Market Monitor Report

MC Webinar

November 14, 2022

IMM

Monitoring Analytics

Incorrect Fuel Cost

- Section 1.1 (b) of Schedule 2 of the PJM Operating Agreement states that "all fuel costs shall employ the marginal fuel price experienced by the Member."
- Some units make energy market offers that include the cost of a fuel that is not actually burned. This occurs infrequently but it has market impacts.
- Primary scenario is use of hourly offers to reflect gas to oil fuel switching.
- The rest is caused by units not making their gas offer available.

Incorrect Fuel Cost

- The introduction of hourly offers in Nov 2017 allowed Market Sellers to submit different offers by hour.
  - The main purpose of hourly offers was to reflect the two gas days in a power day and update costs in real time.
- Some units use hourly offers to differentiate between hours offered on gas versus hours offered on oil.
- Sometimes the units come online before the first hour offered on gas and actually burn gas instead of oil.
- Sometimes the units come offline after the last hour offered on gas and actually burn gas instead of oil.

Incorrect Fuel Cost

- **The IMM has begun to notify Market Sellers of these occurrences.**
- **The IMM expects that any uplift paid based on the incorrect fuel cost will be resettled using the correct fuel cost. The IMM has informed PJM of the issue.**
- **In order to eliminate this issue, the IMM and PJM have developed a guideline for commitment and decommitment of dual fuel units that offer different fuels in contiguous hourly offers.**

Dual Fuel Guideline

- **Dual fuel units that have significant offer level increases from one hour to another due to fuel switches (e.g. a gas based offer to an oil based offer) should communicate with PJM Dispatch Operations at least 20 minutes prior to the end of the last hour with the cheaper offer (when the unit is running for PJM for that hour). PJM Dispatch Operations will determine if the unit can be released before the start of the higher priced hour. If PJM Dispatch Operations determines that the unit can be released, the decommitment instruction will be confirmed. If not, the unit will continue to operate at PJM's request.**

Dual Fuel Guideline

- The IMM and PJM will continue to work on rules to avoid incorrect uplift payments in the MIC problem statement.
- Market Sellers should use their best efforts to reflect in their offers the fuel actually used.
- This means:
  - Updating offers when gas becomes available.
  - Coming online/offline based on the hours submitted on the cheaper fuel, unless instructed differently by PJM.

Nondispatchable Intermittent Units

- **Intermittent units that are not dispatchable either because they do not receive a dispatch signal or receive one but do not follow it should be offered accordingly in the energy market.**
- **This means that intermittent units should not be offered with a dispatchable range unless they can follow a dispatch signal.**
- **Offering intermittent units that do not follow dispatch with a dispatchable range has operational and market implications.**

