

# Market Monitor Report

MC Webinar

05.20.2024

Revised 05.31.2024

IMM



Monitoring Analytics

# Total Price of Wholesale Power

- **The total price of wholesale power is the total cost per MWh of wholesale electricity in PJM markets.**
- **Billing Line Items (BLI) are services for which PJM calculates customer credits or charges.**
- **The costs are the sum of the total charges for the individual billing line items in each category divided by real time load, even when a specific category is not charged on that basis.**
- **There have been questions about why PJM and IMM total prices do not match, and specifically why transmission costs do not match.**

# Total Price of Wholesale Power

Category	2022 \$/MWh	2022 (\$ Millions)	2022 Percent of Total	2023 \$/MWh	2023 (\$ Millions)	2023 Percent of Total	Percent Change
Load Weighted Energy	\$80.14	\$62,401	76.1%	\$31.08	\$23,468	58.2%	(61.2%)
Capacity	\$8.04	\$6,259	7.6%	\$4.00	\$3,023	7.5%	(50.2%)
Capacity	\$7.96	\$6,201	7.6%	\$3.89	\$2,936	7.3%	(51.2%)
Capacity (FRR)	\$0.01	\$4	0.0%	\$0.02	\$14	0.0%	260.8%
Capacity (RMR)	\$0.07	\$54	0.1%	\$0.10	\$73	0.2%	39.5%
Transmission	\$15.12	\$11,772	14.4%	\$16.54	\$12,486	31.0%	9.4%
Transmission Service Charges	\$12.77	\$9,941	12.1%	\$14.13	\$10,670	26.5%	10.7%
Transmission Enhancement Cost Recovery	\$2.28	\$1,773	2.2%	\$2.32	\$1,753	4.3%	2.0%
Transmission Owner (Schedule 1A)	\$0.08	\$58	0.1%	\$0.08	\$63	0.2%	10.8%
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%
Ancillary	\$1.08	\$840	1.0%	\$0.89	\$674	1.7%	(17.3%)
Reactive	\$0.50	\$387	0.5%	\$0.51	\$389	1.0%	3.7%
Regulation	\$0.38	\$296	0.4%	\$0.18	\$134	0.3%	(53.4%)
Black Start	\$0.09	\$69	0.1%	\$0.09	\$67	0.2%	1.1%
Synchronized Reserves	\$0.11	\$87	0.1%	\$0.10	\$74	0.2%	(12.4%)
Secondary Reserves	(\$0.00)	(\$0)	(0.0%)	\$0.00	\$1	0.0%	(950.0%)
Non-Synchronized Reserves	(\$0.01)	(\$8)	(0.0%)	\$0.01	\$9	0.0%	(214.3%)
Day Ahead Scheduling Reserve (DASR)	\$0.01	\$11	0.0%	\$0.00	\$0	0.0%	(100.0%)
Administration	\$0.54	\$421	0.5%	\$0.60	\$456	1.1%	11.7%
PJM Administrative Fees	\$0.50	\$392	0.5%	\$0.56	\$425	1.1%	11.7%
NERC/RFC	\$0.04	\$29	0.0%	\$0.04	\$31	0.1%	10.9%
RTO Startup and Expansion	\$0.00	\$0	0.0%	\$0.00	\$0	0.0%	0.0%
Energy Uplift (Operating Reserves)	\$0.36	\$282	0.3%	\$0.21	\$158	0.4%	(42.4%)
Demand Response	\$0.02	\$12	0.0%	\$0.09	\$68	0.2%	458.8%
Load Response	\$0.01	\$10	0.0%	\$0.01	\$7	0.0%	(31.5%)
Emergency Load Response	\$0.00	\$3	0.0%	\$0.08	\$61	0.2%	2,345.5%
Emergency Energy	\$0.01	\$9	0.0%	\$0.00	\$0	0.0%	(100.0%)
Other	\$0.00	\$4	0.0%	\$0.01	\$6	0.0%	62.5%
Total Price	\$105.30	\$81,992	100.0%	\$53.42	\$40,338	100.0%	(49.3%)
Total Load (GWh)	778,624			755,053			(3.0%)
Total Cost (\$ Billions)	\$82.00			\$40.34			(50.8%)

