



# Monthly Generation Performance Report

October 2023

# Introduction

As part of the Transmission and Distribution System Operation and Maintenance Agreement (OMA), LUMA serves as both the operator of the electric grid and as the island's System Operator.

As the Operator of the electric grid, LUMA oversees and maintains the transmission and distribution system that is critical to delivering energy to over 1.5 million Puerto Rican customers.

As the System Operator, LUMA monitors the performance of GeneraPR and other private generators' generation units, implements dispatch of available units, and plans and maintains adequate generation reserve levels to meet customer's energy demands.

While LUMA does not generate energy, LUMA's responsibility as the System Operator includes measuring the performance of the island's generation fleet. This report summarizes generation performance, identifies trends, compares facility performance, and provides a high-level picture of the entire generation portfolio.



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# Executive Summary – October Performance

## Overview

The maximum peak demand for October 2023 is approximately 2970 MW.

Aguirre 1 return date has been moved to October 6. San Juan 7 is now expected to come back online on October 15. The Costa Sur 5 return date has been moved to October 26. AES 2 is in an outage and is not expected to come back online until November 15th. Palo Seco 4 still does not have an expected return date.

## Major Events

In October, the electric system experienced 3 load shed events due to generation shortfall, and 5 generation events that caused underfrequency load shed to prevent a frequency decay.

## System Reserves

In October, the hourly reserve levels averaged 644 MW, with 455 hours during the month having less than 750 MW in reserves (equal to 61% of the time.)

Without the additional 350 MW of generation from the FEMA units, the electric system would have potentially experienced 19 additional load shed events at peak hours due to generation shortfall this month.

The forecast for November 2023 shows lower reserve levels to the same month last year (November 2022), with 749 MW average reserves forecasted versus 828 MW seen for the same month last year.

The System Availability for the month of October was 56%.

- PREPA – 46%
- AES – 48%
- EcoEléctrica – 100%



# System Reserves

System Reserves is the amount of generating capacity available to meet peak or abnormally high demands for power and to generate power during scheduled or unscheduled outages.

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

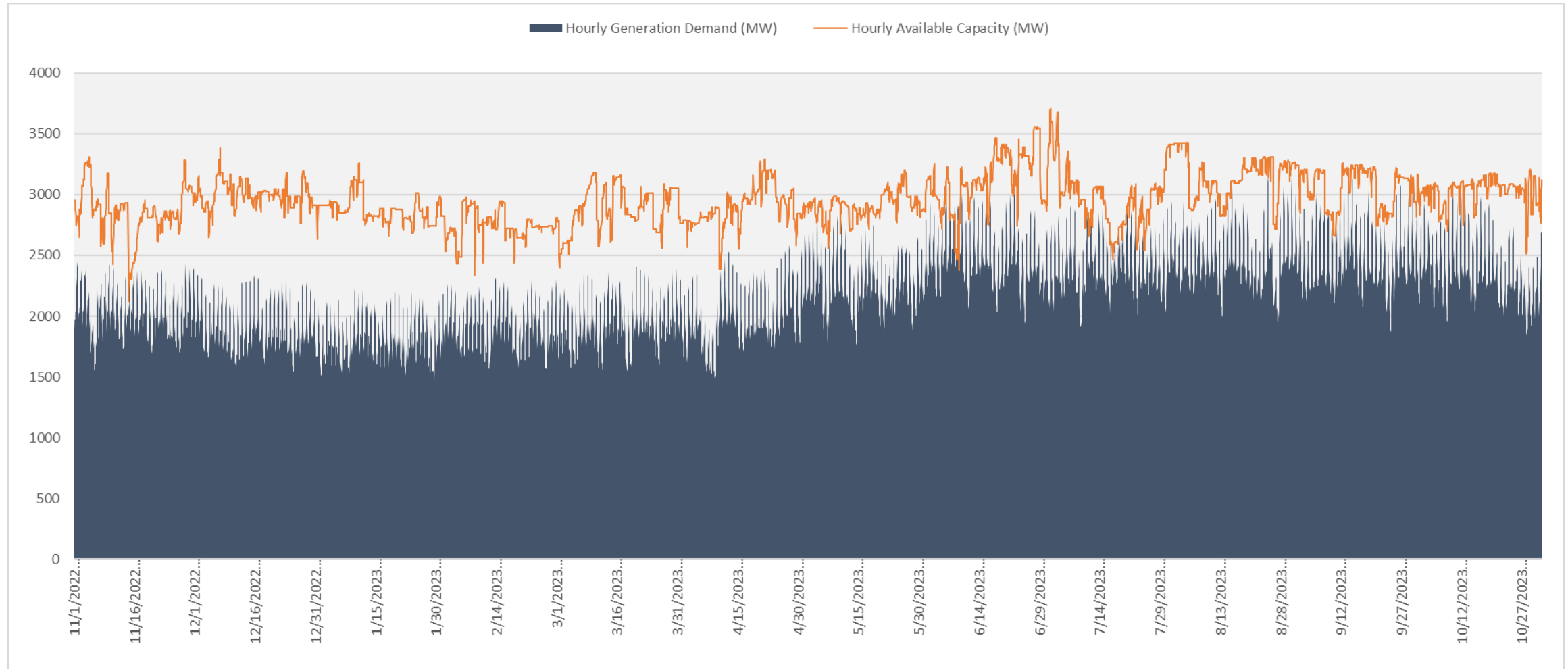


\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# System Availability

The System Availability is the maximum expected output that generating units can supply to system load, adjusted for scheduled or unscheduled outages. In this graph, the availability is being compared with the total generation required to meet demand to visualize the gap between the two lines (the gap represents the reserves level).

Target: ▲ A bigger gap between availability and generation demand means a better chance of recovery in emergency events due to adequate reserves.



