

COMMONWEALTH OF PUERTO RICO
PUERTO RICO ENERGY BUREAU

'18 OCT 15 P3:28

IN RE: REVIEW OF THE PUERTO
RICO ELECTRIC POWER
AUTHORITY INTEGRATED
RESOURCE PLAN

NO. CEPR-AP-2018-0001

SUBJECT: PREPA'S COMPLIANCE
WITH THE ENERGY BUREAU'S
SEPTEMBER 28th ORDER

**PREPA'S COMPLIANCE WITH THE ENERGY
BUREAU'S SEPTEMBER 28th ORDER**

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW the Puerto Rico Electric Power Authority ("PREPA") and respectfully submits PREPA's filing in compliance with the honorable Puerto Rico Energy Bureau's (the "Energy Bureau") Resolution and Order of September 28, 2018. The order directed PREPA to submit "a final timeline for submission of the IRP" (Integrated Resource Plan) within 15 days.¹

1. PREPA and its consultants Siemens PTI have prepared a very detailed timeline, a copy of which is attached hereto.
2. In brief, as explained in the attachment:
 - a. PREPA will informally distribute, by electronic means, by the end of November 2018, a report with preliminary results, pending the stochastic analysis. The report will be distributed to the Energy Bureau and interested stakeholders, provided that, if the report includes confidential information, especially Critical Energy Infrastructure Information, then there will be full and redacted

¹ 15 days from September 28th was October 13th, but that was a Saturday, so this compliance filing is due today.

versions of the report, and only the Bureau (and other qualified governmental entities, if and as applicable) will receive the full version.

- b. PREPA and Siemens, in the first week of December 2018, will make an informal presentation about the preliminary report. The presentation will be a continuation of the pre-filing stakeholder processes that PREPA and Siemens have conducted. The presentation will not be a formal part of this docket, although Energy Bureau personnel will be welcome to attend.
- c. The final IRP report, including the stochastic analysis, will be filed by PREPA on January 21, 2019. The filing will include the IRP as such, its Appendices, and testimony and the other documents required by Regulation No. 9021, subject to any waiver requests. PREPA has not yet identified any waiver requests. The filing can be expected to have full and public versions, as discussed above.

3. PREPA's plan to informally distribute, and to make an informal presentation about, the preliminary report is intended to give the Energy Bureau's staff and consultants and interested stakeholders a "head start" on reviewing major portions of the IRP and beginning to formulate their respective views, feedback, and questions.

4. However, those informal steps should not commence the "discovery" process from either the Energy Bureau and its staff and consultants or interested stakeholders. The discovery process should not begin until after the actual IRP filing is made. Commencing the discovery process before the actual IRP filing would not be

appropriate legally and it would be counter-productive and inefficient rather than constructive. Discovery would be based on incomplete information (the preliminary report without the stochastic analysis and without the actual IRP filing) and PREPA's and Siemen's having to work on discovery responses would significantly impede and delay finalizing the IRP. The idea of distributing the preliminary report is to help the Bureau's staff and consultants and potential intervenors to begin work on their own perspectives and feedback and to begin developing questions, not to open the door to a potential flood of premature inquiries.

WHEREFORE, the Puerto Rico Electric Power Authority respectfully requests that the honorable Puerto Rico Energy Bureau accept this compliance filing.

RESPECTFULLY SUBMITTED,

IN SAN JUAN, PUERTO RICO, THIS 15th DAY OF OCTOBER, 2018

PUERTO RICO ELECTRIC POWER AUTHORITY



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CERTIFICATION OF FILING AND SERVICE

I hereby certify that on October 15, 2018, I have sent the above filing (including its attachment) to the Puerto Rico Energy Bureau through its Clerk via email to secretaria@energia.pr.gov and bmulero@energia.pr.gov; and to the office of the Energy Bureau's internal legal counsel via email to legal@energia.pr.gov.



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MEMO TO: PREPA IRP TEAM

FROM: Siemens PTI/EBA

DATE: October 12, 2018

SUBJECT: Overview of tasks for project completion & timeline

Introduction and key deliverable dates.

This memo provides an overview of the task to completion of the 2018 IRP as well as the detailed timeline. The timeline reflects the new scenarios requested by the commission, the changes that had to be made on the foundational elements, including Energy Efficiency values, new resources to be considered, fuel infrastructure and demand forecast and the use of three load forecasts; high, base and low.

As will be observed below we expect to submit by the end of November a report with preliminary results, pending the stochastic analysis. The results in this report will be presented during the first week of December to the PREB and the stakeholder.