# Total Price of Wholesale Power IMM vs PJM Billing Line Items (BLI) used in Calculation

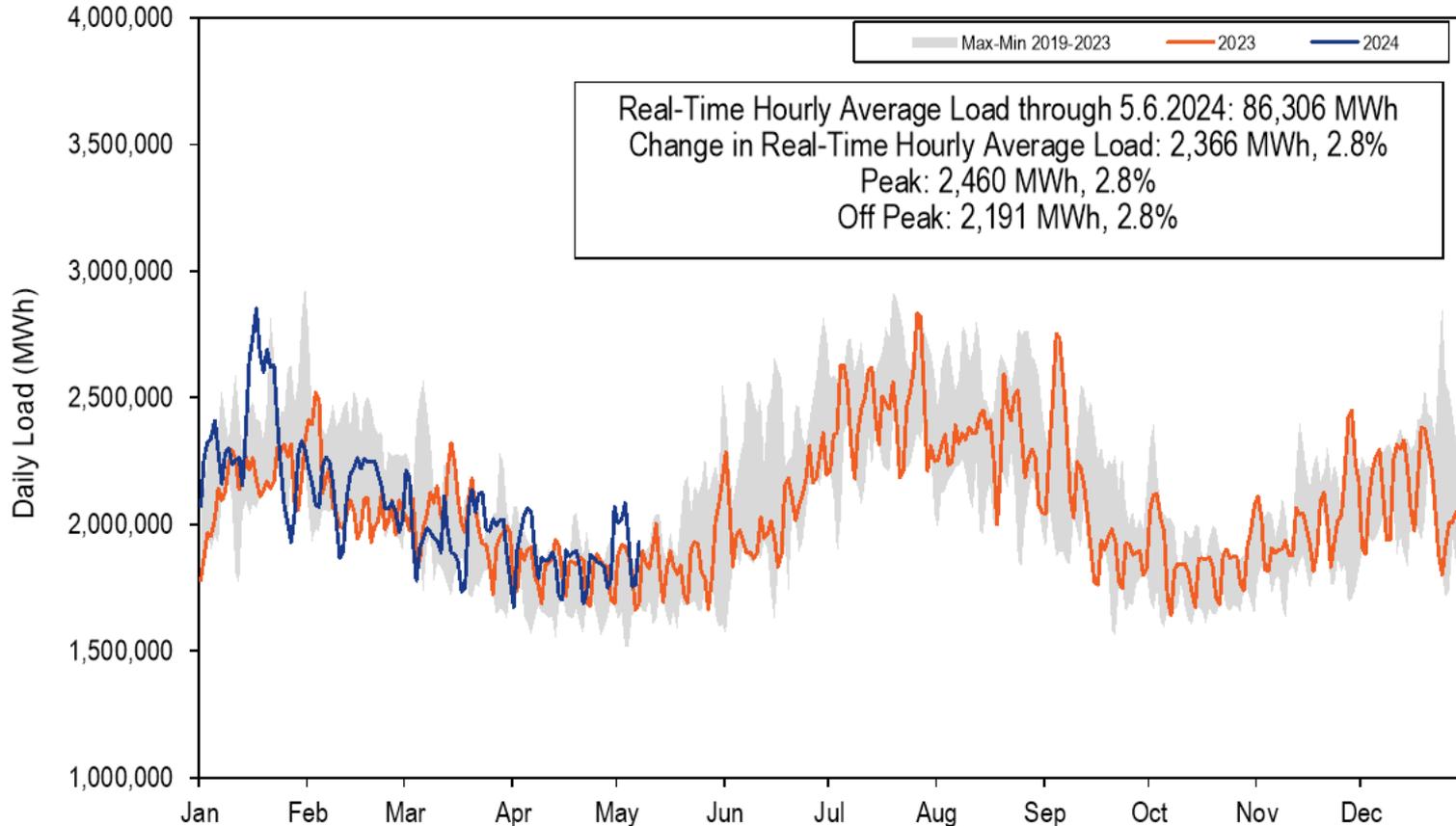
Category	BLI	BLI Name	Monitoring Analytics	PJM
Transmission Service Charges	1100	Network Integration Transmission Service	X	X
Transmission Service Charges	1101	Network Integration Transmission Service (ATSI Low Voltage)	X	
Transmission Service Charges	1102	Network (exempt) Ch	X	
Transmission Service Charges	1103	Underground Transmission Service	X	
Transmission Service Charges	1104	Network Offset Ch	X	
Transmission Service Charges	1110	Direct Assignment Facilities	X	
Transmission Service Charges	1120	Other Supporting Facilities	X	
Transmission Service Charges	1130	Firm Point-to-Point Transmission Service	X	X
Transmission Service Charges	1133	Firm Point-to-Point Transmission Service Resale	X	
Transmission Service Charges	1140	Non-Firm Point-to-Point Transmission Service	X	X
Transmission Service Charges	1143	Non-Firm Point-to-Point Transmission Service Resale	X	
Transmission Service Charges	1900	Unsch Trans Ch	X	
Transmission Enhancement Cost Recovery	1108	Transmission Enhancement	X	
Transmission Enhancement Cost Recovery	1109	MTEP Project Cost Recovery	X	
Transmission Enhancement Cost Recovery	1115	Transmission Enhancement Settlement (EL05-121-009)	X	
Transmission Owner (Schedule 1A)	1320	Transmission Owner Scheduling, System Control and Dispatch Service	X	
Transmission Seams Elimination Cost Assignment (SECA)	1710	PJM/MISO Seams Elimination Cost Assignment	X	
Transmission Seams Elimination Cost Assignment (SECA)	1712	Intra-PJM Seams Elimination Cost Assignment	X	
Transmission Facility Charges	1910	Ramapo PAR Ch	X	
Transmission Facility Charges	1911	Mich-Ont Par Ch	X	

