

Market Monitor Report

MC Webinar

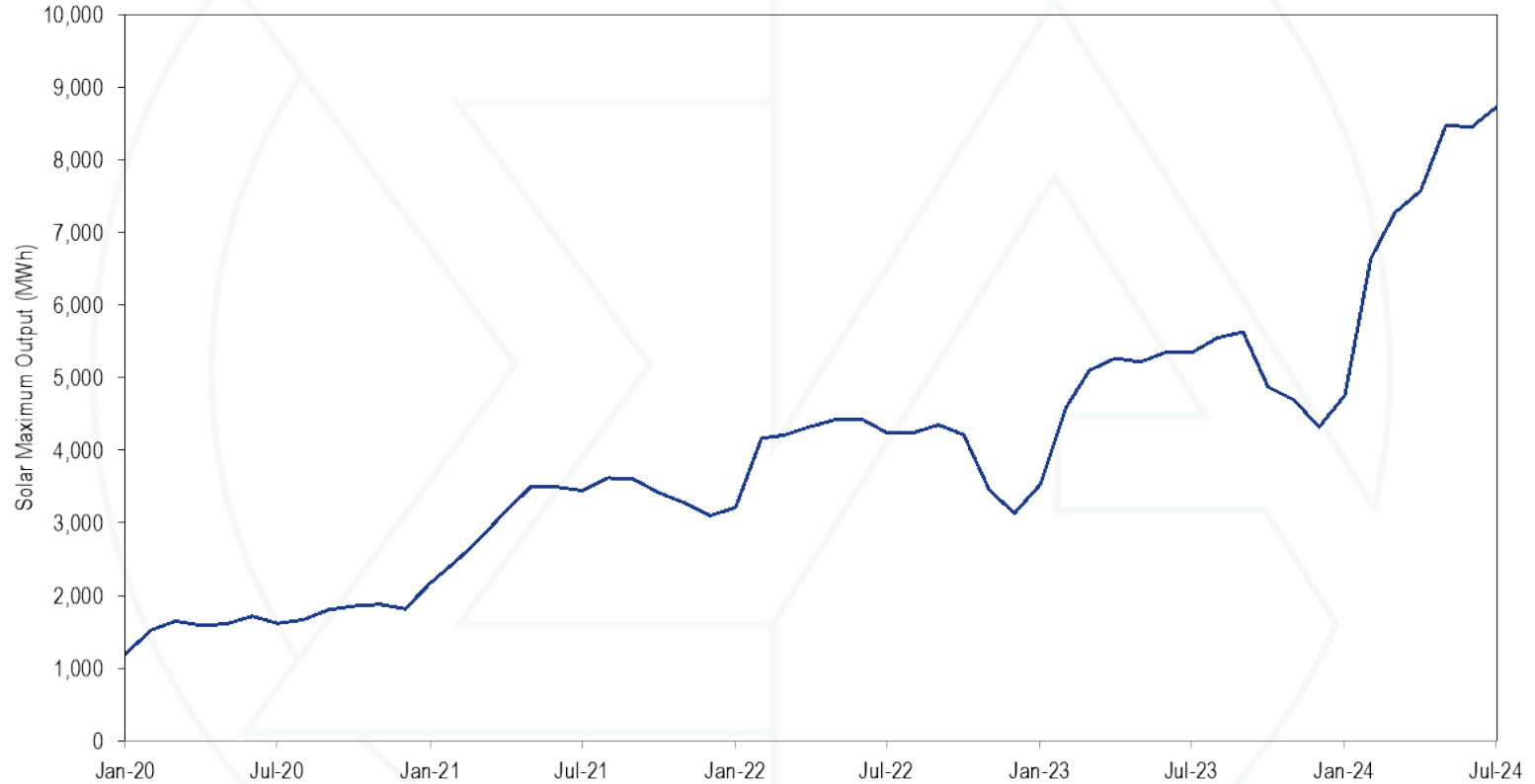
August 19, 2024

IMM



Monitoring Analytics

Maximum Hourly Solar Output by Month through July 2024

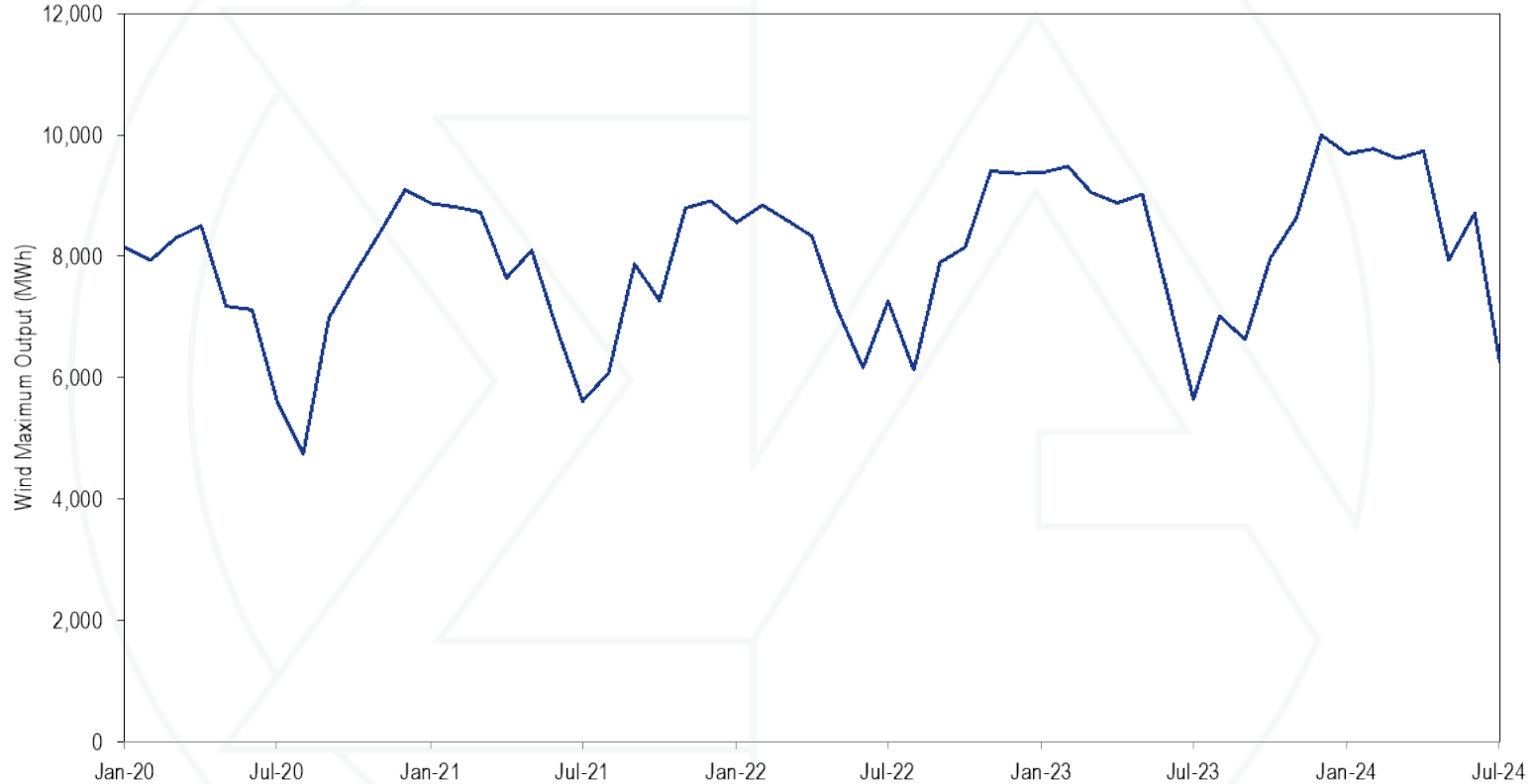


Maximum Hourly Solar Output by Year

