

# Monthly Generation Performance Report

March 2024



#### 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 – March Performance**

#### **Overview**

The maximum peak demand for March 2024 is approximately 2800 MW

San Juan Steam 6 is out with no ETR. San Juan 7 and Aguirre 2 are both expected to come back March 4. San Juan 9 ETR is March 8. Palo Seco 3 is still expected to come back June 6. Palo Seco 4 ETR is still February 28 of 2025. Costa Sur 6 ETR is still March 20.

#### **Major Events**

In March, the electric system experienced 1 load shed event due to generation shortfall, and 10 generation events that resulted in load shed to prevent a frequency decay.

#### **System Reserves**

In March, the hourly reserve levels averaged 777 MW, with 313 hours during the month having less than 750 MW in reserves (equal to 42% of the time.)

Without the additional 350 MW of generation from the FEMA TM units, the electric system would have potentially experienced 9 additional load shed events at peak hours due to generation shortfall this month.

The forecast for April 2024 shows lower reserve levels to the same month last year (April 2023), with 451 MW average reserves forecasted versus 907 MW seen for the same month last year.

The System Availability for the month of March was 48%.

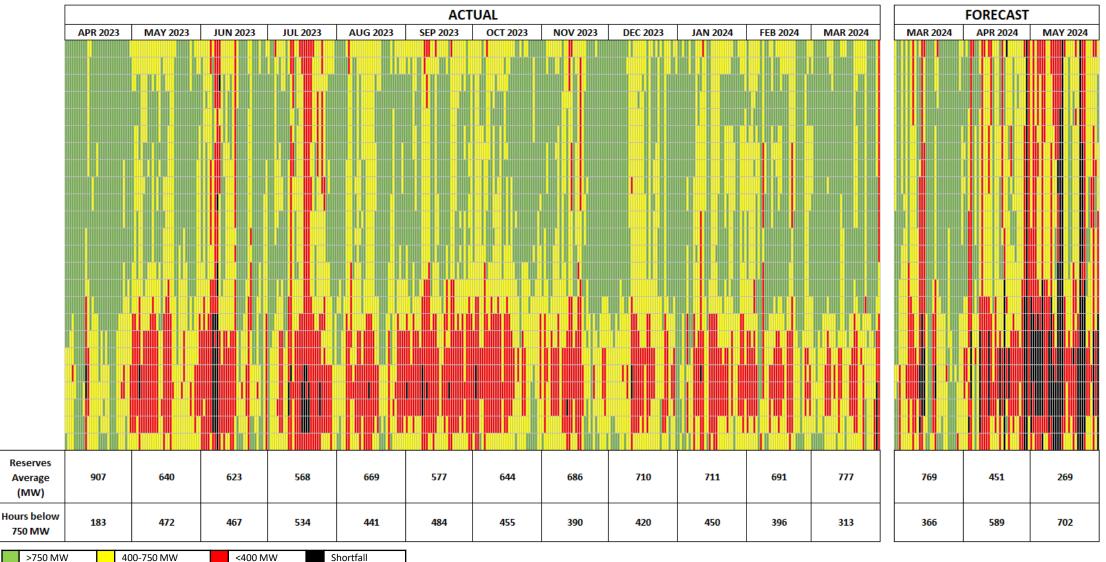
- Genera 38%
- AES 91%
- EcoEléctrica 100%



### **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: A Reserves >750MW per the System Operation Principles

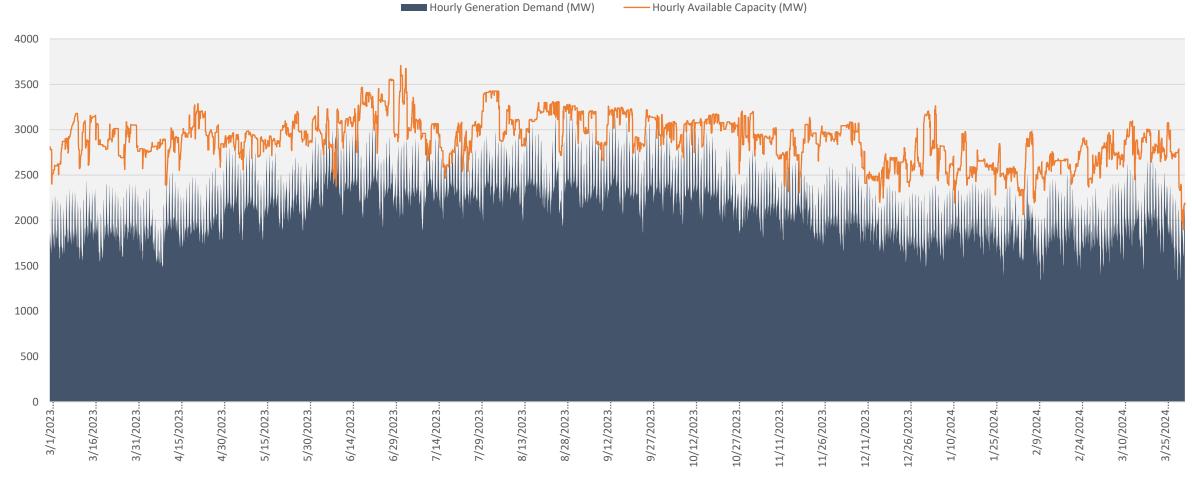


\*Refer to Glossary of Terms on page 22 for a list of definitions and formulas.

