

Market Monitor Report

MC Webinar
December 16, 2024

IMM



Monitoring Analytics

Capacity Market Analysis

- The IMM has posted four reports on capacity market design issues:
 - See reports analyzing the 2025/2026 RPM Base Residual Auction, “Analysis of the 2025/2026 RPM Base Residual Auction - Part A,” (Sep. 20, 2024), “Analysis of the 2025/2026 RPM Base Residual Auction - Part B,” (Oct. 15, 2024), “Analysis of the 2025/2026 RPM Base Residual Auction - Part C,” (Nov. 6, 2024), “Analysis of the 2025/2026 RPM Base Residual Auction – Part D”) (Dec. 6, 2024). These reports can be found at <https://www.monitoringanalytics.com/reports/Reports/2024.shtml>.

Capacity Market Issues

- **IMM BRA Reports**
 - **Part A**
 - **Part B**
 - **Part C**
 - **Part D**
- **Sensitivities showing the impact of key market design elements separately and combined.**

Summary of Key Design Elements by Table

- **Part C Table 3**
 - **Point A: Gross CONE**
 - **CT reference resource**
- **Part C Table 7**
 - **Table 3 plus 2.5 percent load growth**
- **Part C Table 8**
 - **Table 3 plus 5.0 percent load growth**

Summary of Key Assumptions by Table

- **Part D Table 5**
 - **Part C Table 7**
 - **Point A: $1.5 * \text{Net CONE}$**
- **Part D Table 6**
 - **Part C Table 8**
 - **Point A: $1.5 * \text{Net CONE}$**



Part C Table 3 Scenario summary for 2025/2026 RPM

Base Residual Auction: CT Reference Resource; 1.75

* Net CONE; Forward Net Revenue in VRR curve

Scenario	Scenario Description	Scenario Impact			
		RPM Revenue (\$ per Delivery Year)	RPM Revenue Change (\$ per Delivery Year)	Percent Change Scenario to Actual	Percent Change Actual to Scenario
0	Actual results	\$14,687,047,358	NA	NA	NA
13	VRR curve based on higher of CT gross CONE and 1.75 times net CONE calculated using forward E&AS offset	\$16,680,092,261	(\$1,993,044,904)	(11.9%)	13.6%
14	Scenario 13 and RMR resources	\$10,995,403,198	\$3,691,644,159	33.6%	(25.1%)
15	Scenario 13 and winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$8,771,874,183	\$5,915,173,175	67.4%	(40.3%)
16	Scenario 13 and all categorically exempt offers, winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$6,923,416,413	\$7,763,630,945	112.1%	(52.9%)

Part C Table 7 Scenario summary for 2025/2026 RPM

Base Residual Auction: CT Reference Resource; 1.75

* Net CONE; Forward Net Revenue in VRR curve; 2.5 Percent Higher Forecasted Peak Load

Scenario	Scenario Description	Scenario Impact			
		RPM Revenue (\$ per Delivery Year)	RPM Revenue Change (\$ per Delivery Year)	Percent Change Scenario to Actual	Actual to Scenario
0	Actual results	\$14,687,047,358	NA	NA	NA
27	VRR curve based on higher of CT gross CONE and 1.75 times net CONE calculated using forward E&AS offset	\$26,772,578,885	(\$12,085,531,528)	(45.1%)	82.3%
28	Scenario 27 and RMR resources	\$23,838,937,839	(\$9,151,890,481)	(38.4%)	62.3%
29	Scenario 27 and Winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$21,235,916,604	(\$6,548,869,247)	(30.8%)	44.6%
30	Scenario 27 and all categorically exempt offers, winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$13,473,937,677	\$1,213,109,681	9.0%	(8.3%)

Part C Table 8 Scenario summary for 2025/2026 RPM Base Residual Auction: CT Reference Resource; 1.75 * Net CONE; Forward Net Revenue in VRR curve; 5.0 Percent Higher Forecasted Peak Load

Scenario	Scenario Description	Scenario Impact			
		RPM Revenue (\$ per Delivery Year)	RPM Revenue Change (\$ per Delivery Year)	Percent Change Scenario to Actual	Actual to Scenario
0	Actual results	\$14,687,047,358	NA	NA	NA
31	VRR curve based on higher of CT gross CONE and 1.75 times net CONE calculated using forward E&AS offset	\$26,772,578,885	(\$12,085,531,528)	(45.1%)	82.3%
32	Scenario 31 and RMR resources	\$27,101,099,782	(\$12,414,052,425)	(45.8%)	84.5%
33	Scenario 31 and Winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$28,188,304,298	(\$13,501,256,940)	(47.9%)	91.9%
34	Scenario 31 and all categorically exempt offers, winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$28,514,872,062	(\$13,827,824,704)	(48.5%)	94.1%

Part D Table 5 Scenario summary for 2025/2026 RPM

Base Residual Auction: CT Reference Resource; 1.50 * Net CONE; Forward Net Revenue in VRR curve; 2.5 Percent Higher Forecasted Peak Load

Scenario	Scenario Description	Scenario Impact			
		RPM Revenue (\$ per Delivery Year)	RPM Revenue Change (\$ per Delivery Year)	Percent Change Scenario to Actual	Actual to Scenario
0	Actual results	\$14,687,047,358	NA	NA	NA
47	VRR curve based on 1.50 times net CONE calculated using forward E&AS offset	\$14,992,263,281	(\$305,215,923)	(2.0%)	2.1%
48	Scenario 47 and RMR resources	\$12,233,162,290	\$2,453,885,067	20.1%	(16.7%)
49	Scenario 47 and Winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$12,724,537,456	\$1,962,509,901	15.4%	(13.4%)
50	Scenario 47 and all categorically exempt offers, winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$9,165,738,398	\$5,521,308,959	60.2%	(37.6%)

Part D Table 6 Scenario summary for 2025/2026 RPM

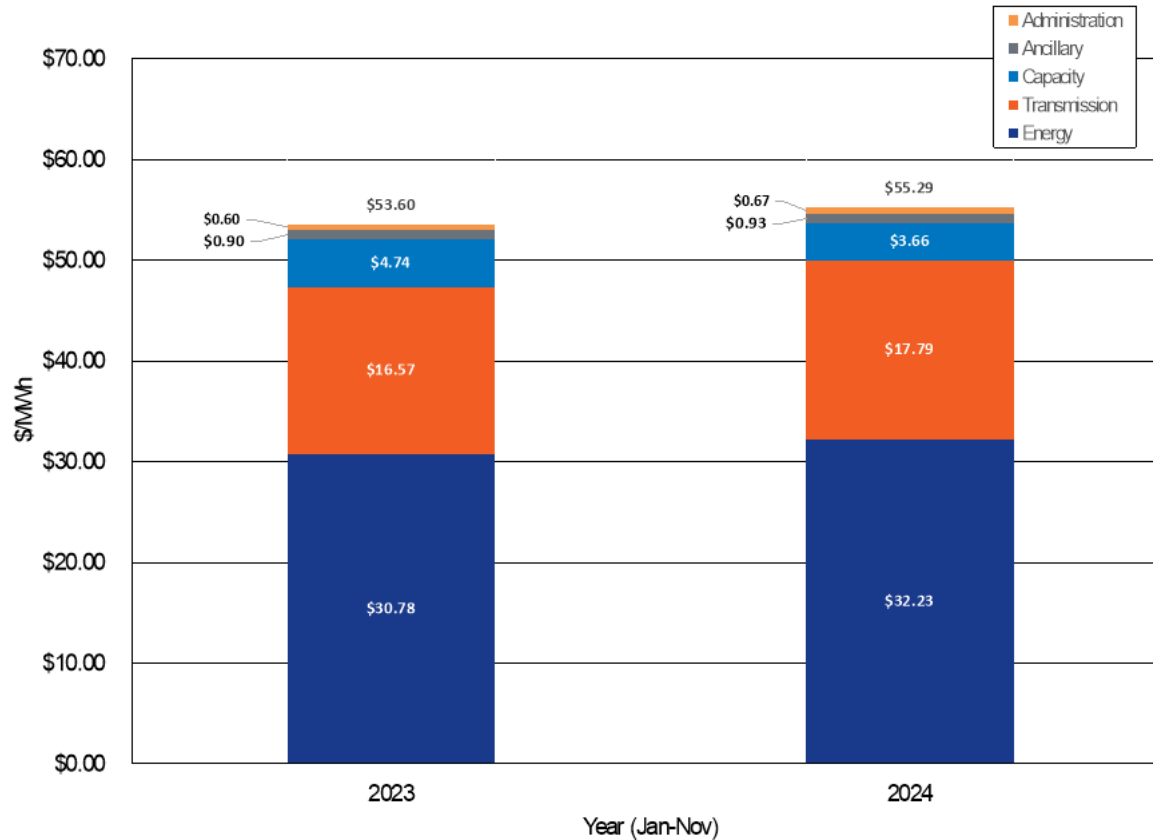
Base Residual Auction: CT Reference Resource; 1.50