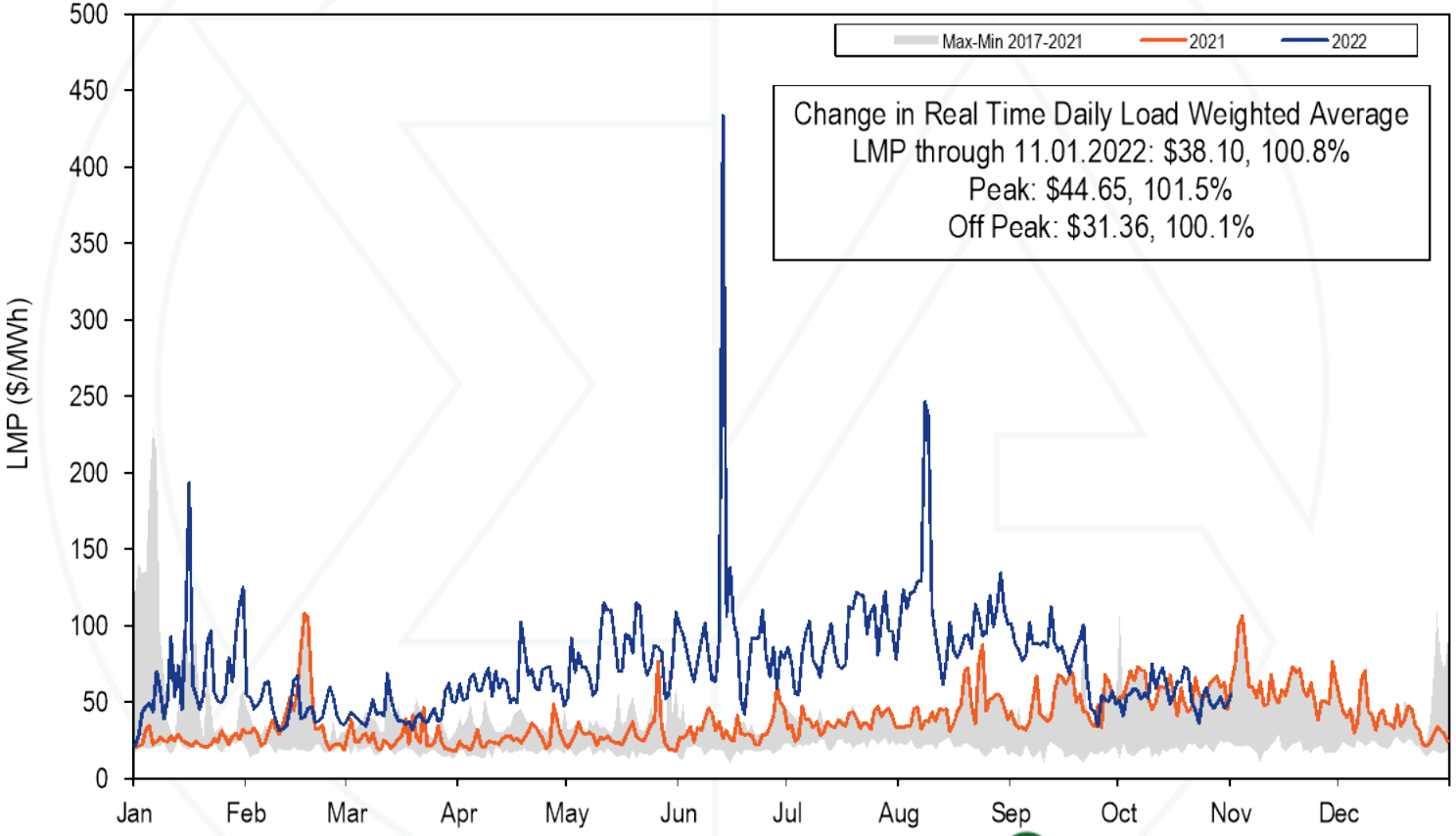
Nondispatchable Intermittent Units

- **In real time, intermittent units with a dispatchable range receive signals to move down (for constraint control) or up (when Eco Max > current output).**
- **The issue is exacerbated when the Eco Max is not updated. For example, a 50 MW (nameplate) wind unit is forecasted DA to produce 40 MW HE12, the unit is offered with a 40 MW Eco Max. In real time, the unit can only produce 25 MW and the Eco Max is not updated. SCED will send a signal of 40 MW and count on 15 MW that are not being produced to meet power balance.**

