

Market Monitor Report

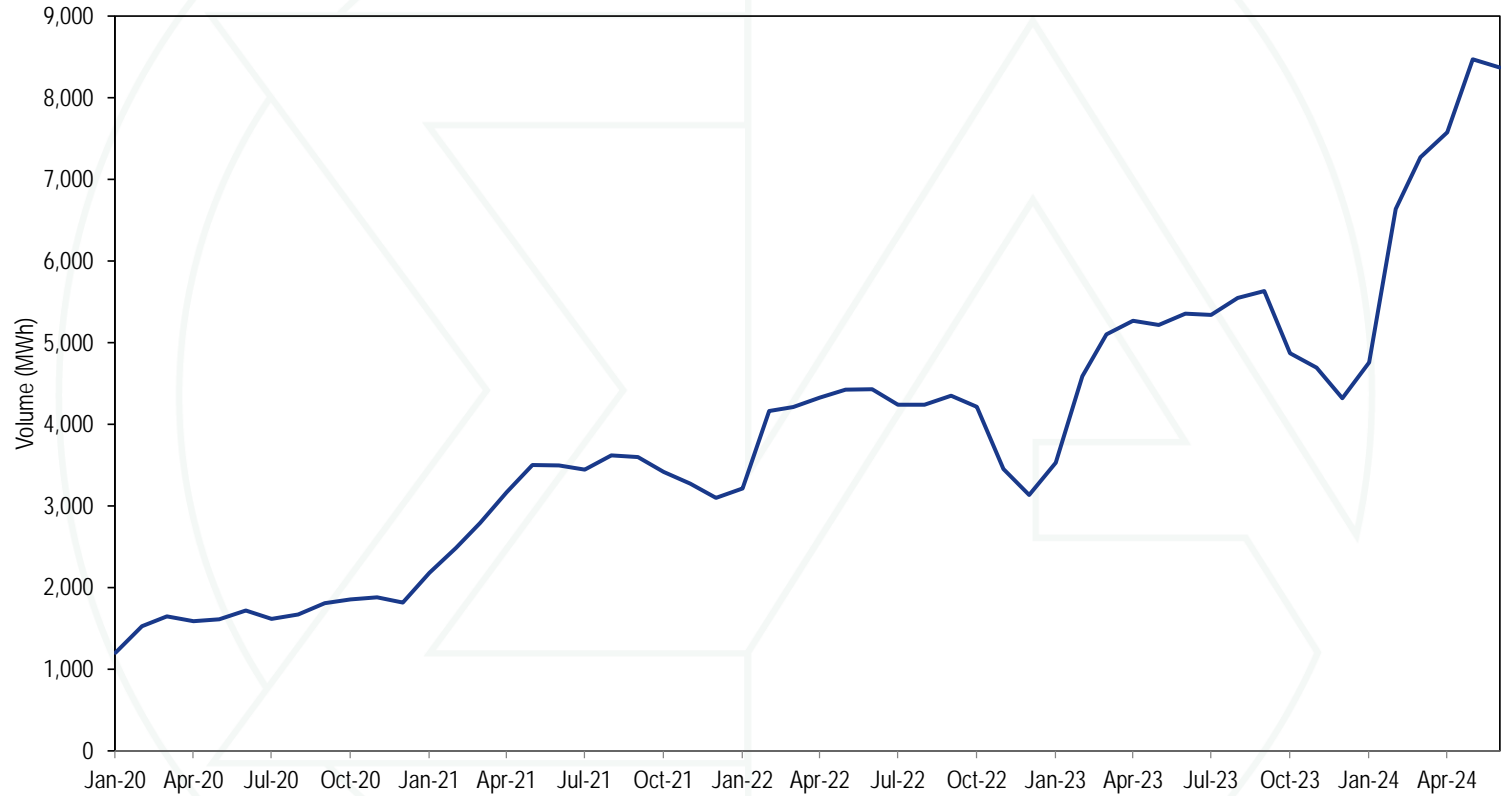
MC Webinar
July 22, 2024

IMM



Monitoring Analytics

Maximum Hourly Solar Output by Month through June 2024

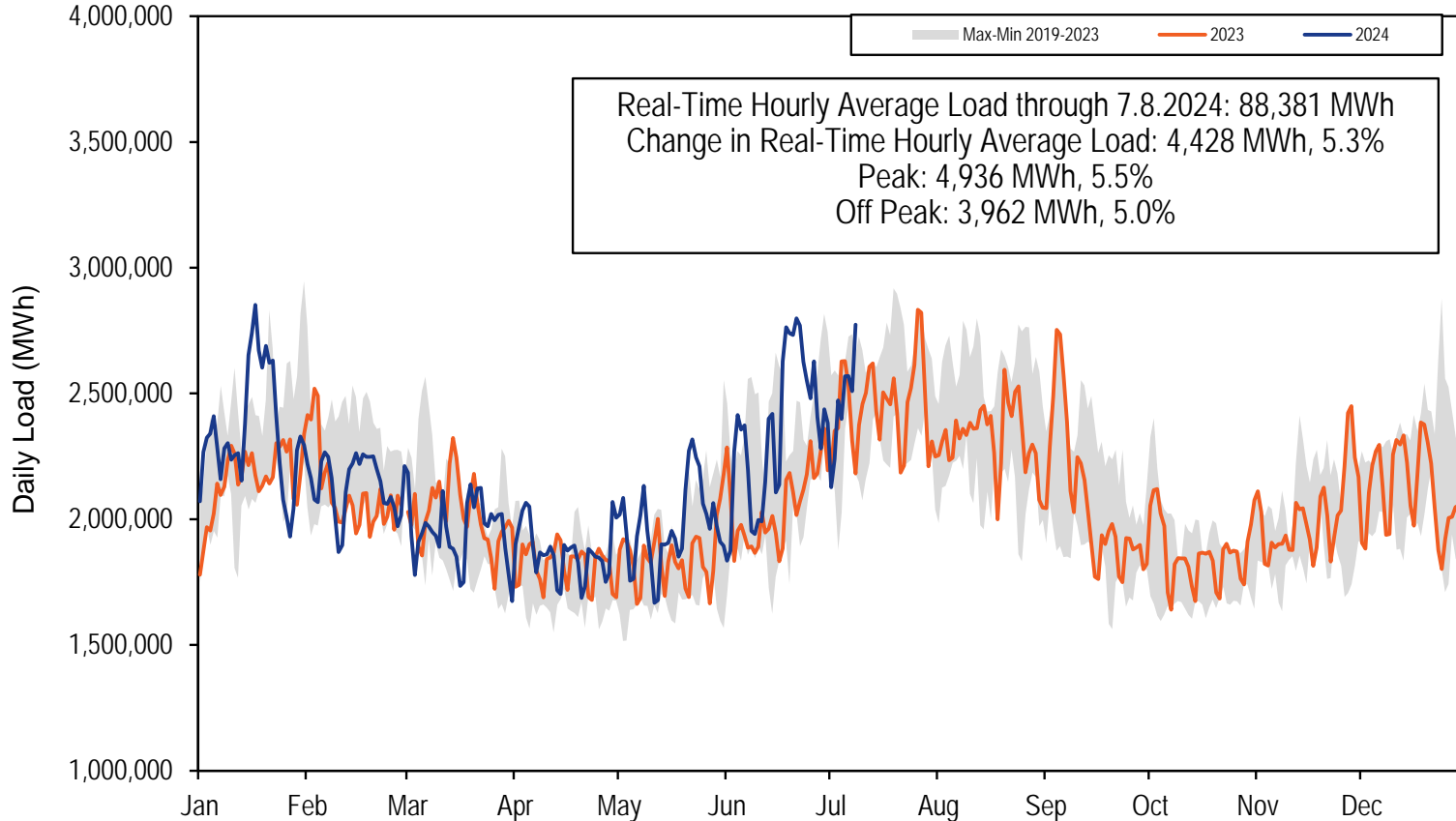


Maximum Hourly Solar Output by Year

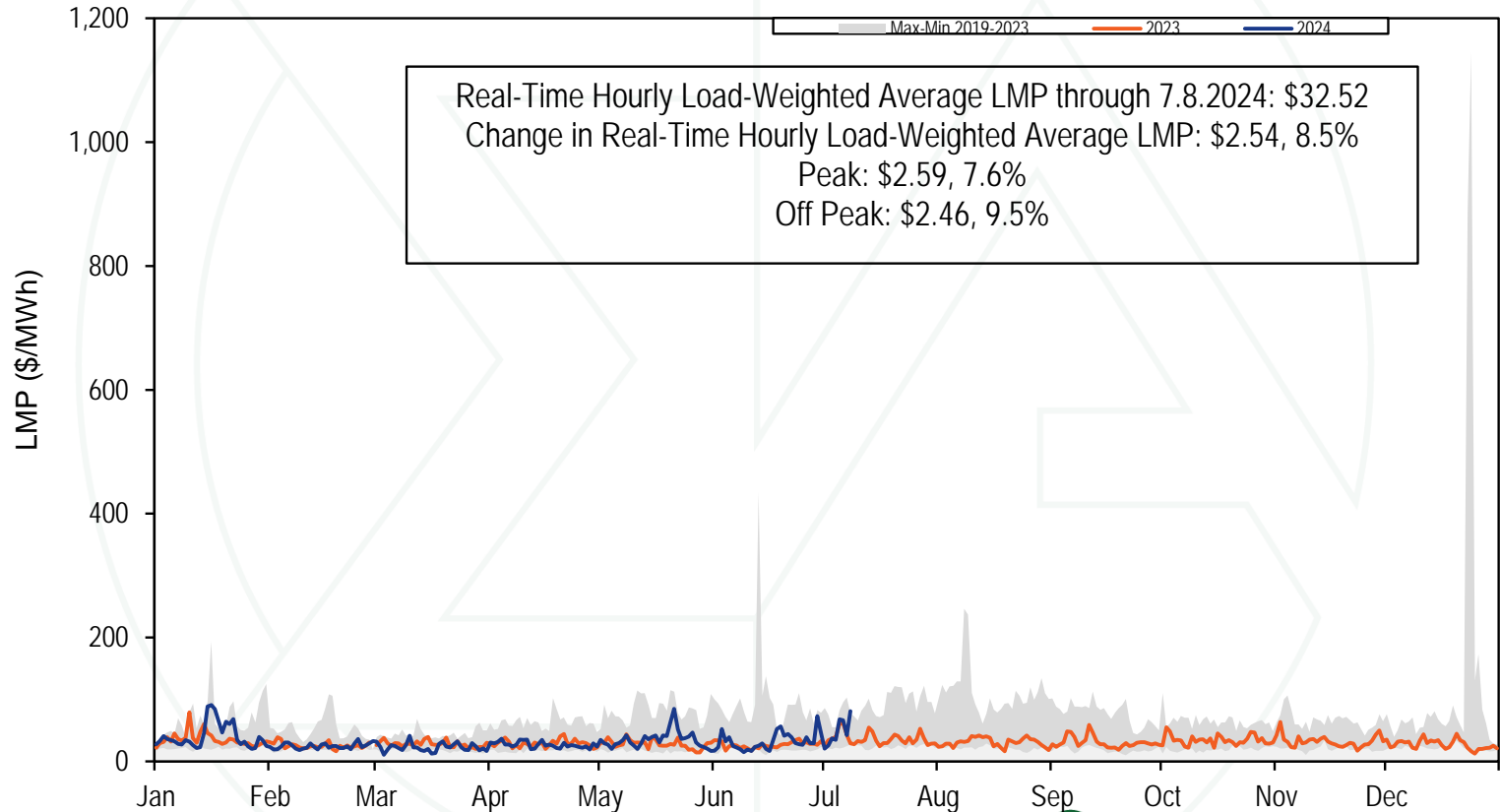