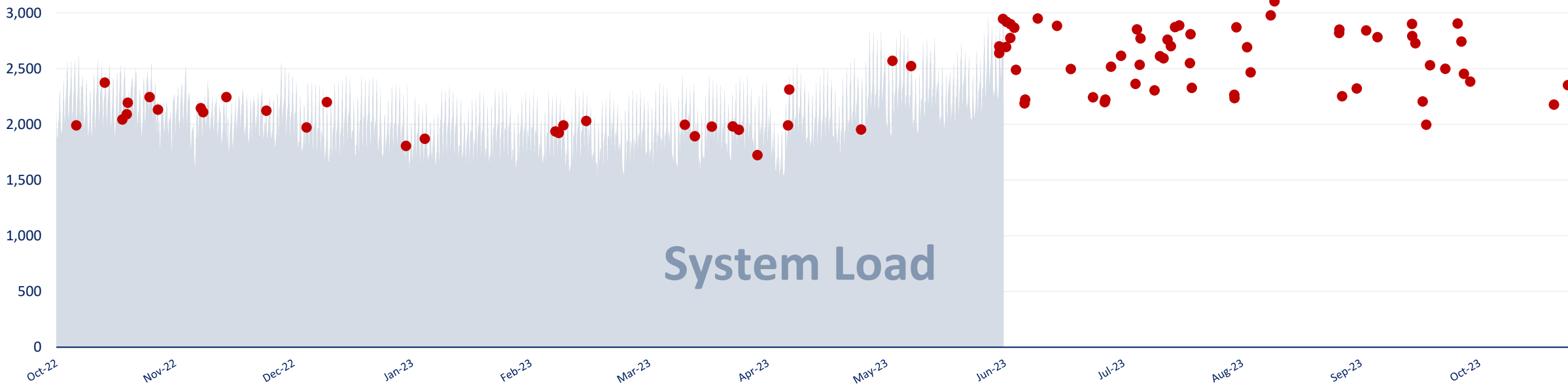
# Load Shed Events

Load shed events can occur due to unexpected generation unit losses (Unit Performance Load Shed Events). Also, when the demand for electricity exceeds available supply levels, LUMA, as the system operator and in compliance with its responsibilities under the T&D OMA, implements load shedding to stabilize the electric system and prevent larger and longer outages (Generation Shortfall Events).

LUMA does not generate energy and can only operate the system with the electricity that is provided by GeneraPR, PREPA, and other island generators.

## Hourly System Load (MW)

Total Load Shed Events: 98



September (October 1, 2023 - October 31, 2023)	Total Events	Average Customers Affected	Average Duration (min)	Rolling 12 Months (October 1, 2022 - October 31, 2023)	Total Events	Average Customers Affected	Average Duration (min)
Generation Shortfall Events	3	73,350	62	Generation Shortfall Events	30	89,132	167
Unit Performance Load Shed Events	5	39,155	18	Unit Performance Load Shed Events	68	99,400	20

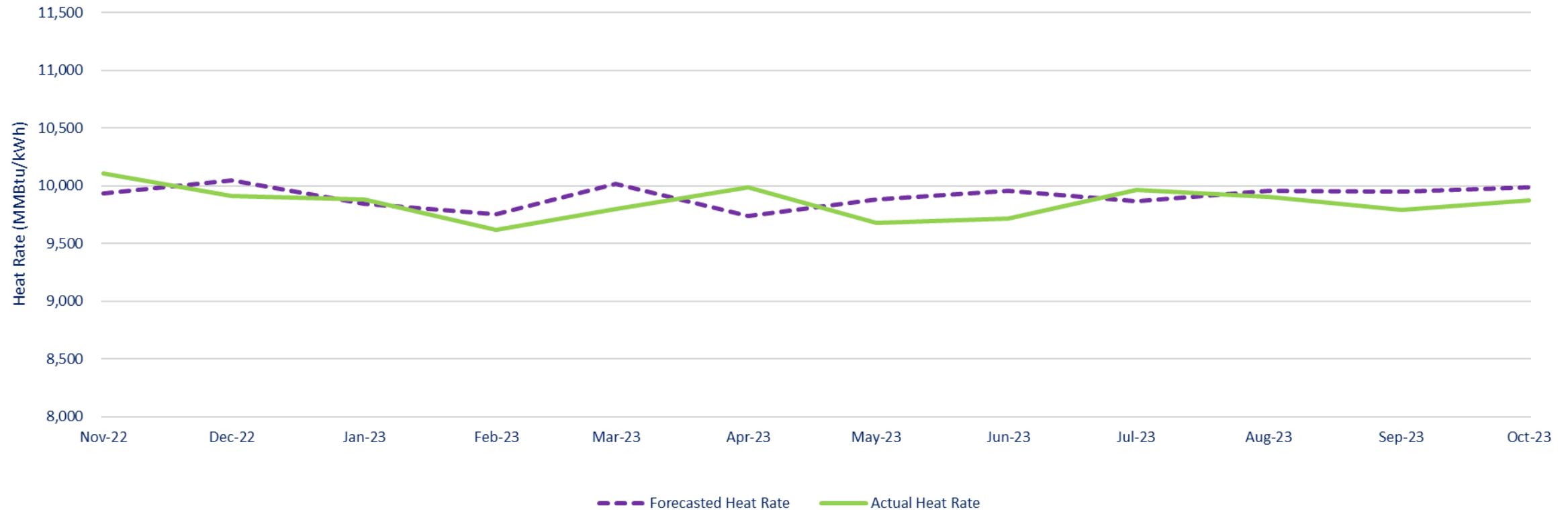
\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# System Heat Rate

The System Heat Rate measures the efficiency of the system to convert fuel into electricity. System Heat Rate will vary depending on the available generation units and required resources to satisfy electrical demand. It is calculated as energy consumed (MMBtu) / energy produced (MWh). The forecasted Heat Rate is determined by the last forecast calculated for the Fuel Clause Adjustment Factor.

Target: ▼ Lower heat rates represent higher efficiency.

Forecasted vs Actual Heat Rate



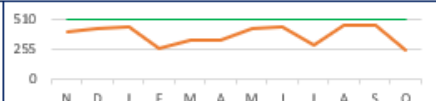
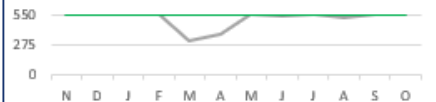


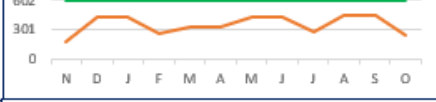
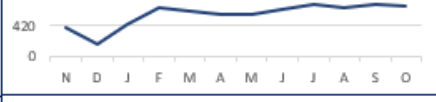



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# Available Capacity – Baseload Units

Available Capacity is the maximum output that a unit can generate at any given time. The Availability Rate indicates the percent of available capacity out of the total nameplate capacity. Variables in the chart below are shown in MW (gross) representing an average over the month.