* Net CONE; Forward Net Revenue in VRR curve; 5.0

Percent Higher Forecasted Peak Load

Scenario	Scenario Description	Scenario Impact			
		RPM Revenue (\$ per Delivery Year)	RPM Revenue Change (\$ per Delivery Year)	Percent Change Scenario to Actual	Actual to Scenario
0	Actual results	\$14,687,047,358	NA	NA	NA
51	VRR curve based on 1.50 times net CONE calculated using forward E&AS offset	\$16,667,694,486	(\$1,980,647,128)	(11.9%)	13.5%
52	Scenario 51 and RMR resources	\$16,872,370,463	(\$2,185,323,105)	(13.0%)	14.9%
53	Scenario 51 and Winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$17,549,723,556	(\$2,862,676,198)	(16.3%)	19.5%
54	Scenario 51 and all categorically exempt offers, winter ratings and IRM at 17.8 percent (same as BRA) and RMR resources	\$15,963,442,312	(\$1,276,394,955)	(8.0%)	8.7%

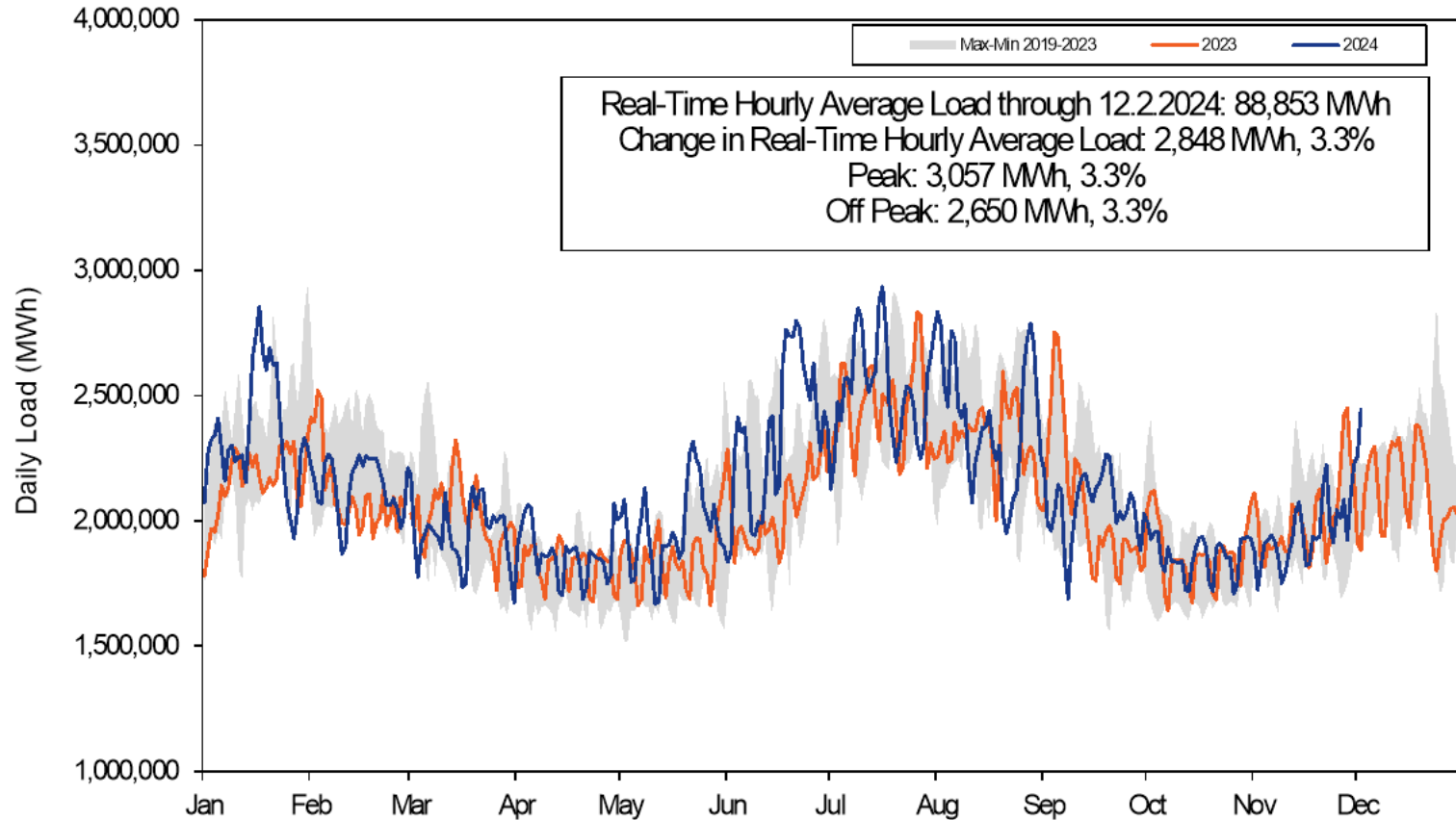
Total Cost of Wholesale Power



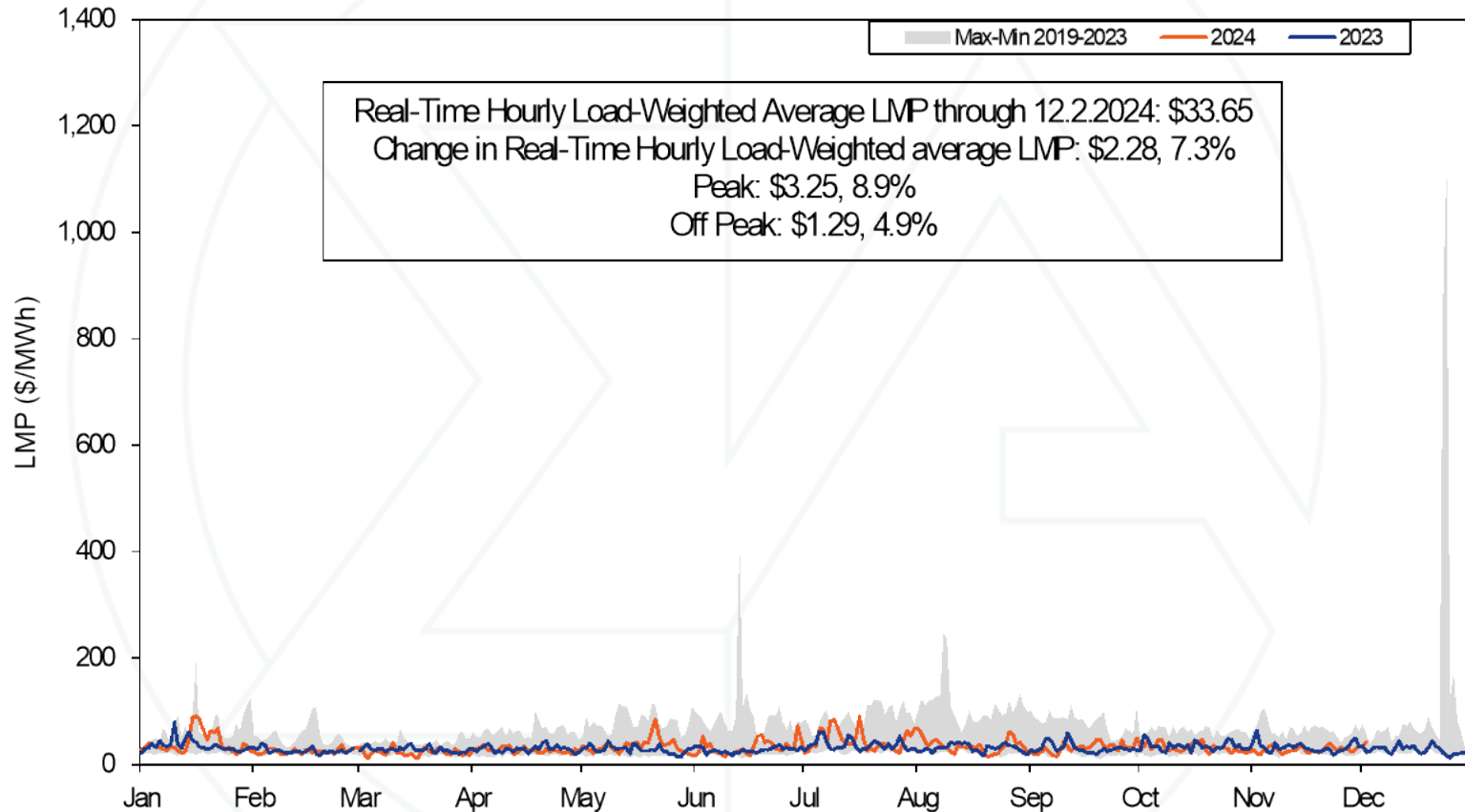
Total Cost of Wholesale Power

Category	2023 (Jan-Nov) \$/MWh	2023 (Jan-Nov) (\$ Millions)	2023 (Jan-Nov) Percent of Total	2024 (Jan-Nov) \$/MWh	2024 (Jan-Nov) (\$ Millions)	2024 (Jan-Nov) Percent of Total	Percent Change
Energy	\$30.78	\$19,368	57.4%	\$32.23	\$21,124	58.3%	4.7%
Day Ahead Energy	\$31.95	\$20,106	59.6%	\$33.13	\$21,712	59.9%	3.7%
Balancing Energy	\$0.46	\$287	0.9%	\$0.55	\$360	1.0%	20.5%
ARR Credits	(\$1.47)	(\$928)	(2.8%)	(\$1.28)	(\$841)	(2.3%)	(13.0%)
Self Scheduled FTR Credits	(\$0.43)	(\$270)	(0.8%)	(\$0.52)	(\$340)	(0.9%)	21.1%
Balancing Congestion	\$0.41	\$255	0.8%	\$0.38	\$251	0.7%	(5.5%)
Emergency Energy	\$0.00	\$0	0.0%	\$0.00	\$0	0.0%	0.0%
Inadvertent Energy	\$0.01	\$4	0.0%	\$0.01	\$9	0.0%	123.8%
Load Response - Energy	\$0.01	\$6	0.0%	\$0.01	\$10	0.0%	70.6%
Emergency Load Response	\$0.09	\$56	0.2%	\$0.00	\$0	0.0%	(100.0%)
Energy Uplift (Operating Reserves)	\$0.22	\$136	0.4%	\$0.34	\$224	0.6%	58.3%