Maximum Hourly Output

Year	MWh	Increase	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	8,470.17	2,839.96	50.4%

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

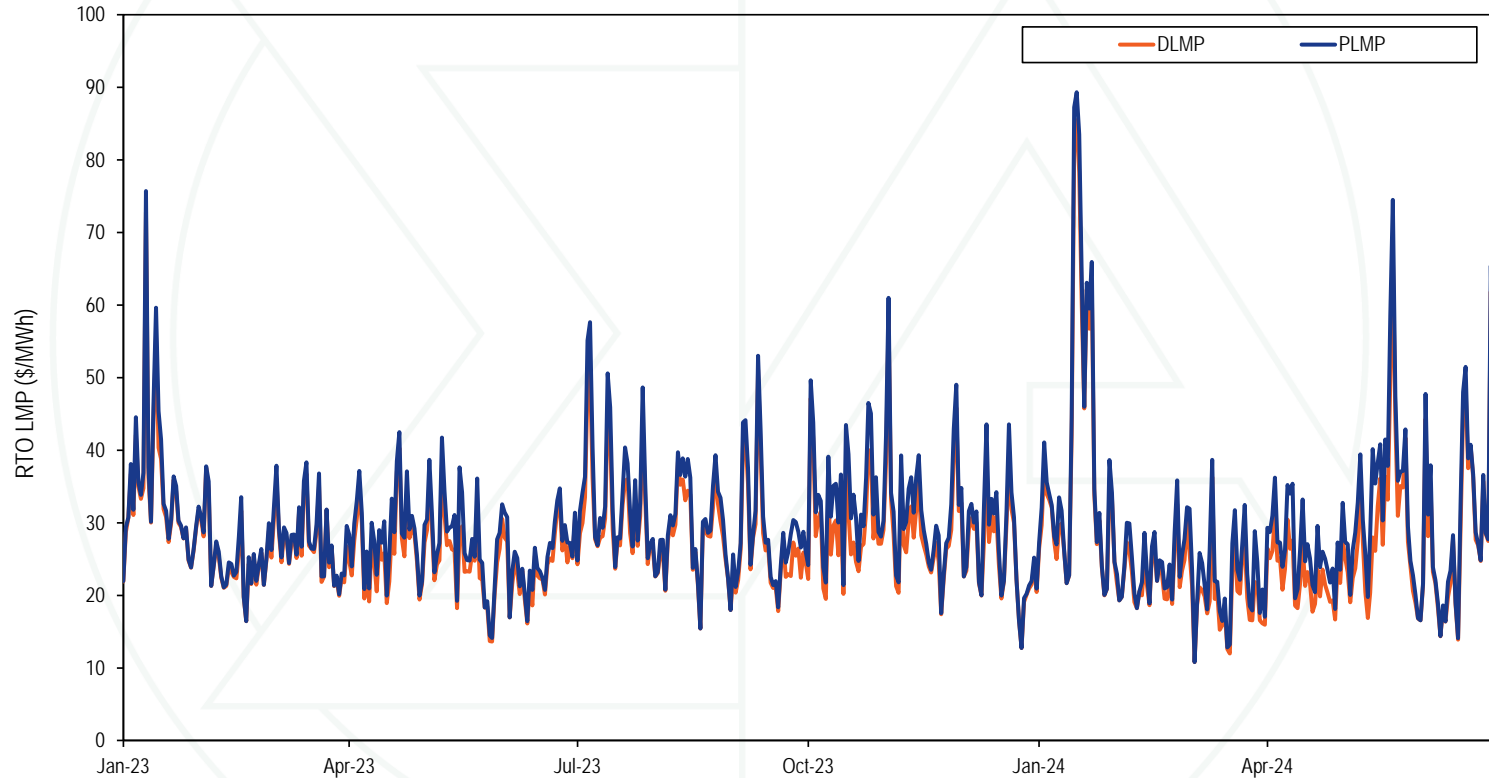
- **PJM also uses the pricing run for capping the system marginal price at \$3,700 per MWh.**
 - **This was last used during Winter Storm Elliott.**
 - **The cap applies to the marginal energy component of LMP, but the congestion and loss components of LMP can exceed the cap.**
- **PJM uses a lower default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