Nondispatchable Intermittent Units

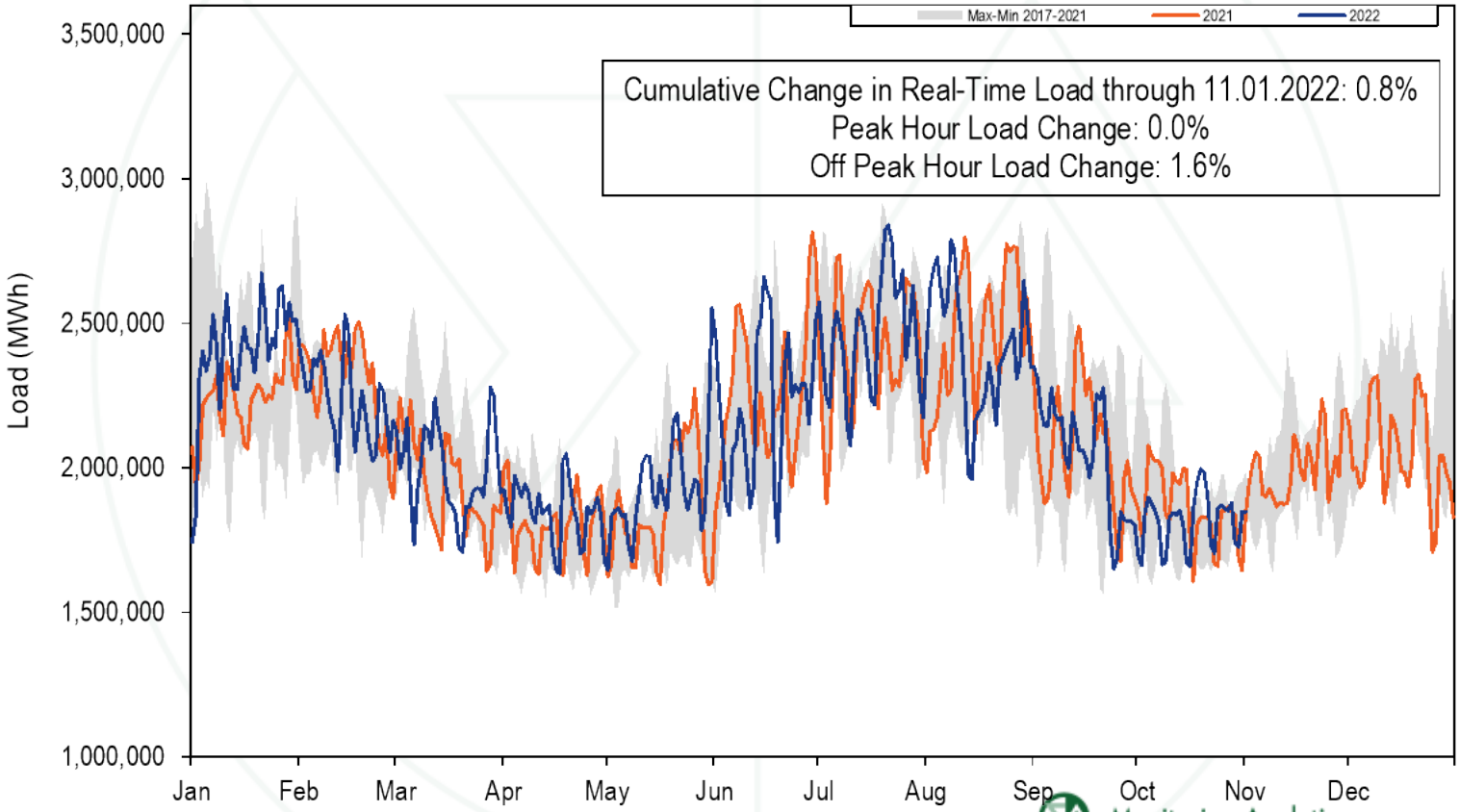
- **Units indicate (eDART data request) that they either do not receive a dispatch signal or receive one but do not follow it.**
  - **The IMM communicated to units that they should start offering the units consistent with actual behavior.**
- **The PJM/IMM Renewable Dispatch proposal (endorsed by the OC on 10.07.2022) addresses the issue related to outdated ratings (e.g. eco max) by requiring five minute updates.**
- **In the meantime, units that are not dispatchable should offer accordingly to avoid operational issues.**