# **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.



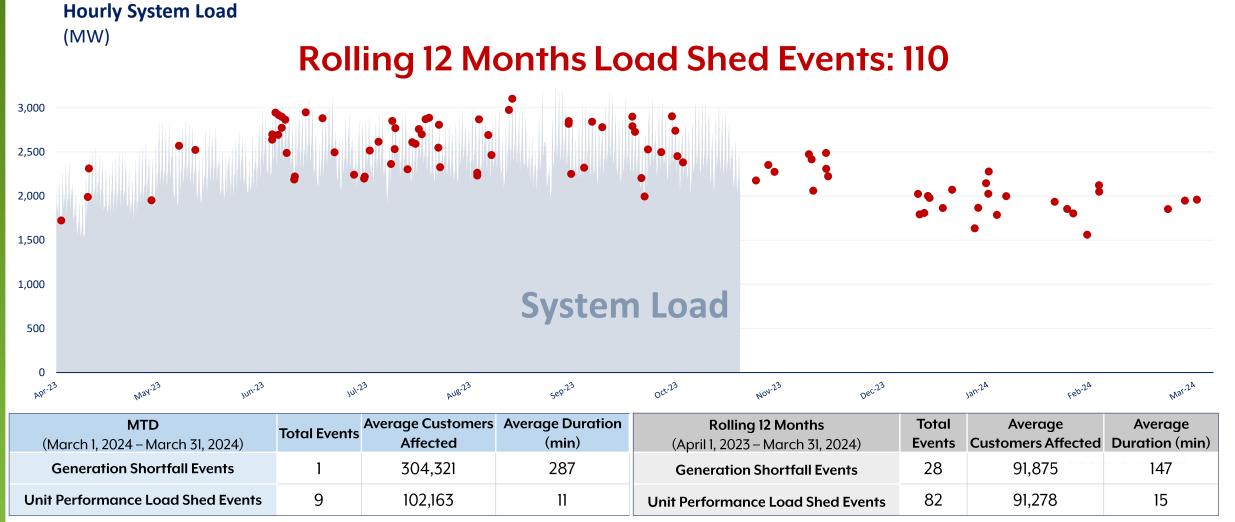
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#### **Load Shed Events**

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).

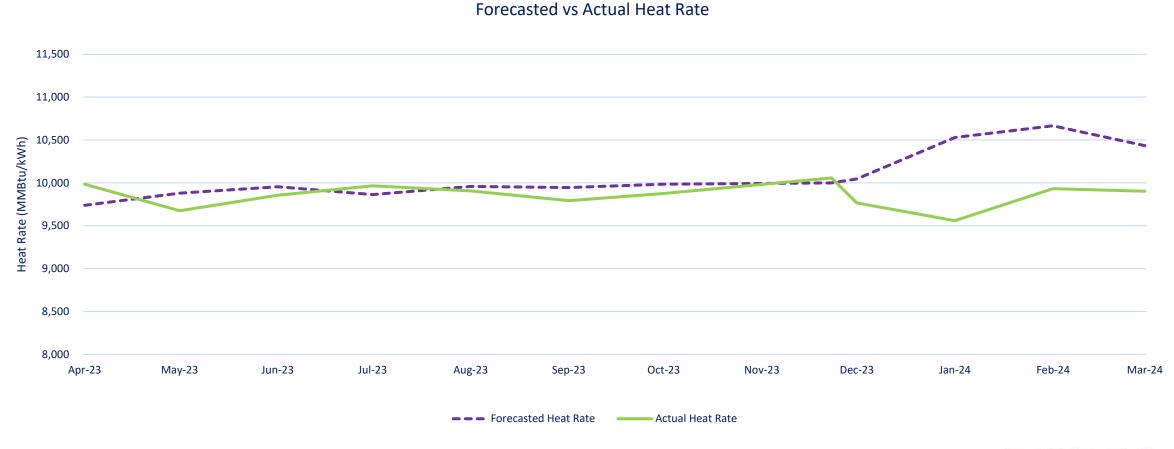
LUMA does not generate energy and can only operate the system with the electricity that is provided by GeneraPR, PREPA, and other island generators.