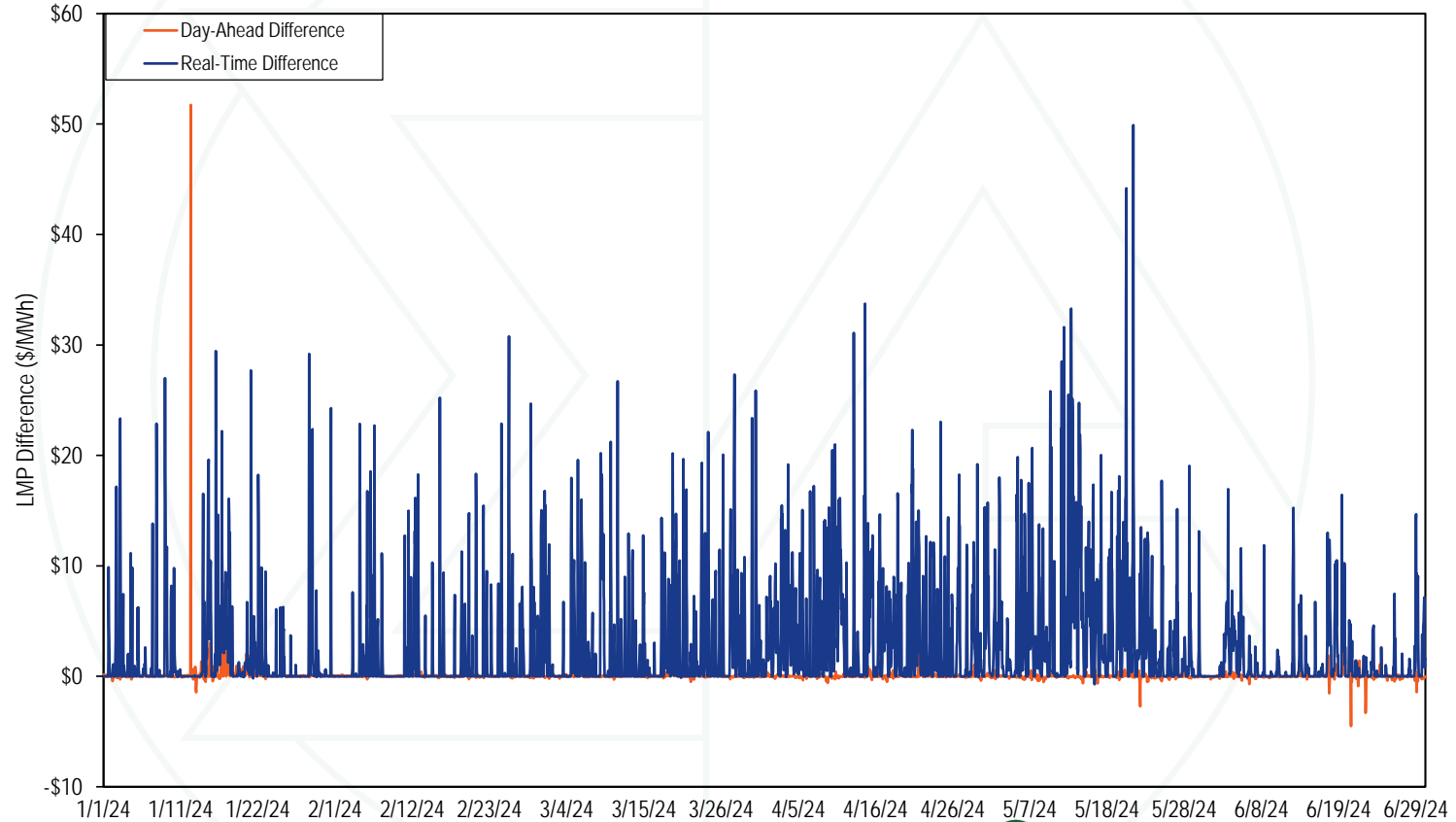
Year	Month	Percent				Percent			
		DLMP	PLMP	Difference	Difference	DLMP	PLMP	Difference	Difference
2023	Jan	\$36.53	\$36.58	\$0.05	0.1%	\$34.66	\$35.75	\$1.09	3.1%
2023	Feb	\$31.16	\$31.22	\$0.06	0.2%	\$25.47	\$26.04	\$0.57	2.2%
2023	Mar	\$28.39	\$28.41	\$0.02	0.1%	\$27.58	\$28.42	\$0.85	3.1%
2023	Apr	\$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 - Jun	\$30.43	\$30.44	\$0.01	0.0%	\$27.73	\$29.21	\$1.48	5.4%
2023		\$32.16	\$32.20	\$0.04	0.1%	\$29.13	\$31.10	\$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	Jan - Jun	\$31.60	\$31.66	\$0.05	0.2%	\$29.07	\$31.70	\$2.63	9.0%



