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

IN RE: REVIEW OF THE PUERTO RICO ELECTRIC POWER AUTHORITY INTEGRATED RESOURCE PLAN	CASE NO. CEPR-AP-2018-0001 **SUBJECT**: FINAL BRIEF

FINAL SUBSTANTIVE BRIEF BY SUNRUN

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW Sunrun, represented by appearing counsel and respectfully alleges and prays:

I. Introduction

1. The uncontroverted testimony in this Integrated Resources Plan (IRP) proceeding's hearing record clearly established the following facts:

A) That the services provided by aggregated/networked solar plus storage, also known as 'Virtual Power Plants' (VPPs), are indistinguishable from those of fossil generation peakers;

B) That from an economic, resiliency, environmental, land use, permitting, general pro-renewables and anti-grid defection public policy point of view, VPPS are in many ways superior to other resource options;

C) That VPPs are simple to procure via request for proposals (RFPs) or special rates/tariffs performance and/or efficiency programs, all of which have been tested in other jurisdictions,

E) That VPPs are simple to build, and grow given their ability to be deployed in a modular, stepwise fashion, and can help defer spending on transmission and infrastructure;

D) That customers are demanding solar plus storage today, becoming prosumers today, that untapped VPP resources are thus being deployed everyday, as we speak.

2. This IRP process' record as a whole, amply and clearly supports the above-listed facts. and not only from the testimony, answers and statements of our expert witness, Mr. Chris Rauscher, but also from PREPA officials and consultants, as well as other parties and witnesses.

3. Although the Puerto Rico Electric Power Authorities' (PREPA) draft IRP did not discuss VPPs, this IRP's evidentiary hearings have made evident that the final IRP must include VPPs as a first-decision, no-regrets solution, and thus inform near-term PREPA resource procurement actions.

II. Specific Hearing Testimony in Support of VPPs and VPP benefit/advantages

4. For the benefit of this Honorable Bureau and all parties and intervenors, we include several testimony excerpts, based on our own hearing transcriptions, which support the above-stated facts as well as the objective of near-term deployment of VPPs in Puerto Rico:

A) <u>IRP Day 2 (afternoon):</u>

> [01:01:35] [PREB Expert Examiner]: I'd like to ask a question of either Mr. Wilson or the Sunrun witness. In terms of controllability of distributed resources and I'm talking about battery systems. What is your understanding of what would be required to control battery resources that are there installed? [...] If all of you or one of you is best to sort of paint a picture of what you believe or as is required. In order to think about how those could be controlled so that PREPA can be confident of the distributive value of that battery resource, be it backed up by a solar P.V. system or not.
>
> [01:04:02] [SUNRUN Expert witness]: Thank you for the question, Chris Rauscher with Sunrun. I think it depends on what you mean by controllable. But I can give you a couple examples. [...] In Hawaii, we have a virtual power plant contract with HECO. They have a four hour peak and this gets to a question earlier in the day. We cover that for our peak by pre-scheduling all of our systems to deliver energy [...] through those four hours. So that's a form of control, but that's scheduled under that same control.

[01:04:56] [PREB Expert Examiner]: So in that specific example, you schedule output of the battery over the four hour period under you schedule it with HECO. [...]

[01:05:10] [SUNRUN Expert witness]: And we do the same thing in California on TOU rates and the same thing in the Northeast with our wholesale market participation. [...] The other piece [...] of that contract is also [...] autonomous fast frequency response. So the inverters pick up on a change in frequency and autonomously respond. That's also a form of control, but there is no one at the utility pushing a button. So I think it depends on capabilities rather than control. And also on programs to pay for the performance from the system. So in Puerto Rico, we install the same sophisticated solar plus storage systems that we do in Hawaii and California and in the Northeast. So everything that we've installed today in Puerto Rico could perform these same functions here that they do in our other markets.

[01:06:02] [PREB Expert Examiner]: The scheduling that occurs, is that a daily process?

[01:06:05] [SUNRUN Expert witness]: It can be so in Hawaii [...] I think that's daily in the Northeast. There's different seasonal windows. [...] [01:06:55] They could just tell us the schedule and then we can show compliance via a monthly batch [CSV] file, for example, in aggregate that can ramp up in terms of sophistication, so that we have an API connection at some point in the future. And the utility does have the capability on their side to call a dispatch, you know, within an hour or sometimes even a shorter time interval.

[01:07:59] [SESA Expert witness]: [...] It appears to me that there's not a technology barrier; that we'd have to wait for PREPA to deploy mass modern API smart meters. [...] [W]e have models from around the nation and the companies on the ground here that can be responsible for flipping the switch and providing the dispatchable storage on a large scale.

