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Generation Stabilization Plan Status Report to PREB

NEPR-MI-2022-0003

November 15, 2022

Agenda

I. Executive Summary of Generation Stabilization Plan Status

II. Past Two Weeks Area of Focus

III. Generation Operational Issues and Concerns

IV. Risk Analysis Update

Executive Summary of Generation Risk Assessment

Executive Summary of Generation Stabilization Plan Status*

- LUMA has not been provided any information to change its concerns with the generation portfolio's inadequate reliability expressed in the October 6th letter to Energy Bureau
  - Load shed occurrences since October 1st due to generation fleet issues continue to occur at an unacceptably high rate from the perspective of the customer
  - Several recurring issues at generation plants increase the potential of future shortfalls and the likelihood that PREPA will not complete required maintenance in time for summer 2023 season which will significantly increase load shed risk and reduce the generation system ability to recover from a hurricane event
  - FEMA Power System Stabilization Task Force (PSSTF) has been fully mobilized and is finishing Phase 1 of their assessment on schedule
  - LUMA and FEMA are coordinating closely
- At the November 1, 2022, Technical Conference, two questions were posed to LUMA
  - PREB asked a question about U.S. Virgin Island Loss of Load Expectation (LOLE) assumptions:
    - The USVI system and their probability of risk events is slightly different primarily because their system is much smaller than Puerto Rico with a total peak demand of only 300 MW on three islands
    - However, the USVI IRP defined their LOLE target to be 1.0 days per year in 2024 and decreasing gradually to the 0.1 day LOLE common in most utilities (in contract to Puerto Rico's current LOLE of 8.81)
    - The USVI planning assumptions also resulted in approximately 75 Loss of Load Hours (LOLH) which is approximately one-fifth of the LOLH calculated for Puerto Rico today in the LUMA resource adequacy report
  - The OPIC asked approximately what percent of total generation could be produced by 500 MW of emergency generation:
    - Assuming a 90 % capacity factor for the emergency generation, this would produce approximately 3.9 GWH of energy which would represent approximately 20% of the annual demand

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*All information described in this update is current as of Friday November 11, 2022 unless otherwise noted

Executive Summary of Generation Stabilization Plan Status

LUMA is closely monitoring the indicators of increased risk.

Reasons to be Optimistic

1. No major failures or damages requiring outages of 6 months or more to repair have been identified
2. The largest LOLE risk was modeled to be in October; weekly risk levels should reduce after October due to reduced demand
3. The period Nov-Feb features reduced demand which could allow PREPA to get caught up on required maintenance outages

Reasons to be Pessimistic

1. Aguirre 1's continued delayed return-to-service suggest potential for more significant problems
2. Uncertainty related to Palo Seco Mega Gen units' permit status limiting production to 25% of mega gen load
3. Ongoing need for repairs to PS4 and Aguirre 2 could indicate reliability issues
4. Utilization of Residual Fuel Oil at Costa Sur to replace undelivered natural gas will increase maintenance issues and reduce unit availability

Indicators of Increased Risk to Be Monitored Closely

1. Continued delays in return to service dates of Aguirre 1&2, and PS 4
2. Fiona-related damages to generators
3. Increased forced outage rates are possible due to existing units generating above their historic performance limits
4. A cold winter in US or Europe could further limit the availability of natural gas, thus increasing prices

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Past Two Weeks Area of Focus

Past Two Weeks Area of Focus - Stakeholder Coordination

FEMA

- Sending Daily Status report to FEMA each day (same daily report that is sent to the Energy Bureau)
- Progress meeting with FEMA held November 10th; follow-up meetings scheduled November 15th and 16th
- Additional meetings will follow

PREPA

- Primary focus has been outage planning
- Daily updates on plant status as generation plant issues emerge each week

