Market Monitor Report

MC Webinar
02.22.2022

IMM

Monitoring Analytics

CEJA

- IL legislation established emissions caps for investor owned, gas-fired units with three years of operating history. New units will have caps after three years.
- Emissions caps based on average emissions over three year period from 2018 through 2020.
- Emissions caps low for some units, much higher for others.
- Total MW currently affected: >10,000 MW
  - About half have requested an opportunity cost calculation.
- The IMM is calculating opportunity costs for units that make request and provide required data.

CEJA: Emissions Limits

- **No EGU or large greenhouse gas-emitting unit that uses gas as a fuel and is not a public GHG-emitting unit may emit, in any 12-month period, CO2e or co-pollutants in excess of that unit's existing emissions for those pollutants (Public Act 102-0662, Section 90-55)**

CEJA: Existing Emissions

- **Existing emissions means:**
  - **for CO2e, the total average tons-per-year of CO2e emitted by the EGU or large GHG-emitting unit either in the years 2018 through 2020 or, if the unit was not yet in operation by January 1, 2018, in the first 3 full years of that unit's operation;**
  - **for any copollutant, the total average tons-per-year of that copollutant emitted by the EGU or large GHG-emitting unit either in the years 2018 through 2020 or, if the unit was not yet in operation by January 1, 2018, in the first 3 full years of that unit's operation.**

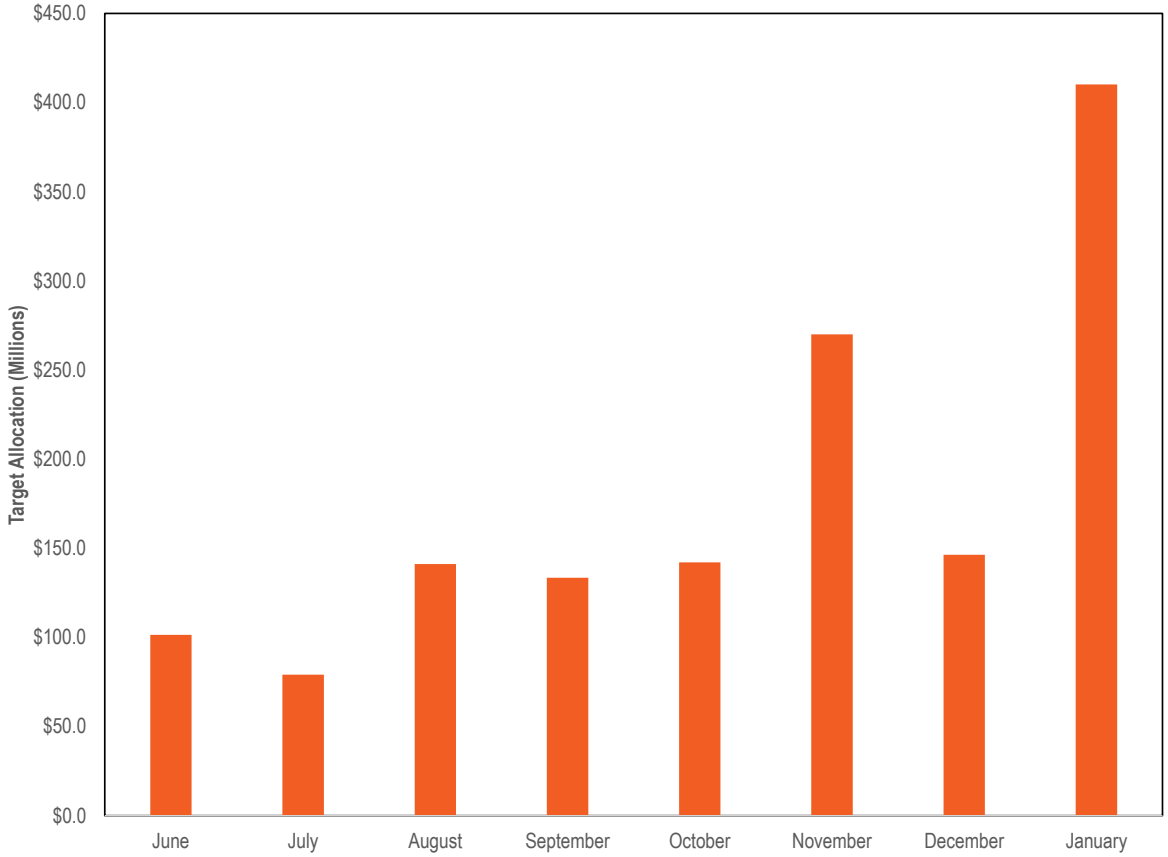
CEJA: CO2e and Co-pollutants

- **Carbon dioxide equivalent (CO2e) emissions means the total emissions of six greenhouse gases (carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride)**
- **Co-pollutants refers to the six criteria pollutants identified by the US EPA pursuant to the Clean Air Act: Carbon Monoxide, Lead, Nitrogen Dioxide, Ozone, Particle Pollution, Sulfur Dioxide**

