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: Reply to Final Briefs

MOTION TO SUBMIT REPLY TO FINAL BRIEFS

TO THE HONORABLE ENERGY BUREAU:

COMES NOW, the Puerto Rico Solar Energy Industries Association Corp. dba Solar & Energy Storage Association of Puerto Rico ("SESA-PR"), through the undersigned legal counsel, and very respectfully submits its Reply to Final Briefs in accordance with the Resolution and Order issued by the Puerto Rico Energy Bureau on April 15, 2020.

WHEREFORE, SESA-PR respectfully requests the Puerto Rico Energy Bureau to take notice of the foregoing and accept the attached Reply to Final Briefs.

I HEREBY CERTIFY that a copy of this document has been notified on this date via email to the following:

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RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 20th day of April, 2020.

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SOLAR & ENERGY STORAGE ASSOCIATION OF PUERTO RICO (SESA-PR)
REPLY TO FINAL BRIEFS

April 20, 2020

In General, SESA-PR agrees with the statements submitted in the Final Briefs, and throughout this IRP, by SESA member companies (Sunrun, Windmar and Wartzila) in support of a stronger focus on solar & storage, and statements made by other formal interveners to that effect. We thank the Energy Bureau for overseeing the IRP, PREPA and Siemens for formulating the IRP and cooperating with the process, and all other stakeholders for their active participation in these important proceedings, and to all involved for considering the comments of SESA-PR.

In considering final analyses and determination about the proposed IRP and input from stakeholders, we suggest that the IRP should not be only a document that is certified as minimally complete & compliant, but also recognize the bold requirements of Law 17 for Puerto Rico's entire energy paradigm to turn quickly to one that's based on efficiency and renewable energy.

Although giving some consideration to the requirements and vision of Law 17, this IRP as presented appears to involve far too small of a focus on the required rapid transition to renewables, and instead focus much of its analyses on various iterations of constructing new fossil fuels. Simply put, the IRP as presented misses the mark of what's required, desired, and needed for Puerto Rico, both presently and for the years to come.

Some examples, as articulated and highlighted by many of the Final Briefs, include:

1. A overly-simplistic projection that 2% per year energy efficiency savings will occur, with little to no analyses of how, and at what cost & benefits.

2. An assumption that the transition to electric vehicles will be insignificant, projected in this proposed IRP to result in no measurable amount of increased electricity to power electric vehicles for the next 5 years of the Action Plan, or for the entire term of the IRP, over the next 20 years.

3. An unexplained "cost adder" of 30% for solar technology, based on no demonstrated or demonstrable analyses or precedent.

For all of these reasons, we do not recommend the Energy Bureau approve the IRP as submitted, but rather to consider implementing, or requiring to be implemented, large substantial changes.

Looking forward, we also recommend, when mapping out the timeframe for the next IRP process, taking into consideration the actual timeline that transpired with this IRP and the previous IRP, and assume the next one will take at least as long or longer to come to completion.

Also noteworthy is that this IRP was largely devoid of meaningful input from stakeholders when it was initially developed. We suggest that the next time around, the IRP process not only begin much sooner, but also be developed collaboratively with stakeholders. This more inclusive approach could raise the chances of the IRP being largely supported by stakeholders when formally filed, with the formal process then being focused more on finer details than on fundamental disagreements.

SPECIFIC RESPONSES TO FINAL BRIEFS

When making final decisions on this proceeding, we recommend the Energy Bureau consider all statements filed in support of renewables & efficiency to serve a roadmap to the path of cleanest, most locally produced, and cheapest electricity prices. Following is a list of excerpts of testimony that we are in support of, to the extent they result in modifications to the IRP that lead to a deeper analyses of energy efficiency, solar energy, and battery storage – including electric vehicle charging.

Final Briefs filed by SESA Members

Organization	Page #	Text supporting renewables & efficiency
Wartsila	2	Wärtsilä has shown that the modeling performed by PREPA in the IRP is flawed for two main reasons: (i**) the use of the Aurora software to model Puerto Rico's island grid; and (ii) the use of numerous inaccurate inputs.**
Wartsila	4	PREPA's use of inaccurate inputs in the IRP's modeling, including: (i) utilizing **inaccurate cost inputs**; (ii) the **failure to include start-up costs;** (iii) inaccurately modeling minimum downtime for reciprocating internal combustion engine ("RICE") technology; and (iv) i**naccurately modeling variable operation and maintenance ("VOM") costs** for the combined cycle gas turbine ("CCGT") all led to inaccurate results.
Sunrun	1	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**;

Organization	Page #	Text supporting renewables & efficiency
Sunrun	1	That **customers are demanding solar plus storage today,** becoming prosumers today, that untapped VPP resources are thus being deployed everyday, as we speak.
Sunrun	2	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.
Sunrun	3	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.**
Sunrun	3-4	How could PREPA design a compensation package for virtual power plants that's more attractive to customers than them potentially disconnecting from the grid ... while still allowing PREPA to recover revenue? .....**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** ....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.