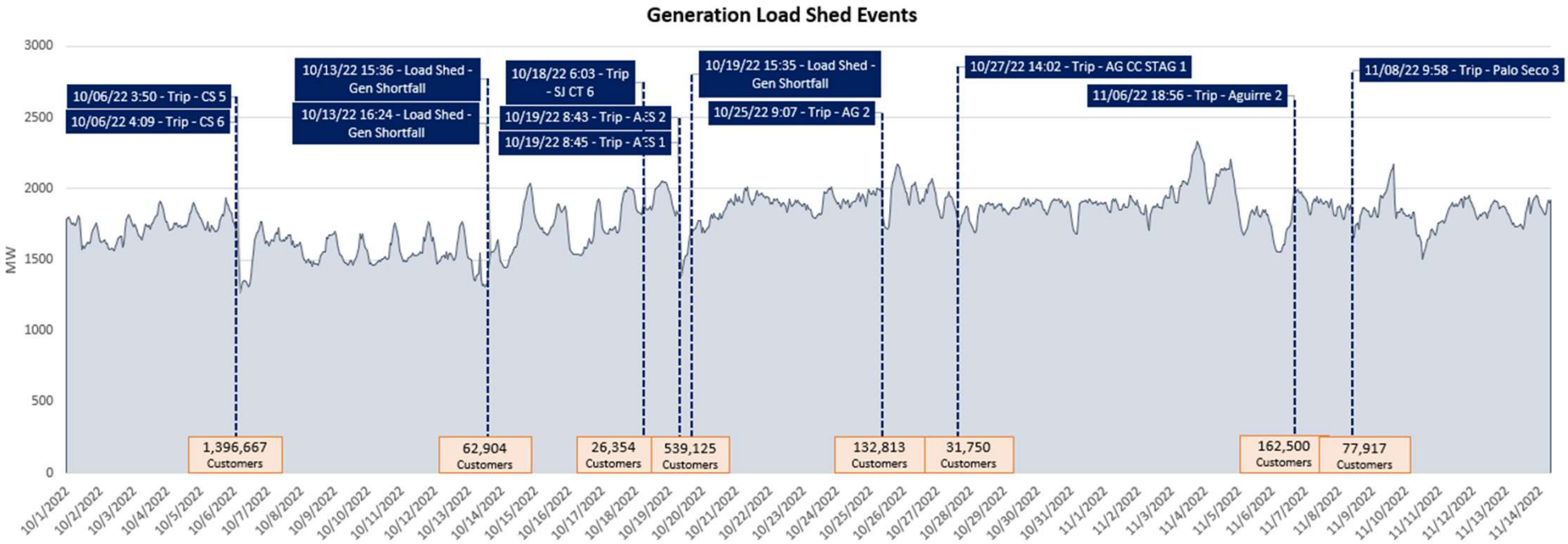
LUMA

- Daily coordination with System Operations as generation performance issues emerge and planning assumptions change
- Weekly updates to risk analysis model

Generation Operational Issues and Concerns

Multiple Generation Events Since October 1st*

Eight days with generation driven load shed events have occurred October 1st through November 11th