Solar Maximum Hourly Output

Year	MWh	Change	Percent
2020	1,878.69		
2021	3,617.34	1,738.65	92.5%
2022	4,429.28	811.94	22.4%
2023	5,630.21	1,200.93	27.1%
2024	8,728.77	3,098.56	55.0%

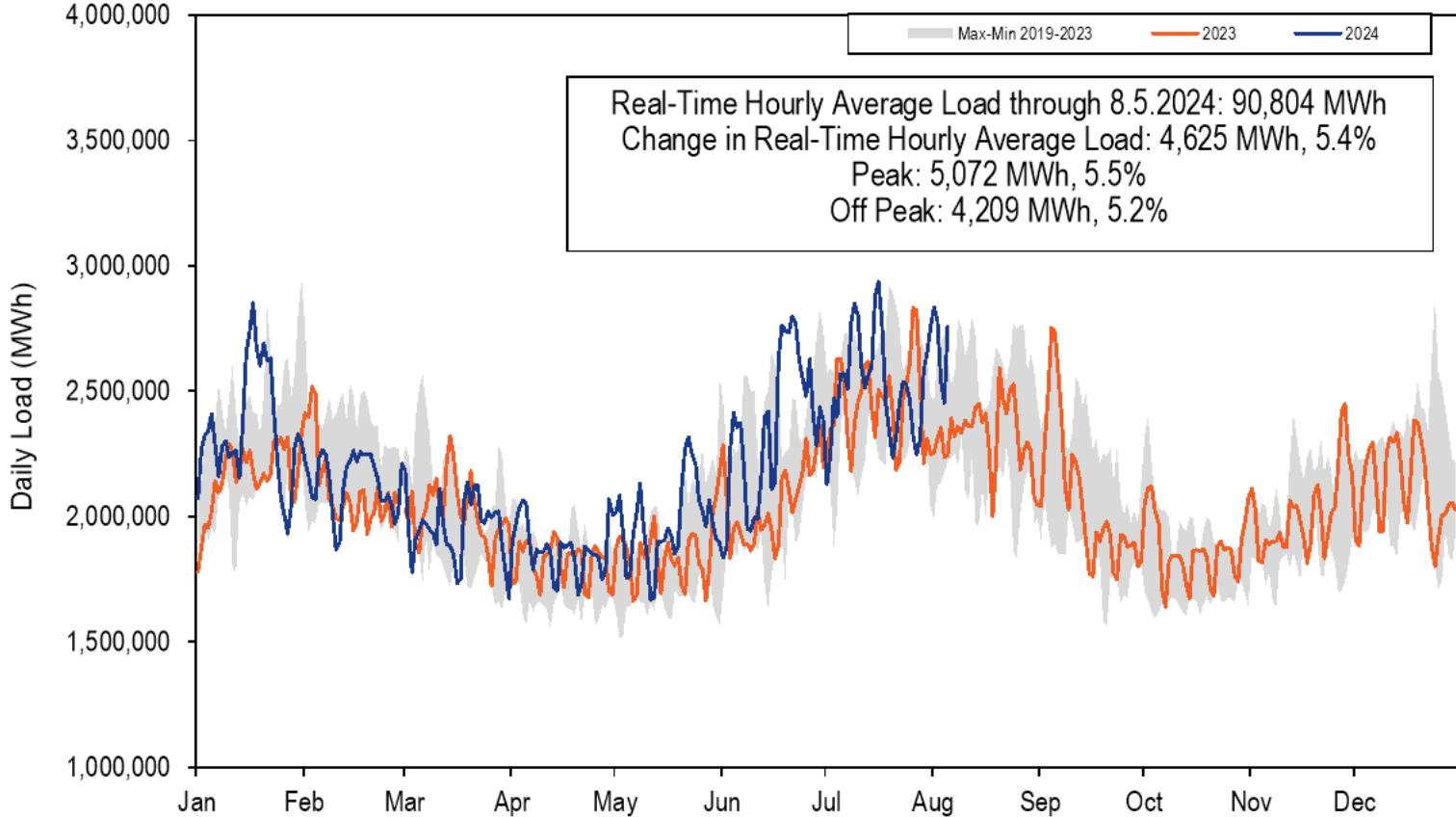
Maximum Hourly Wind Output by Month through July 2024