Organization	Page #	Text supporting renewables & efficiency
Sunrun	4	How could PREPA or PREB go about contracting a virtual power plant? How does that work? 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. .....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.
Sunrun	10	**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
Sunrun	10	...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.

Organization	Page #	Text supporting renewables & efficiency
Sunrun	11	**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.

Final Briefs filed by other Interveners

Organization	Page #	Text supporting renewables & efficiency
AES-PR	2	**AES-PR can be transformed to provide utility scale renewable energy for Puerto Rico, as it already does through AES Ilumina, to support the orderly and planned transition to renewable energy.**
AES-PR	17	While the IRP could be improved and some additional analysis should be performed, the testimony confirmed that **PREPA can and should move ahead with its essential "no regrets" investments in sola**r, while further optimizing its analysis of MiniGrids and decisions regarding gas resources.
EDF	5	EDF ... recommends that the **utility empower customers to help drive the island's energy transition**. To that end, PREPA needs to consider a wider range of resource options requiring less capital that are more responsive to the expressly stated customer demands. **PREPA should therefore encourage and facilitate prosumer solutions,** including energy efficiency, demand response and distributed generation – such as **consumer-sited solar and battery storage systems** being included and integrated into PREPAs long-term planning.
EDF	19	PREPA submitted a proposed IRP that relies heavily on centralized fossil fuel plants and new gas plants. **The plan assumes that energy efficiency will occur at unprecedented levels although the utility has neither plans nor programs in place for achieving it.**

Organization	Page #	Text supporting renewables & efficiency
EDF	23	...the **IRP places unjustified annual capacity expansion constraints on solar and battery storage**, without placing similar limitations on fossil fuel resource expansion. Siemens's justifications for these restrictions are unsubstantiated and it remains unclear as to what, if any, formal analysis Siemens has performed to assess the technical and financial performance constraints that may limit or delay the commercial maturity of these technologies... This is particularly disconcerting given the fact that the IRP only assigned a technology risk to a single resource type, solar energy, of 30%, in its scorecard.
EDF	24	**Delaying renewable resource deployment not only threatens RPS compliance generally, it also leads to a more expensive resource plan,** by not taking advantage of currently available federal tax incentives and crowding renewables out with early gas capacity expansion.
EDF	24	**Solar and batteries were treated as two separate resources rather than analyzing them in combination, which would have reduced the overall cost and improved their performance, making this resource more competitive with other resources.**
EDF	25	Curiously, Siemens's base, high, and low load forecasts all anticipate an almost 50 percent reduction in energy demand levels by 2038. This is a cause for concern because this assumption in turn significantly reduces the amount of renewable generation that Siemens assumed PREPA needs to procure to comply with Act 17 (with lower load, less renewables are needed to make up the same share of load); yet another example of how ***Siemen's modeling diminishes the role renewable energy can play towards advancing public policy goals.***
EDF	25	**Siemens's forecasts expect that customer-sited distributed energy generation will comprise 30 percent of PREPA's total renewable energy requirement by 2038 even though no policy incentives or market mechanisms exist to incentivize this trend** nor does the filed IRP include any plans for market mechanisms to achieve this level of distributed generation.
EDF	26	At the evidentiary hearing, Dr. Nelson Bacalao of Siemens acknowledged giving a 2018 industry presentation on IRP best practices where he stated that **electric vehicles and distributed generation will soon have a dramatic impact on electric utilities, yet Siemens submitted an IRP that omitted potential load growth from electric vehicles** and procurement plans for distributed generation;