[01:13:09] [PREB Expert Examiner]: I want to put this question to Dr. Bacalao [Siemens] and Mr. Paredes [PREPA]. At the bottom of page 67 in the IRP, you state, without the proper foundation of utility, integrated energy storage and software controls, [that] renewable energy resources could face technical and operational challenges. So I want to ask you first, generally, what is that foundation? Of utility, integrated storage and software controls that would be required to count distributed generation battery resources for preppies purposes.

[01:14:12] [PREPA/Siemens]: [...] That's a very timely question, [...] whenever there is a frequency issue, the batteries contribute. And second, that they're able to follow a schedule, a dispatch, [...] today, one of the most important aspects for the integration of renewables. [...]

[01:15:42] [PREB Expert Examiner]: So you certainly wouldn't disagree and perhaps you might agree with Mr. Rauscher's characterisation that what they've done in Hawaii, for example, and I know there's many ways to skin a cat, but what they've done in Hawaii, for example, **could work notionally at for PREPA to use distributed resources, batteries, distribute distributed batteries as a resource that actually is akin to or serves as that proxy for what you talked about in the modeling**.

[01:16:14] [PREPA/Siemens]: **It follows a schedule and it provides frequency response. Therefore, it's akin to a utility scale battery in use as described**. **Yes**.

[01:37:53] [PREB Expert Examiner]: Mr. Rauscher, I ask you another version of the same question, perhaps a bit more challenging. Perhaps beginning to deviate from your testimony just a little bit. How could PREPA design a compensation package for virtual power plants that's more attractive to customers than them potentially disconnecting from the grid [01:38:28] [...] while still allowing PREPA to recover revenue?

[01:38:36] [SUNRUN Expert witness]: It's a great question. I **think there are a couple of different ways that could be done. One would be to [use RFPs] that are already going out to procure emergency generation and procure some demand side resources through that. Another way would be to fund it through the energy efficiency programs, as the testimony shows from this morning. Those ultimately save ratepayers money. [...] That's another way to do it. You could also do a RFP for every single public housing site or some, you know, maybe 100 megawatt tranches of public housing sites in Puerto Rico. I think Puerto Rico is the second largest public housing authority in the country. So you could site solar on the rooftops there and batteries in the common areas and reduce those ratepayer bills and then use the batteries, obviously, to provide a resource. I think [...] there are different ways to structure it. I think one sort of no regrets way is the energy efficiency funded bring your own device programs. Those are open to everyone. You don't have to win an RFP - [...] a battery and the appropriate technology can enroll and get paid for the performance.**

[03:26:27] [Windmar attorney]: [...] I have another question for Chris Rauscher from Sunrun. You discussed aggregated networks of storage or virtual power plants earlier. I would like to better understand how could PREPA or PREB go about contracting a virtual power plant? How does that work?

[03:26:55] [SUNRUN Expert witness]: I think there are two main buckets or ways to do that, one is the sort of open access tariff where you install solar and storage generally behind the meter and enroll it in a tariff program as in Massachusetts and you get paid for performance. The other bucket is to put out the RFP the same way you would for utility scale solar or a fossil resource. But in this case, it would be **a PPDA 'power purchase and dispatch agreement'. So you'd be buying the energy and dispatch rights for whatever needs the utility is defining. That could be put out to RFP just like any other resource. And in that case, there are structures that you could set up to use that agreement as a hedge. Excuse me, as a hedge against grid defection,** you could site those resources on people's homes and people's businesses and those customers maybe pay a little bit a month for the resiliency provided by the battery. And the utility is actually the off-taker of the energy. And so that's a way where a customer can get the reliable power that they want out of solar and storage. But the utility is also able to rate base the service agreement and make sure that that customer stays on the grid in perpetuity.

[03:28:17] [Windmar attorney]: So in the scenario of that RFP you mentioned, [...] who would the utility be contracting with? Is it with each individual customer or how would that work?

[03:28:27] [SUNRUN Expert witness]: So it would be with a developer, whether that's a Tesla or Sunrun or a Sunnova [...]. And that would create a couple of benefits. One would be that **that developer would monetize the investment tax credit, which would immediately allow in many cases still today a 30 percent discount because many developers have warehoused and 'safe-harboured' equipment to push that tax credit into the future. And then the other reason would be that the performance risk would not be on the utility.** If I develop around it, it would be on the developer. [Windmar attorney]: And for that developer or the homeowner or ratepayer to provide this service you're talking about, would it be necessary to swap out the PREPA meter on those homes? [SUNRUN Expert witness]: So no. So [...] the majority, [of] the programs that Sunrun participates in on the mainland, including our forward capacity market bid in ISO New England -which is a FERC jurisdictional wholesale market covering all of New England- all of those programs are directly metered at the inverter level, whether that's in the battery or the DC couple paired inverter between the solar and the storage. So that's our metering that meets ANSI C 12.20 standards. Same as a utility meter. And so that's how we show performance. You don't have to swap out the meter on the home.