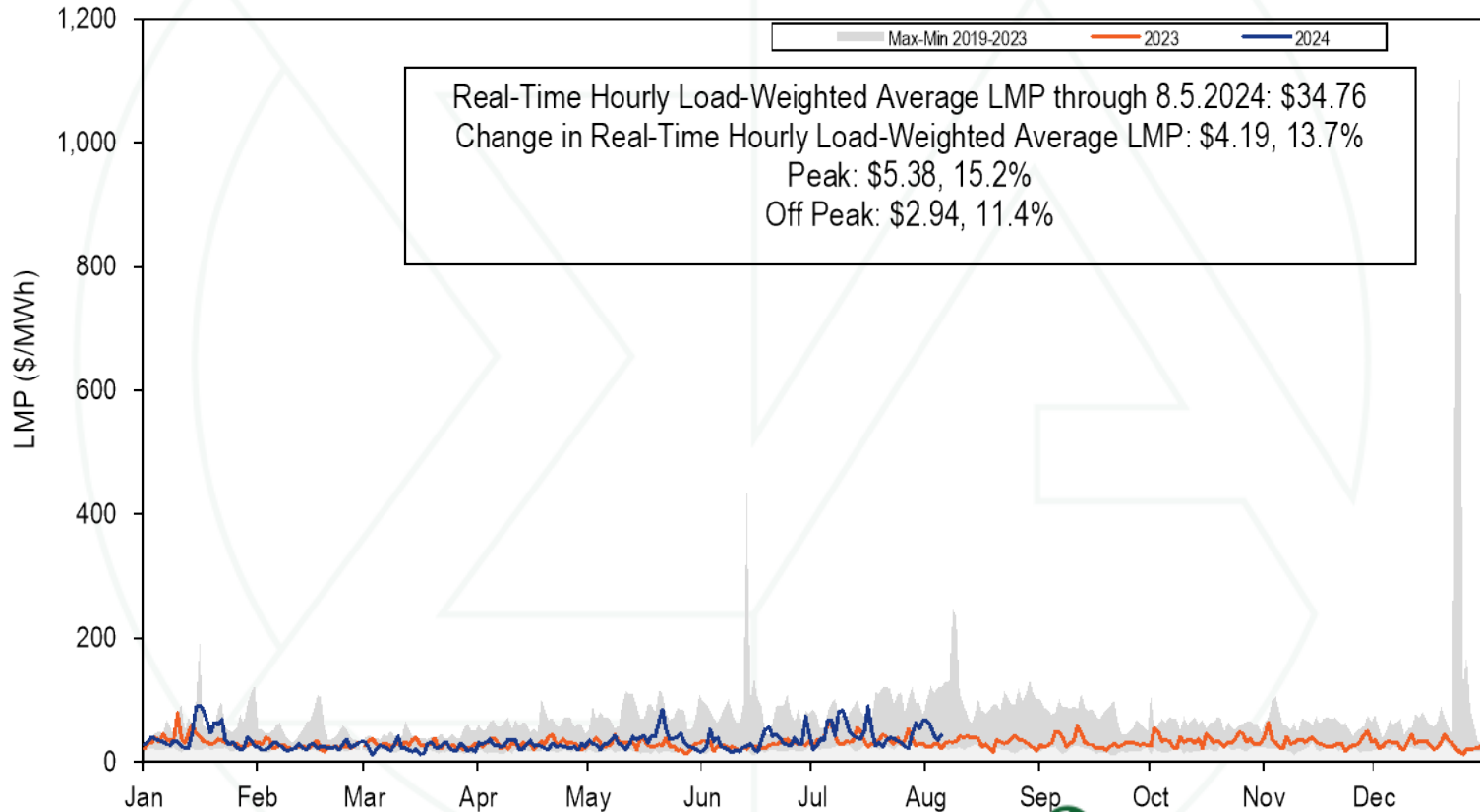
Maximum Hourly Wind Output by Year

Wind Maximum Hourly Output			
Year	MWh	Change	Percent
2020	9,095.00		
2021	8,910.56	(184.44)	-2.0%
2022	9,401.67	491.11	5.5%
2023	9,993.36	591.69	6.3%
2024	9,767.73	(225.62)	-2.3%

2024 YTD PJM Real-Time Daily Load



2024 YTD PJM Real-Time Daily LMP



Fast Start Pricing: DLMP and PLMP

- **PJM implemented fast start pricing in both the day-ahead and real-time markets on September 1, 2021.**
- **The goal of fast start pricing is to allow inflexible resources to set prices based on the sum of their commitment costs per MWh and their marginal costs.**
- **The pricing run LMP (PLMP) is now the official settlement LMP in PJM, replacing the dispatch run LMP (DLMP)**

Fast Start Pricing: DLMP and PLMP

- **Fast start pricing employs a new LMP calculation called the pricing run.**
- **The pricing run calculates LMP using the same optimal power flow algorithm as the dispatch run while simultaneously reducing (“relaxing” or ignoring) the economic minimum and maximum output MW constraints for all eligible fast start units.**

Fast Start Pricing: DLMP and PLMP

- **The price signal no longer equals the short run marginal cost and therefore no longer provides the correct signal for efficient behavior for market participants making decisions on the margin.**
- **The differences between the actual LMP (DLMP) and the fast start LMP(PLMP) distort the incentive for market participants to behave competitively and to follow PJM's dispatch instructions.**

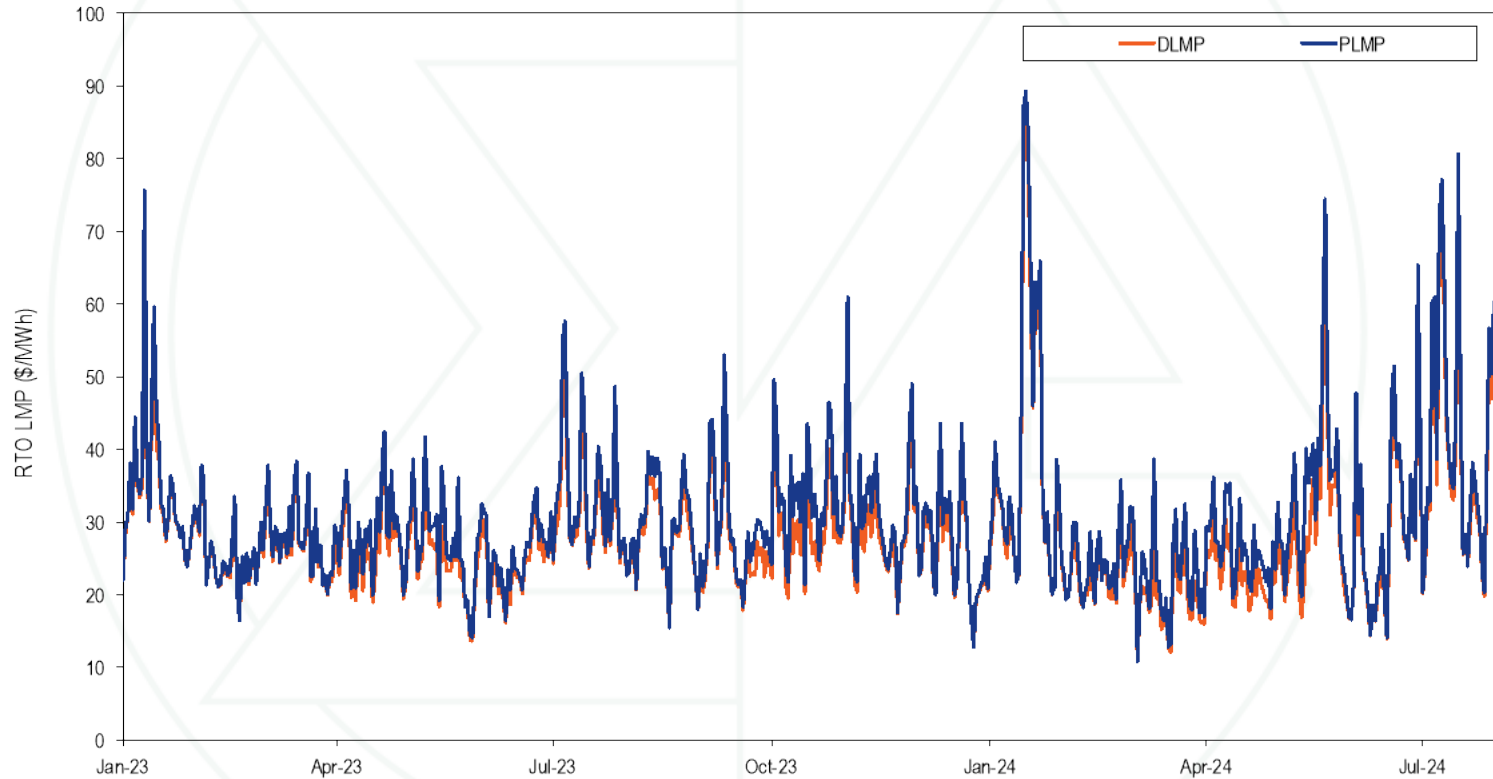
Fast Start Pricing: DLMP and PLMP

- **PJM also uses the pricing run for capping the system marginal price at \$3,700 per MWh.**
 - **This was last used during Winter Storm Elliott.**
 - **The cap applies to the marginal energy component of LMP, but the congestion and loss components of LMP can exceed the cap.**
- **PJM uses a lower default transmission constraint penalty factor in the pricing run in the day-ahead market.**
 - **\$30,000 per MWh in the dispatch run**
 - **\$2,000 per MWh in the pricing run**