### **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: **V** Lower heat rates represent higher efficiency.



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

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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 A	Availability Rate (AR)	A	pr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
AES	510		MM (	323	424	437	290	449	448	243	249	263	370	330	463
Nameplate Cap: 508	A M J J A S O	NDJFM	AR 6	64%	83%	86%	57%	88%	88%	48%	49%	52%	73%	65%	91%
EcoElectrica	275		MM (	385	550	545	552	531	549	550	531	550	550	547	550
Nameplate Cap: 550	AMJJASO	NDJFM	AR 1	70%	100%	99%	100%	97%	100%	100%	97%	100%	100%	99%	100%
Genera Aguirre	450		MW	297	91	310	277	344	316	373	257	152	210	368	341
Nameplate Cap: 900		NDJFM	AR	33%	10%	34%	31%	38%	35%	41%	29%	17%	23%	41%	38%
Genera Costa Sur	320 - 410		MM	534	437	480	224	347	313	333	363	366	48	3	105
Nameplate Cap: 820	A M J J A S O	NDJFM	AR 6	65%	53%	59%	27%	42%	38%	41%	44%	45%	6%	0%	13%
Genera Palo Seco	602		MM (	357	337	235	291	153	168	171	121	0	0	0	0
Nameplate Cap: 602	• • • • • • • • • •	NDJFM	AR	59%	56%	39%	48%	25%	28%	28%	20%	0%	0%	0%	0%
Genera San Juan	420	$\sim$	MW	572	570	641	700	661	690	679	510	652	723	478	585
Nameplate Cap: 840	•	NDJFM	8 6	68%	68%	76%	83%	79%	82%	81%	61%	78%	86%	57%	70%
Total Baseload	4200		<b>MW</b> 2	2469	2410	2648	2484	2631	2626	2697	2384	2329	2249	2070	2043
Nameplate Cap: 4220		NDJFM	AR 6	58%	57%	63%	57%	60%	60%	59%	52%	51%	49%	45%	48%

\*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.

	Ava	ilable C	Capaci	ity (M	W) an	d Ava	ilabilit	ty Rat	e (AR)	)	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Genera Aguirre Combined Cycle	592 296									MM	139	190	193	191	199	148	172	191	185	150	138	127
Nameplate Cap: 592			1 1	JA	S	DN	D	JF	М	AR	23%	32%	33%	32%	34%	25%	29%	32%	31%	25%	23%	21%
Genera Cambalache	248 124 0	-			~		_	_		MM	114	155	146	152	142	144	74	76	104	152	156	153
Nameplate Cap: 248	-	A N	1 1	JA	S	D N	D	JF	м	AR	46%	63%	59%	61%	58%	58%	30%	31%	42%	62%	63%	62%
Genera Mayaguez	220 110 0							_		MM	40	37	35	28	29	20	32	19	26	24	33	50
Nameplate Cap: 220		A N	1 1	J A	S	D N	D	J F	М	AR	18%	17%	16%	13%	13%	9%	14%	9%	12%	11%	15%	23%
Genera Palo Seco (Inc. Mobile- Pack)	208 104 0					1		,		MM	179	165	161	176	192	178	188	186	182	183	182	176
Nameplate Cap: 207		A N	1 ]	J A	S	D N	D	J F	м	AR	86%	80%	78%	85%	93%	86%	91%	90%	88%	89%	88%	85%
Palo Seco TM	150 75 0									MM	0	0	0	149	145	142	148	151	150	147	143	96
Nameplate Cap: 90		A N	1 1	J A	S	O N	D	J F	М	AR	0%	0%	0%	99%	97%	95%	99%	100%	100%	98%	95%	107%
San Juan TM	250 125 0					_			-	MM	0	0	0	0	0	0	199	202	196	201	200	205
Nameplate Cap: 250		A N	( )	JA	S	O N	D	JF	м	AR	0%	0%	0%	0%	0%	0%	100%	101%	98%	101%	100%	82%
Other Peakers	264 132 0									MM	59	57	56	71	69	69	59	62	61	71	68	71
Nameplate Cap: 264		A N	1 1	J A	S	D N	D	J F	М	AR	22%	22%	21%	27%	26%	26%	22%	24%	23%	27%	26%	27%
Total Peakers	1870 935									MM	531	604	591	618	631	560	524	535	557	581	577	879
Nameplate Cap: 1871	0	A N	I J	JA	S	D N	D	JF	М	AR	35%	39%	39%	40%	41%	37%	34%	35%	36%	38%	38%	47%

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\*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: **V** Lower heat rates represent higher efficiency.