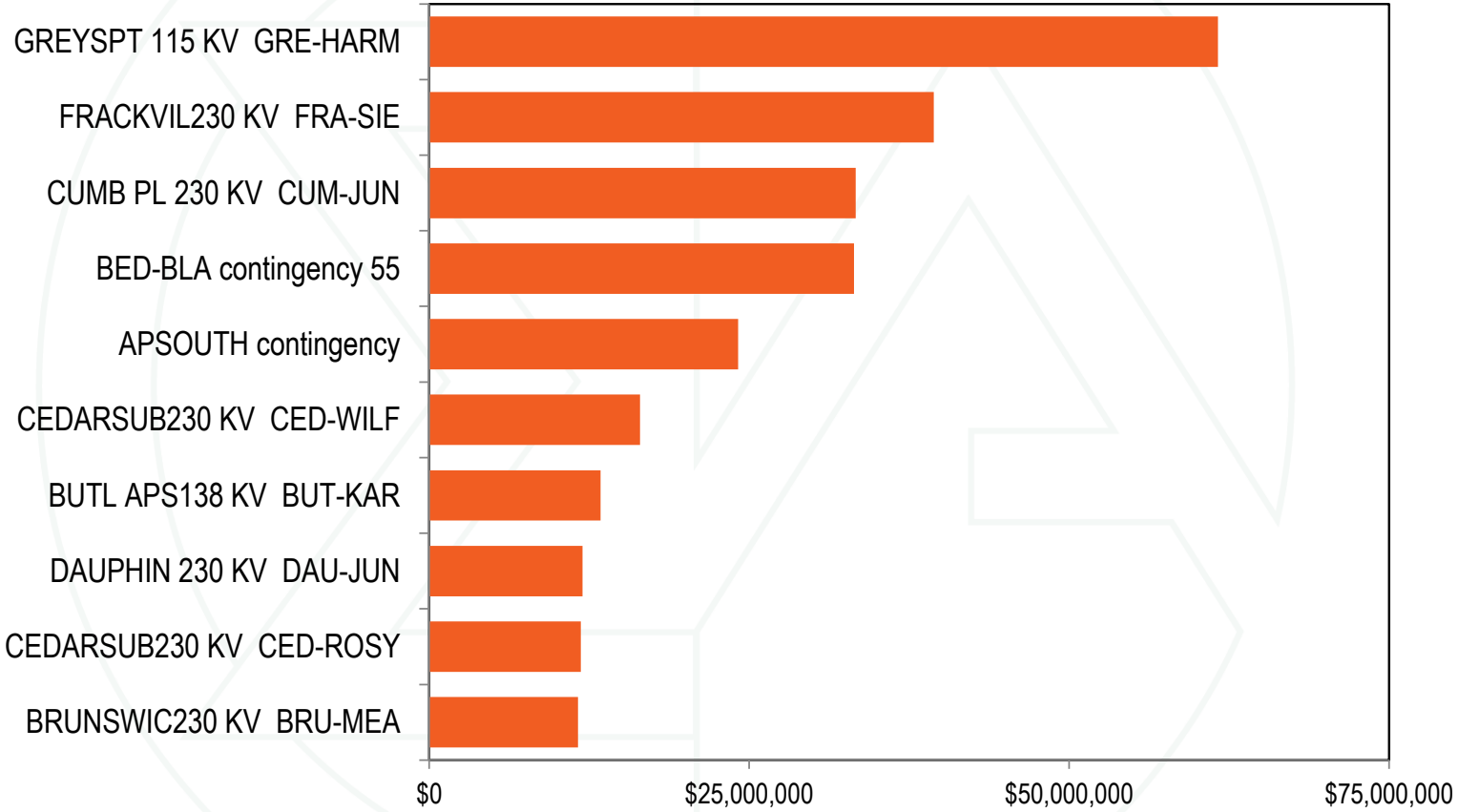
FTR Target Allocations: January 2022

- **FTR target allocations were higher in January 2022 than prior months in planning period.**
  - **Positive: $557.0 million**
  - **Negative: -$146.8 million**
  - **Net: $410.2 million**
- **January target allocations were 28.8 percent of total target allocations for first 8 months of 2021/2022 planning period**
- **Target allocation from GRE-HARM constraint in Dominion was 15.0 percent of January total ($61.6 million).**