2022 YTD PJM Real-Time LMP



Monitoring Analytics

2022 YTD PJM Real-Time Daily Load



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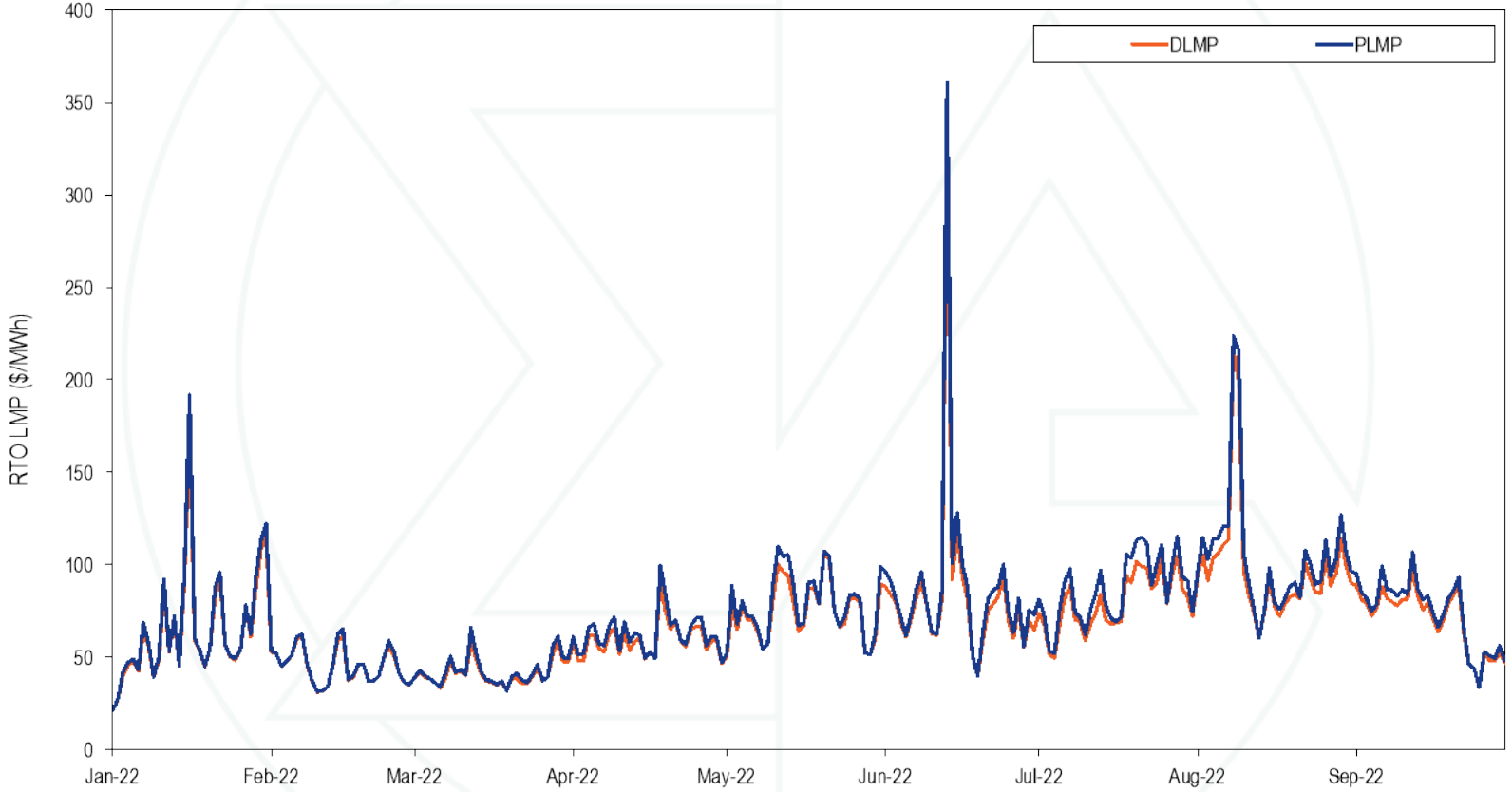
Monthly Average Load-Weighted DLMP and PLMP

		Day-Ahead Load-Weighted Average				Real-Time Load-Weighted Average			
Year	Month	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	$64.57	$64.80	$0.22	0.3%	$66.43	$69.06	$2.64	4.0%
2022	Feb	$49.96	$50.35	$0.39	0.8%	$45.93	$46.76	$0.83	1.8%
2022	Mar	$45.25	$45.50	$0.25	0.6%	$41.83	$43.56	$1.73	4.1%
2022	Apr	$64.10	$64.18	$0.08	0.1%	$60.38	$63.91	$3.52	5.8%
2022	May	$83.17	$83.24	$0.06	0.1%	$79.04	$83.16	$4.12	5.2%
2022	Jun	$90.24	$90.54	$0.29	0.3%	$91.44	$97.89	$6.46	7.1%
2022	Jul	$96.07	$96.38	$0.32	0.3%	$84.03	$92.48	$8.45	10.1%
2022	Aug	$106.18	$106.07	-$0.10	-0.1%	$105.68	$113.74	$8.06	7.6%
2022	Sep	$82.86	$82.80	-$0.06	-0.1%	$74.08	$78.29	$4.22	5.7%
2022	Jan - Sep	$76.81	$76.97	$0.16	0.2%	$73.23	$77.84	$4.61	6.3%