		Heat Rate (MMBtu/MWh)	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
AES	6,000	A M J J A S O N D J F M	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	9,800	10,620
EcoElectrica	6,000 0	A M J J A S O N D J F M	7,945	7,945	7,945	7,945	7,945	7,945	7,945	7,945	7,945	7,957	7,957	7,957
Genera Aguirre	6,000 0	A M J J A S O N D J F M	11,075	10,937	10,741	11,082	10,687	10,644	10,734	11,008	11,034	11,207	11,397	11,268
Genera Costa Sur	6 000	A M J J A S O N D J F M	10,892	11,053	10,733	11,835	10,616	10,788	10,887	10,857	10,838	11,323	40,045	11,913
Genera Palo Seco	6,000 0	A M J J A S O N D J F M	9,799	10,270	10,224	10,168	10,379	9,813	10,463	10,254	-	-	-	-
Genera San Juan	6,000	A M J J A S O N D J F M	8,419	8,059	8,248	8,458	8,476	8,477	8,574	9,317	8,956	8,973	9,432	8,714
Total Baseload	12,000 6,000 0		9,548	9,356	9,336	9,343	9,278	9,215	9,365	9,477	9,267	8,968	9,381	9,510

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

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

#### 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: **V** Lower heat rates represent higher efficiency.

			Heat Rate (M	MBtu/MWh)	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Genera Aguirre Combined Cycle	18,000 12,000 6,000 0	A L L M A	S O N D	J F M	14,562	14,945	14,766	14,365	14,969	14,444	14,811	14,969	14,921	14,671	14,989	13,867
Genera Cambalache	18,000 12,000 6,000 0	A L L M A	S O N D	JFM	13,403	12,535	12,595	12,355	12,573	12,492	12,341	12,435	13,231	12,834	12,785	12,872
Genera Mayaguez	18,000 12,000 6,000 0	A L L M A		J F M	10,566	10,726	10,764	10,716	10,840	10,824	10,942	10,801	11,013	10,882	10,945	11,029
Genera Palo Seco (Inc. Mobile Pack)	18,000 12,000 6,000 0	A M J J A		J F M	10,896	11,320	11,517	11,324	11,454	11,572	15,072	15,981	14,925	15,146	16,487	15,205
Other Peakers	18,000 12,000 6,000 0	A M J J A	S O N D	JFM	13,287	14,056	13,343	13,677	14,906	14,631	15,086	14,893	14,771	15,064	15,462	14,062
Total Peakers	18,000 12,000 6,000 0	A L L M A	S O N D		12,634	13,005	12,819	12,501	12,697	12,578	13,731	13,962	13,195	12,755	12,951	12,710

# **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: A 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		Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
AES	508	MM	317	426	425	281	449	447	242	248	253	355	320	452
Nameplate Cap: 508	A M J J A S O N D J F M	сF	62%	84%	84%	55%	88%	88%	48%	49%	50%	70%	63%	89%
EcoElectrica	275	MM	326	421	430	449	426	434	435	403	410	412	405	398
Nameplate Cap: 550	A M J J A S O N D J F M	GF	59%	77%	78%	82%	78%	79%	79%	73%	75%	75%	74%	72%
Genera Aguirre	450	Ŵ	233	74	245	231	258	249	289	190	156	134	284	243
Nameplate Cap: 900	A M J J A S O N D J F M	сF	26%	8%	27%	26%	29%	28%	32%	21%	17%	15%	32%	27%
Genera Costa Sur	820	MW	456	431	437	214	324	281	314	304	291	37	1	101
Nameplate Cap: 820	A M J J A S O N D J F M	сF	56%	53%	53%	26%	39%	34%	38%	37%	35%	5%	0%	12%
Genera Palo Seco	602 301	MM	231	295	207	259	130	141	147	105	0	0	0	0
Nameplate Cap: 602	AMJJASONDJFM	GF	38%	49%	34%	43%	22%	23%	24%	18%	0%	0%	0%	0%
Genera San Juan	840 420	Ŵ	324	371	417	470	446	462	425	417	397	473	380	380
Nameplate Cap: 840	A M J J A S O N D J F M	сF	39%	44%	50%	56%	53%	55%	51%	50%	47%	56%	45%	45%
Total Baseload	4200	MM	1886	2019	2161	2053	2178	2161	2204	2024	1858	1763	1735	1573
Nameplate Cap: 4220	A M J J A S O N D J F M	Ч	45%	48%	51%	47%	50%	49%	48%	44%	41%	39%	38%	37%