Marginal Loss Surplus Allocation	(\$0.53)	(\$331)	(1.0%)	(\$0.45)	(\$292)	(0.8%)	(15.3%)
Market to Market Payments	\$0.08	\$48	0.1%	\$0.05	\$31	0.1%	(37.1%)
Capacity	\$4.74	\$2,981	8.8%	\$3.66	\$2,399	6.6%	(22.8%)
Capacity (Capacity Market and FRR)	\$4.63	\$2,914	8.6%	\$3.57	\$2,338	6.5%	(23.0%)
Capacity Part V (RMR)	\$0.11	\$66	0.2%	\$0.08	\$53	0.1%	(22.8%)
Load Response - Capacity	\$0.00	\$0	0.0%	\$0.01	\$7	0.0%	3,019.9%
Transmission	\$16.57	\$10,428	30.9%	\$17.79	\$11,662	32.2%	7.4%
Transmission Service Charges	\$14.15	\$8,902	26.4%	\$15.11	\$9,903	27.3%	6.8%
Transmission Enhancement Cost Recovery	\$2.34	\$1,474	4.4%	\$2.59	\$1,699	4.7%	10.6%
Transmission Owner (Schedule 1A)	\$0.08	\$52	0.2%	\$0.09	\$60	0.2%	10.7%
Transmission Seams Elimination Cost Assignment (SECA)	\$0.00	\$0	0.0%	\$0.00	\$0	0.0%	0.0%
Transmission Facility Charges	\$0.00	\$0	0.0%	\$0.00	\$0	0.0%	0.0%
Auxiliary	\$0.90	\$567	1.7%	\$0.93	\$611	1.7%	3.6%
Reactive	\$0.52	\$326	1.0%	\$0.49	\$320	0.9%	(5.6%)
Regulation	\$0.18	\$112	0.3%	\$0.23	\$153	0.4%	31.4%
Black Start	\$0.09	\$56	0.2%	\$0.10	\$63	0.2%	7.2%
Synchronized Reserves	\$0.10	\$64	0.2%	\$0.10	\$65	0.2%	(2.9%)
Secondary Reserves	\$0.00	\$1	0.0%	\$0.00	\$2	0.0%	74.0%
Non-Synchronized Reserves	\$0.01	\$8	0.0%	\$0.01	\$9	0.0%	4.9%
Day Ahead Scheduling Reserve (DASR)	\$0.00	\$0	0.0%	\$0.00	\$0	0.0%	0.0%
Administration	\$0.60	\$380	1.1%	\$0.67	\$441	1.2%	11.6%
PJM Administrative Fees	\$0.56	\$350	1.0%	\$0.62	\$409	1.1%	12.0%
NERC/RFC	\$0.04	\$24	0.1%	\$0.04	\$28	0.1%	8.8%
RTO Startup and Expansion	\$0.00	\$0	0.0%	\$0.00	\$0	0.0%	0.0%
Other	\$0.01	\$5	0.0%	\$0.01	\$5	0.0%	(7.8%)
Total Price	\$63.60	\$33,723	100.0%	\$65.29	\$36,237	100.0%	3.2%
Total Day Ahead Load	624,368			648,775			3.9%
Total Balancing Load	(4,843)			(6,675)			37.8%
Total Real Time Load	629,211			655,450			4.2%
Total Cost (\$ Billions)	\$33.72			\$36.24			7.5%

