

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:** PREPA's request for clarification of  
certain aspects of the September 5, 2018  
Resolution and Order

**RESOLUTION AND ORDER**

On September 13, 2018, the Puerto Rico Energy Bureau ("Energy Bureau") held a Technical Conference Call to clarify questions<sup>1</sup> submitted by the Puerto Rico Electric Power Authority ("PREPA") regarding the additional scenarios set forth on the September 5, 2018 Resolution and Order in the instant case. Appendix A to this Resolution and Order contains the Energy Bureau's responses to PREPA's questions, as discussed in the Technical Conference Call.

The Energy Bureau **ORDERS PREPA** to, within seven (7) days of the notification of this Resolution and Order, provide a complete list of the scenarios it intends to include in the updated IRP.

Be it notified and published.

Edison Avilés Deliz  
Chairman

Lillian Mateo Santos  
Associate Commissioner

Ángel R. Rivera de la Cruz  
Associate Commissioner

Ferdinand A. Ramos Soegaard  
Associate Commissioner

<sup>1</sup> See PREPA's Motion for Expedited Clarification of Certain Aspects of the Energy Bureau's Resolution and Order of September 5, 2018, September 11, 2018, Case No. CEPR-AP-2018-0001.



## CERTIFICATION

I hereby certify that the majority of the members of the Puerto Rico Energy Bureau has so agreed on September 18, 2018. I also certify that on this date a copy of this Resolution and Order was notified by electronic mail to the following: n-vazquez@aeep.com, astrid.rodriguez@prepa.com, and jorge.ruiz@prepa.com. I also certify that today, September 18, 2018, I have proceeded with the filing of the Resolution and Order issued by the Puerto Rico Energy Bureau and I have sent a true and exact copy to the following:

**Puerto Rico Electric Power Authority**

Attn.: Nitza D. Vázquez Rodríguez  
Astrid I. Rodríguez Cruz  
Jorge R. Ruíz Pabón  
PO Box 364267  
Correo General  
San Juan, PR 00936-4267

For the record, I sign this in San Juan, Puerto Rico, today September 18, 2018.

  
María del Mar Cintrón Alvarado  
Clerk



## Appendix A

### Energy Bureau's Responses to PREPA's Questions regarding Additional Scenarios

For clarity purposes, PREPA's questions are included below, followed by the Energy Bureau's response.

- 1- *The Energy Bureau (EB) references in its Order the IRP Regulation and in particular Section 2.03 F (3) e. PREPA provided the Energy Bureau, for its information and subsequent approval, our assessment of programs that have the greatest likelihood of success in Puerto Rico, but this fall short of the 2% per year reduction for 10 years. Please find attached an updated latest version of the memorandum. Is the Energy Bureau expectation that PREPA shall include the 2% per year reduction instead of our forecast on all Scenarios (the new ordered and the ones already proposed by PREPA), or only on the new Scenarios Ordered (except for the Low EE case)?*

#### Energy Bureau's Response

*2018*  
*to*  
*the*  
*EB.*  
Regulation 9021<sup>2</sup> (effective since April 2018) are explicit regarding use of the 2% per year incremental savings attributable to new energy efficiency programs, unless and until an Energy Bureau-approved energy efficiency and demand response potential study shows that achievable cost-effective potential is less than (or greater than) 2% per year. The Energy Bureau expects that all scenarios will be guided by Regulation 9021, thus the Energy Bureau does expect that all scenarios will incorporate energy efficiency resource projections at the 2% per year incremental level, with those incremental savings then accumulating over the planning horizon. PREPA is free to conduct other sensitivities – such as a “Low EE” case – on the original scenarios if or as appropriate.

- 2- *Please note that, for the Energy Bureau mandated EE forecast (e.g. 2% YOY for 10 years), we intend to scale up the costs of the program identified, basically assuming larger participation.*

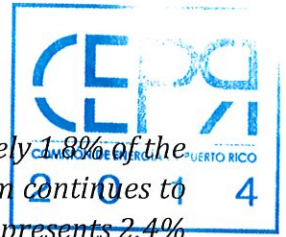
#### Energy Bureau's Response

It is reasonable to properly account for the costs of the energy efficiency included in the effective net load forecast assumption. The Energy Bureau notes that costs for demand-side resources should be documented with an Energy Bureau-approved energy efficiency and demand response potential study.