Daily Average Real-Time DLMP and PLMP



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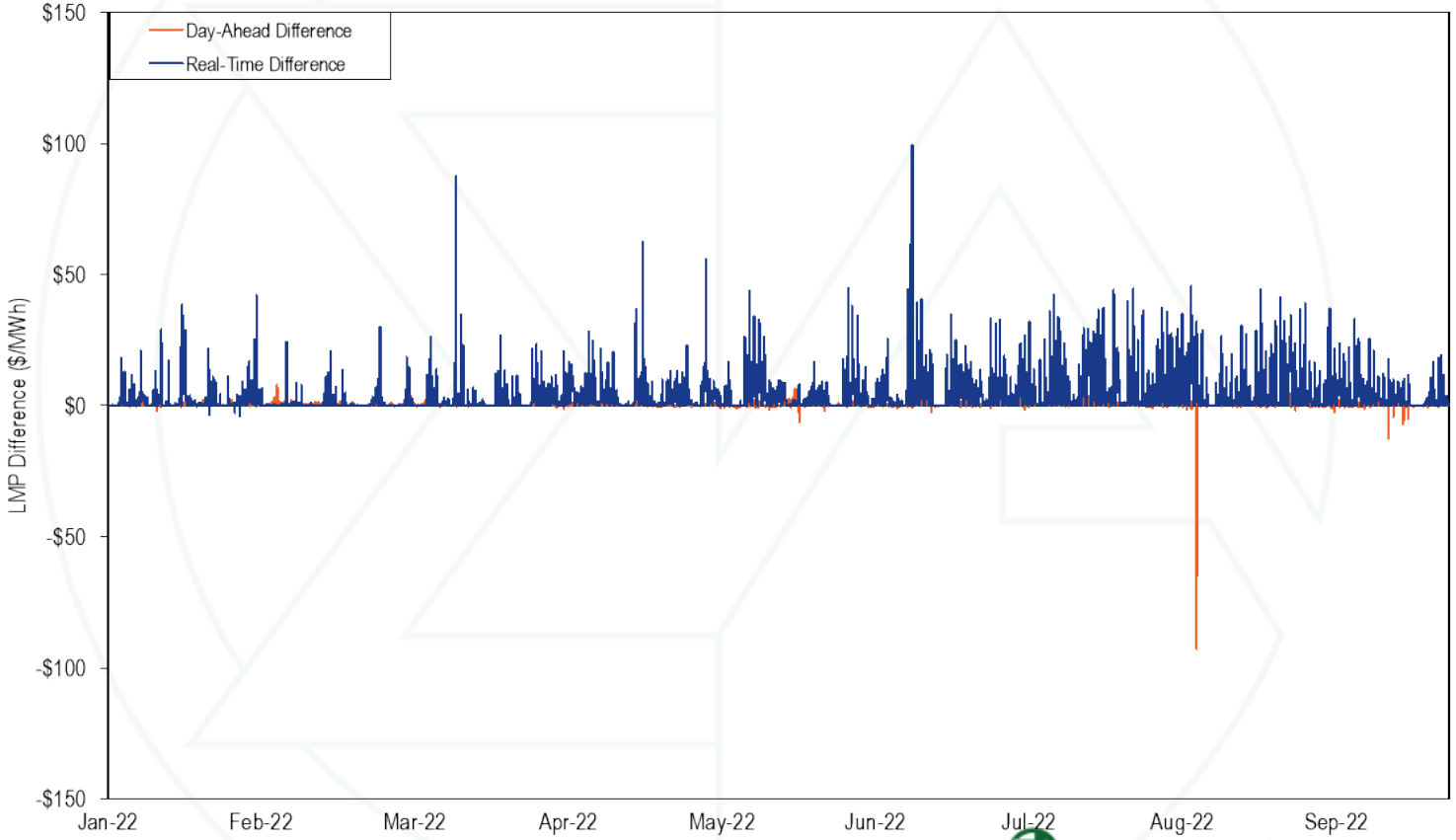
Hourly Difference: PLMP – DLMP