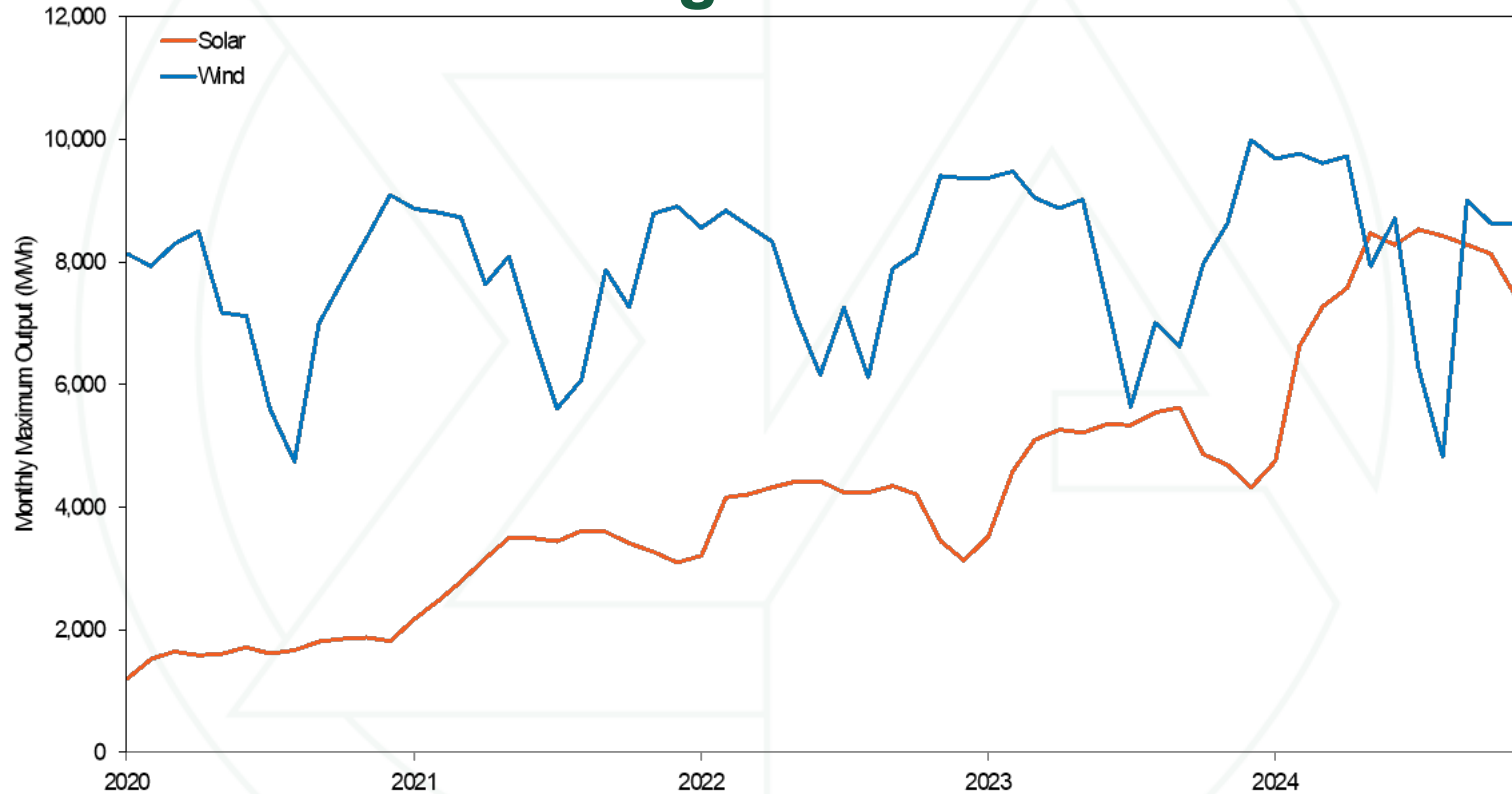
2024 YTD PJM Real-Time Daily Load



2024 YTD PJM Real-Time Daily LMP



Maximum Solar and Wind Hourly Output by Month through November 2024



Maximum Hourly Solar and Wind Output by Year

Solar Maximum Hourly Output					Wind Maximum Hourly Output			
Year	Maximum Hourly MWh	Change	Percent Change	Solar Percent of All Generation For The Year	Maximum Hourly MWh	Change	Percent Change	Wind Percent of All Generation For The Year
2020	1,879			2.1%	9,095			11.3%
2021	3,617	1,739	92.5%	3.0%	8,911	(184)	(2.0%)	9.2%
2022	4,429	812	22.4%	5.2%	9,402	491	5.5%	9.8%
2023	5,630	1,201	27.1%	5.9%	9,993	592	6.3%	9.9%
2024	8,532	2,901	51.5%	8.2%	9,768	(226)	(2.3%)	10.3%