Organization	Page #	Text supporting renewables & efficiency
EDF	28	**EDF recommends that PREPA develop a customer engagement plan** that is responsive to and leverages the growing demand for decentralized, customer-sited solutions.
EDF	29	It is unclear to what extent this solution was preceded by any investigation as to how reliability can be ensured without 100% thermal generation resources and **to what extent non-thermal generation (such as solar plus storage) could have helped lower costs while maintaining reliability** even though Dr. Bacalao confirmed at the hearing that some critical load could be served by solar and storage systems.
EDF	35	Essentially, the **IRP only analyzed two types of conventional supply resources - gas and utility-scale solar plants.** The plan did not evaluate other types of resources that have been gaining greater acceptance as IRP supply resources and would have improved the grid's reliability, resilience and flexibility in a cost-effective manner. **These other types of supply resources that PREPA should have evaluated in the IRP include energy efficiency, demand response, virtual power plants and batteries combined with solar.**
EDF	36	As was identified in the testimony of expert witness, Ronny Sandoval, **the IRP committed to a pre-determined specific solution and approach with large expenditures without clearly defining what constitutes resilient design or considering alternate,** potentially lower cost solutions.
EDF	43	To the extent the model failed to recover these costs by 2050, the I**RP did not reflect the full costs of the new gas plants and these resources would have had an unfair advantage over clean energy resources which do not face this same challenge of becoming stranded assets in 2050, when the island must be served by 100% renewable energy.**
EDF	44	One way to approach this would be to follow certain lessons learned from Hawaii, as Dr. Stanton discussed in her written testimony and at the evidentiary hearing: ● **Develop low-cost renewable resources and battery storag**e; ● Pursue renewables with the highest certainty of deployment early in the planning period; ● Ensure lowest costs for ratepayers by considering renewables on equal footing with fossil fuels; ● Shift from centralized to distributed energy resources; ● Assess all types of distributed energy resources on equal footing with other capacity expansion opportunities; ● Consider grid services and risk reduction from distributed energy resources relative to other capacity expansion opportunities;

Organization	Page #	Text supporting renewables & efficiency
		● Reduce generation costs by retiring aging fossil fuel plants; ● **Place renewable energy, energy efficiency, demand response and battery storage on equal footing with fossil fuel generation for capacity expansion; and** ● Assess the risks of stranded costs, uncertainties, and rate impacts of imported LNG fuels and new fossil generation.
EDF	47	In order to comply with the RPS requirements of Act 17, PREPA must move quickly and encourage a timely, transparent and successful procurement process for cost-effective renewable energy resources. **PREPA should issue an all resource RFP to identify up-to-date, least-cost renewable resources to meet the 3,900 MW of renewables and 1,640 MW of battery storage requirement.**
EDF	50-51	**PREPA should develop tariffs or other incentives and issue RFPs to acquire this generation through aggregators, allowing customers to be compensated for the services they provide to the grid.** It would be most cost-effective to acquire this distributed generation early on in the planning period rather than waiting until 2038. This would give PREPA more experience with this form of generation and should drive costs down in the long run.
EDF	52	Further, while **electric vehicles** have not been included in PREPA's forecast despite national uptake in electric vehicles, they can offer a significant benefit to utilities for load flexibility.

Organization	Page #	Text supporting renewables & efficiency
EDF	53	In its comments submitted for the Energy Bureau workshop on Renewable Energy Credits (RECS) in July 2019, the **Solar and Energy Storage Association of Puerto Rico ("SESA")** cites a PREPA report indicating a distributed generation growth seen in PR from 88 MW in June 2017 to 172.75 MW June 2019. Further, the RMI Amicus brief filed on December 20, 2019 refers to reports from solar companies active on the island, that **the overwhelming majority (~90 percent) of new solar installations since Hurricane Maria are coupled with a battery.** P**REPA should take advantage of this growth in consumer-sited systems and leverage these less capital-intensive existing assets to develop least-cost, least-risk path for serving customers' needs and meeting public policy goals.**
ICSE	8	By **failing to take account of rapidly evolving PV and storage technologies,** PREPA's IRP fails to capture the many benefits these technologies can provide to electricity consumers in Puerto Rico.
ICSE	8	PREPA's IRP ignores this new market development. This development has **tremendous potential to totally disrupt the traditional top to bottom relation between the utility and the consumer.**
ICSE	10	PREPA's IRP ignores virtual power plants....Concerning Law 17 mandates as they relate to the IRP, one of the most egregious examples of how incomplete and how distant from the energy policy, the IRP is, is the failure to account for the possibility of "virtual power plants".
ICSE	12	**IRP is not compliant with Act 17** because: 1.) it makes no provision for customer engagement, 2.) over invests in gas-powered energy supply, 3.) no provision for increasing PREPA's capacity for processing interconnection requests timely and safely 4.) no provision for reducing rates
ICPO (OIPC)	5	:a) Autoridad **no ha podido establecer los posibles costos irrecuperables** o "stranded cost" asociados a estos proyectos de nueva generación; en caso de que su operación resulte innecesaria por sobre generación o por reducción en la demanda y/o consumo de energía.
ICPO (OIPC)	6	Esto nos lleva a concluir que, **los proyectos renovables de energía solar distribuida son mejor alternativa.** El uso de energía solar a nivel de distribución en los techos de las residencias y/o comercios no requiere el uso de terreno para su instalación