# Total Price of Wholesale Power

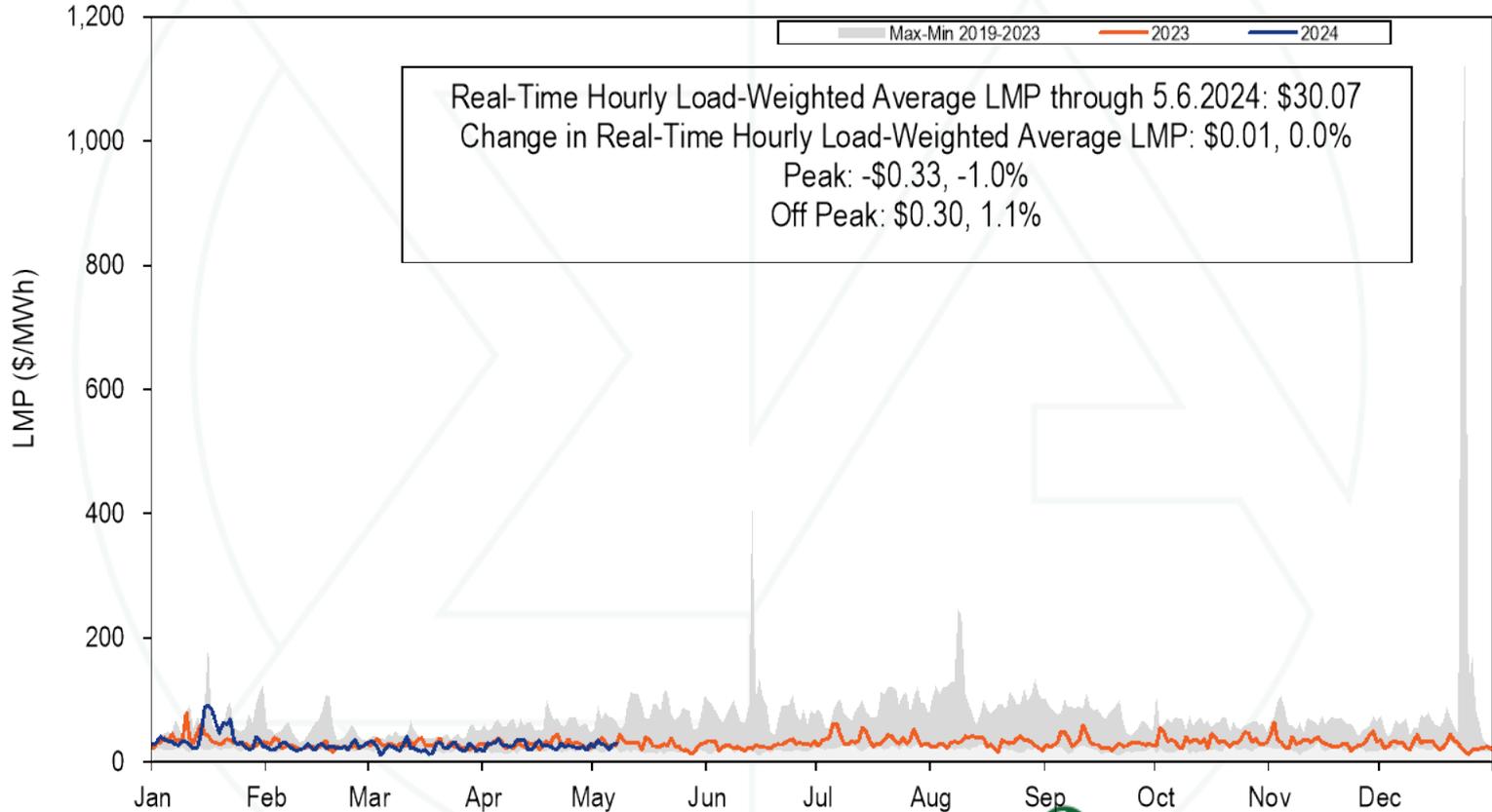
## BLI Total Transmission Price Breakdown

