

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

19 MAY 31 P 3:02

SECRETARIA
COMISION DE ENERGIA DE
PUERTO RICO

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

NO. CEPR-AP-2018-0001


**SUBJECT: PREPA'S MOTION TO
EXTEND SCHEDULE**

PREPA'S MOTION TO EXTEND SCHEDULE

TO THE HONORABLE PUERTO RICO ENERGY BUREAU:

COMES NOW the Puerto Rico Electric Power Authority ("PREPA") and respectfully submits, to the honorable Puerto Rico Energy Bureau (the "Energy Bureau"), PREPA's Motion to Extend the Schedule by: (1) adding five business days to the due date for the compliant Integrated Resource Plan ("IRP") filing,¹ which would move the due date from May 31, 2019, to June 7, 2019; and (2) adding five business days to the due date for the new Direct Testimony, which would move the due date from June 7, 2019, to June 14, 2019. This Motion is supported by the attached Memorandum from PREPA's independent IRP experts, Siemens PTI.

PREPA understands that the Energy Bureau has emphasized the importance of the schedule in this matter. PREPA agrees. PREPA has concluded, however, based on updates from PREPA's independent IRP experts, Siemens PTI, that the requested additional time is essential to preparing a compliant IRP filing and testimony.


¹ When PREPA refers here to a compliant IRP filing, PREPA basically means a revised and updated filing that complies with the Energy Bureau's directives, especially the order of March 14, 2019.


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In brief, the primary driver of this Motion is the fact that, while Siemens have worked diligently to meet the existing deadline, Siemens have had to perform significantly more Long Term Capacity Expansion ("LTCE") model runs than Siemens did or could previously anticipate.

In short, the reasons for the need to perform additional unexpected model runs are as follows. Many of the initial model runs carried out by Siemens in order to prepare a compliant IRP filing yielded results that underbuilt battery storage (or that built storage in big blocks by 2038, which is too late), yielded unacceptable levels of energy not served, and/or caused very high curtailment levels.²

For example, under case "S4S2B", the LTCE results initially built 1,400 MW of storage resulting in 11% curtailment by 2031, while by redistributing the construction schedule of the batteries and increasing the amount to 1,600 MW, the curtailment was reduced to 6% and the net present value ("NPV") of total cost was reduced from \$14,387 million to \$14,311 million. In the long term, the curtailment remains high, but it has a much lesser impact on the short term assessments of the plans and its NPV. Just as another example the energy system modernization ("ESM") plan also had significant issues and by 2027 the curtailment reached 22% dropping to 13% the following year. The LTCE had built 1,520 MW of batteries. With increasing that to 1,640 MW and redistributing the schedule, the curtailment in 2027 (peak for the short term), reached 9%


² In addition, in Scenario 1, the model run results gave inconsistent solutions regarding EcoElectrica's generation, retiring the unit. That is not a reasonable solution under Scenario 1 with no new gas in the South.

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and dropped to 4% the following year. Again, the NPV was reduced from \$14,683 million to \$14,431 million. Those are just examples. All case runs came with similar issues.

Adding sufficient storage in the near and medium term is one of the steps needed to achieve much higher levels of renewable energy generation that comply with (or exceed) the new statutory renewable portfolio standard ("RPS") (Act 82-2010 as amended by Act 17-2019) while maintaining the necessary system capacity, adequacy, and reliability, and avoiding excessive curtailment costs.

Another impact of low levels of batteries were observed in some model runs that sometimes resulted in the system lacking enough capacity at certain times of the day to supply the load, i.e., loss of load hours in the range of 4 to 400 hours in a year. That is not an acceptable outcome.

