

Market Monitor Report

MC Webinar
July 27, 2022

IMM



Monitoring Analytics

PJM Response to SOM (Part 1)

PJM Response to 2021 SOM

- PJM's posted response to the 2021 State of the Market Report includes PJM's position on selected IMM recommendations.
- <https://pjm.com/-/media/library/reports-notices/state-of-the-market/20220613-pjm-narrative-response-to-imm-2021-som.ashx>

SOM: System Marginal Price Capping

- **The MMU recommends that PJM stop capping the system marginal price in RT SCED and instead limit the sum of violated reserve constraint shadow prices used in the LPC to \$1,700 per MWh.**
- **PJM asserts that this recommendation was superseded by market changes. It is not.**
- **The recommendation is still relevant.**
- **The MMU recommends that PJM change its capping method in RT SCED and LPC regardless of the new reserve products.**

SOM: Spin Event ORDCs

- **The MMU recommends that PJM adjust the ORDCs during spin events to reduce the reserve requirement for synchronized and primary reserves by the amount of the reserves deployed.**
- **PJM asserts that this recommendation inconsistent with NERC requirements.**
- **PJM does not support the assertion.**
- **The MMU recommendation is consistent with practices in other RTOs. NERC defines a recovery period for reserves.**

SOM: Flexible Parameters

- **The MMU recommends, in order to ensure effective market power mitigation and to ensure that capacity resources meet their obligations to be flexible, that capacity resources be required to use flexible parameters in all offers at all times.**
- **PJM disagrees. PJM argues that capacity resources do not have a broad obligation to be flexible and that requiring flexible parameters at all times leads to less efficient operational/investment signals.**

SOM: Flexible Parameters

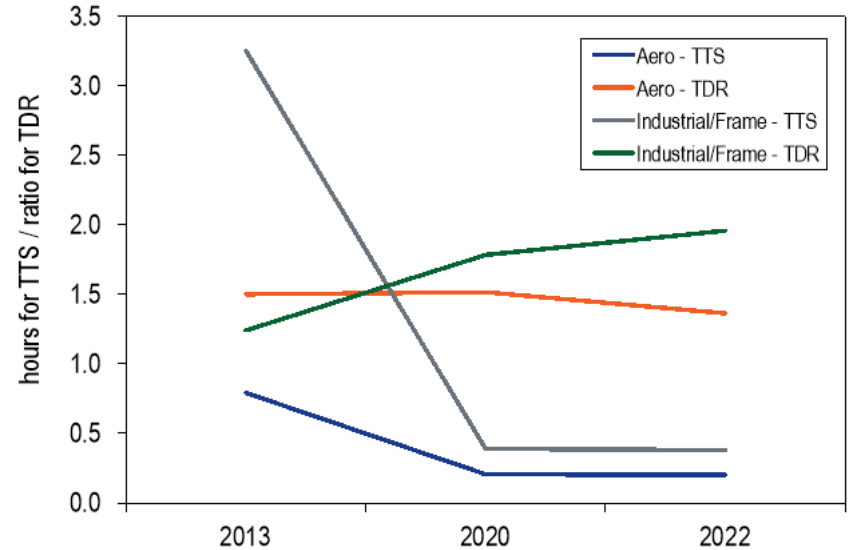
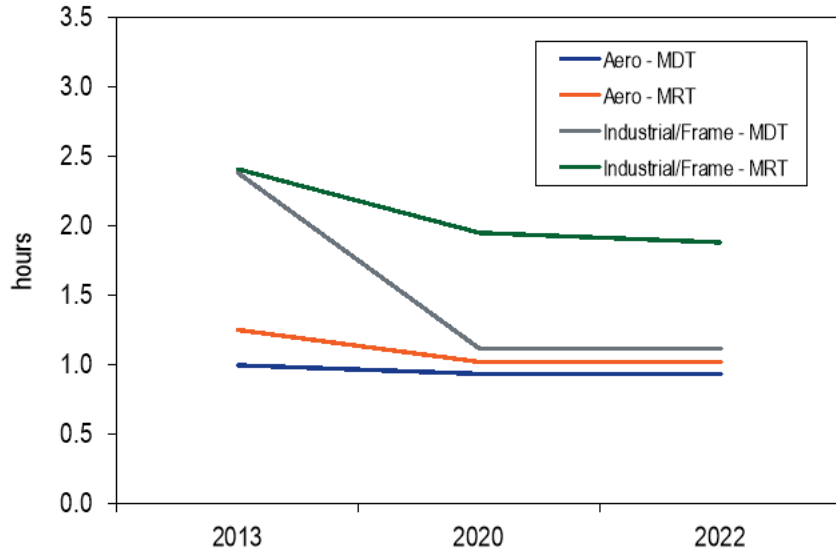
- **PJM argues that, in theory, incentives (explicit compensation for flexibility) is a more effective approach than requiring flexibility.**
- **There were two reforms that addressed flexibility requirements and compensation.**
 - **Capacity Performance**
 - **Fast Start**
- **Explicit requirements (CP) have resulted in more actual changes in behavior than have increases in compensation (Fast Start).**

SOM: Flexible Parameters

- **Pre CP, the data is from July 1, 2013.**
- **For CP, the data is from July 1, 2020.**
- **For Fast Start, the data is from July 1, 2022.**