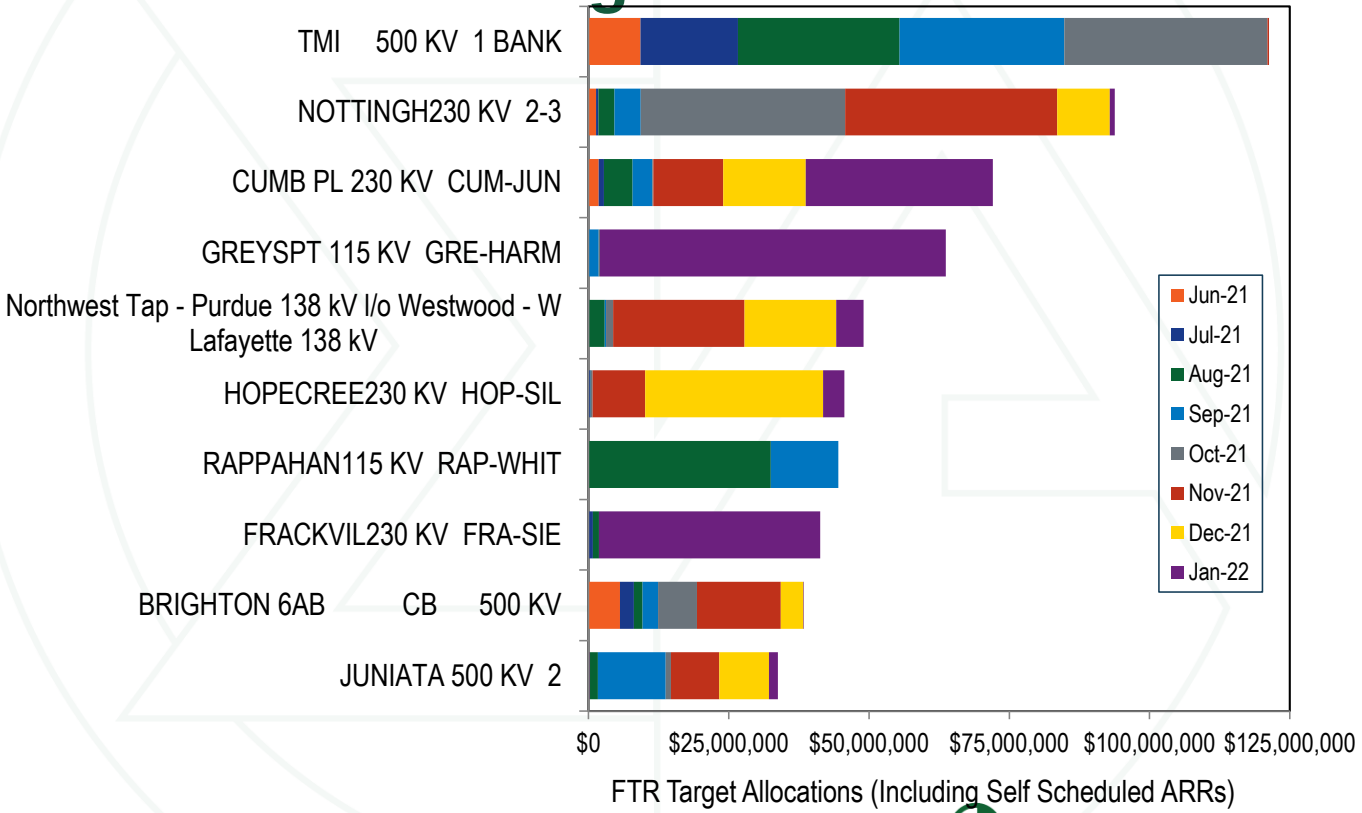
FTR Target Allocations: 2021/2022



FTR Target Allocations by Constraint: January 2022



FTR Target Allocations by Month: 2021/2022 Planning Period



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GRE-HARM Constraint: 2021/2022 Planning Period

- **Outage of Lanexa-Dunnsville beginning January 5.**
- **Result was 96.7 percent of total target allocation for planning year to date on GRE-HARM constraint in one month.**

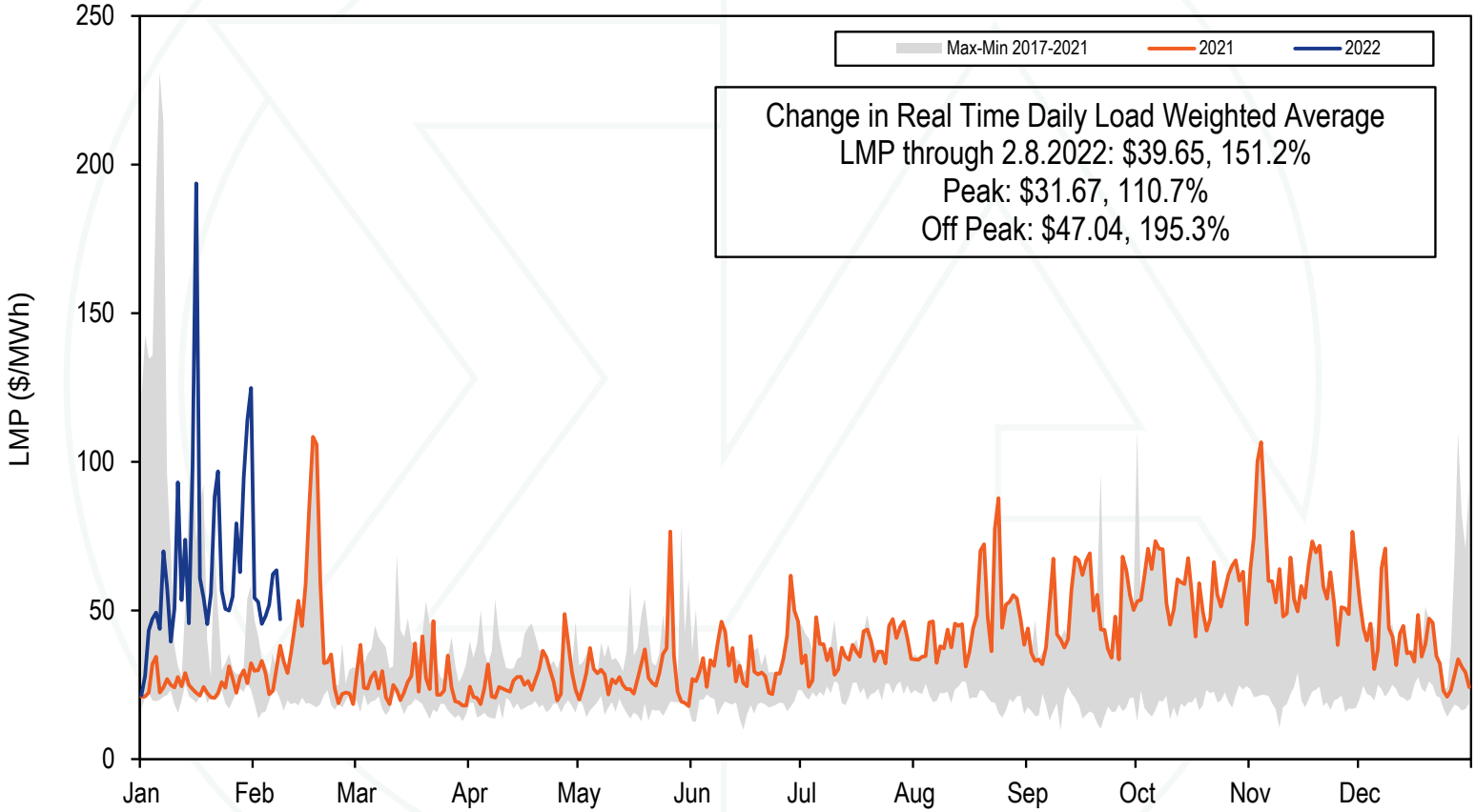
GRE-HARM FTR Over Allocation: January 2022