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

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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: A 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	Ар	r-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Genera Aguirre	992	<b>₩</b> 3	34	103	89	112	83	60	74	75	47	49	42	31
Nameplate Cap: 592		უ 6	%	17%	15%	19%	14%	10%	13%	13%	8%	8%	7%	5%
Genera		<b>₩</b> 1	9	44	44	83	69	84	32	30	18	31	35	24
Nameplate Cap: 247.5	AMJJASONDJFM	ყ 8	%	18%	18%	33%	28%	34%	13%	12%	7%	13%	14%	10%
Genera		<b>≥</b>	26	55	56	88	64	44	32	23	50	77	72	56
Nameplate Cap: 220	AMJJASONDJFM	უ 12	2%	25%	26%	40%	29%	20%	14%	10%	23%	35%	33%	25%
	0	<b>M</b> 1	6	37	40	55	70	74	26	9	10	9	13	15
Nameplate Cap: 207		ყ 7	%	18%	19%	26%	34%	36%	13%	5%	5%	4%	6%	7%
Palo Seco TM	150 75 0	N N	0	0	0	149	146	146	150	154	154	151	143	96
Nameplate Cap: 90	A M J J A S O N D J F M	ყ 0	%	0%	0%	99%	97%	98%	100%	103%	103%	101%	95%	106%
		AM (	0	0	0	0	0	0	201	202	196	201	201	189
Nameplate Cap: 250		უ 0	%	0%	0%	0%	0%	0%	100%	101%	98%	101%	101%	76%
Other Peakers	0	AM (	3	10	11	22	13	24	15	23	7	12	9	7
Nameplate Cap: 264	AMJJASONDJFM	ხ 1	%	4%	4%	8%	5%	9%	6%	9%	3%	5%	3%	3%
Tatal Daalaan	370	<b>M</b> 9	98	248	241	359	299	286	180	161	131	178	171	418
Nameplate Cap: 1871	A M J J A S O N D J F M	ხ 6	%	16%	16%	23%	20%	19%	12%	11%	9%	12%	11%	22%



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

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# 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: **V** A smaller gap between actuals and planned hours represents a more accurate planification.

	Planned Outage Hours (APR 2023 - MAR 2024)	Planned Outage Hours	Completed Outage Hours	Notes for In-Progress Planned Outages	Expected Return-to- Service Date
AES	Completed Planned 0 500 1000 1500	1080	670		
EcoElectrica	Completed Planned 0 500 1000	600	424		
Genera Aguirre	Completed Planned 0 1000 2000 3000	2304	0		
Genera Costa Sur	Completed Planned 0 5000 10000	7152	0		
Genera Palo Seco	Completed Planned 0 5000 10000	7344	456		
Genera San Juan	Completed Planned 0 2000 4000	3312	2273		
Total Baseload	Completed     Planned     0 10000 20000 30000	21792	4743		

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

# 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: **v** Less maintenance hours represents more available capacity in the system to meet demand.

	Maintenance Outage Hours	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
AES	500 0 A M J J A S O N D J F M	0	0	0	0	0	0	398	288	264	0	0	0
EcoElectrica	1 1 0 A M J J A S O N D J F M	0	0	0	0	0	0	0	0	0	0	0	0
Genera Aguirre	1 1 0 A M J J A S O N D J F M	0	0	0	0	0	0	0	0	0	0	0	0
Genera Costa Sur	40 20 0 A M J J A S O N D J F M	0	0	35	0	0	0	10	0	0	0	0	0
Genera Palo Seco	40 20 0 A M J J A S O N D J F M	0	0	0	0	0	0	0	0	0	0	0	24
Genera San Juan	1000 500 0 A M J J A S O N D J F M	37	0	0	0	0	0	37	136	551	34	48	105
Total Baseload	1000 500 0 A M J J A S O N D J F M	37	0	35	11	29	0	717	707	954	118	101	129

### 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: **v** 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		Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
AES	100%	Hrs	249	0	25	505	0	0	48	24	218	265	432	0
	0% A M J J A S O N D J F M	%	17%	0%	2%	34%	0%	0%	5%	3%	19%	18%	31%	0%
EcoElectrica	100%	Hrs	5	0	13	0	72	4	0	35	0	0	7	0
	A M J J A S O N D J F M	%	0%	0%	1%	0%	3%	0%	0%	2%	0%	0%	0%	0%
Genera Aguirre	100%	Hrs	778	1166	823	855	800	770	744	862	898	1014	370	686
	A M J J A S O N D J F M	%	54%	78%	57%	57%	54%	53%	50%	60%	60%	68%	27%	46%
Genera Costa Sur	100% 50%	Hrs	0	139	116	771	743	795	744	720	720	1390	1356	1021
	0% A M J J A S O N D J F M	%	0%	9%	8%	52%	50%	55%	50%	50%	48%	93%	97%	69%
Genera Palo Seco	100%	Hrs	1498	1525	1751	1704	2293	2151	2242	2278	2854	2854	2662	2806
	0% A M J J A S O N D J F M	%	52%	51%	61%	57%	77%	76%	75%	82%	97%	100%	100%	97%
Genera San Juan	100%	Hrs	2342	2421	2196	2328	2489	2180	2283	2193	1589	1520	2198	1964
	0% A M J J A S O N D J F M	%	47%	45%	40%	39%	42%	38%	39%	39%	30%	26%	41%	35%
Total Baseload	100%	Hrs	4872	5251	4923	6240	6784	6140	6624	6587	6594	7775	8170	6477
	A M J J A S O N D J F M	%	32%	34%	33%	30%	33%	31%	24%	25%	25%	28%	32%	41%