Organization	Page #	Text supporting renewables & efficiency
ICPO (OIPC)	11	**El hecho de que la generación de energía continúe centralizada en el área sur de Puerto Rico no debería afectar de forma significativa los planes de aumentar la resiliencia de nuestro sistema eléctrico futuro.** La manera mas eficiente de lograr la resiliencia de nuestro sistema es reforzando el sistema de transmisión y distribución mediante el uso de tecnología, maxirnizando así el manejo de la generación distribuida localizada en la carga, especialmente de aquellas identificadas como cargas críticas.
Local Environmental Organizations	4	...instead of embracing a clean, cost-effective, equitable, and resilient system, the Puerto Rico Electric Power Authority (PREPA) has asked the Energy Bureau to approve deeply flawed plans that will not solve Puerto Rico's energy problems. PREPA's **Preferred Plans are over-reliant on imported methane gas, rather than prioritizing the maximum integration of renewable energy and distributed generation into the grid**. **PREPA fails to meaningfully consider and prioritize renewable and battery storage resources, particularly customer-cited rooftop solar and battery systems.** It perpetuates an energy grid beholden to long-distance transmission lines that routinely fail, to fossil fuel imports that direct money away from the Puerto Rican economy, and to emissions of pollution and greenhouse gases that threaten the lives of the public.
Local Environmental Organizations	5	The earthquake of January 7, 2020, not only intensified the need to decentralize the network, but also demonstrated the resilience of photovoltaic systems to seismic events.
Local Environmental Organizations	7	The Local Environmental Organizations share the public's sentiment on all of the failings of the IRP described above, and agree that the IRP must be rejected. **PREPA acknowledges that it must install as much PV and storage as practical right away, but does not present specific locations, investments, budget allocations, or identify PREPA employees or consultants who will actually achieve these deployments.** On distributed generation and storage, PREPA is even worse, **refusing to offer any encouragement, customer engagement, incentives or service payments at all for the significant distributed solar and storage that Puerto Ricans are installing on their own.** And finally on energy efficiency and demand response, PREPA freely admits it has no real plan whatsoever to incorporate these critical resources.

Organization	Page #	Text supporting renewables & efficiency
Local Environmental Organizations	7	**Without more specific plans on renewables and storage**, PREPA cannot claim to have a real plan to meet the RPS targets, or to eliminate our dependence on imported fuels. PREPA has therefore **failed to meet the fundamental goal for this IRP**
Local Environmental Organizations	9	PREPA's Preferred Plans, Scenario 4 Strategy 2 and the Energy System Modernization Plan, do not offer that transformation, but rather **merely a shift from one fossil fuel to another**.....Siemens **overestimated the costs of renewables and distributed generation,** and underestimated the costs of gas and gas-fired plants.
Local Environmental Organizations	14	Siemens chose to create its own LCOE. **Siemens now claims that, by the LCOE it generated, distributed solar is twice as expensive in Puerto Rico as on the mainland today, ballooning to four times as expensive in 2038.** The testimony of Dr. Agustin Irizarry-Rivera,14 demonstrates that Siemens's forecasting method has wildly overestimated these costs. The significant errors in Siemens' methods would have been avoided had Siemens used actual real-world market data on the costs of these systems.
Local Environmental Organizations	15	All of Siemens' scenarios included the same forecast that customers would add 1,176 MW of distributed generation by 2038, without any incentives or cost-sharing from PREPA and without any ability for these distributed resources to offer services to the larger grid.
Local Environmental Organizations	17	**Siemens overestimated utility-scale solar costs by thirty percent.** The true cost of utility-scale solar is far lower than the erroneous inputs used by Siemens, and lower even than the Low Case Solar PV in Exhibit 6-31 used by Siemens for Scenario 3.24 And Siemens' modeling demonstrates that PREPA's gas-heavy Preferred Plans, **even with this error in their favor, still do not outperform a portfolio choosing renewables and storage over gas-fired plants.**
Local Environmental Organizations	18	An expert report coincides with the type of transformation proposed in Queremos Sol: "In the short term, the bottom-up approach to **build decentralized resiliency from individual solar home systems, to microgrids,** and all the way to the main grid needs to be explored as a potential option because a relatively high penetration rate could enable a variety of options for microgrid development that enhance the robustness of community resilience while also provides economies of scales"