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-Jun	1.2%	0.3%	0.1%	1.6%	4.6%	1.0%	0.1%	5.7%
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	Jan-Jun	0.7%	0.3%	0.3%	1.3%	4.3%	0.7%	0.3%	5.3%

Fast Start Impacts: Zone Average Differences

2024 Jan - Jun								
Zone	Day-Ahead				Real-Time			
	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
ACEC	\$21.93	\$21.92	(\$0.01)	(0.1%)	\$20.92	\$23.55	\$2.64	12.6%
AEP	\$31.24	\$31.23	(\$0.01)	(0.0%)	\$29.55	\$34.05	\$4.50	15.2%
APS	\$30.31	\$30.30	(\$0.01)	(0.0%)	\$28.14	\$32.58	\$4.44	15.8%
ATSI	\$31.06	\$31.04	(\$0.01)	(0.0%)	\$31.94	\$36.13	\$4.19	13.1%
BGE	\$40.67	\$40.66	(\$0.01)	(0.0%)	\$35.82	\$41.77	\$5.95	16.6%
COMED	\$24.64	\$24.63	(\$0.01)	(0.1%)	\$22.97	\$26.97	\$4.00	17.4%
DAY	\$32.65	\$32.64	(\$0.01)	(0.0%)	\$30.31	\$34.94	\$4.62	15.3%
DUKE	\$32.15	\$32.14	(\$0.01)	(0.0%)	\$29.97	\$34.50	\$4.53	15.1%
DOM	\$44.83	\$44.80	(\$0.03)	(0.1%)	\$41.86	\$47.07	\$5.21	12.4%
DPL	\$21.88	\$21.88	\$0.00	0.0%	\$20.72	\$23.24	\$2.52	12.2%
DUQ	\$31.42	\$31.41	(\$0.01)	(0.0%)	\$36.30	\$40.21	\$3.91	10.8%
EKPC	\$30.31	\$30.30	(\$0.01)	(0.0%)	\$28.11	\$32.51	\$4.40	15.7%
JCPLC	\$22.51	\$22.49	(\$0.01)	(0.1%)	\$21.57	\$24.33	\$2.76	12.8%
MEC	\$24.79	\$24.75	(\$0.04)	(0.2%)	\$22.10	\$25.05	\$2.94	13.3%
OVEC	\$30.22	\$30.21	(\$0.01)	(0.0%)	\$28.27	\$32.66	\$4.39	15.5%
PECO	\$21.21	\$21.20	(\$0.01)	(0.1%)	\$20.22	\$22.74	\$2.52	12.5%
PE	\$29.08	\$29.07	(\$0.01)	(0.0%)	\$27.95	\$31.88	\$3.93	14.1%
PEPCO	\$39.95	\$39.93	(\$0.02)	(0.0%)	\$36.22	\$41.70	\$5.47	15.1%
PPL	\$22.01	\$22.00	(\$0.01)	(0.1%)	\$21.04	\$23.78	\$2.74	13.0%
PSEG	\$22.54	\$22.52	(\$0.01)	(0.1%)	\$21.64	\$24.41	\$2.77	12.8%
REC	\$23.80	\$23.78	(\$0.01)	(0.1%)	\$23.03	\$26.00	\$2.97	12.9%