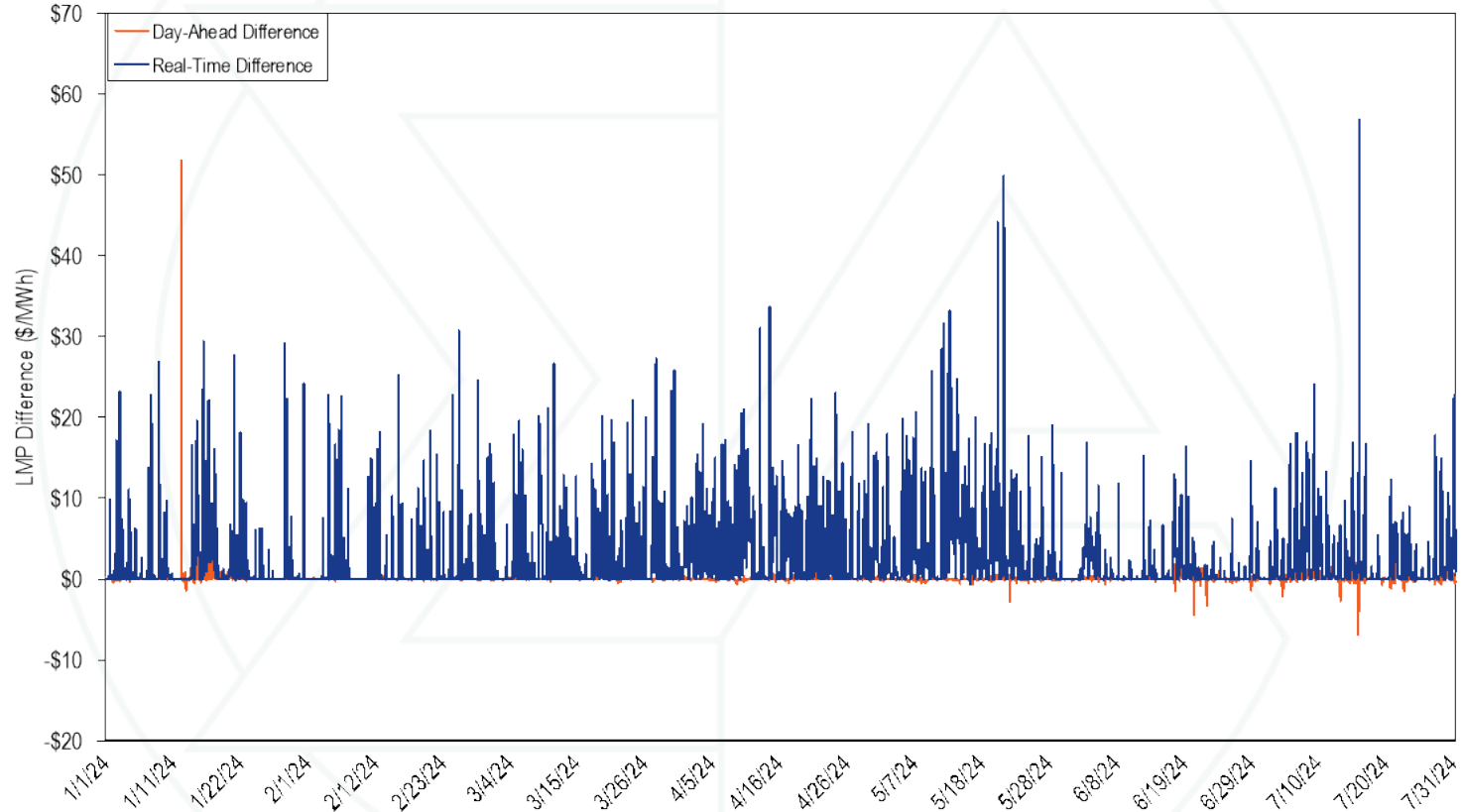
Monthly Average Load-Weighted DLMP and PLMP

Year	Month	Day-Ahead Load-Weighted Average				Real-Time Load-Weighted Average			
		DLMP	PLMP	Difference	Percent Difference	DLMP	PLMP	Difference	Percent Difference
2023	Jan	\$36.53	\$36.58	\$0.05	0.1%	\$34.66	\$35.75	\$1.09	3.1%
2023	Feb	\$31.16	\$31.22	\$0.06	0.2%	\$25.47	\$26.04	\$0.57	2.2%
2023	Mar	\$28.39	\$28.41	\$0.02	0.1%	\$27.58	\$28.42	\$0.85	3.1%
2023	Apr	\$29.81	\$29.81	(\$0.00)	(0.0%)	\$27.09	\$29.32	\$2.22	8.2%
2023	May	\$28.86	\$28.80	(\$0.05)	(0.2%)	\$25.91	\$28.44	\$2.53	9.7%
2023	Jun	\$27.82	\$27.82	(\$0.00)	(0.0%)	\$25.69	\$27.29	\$1.60	6.2%
2023	Jul	\$40.46	\$40.56	\$0.10	0.3%	\$34.34	\$37.21	\$2.87	8.4%
2023	Aug	\$30.49	\$30.54	\$0.05	0.2%	\$29.77	\$31.33	\$1.55	5.2%
2023	Sep	\$30.82	\$30.91	\$0.09	0.3%	\$29.33	\$31.55	\$2.22	7.6%
2023	Oct	\$35.03	\$35.05	\$0.02	0.1%	\$30.66	\$34.92	\$4.26	13.9%
2023	Nov	\$33.32	\$33.40	\$0.08	0.2%	\$30.00	\$32.94	\$2.94	9.8%
2023	Dec	\$29.89	\$29.94	\$0.05	0.2%	\$26.37	\$27.97	\$1.59	6.0%
2023	Jan - Jul	\$31.86	\$31.89	\$0.02	0.1%	\$28.68	\$30.35	\$1.68	5.9%
2023		\$31.89	\$31.93	\$0.04	0.1%	\$29.11	\$31.08	\$1.97	6.8%
2024	Jan	\$48.45	\$48.65	\$0.20	0.4%	\$40.82	\$42.78	\$1.95	4.8%
2024	Feb	\$23.67	\$23.70	\$0.03	0.1%	\$23.20	\$24.86	\$1.66	7.2%
2024	Mar	\$21.89	\$21.93	\$0.04	0.2%	\$20.30	\$23.15	\$2.85	14.0%
2024	Apr	\$26.73	\$26.75	\$0.02	0.1%	\$23.29	\$27.17	\$3.87	16.6%
2024	May	\$32.92	\$32.90	(\$0.02)	(0.1%)	\$31.70	\$36.16	\$4.46	14.1%
2024	Jun	\$32.59	\$32.62	\$0.03	0.1%	\$31.95	\$33.35	\$1.40	4.4%
2024	Jul	\$43.15	\$43.31	\$0.16	0.4%	\$44.12	\$47.17	\$3.04	6.9%
2024	Jan - Jul	\$33.50	\$33.58	\$0.07	0.2%	\$31.63	\$34.32	\$2.70	8.5%