On January the stochastic analysis will be finalized as well as the IRP implementation plan. The final report will be submitted on the third week of this month followed with final presentations on the fourth week of January.

The exhibit below provides an overview of the timeline and details of each activity is presented later in this memo.

Exhibit 1: Overview of timeline

Month		9	9	10	10	10	10	10	11	11	11	11	12	12	12	12	12	1	1	1	1
	Model Runs	9/17/2018	9/24/2018	10/1/2018	10/8/2018	10/15/2018	10/22/2018	10/29/2018	11/5/2018	11/12/2018	11/19/2018	11/26/2018	12/3/2018	12/10/2018	12/17/2018	12/24/2018	12/31/2018	1/7/2019	1/14/2019	1/21/2019	1/28/2019
Week		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Task 1: LTCE methodology, assumptions & input consolidation																					
Task 2: 34 LTCE and Memos;																					
Task 3: Determination of PRM																					
Task 4: PROMOD Assessment (ENS, LOLH, Dispatch, 1 month weakened system)																					
Task 5: Stochastic Analysis and Memo																					
Task 6: PSS®E Interconnected Assessment																					
Task 7: PSS®E Minigrid Assessment																					
Task 8: Distribution Assessment																					
Task 9: Results Analysis and Recommendations Preliminary & Final ; Action Plan																					
Preliminary results report	10																				
Final Report	25																				
Task 10: Ongoing Stakeholder engagement																					
Task 11: Presentation and Stakeholder Meetings																					

Key deliverable dates.

There are some key dates associated with this project which are detailed below:

- October 15th, 2018:** Preliminary expansion plan for Scenarios 1, 2 & 4 presented. Major findings and trends that are expected to be a common trend throughout the IRP identified and presented in a PowerPoint.

- 2- **November 12th, 2018:** Expansion plans for all scenarios and sensitivities completed. Memo report and PowerPoint presentation delivered. Key recommendations with respect of investments and their corresponding generation retirements provided.
- 3- **November 19th, 2018:** PROMOD assessment. This assessment complements the recommended expansion plan and provides details on effects of transmission limitations and detailed dispatch in key metrics as curtailment, production costs, LOLH and energy not served. The memo report presented.
- 4- **November 19th, 2018:** Transmission and Minigrid assessment. Results on expected performance of the transmission system on an integrated operation and when segregated by minigrids presented on a memo report.
- 5- **November 19th, 2018:** Distribution System analysis memo report provided covering the non-technical loss, Distribution Reliability Review and Distribution PV penetration limitations.
- 6- **November 26th, 2018:** Preliminary recommendations on the IRP and high-level action plan.
- 7- **December 30th, 2018:** Stochastics analysis results memo. These results are expected to provide additional understanding on the impact of the recommendations but not materially alter them given the extensive sensitivities carried out.
- 8- **January 21st, 2018:** Final IRP report and filing.
- 9- **January 28th, 2018:** Final presentations in Puerto Rico.

Details on the Tasks to Completion

The following tasks will be carried out to complete the IRP

Task 1: LTCE methodology, assumptions & input consolidation

This task consists in updating all the inputs to the model based on prior activities, introducing the results to the Aurora model and verifying adequacy. Initial test runs are carried out.

Task 2: Long Term Capacity Expansion Plan (LTCE) development

Aurora model LTCE run identifies optimal expansions of new resources and economic retirements of existing resources while meeting key system constraints, including planning reserve margin.

34 distinct LTCE are produced under this task considering combination of Scenarios/Sensitivities with Strategies and the three different load growth. There are 5 Scenarios, supplemented by five sensitivities as shown below:

Exhibit 2: Scenarios and Sensitivities

Scenario	New Gas				Renewable & Storage	
	AOGP	Land-based LNG at San Juan	Ship-based LNG at Yabucoa	Ship-based LNG at Mayaguez	Costs	Availability
1	No	No	No	No	Reference	Reference
2	No	Yes	No	No	Reference	Reference
3	No	Yes	Yes	Yes	Low	High
4	No	Yes	Yes	Yes	Reference	Reference
5	Yes	Yes	Yes	Yes	Reference	Reference

Sensitivity	Renewable & Storage		Energy Efficiency	PPOAs	Gas	
	Low Cost	High Availability	Low EE	Economic Retirement of AES and EcoEléctrica	Ship-based LNG at San Juan	High Gas Prices
1	◆	◆				
2			◆			
3				◆		
4					◆	
5						◆

Three Strategies (centralized, fully distributed and hybrid centralized / distributed) and High, Base and Low Load Forecast were used in the formulation of the 34 cases for the LTCE. In this formulation the following was considered:

- High, Base and Low Load Forecast was considered for Scenarios 1 to 4 and only Base on 5.
- Strategy 1 (fully centralized) is modeled only on Scenario 5.
- Strategy 2 is modeled on Scenarios 1 to 4.
- Strategy 3 is modeled in all scenarios and sensitivities

The exhibit below shows a summary of the cases for which a LTCE runs will be carried out as well as for those where PROMOD runs will be done, PSS®E simulations and Aurora Stochastics. These last three activities are discussed below. Exhibit 4 provides the detailed timeline by Case.