BLI_ID	BLI_NAME	2023	2023
		\$/MWh	(\$ Millions)
1100	Network Integration Transmission Service	\$13.82	\$10,436
1108	Transmission Enhancement	\$2.31	\$1,747
1130	Firm Point-to-Point Transmission Service	\$0.17	\$131
1320	Transmission Owner Scheduling, System Control and Dispatch Service	\$0.08	\$63
1120	Other Supporting Facilities	\$0.08	\$62
1140	Non-Firm Point-to-Point Transmission Service	\$0.03	\$19
1103	Underground Transmission Service	\$0.02	\$14
1109	MTEP Project Cost Recovery	\$0.01	\$7
1133	Firm Point-to-Point Transmission Service Resale	\$0.01	\$6
1110	Direct Assignment Facilities	\$0.00	\$3
1115	Transmission Enhancement Settlement (EL05-121-009)	\$0.00	\$0
1101	Network Integration Transmission Service (ATSI Low Voltage)	\$0.00	\$0
1102	Network Integration Transmission Service (exempt)	\$0.00	\$0
1104	Network Integration Transmission Service Offset	\$0.00	\$0
1143	Non-Firm Point-to-Point Transmission Service Resale	\$0.00	\$0
1710	PJM/MISO Seams Elimination Cost Assignment	\$0.00	\$0
1712	Intra-PJM Seams Elimination Cost Assignment	\$0.00	\$0
1900	Unscheduled Transmission Service	\$0.00	\$0
1910	Ramapo Phase Angle Regulators	\$0.00	\$0
1911	Michigan - Ontario Interface Phase Angle Regulators	\$0.00	\$0
Total	Total	\$16.54	\$12,486
	Total Load (GWh)	755,053	
	<b>PJM TOTAL</b>	<b>\$14.02</b>	<b>\$10,585.61</b>
	<b>Difference MMU-PJM</b>	<b>\$2.52</b>	<b>\$1,900.79</b>