Target: ▲ A higher availability indicates the plant is able to produce power closer to its nameplate capacity.

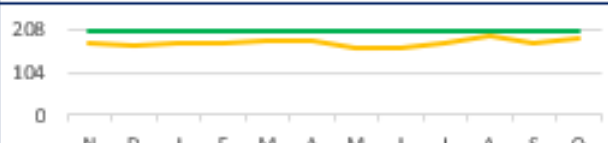
Available Capacity (MW) and Availability Rate (AR)		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	
<b>AES</b> Nameplate Cap: 508		MW	391	426	438	256	333	323	425	435	285	449	447	243
		AR	77%	84%	86%	50%	66%	64%	84%	86%	56%	88%	88%	48%
<b>EcoElectrica</b> Nameplate Cap: 550		MW	550	550	550	550	315	380	550	544	552	530	549	550
		AR	100%	100%	100%	100%	57%	69%	100%	99%	100%	96%	100%	100%
<b>PREPA Aguirre</b> Nameplate Cap: 900		MW	107	350	128	0	243	307	84	321	274	343	314	373
		AR	12%	39%	14%	0%	27%	34%	9%	36%	30%	38%	35%	41%
<b>PREPA Costa Sur</b> Nameplate Cap: 820		MW	586	568	532	524	616	536	442	479	221	347	311	331
		AR	71%	69%	65%	64%	75%	65%	54%	58%	27%	42%	38%	40%
<b>PREPA Palo Seco</b> Nameplate Cap: 602		MW	178	426	438	256	333	323	425	435	285	449	447	243
		AR	30%	71%	73%	43%	55%	54%	71%	72%	47%	75%	74%	40%
<b>PREPA San Juan</b> Nameplate Cap: 840		MW	385	167	445	662	614	571	571	638	700	659	703	680
		AR	46%	20%	53%	79%	73%	68%	68%	76%	83%	78%	84%	81%
<b>FEMA Palo Seco</b> Nameplate Cap: 150		MW	0	0	0	0	0	0	0	149	145	142	148	
		AR	0%	0%	0%	0%	0%	0%	0%	0%	99%	97%	94%	99%
<b>FEMA San Juan</b> Nameplate Cap: 210		MW	0	0	0	0	0	0	0	0	0	0	199	
		AR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	95%
<b>Total Baseload</b> Nameplate Cap: 4370		MW	2197	2488	2531	2249	2455	2441	2497	2853	2467	2923	2914	2768
		AR	52%	59%	60%	53%	58%	58%	59%	68%	56%	67%	67%	63%

\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Available Capacity – Peaker Units

Available Capacity is the maximum output that a unit can generate at any given time. The Availability Rate indicates the percent of available capacity out of the total nameplate capacity. Variables in the chart below are shown in MW representing an average over the month.

Target: ▲ A higher availability indicates the plant is able to produce power closer to its nameplate capacity.

Available Capacity (MW) and Availability Rate (AR)		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	
<b>PREPA Aguirre Combined Cycle</b> Nameplate Cap: 592		MW	166	65	0	81	95	137	190	193	191	199	148	173
		AR	28%	11%	0%	14%	16%	23%	32%	33%	32%	34%	25%	29%
<b>PREPA Cambalache</b> Nameplate Cap: 248		MW	146	156	151	136	136	113	155	146	152	142	144	73
		AR	59%	63%	61%	55%	55%	46%	63%	59%	61%	57%	58%	30%
<b>PREPA Mayaguez</b> Nameplate Cap: 220		MW	29	37	38	38	33	40	37	35	28	29	21	32
		AR	13%	17%	17%	17%	15%	18%	17%	16%	13%	13%	9%	15%
<b>PREPA Palo Seco (Inc. Mobile-Pack)</b> Nameplate Cap: 207		MW	177	170	177	177	178	178	165	162	175	192	177	188
		AR	85%	82%	85%	86%	86%	86%	80%	78%	85%	93%	86%	91%
<b>Other Peakers</b> Nameplate Cap: 264		MW	71	73	69	76	78	59	57	55	71	69	69	59
		AR	27%	28%	26%	29%	30%	22%	22%	21%	27%	26%	26%	22%
<b>Total Peakers</b> Nameplate Cap: 1531		MW	589	501	435	508	520	527	604	591	617	631	559	526
		AR	38%	33%	28%	33%	34%	34%	39%	39%	40%	41%	37%	34%

\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Heat Rate – Baseload Units

Heat Rate measures the efficiency of a power plant to convert fuel into electricity. It is calculated as energy consumed (MMBtu) / energy produced (MWh).

Target: ▼ Lower heat rates represent higher efficiency.

Heat Rate (MMBtu/MWh)		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
<b>AES</b>		9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800
<b>EcoElectrica</b>		7,932	7,932	7,932	7,945	7,945	7,945	7,945	7,945	7,945	7,945	7,945	7,945
<b>PREPA Aguirre</b>		12,016	10,957	10,699	-	11,230	11,075	12,205	10,741	11,494	11,061	11,010	11,074
<b>PREPA Costa Sur</b>		10,736	10,845	10,909	11,408	10,995	11,249	11,281	11,095	12,327	10,955	11,211	11,258
<b>PREPA Palo Seco</b>		9,876	10,131	10,483	10,363	10,223	10,229	10,614	10,474	10,573	10,785	10,173	10,808
<b>PREPA San Juan</b>		11,404	11,603	10,559	9,869	8,345	8,751	8,308	8,566	8,729	8,772	8,645	8,791
<b>Total Baseload</b>		10,049	9,982	9,931	9,866	9,761	9,860	9,662	9,626	8,987	8,951	8,864	8,118

- The FEMA Palo Seco units are not included as not all the units' consumption is included in the Genera Fuel Report

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# Heat Rate – Peaker Units

Heat Rate measures the efficiency of a power plant to convert fuel into electricity. It is calculated as energy consumed (MMBtu) / energy produced (MWh).

Target: ▼ Lower heat rates represent higher efficiency.