[03:29:50] [Windmar attorney]: [...] [J]ust to be very clear, for a home that has a D.G. plus battery storage system in their house, there would be no additional technology, not an additional meter.

Nothing new has to be added to that home in order to provide that grid service. We've been talking about that, correct?

[03:30:14] [SUNRUN Expert witness]: Correct. As long as that system has revenue grade metering on board, which all systems that Sunrun [installs] do.

[04:48:57] [SUNRUN attorney]: [...] [O]n the savings narrative and could you [discuss] specifically the different [...] energy services and grid services you can pull out from a battery that mean utility savings?

[04:49:14] [SUNRUN Expert witness]: [Its] in my testimony [...] I don't know if we have the time here, but what I will say is that while we're discussing the IRP, my company and [...] other companies are out there today installing solar and storage right now, this moment, which will not be providing any of these resources or any of these services, any of these savings to the utility, unless they're more expressly contemplated in the IRP, and programs are set up to draw those services out of the systems we're installing.

B) IRP Day 4 (morning):

[00:30:01] [PREB Expert Examiner]: Looking ahead to when you have battery resources on your system, independent of where those resources are, whether or not they're aggregations of small resources, virtual power plants or whether or not their utility scale resources. Do you have a sense of what that will do to your regular operating reserved needs? [...] [A]t what point or at what level of battery resources on your system would the battery resources potentially be carrying most of all of much of your operational reserve requirement?

[00:30:49] [PREPA/Siemens]: That's one of the beauties of the batteries. You can basically have a spinning reserve on line waiting without having that burning fuel. [...]

[02:25:36] [...] [PREB Expert Examiner] I have questions for a number of folks to bounce around [...] on the [...] virtual power plants. I want to start back with it with the Siemens folks or the PREPA folks [...]. **My understanding from our discussion a couple days ago is that if distributed resources, if the utility [can] control [the] ball in some fashion, dispatchable in some fashion, could actually be some component of those overall [IRP MW] totals. Is that fair**?

[02:26:29] [PREPA/Siemens]: **That's correct, sir.** Provided that they behave to the system in the same way that [a] utility scale power plant.

[02:26:49] [...] [PREB Expert Examiner]: **Could all of the solar and storage identified in the IRP be distributed in that fashion, or does just some of it need to be centralized**?

[02:27:16] [...] [PREPA/Siemens]: **If they behave the same. Frequency response; following instructions; there is no way to distinguish one from the other.** [...]

[02:30:20] [...] [PREPA/Siemens]: [...]. Where there are developers like Sunrun or something along those like that could go out and rent; [02:31:15] [...] [e]nter into a form of an agreement with customers. Use their rooftop install. There the photovoltaics installed, either centralized or in each

of their customers facilities [...] then package all that, and offer it to PREPA as part of an RFP where it would be competing with others that may provide a utility scale [...] power plant. [...].

[02:32:10] [PREB Expert Examiner]: Mr. Rauscher. You testified about virtual power plants. [02:32:22] Do you have any sort of design rules of thumb or insights that we could use in the sense of, you know, a customer that had, say, 10 KW of solar PV and a 5 KW battery? How much resource does that look like [as a] component of virtual power plant offering? [...] How much of that could be thought of [...] being part of that utility resource versus that there's some other part that wouldn't necessarily be under the utilities control that sort of potentially extra capacity. I was trying to imagine [the] trade-offs.

[02:33:31] [...] [SUNRUN Expert witness]: I think there's two buckets to the answer. One is this sort of policy regulatory bucket, the other the technology on the policy regulatory side. If you have a customer that has net metering with solar and then has a battery for backup, we're going to build so that that system is economic[...]. I think today if you just take a Tesla Powerwall 13 or so KWH and you reserve twenty percent for backup power at all times and you can use the rest throughout the day to provide utility services. [...] California's a really good example. There we have time-of-use customers where in the morning sun is coming up and it's charging the battery and delivering energy to the home under pretty light demand scenarios. [...] it's just a matter of structuring the program, whether through an RFP or something else, so that you can economically use the size the rooftops here and size the batteries accordingly.