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.**

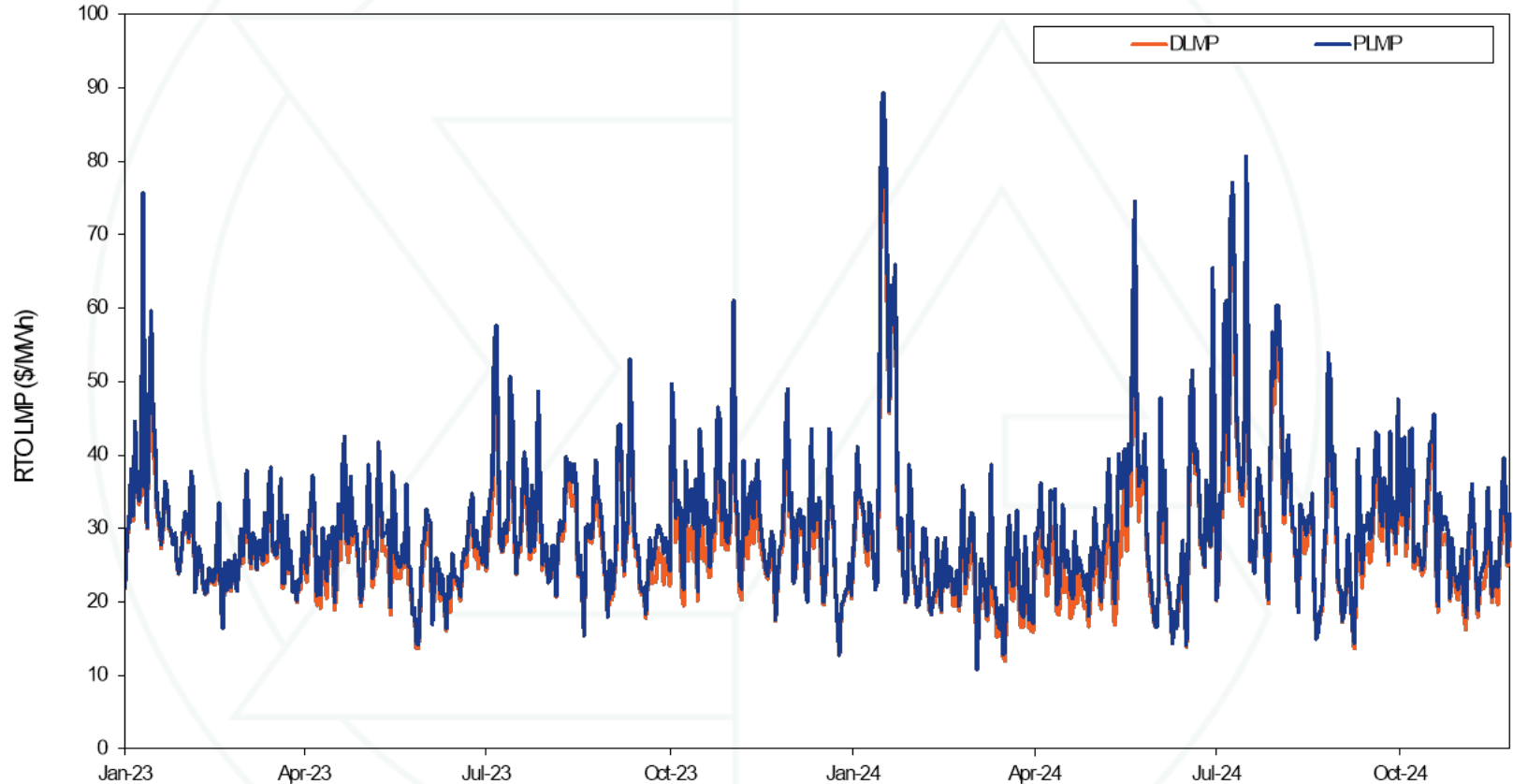
Fast Start Pricing: DLMP and PLMP

- **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**

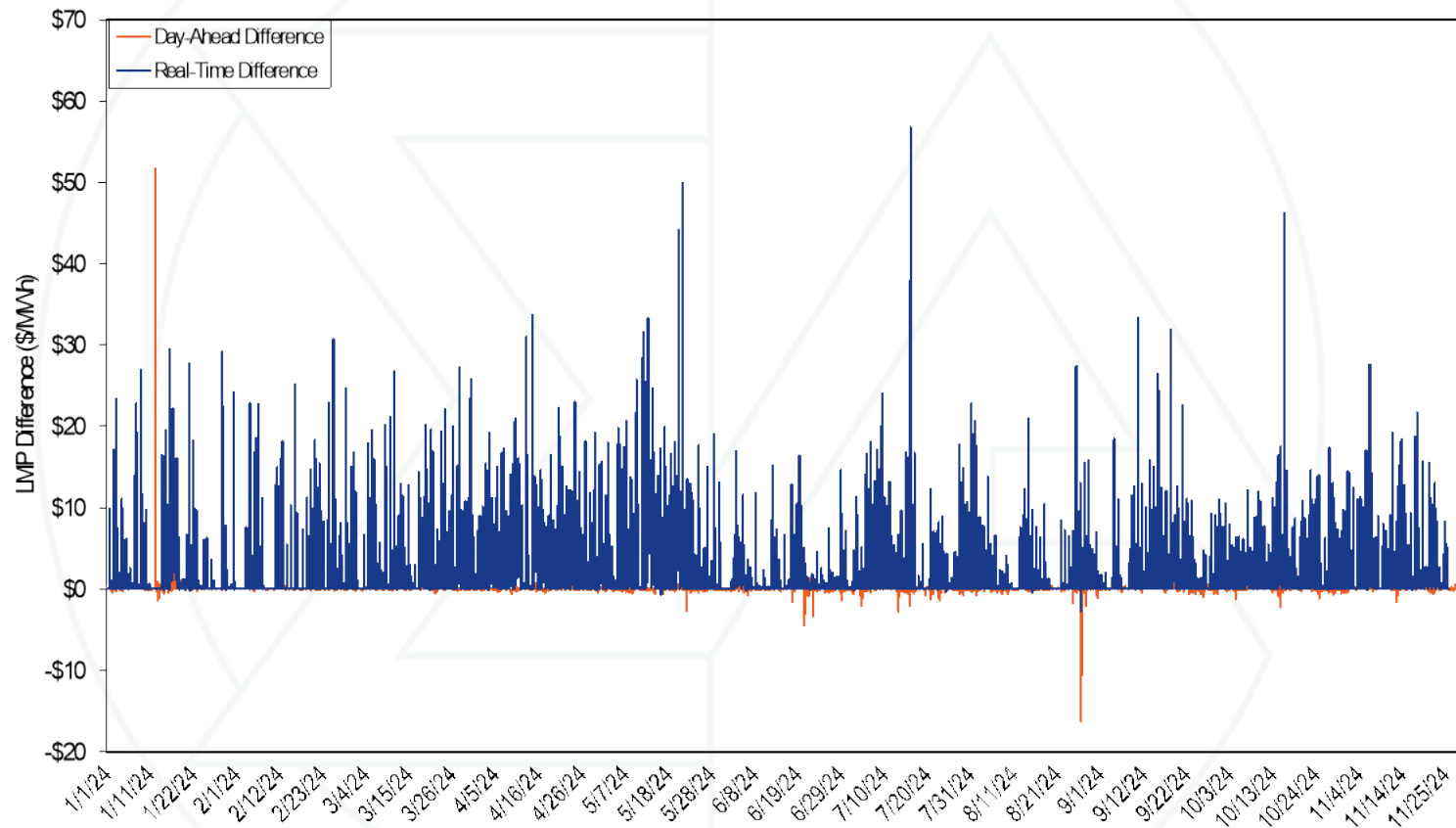
Monthly Average Load-Weighted DLMP and PLMP

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 - Nov	\$32.06	\$32.10	\$0.04	0.1%	\$29.14	\$31.20	\$2.06	7.0%
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	Aug	\$36.34	\$36.31	(\$0.03)	(0.1%)	\$34.37	\$36.29	\$1.92	5.6%
2024	Sep	\$30.63	\$30.77	\$0.14	0.4%	\$29.32	\$31.81	\$2.48	8.5%
2024	Oct	\$33.18	\$33.26	\$0.08	0.2%	\$29.85	\$31.87	\$2.02	6.8%
2024	Nov	\$29.58	\$29.62	\$0.04	0.1%	\$25.37	\$27.98	\$2.61	10.3%
2023	Jan - Nov	\$33.40	\$33.47	\$0.07	0.2%	\$31.09	\$33.63	\$2.54	8.2%

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-Nov	1.4%	0.5%	0.0%	2.0%	5.9%	1.2%	0.0%	7.2%
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	Aug	0.6%	0.5%	0.0%	1.1%	5.0%	1.0%	0.0%	6.0%
2024	Sep	1.0%	0.1%	0.0%	1.1%	7.1%	0.4%	0.0%	7.6%
2024	Oct	1.2%	0.1%	0.0%	1.3%	6.4%	1.3%	0.0%	7.7%
2024	Nov	1.3%	0.1%	0.0%	1.4%	7.6%	0.5%	0.0%	8.2%
2024	Jan-Nov	0.8%	0.3%	0.2%	1.3%	5.4%	0.8%	0.2%	6.3%