Heat Rate (MMBtu/MWh)		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
<b>PREPA Aguirre Combined Cycle</b>		13,145	15,978	-	15,272	13,680	15,461	15,437	15,129	14,561	15,243	14,762	15,160
<b>PREPA Cambalache</b>		13,185	14,794	14,509	13,971	13,264	14,206	12,887	13,005	12,504	12,965	12,837	12,663
<b>PREPA Mayaguez</b>		10,919	10,413	10,816	10,934	10,355	11,417	11,234	11,046	10,970	11,256	11,436	11,441
<b>PREPA Palo Seco (Inc. Mobile Pack)</b>		11,481	11,719	11,341	11,719	11,964	11,499	11,908	12,143	11,493	11,967	11,666	15,333
<b>Other Peakers</b>		14,053	15,681	16,101	17,324	15,391	14,898	14,497	13,642	13,677	15,418	14,929	15,444
<b>Total Peakers</b>		12,438	12,628	12,332	13,085	12,746	13,479	13,499	13,220	12,690	13,109	12,894	14,102

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# Generation and Capacity Factor – Baseload Units

Generation indicates the average amount of energy each plant produced per month, in MW (gross). The Capacity Factor measures what percentage of the nameplate capacity was used to produce energy during that time period.

Target: ▲ Higher Capacity Factor, and a Generation closer to the nameplate capacity will represent a better utilization of the units.

Average Generation (MW) and Capacity Factor		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	
AES Nameplate Cap: 508		MW	390	414	414	253	314	317	426	425	281	449	447	242
	CF	77%	82%	82%	50%	62%	62%	84%	84%	55%	88%	88%	48%	
EcoElectrica Nameplate Cap: 550		MW	416	411	380	404	261	326	421	430	449	426	434	435
	CF	76%	75%	69%	73%	47%	59%	77%	78%	82%	78%	79%	79%	
PREPA Aguirre Nameplate Cap: 900		MW	83	250	87	0	191	233	74	245	231	258	249	289
	CF	9%	28%	10%	0%	21%	26%	8%	27%	26%	29%	28%	32%	
PREPA Costa Sur Nameplate Cap: 820		MW	503	471	441	429	473	456	431	437	214	324	281	314
	CF	61%	57%	54%	52%	58%	56%	53%	53%	26%	39%	34%	38%	
PREPA Palo Seco Nameplate Cap: 602		MW	152	258	239	261	241	231	295	207	259	130	141	147
	CF	25%	43%	40%	43%	40%	38%	49%	34%	43%	22%	23%	24%	
PREPA San Juan Nameplate Cap: 840		MW	365	141	293	432	363	324	371	417	470	446	462	425
	CF	43%	17%	35%	51%	43%	39%	44%	50%	56%	53%	55%	51%	
FEMA Palo Seco Nameplate Cap: 150		MW	0	0	0	0	0	0	0	0	149	146	146	150
	CF	0%	0%	0%	0%	0%	0%	0%	0%	99%	97%	98%	100%	
FEMA San Juan Nameplate Cap: 210		MW	0	0	0	0	0	0	0	0	0	0	0	201
	CF	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	96%
Total Baseload Nameplate Cap: 4370		MW	1910	1945	1854	1778	1842	1886	2019	2161	2053	2178	2161	2003
	CF	45%	46%	44%	42%	44%	45%	48%	51%	47%	50%	49%	46%	

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# Generation and Capacity Factor – Peaker Units

Generation indicates the average amount of energy each plant produced per month (MW). The Capacity Factor measures what percentage of the nameplate capacity was used to produce energy during that time period.

Target: ▲ Higher Capacity Factor, and a Generation closer to the nameplate capacity will represent a better utilization of the units.

Average Generation (MW) and Capacity Factor		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
<b>PREPA Aguirre Combined Cycle</b>  Nameplate Cap: 592	 N D J F M A M J J A S O	MW 76	5	0	23	28	34	103	89	112	83	60	74
	CF 13%	1%	0%	4%	5%	6%	17%	15%	19%	14%	10%	13%	
<b>PREPA Cambalache</b>  Nameplate Cap: 247.5	 N D J F M A M J J A S O	MW 22	10	7	18	21	19	44	44	83	69	84	32
	CF 9%	4%	3%	7%	8%	8%	18%	18%	33%	28%	34%	13%	
<b>PREPA Mayaguez</b>  Nameplate Cap: 220	 N D J F M A M J J A S O	MW 51	18	8	23	17	26	55	56	88	64	44	32
	CF 23%	8%	4%	10%	8%	12%	25%	26%	40%	29%	20%	14%	
<b>PREPA Palo Seco (Inc. Mobile-Pack)</b>  Nameplate Cap: 207	 N D J F M A M J J A S O	MW 21	4	8	17	17	16	37	40	55	70	74	26
	CF 10%	2%	4%	8%	8%	7%	18%	19%	26%	34%	36%	13%	
<b>Other Peakers (PREPA)</b>  Nameplate Cap: 264	 N D J F M A M J J A S O	MW 16	2	1	2	7	3	10	11	22	13	24	15
	CF 6%	1%	0%	1%	3%	1%	4%	4%	8%	5%	9%	6%	
<b>Total Peakers</b>  Nameplate Cap: 1530.5	 N D J F M A M J J A S O	MW 186	39	24	83	90	98	248	241	359	299	286	180
	CF 12%	3%	2%	5%	6%	6%	16%	16%	23%	20%	19%	12%	

\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Planned Outage Hours – Baseload Units

Planned Outage Hours represents the shutdown of a generating unit or facility for inspection or maintenance, in accordance with an advance schedule; represented in hours. This scoreboard compares the scheduled outage hours with the actual duration of the outage.

Target: ▼ A smaller gap between actuals and planned hours represents a more accurate planification.

	Planned Outage Hours (NOV 2022 - OCT 2023)	Planned Outage Hours	Completed Outage Hours	Notes for In-Progress Planned Outages	Expected Return-to- Service Date
AES		1416	859	AES 2 - Out since 10/1/23 (Annual Maintenance)	AES 2 - 11/15/23
EcoElectrica		1248	1099		
PREPA Aguirre		1248	1055		
PREPA Costa Sur		4896	0		
PREPA Palo Seco		960	48		
PREPA San Juan		5256	3570		
FEMA Palo Seco		0	233		
FEMA San Juan		0	76		
Total Baseload		15024	6864		







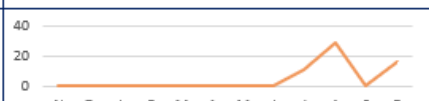


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# Maintenance Outage Hours – Baseload Units

Maintenance Outage Hours represent the shutdown of a generating unit or facility for nonemergency reasons or conditions which need repair outside of the advance schedule; represented in hours per unit.