Exhibit 3: Cases to be assessed

Count	Case ID	Scenario	Strategy	Sensitivity	Load	PREB Scenario ID	Aurora LTCE	PROMOD	PSSE	Aurora Stochastic
1	S1S2B	1	2		Base		Yes	Yes		
2	S1S2H	1	2		High		Yes			
3	S1S2L	1	2		Low		Yes			
4	S1S3B	1	3		Base	3	Yes	Yes	Yes	Yes
5	S1S3H	1	3		High	5	Yes			
6	S1S3L	1	3		Low	7	Yes			
7	S1S3S1B	1	3	1	Base	4	Yes	Yes	Yes	
8	S1S3S1H	1	3	1	High	6	Yes			
9	S1S3S1L	1	3	1	Low		Yes			
10	S1S3S2B	1	3	2	Base	3	Yes	Yes		
11	S1S3S3B	1	3	3	Base	8	Yes	Yes		
12	S2S2B	2	2		Base		Yes	Yes		
13	S2S2H	2	2		High		Yes			
14	S2S2L	2	2		Low		Yes			
15	S2S3B	2	3		Base		Yes	Yes	Yes	Yes
16	S2S3H	2	3		High		Yes			
17	S2S3L	2	3		Low		Yes			
18	S2S3S4B	2	3	4	Base		Yes	Yes		
19	S3S2B	3	2		Base		Yes	Yes		
20	S3S2H	3	2		High		Yes			
21	S3S2L	3	2		Low		Yes			
22	S3S3B	3	3		Base		Yes	Yes	Yes	Yes
23	S3S3H	3	3		High		Yes			
24	S3S3L	3	3		Low		Yes			
25	S4S2B	4	2		Base		Yes	Yes		
26	S4S2H	4	2		High		Yes			
27	S4S2L	4	2		Low		Yes			
28	S4S3B	4	3		Base		Yes	Yes		Yes
29	S4S3H	4	3		High		Yes			
30	S4S3L	4	3		Low		Yes			
31	S4S3S3B	4	3	3	Base		Yes	Yes		
32	S4S3S5B	4	3	5	Base		Yes	Yes		
33	S5S1B	5	1		Base	1	Yes	Yes		
34	S5S1S5B	5	1	5	Base	2	Yes	Yes		

Task 3: Determination of PRM

This task consists of an iteration between Aurora and PROMOD and supplemented by external calculations to determine the adequacy of the selected Planning Reserve Margin. The proposal provides details on the methodology and Exhibit 4 provides details on the timeline.

Task 4: PROMOD Assessment (ENS, LOLH, Dispatch, 1 month weakened system)

The PROMOD runs are carried out for each of the LTCE base case developed in the previous activities. The PROMOD runs provide detailed information on cost, curtailment, energy not served, loss of load hours and in general the dispatch considering transmission limitations. Also, during this activity, the impact of a weakened transmission system is assessed. As before Exhibit 4 provides details on the timeline.

Task 5: Stochastic Analysis

This is one of the last tasks in the project and as presented in the proposal, the impact of the volatility of variables as is the case of fuel, demand, DG penetration, etc. is provided. This assessment is helpful in making the decision on the final recommended IRP and pivot strategies to deal with uncertainties.

Exhibit 4 provides details on the timeline.

Task 6: PSS@E Interconnected Assessment

This activity is carried out on selected LTCE plans that are likely to stress more the transmission system either by location of generating resources or levels of renewable penetration. The main objective is to confirm the adequacy of the transmission system. However, if reinforcements beyond those necessary for resiliency, are identified for a given LTCE, then the necessity of this reinforcements is confirmed if the LTCE that gave rise to them differed materially from the recommended LTCE.

As before Exhibit 4 provides details on the timeline.

Task 7: PSS@E Minigrid Assessment

Under this task the minigrid designed in prior activities are verified under steady state and if necessary stability, considering the local resources form the LTCE. Strategy 2 and Strategy 3 resources are considered unless they do not differ materially in the way the transmission system is stressed. See Exhibit 4 for details on the timeline.