- **GRE-HARM constraint in January:**
  - **FTR target allocations: $61.6 million**
  - **Day-ahead congestion: $45.7 million**
  - **DA congestion less target allocations: $15.9 million**
  - **Mismatch between definition of congestion paid to FTRs and actual congestion.**

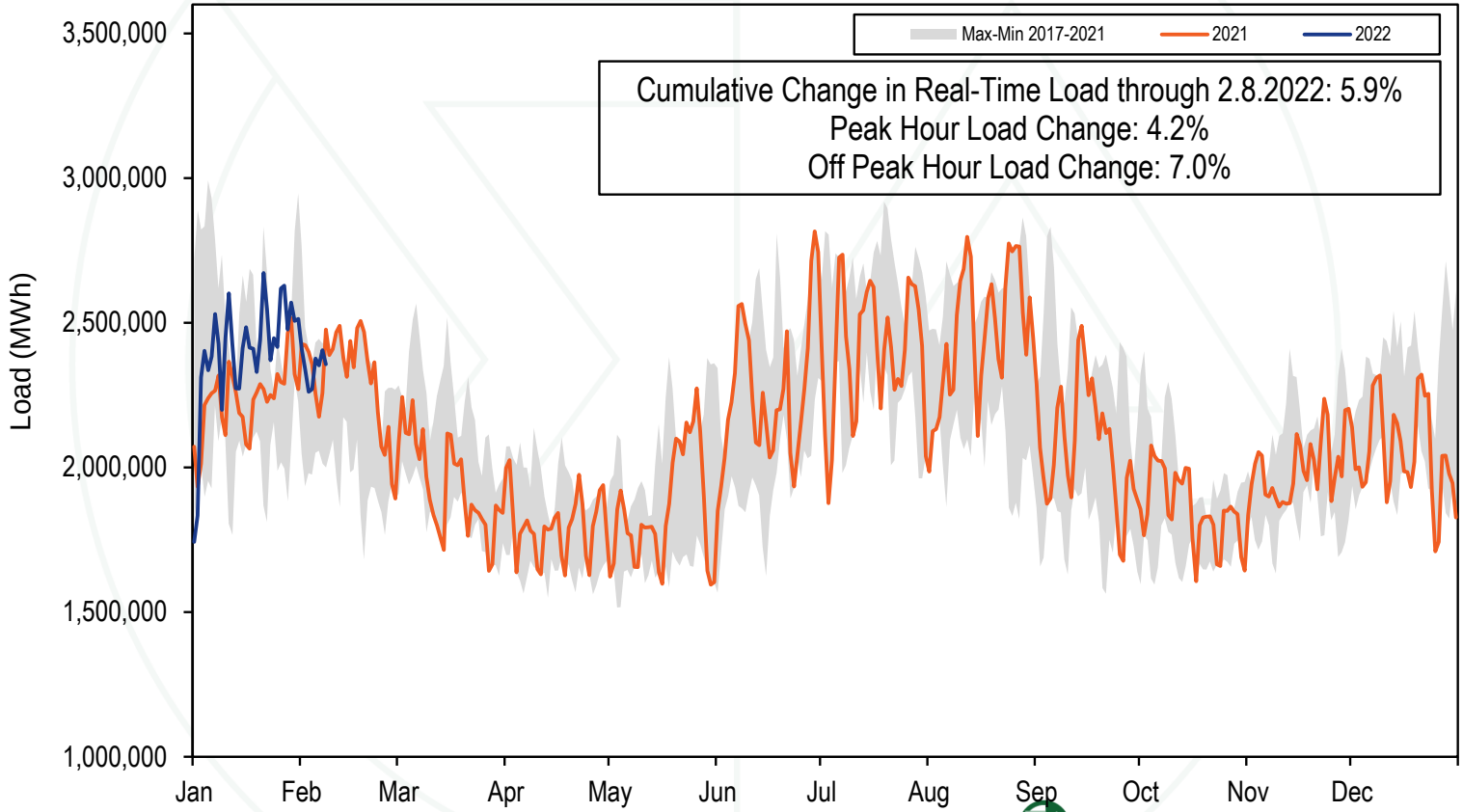
GRE-HARM FTR Over Allocation: January 2022