Target: ▼ Less maintenance hours represents more available capacity in the system to meet demand.

Maintenance Outage Hours		Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
AES		0	0	0	24	0	0	0	0	0	0	0	398
EcoElectrica		0	0	0	0	24	0	0	0	0	0	0	0
PREPA Aguirre		0	0	0	0	44	0	0	0	0	0	0	0
PREPA Costa Sur		0	90	0	0	0	0	0	35	0	0	0	10
PREPA Palo Seco		0	0	0	0	0	0	0	0	0	0	0	0
PREPA San Juan		137	421	0	2	39	37	0	0	0	0	0	37
FEMA Palo Seco		0	0	0	0	0	0	0	0	11	29	0	16
FEMA San Juan		0	0	0	0	0	0	0	0	0	0	0	255
Total Baseload		137	511	0	26	107	37	0	35	11	29	0	462

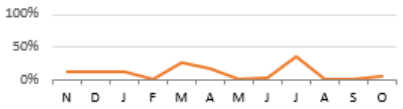
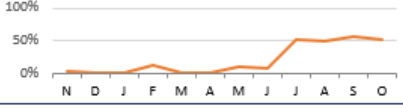
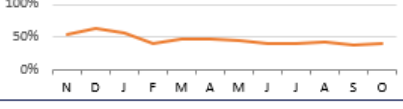
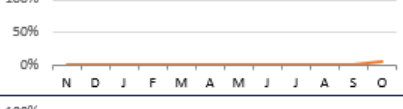
\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.



# Forced Outage Hours and Rate – Baseload Units

Forced Outage Hours represent the shutdown of a generating unit or facility for emergency reasons or a condition in which the generating equipment is unavailable for load due to an unanticipated breakdown; represented in hours per unit. The Forced Outage Rate represents the percentage of time the unit was in a Forced Outage condition out of the total time the unit was expected to be available.

Target: ▼ Less forced outage hours and a smaller outage rate represents more available capacity in the system to meet demand.




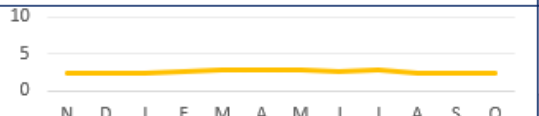
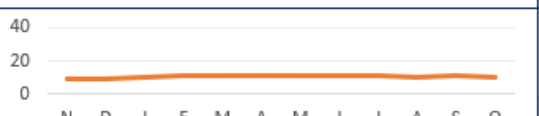


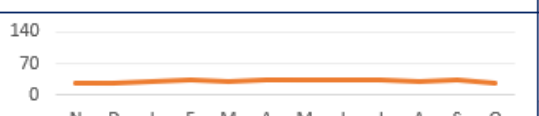
Forced Outage Hours and Outage Rate			Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
AES		Hrs	175	178	173	0	384	249	0	25	505	0	0	48
		%	12%	12%	12%	0%	27%	17%	0%	2%	34%	0%	0%	5%
EcoElectrica		Hrs	0	4	0	0	30	5	0	13	0	72	4	0
		%	0%	0%	0%	0%	2%	0%	0%	1%	0%	3%	0%	0%
PREPA Aguirre		Hrs	1180	720	815	720	768	778	1166	823	855	800	770	744
		%	82%	48%	75%	94%	56%	54%	78%	57%	57%	54%	53%	50%
PREPA Costa Sur		Hrs	46	0	0	153	0	0	139	116	771	743	795	744
		%	3%	0%	0%	11%	0%	0%	9%	8%	52%	50%	55%	50%
PREPA Palo Seco		Hrs	2120	1572	1537	1395	1598	1498	1525	1751	1704	2293	2151	2242
		%	74%	53%	52%	52%	54%	52%	51%	61%	57%	77%	76%	75%
PREPA San Juan		Hrs	3071	2930	3174	2063	2449	2342	2421	2196	2328	2489	2180	2283
		%	55%	64%	55%	40%	46%	47%	45%	40%	39%	42%	38%	39%
FEMA Palo Seco		Hrs	0	0	0	0	0	0	0	0	76	386	239	58
		%	0%	0%	0%	0%	0%	0%	0%	0%	1%	8%	5%	1%
FEMA San Juan		Hrs	0	0	0	0	0	0	0	0	0	0	0	391
		%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%
Total Baseload		Hrs	6592	5405	5699	4330	5228	4872	5251	4923	6240	6784	6140	6120
		%	44%	35%	36%	31%	33%	32%	34%	33%	30%	33%	31%	30%

\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Renewables Capacity Factor - Solar

The Capacity Factor measures the actual production of electricity over the theoretical maximum output (nameplate capacity). For Renewable projects, the Capacity Factor is expected to be lower due to the solar and wind cycles.

Target: ▲ A higher Capacity Factor represents a better utilization of the maximum capacity the project is able to produce.

Average Production (MW) and Capacity Factor			Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
AES Ilumina		MW	4	3	4	4	4	4	4	4	4	4	4	3
Nameplate Cap: 20		CF	18%	17%	19%	21%	22%	22%	21%	21%	20%	20%	21%	17%
Windmar Cantera Martínó		MW	0.4	0.5	0.5	0.5	0.6	0.5	0.5	0.4	0.5	0.5	0.4	0.4
Nameplate Cap: 2.1		CF	21%	23%	22%	26%	29%	24%	24%	21%	23%	22%	21%	19%
San Fermín		MW	2	2	2	3	3	3	3	3	3	3	3	2
Nameplate Cap: 20		CF	10%	12%	11%	13%	14%	14%	13%	14%	13%	13%	13%	11%
Horizon Energy		MW	2	2	2	2	3	3	3	3	3	2	2	2
Nameplate Cap: 10		CF	22%	23%	24%	25%	28%	28%	28%	26%	27%	23%	23%	24%
Oriana Energy		MW	9	9	10	11	10	11	11	11	11	10	11	10
Nameplate Cap: 45		CF	20%	20%	21%	24%	23%	25%	25%	24%	24%	21%	25%	21%
Windmar Coto Laurel		MW	2	2	2	2	2	2	2	2	2	2	2	2
Nameplate Cap: 10		CF	20%	22%	20%	22%	22%	20%	21%	21%	23%	22%	22%	18%
Fonroche Humacao		MW	7	7	7	8	8	9	8	9	8	8	8	6
Nameplate Cap: 40		CF	17%	18%	18%	21%	19%	22%	21%	22%	21%	19%	20%	16%
Total Solar		MW	26	27	28	31	31	33	32	32	31	29	31	26
Nameplate Cap: 147		CF	18%	18%	19%	21%	21%	22%	22%	22%	21%	20%	21%	18%