Fast Start Impacts: Zone Average Differences

Zone	2024 Jan - Nov							
	Day-Ahead				Real-Time			
	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
ACEC	\$25.32	\$25.36	\$0.04	0.2%	\$23.65	\$25.08	\$1.43	6.0%
AEP	\$30.87	\$30.91	\$0.05	0.2%	\$28.40	\$30.52	\$2.11	7.4%
APS	\$32.05	\$32.09	\$0.04	0.1%	\$29.19	\$31.40	\$2.20	7.5%
ATSI	\$30.91	\$30.93	\$0.02	0.1%	\$28.38	\$30.45	\$2.07	7.3%
BGE	\$38.94	\$39.00	\$0.05	0.1%	\$35.16	\$37.86	\$2.71	7.7%
COMED	\$26.10	\$26.15	\$0.05	0.2%	\$23.77	\$25.60	\$1.83	7.7%
DAY	\$32.27	\$32.32	\$0.05	0.2%	\$29.59	\$31.81	\$2.22	7.5%
DUKE	\$31.30	\$31.35	\$0.05	0.2%	\$28.63	\$30.76	\$2.13	7.4%
DOM	\$36.10	\$36.14	\$0.05	0.1%	\$33.34	\$35.74	\$2.40	7.2%
DPL	\$28.68	\$28.73	\$0.05	0.2%	\$26.21	\$28.68	\$2.47	9.4%
DUQ	\$30.84	\$30.88	\$0.04	0.1%	\$28.50	\$30.58	\$2.08	7.3%
EKPC	\$30.61	\$30.65	\$0.05	0.2%	\$28.37	\$30.48	\$2.10	7.4%
JCPLC	\$25.71	\$25.75	\$0.04	0.2%	\$24.07	\$25.57	\$1.49	6.2%
MEC	\$27.69	\$27.74	\$0.04	0.2%	\$25.33	\$27.10	\$1.76	7.0%
OVEC	\$30.00	\$30.05	\$0.05	0.2%	\$27.58	\$29.63	\$2.05	7.4%
PECO	\$24.60	\$24.64	\$0.04	0.2%	\$23.05	\$24.40	\$1.35	5.9%
PE	\$30.81	\$30.84	\$0.03	0.1%	\$28.25	\$30.27	\$2.02	7.1%
PEPCO	\$36.88	\$36.93	\$0.05	0.1%	\$33.17	\$35.69	\$2.51	7.6%
PPL	\$25.77	\$25.82	\$0.04	0.2%	\$23.80	\$25.40	\$1.60	6.7%
PSEG	\$25.92	\$25.96	\$0.04	0.2%	\$24.31	\$25.81	\$1.50	6.2%
REC	\$27.78	\$27.82	\$0.04	0.1%	\$25.90	\$27.50	\$1.59	6.2%

Fast Start Impacts: Hub Average Differences

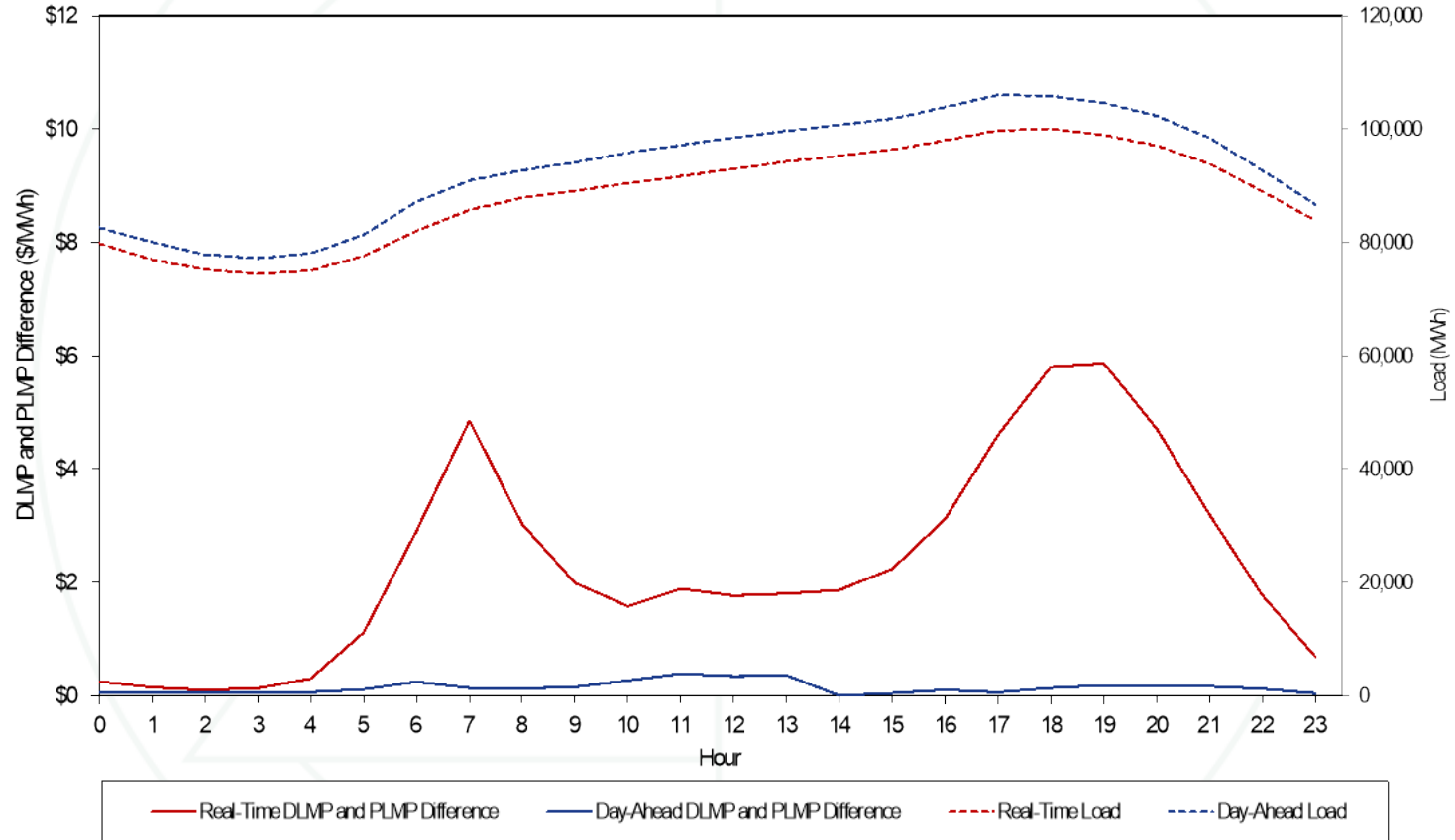
Hub	2024 Jan - Nov							
	Average DLMP	Day-Ahead		Percent Difference	Average DLMP	Real-Time		Percent Difference
		Average PLMP	Difference			Average PLMP	Difference	
AEP GEN HUB	\$29.83	\$29.87	\$0.03	0.1%	\$27.49	\$29.53	\$2.04	7.4%
AEP-DAYTON HUB	\$30.61	\$30.64	\$0.03	0.1%	\$28.13	\$30.21	\$2.08	7.4%
ATSI GEN HUB	\$30.41	\$30.44	\$0.03	0.1%	\$27.82	\$29.83	\$2.01	7.2%
CHICAGO GEN HUB	\$25.73	\$25.79	\$0.06	0.2%	\$23.44	\$25.24	\$1.80	7.7%
CHICAGO HUB	\$26.45	\$26.47	\$0.02	0.1%	\$24.23	\$26.05	\$1.82	7.5%
DOMINION HUB	\$33.68	\$33.71	\$0.03	0.1%	\$30.86	\$33.14	\$2.28	7.4%
EASTERN HUB	\$28.95	\$28.98	\$0.03	0.1%	\$26.37	\$28.86	\$2.49	9.4%
N ILLINOIS HUB	\$26.17	\$26.24	\$0.07	0.3%	\$24.12	\$25.94	\$1.82	7.5%
NEW JERSEY HUB	\$25.66	\$25.69	\$0.03	0.1%	\$24.08	\$25.54	\$1.47	6.1%
OHIO HUB	\$30.57	\$30.60	\$0.03	0.1%	\$28.09	\$30.16	\$2.07	7.4%
WEST INT HUB	\$31.76	\$31.78	\$0.02	0.1%	\$29.18	\$31.31	\$2.13	7.3%
WESTERN HUB	\$33.34	\$33.37	\$0.02	0.1%	\$30.24	\$32.49	\$2.25	7.4%