[02:37:01] [PREB Expert Examiner]: Can I just tie a bow on that so that it's not an added cost to the utility ratepayers. If you do it behind the meter versus utility scale.

[02:37:08] [SUNRUN Expert witness]: Right. Yes. The actual cost, the actual end up distribution of costs between the customer and utility would depend on what the actual programs ended up actually looking like.

[02:48:26] [...] [PREB Expert Examiner]: [F]rom a PREPA perspective. Can you think about sort of standardized procurement processes for virtual power plants across the sectors? You know, do they have to have five d**ifferent ways to think about soliciting for virtual power plants or can it be standardized?** [...]

[02:49:14] [SUNRUN Expert witness]: [...] [W]e sort of discussed [this] on Tuesday, **I think there's two different pathways here. One is to standardize [an] RFP. [...] PREPA is looking to procure and then perhaps doing it by, you know, seventy, five megawatt chunks starting with a certain type of site or certain locations. The other way to do it is a very simple tariff program. Connected Solutions in Massachusetts is a great example. We call those BYOB bring your own device programs. So the utility would identify the service that's needed.** Maybe it's peaking capacity over before hours, whatever it is. And they open a tariff. They say if you show up and perform during those hours, then here's what we'll pay you. And that is a way to allow sort of all technologies to come and provide that service. And then a number of different vendors to come and provide that service. And again, I think for Sunrun and most of the solar and storage and sellers here in Puerto Rico [...] [[w]e are taking a resiliency first approach. So we're going to be installing these systems anyway. So any more value that we can get out of the system is only accretive to the customer and obviously to the company as well. **One other piece on this that we haven't really talked about that I think is really important is if you're just looking at standalone utility scale from the meter storage. And the same thing for solar, you're going to miss the ITC benefit on the battery.** [...] [T]hat's 26 percent today. And as I mentioned on Tuesday, for a lot of companies, it's still 30 percent going into the future because we've 'safe-harboured' equipment. [...] **It's really important that [...] when we're viewing solar and storage, we try to do it as much co-located as possible and having the storage being charged by the solar to grab that benefit.** [02:51:16] [...] [W]e're looking for the maximum, biggest value

possible and we think there's at least three buckets. Customer obviously, and that can be obtained in part by tariff and going straight to the customer. But the utility benefits in integrating with [us]- we want to work with utility and be the agent that the utility uses; be in a competitive procurement [...].

[02:58:03] [PREB Expert Examiner]: So let me just put something back to you, Dr. Bacalao. [02:58:12] [...] This is virtual power plant universe out there**. What would you need to know from the virtual power plant? [...][to] [b]e comfortable[...]** "Oh, that's a hedge that I might be able to rely on." You know, [so] that I could scale up procurement of virtual power plant? [...]

[02:59:06] [PREPA/Siemens]: Excellent. That's one question that it was hoping to get. [...] [**Y]ou need to have certainty [...]. [...] [B]uild out that service that will be provided, in other words, the energy that will be injected back into the system** [...].

[03:00:32] [PREB Expert Examiner]: **Mr. Rauscsher just indicated that if he was certain[ty] of contract revenue streams, he could give you that.**

[03:39:49] [SUNRUN attorney]: Good morning, [...] chairman, commissioners, parties. Just a few questions. Javier Rua-Jovet for the record for Sunrun. Question for PREPA, perhaps Dr. Bacalao or anybody else. [03:40:04]We've talked about **VPPs** and [...] **you mentioned that [...] presuming their availability, <u>they're indistinguishable from other potential generation sources</u>. [03:40:18] Is that correct?** [...]

03:40:46] [PREPA/Siemens]: **<u>Correct</u>.** [...]

[03:41:20] [SUNRUN attorney]: Mr. Bacalao, how do you think that VP.Ps have a place within [...] [emergency generation] RFPs, maybe even even as test cases or smaller, smaller [...] proposals?

[03:41:44]. [PREPA/Siemens]: [B]asically [...] in general terms, we will ask for some characteristics of generation that we will need in order to supply or comply with [...].

C) <u>IRP Day 4 (afternoon):</u>

[04:35:46] [PREB Expert Examiner]: The partnership with customers comes up soon. [...] [04:35:59] And that section of the plan, the first part of it talks about the distribution system, including supporting the integration of distributed resources, in particular rooftop solar, and then it also talks about accelerating energy efficiency. On page 10, dash 22, enabling demand response and then and then references appendix four for four timetables around all of that. **But there's nothing specific right there about the partnership with customers as it relates to the sort of virtual power plant discussions that we've had during this week.**[04:36:39] I just wanted to ask you to give us your sense of the extent to which you think the action plan, either as written or as evolving or includes partnerships with customers. That includes something more [...] **and indeed thinks about reaching out and and thinking about the role of virtual power plants as part of the overall action plan**.