- **GRE-HARM constraint in January:**
  - **FTR target allocations: $61.6 million**
  - **Day-ahead congestion: $45.7 million**
  - **Balancing congestion: -$7.9 million**
  - **Total congestion: $37.8 million**
  - **Accounting for DA and balancing congestion, actual total congestion less target allocations: $23.8 million**
  - **Congestion is currently incorrectly defined to exclude balancing congestion.**
  - **Mismatch between definition of congestion paid to FTRs and actual, correctly defined, total congestion.**

2022 YTD PJM Real-Time LMP



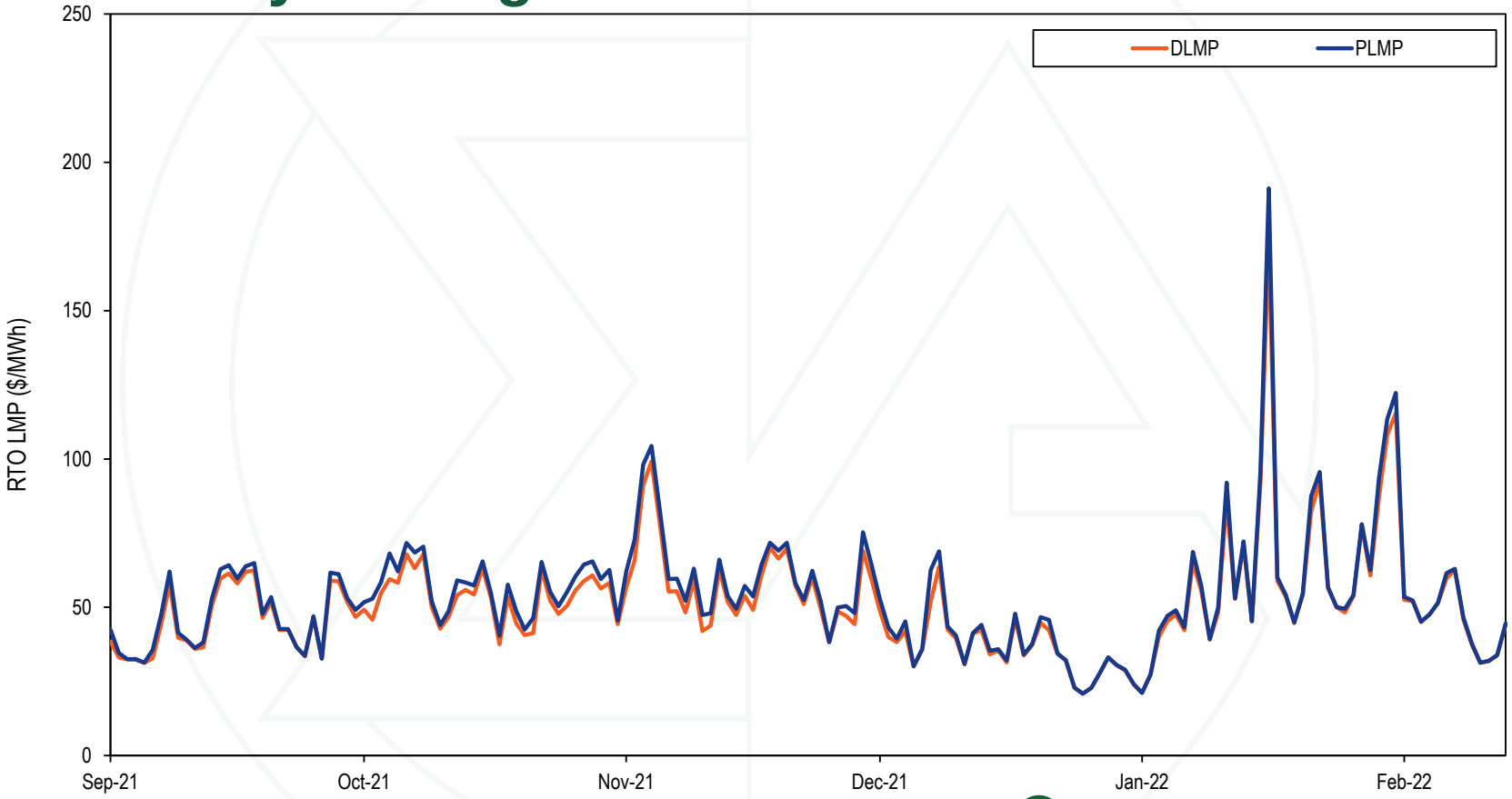
2022 YTD PJM Real-Time Daily Load



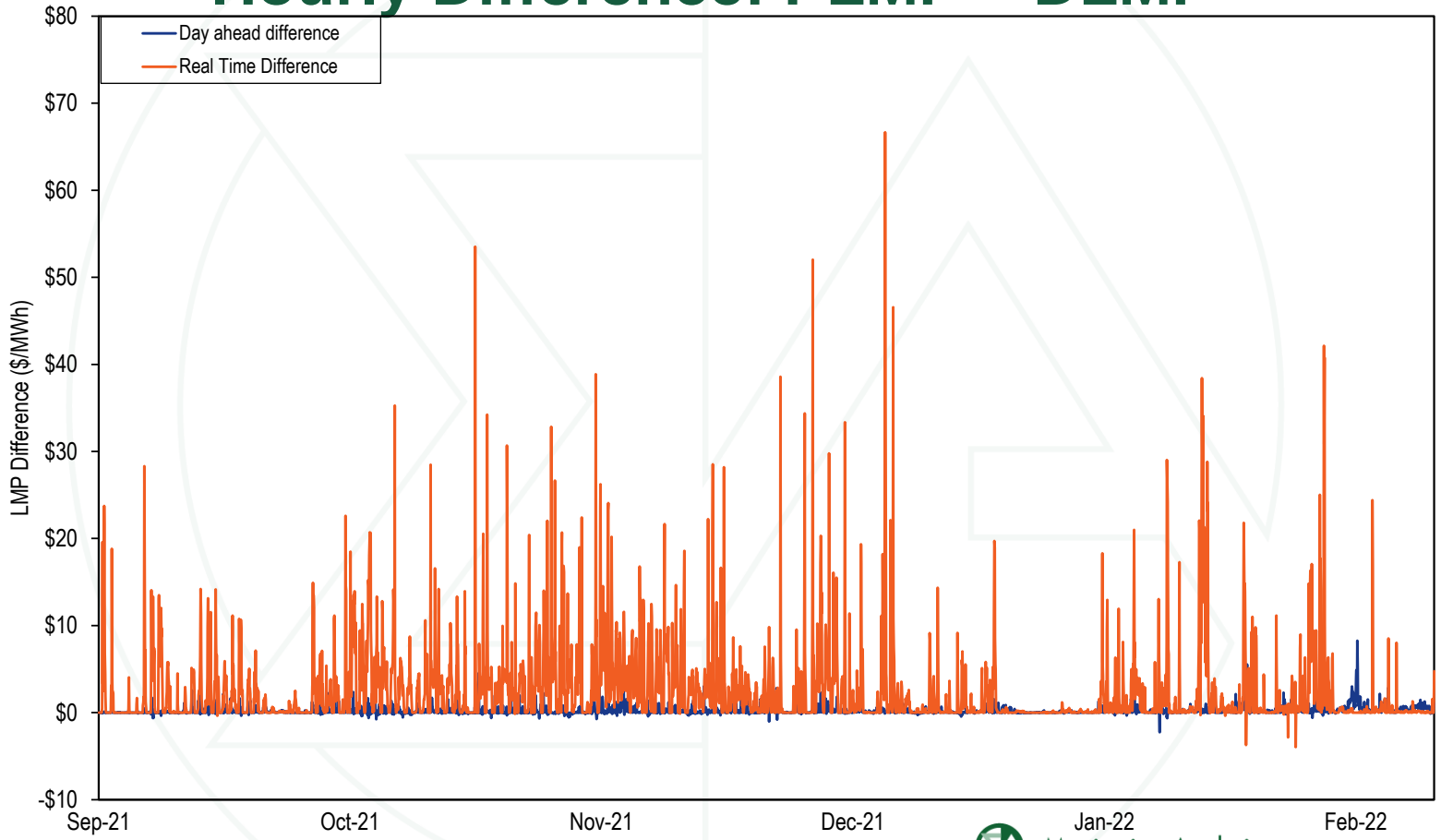
Monthly Average Load-Weighted PLMP and DLMP

		Day-Ahead Load-Weighted Average				Real-Time Load-Weighted Average			
Year	Month	DLMP	PLMP	Difference	Difference Percent	DLMP	PLMP	Difference	Difference Percent