SOM: Flexible Parameters

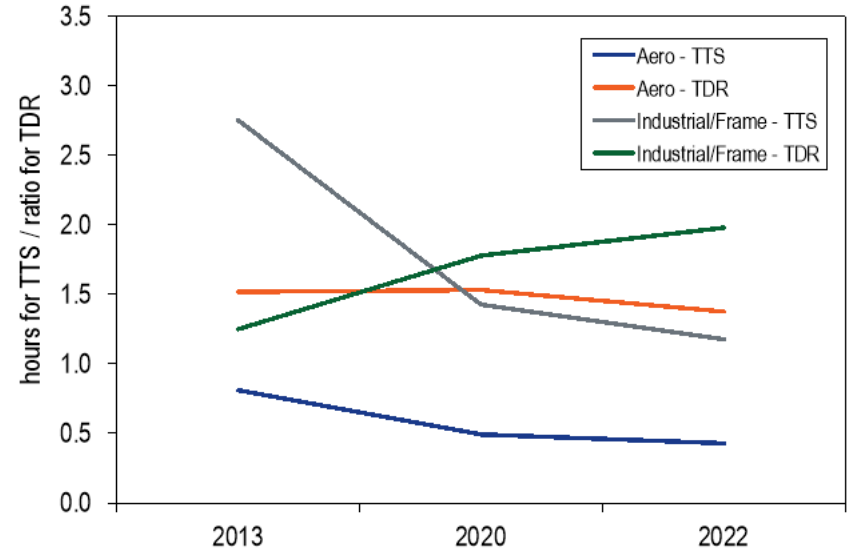
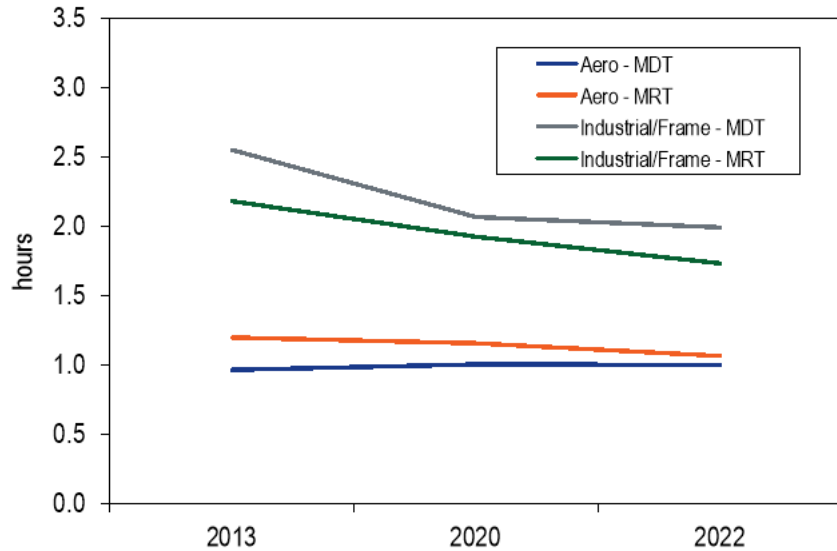
- **CT parameters in cost offers.**
 - **MRT excludes gas related exceptions.**



MRT: Min run time
TTS: Time to start (start plus notification time)
TDR: Turn down ratio (Eco Max / Eco Min)

SOM: Flexible Parameters

- **CT parameters in price offers.**
 - **MRT excludes gas related exceptions.**



MDT: Min down time
MRT: Min run time
TTS: Time to start (start plus notification time)
TDR: Turn down ratio (Eco Max / Eco Min)

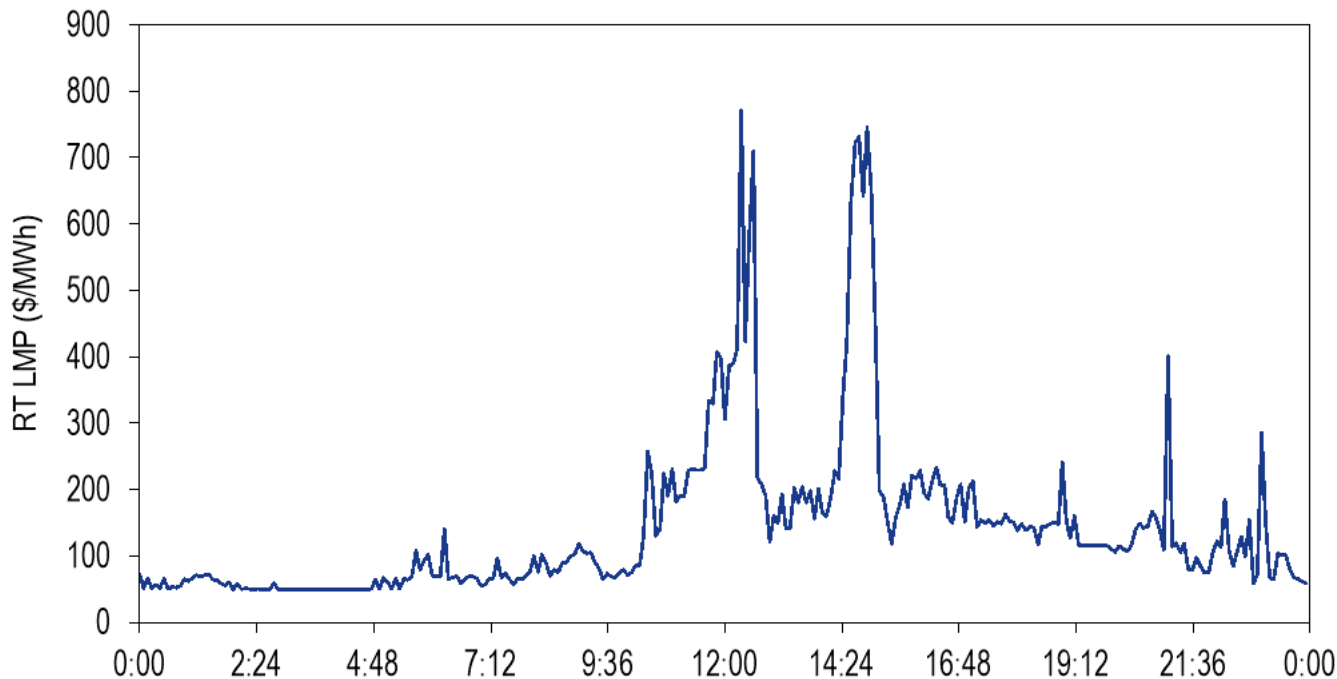
SOM Flexible Parameters

- **PJM does not discuss the disincentives to flexibility embedded in current uplift rules.**
- **When PJM pays uplift for units that are not following dispatch, there is a disincentive to flexibility.**