Monitoring Analytics

Fast Start Units as a Percent of Marginal Units

		Dispatch Run				Pricing Run			
Year	Month	CT	Diesel	Wind	All Fast Start Units	CT	Diesel	Wind	All Fast Start Units
2021	Sep	1.3%	0.3%	0.2%	1.8%	5.0%	0.9%	0.2%	6.2%
2021	Oct	0.6%	0.2%	0.3%	1.2%	3.3%	0.5%	0.3%	4.0%
2021	Nov	0.5%	0.2%	0.4%	1.1%	3.5%	0.5%	0.4%	4.4%
2021	Dec	0.9%	0.1%	0.1%	1.2%	4.6%	0.3%	0.1%	5.0%
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	1.5%	0.7%	0.1%	2.4%	6.8%	1.2%	0.1%	8.1%
2022	Jun	2.3%	0.3%	0.1%	2.6%	9.3%	0.8%	0.1%	10.2%
2022	Jul	2.2%	0.8%	0.1%	3.1%	15.5%	1.6%	0.0%	17.1%
2022	Aug	1.6%	0.4%	0.0%	2.1%	8.8%	1.3%	0.0%	10.1%
2022	Sep	0.8%	0.3%	0.1%	1.3%	5.8%	1.1%	0.1%	7.0%

Fast Start Impacts: Zonal Average Differences

	2022 (Jan-Sep)							
	Day-Ahead				Real-Time			
Zone	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
ACEC	$64.14	$64.30	$0.16	0.2%	$61.89	$65.80	$3.91	6.3%
AEP	$71.36	$71.56	$0.20	0.3%	$66.66	$71.38	$4.72	7.1%
APS	$72.33	$72.55	$0.22	0.3%	$67.54	$72.33	$4.79	7.1%
ATSI	$70.56	$70.78	$0.21	0.3%	$65.35	$69.99	$4.64	7.1%
BGE	$83.36	$83.55	$0.19	0.2%	$79.44	$85.25	$5.81	7.3%
COMED	$62.95	$63.12	$0.18	0.3%	$57.56	$61.95	$4.40	7.6%
DAY	$73.84	$74.04	$0.20	0.3%	$68.85	$73.70	$4.85	7.0%
DUKE	$72.57	$72.77	$0.20	0.3%	$67.28	$72.02	$4.74	7.1%
DOM	$84.84	$84.73	-$0.11	-0.1%	$84.17	$89.46	$5.29	6.3%
DPL	$68.11	$68.28	$0.17	0.2%	$66.49	$71.10	$4.60	6.9%
DUQ	$69.23	$69.44	$0.21	0.3%	$64.13	$68.72	$4.59	7.2%
EKPC	$71.68	$71.87	$0.19	0.3%	$67.16	$71.86	$4.70	7.0%
JCPLC	$65.37	$65.54	$0.17	0.3%	$63.12	$67.22	$4.10	6.5%
MEC	$75.10	$75.25	$0.15	0.2%	$70.81	$75.50	$4.69	6.6%
OVEC	$69.90	$70.09	$0.20	0.3%	$65.16	$69.75	$4.59	7.0%
PECO	$63.24	$63.40	$0.16	0.2%	$60.99	$64.81	$3.82	6.3%
PE	$70.06	$70.26	$0.20	0.3%	$65.05	$69.48	$4.43	6.8%
PEPCO	$80.39	$80.57	$0.18	0.2%	$76.38	$81.92	$5.53	7.2%
PPL	$69.08	$69.23	$0.16	0.2%	$65.26	$69.54	$4.29	6.6%
PSEG	$66.42	$66.58	$0.16	0.2%	$64.45	$68.50	$4.04	6.3%
REC	$68.85	$69.01	$0.16	0.2%	$66.39	$70.49	$4.10	6.2%