# 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.**

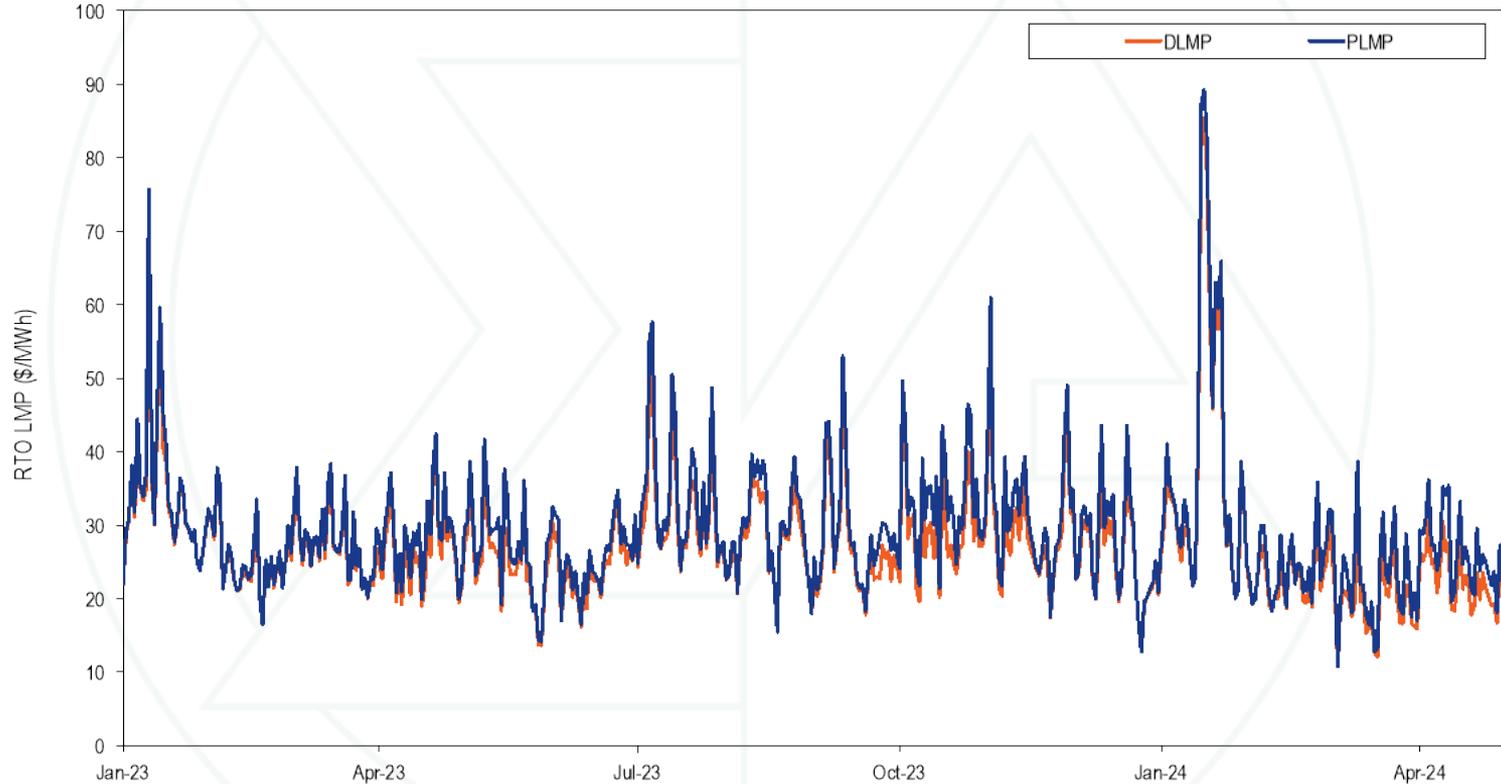
# Fast Start Pricing: DLMP and PLMP

- **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**

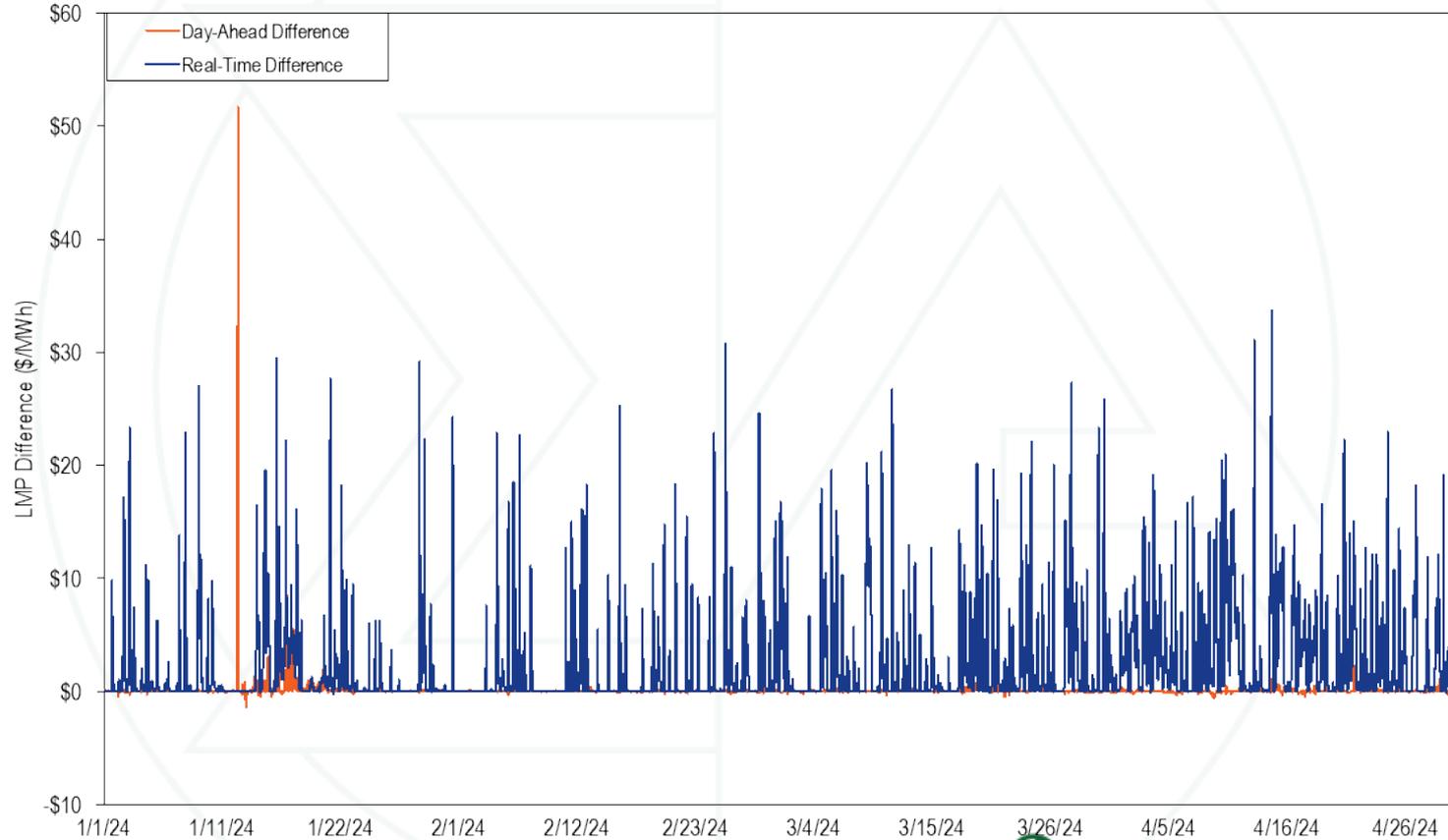
# Monthly Average Load-Weighted DLMP and PLMP