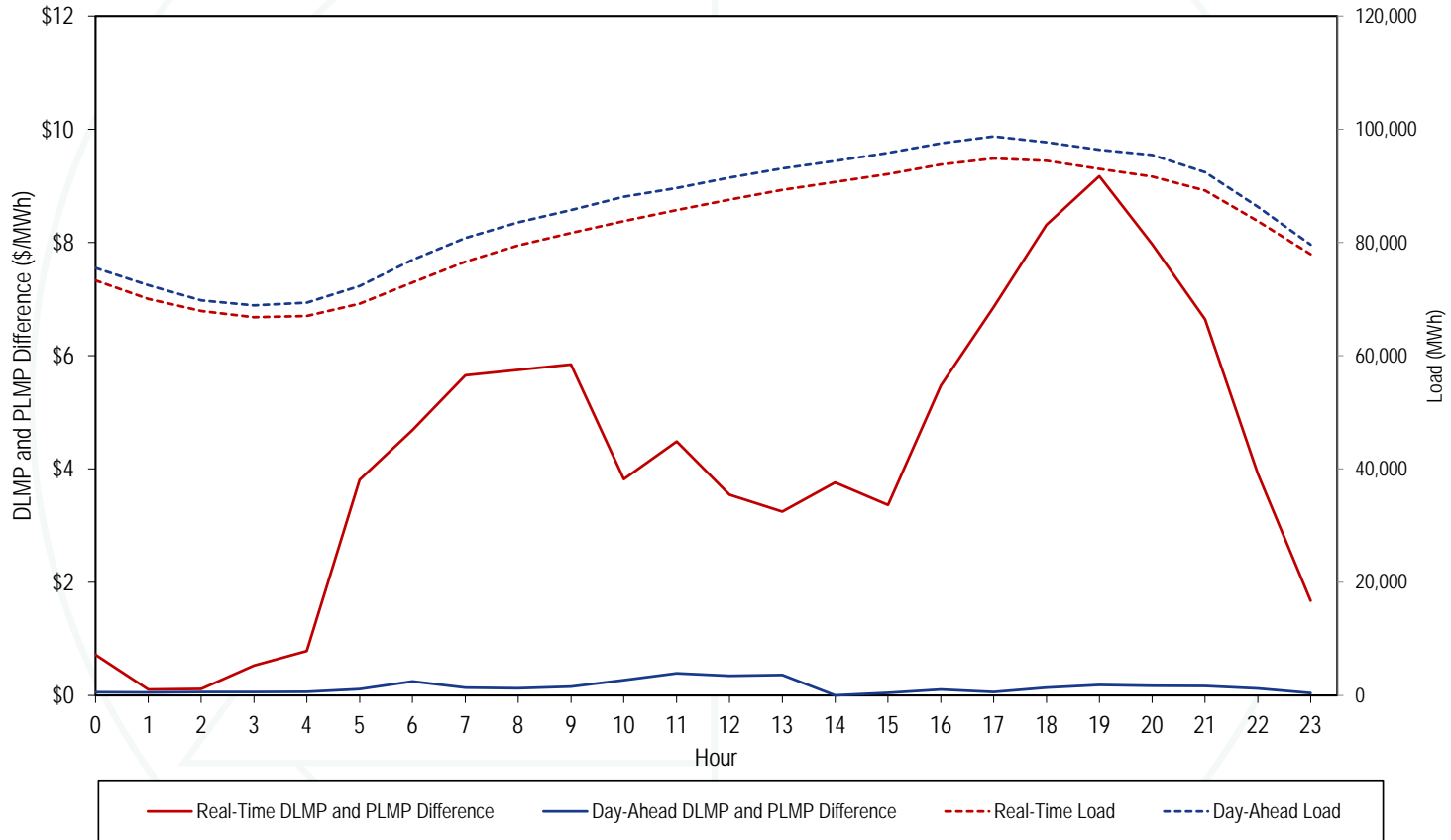
Fast Start Impacts: Hub Average Differences

Hub	2024 Jan - Jun							
	Average DLMP	Day-Ahead			Average DLMP	Real-Time		
		Average PLMP	Difference	Percent Difference		Average PLMP	Difference	Percent Difference
AEP GEN HUB	\$29.88	\$29.60	(\$0.28)	(0.9%)	\$28.10	\$32.58	\$4.47	15.9%
AEP-DAYTON HUB	\$30.99	\$30.68	(\$0.31)	(1.0%)	\$28.55	\$32.98	\$4.43	15.5%
ATSI GEN HUB	\$30.66	\$30.33	(\$0.33)	(1.1%)	\$30.48	\$34.49	\$4.01	13.2%
CHICAGO GEN HUB	\$24.47	\$24.21	(\$0.25)	(1.0%)	\$22.19	\$26.13	\$3.94	17.8%
CHICAGO HUB	\$24.98	\$24.71	(\$0.27)	(1.1%)	\$23.14	\$27.16	\$4.02	17.4%
DOMINION HUB	\$39.58	\$39.04	(\$0.54)	(1.4%)	\$35.61	\$40.57	\$4.96	13.9%
EASTERN HUB	\$22.49	\$22.37	(\$0.13)	(0.6%)	\$21.10	\$23.72	\$2.62	12.4%
N ILLINOIS HUB	\$24.79	\$24.53	(\$0.26)	(1.1%)	\$22.94	\$26.93	\$3.99	17.4%
NEW JERSEY HUB	\$22.54	\$22.40	(\$0.14)	(0.6%)	\$21.47	\$24.21	\$2.74	12.8%
OHIO HUB	\$30.98	\$30.67	(\$0.31)	(1.0%)	\$28.35	\$32.78	\$4.43	15.6%
WEST INT HUB	\$34.62	\$34.21	(\$0.41)	(1.2%)	\$32.35	\$36.85	\$4.50	13.9%
WESTERN HUB	\$33.46	\$33.10	(\$0.36)	(1.1%)	\$30.73	\$35.31	\$4.58	14.9%