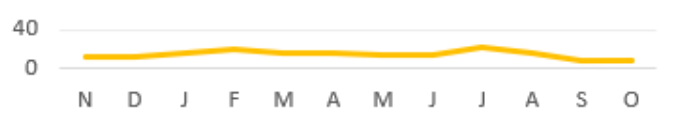
\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Renewables Capacity Factor – Wind and Landfill

The Capacity Factor measures the actual production of electricity over the theoretical maximum output (nameplate capacity). For Renewable projects, the Capacity Factor is expected to be lower due to the solar and wind cycles.

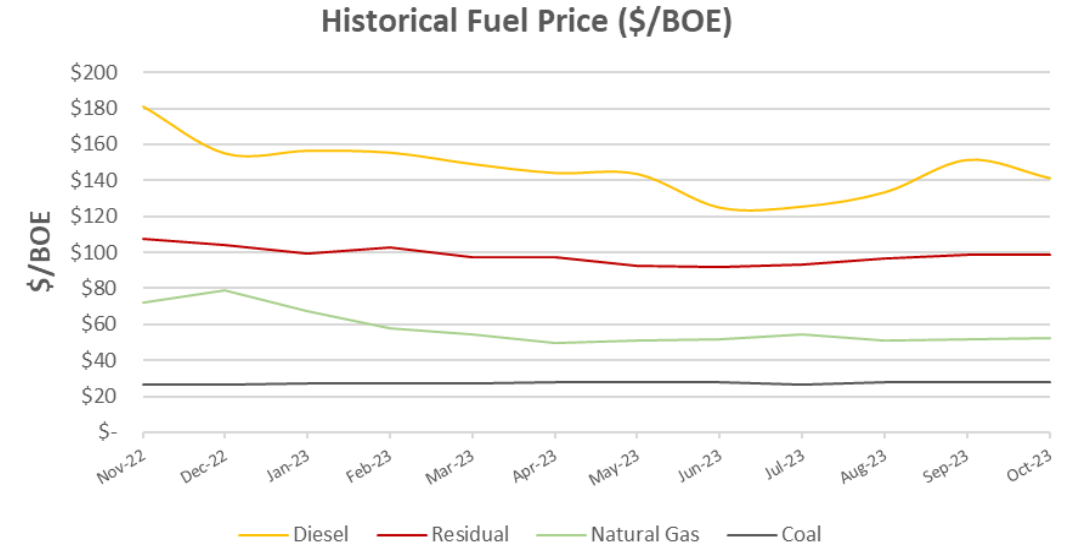
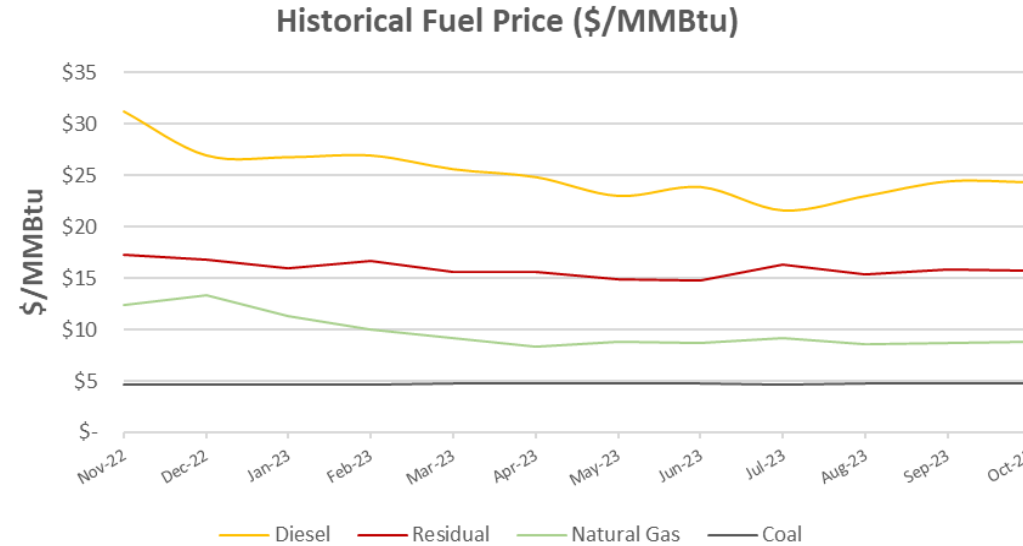
Target: ▲ A higher Capacity Factor represents a better utilization of the maximum capacity the project is able to produce.

Average Production (MW) and Capacity Factor

			Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
<b>Pattern Santa Isabel</b>		<b>MW</b>	10	11	14	18	14	13	11	12	20	14	6	5
Nameplate Cap: 75	N D J F M A M J J A S O	<b>CF</b>	13%	14%	19%	24%	19%	18%	15%	15%	27%	19%	9%	6%
<b>Landfill Gas Fajardo</b>		<b>MW</b>	0.2	0.4	0.3	0.5	0.5	0.4	0.7	0.5	0.5	0.4	0.3	0.6
Nameplate Cap: 2.4	N D J F M A M J J A S O	<b>CF</b>	9%	18%	12%	20%	22%	15%	28%	22%	21%	16%	14%	24%
<b>Landfill Gas Toa Baja</b>		<b>MW</b>	0.6	0.5	0.6	0.8	0.6	0.8	0.6	0.9	1.3	0.9	1.1	1.3
Nameplate Cap: 2.4	N D J F M A M J J A S O	<b>CF</b>	26%	21%	24%	32%	27%	32%	24%	39%	55%	36%	45%	55%
<b>Total Wind and Landfill</b>		<b>MW</b>	11	12	15	19	15	14	12	13	22	16	8	7
Nameplate Cap: 80	N D J F M A M J J A S O	<b>CF</b>	14%	14%	19%	24%	19%	18%	15%	16%	27%	20%	10%	8%

# Fuel Prices

Fuel Price shows the prices paid for fuel used by PREPA and private generators, both in terms of MMBtus and Barrel of Oil Equivalent (BOE). The Fuel Price is divided by Fuel Type to better illustrate the contribution to the total Fuel Price for the month.