Organization	Page #	Text supporting renewables & efficiency
Local Environmental Organizations	19	In this new study a team led by Dr. Marc Perez brought out an important tool: **oversizing of PV systems relative to storage capacity.** In an analysis of matching supply and demand on an hourly basis over the course of a year, Dr. Perez showed **how over-building solar relative to energy storage results in lower combined system costs,** while creating a system that can provide power 24/7
Local Environmental Organizations	20	After being challenged on its assumption, **Siemens acknowledged that renewable resources could be available immediately after a major event, and therefore the original assumption was wrong.** This is just one example of the **pro-gas, anti-renewable bias** that infects the Integrated Resource Plan. The Energy Bureau must reject the biased Preferred Plans and Action Plan, and ensure that the next Integrated Resource Plan is free from this bias.
Local Environmental Organizations	21	June 2019 Integrated Resource Plan did not recognize the full value of renewables, stating that **solar panels could in fact be certified to withstand major events, and therefore should have been considered to supply critical loads**
Local Environmental Organizations	22	The analysis finds that the gas-fired plants (thermal resources) required by PREPA's minigrids approach to meet critical and priority load impact the buildout of solar and storage. **Because the model is forced to include thermal resources, it cannot add as much solar and storage as it would if it were allowed to seek out the most cost-effective options for meeting demand**....In sum, the Energy Bureau should reject any spending on gas-fired peakers, until Siemens can correct the mistaken assumptions in its analysis.
Local Environmental Organizations	25	Looking specifically at the effect of battery storage on reserve margin, Mr. Efran Paredes explained that **battery storage can indeed replace thermal reserves...also** battery system successfully for daily frequency control and spinning reserve. Mr. Paredes further stated that "[t]echnically speaking, we have no doubt that the batteries can do the work [of replacing thermal reserves]."4 Later in Panel H, Dr. Saenz explained that the **replacement of thermal generation with battery storage saved money, and actually saved the most money**
Local Environmental Organizations	33	"One such change that PREPA failed to incorporate into the Integrated Resource Plan is the penetration of electric vehicles into Puerto Rico's market. Witnesses in Panel D explained that accounting for EVs would help mitigate risks associated with the load forecasts across PREPA's system planning efforts."

Organization	Page #	Text supporting renewables & efficiency
Local Environmental Organizations	35	First, PREPA must provide an expedited timeline to actually implement Comunicado Técnico 19-02, which would allow **automatic interconnection of distributed PV systems,** as well as net metering for those system....Second, PREPA must coordinate with owners of current distributed renewable generation & storage to gain visibility of these resources, and **PREPA must offer to compensate customers for the services these resources could then provide to the grid.**
Local Environmental Organizations	36	Fourth, PREPA must coordinate with the Bureau, the Energy Efficiency program administrator, and stakeholders on **designing a customer engagement plan "to educate citizens and electric power service customers on energy efficiency consumption reduction, distributed generation strategies, and other available tools** to empower consumers to have more control over their energy consumption," as required by Law 17-2019 Section 1.5(4)(b).
Local Environmental Organizations	37-38	Finally, PREPA should implement a system to **incentivize customers to build distributed solar and storage systems**, and share implementation costs with customers....funds for onsite/rooftop initiative can come from short term and long term sources that would not result in rate increases. In fact, **people who adopt rooftop solar technologies would experience an overall decline in electricity costs**
Local Environmental Organizations	50	PREPA **may delay or raise the costs of renewables and distributed generation through "unreasonable or not authorized, or 'improvised' requirements or processes** from PREPA . . . rather than global free market trend."In Panel D, Ms. Cosme reiterated that PREPA "**might underperform in its acquisition of efficiency and renewables that then might result in needing to fall back on fossil fuel generation.**