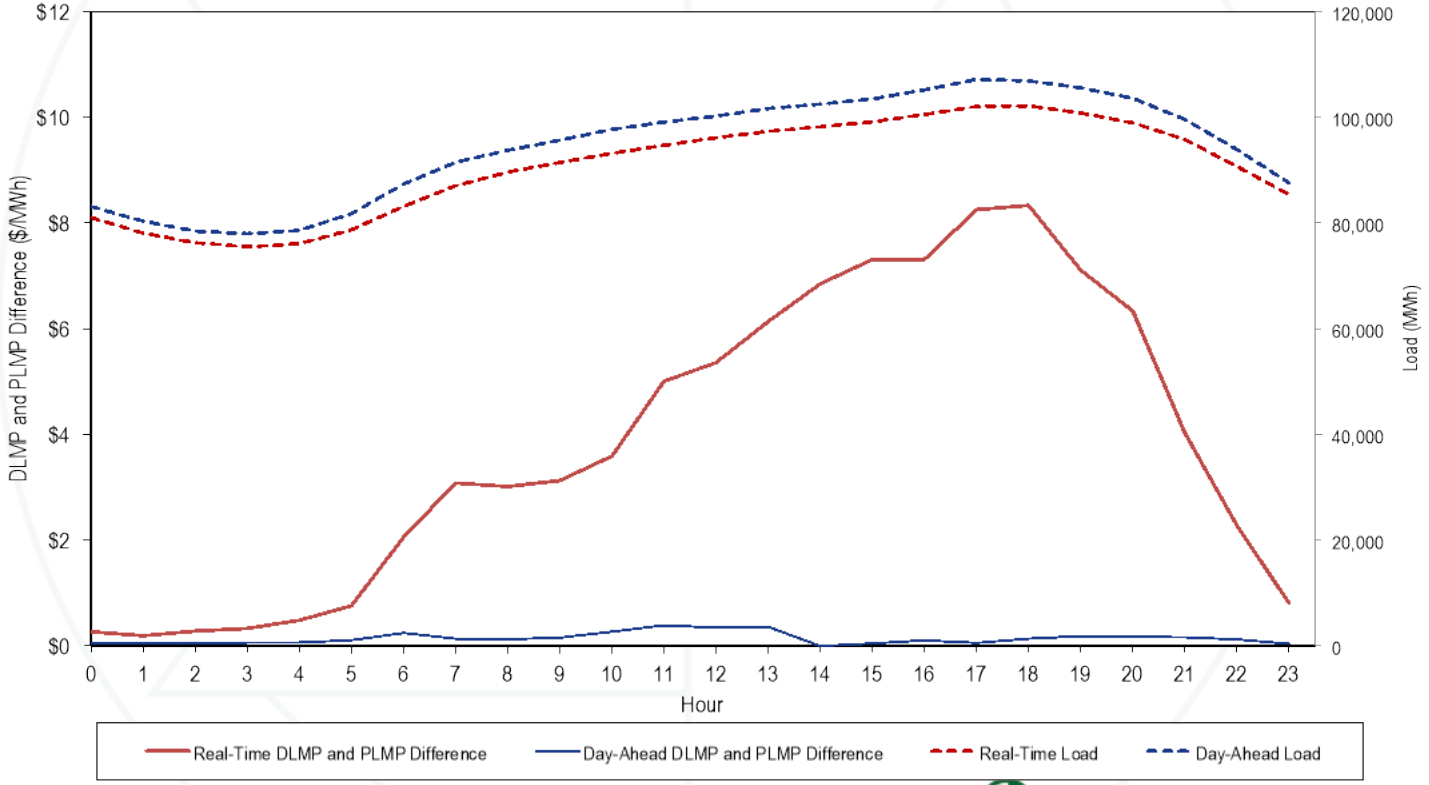
Fast Start Impacts: Hub Average Differences

	2022 (Jan-Sep)							
	Day-Ahead				Real-Time			
Hub	Average DLMP	Average PLMP	Difference	Percent Difference	Average DLMP	Average PLMP	Difference	Percent Difference
AEP GEN HUB	$69.31	$69.51	$0.20	0.3%	$64.37	$68.09	$3.72	5.8%
AEP-DAYTON HUB	$70.81	$71.01	$0.20	0.3%	$65.80	$69.62	$3.82	5.8%
ATSI GEN HUB	$69.29	$69.50	$0.21	0.3%	$63.93	$67.66	$3.73	5.8%
CHICAGO GEN HUB	$61.99	$62.17	$0.18	0.3%	$56.53	$60.06	$3.54	6.3%
CHICAGO HUB	$63.21	$63.39	$0.18	0.3%	$57.74	$61.34	$3.59	6.2%
DOMINION HUB	$77.60	$77.75	$0.15	0.2%	$74.03	$78.13	$4.10	5.5%
EASTERN HUB	$68.15	$68.33	$0.18	0.3%	$65.76	$69.71	$3.95	6.0%
N ILLINOIS HUB	$62.72	$62.90	$0.18	0.3%	$57.40	$60.95	$3.55	6.2%
NEW JERSEY HUB	$65.61	$65.78	$0.16	0.2%	$63.49	$66.82	$3.32	5.2%
OHIO HUB	$70.81	$71.01	$0.20	0.3%	$65.74	$69.56	$3.82	5.8%
WEST INT HUB	$72.05	$72.23	$0.17	0.2%	$67.35	$71.21	$3.86	5.7%
WESTERN HUB	$74.37	$74.56	$0.19	0.3%	$69.13	$73.14	$4.01	5.8%

