PREPA, the P3 Authority, LUMA Energy, LLC and LUMA Energy Servco, LLC, dated as of June 22, 2020 (the "T&D O&M Agreement"), LUMA will become master of the information relating to the T&D system's operation and ongoing evolution that

will be necessary to permit an informed assessment of issues relating to the definition, design and implementation of microgrids. PREPA anticipates that LUMA will build upon the base of knowledge of the T&D system which PREPA has developed, and in accordance with the T&D O&M Agreement will bring to the task of evaluating microgrid options system modelling and analytical capabilities beyond those PREPA currently has available. These capabilities will be critical to any analysis of alternative possible microgrid configurations and the establishment of priorities for the establishment of the individual microgrids.

PREPA will remain the owner of the T&D system even after LUMA takes on responsibility for T&D system operation and maintenance. Accordingly, PREPA has a substantial interest in the processes through which decisions on the configuration and development of the T&D system are made, and in the manner in which those decisions are implemented. PREPA, in its capacity as asset owner, should therefore be involved formally in the evaluation of microgrid options following the completion of the LUMA transition.

b. PREPA currently facilitates the development and integration of distributed generation through procurement of VPPs, and through development of Demand Response programs. Should PREPA or LUMA support direct installation of DERs through specific procurement tariffs?

PREPA's Response:

PREPA is required by provisions of law (in particular, Act 114-2007) to afford customers the opportunity to generate energy and to be paid for amounts delivered to the grid under net metering arrangements. The result has been payment structures that promote third party development of DERs, including provisions that require PREPA to support net metering. These structures offer consumers substantial incentives to develop distributed generation facilities. They will continue to provide these incentives following the completion of the LUMA transition.

It is not clear to PREPA that it would be necessary or desirable for the Energy Bureau to mandate that PREPA or LUMA provide incentives beyond those that currently exist for the installation of DERs. Under the existing net metering program, qualifying customers are paid the equivalent of PREPA's retail rate for energy they are able to produce in their own facilities and deliver into the grid. This level of compensation is arguably greater than necessary to encourage the development of DERs in that it yields a windfall for consumers who can take advantage of the net metering program. In PREPA's view no additional monetary incentive would be appropriate given the upward pressure on PREPA's rates which results from payment of the retail rate for customer-generated energy. Accordingly, PREPA would caution against adoption of proposals that would in any way increase the incentives for self-generation that currently exist and would

instead advocate that the Energy Bureau move away from net metering over time.

If the Energy Bureau were to conclude that PREPA and, eventually, LUMA should provide support for the direct installation of DERs beyond that which is already available, it might consider the establishment of a program that would enable PREPA or LUMA to compensate the DER owner for the amount of fully dispatchable capacity it contractually commits to the purchaser for a multi-year period. The Energy Bureau might consider permitting the pricing of this capacity product to reflect the location of the specific DER, with DERs located in areas of the T&D system in greatest need of local support being compensated at levels greater than the compensation offered to resources located in other areas.

c. Should PREPA or LUMA directly participate in the installation and maintenance of distributed photovoltaic systems with storage? Would this be in alignment with Act 17-2019 and other Puerto Rico public policy that supports "prosumers"?

PREPA's Response:

Given the mandates of Act 17 and Puerto Rico public policy, PREPA should not be tasked with the responsibility of participating directly in the installation or maintenance of distributed PV systems with storage. While it is true that Act 17 and other elements of Puerto Rico energy policy express support for the empowerment of "prosumers," this support need not be – and would not best be – provided by the entity charged with responsibility of operating and maintaining the T&D system. Act 17 and Puerto Rico policy have mandated the separation of the utility business of operating and maintaining the T&D system from other businesses, including the development, construction and operation of electric generating facilities; directing PREPA to take on the entirely new responsibility of installing and maintaining solar PV and storage systems would run counter to this mandate.

In Puerto Rico and elsewhere in the U.S., solar PV and battery storage system sales, installation, maintenance, and management are generally performed by private sector players which specialize in these activities. It is rare in the U.S. for regulated electric utilities to perform these functions, given the availability of many private sector actors who compete in terms of the solar plus storage products, service terms and prices they offer to attract consumer business.

PREPA personnel and management capability is better suited to the considerable challenges of restoring, enhancing, operating and maintaining the T&D system than they would be to the tasks of marketing, selling, installing, managing and maintain solar PV and storage equipment that can be handled by firms currently in the business and by new entrants which increased demand may draw into the market.

It should be noted that the involvement of PREPA or LUMA in the installation and maintenance of distributed PV systems with storage is not likely to make such

installations eligible for funding by the Federal Emergency Management Agency ("FEMA") under Sections 406, 428 and 404 of the Stafford Act. Eligible applicants for FEMA Section 406/428 and 404 funding are state and local governments, private non-profit entities, and Indian tribes or other authorized tribal organizations (44 C.F.R. §§ 206.222 and 206.434(a)); such funding is not available for private, for-profit entities. FEMA is therefore unlikely to approve proposals to use FEMA Section 406/428 or 404 funding to develop renewable energy projects to be owned by private (investor-owned) partners. While it is possible, with FEMA approval, to arrange for the transfer of FEMA funding or projects constructed with funding provided under a Section 428 fixed estimate, the transferee must be a government or non-profit entity that is an "eligible applicant" under 44 C.F.R. § 206.222. And although an eligible applicant can contract with for-profit entities to construct a facility approved for funding under Section 406/428 or 404, the legal responsibility for the facility must remain with the eligible applicant (which cannot include private, for-profit entities). Consequently, having PREPA or LUMA step in as the entity that procures, installs, and maintains solar PV plus storage facilities to be owned by private individuals or businesses would not render those installations eligible for FEMA funding support.