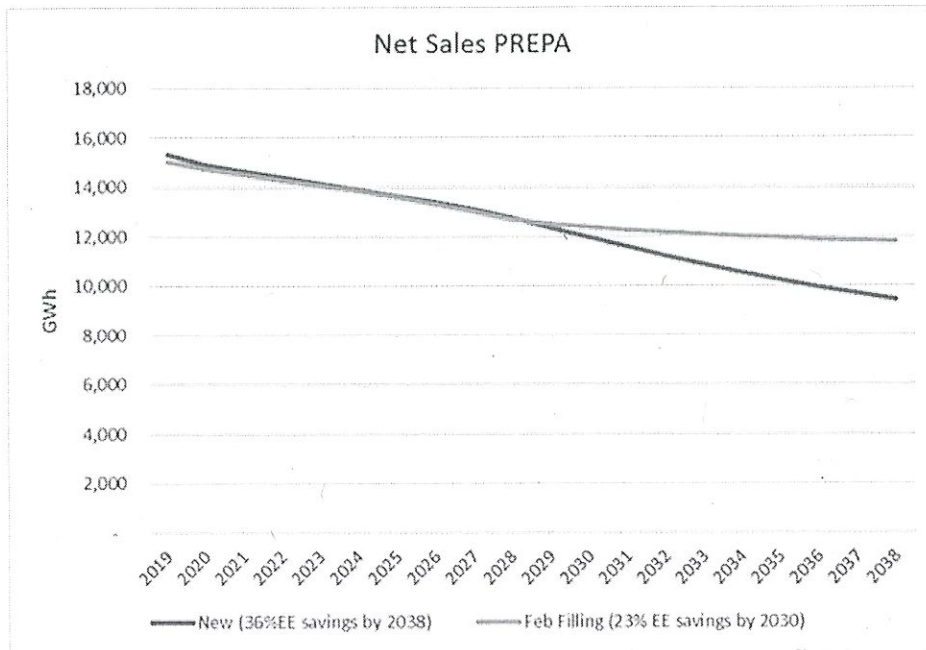
Moreover, the model runs more generally unexpectedly generated very high levels of solar generation curtailment (in the range of 10% to 40%, depending on the case, with the spikes in curtailments starting in the late 2020's, when the projected load declines more aggressively). High curtailment levels mean excessive curtailment costs.

Basically, the changing fundamentals required of the compliant IRP, especially the lower load levels due to required levels of increasing energy efficiency penetration over time and the increased RPS requirements, made it more difficult for the Aurora software to find solutions that satisfied all of the above objectives and concerns.

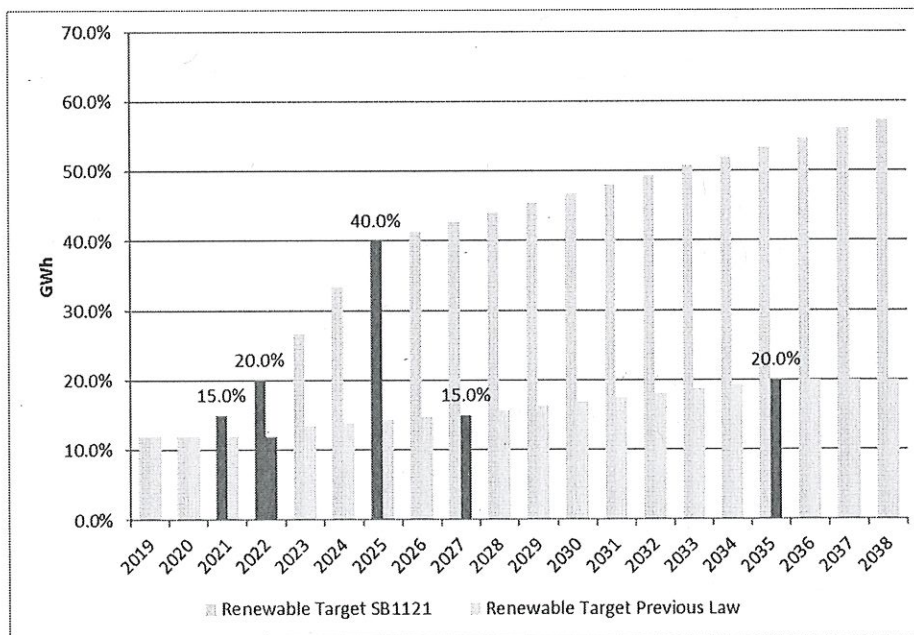
The changes in load are dramatic. The load in the compliant IRP filing base case is 33% below the 2019 levels by 2038. That is 20% lower than the 2038 level used in PREPA's February 2019 IRP filing.

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Meanwhile, the RPS requirements basically doubled.



During the past month, Siemens worked with the head of development at Energy Exemplar (the Aurora software developer) to resolve the issues.

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Ultimately, Siemens needed to make adjustments, and to re-run most cases at least once, in order to achieve sufficient levels of battery storage without unacceptable levels of energy not served and without high levels of curtailment with focus on the short / medium term. However, it must be stressed that further optimizations of the curtailment (particularly in the long term) are feasible and possibly desired, but this would require more time as it is a labor-intensive interactive process.