Daily Average Real-Time DLMP and PLMP



Hourly Difference: PLMP – DLMP



Fast Start Units as a Percent of Marginal Units

Year	Month	Dispatch Run				Pricing Run			
		CT	Diesel	Wind	All Fast Start Units	CT	Diesel	Wind	All Fast Start Units
2023	Jan	1.6%	0.5%	0.1%	2.1%	6.2%	2.8%	0.0%	9.0%
2023	Feb	0.9%	0.2%	0.0%	1.1%	3.1%	0.6%	0.0%	3.7%
2023	Mar	0.8%	0.4%	0.1%	1.2%	3.0%	0.7%	0.1%	3.8%
2023	Apr	2.5%	0.4%	0.2%	3.2%	8.1%	0.8%	0.2%	9.1%
2023	May	1.0%	0.3%	0.1%	1.3%	4.8%	0.7%	0.1%	5.6%
2023	Jun	0.5%	0.2%	0.0%	0.7%	2.5%	0.5%	0.0%	3.0%
2023	Jul	1.4%	0.9%	0.0%	2.4%	8.6%	1.6%	0.0%	10.3%
2023	Aug	0.9%	1.5%	0.0%	2.4%	5.1%	2.3%	0.0%	7.4%
2023	Sep	0.4%	0.8%	0.1%	1.3%	5.1%	1.4%	0.1%	6.6%
2023	Oct	1.4%	0.3%	0.0%	1.7%	6.9%	0.8%	0.0%	7.7%
2023	Nov	4.0%	0.6%	0.0%	4.5%	11.4%	1.4%	0.0%	12.8%
2023	Dec	1.4%	0.7%	0.0%	2.2%	7.2%	2.0%	0.0%	9.3%
2023	Jan-Jul	1.2%	0.4%	0.1%	1.7%	5.2%	1.1%	0.1%	6.4%
2023		1.4%	0.6%	0.0%	2.0%	6.0%	1.3%	0.0%	7.4%
2024	Jan	0.7%	0.6%	0.0%	1.3%	3.5%	1.1%	0.0%	4.7%
2024	Feb	0.4%	0.1%	0.1%	0.5%	2.2%	0.1%	0.1%	2.4%
2024	Mar	0.7%	0.2%	1.2%	2.1%	4.1%	0.8%	1.3%	6.2%
2024	Apr	1.5%	0.2%	0.2%	1.9%	6.5%	0.7%	0.1%	7.3%
2024	May	0.6%	0.2%	0.1%	1.0%	5.1%	0.6%	0.1%	5.8%
2024	Jun	0.5%	0.3%	0.1%	0.8%	4.3%	0.7%	0.3%	5.3%
2024	Jul	0.8%	0.5%	0.0%	1.4%	7.4%	1.0%	0.0%	8.5%
2024	Jan-Jul	0.7%	0.3%	0.3%	1.3%	4.7%	0.7%	0.3%	5.7%

Fast Start Impacts: Zone Average Differences

Zone	2024 Jan - Jul							
	Day-Ahead				Real-Time			
	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
ACEC	\$25.08	\$25.11	\$0.03	0.1%	\$23.34	\$24.76	\$1.42	6.1%
AEP	\$30.77	\$30.82	\$0.04	0.1%	\$28.25	\$30.38	\$2.12	7.5%
APS	\$32.02	\$32.05	\$0.04	0.1%	\$29.22	\$31.45	\$2.22	7.6%
ATSI	\$30.75	\$30.79	\$0.04	0.1%	\$28.41	\$30.49	\$2.08	7.3%
BGE	\$38.63	\$38.68	\$0.05	0.1%	\$34.97	\$37.69	\$2.72	7.8%
COMED	\$26.10	\$26.15	\$0.05	0.2%	\$23.72	\$25.56	\$1.84	7.7%
DAY	\$32.10	\$32.14	\$0.04	0.1%	\$29.32	\$31.53	\$2.21	7.5%
DUKE	\$31.32	\$31.36	\$0.04	0.1%	\$28.58	\$30.72	\$2.14	7.5%
DOM	\$36.08	\$36.12	\$0.04	0.1%	\$33.69	\$36.11	\$2.42	7.2%
DPL	\$28.17	\$28.21	\$0.04	0.1%	\$25.76	\$28.16	\$2.41	9.3%
DUQ	\$30.78	\$30.82	\$0.04	0.1%	\$28.58	\$30.67	\$2.09	7.3%
EKPC	\$30.58	\$30.62	\$0.04	0.1%	\$28.34	\$30.46	\$2.12	7.5%
JCPLC	\$25.58	\$25.62	\$0.03	0.1%	\$23.78	\$25.27	\$1.50	6.3%
MEC	\$27.91	\$27.94	\$0.03	0.1%	\$25.39	\$27.18	\$1.80	7.1%
OVEC	\$29.89	\$29.93	\$0.04	0.1%	\$27.42	\$29.47	\$2.05	7.5%
PECO	\$24.28	\$24.31	\$0.03	0.1%	\$22.71	\$24.06	\$1.35	5.9%
PE	\$30.81	\$30.84	\$0.03	0.1%	\$28.38	\$30.44	\$2.05	7.2%
PEPCO	\$36.59	\$36.63	\$0.04	0.1%	\$33.23	\$35.76	\$2.52	7.6%
PPL	\$25.75	\$25.79	\$0.04	0.1%	\$23.73	\$25.34	\$1.61	6.8%
PSEG	\$25.80	\$25.83	\$0.03	0.1%	\$24.13	\$25.64	\$1.51	6.3%
REC	\$27.61	\$27.64	\$0.03	0.1%	\$25.79	\$27.39	\$1.60	6.2%