May 11 Prices in ComEd

May 11 – ComEd High Prices

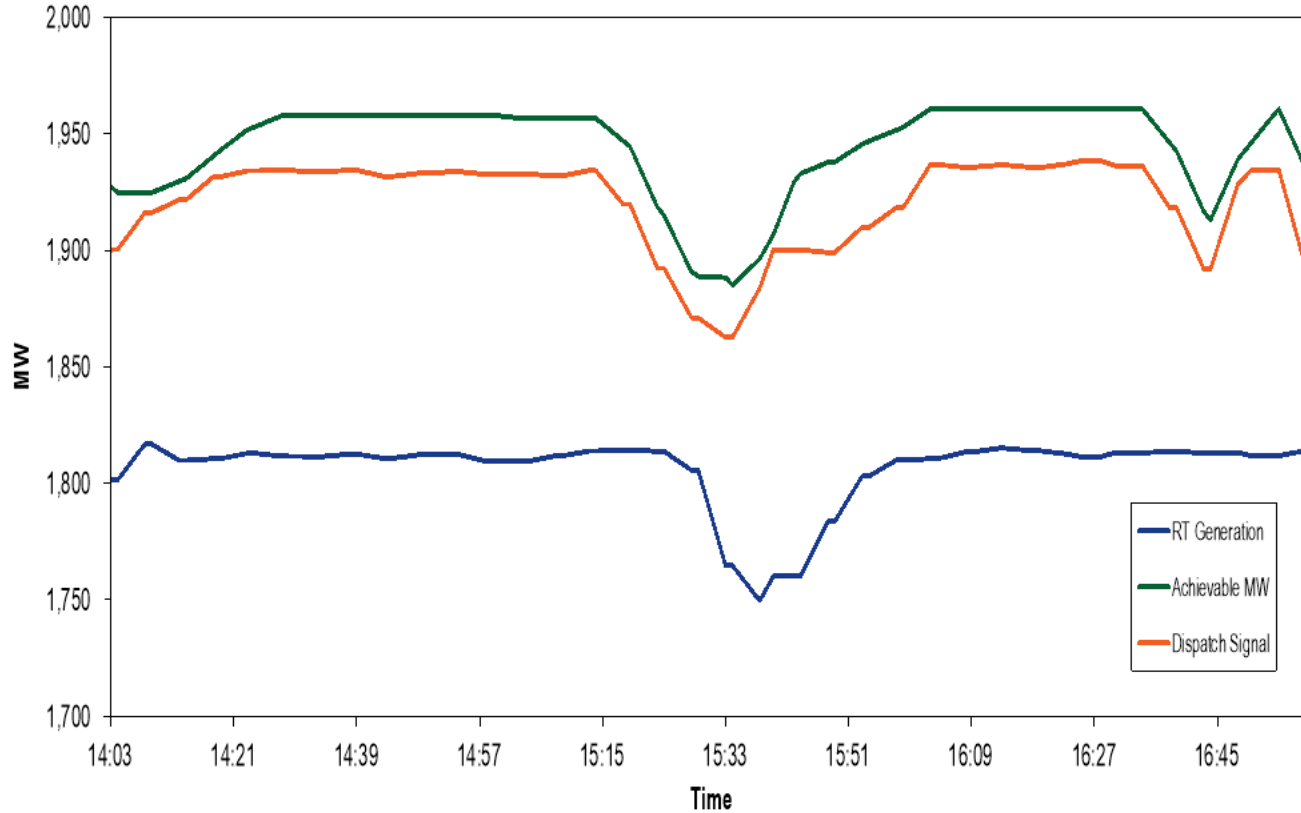
- On May 11, 2022, unexpected hot weather in ComEd resulted in high real-time LMPs.



May 11 – ComEd High Prices

- **The unexpected change in ambient conditions affected load levels, wind generation and thermal generation.**
- **The high prices were in part a result of triggering the transmission constraint penalty factor based on PJM's use of a constraint limit below the actual line limit.**
- **The issues were compounded by the failure to perform of several units.**
- **PJM expected about 140 MW more from 17 different units.**