[04:37:18] [PREPA/Siemens]: **You're right, there**. [...] [04:37:26] [...]. Approach to the customer, which is for some of the virtual power plants, can be considered. But that takes something different. That's not their retail customer by itself. **<u>It's somebody like [...] a big aggregator that actually builds there</u> [...]. In fact, we're familiar of cases where what they do**

is that they rent their roofs from the houses. They own all of the equipment. They build a power plant very efficiently. [...] So there's different models [...] kind of in a different bucket. Pretty exciting bucket, but a different bucket.

[04:38:36][PREB Expert Examiner]: [...] **Would it be safe to assume that part of customer engagement that speaks of more generally, it's at that part of the RFP that something like virtual power plants can participate in potentially providing PREPA with P.V.**? [...]

[04:39:24] [PREPA/Siemens]: **Yes, indeed**. That's one. That's [where] I currently see [...] the type of innovation that we're hoping to foster [...]

[04:48:24] [PREB Expert Examiner]: Mr. Rauscher, we're interested in understanding -the Bureau's interest in understanding- the different means by which distributed generation resources, batteries, solar, P.V in particular can be obtained, procured by PREPA and during the week we've talked a lot about virtual power plants. We want to make sure we have a comprehensive sense of the lay of the land around the different types of procurement options that could be available, be it through an aggregator or be it directly to a customer. There's a lot of different ways that could happen [...]as Dr. Bacalao just mentioned. There could also be a tariff. You could look at the net metering tariff as one form of PREPA directly obtaining resources on its system. You could look at alternate forms of that type of a tariff. There's a lot of different things and we're interested in getting the understanding of interested parties and experts like yourself as to making sure we can understand the lay of that land. So with that, can you help answer the question of what procuring a virtual power plant or its components might look like?

[04:49:39] [SUNRUN Expert witness]: Sure. [...] There are a number of different ways that you could do it. We've talked about net metering, plus bring your own device tariff where you're paid for the services. Dr. Bacalao also briefly mentioned what I would call **a power purchase and dispatch agreement with a roof rental payment**. So in that structure, the utility would be the off taker for the energy and for the services. The systems would be owned by a third party and sited on residential or or even public housing buildings. And the tenants or owners of those buildings would have a roof rental payment that would provide savings on a monthly basis to their electricity bill. But in that arrangement, PREPA would still maintain that customer and be billing the customer at the regular retail rate for the energy that they receive. And of course, that customer would also receive backup power. There are also utility owned structures, Green Mountain Power in Vermont, [and] Liberty in New Hampshire. Those I think are really the only two that are doing this at the residential level. They have programs or they offer Tesla Powerwalls. And in Green Mountain Power's case, solar directly to customers. The utility owns those assets, manages and controls them, and the customer pays a monthly fee. [...] PREPA could also undertake a version of that where they have a certain amount of resource that they want to procure in that way, but they contract out to qualified vendors, say Windmar and other installers on the island or Sunrun to go out and procure those customers, install the systems and then kind of fill up the resource that PREPA is looking for. [04:51:39] [A]s I mentioned, on Tuesday, we have a 5000 home virtual power plant that has cleared out in last year's capacity auction in New England. And that auction for this year was held again on Monday. And I can't release the results, but we expect to have an ongoing virtual power plant there through the wholesale market. There could be another structure where another public entity either owns or houses the systems. So it could be [that] [Vivienda] or the public housing authority, rather, puts out an RFP for all of their buildings to have critical loads backed up in common areas. And so we're on the roof. [T]here are many different ways to do it, depending on whether who needs to own the asset, if you want to capture the investment tax credit, and what other sort of relationship you want structured between the utility and whoever manages the asset. [...] Could I offer one more if we ever have competitive suppliers in Puerto Rico? You could have a Sunrun do a deal with a competitive supplier who offers 'synthetic' net metering or something like that and then turn around, and offer a service agreement to the utility.

D) IRP Day 5:

[00:43:43] [SUNRUN attorney]: Good morning, chairman, commissioners, parties. Good morning, Mr. [PREPA Director] Ortiz. **You mentioned in your direct [...] your good knowledge of distributed generation as virtual power plants. Correct?**

[00:44:34] [PREPA Director]: **Correct.**

[00:44:41] [SUNRUN attorney]: So **there is no specific mention [...] in the IRP in general, [...] of virtual power plants. But is it your position that it is somehow implicit in there**?