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<sup>2</sup> Regulation on Integrated Resource Plan for the Puerto Rico Electric Power Authority.





- 3- *With respect of Demand Response, our updated forecast reaches approximately 1.8% of the peak of the served load peak by 2021 and by 2027 reaches 3%. This program continues to grow, while the load is declining and by 2038 represents 3.8%. By 2025 DR represents 2.4% of the peak demand. With this revised forecast, should we use our projections for which we have a cost and a rationale?*

### **Energy Bureau's Response**

The updated forecast reaching 1.8% of peak load by 2021, 3% by 2027, and 3.8% by 2038 is reasonable at this time. The Energy Bureau expects this projection to be justified in a demand response potential study.

- 4- *It should be noted that we are modeling the effect of Demand Response as fast responsive reserves. That is a resource available to operators to complement the spinning reserve requirements and avoid the need to bring online expensive combustion turbines as well postponing / eliminating the need for new peaking units. Therefore, DR is currently being modeled as reserve not a reduction on the peak. Is this acceptable, or does the EB intends for other effects to be modeled in the added cases, or in all the cases?*

### **Energy Bureau's Response**

Yes, as long as the Demand Response resource is part of those resources that contribute to the planning reserve margin requirement (or "need") underlying the capacity expansion mechanism. The Energy Bureau notes that demand response resources being modeled as "supply side" resources in this manner usually are credited with additional peak-load-reducing characteristics reflective of their peak-period system-loss savings (e.g., 5-10% "adder" to capacity capabilities, incremental to point-of-use capacity savings, depending on the electrical location assumed for the resource), and would expect to see such "downstream" benefits associated with Demand Response resources appropriately quantified.

- 5- *The Energy Bureau request for PREPA to use as the reference case the FOMB base forecast. However, we would like to clarify that our reference case base forecast uses the same underlying assumptions as the FOMB forecast and the only difference is the way the model was created as our model is based on normalized monthly values (normalization filter volatility introduced by billing), instead of yearly values. Also, the FOMB forecast includes the effect of DG and EE that our forecast treats separately. The attached memo provides an update on our forecast and it was extensively discussed with the FOMB. The graph below shows a comparison between or base case and the FOMB projection (before EE and DG). As a reference, our forecast by 2025 is 6% higher than FOMB and by 2038 11% higher.*

Considering the above, should PREPA switch its Base Case to the FOMB base case? Are we to use this different load forecast in all cases/scenarios?



### Energy Bureau's Response

PREPA is correct to use their forecast as long as the effect of Distributed Generation and Energy Efficiency is treated separately and the differences between using monthly versus annual values is well understood. PREPA should clearly demonstrate that the macroeconomic forecast underlying the reference, high and low load scenarios is appropriately reconciled to, or comparable with, FOMB forecasts, and/or otherwise fully explained.

- 6- *With respect of the high and low load forecast, there are two approaches. We intend to use stochastics to identify the 25 and 75 percentile projections and provide generic explanation of what would need to happen in the PR economy for this to occur (see attached report for details on explanatory variables for the high and low case). Alternatively, we could use the highest GNP forecast we have (Moody's) and the slower population decline (US Census) to produce the high case. For the low case we could use Moody's population forecast (most pessimistic) and for the GNP we could use FOMB to 2018 and continue declining the IMF decline rate from this moment onwards. We favor the first approach but would like to confirm the Energy Bureau position. The final base, high and low load forecasts will be used for all scenarios. Is this acceptable?*

### Energy Bureau's Response

The Energy Bureau is accepting the first approach, as long as PREPA can give reasonable confidence that the 25% and 75% projection paths are reasonably representative of the load forecast distribution, and PREPA can confirm, and document, that they represent a sufficient spread between the high and low forecast cases.

- 7- *Our forecast is based on creating a model that correlates the observed change in sales with the exogenous variables (GNP, population, weather, etc.). In as much as the history includes the effect of naturally occurring EE and changes in construction, these are included in the forecast. There is no other adjustment beyond those explicitly model externally. In our opinion this should be adequate for the purposes of the IRP. Is this acceptable?*

### Energy Bureau's Response

Yes, for the purposes of this IRP only, in the context of post-hurricane changes in construction approaches (based on the August 30, 2018 update memo which includes Residential Rebuilding Efficiency as part of the incremental energy efficiency gains). For



future IRPs, this may not be the case, as continuing impacts of anticipated naturally occurring energy efficiency and efficiency resulting from existing and expected codes and standards should form part of the gross load projection and would not necessarily be captured in retrospective regression analysis alone.