As the Energy Bureau is aware, each LTCE model run takes a significant amount of time to prepare and then to run on the supercomputer, even using multiple servers in cloud supercomputers that allow running more than one LTCE at a time.

One additional factor is that a key Siemens IRP team member unexpectedly departed to join another consulting firm approximately two weeks ago. Siemens worked diligently in bringing other resources to the project, but there was always the unavoidable lost time to bring the new resources up to date in the project.

This week, Siemens, due to its extensive efforts, finished its analytical work on most of the required IRP cases, including all the central or core cases. Siemens completed Scenario 4, the Energy System Modernization ("ESM"), Scenario 1, and Scenario 3, under the base load structure. Siemens also has completed the high and low load cases for Scenario 4 and the ESM.

Siemens is working on 12 non-LTCE sensitivities that it estimates it can complete by end of day on May 31.

As of the afternoon of May 30, 2019, Siemens had 9 LTCE cases pending, which is work in progress but not finalized. This group of cases includes the high and low load

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scenarios for Scenarios 1 and 3, the centralized strategy (strategy 1) for Scenarios 4 and 1, a gas sensitivity for Scenario 4 and Scenario 1, and strategy 3 for Scenario 1. Siemens estimates that it will take three additional days of work to complete these items.

Siemens also needs to prepare the IRP main Report, plus its many required attachments and Appendices, under the Energy Bureau's rule and orders, including the additional items required by the Energy Bureau's order of March 14, 2019. Siemens also needs to assemble the extensive work papers required by the rule.

While Siemens as independent experts have the lead in preparing the IRP filing, PREPA ultimately is responsible for the IRP filing. In particular, a critical component of the IRP filing is the presentation and support of PREPA's proposed Action Plan and PREPA's Preferred Resource Plan, which is to be addressed primarily by Part 10 of the IRP main Report (as required by Reg. No. 8720).

Thus, the schedule needs to include enough time for Siemens and PREPA to work together on the IRP filing, especially Part 10 of the IRP main Report.

Furthermore, several of the required IRP filing documents will contain Critical Energy Infrastructure Information ("CEII") and, in some instances, other confidential information. The IRP filing needs to address that fact through the preparation of public and confidential versions of documents when applicable, and through the preparation of a motion to approve the confidentiality designations. That also takes some time.

Finally, PREPA also respectfully requests an extension of time for the preparation of the required Direct Testimony. The testimony must reflect the actual final IRP, of course, as well as comply with Reg. No. 8720. In addition, PREPA must prepare and

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submit the chart that indicates which portions of the IRP filing are supported by which witness, as required by the rule.

Under all of the circumstances, and taking into consideration the Energy Bureau's past directives and statements regarding the schedule, PREPA believes that it must respectfully ask for (1) an additional five business days to submit the compliant IRP filing, which would move the due date from May 31, 2019, to June 7, 2019; and (2) an additional five business days to submit the new Direct Testimony, which would move the due date from June 7, 2019, to June 14, 2019.

PREPA believes that the additional time it is requesting is the minimum additional time that it can request consistent with performing its responsibilities relating to the IRP filing while taking into account the Energy Bureau's directives and statements.

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WHEREFORE, the Puerto Rico Electric Power Authority respectfully requests that the Honorable Puerto Rico Energy Bureau grant this Motion; add an additional five business days to submit the compliant IRP filing, which would move the due date from May 31, 2019, to June 7, 2019; add an additional five business days to submit the new Direct Testimony, which would move the due date from June 7, 2019, to June 14, 2019; and, enter such other relief as is warranted.

RESPECTFULLY SUBMITTED,

IN SAN JUAN, PUERTO RICO, THIS 31st DAY OF MAY, 2019

I HEREBY CERTIFY that on this day, I have filed the above motion with the Puerto Rico Energy Bureau in hard copy format at the office of the Clerk of the Puerto Rico Energy Bureau; and that courtesy copies of the filing were sent via email to the Puerto Rico Energy Bureau via email to secretaria@energia.pr.gov and wordero@energia.pr.gov, and to the office of the Energy Bureau's internal legal counsel via email to legal@energia.pr.gov and sugarte@energia.pr.gov.