May 11 – ComEd High Prices

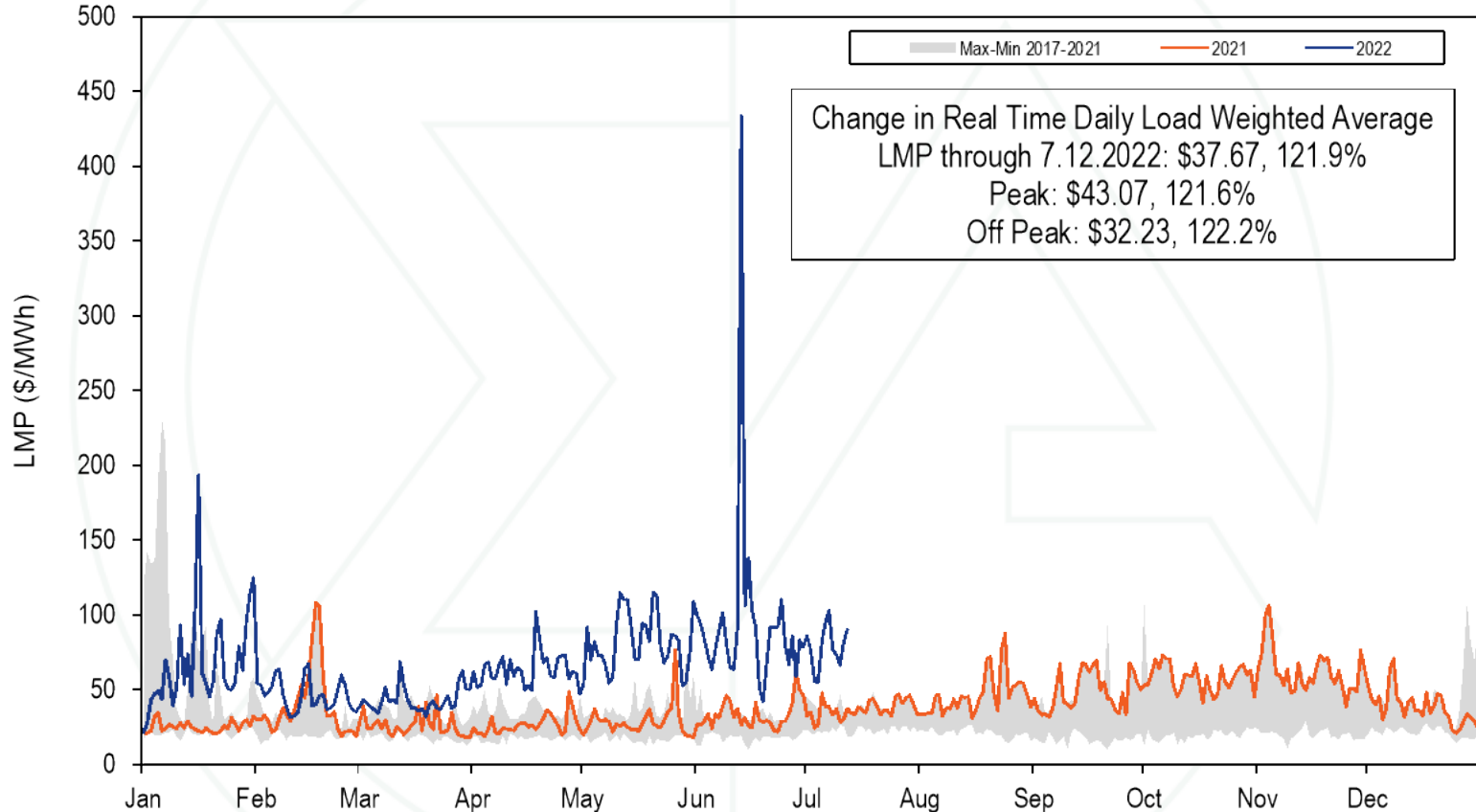


May 11 – ComEd High Prices

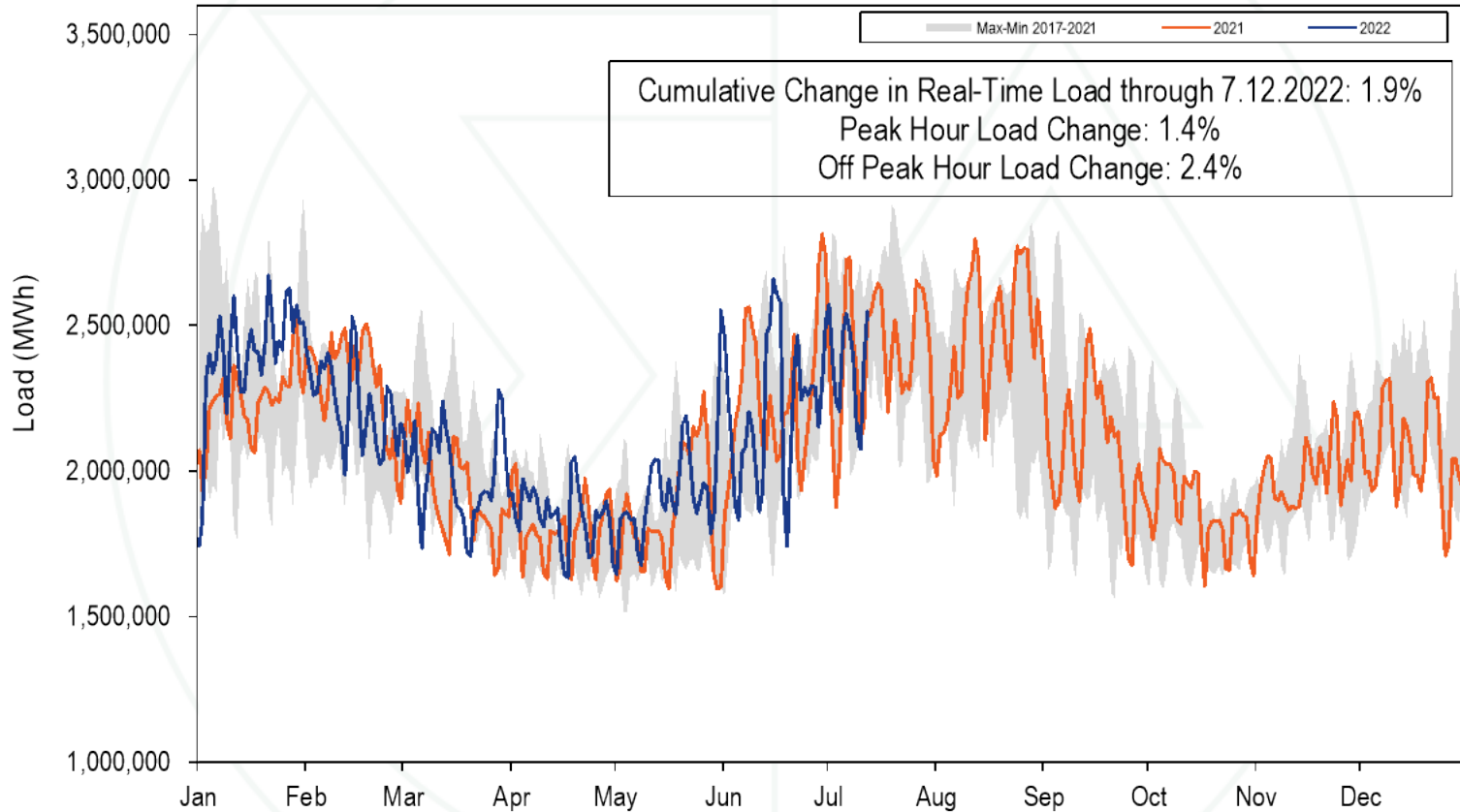
- **Some units failed to update eco max values based on current ambient conditions.**
- **Some units failed to reflect derates due to equipment issues.**
- **Differences in load due to weather forecast errors is expected.**
- **Failure to update units' ratings in real time based on real time conditions is not expected or acceptable.**
- **Generators are required to maintain accurate data.**
- **Bad data leads to inefficient market outcomes.**
- **This is a broader issue than May 11 example.**