8- PREPA intends to determine the Long-Term Capacity Expansion plan for each scenario / strategy for the base, high and low case load forecast. This will allow forming opinion on impacts and decision points. In addition, we propose to run a risk analysis with 200 iterations to assess impacts of load, fuel, DER penetration on the Base Capacity Expansion Plan as modified from the analysis above. Detailed PROMOD analysis will also be carried out on this modified Capacity Expansion Plan and well as transmission system analysis (for selected years) and Base Case load forecast. If this is acceptable to the Energy Bureau it would allow combining the Energy Bureau Scenario 3 (base load forecast), Scenario 5 (high load forecast) and Scenario 7 (low load forecast). In addition to the above, the Energy Bureau Scenario 4 (base load forecast) could be combined with Scenario 5 (high load forecast) and this analysis could also include Scenario 4 but with low load forecast. Is that consolidation of scenarios acceptable?

#### Energy Bureau's Response

As long as the separate input assumptions and the separate output results associated with scenarios ordered by the Energy Bureau can be directly mapped to PREPA's results, the scenario and sensitivity naming conventions used by PREPA are not relevant to the Energy Bureau. The Energy Bureau's first focus is on the deterministic modeling results from the capacity expansion optimization, across the different scenarios. PREPA can define and utilize its stochastic risk analyses as it sees appropriate.

9- In connection to the above, does the Energy Bureau requires the 200 iterations risk analysis to be ran for the new scenarios ordered, or to limit the analysis to specifically the load, and fuel prices set?

#### Energy Bureau's Response

No. PREPA can define and utilize its stochastic risk analyses as it sees appropriate, as long as it provides the Energy Bureau with deterministic analysis and results for the scenarios requested.

10- The Energy Bureau indicates that: "All" fossil options to include properly-costed AOGP and larger "H" class combined cycle alternatives offered as resource options to the model". Does that apply only to the Energy Bureau Scenarios 1 & 2 or does this also include PREPA's Scenarios 2, 3 and 4 that consider other gas sources instead of the AOGP? Will the EB

*Scenarios 1 and 2 include a sensitivity for a floating LNG platform in San Juan, instead of the LNG land terminal?*



### **Energy Bureau's Response**

This applies to just the Energy Bureau scenarios 1 and 2 as indicated. It is up to PREPA as to whether it thinks additional sensitivities to PREPA's scenarios 2, 3 and 4 should be run. It is also up to PREPA to decide if it wishes to run sensitivities to the Energy Bureau scenarios 1 and 2, distinguishing results for a model run including all fossil options, from a model run including just a subset of fossil options. To be clear, Energy Bureau scenarios 1 and 2 presume that all fossil alternatives, including any and all of LNG alternatives PREPA can formulate with credible cost trajectories, should be offered to the model as competing resources, along with the renewable options, battery options, and load trajectories affected by the incremental energy efficiency.

*11- Does the Energy Bureau intend for Scenarios 1 & 2 to consider in addition to the AOGP, the availability of gas at Yabucoa, Mayagüez and San Juan in line with PREPA's Scenario 3 & 4?*

### **Energy Bureau's Response**

Yes, to the extent that PREPA can formulate credible cost trajectories for those alternatives. To be clear, Energy Bureau scenarios 1 and 2 presume that all fossil alternatives, including any and all of LNG alternatives PREPA can formulate with credible cost trajectories, should be offered to the model as competing resources, along with the renewable options, battery options, and load trajectories affected by the incremental energy efficiency.

*12- Does the alternative of a large H Class combined cycle units to be considered on all scenarios including those proposed by PREPA? Note that the H Class has a maximum duct fired capacity of 368/ 393 MW (normal/ duct fired) and the F-Class units already in our plan have a maximum capacity of 303 /369 MW (normal/ duct fired). PREPA understands that it is preferred to move away from such large units, due to increased reserve requirements and less flexibility implied by such unit sizes.*

### **Energy Bureau's Response**

No. Energy Bureau scenarios 1 and 2 were requested to ensure that scenarios exist that effectively test economic "competition" between and among resources whose cost trajectories can be credibly defined.