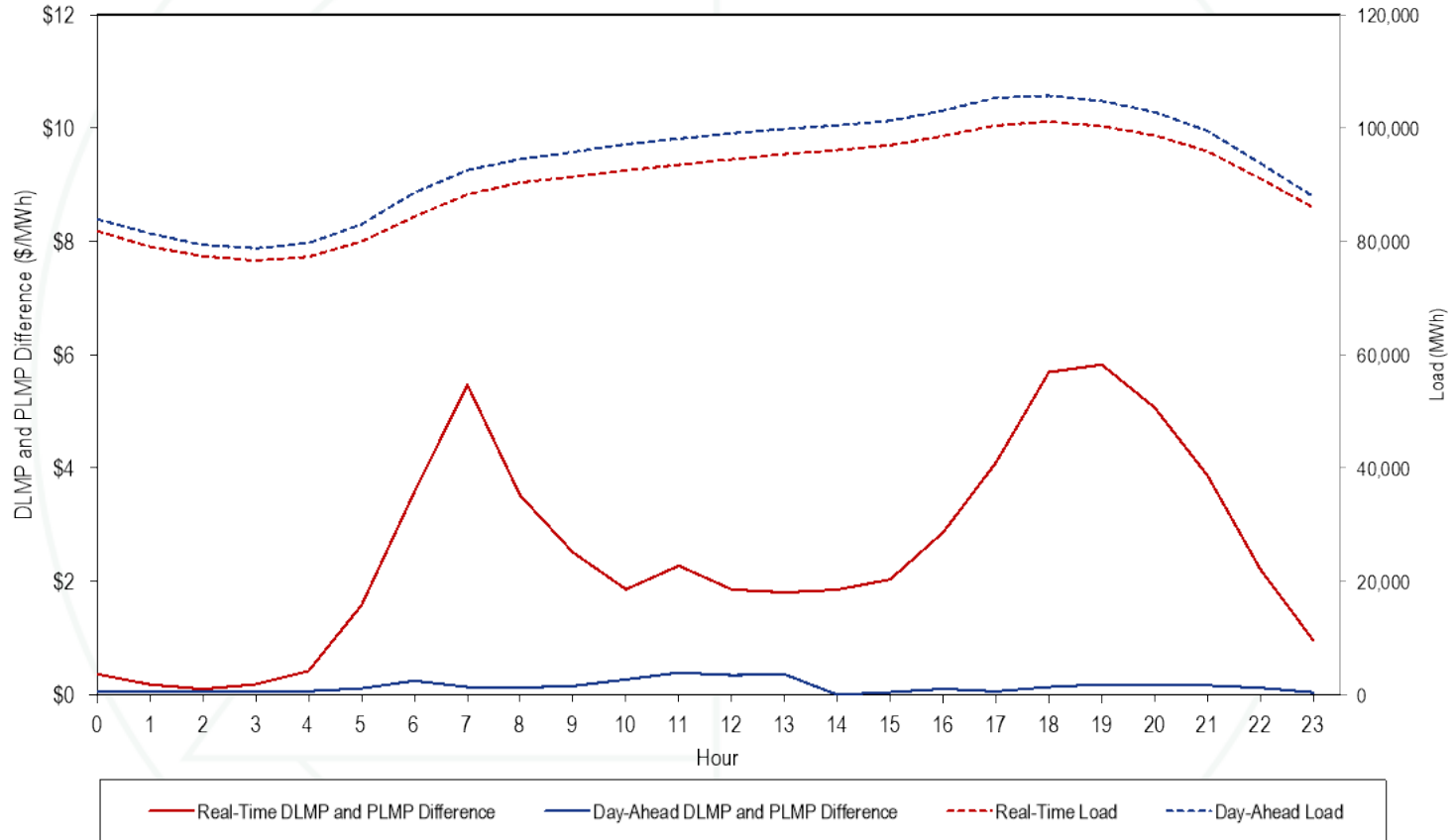
Fast Start Impacts: Hub Average Differences

2024 Jan - Jul									
Hub	Day-Ahead				Real-Time				
	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference	
AEP GEN HUB	\$29.74	\$29.77	\$0.03	0.1%	\$27.26	\$29.33	\$2.07	7.6%	
AEP-DAYTON HUB	\$30.49	\$30.52	\$0.03	0.1%	\$27.85	\$29.95	\$2.10	7.5%	
ATSI GEN HUB	\$30.38	\$30.40	\$0.03	0.1%	\$27.83	\$29.89	\$2.05	7.4%	
CHICAGO GEN HUB	\$25.63	\$25.69	\$0.06	0.2%	\$23.10	\$24.92	\$1.83	7.9%	
CHICAGO HUB	\$26.31	\$26.32	\$0.01	0.1%	\$23.86	\$25.70	\$1.85	7.7%	
DOMINION HUB	\$33.74	\$33.77	\$0.03	0.1%	\$30.89	\$33.21	\$2.32	7.5%	
EASTERN HUB	\$28.65	\$28.66	\$0.02	0.1%	\$26.07	\$28.48	\$2.41	9.2%	
N ILLINOIS HUB	\$26.03	\$26.10	\$0.07	0.3%	\$23.74	\$25.58	\$1.84	7.8%	
NEW JERSEY HUB	\$25.68	\$25.70	\$0.02	0.1%	\$23.97	\$25.47	\$1.50	6.2%	
OHIO HUB	\$30.44	\$30.47	\$0.03	0.1%	\$27.78	\$29.88	\$2.09	7.5%	
WEST INT HUB	\$31.71	\$31.74	\$0.03	0.1%	\$29.13	\$31.30	\$2.17	7.5%	
WESTERN HUB	\$33.26	\$33.28	\$0.01	0.0%	\$30.25	\$32.55	\$2.29	7.6%	

Zonal Real-Time PLMP-DLMP Difference Frequency

Zone	2024 Jan - Jul										
	< (\$50)	(\$50) to (\$10)	(\$10) to \$0	\$0	\$0 to \$10	\$10 to \$20	\$20 to \$50	\$50 to \$100	\$100 to \$200	>= \$200	
PJM-RTO	0.0%	0.0%	0.8%	52.1%	39.1%	5.4%	2.5%	0.1%	0.0%	0.0%	
ACEC	0.0%	0.0%	4.5%	52.3%	37.6%	3.5%	1.8%	0.1%	0.0%	0.0%	
AEP	0.0%	0.0%	1.5%	52.2%	37.9%	5.5%	2.8%	0.1%	0.0%	0.0%	
APS	0.0%	0.0%	1.1%	52.2%	38.0%	5.5%	3.1%	0.1%	0.0%	0.0%	
ATSI	0.0%	0.1%	1.9%	52.1%	37.8%	5.3%	2.8%	0.1%	0.0%	0.0%	
BGE	0.0%	0.1%	2.6%	52.0%	34.4%	6.1%	4.3%	0.5%	0.1%	0.0%	
COMED	0.0%	0.1%	3.7%	53.0%	36.3%	4.6%	2.3%	0.1%	0.0%	0.0%	
DAY	0.0%	0.0%	1.6%	52.2%	37.5%	5.5%	3.1%	0.2%	0.0%	0.0%	
DUKE	0.0%	0.0%	1.7%	52.2%	37.8%	5.3%	2.8%	0.1%	0.0%	0.0%	
DOM	0.0%	0.1%	1.9%	52.2%	36.3%	5.7%	3.6%	0.3%	0.0%	0.0%	
DPL	0.0%	0.2%	6.8%	52.2%	34.4%	3.3%	2.2%	0.4%	0.4%	0.0%	
DUQ	0.1%	0.1%	1.7%	52.2%	37.9%	5.2%	2.7%	0.1%	0.0%	0.0%	
EKPC	0.0%	0.0%	1.5%	52.2%	38.1%	5.3%	2.7%	0.1%	0.0%	0.0%	
JCPLC	0.0%	0.0%	2.2%	52.3%	40.0%	3.5%	1.8%	0.1%	0.0%	0.0%	
MEC	0.0%	0.2%	3.6%	52.1%	37.3%	4.4%	2.2%	0.1%	0.0%	0.0%	
OVEC	0.0%	0.1%	1.9%	52.3%	37.7%	5.2%	2.7%	0.1%	0.0%	0.0%	
PECO	0.0%	0.1%	6.1%	52.2%	36.2%	3.5%	1.9%	0.1%	0.0%	0.0%	
PE	0.0%	0.1%	1.3%	52.0%	38.8%	5.2%	2.5%	0.1%	0.0%	0.0%	
PEPCO	0.0%	0.1%	2.2%	52.2%	35.3%	6.0%	3.9%	0.3%	0.0%	0.0%	
PPL	0.0%	0.1%	3.3%	52.1%	38.7%	3.9%	1.8%	0.1%	0.0%	0.0%	
PSEG	0.0%	0.0%	2.1%	52.2%	40.1%	3.6%	1.9%	0.1%	0.0%	0.0%	
REC	0.0%	0.1%	2.0%	52.0%	40.1%	3.7%	2.0%	0.1%	0.0%	0.0%	