Price Data/Fast Start Pricing Data

2022 YTD PJM Real-Time LMP



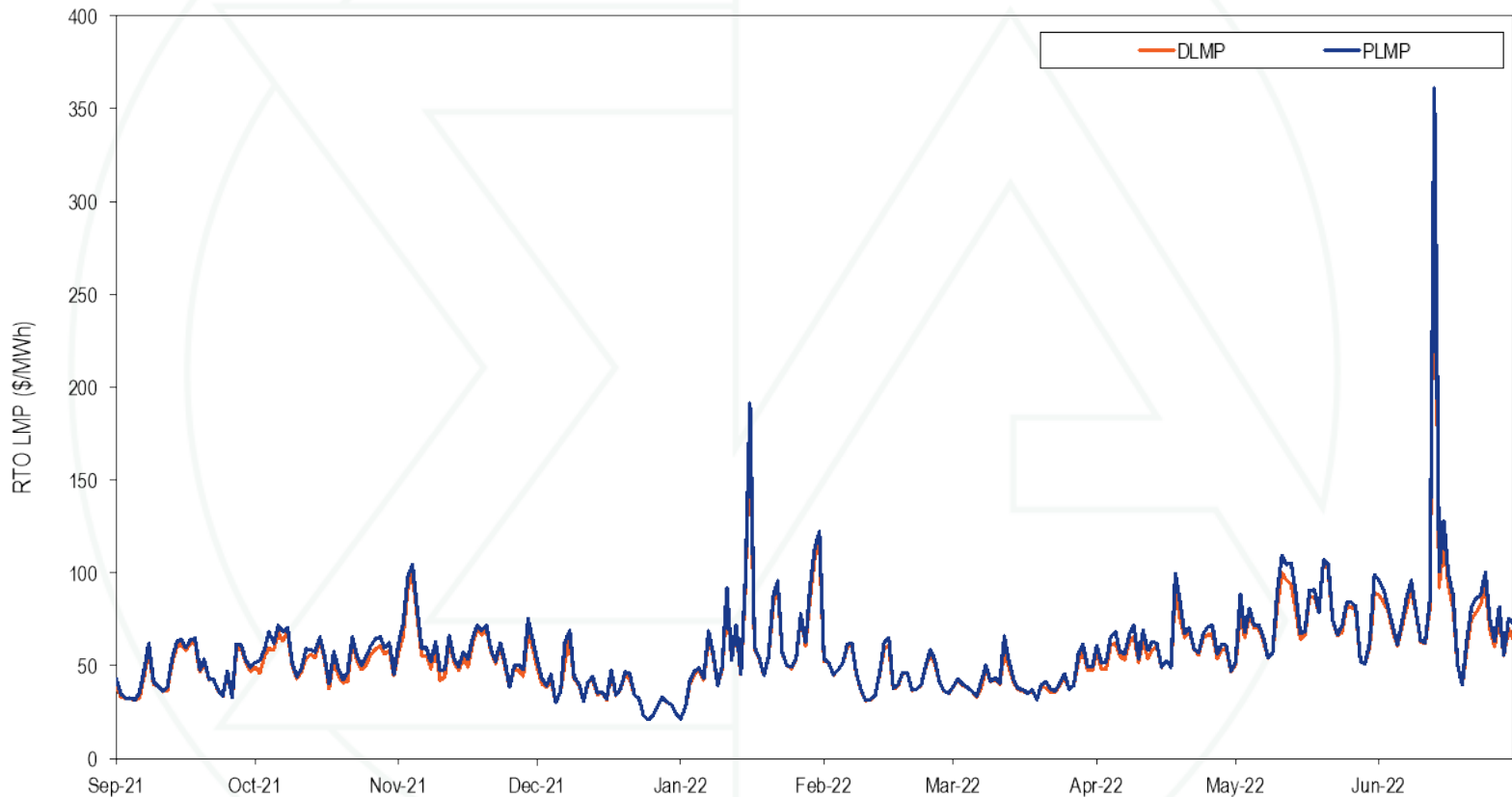
2022 YTD PJM Real-Time Daily Load



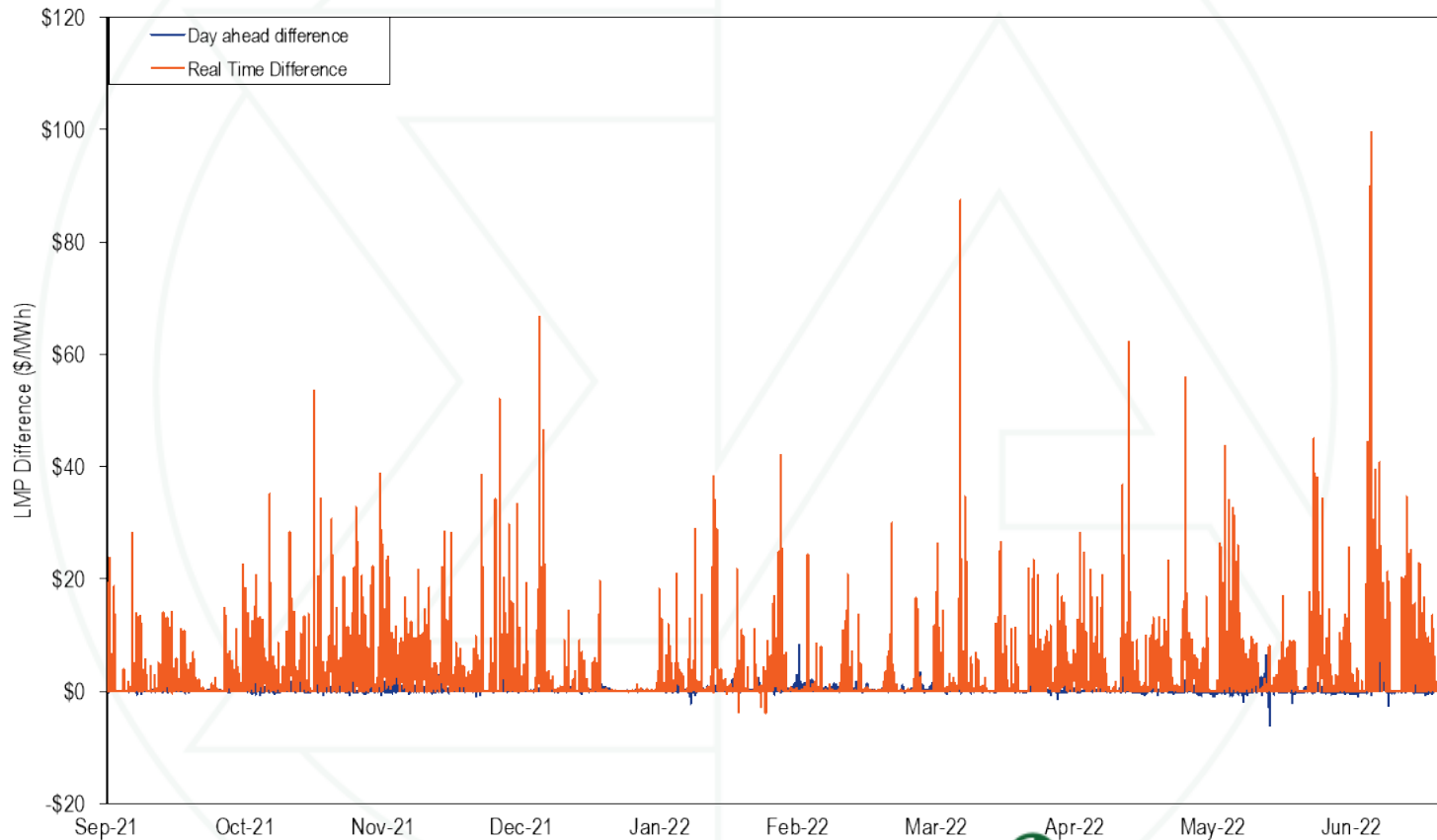
Monthly Average Load-Weighted DLMP and PLMP

Year	Month	Day-Ahead Load-Weighted Average				Real-Time Load-Weighted Average			
		DLMP	PLMP	Difference	Percent Difference	DLMP	PLMP	Difference	Percent Difference
2021	Sep	\$46.00	\$46.14	\$0.13	0.3%	\$47.73	\$49.63	\$1.90	4.0%
2021	Oct	\$57.86	\$57.98	\$0.12	0.2%	\$54.53	\$58.42	\$3.89	7.1%
2021	Nov	\$60.76	\$61.00	\$0.24	0.4%	\$59.27	\$63.01	\$3.74	6.3%
2021	Dec	\$37.74	\$37.85	\$0.11	0.3%	\$37.37	\$38.92	\$1.55	4.2%
2021	Sep - Dec	\$50.30	\$50.46	\$0.15	0.3%	\$49.47	\$52.20	\$2.73	5.5%
2022	Jan	\$63.93	\$64.15	\$0.22	0.3%	\$66.43	\$69.06	\$2.64	4.0%
2022	Feb	\$49.75	\$50.13	\$0.39	0.8%	\$45.93	\$46.76	\$0.83	1.8%