Zonal Real-Time PLMP-DLMP Difference Frequency

Zone	2024 Jan - Jun										
	< (\$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	0.1%	0.8%	34.6%	50.9%	8.8%	4.6%	0.1%	0.1%	0.0%	0.0%	
ACEC	0.1%	5.7%	34.8%	52.0%	4.3%	2.9%	0.2%	0.1%	0.0%	0.0%	
AEP	0.0%	1.4%	34.8%	48.7%	9.5%	5.4%	0.2%	0.1%	0.0%	0.0%	
APS	0.0%	1.5%	34.7%	49.2%	8.8%	5.4%	0.2%	0.1%	0.0%	0.0%	
ATSI	0.3%	1.6%	34.6%	49.5%	8.7%	5.1%	0.2%	0.1%	0.0%	0.0%	
BGE	0.1%	2.8%	34.5%	43.7%	9.8%	8.2%	1.0%	0.1%	0.0%	0.0%	
COMED	0.0%	2.7%	35.1%	48.9%	8.6%	4.5%	0.1%	0.1%	0.0%	0.0%	
DAY	0.0%	1.2%	34.8%	48.3%	9.8%	5.5%	0.2%	0.1%	0.0%	0.0%	
DUKE	0.0%	1.3%	34.8%	48.5%	9.7%	5.4%	0.2%	0.1%	0.0%	0.0%	
DOM	0.2%	2.5%	34.6%	45.9%	8.9%	7.0%	0.7%	0.1%	0.1%	0.0%	
DPL	0.2%	11.2%	35.0%	46.0%	4.2%	3.0%	0.2%	0.1%	0.0%	0.0%	
DUQ	0.3%	1.3%	34.7%	49.6%	8.5%	5.0%	0.2%	0.1%	0.4%	0.0%	
EKPC	0.0%	1.6%	34.8%	48.9%	9.4%	5.1%	0.2%	0.1%	0.0%	0.0%	
JCPLC	0.1%	2.9%	34.6%	54.9%	4.4%	2.9%	0.2%	0.1%	0.0%	0.0%	
MEC	0.5%	6.5%	34.6%	49.7%	5.2%	3.3%	0.2%	0.1%	0.0%	0.0%	
OVEC	0.0%	1.2%	34.9%	49.1%	9.4%	5.0%	0.2%	0.1%	0.0%	0.0%	
PECO	0.1%	9.2%	34.7%	48.5%	4.2%	2.9%	0.2%	0.1%	0.0%	0.0%	
PE	0.0%	0.9%	34.5%	52.3%	8.1%	3.8%	0.2%	0.1%	0.0%	0.0%	
PEPCO	0.1%	2.2%	34.7%	45.1%	9.3%	7.8%	0.6%	0.1%	0.0%	0.0%	
PPL	0.3%	6.0%	34.5%	51.4%	4.7%	3.0%	0.1%	0.1%	0.0%	0.0%	
PSEG	0.1%	2.5%	34.6%	55.3%	4.4%	2.9%	0.2%	0.1%	0.0%	0.0%	
REC	0.1%	1.9%	34.6%	55.7%	4.5%	3.0%	0.1%	0.1%	0.0%	0.0%	

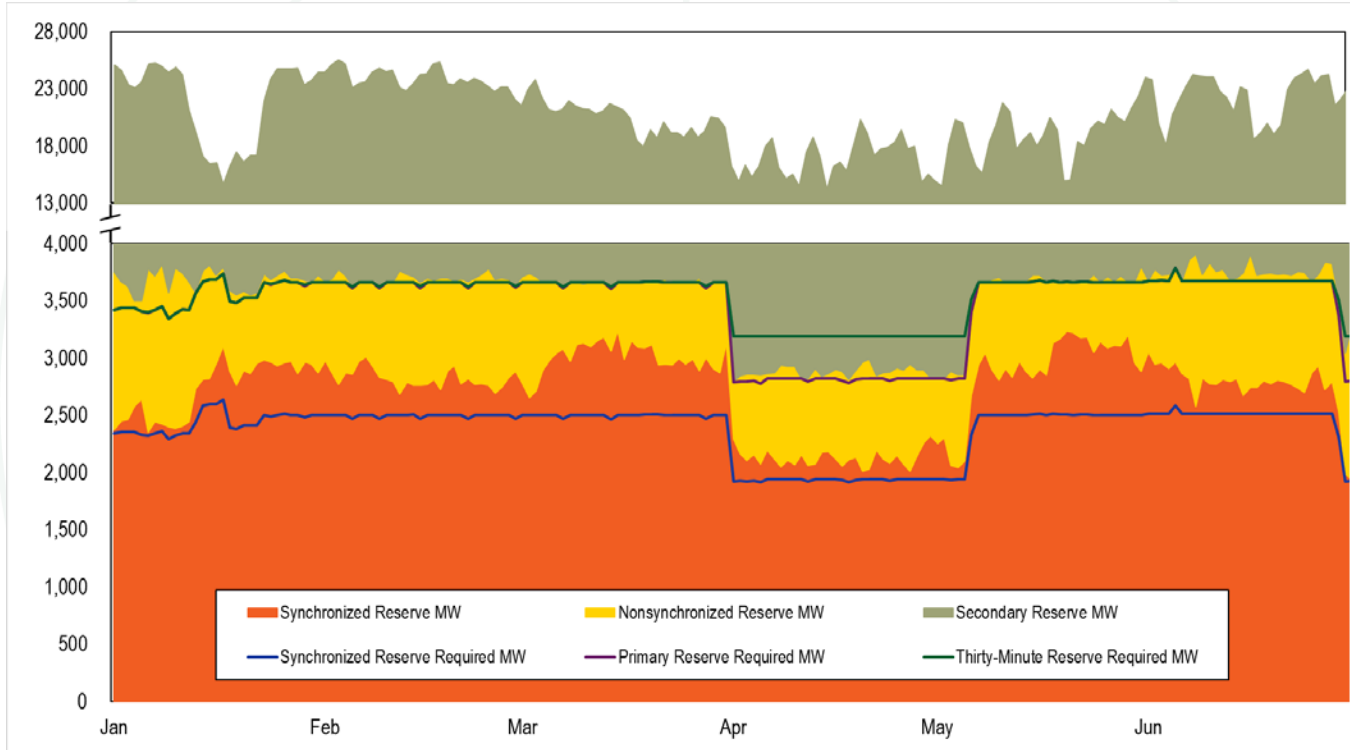
Hourly Average Load and LMP Difference



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%				
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 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