Zonal Real-Time PLMP-DLMP Difference Frequency

2024 Jan - Nov										
Zone	< (\$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-RT0	0.0%	0.0%	0.7%	51.8%	40.5%	5.0%	1.9%	0.1%	0.0%	0.0%
ACEC	0.0%	0.0%	4.5%	52.0%	38.6%	3.3%	1.4%	0.1%	0.0%	0.0%
AEP	0.0%	0.0%	1.3%	52.0%	39.2%	5.1%	2.2%	0.1%	0.0%	0.0%
APS	0.0%	0.0%	1.1%	51.9%	39.3%	5.1%	2.4%	0.1%	0.0%	0.0%
ATSI	0.0%	0.1%	1.7%	51.8%	39.1%	4.9%	2.2%	0.1%	0.0%	0.0%
BGE	0.0%	0.1%	2.4%	51.8%	36.0%	5.8%	3.5%	0.4%	0.1%	0.0%
COMED	0.0%	0.1%	3.5%	52.7%	37.5%	4.3%	1.8%	0.1%	0.0%	0.0%
DAY	0.0%	0.0%	1.4%	52.0%	38.6%	5.4%	2.5%	0.2%	0.0%	0.0%
DUKE	0.0%	0.0%	1.4%	52.0%	39.1%	5.1%	2.2%	0.1%	0.0%	0.0%
DOM	0.0%	0.1%	1.7%	51.9%	37.8%	5.4%	2.8%	0.2%	0.0%	0.0%
DPL	0.0%	0.1%	6.5%	52.0%	34.8%	3.2%	2.5%	0.5%	0.4%	0.0%
DUQ	0.0%	0.0%	1.5%	51.9%	39.5%	4.8%	2.1%	0.1%	0.0%	0.0%
EKPC	0.0%	0.0%	1.4%	51.9%	39.4%	5.0%	2.1%	0.1%	0.0%	0.0%
JCPLC	0.0%	0.0%	2.3%	52.1%	40.8%	3.3%	1.4%	0.1%	0.0%	0.0%
MEC	0.0%	0.1%	3.8%	51.9%	38.4%	4.0%	1.7%	0.1%	0.0%	0.0%
OVEC	0.0%	0.1%	1.6%	52.0%	39.1%	4.9%	2.1%	0.1%	0.0%	0.0%
PECO	0.0%	0.1%	6.0%	52.0%	37.1%	3.2%	1.4%	0.1%	0.0%	0.0%
PE	0.0%	0.1%	1.4%	51.7%	40.1%	4.7%	1.9%	0.1%	0.0%	0.0%
PEPCO	0.0%	0.1%	2.1%	51.9%	36.8%	5.7%	3.2%	0.3%	0.0%	0.0%
PPL	0.0%	0.1%	3.1%	51.9%	39.9%	3.6%	1.4%	0.1%	0.0%	0.0%
PSEG	0.0%	0.0%	2.2%	52.0%	40.9%	3.3%	1.4%	0.1%	0.0%	0.0%
REC	0.0%	0.1%	2.1%	51.8%	41.0%	3.5%	1.5%	0.1%	0.0%	0.0%



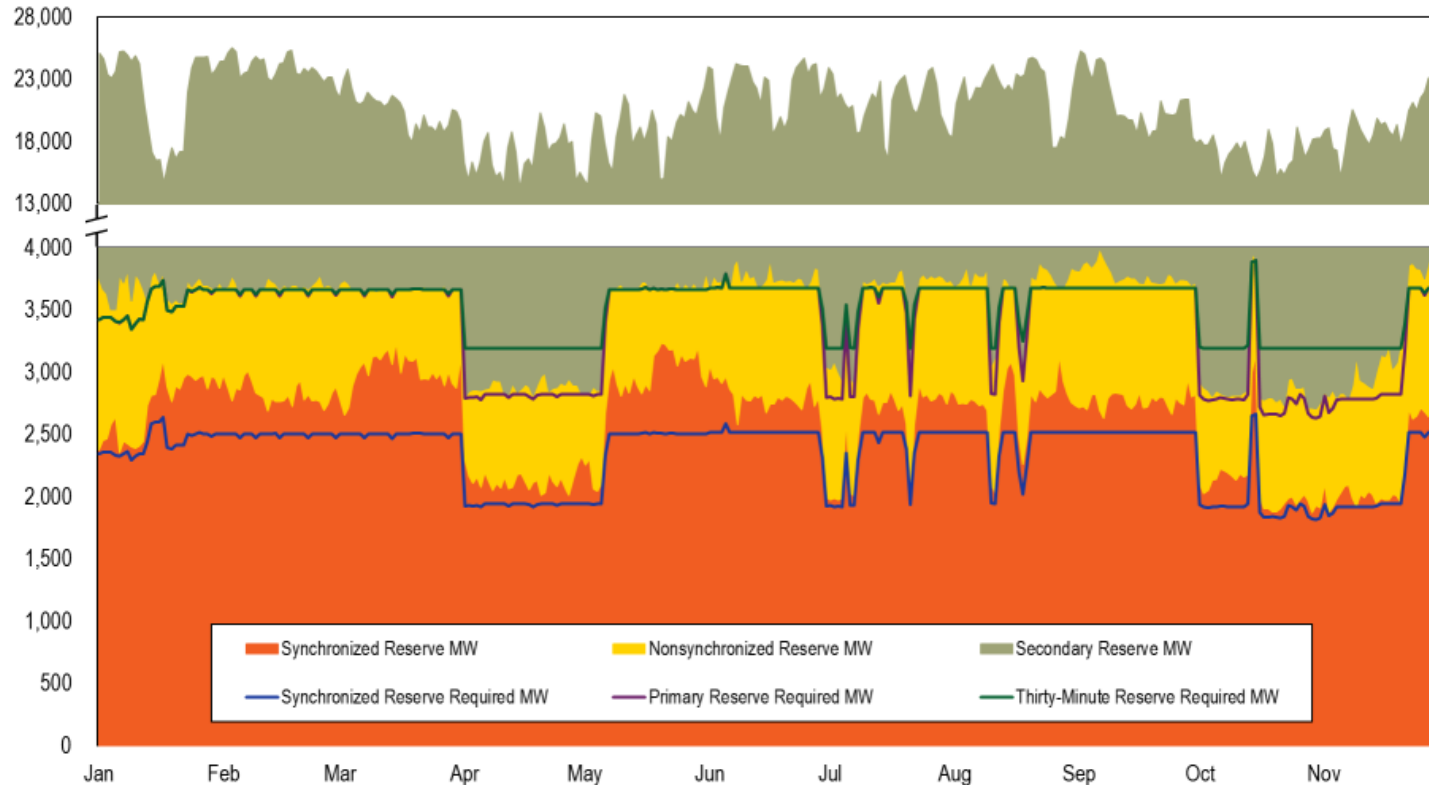
Hourly Average Load and LMP Difference



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%	\$26.71	\$44.99	\$18.28	68.5%
Sep	\$24.76	\$38.65	\$13.88	56.1%	\$24.53	\$39.42	\$14.89	60.7%
Oct	\$26.41	\$42.58	\$16.17	61.2%	\$26.60	\$36.49	\$9.89	37.2%
Nov	\$29.45	\$36.48	\$7.02	23.9%	\$23.00	\$33.24	\$10.25	44.6%
Dec	\$23.70	\$32.88	\$9.18	38.7%				