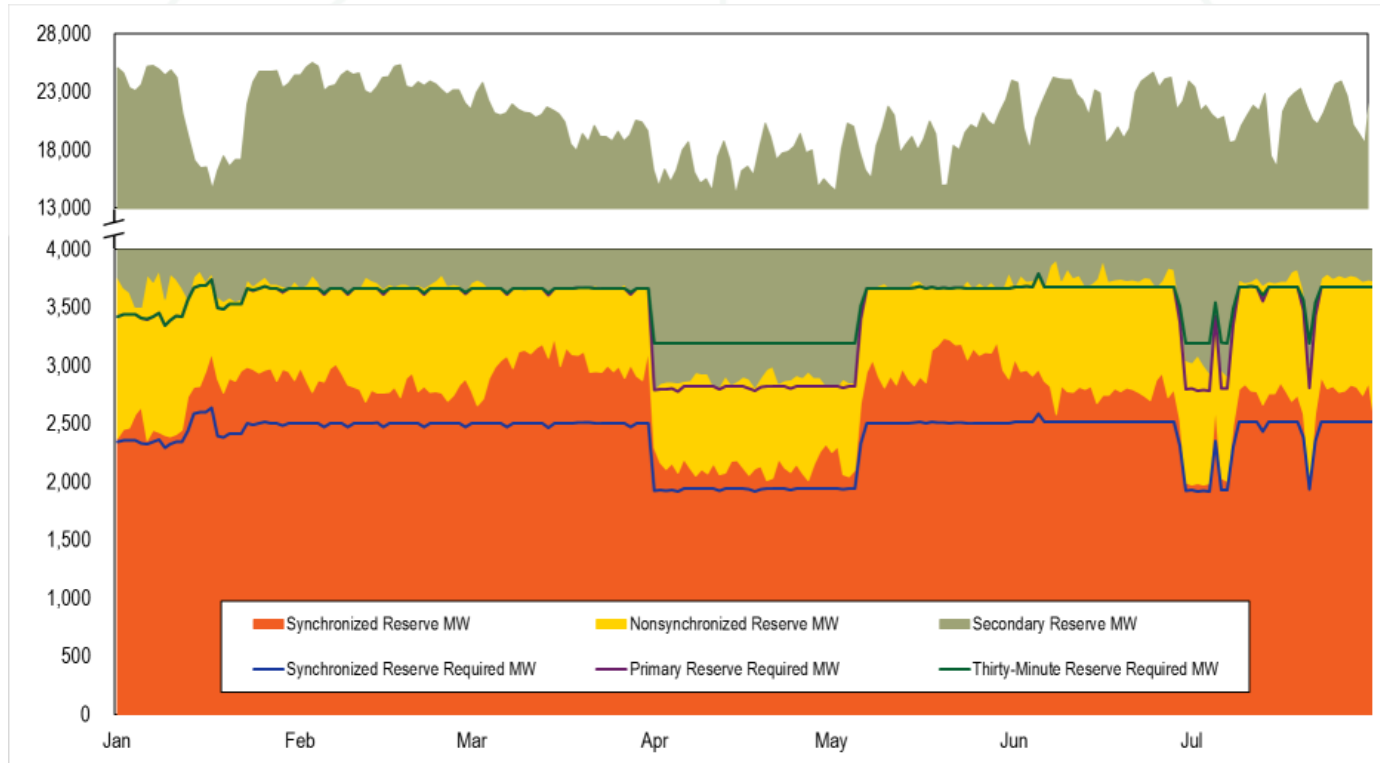
Hourly Average Load and LMP Difference



Real-Time Load-Weighted Average LMP

	2023				2024			
	Off Peak	On Peak	Difference	Percent Difference	Off Peak	On Peak	Difference	Percent Difference
Jan	\$33.20	\$38.53	\$5.32	16.0%	\$38.50	\$47.10	\$8.60	22.3%
Feb	\$23.45	\$28.67	\$5.22	22.3%	\$24.49	\$25.23	\$0.74	3.0%
Mar	\$26.96	\$29.78	\$2.82	10.5%	\$21.64	\$24.79	\$3.15	14.6%
Apr	\$24.08	\$35.00	\$10.92	45.4%	\$23.99	\$30.03	\$6.04	25.2%
May	\$22.65	\$33.84	\$11.19	49.4%	\$28.99	\$42.74	\$13.75	47.4%
Jun	\$21.64	\$32.16	\$10.52	48.6%	\$26.66	\$40.04	\$13.38	50.2%
Jul	\$26.86	\$48.04	\$21.18	78.9%	\$32.20	\$60.78	\$28.58	88.7%
Aug	\$26.60	\$35.30	\$8.70	32.7%				
Sep	\$24.76	\$38.65	\$13.88	56.1%				
Oct	\$26.41	\$42.58	\$16.17	61.2%				
Nov	\$29.45	\$36.48	\$7.02	23.9%				
Dec	\$23.70	\$32.88	\$9.18	38.7%				

Real-Time Reserves and Requirements



Decreased requirements in April and July are due to a smaller unit being the contingency.