9. In general, concerning the best microgrid candidate sites across Puerto Rico:

    a. Comment on the number, size, facility type, and resource configurations identified at the microgrid sites in the Sandia microgrid report (159 sites) and in PREPA's Appendix 1IRP filing ("50 potential zones").
    b. Should all these sites be specifically targeted for microgrid development for resiliency reasons? Explain in why or why not.

PREPA's Responses for questions 9(a) and 9(b):

As mentioned in the IRP, there are some areas that given their relative isolation and geography, would be economically impractical to provide resiliency through traditional T&D hardening or expansion. Given this situation, these loads are best suited for the use of microgrids. PREPA through its IRP analysis identified about 50 zones that could be suited for this arrangement. The concept provides for critical loads in those microgrids to be covered by thermal units as these can be readily available after a major event. It is important to stress that the critical loads are served by thermal generation to the extent they fulfill a service for availability; that is, technology should not be prescriptive and instead focus on reliable service right after major events.

Prioritization of these project should be based on its cost effectiveness and the potential for benefit to the largest number of clients possible (See answers to questions 5 and 6).

    c. Comment on how microgrid applications should be paid for, differentiating between "public" and "private" microgrids.

PREPA's Response:

For purposes of this response, PREPA will assume that a "public" microgrid would be one that would be incorporated into the PREPA owned T&D system and would be financed and owned by PREPA, as are other T&D assets serving Puerto Rico electric consumers. A "private" microgrid would be one that would be developed, financed, constructed and owned (and perhaps operated) by a private sector entity (i.e., not PREPA or another governmentally-owned organization).

As indicated in PREPA's response to question 8(c), the identity and status of the owner of facilities can have an important bearing on the availability of public funding to pay for those facilities. A "public" microgrid incorporated into the PREPA-owned T&D system may be eligible for FEMA funding under Section 428 of the Stafford Act if the microgrid would repair, restore, reconstruct, or replace facilities damaged by Hurricanes Irma and María. Or, if the microgrid would qualify as a hazard mitigation project, the public microgrid may be eligible for FEMA funding under Section 404 of the Stafford Act. Federal funding under these provisions of the Stafford Act would be available only to an "eligible applicant," which would include PREPA (a government-owned entity) but would not be available if the applicant were a private, for-profit entity.

PREPA anticipates that some consumers, particularly those with substantial electricity requirements and special reliability requirements, may be interested in establishing "private" microgrids that would link specific loads with local sources of supply. Such microgrids could contribute in important way to the overall reliability and resiliency of electric service, and they therefore should not be discouraged. But these "private" microgrids would generally not be eligible for FEMA funding as repair or replacement facilities under Section 428 or as hazard mitigation projects under Section 404 of the Stafford Act. Their development and ownership a private sector entity would be disqualifying. See response to question 8(c).

10. In general, concerning stand-alone DER solutions (i.e., not microgrids) across Puerto Rico:

    a. How should stand-alone DER solutions be procured or paid for?

PREPA's Response:

Generally speaking, stand-alone DER solutions should be sponsored and financed by facility owners, whether privately or governmentally owned, who would be best positioned to evaluate alternative DER solutions in light of their existing and anticipated requirements. Contracts for the sale of the electrical generation capacity and energy they can provide in excess of local requirements (*i.e.*, capacity and energy that can be delivered into the T&D system) should be offered to PREPA or its successor through the Request for Proposal process which the Energy Bureau has found appropriate for the procurement of resources identified in the Approved Integrated Resource Plan and Modified Action Plan.

PREPA expects that most DER solutions will be privately financed. Some public purpose DER solutions could be publicly financed where the involved municipality or governmental authority has the capacity and mandate to finance investments in energy production facilities. It is conceivable that some DER solutions could qualify as hazard mitigation projects (through a process administered by the Central Recovery and Reconstruction Office of Puerto Rico ("COR3") and, where such projects would be owned by an "eligible applicant" under 44 C.F.R. § 206.222, could be eligible for FEMA funding under Section 404 or Section 406 of the Stafford Act. This would not be true of DER solutions that are privately owned.

b. Should the Energy Bureau differentiate between resiliency provided by public purpose DER solutions (e.g., town centers, municipal buildings, water and sewer facilities), and private purpose DER solutions, when considering alternative deployment and procurement vehicles for these resources?

PREPA's Response:

From PREPA's perspective, contributions to grid resiliency are valuable regardless of their source. The Energy Bureau should encourage investments in DER solutions that contribute to enhanced grid resiliency whether they are to be developed for public purposes or private purposes. If prioritizing among DER solutions becomes necessary given resource constraints or limits on the T&D operator's ability to integrate new resources in a given period, it would be consistent with the public interest for the Energy Bureau to authorize that preference be given to procurement of DER solutions that provide the most significant contributions to enhancement of grid resiliency and reliability, without regard to whether the investment's purpose is public or private.

If it were to prove possible for some public purpose DER solutions to qualify for consideration by COR3 as hazard mitigation projects, it would be appropriate for the Energy Bureau to direct that priority be given to development and procurement of these resources while the opportunity for FEMA funding remains open.