Task 8: Distribution Assessment

This task consists of the following main activities to be carried out with the support of PREPA; a) Review non-technical loss causes and progress to date, b) Proposed non-technical loss strategies & forecast, c) Distribution Reliability Review (Use Cases based on actual project) and d) Distribution PV penetration limitations and identification investments based on selected examples (Use Cases). See Exhibit 4 for details on the timeline.

Task 9: Results Analysis and Recommendations Preliminary & Final; Action Plan

This task is the final task of the IRP and under it the analysis carried out are consolidated in a report and presentations the PREC and stakeholders. Also, the implementation plan is developed working with PREPA. As indicated in the introduction there are two deliveries, an initial delivery by the end of November / beginnings of December and a final delivery by mid January 2019.

Task 10 and 11: Presentations and Stakeholder engagements

These two tasks consist of the ongoing meetings with stakeholders and 3 on site presentations one in October, the preliminary results presentation in December and the final results in January.

Exhibit 4 below provides the detailed timeline for all the activities above.

Exhibit 4: Detailed Timeline

	Model Runs	Duration (days)	9/17/2018	9/24/2018	10/1/2018	10/8/2018	10/15/2018	10/22/2018	10/29/2018	11/5/2018	11/12/2018	11/19/2018	11/26/2018	12/3/2018	12/10/2018	12/17/2018	12/24/2018	12/31/2018	1/7/2019	1/14/2019	1/21/2019	1/28/2019
Task 1: LTCE methodology, assumptions & input consolidation				◆																		
				◆																		
				◆																		
Task 2: 34 LTCE development										◆												
Scenario 1 / Strategy 2, & 3 (B, H & L) Model Runs (Team 1)	6	20																				
Scenario 1 / Strategy 2, & 3 (B, H & L) Analysis - Report (Team 1)		15						◆														
Scenario 1 / Strategy 3 (B) / Sensitivity 2 & Sensitivity 3 model runs (Team 1)	2	5																				
Scenario 1 / Strategy 3 (B) / Sensitivity 2 & Sensitivity 3 analysis & report (Team 1)		5							◆				;									
Scenario 1 / Strategy 3 (B, H & L) / Sensitivity 1 model runs (Team 1)	3	5								◆												
Scenario 1 / Strategy 3 (B, H & L) / Sensitivity 1 analysis & report (Team 1)		5																				
Scenario 2 / Strategy 2& 3 (B, H & L) model runs (Team 2)	6	20																				
Scenario 2 / Strategy 2& 3 (B, H & L) analysis & report (Team 2)		15						◆														
Scenario 2 / Strategy 3 / Sensitivity 4 (B) model runs (Team 2)	1	5																				
Scenario 2 / Strategy 3 / Sensitivity 4 (B) analysis & report (Team 2)		5							◆													
Scenario 5 / Strategy 1 (B) Base & Sensitivity 1 model runs (Team 2)	2	5																				
Scenario 5 / Strategy 1 (B) Base & Sensitivity 5 analysis & report (Team 2)		5							◆													
Scenario 4 / Strategy 2&3 (B, H & L) model runs (Team 3)	6	20																				
Scenario 4 / Strategy 2&3 (B, H & L) analysis & reports (Team 3)		15						◆														
Scenario 4 / Strategy 3 / Sensitivity 3 & 5 (B) model runs (Team 3)	2	5																				
Scenario 4 / Strategy 3 / Sensitivity 3 & 5 analyses & report (B) (Team 3)		5							◆													