*13- The Energy Bureau indicates that "All scenarios to include wind resource offerings at reference cost and availability (onshore coastal and/or inland)". Does this apply to all*



scenarios including those proposed by PREPA? PREPA always intends to let wind compete with solar resources, but at current and forecast prices, lack of local interest in new wind, relatively cheap solar, and poor wind availability, it seems that wind does not compete, unless a project is forced onto the system.



### Energy Bureau's Response

Yes. The Energy Bureau expects that potential wind resources be included in the economic "competition" with all other options, fossil and renewable, and be quantitatively tested within the model environment, rather than presumed *a priori* to be non-competitive. As with all resources offered as alternatives for the capacity expansion model, the characteristics, presumed output profiles, and assumed cost trajectories should be fully and clearly documented.

14- With respect of "PREPA to consider running high gas price sensitivities on other PREPA-determined scenarios.", we intended to evaluate the impact of gas price volatility on the risk analysis section of the IRP across all scenarios/strategies. Does the Energy Bureau would like to see in lieu of this, a discrete scenario(s) to be assessed and with high fossil fuel prices? Does the EB believe that NG prices will diverge upwards and not affect the rest of fossil fuel prices?

### Energy Bureau's Response

No, not necessarily, for PREPA scenarios and the "no new gas" Energy Bureau scenarios 3 through 8. The Energy Bureau would like to see high and reference case gas price scenarios for the "all fossil" Bureau-requested scenarios 1 and 2 but leaves to PREPA's discretion how to test gas price effects in its other scenarios. The Energy Bureau makes no presumption as to how gas prices will affect other fossil fuel prices but expects that PREPA will document and explain all assumptions used in its model runs.

15- PREPA prepared a document with our proposal for modeling a base case cost reduction for PV/BEES as well as a low case. Please find it attached. We intend to use this in the study. Note that for PV we intend to use NREL's low case and for BESS our estimation based on multiple sources including Lazard. Is this acceptable?

### Energy Bureau's Response

Yes. As noted in the response to Question 4 concerning use of demand response resources as "supply" resources, we would also expect that the IRP modeling will in some manner quantitatively account for the added capacity and/or energy value that can accrue to resources located downstream of the transmission system. This would especially be the case



for battery system resources that are located on the distribution system 1) at or electrically close to end user load, or 2) connected at distribution system voltages. This would also be the case for added energy value alone, for solar PV resources connected at similar locations.



*16-In terms of the Solar PV/BESS quantity availability, your differentiation of the reference trajectory and high availability case is whether to allow solar PV/BESS to be available for commercial operation in fiscal year 2021? If not please clarify the difference between Reference Trajectory and High Availability.*

### **Energy Bureau's Response**

No. In the reference case, PV/BESS systems are presumed to be available, in unlimited quantities, from 2022 and beyond. In the "high availability" scenarios, unlimited quantities are presumed available from 2021 and beyond. The spreadsheet left "blank" a level of availability for these resources in 2019-2021 for the reference case (and for 2019-2020 for the "high availability" case) only because it is unclear what the actual upper limit on availability might be in those years; but critically, the Energy Bureau does presume that these resources will be available, and at potentially relatively high quantities in both the reference and "high availability" case. PREPA will document its understanding of maximum availability for those years (2019-2021) for the reference case, and for 2019-2020 for the "high availability" case, to support its underlying assumptions for the model runs.

*17-Does the EB want to run the high fuel price sensitivities over all the existing PREPA Scenarios?*

### **Energy Bureau's Response**

Not necessarily; PREPA can use its discretion. See the response to Question 14.

*18-PREPA intends the sensitivities (Example Economic Retirement of AES/EcoEléctrica) starting over 1 selected scenario. Does the EB want to run these sensitivities over all the EB Scenarios?*

### **Energy Bureau's Response**

The Energy Bureau would like to see an "AES economic retirement" sensitivity on at least Energy Bureau scenario 3. The results of additional "AES economic retirement" sensitivities run on the other Energy Bureau scenarios would be of interest but are not specifically requested.