### **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.

		Av	erag	ge P	rodu	uctio	n (N	W)	and (	Cap	acity	Factor		Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
AES Ilumina	20 10 0	_											MM	4	4	4	4	4	4	3	3	3	4	3	4
Nameplate Cap: 20	0	А	Μ	J	J	А	S	0	N D	) ]	F	М	СЕ	22%	21%	21%	20%	20%	21%	17%	17%	17%	19%	17%	21%
Windmar Cantera Martinó	2.0 1.0												MM	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5
Nameplate Cap: 2.1	0.0	А	М	J	J	А	S	0	NE	)	J F	М	СЕ	24%	24%	21%	23%	22%	21%	19%	19%	21%	21%	18%	25%
San Fermín	20 10	_											M	3	3	3	3	3	3	2	2	2	2	2	2
Nameplate Cap: 20	0	А	М	J	J	А	S	0	N D	) ]	F	М	СЕ	14%	13%	14%	13%	13%	13%	11%	10%	10%	10%	9%	12%
Horizon Energy	10 5												M	3	3	3	3	2	2	2	2	2	2	2	3
Nameplate Cap: 10	0	А	Μ	J	J	А	S	0	N D	) ]	F	М	CF	28%	28%	26%	27%	23%	23%	24%	24%	24%	25%	22%	27%
Oriana Energy	40 20 0	_											MM	11	11	11	11	10	11	10	9	9	10	10	10
Nameplate Cap: 45	0	A	М	J	J	А	S	0	N D	) ]	F	Μ	СЕ	25%	25%	24%	24%	21%	25%	21%	20%	20%	22%	21%	23%
Windmar Coto Laurel	10 5 0	_											MM	2	2	2	2	2	2	2	2	2	2	2	2
Nameplate Cap: 10	0	A	Μ	J	J	А	S	0	N D	) ]	F	Μ	СЕ	20%	21%	21%	23%	22%	22%	18%	17%	17%	16%	16%	19%
Fonroche Humacao	40	_											MM	9	8	9	8	8	8	6	6	6	7	7	9
Nameplate Cap: 40	0	A	М	J	J	A	S	0	N D	) ]	F	М	CF	22%	21%	22%	21%	19%	20%	16%	15%	16%	16%	17%	21%
Total Solar	140 70 0	_											MM	33	32	32	31	29	31	26	25	25	27	26	31
Nameplate Cap: 147	0		Μ	J	J	А	S	0	NE	)	F	Μ	СЕ	22%	22%	22%	21%	20%	21%	18%	17%	17%	18%	17%	21%

# **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.

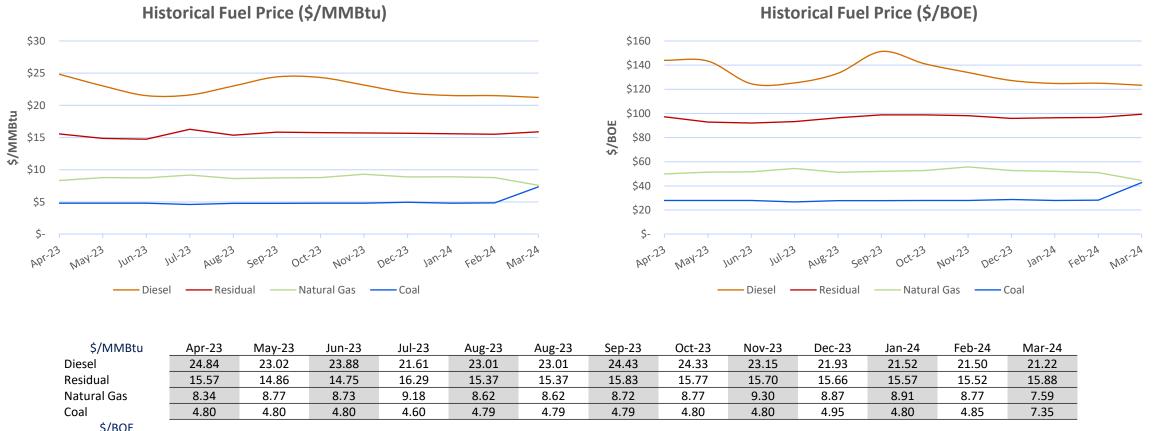
Target: A higher Capacity Factor represents a better utilization of the maximum capacity the project is able to produce.