[00:44:58] [PREPA Director]: **To me, it is. Yes**.

[00:45:01] [SUNRUN attorney]: **Would you agree that it should be perhaps explicit in there?**

[00:45:09] [PREPA Director]: Not necessarily. But, you know, **that's a call for the Bureau.**

[00:45:16] [SUNRUN attorney]: **Would you object if it was explicitly in there**?

[00:45:20] [PREPA Director] **No**.

[03:27:16] [SUNRUN attorney]: Dr. Bacalao. Good morning again. [03:27:23] Would you agree that resources, planning and procurement decisions start with [...]no regrets decisions?

[PREPA/Siemens]: Of course. Yes. [03:28:00] In all plans, it appears the elements of the least cost solution. Ah, yes, they are.

[03:28:43 [SUNRUN attorney]: Thank you. **And as you also mention [that in] this discussion of different scales, residential scales, utility scales, that there is this concept of virtual power plants that in some ways [...] blurs that line because you can grow your residential scales up to utility scales by networking and aggregation.**

[PREPA/Siemens]: **Correct.**

[SUNRUN attorney]: And did you also mention that these aggregated, networked, distributed resources that are sometimes called virtual power plants [...] but that they provide the same services that other resources provide? [...]

[03:29:33] [PREPA/Siemens]: I understand that that's the case. [...] It's something you want to elaborate. Now that I've seen it also developed in other areas, it's people sort of renting roofs into going into a full power plant. And providing something that would [...] behave[...] in the same way[...].. So, yes, in a way they're equivalent..

[03:30:09] [SUNRUN attorney]: Thank you. And if I can direct you to [...] the action plan, [...] the page that has a chart on [...] engineering permitting scheduling information and also some permitting and regulatory type of scheduling and [...] cost discussion. [03:30:55] Well, [...] the general question is the following. [...] [T]here has been discussion today regarding, [...], the action plan and discussion having to do with environmental compliance, permitting, you know, permitting costs and scheduling and the different factual situations that involve different types of

generation resources [...]. So you need permitting to get things done. Would you agree that these permitting and environmental concerns, land use concerns and such, those types of concerns do not apply to behind the meter resources? [03:31:47] [...] You already answered that behind the meter resources do not have these environmental and permitting concerns. Correct?

[PREPA/Siemens]:Yes.

[SUNRUN attorney] Thank you. And [...], given all this background and these facts around aggregated network solar and storage systems **called virtual power plants, would you agree that such proposals are in themselves a no regrets planning and procurement action or decision**?

[03:32:50] [PREPA/Siemens]: [...] **all of those advantages that virtual power plants can have,** [...] **they're likely to be the winner. But they should be selected via an RFP process**. [...]

[03:34:41] [SUNRUN attorney]: Thank you. And no regrets solutions are those that I suppose comply with the IRP pillars of, you know, resiliency, customer centric, reliable lease least cost, sustainable economic development, etc.

[PREPA/Siemens]: Correct. [...]

[03:35:04] [SUNRUN attorney]: Thank you. And [...] just to finish, **would you say that the action plan should be [...] more specific [...] in [...] generation resource procurement path available, including virtual power plants?**

[03:35:21] [PREPA/Siemens]: I think in a way, I answered that already. I think the action plan should say you need to go out and procure this amount of solar. **Expect that virtual power plants will be part of that proposal.**

[03:38:34] [PREB Expert Examiner]: Mr. Rauscher, [...] Mr. Bacalao testified this morning about a risk that he assigns to the fact that the action plan [...] [and] renewables in the system in the future. And I was asking whether the usage of aggregated solar or [amd] storage as used in a virtual power plant, would mitigate that risk?

[03:39:14] [SUNRUN Expert witness]: I think so. And I think something that needs to be made clear is that aggregated, distributed solar and storage is a different thing than utility scale solar. And they don't directly compete with each other. They may be providing certain services such as renewable generation, but they don't necessarily compete with each other. So we're talking about the RFP to procure renewable generation [...] **a VPP is [...] providing different services by the nature of it being distributed. It's modular. So it does mitigate risk because you're not going in and installing very large, you know, 40 megawatt or whatever it is systems at once. You're doing 5, 10 KW on [...] and then larger [...]. Aside from modularity is that -we have evidence throughout the country- just our company- we've got almost 300000 customers and now there's 2 million residential rooftops nationwide with solar.** That solar is the gateway into the home for everything else we've been talking about or into the business. Energy efficiency, electric vehicles [...]. So again, because you're already in the building, you can gain efficiencies in the system with those other things so you can better match the generation to the load. The other thing that I think is really important [...] is that we've talked some today about the risks associated with increased residential solar on the system, and maybe Hawaii has experienced that. But we don't have that here [...]. **[B]atteries were the solution in here, they're all going in with batteries. So that's a resource that we already have in place.**

[03:41:08] [PREB Expert Examiner]: [You expressed] **Virtual Power Plants [can] be a hedge against a great defection, [...] if so, could you explain how**?