Day-Ahead & Real-Time RTO Reserve MW

Year	Month	Synchronized Reserve MW		Nonsynchronized Reserve MW		Total Primary Reserve MW		Secondary Reserve MW		Total Thirty-Minute Reserve MW	
		DA	RT	DA	RT	DA	RT	DA	RT	DA	RT
2024	Jan	2,757	2,732	1,229	950	3,987	3,682	15,051	18,087	19,038	21,769
2024	Feb	2,769	2,827	1,215	868	3,983	3,694	15,323	20,219	19,306	23,914
2024	Mar	2,913	3,007	773	663	3,686	3,669	13,423	16,852	17,108	20,521
2024	Apr	2,880	2,130	867	753	3,747	2,884	11,066	14,035	14,813	16,919
2024	May	2,974	2,874	795	674	3,769	3,549	11,877	15,238	15,645	18,787
2024	Jun	2,889	2,780	974	951	3,863	3,730	15,142	18,543	19,006	22,274
2024	Jul	2,654	2,585	910	965	3,564	3,550	13,136	17,620	16,701	21,169

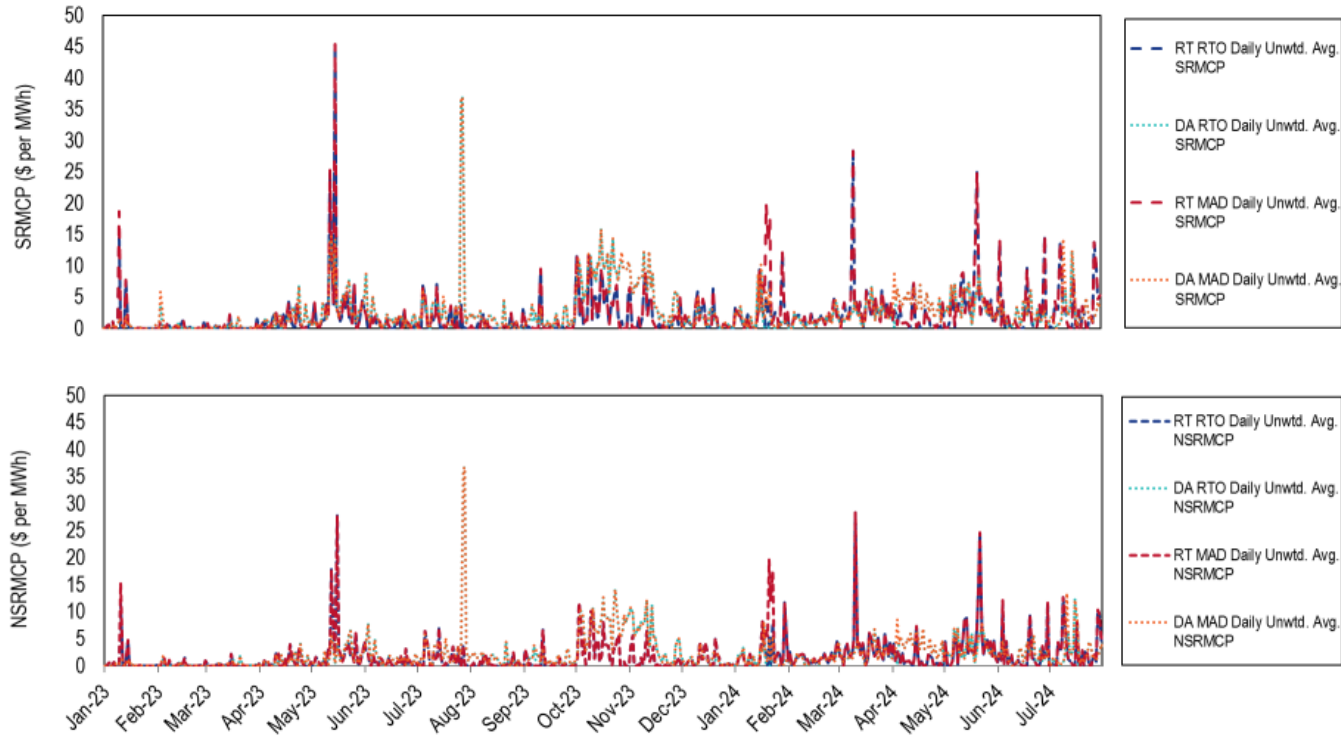
Day-Ahead & Real-Time MAD Reserve MW

Year	Month	Synchronized Reserve MW		Nonsynchronized Reserve MW		Total Primary Reserve MW		Secondary Reserve MW		Total Thirty-Minute Reserve MW	
		DA	RT	DA	RT	DA	RT	DA	RT	DA	RT
2024	Jan	1,995	2,008	936	754	2,932	2,762	NA	NA	NA	NA
2024	Feb	1,959	1,992	932	707	2,891	2,699	NA	NA	NA	NA
2024	Mar	1,999	2,024	622	578	2,621	2,602	NA	NA	NA	NA
2024	Apr	1,770	1,724	645	633	2,414	2,357	NA	NA	NA	NA
2024	May	1,985	1,968	683	606	2,668	2,574	NA	NA	NA	NA
2024	Jun	2,070	1,891	800	782	2,870	2,674	NA	NA	NA	NA
2024	Jul	2,024	1,856	725	789	2,749	2,646	NA	NA	NA	NA

Reserve Settlements by Month

Year	Month	Total Day-Ahead Credits			Total Balancing MCP Credits			Total LOC Credits		
		SR	NSR	SecR	SR	NSR	SecR	SR	NSR	SecR
2024	Jan	\$4,327,646	\$549,761	\$0	(\$426,107)	(\$805,570)	\$0	\$1,137,709	\$246,452	\$159,892
2024	Feb	\$2,894,089	\$406,207	\$0	(\$98)	(\$224,893)	\$0	\$536,756	\$144,292	\$96,114
2024	Mar	\$5,930,989	\$907,106	\$0	(\$297,375)	(\$493,717)	\$0	\$1,078,643	\$265,668	\$130,584
2024	Apr	\$9,018,149	\$1,854,995	\$0	(\$907,004)	(\$145,415)	\$0	\$594,641	\$81,949	\$96,599
2024	May	\$9,477,497	\$1,236,498	\$0	(\$169,439)	(\$653,931)	\$0	\$1,259,463	\$575,091	\$291,530
2024	Jun	\$4,594,840	\$879,638	\$0	(\$602,073)	(\$184,008)	\$0	\$784,525	\$41,843	\$125,671
2024	Jul	\$5,994,640	\$1,271,008	\$0	\$88,604	(\$166,519)	\$0	\$1,400,567	\$42,325	\$313,369
Year	Month	Total Shortfall Charges			Total Credits					
		SR	NSR	SecR	SR	NSR	SecR			
2024	Jan	\$0	NA	\$0	\$5,039,248	(\$9,357)	\$159,892			
2024	Feb	\$19,515	NA	\$0	\$3,411,232	\$325,606	\$96,114			
2024	Mar	\$0	NA	\$0	\$6,712,258	\$679,056	\$130,584			
2024	Apr	\$0	NA	\$0	\$8,705,786	\$1,791,529	\$96,599			
2024	May	\$0	NA	\$0	\$10,567,521	\$1,157,657	\$291,530			
2024	Jun	\$0	NA	\$0	\$4,777,292	\$737,472	\$125,671			
2024	Jul	\$508,031	NA	\$0	\$6,975,780	\$1,146,814	\$313,369			

Reserve Prices: 2024



- Higher prices in 2024 during winter storms and during intervals of shortage in March, May, June, and July.

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