2022	Mar	\$45.15	\$45.40	\$0.25	0.6%	\$41.83	\$43.56	\$1.73	4.1%
2022	Apr	\$64.22	\$64.30	\$0.08	0.1%	\$60.38	\$63.91	\$3.52	5.8%
2022	May	\$82.73	\$82.79	\$0.06	0.1%	\$79.04	\$83.16	\$4.12	5.2%
2022	Jun	\$89.64	\$89.93	\$0.29	0.3%	\$91.44	\$97.89	\$6.46	7.1%
2022	Jan - Jun	\$66.01	\$66.23	\$0.22	0.3%	\$64.55	\$67.77	\$3.22	5.0%

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
2021	Sep	2.2%	0.8%	0.0%	3.0%	6.7%	1.3%	0.0%	8.1%
2021	Oct	3.2%	1.4%	0.0%	4.6%	11.1%	2.1%	0.0%	13.3%
2021	Nov	3.2%	0.3%	0.0%	3.5%	11.3%	0.6%	0.0%	11.9%
2021	Dec	1.4%	0.3%	0.2%	1.8%	4.4%	0.6%	0.1%	5.2%
2022	Jan	1.3%	0.3%	0.2%	1.8%	5.0%	0.9%	0.2%	6.2%
2022	Feb	0.6%	0.2%	0.3%	1.2%	3.3%	0.5%	0.3%	4.0%
2022	Mar	0.5%	0.2%	0.4%	1.1%	3.5%	0.5%	0.4%	4.4%
2022	Apr	0.9%	0.1%	0.1%	1.2%	4.6%	0.3%	0.1%	5.0%
2022	May	1.6%	0.8%	0.1%	2.5%	7.0%	1.3%	0.1%	8.3%
2022	Jun	2.3%	0.3%	0.1%	2.6%	9.3%	0.8%	0.1%	10.2%