[03:41:23] [SUNRUN Expert witness]: **Batteries are really expensive. [03:41:27] And that's gonna be true for a little while, even though the costs are coming down. And yet we've seen both in the mainland and here in Puerto Rico that customers are procuring them for their own uses for backup power against what every economist was saying five years ago, that they were all saying that utility scale would outpace site level batteries. And so to the extent that the utility can create programs that pay for the services that the batteries can provide, you will lower the cost of those batteries to the end users. And so if I'm an average family that wants resiliency for my home, I'm going to stay connected to the grid if I can get that resiliency cheaper because I can provide service to the utility and and and get paid for that.** The other side of that right now is that we probably have some of the most expensive resiliency in Puerto Rico [...]. **Puerto Rico probably already has or will soon have the largest untapped V.P.P. resource in the world. And so what we're suggesting is tap that and encourage the utility, encourage that to grow, and that will be a hedge against a great defection**.

III. Applicable Statutory Mandates

5. Pursuant to Section 6.23 of Act No. 57 of May 27, 2014 , as amended ("Act 57-2014"), and Section 6B of Act No. 83 of May 2, 1941, as amended ("Act 83-1941"), the Puerto Rico Electric Power Authority ("PREPA") must prepare and implement an Integrated Resource Plan ("IRP") subject to the evaluation and approval of this Honorable Energy Bureau.

6. The IRP must "be consistent with all the mandates" of Act No. 17-2019, the Puerto Rico Energy Public Policy Act, ("Act 17-2019") (Sec. 1.9(b)(2)). Act 17-2019, sec. 5.2(ll), which amends Act 57-2014, specifically establishes that the IRP "shall […] consider[…] **all reasonable resources to satisfy the demand for electric power services during a period of twenty (20) years, including those related to the offering of electric power, whether existing, traditional, and/or new resources, and those related to energy demand, such as energy conservation and efficiency or demand response and localized energy generation by the customer.** […]". [Emphasis provided.]

7. Furthermore, one of the central mandates of Act 17-2019, (Sec. 1.6) is its focus on distributed renewable generation plus energy storage as the path away from fossil fuels and towards a certain 100% renewables generation portfolio:

> "7) To reduce and eventually **eliminate electric power generation from fossil fuels by integrating orderly and gradually alternative renewable energy** while safeguarding the stability of the Electrical System and maximizing renewable energy resources in the short-, medium-, and long-term. For such purpose, a Renewable Portfolio Standard is established in order to achieve a minimum of forty percent (40%) on or before 2025; sixty percent (60%) on or before 2040; and one hundred percent (100%) on or before 2050.
>
> 8) **To facilitate the interconnection of distributed generation to the electric power grid through any available mechanism including, but not limited to, distributed generation, renewable energy sources, net metering, and the use of microgrids by implementing the mechanisms, strategies, and technologies available in the electric power industry for such purposes**.
>
> 9) To **encourage the use of energy storage technology for consumers at all levels to facilitate and accelerate the integration of renewable energy sources and capitalize on their capacity as a distributed generation mechanism."** [Emphasis provided.]

8. This Honorable Bureau adopted IRP Regulation 9021. Regulation 9021, sec. 2.03(G)(2)(c)(i-iii), specifies that in its IRP "PREPA shall justify the scenarios used and **excluded** from consideration, [...] [and] [t]o the extent that PREPA relies on explicit or implicit relationships correlations between forecasts, PREPA shall describe the basis of the relationships. […] **PREPA shall incorporate any scenarios required by the Commission** […]." [Emphasis provided.]