		Average Production (MW) and Capacity Factor		Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Pattern Santa Isabel	94 47 0		MM	13	11	12	20	14	6	5	12	12	17	10	13
Nameplate Cap: 95		A M J J A S O N D J F M	CF	18%	15%	15%	27%	19%	9%	6%	17%	15%	22%	13%	14%
Punta Lima	26 13		MM	0	0	0	0	0	0	1	3	4	6	4	5
Nameplate Cap: 26	-	AMJJASONDJFM	СЕ	0%	0%	0%	0%	0%	0%	4%	11%	17%	25%	14%	20%
Landfill Gas Fajardo	2.4 1.2 0.0		MM	0.4	0.7	0.5	0.5	0.4	0.3	0.6	0.3	0.5	0.2	0.0	0.0
Nameplate Cap: 2.4	0.0	A M J J A S O N D J F M	СЕ	15%	28%	22%	21%	16%	14%	24%	11%	22%	10%	0%	0%
Landfill Gas Toa Baja	2.4 1.2 0.0		MM	0.8	0.6	0.9	1.3	0.9	1.1	1.3	1.2	1.1	1.0	1.0	1.0
Nameplate Cap: 2.4		A M J J A S O N D J F M	CF	32%	24%	39%	55%	36%	45%	55%	49%	46%	42%	43%	41%
Total Wind and Landfill	130 65 0		MΜ	14	12	13	22	16	8	8	17	17	24	14	20
Nameplate Cap: 125.8		A M J J A S O N D J F M	CF	14%	12%	12%	21%	15%	7%	7%	16%	17%	23%	14%	16%

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### **Fuel Prices**

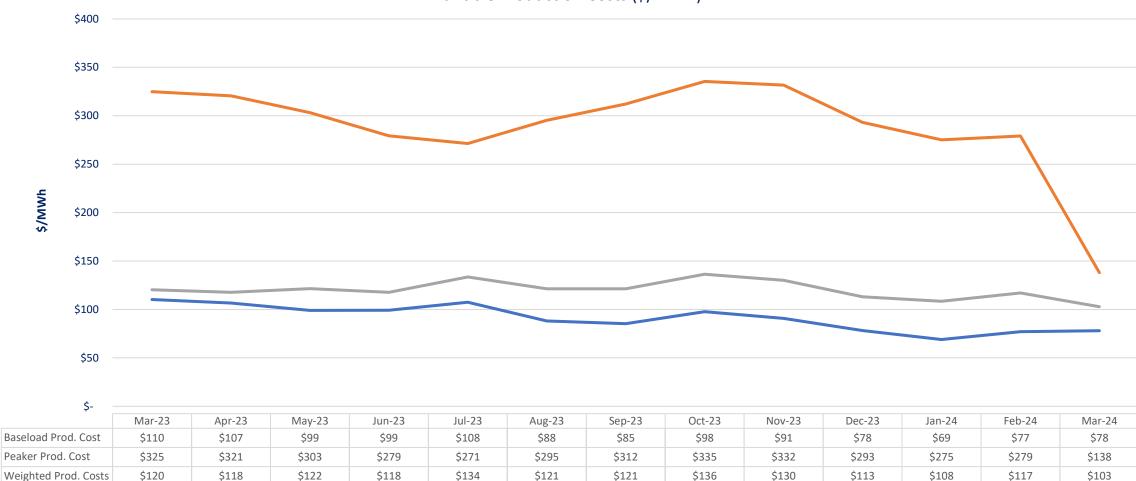
Fuel Price shows the prices paid for fuel used by PREPA and private generators, both in terms of MMBtus and Barrel of Oil Equivalent (BOE). The Fuel Price is divided by Fuel Type to better illustrate the contribution to the total Fuel Price for the month.



J/ DOL													
Diesel	143.93	143.30	124.61	125.28	133.24	133.24	151.21	141.06	133.88	127.24	124.84	125.03	123.35
Residual	97.19	92.75	92.01	93.14	96.34	96.34	98.81	98.75	98.09	95.89	96.38	96.71	99.35
Natural Gas	49.88	51.27	51.62	54.32	51.23	51.23	51.93	52.63	55.73	52.63	51.96	50.94	44.49
Coal	27.86	27.86	27.86	26.68	27.78	27.78	27.78	27.86	27.86	28.69	27.85	28.16	42.66

### **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.



Variable Production Costs (\$/MWh)