Fast Start Impacts: Zonal Average Differences

Sep 2021 - Jun 2022								
Zone	Day-Ahead				Real-Time			
	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
ACEC	\$49.04	\$49.17	\$0.13	0.3%	\$48.62	\$50.80	\$2.19	4.5%
AEP	\$58.11	\$58.30	\$0.19	0.3%	\$55.79	\$58.91	\$3.12	5.6%
APS	\$59.35	\$59.55	\$0.20	0.3%	\$56.98	\$60.09	\$3.12	5.5%
ATSI	\$57.78	\$57.96	\$0.19	0.3%	\$54.94	\$57.98	\$3.03	5.5%
BGE	\$67.09	\$67.29	\$0.20	0.3%	\$64.57	\$68.35	\$3.78	5.9%
COMED	\$49.21	\$49.39	\$0.17	0.4%	\$46.29	\$49.31	\$3.02	6.5%
DAY	\$60.32	\$60.52	\$0.19	0.3%	\$57.93	\$61.12	\$3.18	5.5%
DUKE	\$59.23	\$59.42	\$0.19	0.3%	\$56.29	\$59.40	\$3.11	5.5%
DOM	\$66.97	\$67.13	\$0.16	0.2%	\$67.92	\$71.44	\$3.52	5.2%
DPL	\$53.10	\$53.27	\$0.17	0.3%	\$52.08	\$54.93	\$2.85	5.5%
DUQ	\$56.72	\$56.90	\$0.18	0.3%	\$54.06	\$57.06	\$3.00	5.6%
EKPC	\$58.96	\$59.15	\$0.19	0.3%	\$56.63	\$59.73	\$3.10	5.5%
JCPLC	\$51.06	\$51.20	\$0.14	0.3%	\$50.44	\$52.89	\$2.45	4.9%
MEC	\$59.16	\$59.31	\$0.15	0.3%	\$56.84	\$59.74	\$2.89	5.1%
OVEC	\$57.23	\$57.41	\$0.19	0.3%	\$54.87	\$57.91	\$3.03	5.5%
PECO	\$48.66	\$48.79	\$0.13	0.3%	\$48.13	\$50.31	\$2.17	4.5%
PE	\$57.46	\$57.65	\$0.18	0.3%	\$54.54	\$57.27	\$2.73	5.0%
PEPCO	\$65.21	\$65.40	\$0.20	0.3%	\$63.08	\$66.72	\$3.64	5.8%
PPL	\$54.15	\$54.30	\$0.15	0.3%	\$52.01	\$54.60	\$2.59	5.0%
PSEG	\$52.00	\$52.14	\$0.14	0.3%	\$51.73	\$54.14	\$2.41	4.7%
REC	\$54.58	\$54.71	\$0.14	0.3%	\$53.89	\$56.39	\$2.50	4.6%