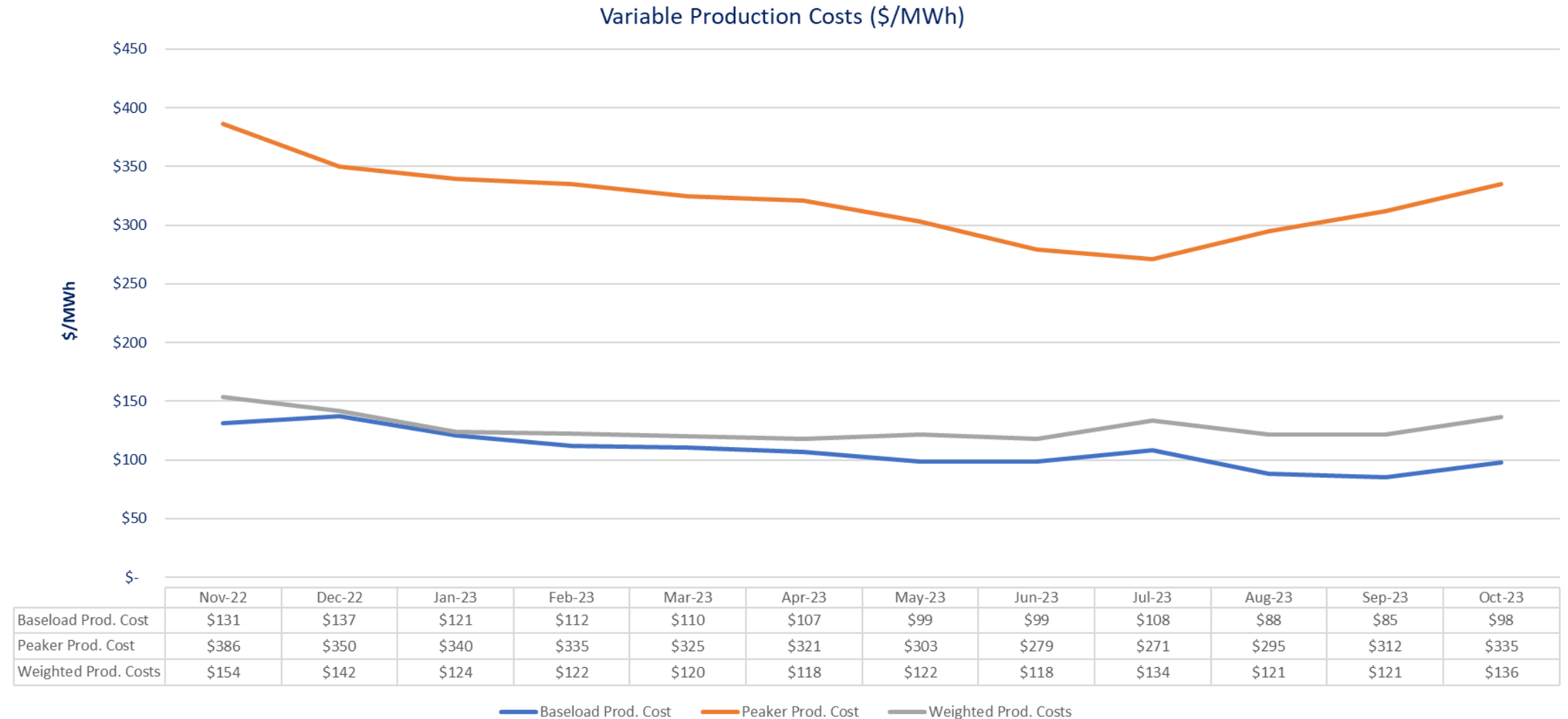


\$/MMBtu	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Aug-23	Sep-23	Oct-23
Diesel	31.20	26.95	26.77	26.93	25.60	24.84	23.02	23.88	21.61	23.01	23.01	24.43	24.33
Residual	17.26	16.75	15.98	16.67	15.62	15.57	14.86	14.75	16.29	15.37	15.37	15.83	15.77
Natural Gas	12.35	13.32	11.36	10.02	9.19	8.34	8.77	8.73	9.18	8.62	8.62	8.72	8.77
Coal	4.63	4.62	4.68	4.68	4.73	4.80	4.80	4.80	4.60	4.79	4.79	4.79	4.80
\$/BOE	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Aug-23	Sep-23	Oct-23
Diesel	180.89	154.70	156.31	155.24	148.87	143.93	143.30	124.61	125.28	133.24	133.24	151.21	141.06
Residual	107.37	104.42	99.14	102.69	97.22	97.19	92.75	92.01	93.14	96.34	96.34	98.81	98.75
Natural Gas	72.11	78.82	67.47	58.05	54.41	49.88	51.27	51.62	54.32	51.23	51.23	51.93	52.63
Coal	26.83	26.83	27.14	27.16	27.43	27.86	27.86	27.86	26.68	27.78	27.78	27.78	27.86

\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Variable Production Costs

Variable Production Costs are predominantly fuel costs and 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 energy produced for the System Portfolio.