9. Perhaps more importantly, Regulation 9021,Sec. 2.03(K) mandates that the IRP must include a very specific "Action Plan" that shall lay out specific procurement processes, project timelines

and financing mechanisms for the projects PREPA it will carry within five years of IRP approval out to comply with the same:

> "[The] "Action Plan" […] shall include a table of key actions in the first five years after approval of the IRP including, at a minimum, **expected procurement processes** for supply-side resources and energy efficiency, permitting requirements, construction activities, required studies, and other significant events. The **Action Plan shall cover intended acquisitions** of demand-side, supply-side, transmission, distribution, and/or fuel infrastructure resources; retirements and/or retrofits of existing generating resources; entrance into, renegotiation or cessation of power purchase agreements; and any other resource commitments. a) For each action, the IRP shall specify and provide: i. The expected calendar year and quarter in which the action will be commenced; ii. The expected calendar year and quarter in which the action will be completed; iii. Issuances of permits and other regulatory actions that are required in order for the resource action to take place. iv. For any major expected resource acquisitions, retirements, retrofits or power purchase agreements, the action plan shall provide information on the cost of the option chosen and the plan for financing that option." [Emphasis provided.]

IV. Conclusion

10. There is ample and uncontested evidence on the hearing record as a whole that establishes VPPs as superior, least-cost, first decision and no-regrets clean resource options that must be featured in the IRP's initial 5-year Action Plan. VPPs provide all the services fossil generation peaker plants provide, without the economic, environmental, permitting and other costs.

11. The record is also pellucidly clear on how VPPs are in many superior not only to fossil plants, but also "utility scale" renewables: aggregated, networked solar plus storage lacks the environmental, land use & permitting costs of other resource options and are perhaps the only way to quickly move to comply with the pro-renewables public policy and renewable portfolio standard of Act 17/2019. The record also showed the several ways in which VPPs can be

procured and deployed quickly and economically via correctly-scoped RFPs and/or rate/tariff programs, including very fast, large deployments on public building rooftops. However, there is no mention of VPPs in the draft IRP.

12. The final IRP, as amended and approved by this Honorable Bureau, must clearly reflect all of the aforementioned evidenced benefits and advantages of VPPs and, as such, clearly and prescriptively inform near-term PREPA resource procurement actions. This Honorable Bureau must ensure that the final IRP Action Plan overtly prioritizes near-term VPP procurement and deployment, as VPPs are perhaps the best way to move Puerto Rico towards its Act 17/2019-mandated renewable energy future.

WHEREFORE It is respectfully requested from this Honorable Energy Bureau consider the record as a whole, and adopt an amended IRP and IRP Action Plan where aggregated/networked solar plus storage Virtual Power Plants figure prominently as short, mid and long term paths forward towards Puerto Rico's, statutorily mandated, 100% renewable energy future.

CERTIFICATE OF SERVICE

We hereby certify that a copy of the filling was sent via e-mail to the Energy Bureau Clerk to secretaria@energia.pr.gov and wcordero@energia.pr.gov, and to counsel at legal@energia.pr.gov; and sugarte@energia.pr.gov.

Additionally, the instant filing was sent via email to pending or actual intervenors: Arctas, Caribe GE, League of Cooperatives and AMANESER 2025, OIPC, EcoEléctrica, Empire Gas, Environmental Defense Fund, Local Environmental Organizations, National, "Non Profits", Progression, SESA-PR, Renew, Shell, Wartsila, Windmar Group and amici ACONER, AES-PR, RMI, CUD, MIDA, PRMA and ICSE at the following e-mail

addresses: agrait@agraitlawpr.com; sierra@arctas.com; tonytorres2366@gmail.com; cfl@mcvpr.com; gnr@mcvpr.com; info@liga.coop; amaneser2020@gmail.com; hrivera@oipc.pr.gov; jrivera@cnslpr.com; carlos.reyes@ecoelectrica.com; ccf@tcmrslaw.com; manuelgabrielfernandez@gmail.com; acarbo@edf.org; pedrosaade5@gmail.com; rmurthv@earthjustice.org; rstgo2@gmail.com; larroyo@earthjustice.org; jluebkemann@earthjustice.org; acasellas@amgprlaw.com; loliver@amgprlaw.com; epo@amgprlaw.com; robert.berezin@weil.com; marcia.goldstein@weil.com; jonathan.polkes@weil.com; gregory.silbert@weil.com; maortiz@lvprlaw.com, rnegron@dnlawpr.com; castrodieppalaw@gmail.com, voxpopulix@gmail.com, paul.demound@shell.com, escott@ferraiuoli.com; mgrpcorp@gmail.com, aconer.pr@gmail.com; axel.colon@aes.com; rtorbert@rmi.org; kbolanos@diazvaz.law; & n-vazquez@aeepr.com.

In San Juan, Puerto Rico, this 5th day of March, 2020.

Respectfully submitted,
[*signed/ Javier Rúa-Jovet*]

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