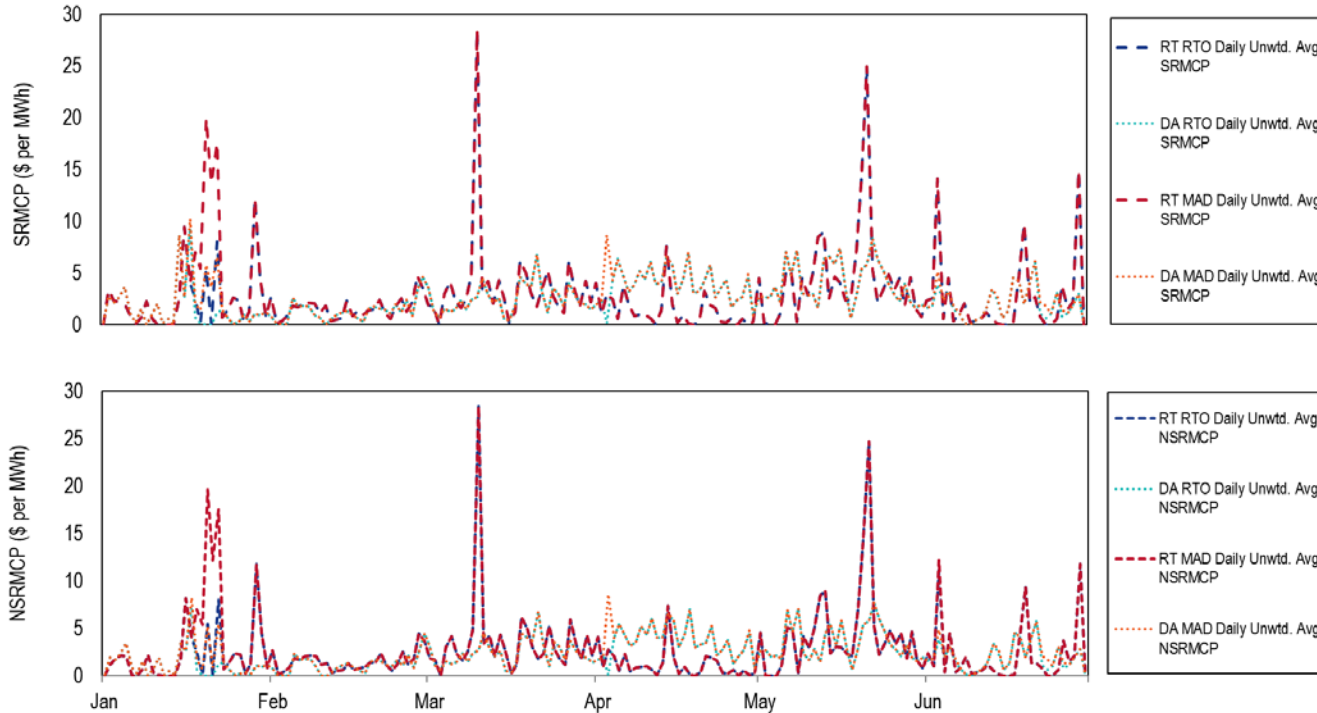
Day-Ahead & Real-Time MAD Reserve MW

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

Reserve Settlements by Month

Product	Year	Month	Total Day-Ahead Credits	Total Balancing MCP Credits	Total LOC Credits	Total Shortfall Charges	Total Credits
Synchronized Reserve	2024	Jan	\$4,327,646	(\$426,107)	\$1,137,709	\$0	\$5,039,248
	2024	Feb	\$2,894,089	(\$98)	\$536,756	\$19,515	\$3,411,232
	2024	Mar	\$5,930,989	(\$297,375)	\$1,075,449	\$0	\$6,709,064
	2024	Apr	\$9,018,149	(\$907,004)	\$594,642	\$0	\$8,705,787
	2024	May	\$9,477,497	(\$169,439)	\$1,259,217	\$0	\$10,567,275
	2024	Jun	\$4,168,459	(\$615,841)	\$675,952	\$0	\$4,228,570
Nonsynchronized Reserve	2024	Jan	\$549,761	(\$805,570)	\$246,452	NA	(\$9,357)
	2024	Feb	\$406,207	(\$224,893)	\$144,292	NA	\$325,606
	2024	Mar	\$907,106	(\$493,075)	\$265,668	NA	\$679,699
	2024	Apr	\$1,854,995	(\$145,415)	\$81,949	NA	\$1,791,529
	2024	May	\$1,236,498	(\$653,931)	\$575,091	NA	\$1,157,657
	2024	Jun	\$762,824	(\$75,313)	\$39,318	NA	\$726,829
Secondary Reserve	2024	Jan	\$0	\$0	\$159,892	\$0	\$159,892
	2024	Feb	\$0	\$0	\$96,114	\$0	\$96,114
	2024	Mar	\$0	\$0	\$130,711	\$0	\$130,711
	2024	Apr	\$0	\$0	\$96,599	\$0	\$96,599
	2024	May	\$0	\$0	\$291,530	\$0	\$291,530
	2024	Jun	\$0	\$0	\$119,061	\$0	\$119,061

Reserve Prices



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

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