Fast Start Impacts: Hub Average Differences

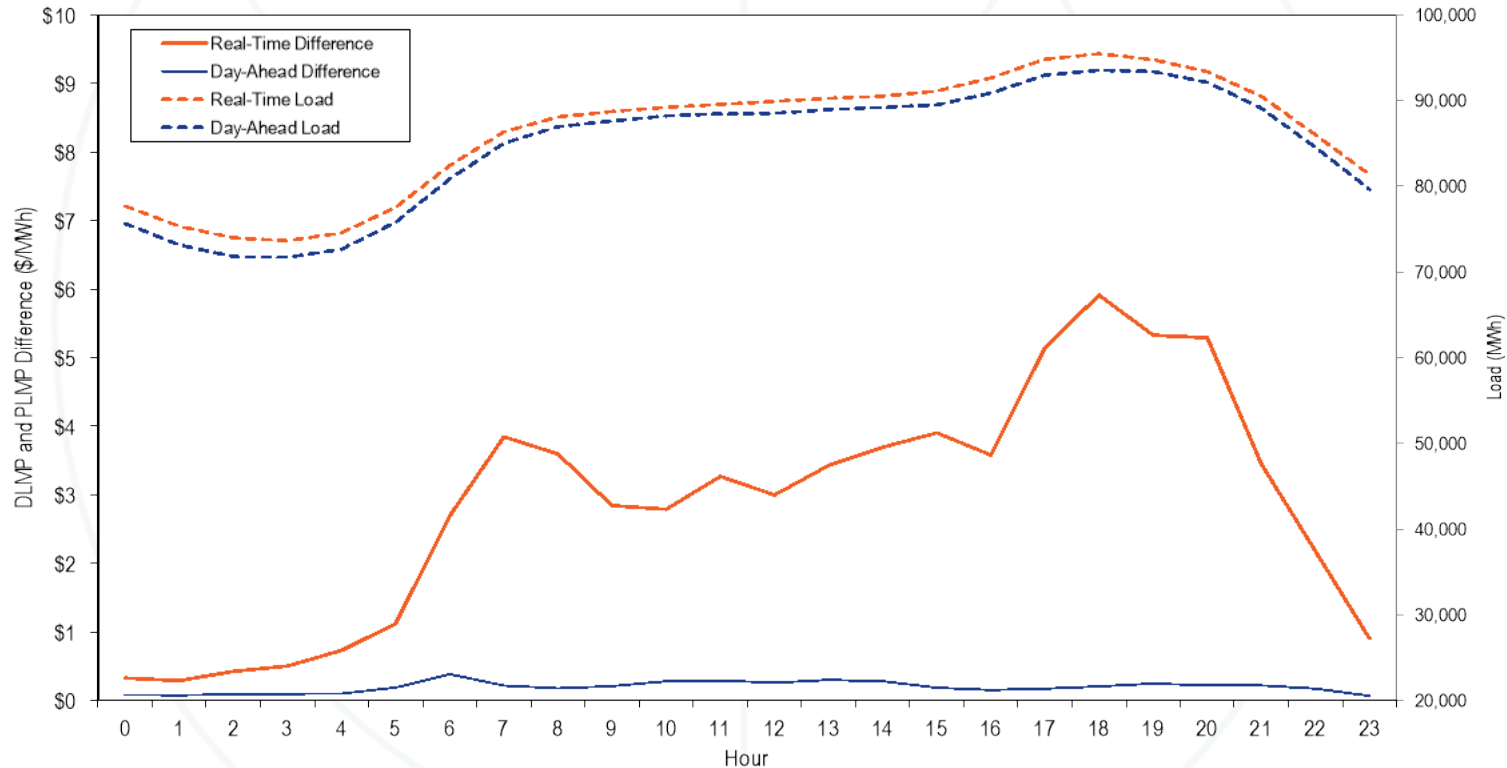
Sep 2021 - Jun 2022

Hub	Day-Ahead				Real-Time			
	Average DLMP	Average PLMP	Difference	Difference Percent	Average DLMP	Average PLMP	Difference	Difference Percent
AEP GEN HUB	\$56.83	\$57.01	\$0.18	0.3%	\$54.24	\$56.82	\$2.57	4.7%
AEP-DAYTON HUB	\$57.51	\$57.70	\$0.19	0.3%	\$54.87	\$57.53	\$2.66	4.8%
ATSI GEN HUB	\$56.77	\$56.96	\$0.18	0.3%	\$53.77	\$56.34	\$2.57	4.8%
CHICAGO GEN HUB	\$48.45	\$48.62	\$0.17	0.4%	\$45.31	\$47.89	\$2.59	5.7%
CHICAGO HUB	\$49.49	\$49.66	\$0.17	0.4%	\$46.51	\$49.15	\$2.63	5.7%
DOMINION HUB	\$62.82	\$63.00	\$0.18	0.3%	\$61.58	\$64.45	\$2.87	4.7%
EASTERN HUB	\$52.83	\$53.01	\$0.18	0.3%	\$51.69	\$54.35	\$2.66	5.1%
N ILLINOIS HUB	\$49.13	\$49.31	\$0.17	0.4%	\$46.21	\$48.80	\$2.60	5.6%
NEW JERSEY HUB	\$51.15	\$51.29	\$0.14	0.3%	\$50.73	\$52.86	\$2.13	4.2%
OHIO HUB	\$57.33	\$57.52	\$0.19	0.3%	\$54.58	\$57.25	\$2.67	4.9%
WEST INT HUB	\$58.69	\$58.88	\$0.19	0.3%	\$56.40	\$59.07	\$2.68	4.7%
WESTERN HUB	\$60.52	\$60.71	\$0.19	0.3%	\$57.54	\$60.23	\$2.69	4.7%

Zonal PLMP-DLMP Difference Frequency

Sep 2021 - Jun 2022										
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-RTO	0.0%	0.7%	0.0%	0.6%	50.4%	41.2%	4.6%	2.1%	0.3%	0.1%
ACEC	0.0%	0.7%	0.3%	7.0%	50.9%	36.0%	3.1%	1.6%	0.3%	0.1%
AEP	0.0%	0.7%	0.0%	0.8%	50.6%	40.8%	4.6%	2.2%	0.3%	0.1%
APS	0.0%	0.7%	0.0%	0.8%	50.6%	40.4%	4.7%	2.3%	0.3%	0.1%
ATSI	0.0%	0.7%	0.0%	1.0%	50.5%	40.9%	4.3%	2.1%	0.3%	0.1%
BGE	0.0%	0.7%	0.1%	2.2%	50.5%	37.3%	5.3%	3.1%	0.6%	0.1%
COMED	0.0%	0.7%	0.1%	2.1%	50.8%	39.6%	4.2%	2.1%	0.3%	0.1%
DAY	0.0%	0.7%	0.0%	0.9%	50.6%	40.4%	4.6%	2.3%	0.4%	0.1%
DUKE	0.0%	0.7%	0.0%	0.9%	50.6%	40.6%	4.5%	2.2%	0.3%	0.1%
DOM	0.0%	0.7%	0.1%	1.6%	50.7%	38.6%	5.0%	2.7%	0.5%	0.1%
DPL	0.0%	0.7%	0.2%	10.8%	50.9%	30.8%	3.2%	2.4%	0.7%	0.4%
DUQ	0.0%	0.7%	0.0%	1.1%	50.6%	40.8%	4.3%	2.0%	0.4%	0.1%
EKPC	0.0%	0.7%	0.0%	1.0%	50.6%	40.4%	4.6%	2.2%	0.3%	0.1%
JCPLC	0.0%	0.7%	0.1%	3.6%	50.9%	39.4%	3.2%	1.7%	0.3%	0.1%
MEC	0.0%	0.7%	0.2%	2.5%	50.6%	38.9%	4.4%	2.1%	0.5%	0.1%
OVEC	0.0%	0.7%	0.0%	1.0%	50.7%	40.6%	4.5%	2.1%	0.3%	0.1%
PECO	0.0%	0.7%	0.1%	9.6%	50.9%	33.6%	3.1%	1.6%	0.3%	0.1%
PE	0.0%	0.7%	0.1%	1.0%	50.5%	41.2%	4.4%	1.8%	0.3%	0.1%
PEPCO	0.0%	0.7%	0.1%	2.1%	50.6%	37.8%	5.2%	2.9%	0.6%	0.1%
PPL	0.0%	0.7%	0.1%	2.5%	50.7%	40.0%	3.8%	1.8%	0.4%	0.1%
PSEG	0.0%	0.7%	0.1%	3.3%	50.9%	39.6%	3.3%	1.7%	0.4%	0.1%
REC	0.0%	0.7%	0.1%	2.1%	50.6%	40.6%	3.5%	1.9%	0.4%	0.1%

Hourly Average Load and LMP Difference: Jan through June 2022



Real-Time Monthly On Peak and Off Peak Load-Weighted LMP

	2021				2022			
	Off Peak	On Peak	Difference	Percent	Off Peak	On Peak	Difference	Percent
				Difference				Difference
Jan	\$23.53	\$27.45	\$3.91	16.6%	\$74.99	\$62.54	(\$12.46)	(16.6%)
Feb	\$35.40	\$46.40	\$11.01	31.1%	\$45.70	\$47.86	\$2.16	4.7%
Mar	\$23.98	\$28.43	\$4.45	18.6%	\$41.58	\$45.41	\$3.83	9.2%
Apr	\$22.60	\$30.45	\$7.86	34.8%	\$55.93	\$71.89	\$15.96	28.5%
May	\$22.58	\$36.80	\$14.23	63.0%	\$66.12	\$100.85	\$34.73	52.5%
Jun	\$27.50	\$39.88	\$12.38	45.0%	\$61.63	\$126.83	\$65.20	105.8%
Jul	\$31.52	\$42.83	\$11.31	35.9%				
Aug	\$36.74	\$56.71	\$19.97	54.4%				
Sep	\$39.47	\$59.03	\$19.56	49.6%				
Oct	\$49.53	\$67.34	\$17.81	36.0%				
Nov	\$55.73	\$70.49	\$14.76	26.5%				
Dec	\$34.83	\$42.56	\$7.73	22.2%				

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