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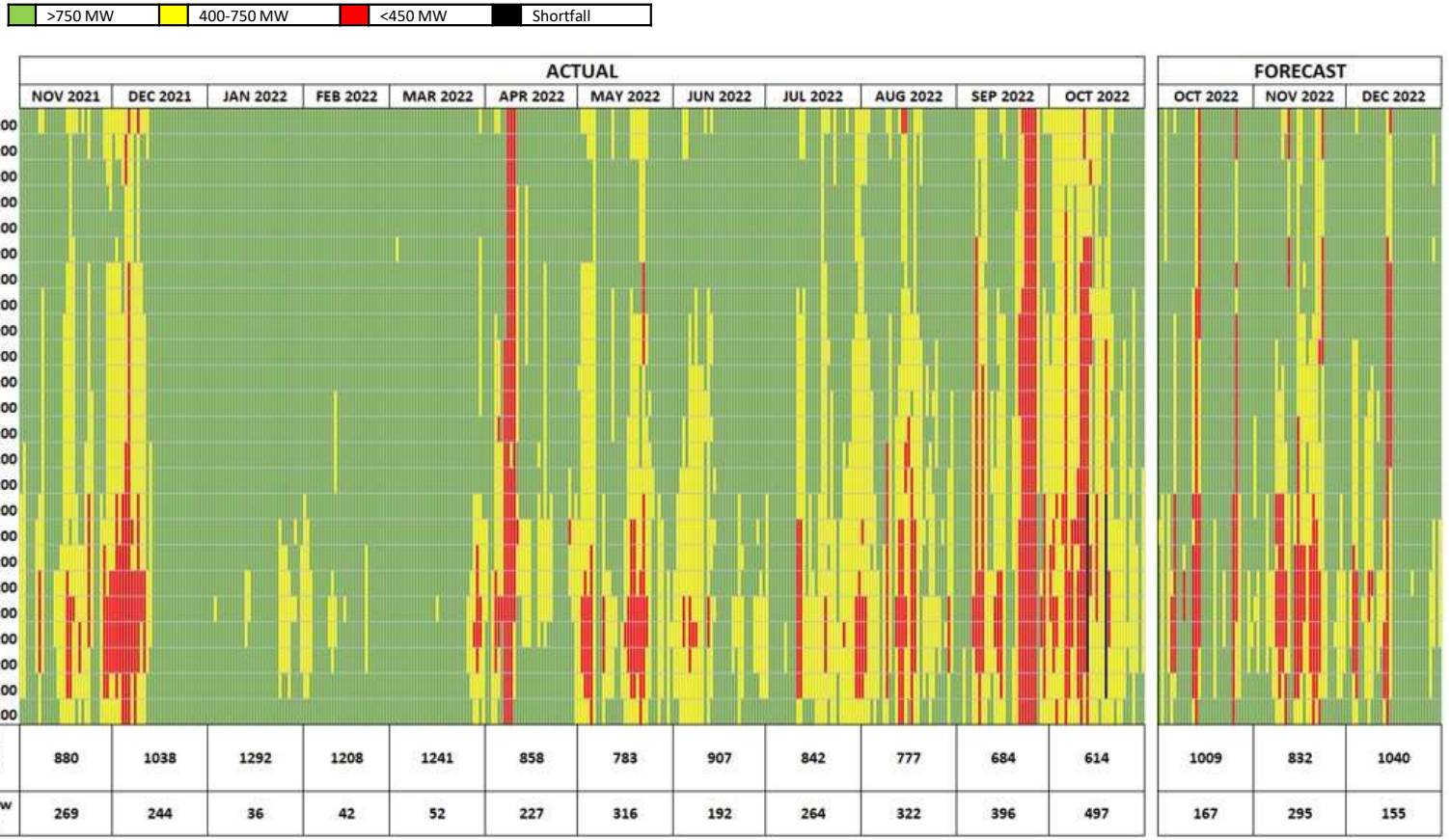
*October 1, 2022 was date that 90% of Customers restored

Inadequate System Reserves for 28% of hours in Oct-Dec

System Reserves is the amount of generating capacity available to meet demand on an hourly basis after adjusting for Planned Outages and historical forced outage rates