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%
2024	Jan - Apr	\$31.89	\$31.93	\$0.04	0.1%	\$29.11	\$31.08	\$1.97	6.8%
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	Jan - Apr	\$31.01	\$31.09	\$0.08	0.3%	\$27.62	\$30.15	\$2.53	9.1%

# Daily Average Real-Time DLMP and PLMP



# Hourly Difference: PLMP – DLMP



# Fast Start Units as a Percent of Marginal Units (Rev)

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-Apr	1.4%	0.4%	0.1%	1.9%	5.1%	1.2%	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	Jan - Apr	0.8%	0.3%	0.4%	1.5%	4.1%	0.7%	0.4%	5.1%

# Fast Start Impacts: Zone Average Differences

Zone	2024 Jan - Apr							
	Day-Ahead				Real-Time			
	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
ACEC	\$24.57	\$24.60	\$0.03	0.1%	\$22.62	\$23.97	\$1.35	6.0%
AEP	\$30.53	\$30.57	\$0.04	0.1%	\$27.68	\$29.70	\$2.02	7.3%
APS	\$31.72	\$31.75	\$0.04	0.1%	\$28.58	\$30.71	\$2.13	7.4%
ATSI	\$30.43	\$30.47	\$0.04	0.1%	\$27.58	\$29.57	\$1.99	7.2%
BGE	\$37.05	\$37.10	\$0.04	0.1%	\$33.04	\$35.58	\$2.54	7.7%
COMED	\$25.97	\$26.02	\$0.05	0.2%	\$23.32	\$25.05	\$1.74	7.5%
DAY	\$31.94	\$31.98	\$0.04	0.1%	\$28.91	\$31.03	\$2.12	7.3%
DUKE	\$31.18	\$31.23	\$0.04	0.1%	\$28.22	\$30.27	\$2.05	7.3%
DOM	\$35.13	\$35.17	\$0.04	0.1%	\$32.60	\$34.90	\$2.30	7.0%
DPL	\$26.90	\$26.92	\$0.03	0.1%	\$24.57	\$26.77	\$2.20	9.0%
DUQ	\$30.36	\$30.40	\$0.04	0.1%	\$27.54	\$29.56	\$2.01	7.3%
EKPC	\$30.51	\$30.55	\$0.04	0.1%	\$28.06	\$30.09	\$2.03	7.2%
JCPLC	\$25.27	\$25.31	\$0.03	0.1%	\$23.26	\$24.69	\$1.43	6.2%
MEC	\$27.93	\$27.96	\$0.04	0.1%	\$25.19	\$26.97	\$1.78	7.1%
OVEC	\$29.89	\$29.93	\$0.04	0.1%	\$27.17	\$29.15	\$1.97	7.3%
PECO	\$23.57	\$23.60	\$0.03	0.1%	\$21.81	\$23.07	\$1.26	5.8%
PE	\$30.70	\$30.72	\$0.02	0.1%	\$27.88	\$29.88	\$1.99	7.1%
PEPCO	\$35.36	\$35.40	\$0.04	0.1%	\$31.57	\$33.94	\$2.38	7.5%
PPL	\$25.57	\$25.60	\$0.03	0.1%	\$23.31	\$24.87	\$1.57	6.7%
PSEG	\$25.51	\$25.54	\$0.03	0.1%	\$23.63	\$25.08	\$1.45	6.1%
REC	\$27.44	\$27.47	\$0.03	0.1%	\$25.35	\$26.89	\$1.54	6.1%