Week	Model Runs	Duration (days)	9/17/2018	9/24/2018	10/1/2018	10/8/2018	10/15/2018	10/22/2018	10/29/2018	11/5/2018	11/12/2018	11/19/2018	11/26/2018	12/3/2018	12/10/2018	12/17/2018	12/24/2018	12/31/2018	1/7/2019	1/14/2019	1/21/2019	1/28/2019
Scenario 3 / Strategy 2& 3 (B, H & L) Model runs (Team 3)	6	10																				
Scenario 3 / Strategy 2& 3 (B, H & L) Analysis & Reports (Team 3)	5	5																				
Task 3: Determination of PRM																						
Update of process to move Aurora to PROMOD / PSS@E	5	5																				
Model Scenario 4 / Strategy 3	5	5																				
Determine PRM	5	5																				
Task 4: PROMOD Assessment (ENS, LOLH, Dispatch, 1 month weakened system)																						
Scenario 1 / Strategy 2, & 3(B) Model Runs (Team 1)	2	15																				
Scenario 1 / Strategy 2, & 3(B) Analysis - Report (Team 1)	15	15																				
Scenario 1 / Strategy 3 (B) / Sensitivity 2 & Sensitivity 3 model runs (Team 1)	2	5																				
Scenario 1 / Strategy 3 (B) / Sensitivity 2 & Sensitivity 3 analysis & report (Team 1)	5	5																				
Scenario 1 / Strategy 3(B) / Sensitivity 1 model runs (Team 1)	1	5																				
Scenario 1 / Strategy 3(B) / Sensitivity 1 analysis & report (Team 1)	5	5																				
Scenario 4 / Strategy 2&3(B) model runs (Team 1)	2	15																				
Scenario 4 / Strategy 2&3(B) analysis & reports (Team 1)	10	10																				
Scenario 2 / Strategy 2& 3(B) model runs (Team 2)	2	15																				
Scenario 2 / Strategy 2& 3(B) analysis & report (Team 2)	15	15																				
Scenario 2 / Strategy 3 / Sensitivity 4 (B) model runs (Team 2)	1	5																				
Scenario 2 / Strategy 3 / Sensitivity 4 (B) analysis & report (Team 2)	5	5																				
Scenario 5 / Strategy 1 (B) & Sensitivity 5 model runs (Team 2)	2	5																				
Scenario 5 / Strategy 1 (B) & Sensitivity 1 analysis & report (Team 2)	5	5																				
Scenario 4 / Strategy 3 / Sensitivity 3 & 4 (B) model runs (Team 2)	2	5																				

	Model Runs	Duration (days)	9/17/2018	9/24/2018	10/1/2018	10/8/2018	10/15/2018	10/22/2018	10/29/2018	11/5/2018	11/12/2018	11/19/2018	11/26/2018	12/3/2018	12/10/2018	12/17/2018	12/24/2018	12/31/2018	1/7/2019	1/14/2019	1/21/2019	1/28/2019
Week			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Scenario 4 / Strategy 3 / Sensitivity 3 & 4 analyses & report (B) (Team 2)	5																					
Scenario 3 / Strategy 2 & 3(B) Model runs (Team 2)	2																					
Scenario 3 / Strategy 2 & 3(B) Analysis & Reports (Team 2)	10																					
Task 5: Stochastic Analysis and Memo																						
Cases Set up	5																					
Scenario 1 / Strategy 3 runs & analysis	7																					
Scenario 2 / Strategy 3 runs & analysis	3																					
Scenario 4 / Strategy 3 runs & analysis	7																					
Scenario 3 / Strategy 3 runs & analysis	3																					
Stochastics memo	1																					
Task 6: PSS®E Interconnected Assessment																						
Determination of critical / preferred portfolios LTCE to model (2 max & 2 years)	5																					
Determination of affected / weakened system to evaluate	5																					
Steady State Assessment (2 LTCE x 2 years x 2 dispatch x 2 config) = 16	20																					
Stability Assessment (2 LTCE x 2 Years x 2 dispatch) = 8	20																					
Transmission memo / invoice	5																					
Task 7: PSS®E Minigrid Assessment																						
Finalize determination of critical loads / topology & report	5																					
Location & size of generating resources Strategy 2 & 3	5																					
Steady State Assessment (1-year x 2 dispatches x 2 strategies) = 5	10																					
PROMOD Assessment (1-year, 1 month, 2 strategies)	10																					
Minigrid memo	5																					

	Model Runs	Duration (days)	9/17/2018	9/24/2018	10/1/2018	10/8/2018	10/15/2018	10/22/2018	10/29/2018	11/5/2018	11/12/2018	11/19/2018	11/26/2018	12/3/2018	12/10/2018	12/17/2018	12/24/2018	12/31/2018	1/7/2019	1/14/2019	1/21/2019	1/28/2019
Week			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Task 8: Distribution Assessment																						
Review non-technical loss causes & progress		5																				
Propose non-technical loss strategies & forecast		5																				
Distribution Reliability Review (Use Cases)		5																				
Distribution PV Penetration (Use Cases)		5																				
Distribution memo.		5																				
Task 9: Results Analysis and Recommendations Preliminary & Final; Action Plan																						
Scenario consolidation & recommendations	20																					
Preliminary results report	10																					
Action Plan	15																					
Caveats and limitations	5																					
Final Report	25																					
Task 10: Ongoing Stakeholder engagement																						
Ongoing meetings	20																					
Task 11: Presentation and Stakeholder Meetings																						
PR Summit Presentation	5																					
PREC & Stakeholder Preliminary Results Presentation	10																					