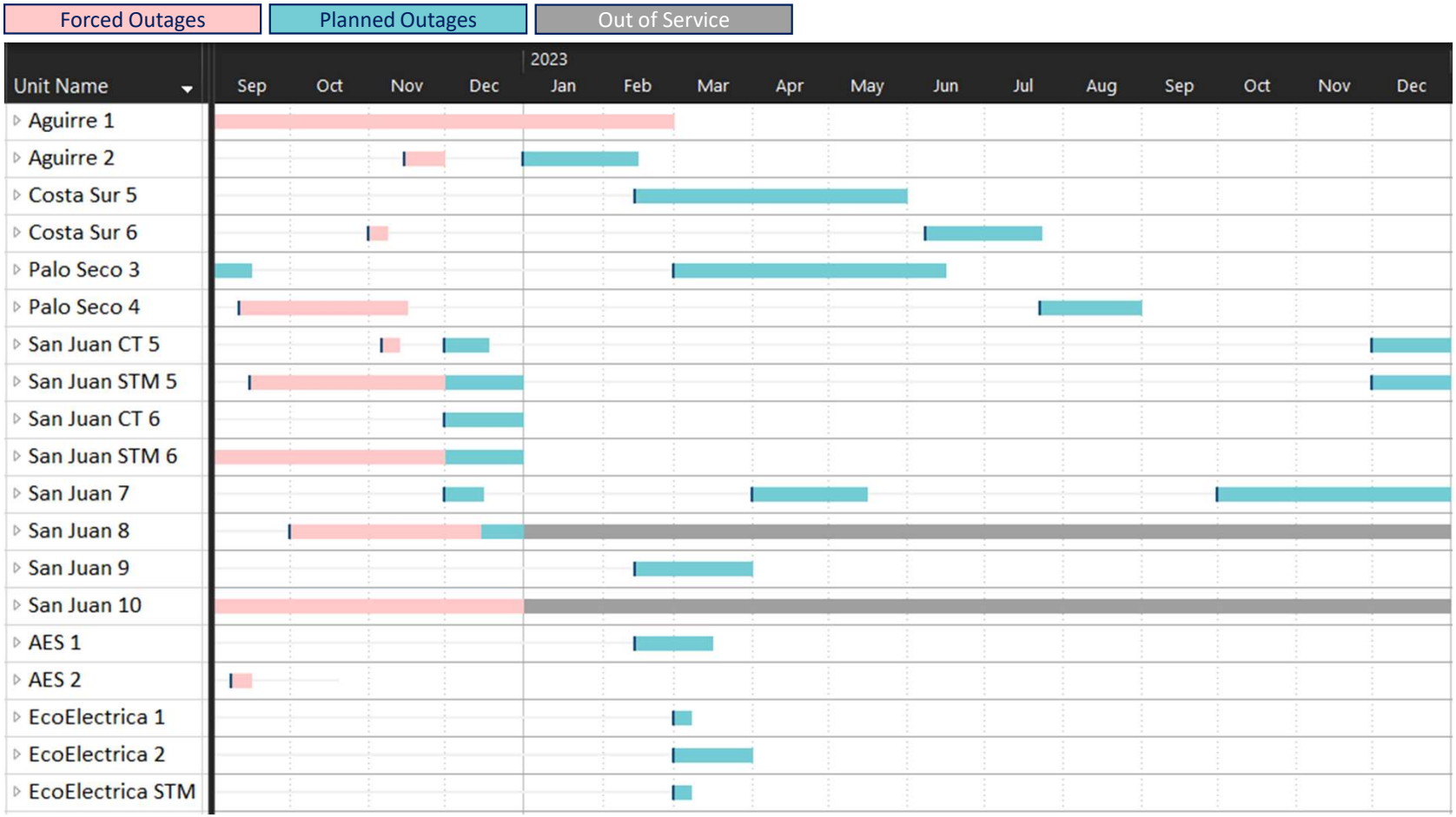
Target: ▲ Reserves >750MW per the System Operation Principles and Industry Guidelines



	NOV 2021	DEC 2021	JAN 2022	FEB 2022	MAR 2022	APR 2022	MAY 2022	JUN 2022	JUL 2022	AUG 2022	SEP 2022	OCT 2022	OCT 2022	NOV 2022	DEC 2022
Reserves Average (MW)	880	1038	1292	1208	1241	858	783	907	842	777	684	614	1009	832	1040
Hours below 750 MW	269	244	36	42	52	227	316	192	264	322	396	497	167	295	155

- 58 out of 90 days are forecasted to have at least one hour where reserves <750MWh. Out of these 58 days, 31 are expected to have at least one hour <450MWh reserves.
- It's important to note that the forecast availability assumes maintenance outages are completed as scheduled, and no need for unplanned outages which could occur more frequently than historic rates depending on plant damages.
- October had 497 hours (67% of hours in month) where reserves were <750MWh, as compared to the 167 hours (22% of hours in month) that were forecasted.