2021	Sep	$46.00	$46.14	$0.13	0.3%	$47.74	$49.65	$1.90	4.0%
2021	Oct	$57.86	$57.98	$0.12	0.2%	$54.54	$58.43	$3.89	7.1%
2021	Nov	$60.76	$61.00	$0.24	0.4%	$59.30	$63.04	$3.74	6.3%
2021	Dec	$37.74	$37.85	$0.11	0.3%	$37.36	$38.91	$1.55	4.2%
2021	Sep - Dec	$50.30	$50.46	$0.15	0.3%	$49.48	$52.21	$2.73	5.5%
2022	Jan	$63.93	$64.15	$0.22	0.3%	$66.39	$69.02	$2.64	4.0%

Daily Average Real-Time PLMP and DLMP



Hourly Difference: PLMP – DLMP



Monitoring Analytics

Fast Start Units as a Percent of Marginal Units

		Pricing Run				Dispatch Run			
Year	Month	CT	Diesel	Wind	All Fast Start Units	CT	Diesel	Wind	All Fast Start Units
2021	Sep	6.7%	1.3%	0.0%	8.1%	2.2%	0.8%	0.0%	3.0%
2021	Oct	11.1%	2.1%	0.0%	13.3%	3.2%	1.4%	0.0%	4.6%
2021	Nov	11.3%	0.6%	0.0%	11.9%	3.2%	0.3%	0.0%	3.5%
2021	Dec	4.4%	0.6%	0.1%	5.2%	1.4%	0.3%	0.2%	1.8%
2022	Jan	5.0%	0.9%	0.2%	6.2%	1.3%	0.3%	0.2%	1.8%