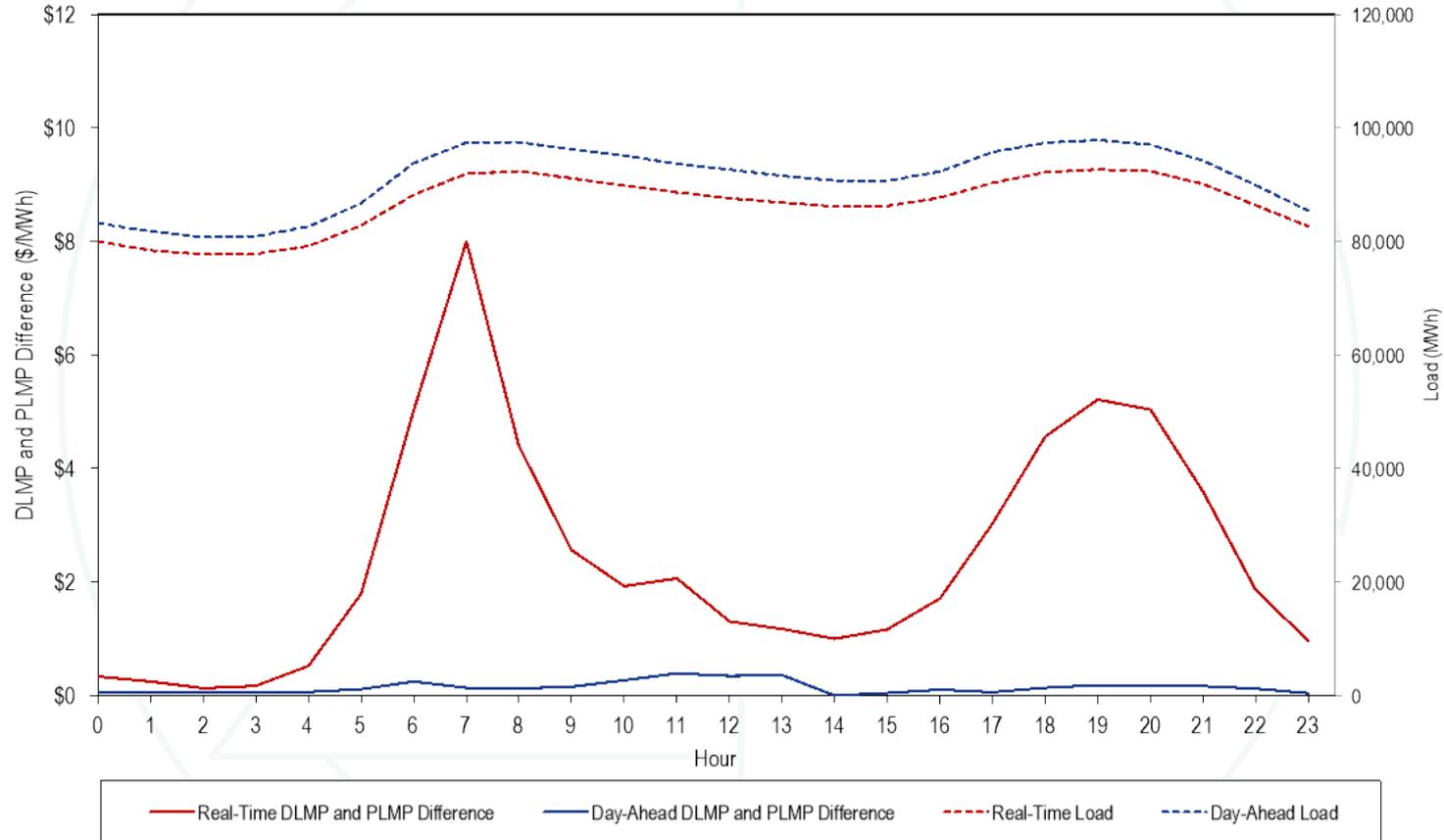
# Fast Start Impacts: Hub Average Differences