Real-Time Reserves and Requirements



Decreased requirements in April, July, August, October, and November are due to smaller units 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
2024	Aug	2,747	2,736	1,018	929	3,765	3,665	13,666	18,320	17,431	21,985
2024	Sep	2,848	2,771	1,031	1,011	3,879	3,782	12,609	17,454	16,488	21,236
2024	Oct	2,133	2,101	785	793	2,918	2,893	9,736	14,177	12,654	17,070
2024	Nov	2,227	2,203	1,072	1,049	3,299	3,251	11,257	16,134	14,556	19,385

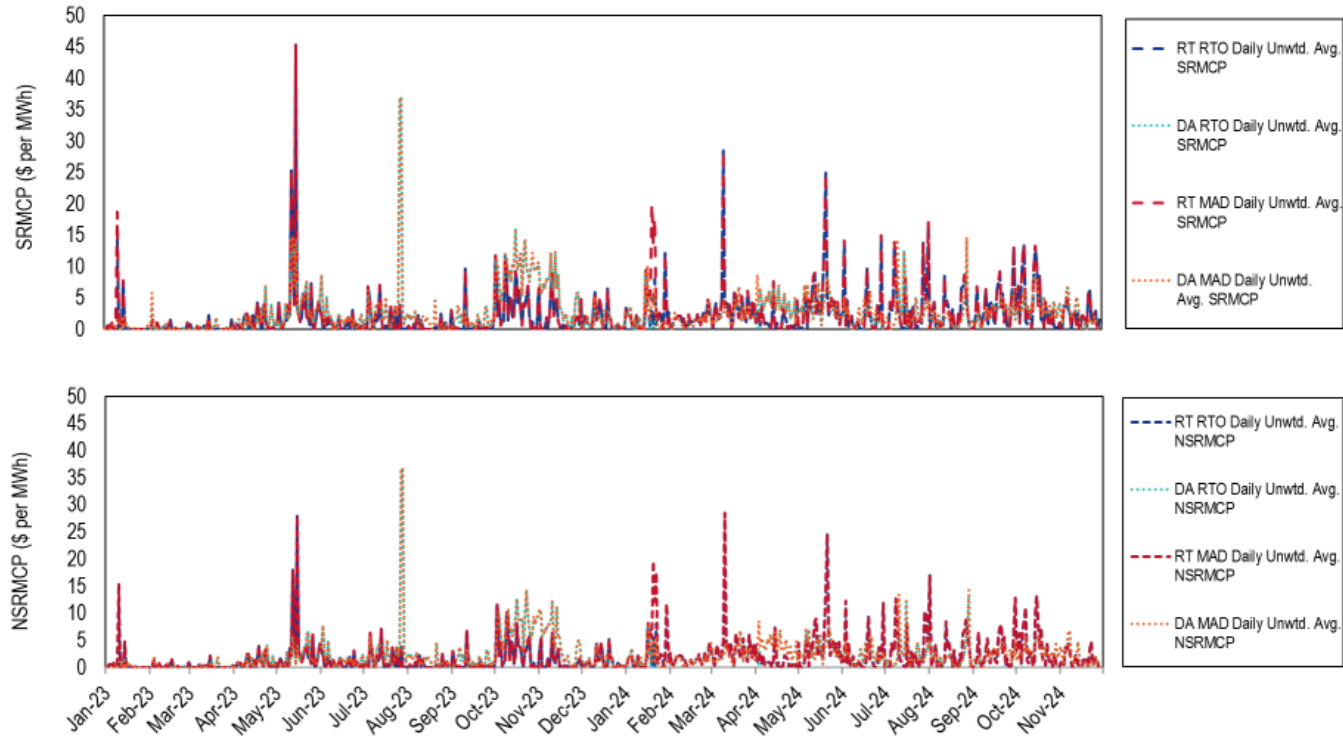
Day-Ahead & Real-Time MAD Reserve MW

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
2024	Aug	2,015	1,906	798	792	2,813	2,699	NA	NA	NA	NA
2024	Sep	1,989	1,883	794	840	2,783	2,723	NA	NA	NA	NA
2024	Oct	1,870	1,862	636	702	2,506	2,565	NA	NA	NA	NA
2024	Nov	1,734	1,685	773	860	2,507	2,546	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	\$1,144,741	\$246,452	\$159,892
2024	Feb	\$2,894,089	\$406,207	\$0	(\$98)	(\$224,893)	\$0	\$536,025	\$144,292	\$96,114
2024	Mar	\$5,930,989	\$907,106	\$0	(\$297,375)	(\$493,717)	\$0	\$1,078,487	\$265,668	\$129,812
2024	Apr	\$9,018,149	\$1,854,995	\$0	(\$907,004)	(\$145,771)	\$0	\$594,268	\$81,932	\$96,528
2024	May	\$9,477,497	\$1,236,498	\$0	(\$169,439)	(\$655,115)	\$0	\$1,260,078	\$575,064	\$289,740
2024	Jun	\$4,594,840	\$879,638	\$0	(\$602,073)	(\$184,066)	\$0	\$788,610	\$41,825	\$123,529
2024	Jul	\$5,994,640	\$1,271,008	\$0	\$88,604	(\$182,792)	\$0	\$1,400,608	\$42,317	\$311,806
2024	Aug	\$5,015,123	\$952,433	\$0	(\$203,403)	(\$143,830)	\$0	\$1,001,776	\$71,568	\$395,696
2024	Sep	\$5,792,899	\$1,072,480	\$0	(\$174,272)	(\$391,855)	\$0	\$913,531	\$267,027	\$114,300
2024	Oct	\$6,502,979	\$1,038,044	\$0	(\$238,832)	(\$128,961)	\$0	\$1,154,336	\$157,580	\$365,548
2024	Nov	\$3,503,209	\$695,733	\$0	\$23,756	(\$31,505)	\$0	\$600,313	\$74,935	\$45,482
Year	Month	Total Shortfall Charges			Total Credits					
		SR	NSR	SecR	SR	NSR	SecR			
2024	Jan	\$0	NA	\$0	\$5,046,280	(\$9,357)	\$159,892			
2024	Feb	\$19,515	NA	\$0	\$3,410,501	\$325,606	\$96,114			
2024	Mar	\$0	NA	\$0	\$6,712,102	\$679,056	\$129,812			
2024	Apr	\$0	NA	\$0	\$8,705,412	\$1,791,156	\$96,528			
2024	May	\$0	NA	\$0	\$10,568,136	\$1,156,446	\$289,740			
2024	Jun	\$0	NA	\$0	\$4,781,377	\$737,397	\$123,529			
2024	Jul	\$508,031	NA	\$0	\$6,975,821	\$1,130,532	\$311,806			
2024	Aug	\$22,653	NA	\$0	\$5,790,843	\$880,171	\$395,696			
2024	Sep	\$0	NA	\$0	\$6,532,157	\$947,653	\$114,300			
2024	Oct	\$0	NA	\$0	\$7,418,483	\$1,066,664	\$365,548			
2024	Nov	\$13,867	NA	\$0	\$4,113,411	\$739,163	\$45,482			

Reserve Prices: 2023 and 2024



- Higher prices in 2024 during winter storms and during intervals of shortage in March, May, June, July, and September. Higher prices in August correspond with hot weather alerts and spin events. Higher prices in October correspond with shortage pricing. Higher prices in November correspond with spin events and shortage pricing.

Monitoring Analytics, LLC

2621 Van Buren Avenue

Suite 160

Eagleview, PA

19403

(610) 271-8050

MA@monitoringanalytics.com

www.MonitoringAnalytics.com