Fast Start Impacts: Zonal Average Differences

2021 Sep - 2022 Jan								
	Day Ahead				Real Time			
Zone	Average DLMP	Average PLMP	Difference	Difference Pecent	Average DLMP	Average PLMP	Difference	Difference Pecent
AECO	$44.47	$44.58	$0.11	0.2%	$46.57	$48.48	$1.91	4.1%
AEP	$51.43	$51.60	$0.17	0.3%	$50.13	$52.28	$2.15	4.3%
APS	$53.65	$53.83	$0.18	0.3%	$52.97	$55.21	$2.24	4.2%
ATSI	$51.11	$51.27	$0.16	0.3%	$49.25	$51.32	$2.08	4.2%
BGE	$60.48	$60.66	$0.17	0.3%	$60.31	$63.09	$2.78	4.6%
COMED	$43.22	$43.39	$0.16	0.4%	$41.20	$43.53	$2.33	5.7%
DAY	$53.72	$53.89	$0.17	0.3%	$52.12	$54.28	$2.16	4.1%
DEOK	$52.48	$52.65	$0.17	0.3%	$50.20	$52.29	$2.09	4.2%
DOM	$58.80	$58.96	$0.16	0.3%	$60.08	$62.68	$2.60	4.3%
DPL	$50.72	$50.89	$0.18	0.3%	$51.29	$54.21	$2.92	5.7%
DUQ	$50.13	$50.29	$0.16	0.3%	$48.48	$50.50	$2.02	4.2%
EKPC	$52.51	$52.67	$0.17	0.3%	$50.80	$52.92	$2.12	4.2%
JCPL	$46.88	$46.99	$0.11	0.2%	$48.93	$51.09	$2.16	4.4%
METED	$55.78	$55.91	$0.13	0.2%	$56.00	$58.31	$2.31	4.1%
OVEC	$50.91	$51.08	$0.17	0.3%	$49.27	$51.32	$2.06	4.2%
PECO	$44.74	$44.84	$0.10	0.2%	$46.63	$48.59	$1.96	4.2%
PENELEC	$53.52	$53.69	$0.17	0.3%	$51.07	$52.99	$1.93	3.8%
PEPCO	$59.27	$59.44	$0.17	0.3%	$60.28	$63.04	$2.76	4.6%
PPL	$49.72	$49.84	$0.12	0.2%	$49.52	$51.58	$2.06	4.2%
PSEG	$48.07	$48.18	$0.11	0.2%	$50.07	$52.28	$2.20	4.4%
RECO	$50.57	$50.69	$0.11	0.2%	$52.17	$54.47	$2.30	4.4%

Fast Start Impacts: Hub Average Differences

	2021 Sep - 2022 Jan							
	Day Ahead				Real Time			
Hub	Average DLMP	Average PLMP	Difference	Difference Pecent	Average DLMP	Average PLMP	Differenc	Differenc e Pecent
AEP GEN HUB	$50.26	$50.43	$0.17	0.3%	$48.49	$50.53	$2.04	4.2%
AEP-DAYTON HUB	$50.61	$50.78	$0.17	0.3%	$48.80	$50.94	$2.14	4.4%
ATSI GEN HUB	$50.17	$50.33	$0.16	0.3%	$48.06	$50.10	$2.04	4.2%
CHICAGO GEN HUB	$42.48	$42.64	$0.16	0.4%	$40.16	$42.43	$2.28	5.7%
CHICAGO HUB	$43.50	$43.66	$0.17	0.4%	$41.47	$43.82	$2.35	5.7%
DOMINION HUB	$57.65	$57.80	$0.15	0.3%	$58.74	$61.24	$2.49	4.2%
EASTERN HUB	$49.84	$50.03	$0.19	0.4%	$50.54	$53.36	$2.82	5.6%
N ILLINOIS HUB	$43.17	$43.34	$0.17	0.4%	$41.11	$43.42	$2.32	5.6%
NEW JERSEY HUB	$47.04	$47.15	$0.11	0.2%	$49.03	$51.17	$2.14	4.4%
OHIO HUB	$50.28	$50.45	$0.17	0.3%	$48.27	$50.43	$2.16	4.5%
WEST INT HUB	$52.43	$52.59	$0.16	0.3%	$51.58	$53.79	$2.20	4.3%
WESTERN HUB	$55.34	$55.51	$0.17	0.3%	$53.84	$56.11	$2.27	4.2%