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MEMO TO: PREPA CEO and IRP Team
FROM: Siemens PTI/EBA
DATE: May 31st, 2019
SUBJECT: Modeling Issues and Results Delay

This memo summarizes the issues encountered by the Siemens team which has delayed the delivery of the results for all the cases and the IRP report on May 31st, 2019, as directed by the PREB order. This memo includes information provided to PREPA on May 30 with some additional information.

Siemens PTI, have worked diligently to meet the existing deadline, however the Siemens team have had to perform significantly more simulations of the model than Siemens did or could previously anticipate.

In short, the reasons for the need to perform additional unexpected model runs are as follows. Many of the initial model runs carried out by Siemens in order to prepare a compliant IRP filing yielded results that underbuilt battery storage (or that built storage in big blocks by 2038, which is too late), yielded unacceptable levels of energy not served, and/or caused very high renewable curtailment levels and costs.¹

For example, under S4S2B the LTCE initially built 1,400 MW of Storage resulting in 11% curtailment by 2031. By redistributing the construction schedule of the batteries and increasing the amount of storage to 1,600 MW in total, the curtailment went down to 6 % by 2031, and the NPV of total cost declined from \$14,387 million to \$14,311 million. In the long term, the curtailment remains high but it has a much lesser impact on the short-term assessments of the plans and its NPV of the cost. In another case, the ESM plan, the curtailment reached 22% by 2027 dropping to 13% the following year. The Aurora model had built 1,520 MW of batteries. After increasing the amount of batteries built to 1,640 MW and redistributing their starting year, the curtailment fell to 9% in 2027 and 4% the following year. Again, the NPV of the costs was reduced from \$14,683 million to \$14,431 million.

Adding sufficient storage in the near and medium term is one of the steps needed to achieve much higher levels of renewable energy generation that comply with (or exceed) the new statutory renewable portfolio standard ("RPS") (Act 17-2019) while maintaining the necessary system capacity, adequacy, and reliability, and avoiding excessive curtailment costs.

Another impact of low levels of batteries were observed in some model runs that resulted in the system lacking enough capacity at certain times of the day to supply the load, i.e., loss of load hours in the range of 4 to 400 hours in a year, depending on the case. This is not considered an acceptable outcome.

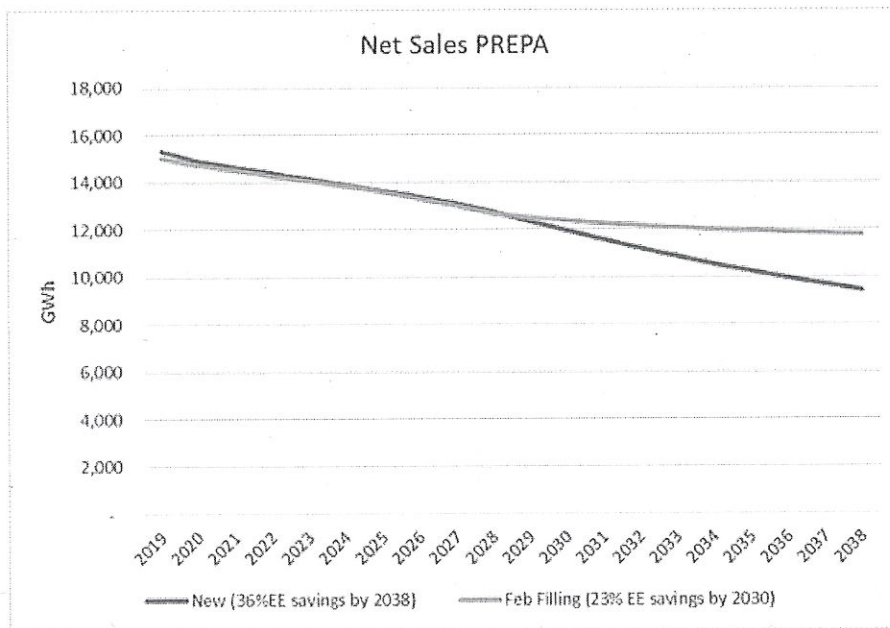
Moreover, the model runs unexpectedly generated very high levels of solar generation curtailment (in the range of 10% to 40%), depending on the case, with the increase in curtailments starting in the late 2020's, when the forecast load declines more aggressively. High curtailment levels mean excessive curtailment costs.

¹ In addition, in Scenario 1, the model run results gave inconsistent solutions regarding EcoElectrica's generation, retiring the unit. That is not a reasonable solution under Scenario 1 with no new gas in the South.