Generation Planned Outages as of October 28, 2022



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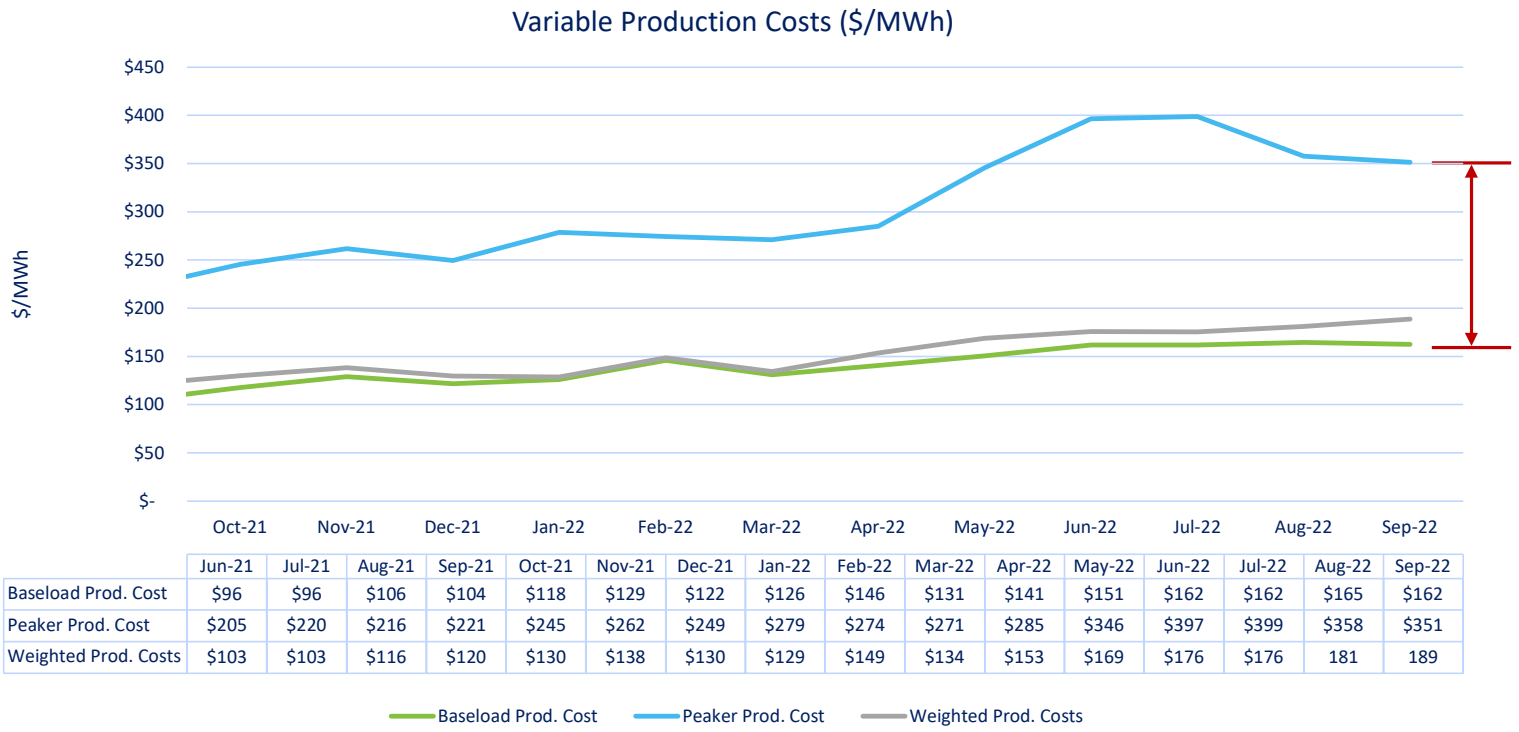
Impact of Baseload Plant Outages- Increased Fuel Cost

Fuel Costs reflect the cost to produce one MWh of energy. In the graph, the cost is shown separately for Baseload units and Peaker units. The weighted average cost indicates the cost per MWh of all energy produced for the system portfolio. When Peaker units represent a small percentage of total production, the average costs are only slightly affected. But when Peakers are larger component, then the weighted production costs are more impacted such as in September 2022



	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22
Baseload Prod. Cost	$96	$96	$106	$104	$118	$129	$122	$126	$146	$131	$141	$151	$162	$162	$165	$162
Peaker Prod. Cost	$205	$220	$216	$221	$245	$262	$249	$279	$274	$271	$285	$346	$397	$399	$358	$351
Weighted Prod. Costs	$103	$103	$116	$120	$130	$138	$130	$129	$149	$134	$153	$169	$176	$176	181	189

The incremental cost to replace an out-of-service baseload plant with a peaker in September was 18.9 cents/KWH (=351-162)

October data still not available from PREPA as of November 14th. LUMA has ongoing exchange of formal letters to PREPA insisting on access to OSI-PI system data which would provide more timely access to fuel consumption data, but PREPA continues to refuse to provide this access.

Risk Analysis Update

Risk Analysis – Range of potential generation damage

Additional risk analysis focusing on impact to forced outage rates from Fiona damages. Increased LOLE is primarily due to uncertain impact of the air permits for the mega-gen units.