Zonal PLMP-DLMP Difference Frequency

	2022 (Jan-Sep)									
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%	0.0%	0.0%	0.5%	50.8%	35.7%	7.5%	5.0%	0.4%	0.1%
ACEC	0.0%	0.0%	0.2%	6.0%	51.1%	32.3%	5.5%	4.2%	0.5%	0.1%
AEP	0.0%	0.0%	0.0%	0.7%	50.9%	35.3%	7.6%	5.0%	0.4%	0.1%
APS	0.0%	0.0%	0.0%	0.6%	50.9%	35.1%	7.6%	5.2%	0.4%	0.1%
ATSI	0.0%	0.0%	0.0%	0.8%	50.9%	35.6%	7.3%	4.9%	0.4%	0.1%
BGE	0.0%	0.0%	0.2%	2.6%	50.8%	31.5%	7.6%	6.2%	1.1%	0.1%
COMED	0.0%	0.0%	0.1%	1.8%	51.1%	35.0%	7.0%	4.5%	0.4%	0.1%
DAY	0.0%	0.0%	0.0%	0.7%	51.0%	35.0%	7.6%	5.2%	0.5%	0.1%
DUKE	0.0%	0.0%	0.0%	0.8%	51.0%	35.1%	7.6%	5.0%	0.4%	0.1%
DOM	0.0%	0.1%	0.3%	1.9%	50.9%	32.9%	7.3%	5.7%	0.8%	0.1%
DPL	0.0%	0.0%	0.2%	9.9%	51.0%	28.0%	5.2%	3.8%	1.4%	0.5%
DUQ	0.0%	0.0%	0.0%	0.9%	50.9%	35.7%	7.3%	4.7%	0.5%	0.1%
EKPC	0.0%	0.0%	0.0%	0.8%	51.0%	35.1%	7.7%	4.9%	0.4%	0.1%
JCPLC	0.0%	0.0%	0.1%	3.1%	51.1%	35.2%	5.7%	4.3%	0.5%	0.1%
MEC	0.0%	0.1%	0.3%	2.1%	50.8%	34.5%	6.7%	4.6%	0.7%	0.1%
OVEC	0.0%	0.0%	0.0%	0.9%	51.0%	35.3%	7.6%	4.7%	0.4%	0.1%
PECO	0.0%	0.0%	0.1%	8.8%	51.0%	29.8%	5.5%	4.2%	0.5%	0.1%
PE	0.0%	0.0%	0.1%	0.8%	50.7%	36.1%	7.3%	4.5%	0.4%	0.0%
PEPCO	0.0%	0.0%	0.1%	2.2%	50.9%	32.3%	7.6%	5.9%	0.9%	0.1%
PPL	0.0%	0.0%	0.2%	2.2%	50.8%	35.6%	6.4%	4.2%	0.5%	0.1%
PSEG	0.0%	0.0%	0.1%	2.7%	51.0%	35.4%	5.8%	4.4%	0.5%	0.1%
REC	0.0%	0.0%	0.1%	1.7%	50.9%	36.1%	6.1%	4.5%	0.5%	0.1%

Hourly Average Load and LMP Difference: Jan through September 2022



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

	2021				2022			
	Off Peak	On Peak	Difference	Percent Difference	Off Peak	On Peak	Difference	Percent 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%	$71.83	$114.14	$42.31	58.9%
Aug	$36.74	$56.71	$19.97	54.4%	$85.89	$136.31	$50.42	58.7%
Sep	$39.47	$59.03	$19.56	49.6%	$66.36	$89.76	$23.40	35.3%
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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