Basically, the changing fundamentals required of the compliant IRP, especially the lower load levels due to required levels of increasing energy efficiency penetration over time and the increased RPS requirements, made it more difficult for the Aurora software to find solutions that satisfied all of the above objectives and concerns.

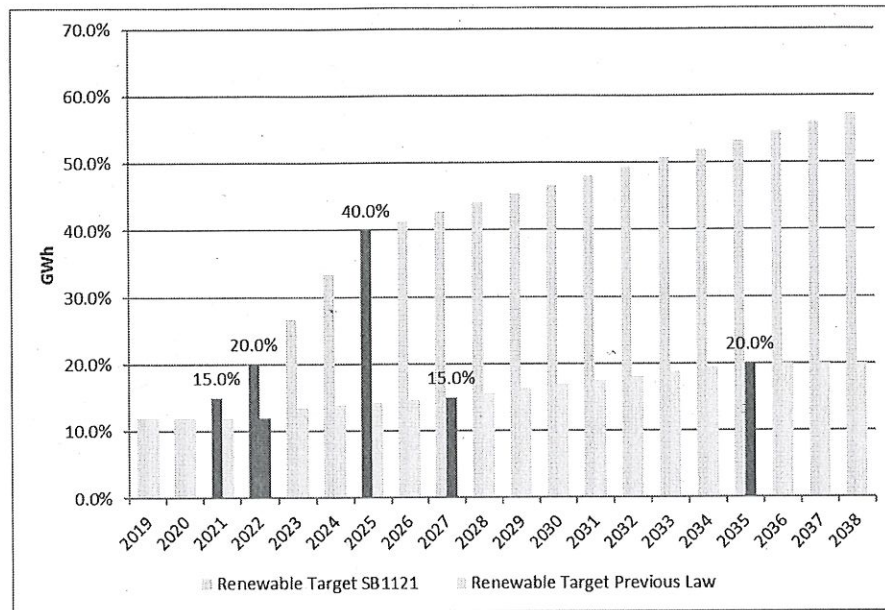
The decline in load is very significant. The load in the compliant IRP filing base case is 33% below the 2019 levels by 2038. That is 20% lower than the 2038 level used in PREPA's February 2019 IRP filing. See Exhibit 1.

Exhibit 1: Net Sales Forecast in GWh



Meanwhile, the RPS requirements more than doubled, as shown in Exhibit 2.

Exhibit 2: RPS Targets



During the past month, Siemens worked with the head of development at Energy Exemplar (the Aurora software developer) to address the issues.

Ultimately, Siemens needed to make adjustments after our expert review, and re-run most cases at least once, in order to achieve sufficient levels of battery storage without unacceptable levels of energy not served and without high levels of curtailment. However, it must be stressed that further optimizations of the curtailment (particularly in the long term) are feasible and possibly desired, but this would require more time as it is a labor-intensive interactive process.

As PREPA is aware, each LTCE model run takes a significant amount of time to prepare and run in powerful computers, even if multiple servers in cloud computers are used that allow for running more than one LTCE at a time.

One additional factor is that a key Siemens modeler unexpectedly departed to join another consulting firm, approximately two weeks ago; Siemens worked diligently in bringing another resources to the project, but there was always the unavoidable lost time to bring the new resources up to speed in a complex project like this one.

This week, Siemens, due to its extensive efforts, finished its analytical work on most of the required IRP cases, including all the central or core cases. Siemens completed Scenario 4, the Energy System Modernization ("ESM"), Scenario 1, and Scenario 3, under the base load structure. Siemens also has completed the high and low load cases for Scenario 4 and the ESM.

Siemens is working on 12 non-LTCE sensitivities. As of the afternoon of May 30, 2019, Siemens had 9 LTCE cases pending, which is work in progress but not finalized. This group of cases includes the high and low load scenarios for Scenarios 1 and 3, the centralized strategy (strategy 1) for Scenarios 4 and



1, a gas sensitivity for Scenarios 4 and 1, and strategy 3 for Scenario 1. Siemens estimates that it will take three additional days of work to complete these items.

Siemens also needs to continue preparing the IRP main Report, plus its many required attachments and Appendices, under the Energy Bureau's rule and orders, including the additional items required by the Energy Bureau's order of March 14, 2019. Siemens also needs to assemble the work papers required by the rule.