Zonal PLMP and DLMP Difference Frequency

	2021 Sep - 2022 Jan									
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%	1.3%	0.0%	0.9%	47.2%	45.4%	3.2%	1.6%	0.3%	0.1%
AECO	0.0%	1.4%	0.3%	6.8%	47.8%	39.6%	2.3%	1.2%	0.4%	0.2%
AEP	0.0%	1.3%	0.0%	1.1%	47.3%	45.3%	3.3%	1.2%	0.3%	0.1%
APS	0.0%	1.3%	0.0%	1.2%	47.4%	44.7%	3.3%	1.6%	0.3%	0.1%
ATSI	0.0%	1.3%	0.0%	1.5%	47.3%	45.3%	3.0%	1.1%	0.3%	0.1%
BGE	0.0%	1.3%	0.1%	2.7%	47.4%	41.5%	4.2%	2.1%	0.6%	0.2%
COMED	0.0%	1.3%	0.0%	2.2%	47.7%	43.8%	3.2%	1.3%	0.3%	0.1%
DAY	0.0%	1.3%	0.0%	1.3%	47.5%	45.0%	3.3%	1.3%	0.3%	0.1%
DEOK	0.0%	1.3%	0.0%	1.3%	47.5%	45.2%	3.2%	1.2%	0.3%	0.1%
DOM	0.0%	1.3%	0.1%	2.2%	47.6%	42.4%	3.8%	1.9%	0.5%	0.1%
DPL	0.0%	1.3%	0.1%	9.6%	47.8%	34.5%	2.7%	2.8%	0.8%	0.4%
DUQ	0.0%	1.3%	0.0%	1.7%	47.4%	45.1%	3.0%	1.1%	0.3%	0.1%
EKPC	0.0%	1.3%	0.0%	1.4%	47.5%	44.9%	3.2%	1.3%	0.3%	0.1%
JCPL	0.0%	1.3%	0.1%	3.5%	47.8%	42.8%	2.4%	1.3%	0.5%	0.2%
METED	0.0%	1.3%	0.2%	3.4%	47.5%	41.4%	3.4%	1.8%	0.7%	0.2%
OVEC	0.0%	1.3%	0.0%	1.4%	47.5%	45.1%	3.0%	1.2%	0.3%	0.1%
PECO	0.0%	1.3%	0.1%	8.4%	47.8%	38.2%	2.4%	1.2%	0.5%	0.2%
PENELEC	0.0%	1.3%	0.1%	1.4%	47.3%	44.8%	3.4%	1.3%	0.3%	0.1%
PEPCO	0.0%	1.3%	0.1%	2.8%	47.5%	41.5%	4.1%	2.1%	0.5%	0.2%
PPL	0.0%	1.3%	0.1%	3.2%	47.6%	42.9%	2.8%	1.5%	0.5%	0.1%
PSEG	0.0%	1.3%	0.1%	3.4%	47.8%	42.9%	2.6%	1.4%	0.5%	0.2%
RECO	0.0%	1.3%	0.1%	2.5%	47.5%	43.8%	2.6%	1.5%	0.5%	0.2%

Intermittent Generation in Excess of ICAP: 2019

	2019 Summer Testing Hours (June through August, 2pm - 6pm)		
	MWh	MWh > ICAP	Percent
Solar	281,924.2	74,348.8	26.4%
Wind	559,859.2	308,554.1	55.1%
Solar & Wind	841,783.4	382,902.9	45.5%

Intermittent Generation in Excess of ICAP: 2020

	2020 Summer Testing Hours (June through August, 2pm - 6pm)		
	MWh	MWh > ICAP	Percent
Solar	367,693.5	90,858.6	24.7%
Wind	463,991.8	226,610.6	48.8%
Solar & Wind	831,685.3	317,469.2	38.2%

Intermittent Generation in Excess of ICAP: 2021

	2021 Summer Testing Hours (June through August, 2pm - 6pm)		
	MWh	MWh > ICAP	Percent
Solar	756,448.6	222,893.6	29.5%
Wind	565,146.0	281,788.1	49.9%
Solar & Wind	1,321,594.6	504,681.7	38.2%

Intermittent Generation in Excess of ICAP: 2019-2021

	2019 - 2021 Summer Testing Hours (June through August, 2pm - 6pm)		
	MWh	MWh > ICAP	Percent
Solar	1,406,066.2	388,100.9	27.6%
Wind	1,588,997.1	816,952.9	51.4%
Solar & Wind	2,995,063.3	1,205,053.8	40.2%

Intermittent Generation Above ICAP

- **Definitions:**
  - **ICAP is the derated MW value of a resource**
  - **ICAP is the amount of capacity sold in the PJM capacity market**
  - **ICAP equals CIR value**

Intermittent Generation Above ICAP

- **Summer testing hours are defined by PJM as the 368 hours between 2pm and 6pm, beginning on June 1 and ending on August 31.**
- **For each wind and solar generator, hourly generation was compared to the generator's ICAP over three summer testing periods, 2019-2021.**
- **The MWh in excess of ICAP equals the sum of the hourly generation in excess of the MWh produced by the rated ICAP during the summer testing hours.**

Wind and Solar ICAP

Fuel	Current ICAP (MW)	ICAP based on Max MWH: $ICAP_1$ (MW)	ICAP based on Max MWH: Percent Difference	ICAP based on current CIR levels: $ICAP_2$ (MW)	ICAP based on current CIR levels: Percent Difference
Solar	1,818.4	3,563.3	96.0%	1,455.6	(20.0%)
Wind	1,575.4	8,922.2	466.3%	804.7	(48.9%)
Wind & Solar	3,393.8	12,485.5	267.9%	2,260.3	(33.4%)

ICAP Calculations

- **Current ICAP: ICAP rating using Appendix B of PJM Manual 21**
  - **Manual 21 uses the terms rated ICAP and UCAP for the same concept.**
- **$ICAP_1$: the maximum generation for each wind and solar generator over three summer testing periods.**
- **$ICAP_2$: the value obtained by capping the hourly generation for each wind and solar generator at the CIR and applying the method in Appendix B of PJM Manual 21.**

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