Baseload Prod. Cost Peaker Prod. Cost Weighted Prod. Costs

# **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	<ul> <li>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).</li> <li>Planned Hours – hours provided in the Generation Outage Schedule for the following 90-day outlook.</li> <li>Actual Hours – number of hours a unit was out of service due to a planned outage.</li> </ul>	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										PEA	AKER UN	NITS				PEAKER UNITS							
Plant	Units	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor	Plant	Units	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor	Plant	Units	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
-	CT 5	Х	Х	Х	Х				GT 1	Х	Х			Х		Other Peakers	Daguao 1-1	Х	Х	Х		х	
	STM 5	Х	Х	Х	Х			FEMA San Juan	GT 2	Х	Х			Х			Daguao 1-2	Х	Х	Х		Х	
	CT 6	Х	Х	Х	Х				GT 3	Х	Х			Х			Aguirre 2-1	Х	Х	Х		Х	
Can luan	STM 6	Х	Х	Х	Х				GT 4	Х	Х			Х			Aguirre 2-2	Х	Х	Х		Х	
San Juan	7	Х	Х	Х	Х				GT 5	Х	Х			Х			Costa Sur 1-1	Х	Х	Х		Х	
	8	Х	Х	Х	Х				GT 6	Х	Х			Х			Costa Sur 1-2	Х	Х	Х		Х	
	9	Х	Х	Х	Х				GT 7	Х	Х			Х			Jobos 1-1	Х	Х	Х		Х	
	10	Х	Х	Х	Х				GT 8	Х	Х			Х			Jobos 1-2	Х	Х	Х		Х	
Costa Sur	5	Х	Х	Х	Х				GT 9	х	х			х			Yabucoa 1-1	Х	Х	Х		Х	
	6	Х	Х	Х	Х				GT 10	х	х			х			Yabucoa 1-2	Х	Х	Х		Х	
Aguirre	1	Х	Х	Х	Х			Palo Seco (Inc. Mobile- Pack)	1-1	Х	Х	Х		Х			Vega Baja 1-1	Х	Х	Х		Х	
	2	Х	Х	Х	Х				1-2	Х	Х	Х		Х			Vega Baja 1-2	Х	Х	Х		Х	
	1	Х	Х	Х	Х				2-1	Х	Х	Х		Х			Vieques 1	Х	Х	Х		Х	
	2	Х	х	х	Х				2-2	Х	Х	Х		Х			Vieques 2	Х	Х	Х		Х	
Palo Seco	3	Х	Х	х	Х				3-1	Х	Х	Х		Х			Culebra 1	Х	Х	Х		Х	
	4	Х	х	Х	х				3-2	Х	Х	Х		Х			Culebra 2	Х	Х	Х		Х	
	AES 1	X	X	X	X				MP 1	Х	Х	Х		Х		Cambalache	Culebra 3	Х	Х	Х		Х	
AES	AES 2	X	X	Х	X				MP 2	Х	Х	Х		Х			1	Х	Х	Х		Х	
	ECO 1	X	X	X	X				MP 3	Х	Х	Х		Х			2	Х	Х	Х		Х	
EcoEléctrica	ECO 2	X	X	X	X				I-1	Х	Х	Х		Х			3	Х	Х	Х		Х	
	STM 1	X	X	X	X				I-2	Х	Х	Х		Х			1A	Х	Х	Х		Х	
	011111	~	~	~	A				I-3	Х	Х	Х		Х			1B	Х	Х	Х		Х	
PEAKER UNITS						Aguirre CC	1-4	Х	Х	Х		Х		Mayaguez	2A	Х	Х	Х		Х			
							ST-1	Х	Х	Х		Х			2B	Х	Х	Х		Х			
	CT 1	V	V	-		V		Aguirre CC	II-1	Х	Х	Х		Х		Wayaguez	3A	X	X	Х		Х	
	GT 1 GT 2	X	X			X			II-2	Х	Х	Х		Х			3B	X	X	X		X	
FEMA		X	X			X			II-3	Х	Х	Х		Х			4A	X	X	Х		X	
	GT 4	X	X			X			11-4	Х	Х	Х		Х			4B	Х	Х	Х		Х	
Palo Seco	GT 5	X	X			X			ST-2	Х	Х	Х		Х									

GT 6 GT 7

Х

### **Plant and Unit List – Renewable Projects**

	S	OLAR PR	OJECTS						ND LAND	FILL PRC	DJECTS		HYDRO PLANTS							
Projects	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor	Projects	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor	Projects	System Reserves	System Availability	System Heat Rate	All Metrics for Baseload Units	All Metrics for Peaker Units	Renewables Capacity Factor
AES Ilumina						х	Pattern Santa						х	Caonillas 1-1						
						~	Isabel						~	Caonillas 1-2						
Cantera							Durate Lines						V	Caonillas 2-1						
Martinó						Х	Punta Lima						Х	Dos Bocas 1 Dos Bocas 2						
							Landfill Gas							Dos Bocas 2 Dos Bocas 3						
San Fermín						Х	Fajardo						Х	Garzas 1-1						
							Landfill Gas							Garzas 1-2						
Horizon Energy						Х	Toa Baja						Х	Garzas 2-1						
														Patillas 1-1						
Oriana Energy						Х								Patillas 1-2						
														Rio Blanco 1-1						
Coto Laurel						х								Rio Blanco 1-2						
						~								Toro Negro 1-1						
														Toro Negro 1-2						
Humacao						х								Toro Negro 1-3						
														Toro Negro 1-4						
														Toro Negro 2-1						
														Yauco 1-1						
														Yauco 2-1						
														Yauco 2-2						