\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# Glossary of Terms

Term	Definition	Formula
Heat Rate	Measures the efficiency of a power plant to convert fuel into electricity. It is the amount of energy used by a power plant to generate one kilowatt-hour (kWh) of electricity. The more efficient the generator is, the lower the heat rate.	MMBtu consumption by all units in the station during a specific period / MWh produced by the same units in the same period
Reserves	Amount of generating capacity available to meet peak or abnormally high demands for power and to generate power during scheduled or unscheduled outages.	Available Capacity (MW) during the reported period minus the Actual Generation (MW) during the same period
Available Capacity	The maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, adjusted for scheduled or unscheduled outages.	N/A – value is provided for each unit
Availability Rate	The ratio of the maximum output that can be supplied to system load for the period of time considered to the nameplate capacity.	Average available capacity for a specific period (MW) / nameplate capacity
Production	The amount of electric energy produced.	N/A – value is provided for each unit
Capacity Factor	The ratio of the electrical energy produced by a generating unit for the period of time considered to the nameplate capacity.	The average energy produced by all units in the plant during a specific period (MWh) / Nameplate capacity for the plant
Planned Outage Hours	The shutdown of a generating unit or facility for inspection or maintenance, in accordance with an advance schedule; represented in hours per unit (Equivalent Planned Outage Hours). Planned Hours – hours provided in the Generation Outage Schedule for the following 90-day outlook. Actual Hours – number of hours a unit was out of service due to a planned outage.	N/A – values is provided for each unit
Maintenance Outage Hours	The shutdown of a generating unit or facility for nonemergency reasons or conditions which need repair outside of the advance schedule; represented in hours per unit.	N/A – value is provided for each unit
Forced Outage Hours	The shutdown of a generating unit or facility for emergency reasons or a condition in which the generating equipment is unavailable for load due to unanticipated breakdown; represented in hours per unit.	N/A – value is provided for each unit
Forced Outage Rate	The ratio of the forced outages hours to the hours the unit was anticipated to be available for the reporting period.	Forced Outage Hours / Period Hours (excluding planned and unplanned outage hours)
Nameplate Capacity	The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer.	N/A – value is provided for each unit
Generation Shortfall Events	An event in which customer demand for electricity is unable to be met due to lack of Available Capacity, leading to customers being manually disconnected from the grid.	N/A – Value is all events which occur in a specified time frame
Unit Performance Load Shed Events	An event in which a generating unit has an unanticipated breakdown and causes customers to be automatically disconnected from the grid to prevent potential damage to the system.	N/A – Value is all events which occur in a specified time frame

# Plant and Unit List – Baseload and Peaker Units

## BASELOAD UNITS

Plant	Units	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
San Juan	CT 5	X	X	X	X		
	STM 5	X	X	X	X		
	CT 6	X	X	X	X		
	STM 6	X	X	X	X		
	7	X	X	X	X		
	8	X	X	X	X		
	9	X	X	X	X		
	10	X	X	X	X		
Costa Sur	5	X	X	X	X		
	6	X	X	X	X		
Aguirre	1	X	X	X	X		
	2	X	X	X	X		
Palo Seco	1	X	X	X	X		
	2	X	X	X	X		
	3	X	X	X	X		
	4	X	X	X	X		
AES	AES 1	X	X	X	X		
	AES 2	X	X	X	X		
EcoEléctrica	ECO 1	X	X	X	X		
	ECO 2	X	X	X	X		
	STM 1	X	X	X	X		
FEMA Palo Seco	GT 1	X	X		X		
	GT 2	X	X		X		
	GT 4	X	X		X		
	GT 5	X	X		X		
	GT 6	X	X		X		
	GT 7	X	X		X		

## PEAKER UNITS

Plant	Units	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
Cambalache	1	X	X	X		X	
	2	X	X	X		X	
	3	X	X	X		X	
Mayaguez	1A	X	X	X		X	
	1B	X	X	X		X	
	2A	X	X	X		X	
	2B	X	X	X		X	
	3A	X	X	X		X	
	3B	X	X	X		X	
	4A	X	X	X		X	
	4B	X	X	X		X	
	1-1	X	X	X		X	
	1-2	X	X	X		X	
Palo Seco (Inc. Mobile-Pack)	2-1	X	X	X		X	
	2-2	X	X	X		X	
	3-1	X	X	X		X	
	3-2	X	X	X		X	
	MP 1	X	X	X		X	
	MP 2	X	X	X		X	
	MP 3	X	X	X		X	
	I-1	X	X	X		X	
	I-2	X	X	X		X	
Aguirre CC	I-3	X	X	X		X	
	I-4	X	X	X		X	
	ST-1	X	X	X		X	
	II-1	X	X	X		X	
	II-2	X	X	X		X	
	II-3	X	X	X		X	
	II-4	X	X	X		X	
	ST-2	X	X	X		X	

## PEAKER UNITS

Plant	Units	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
Other Peakers	Daguao 1-1	X	X	X		X	
	Daguao 1-2	X	X	X		X	
	Aguirre 2-1	X	X	X		X	
	Aguirre 2-2	X	X	X		X	
	Costa Sur 1-1	X	X	X		X	
	Costa Sur 1-2	X	X	X		X	
	Jobos 1-1	X	X	X		X	
	Jobos 1-2	X	X	X		X	
	Yabucoa 1-1	X	X	X		X	
	Yabucoa 1-2	X	X	X		X	
	Vega Baja 1-1	X	X	X		X	
	Vega Baja 1-2	X	X	X		X	
	Vieques 1	X	X	X		X	
	Vieques 2	X	X	X		X	
	Culebra 1	X	X	X		X	
	Culebra 2	X	X	X		X	
	Culebra 3	X	X	X		X	

# Plant and Unit List – Renewable Projects

## SOLAR PROJECTS

Projects	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
AES Ilumina						X
Cantera Martinó						X
San Fermín						X
Horizon Energy						X
Oriana Energy						X
Coto Laurel						X
Humacao						X

## WIND AND LANDFILL PROJECTS

Projects	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
Pattern Santa Isabel						X
Landfill Gas Fajardo						X
Landfill Gas Toa Baja						X

## HYDRO PLANTS

Projects	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
Caonillas 1-1						
Caonillas 1-2						
Caonillas 2-1						
Dos Bocas 1						
Dos Bocas 2						
Dos Bocas 3						
Garzas 1-1						
Garzas 1-2						
Garzas 2-1						
Patillas 1-1						
Patillas 1-2						
Rio Blanco 1-1						
Rio Blanco 1-2						
Toro Negro 1-1						
Toro Negro 1-2						
Toro Negro 1-3						
Toro Negro 1-4						
Toro Negro 2-1						
Yauco 1-1						
Yauco 2-1						
Yauco 2-2						