Hub	2024 Jan - Apr								
	Average DLMP	Day-Ahead			Percent Difference	Real-Time			Percent Difference
		Average PLMP	Difference	Percent Difference		Average DLMP	Average PLMP	Difference	
AEP GEN HUB	\$29.59	\$29.64	\$0.04	0.1%	\$26.76	\$28.72	\$1.95	7.3%	
AEP-DAYTON HUB	\$30.23	\$30.27	\$0.04	0.1%	\$27.31	\$29.30	\$1.99	7.3%	
ATSI GEN HUB	\$30.04	\$30.08	\$0.04	0.1%	\$27.12	\$29.09	\$1.96	7.2%	
CHICAGO GEN HUB	\$25.51	\$25.59	\$0.08	0.3%	\$22.81	\$24.53	\$1.72	7.5%	
CHICAGO HUB	\$26.13	\$26.16	\$0.03	0.1%	\$23.40	\$25.14	\$1.74	7.4%	
DOMINION HUB	\$33.03	\$33.07	\$0.04	0.1%	\$30.06	\$32.26	\$2.19	7.3%	
EASTERN HUB	\$27.38	\$27.40	\$0.02	0.1%	\$24.85	\$27.08	\$2.23	9.0%	
N ILLINOIS HUB	\$25.87	\$25.96	\$0.09	0.4%	\$23.32	\$25.06	\$1.74	7.5%	
NEW JERSEY HUB	\$25.25	\$25.28	\$0.03	0.1%	\$23.31	\$24.73	\$1.42	6.1%	
OHIO HUB	\$30.17	\$30.22	\$0.04	0.1%	\$27.27	\$29.25	\$1.98	7.3%	
WEST INT HUB	\$31.18	\$31.22	\$0.04	0.1%	\$28.24	\$30.30	\$2.06	7.3%	
WESTERN HUB	\$32.65	\$32.68	\$0.03	0.1%	\$29.25	\$31.45	\$2.19	7.5%	

# Zonal Real-Time PLMP-DLMP Difference Frequency

Zone	2024 Jan - Apr										
	< (\$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%	54.1%	37.1%	5.3%	2.6%	0.1%	0.0%	0.0%	
ACEC	0.0%	0.0%	5.1%	54.4%	34.7%	3.7%	2.0%	0.1%	0.0%	0.0%	
AEP	0.0%	0.0%	1.6%	54.3%	35.7%	5.3%	3.0%	0.1%	0.0%	0.0%	
APS	0.0%	0.0%	0.9%	54.2%	36.0%	5.4%	3.4%	0.1%	0.0%	0.0%	
ATSI	0.0%	0.0%	2.2%	54.1%	35.4%	5.2%	3.0%	0.1%	0.0%	0.0%	
BGE	0.0%	0.0%	1.6%	54.1%	34.1%	5.7%	4.0%	0.3%	0.0%	0.0%	
COMED	0.0%	0.0%	4.2%	54.8%	34.4%	4.2%	2.3%	0.1%	0.0%	0.0%	
DAY	0.0%	0.0%	1.7%	54.2%	35.0%	5.4%	3.4%	0.2%	0.0%	0.0%	
DUKE	0.0%	0.0%	1.6%	54.2%	35.6%	5.3%	3.1%	0.1%	0.0%	0.0%	
DOM	0.0%	0.1%	1.5%	54.2%	34.6%	5.8%	3.7%	0.2%	0.0%	0.0%	
DPL	0.0%	0.2%	7.8%	54.3%	31.8%	3.7%	2.1%	0.1%	0.0%	0.0%	
DUQ	0.0%	0.0%	2.1%	54.2%	35.5%	5.1%	2.9%	0.1%	0.0%	0.0%	
EKPC	0.0%	0.0%	1.5%	54.2%	35.8%	5.4%	3.0%	0.1%	0.0%	0.0%	
JCPLC	0.0%	0.0%	2.0%	54.4%	37.8%	3.7%	2.0%	0.1%	0.0%	0.0%	
MEC	0.0%	0.1%	1.5%	54.2%	36.7%	4.9%	2.6%	0.1%	0.0%	0.0%	
OVEC	0.0%	0.1%	1.8%	54.3%	35.5%	5.2%	3.0%	0.1%	0.0%	0.0%	
PECO	0.0%	0.1%	7.1%	54.3%	32.7%	3.6%	2.1%	0.1%	0.0%	0.0%	
PE	0.0%	0.1%	1.2%	54.1%	36.4%	5.3%	2.9%	0.1%	0.0%	0.0%	
PEPCO	0.0%	0.0%	1.5%	54.2%	34.4%	5.8%	3.8%	0.3%	0.0%	0.0%	
PPL	0.0%	0.0%	1.9%	54.2%	37.7%	4.2%	2.0%	0.0%	0.0%	0.0%	
PSEG	0.0%	0.0%	2.1%	54.3%	37.6%	3.8%	2.1%	0.1%	0.0%	0.0%	
REC	0.0%	0.1%	1.8%	54.1%	37.7%	4.0%	2.2%	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%				
Jun	\$21.64	\$32.16	\$10.52	48.6%				
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%				

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