IMM Quarterly Report: Winter 2024

MISO Independent Market Monitor

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Highlights and Findings: Winter 2024

- The MISO markets performed competitively this winter.
- Energy prices fell by a third compared to last year because gas prices fell roughly one quarter, and no emergency pricing occurred (unlike last winter).
  - ✓ Average load fell one percent, and the peak load of 107 GW that occurred during Winter Storm Heather in January was similar to last winter.
  - ✓ A new record winter peak load of 32.6 GW in the South occurred on Jan. 17.
- Temperatures during Winter Storm Heather were comparably cold as during Winter Storms Uri and Elliott. MISO managed the system reliably with no emergency declarations and limited supplemental commitments.
  - ✓ High expected real-time prices led to increased virtual load during Heather, causing higher unit commitments, lower supplemental commitments and lower RSG. The virtual load lost money as real-time prices were moderate.
- Real-time congestion fell by 37 percent because of lower gas prices, but day-ahead congestion rose 18 percent primarily because of day-ahead constraint violations during the winter event we discuss in this report.
- Uplift remained low because of improvements in MISO's commitment processes and reduced natural gas prices.

Quarterly Summary

Winter

		Value	Change[1] Prior Qtr.	Change[1] Prior Year
RT Energy Prices ($/MWh)	🟣	$31.51	*-1%*	*-34%*
Fuel Prices ($/MMBtu)				
Natural Gas - Chicago	🟣	$3.10	*33%*	*-25%*
Natural Gas - Henry Hub	🟣	$2.78	*0%*	*-28%*
Western Coal	🟢	$0.79	*-2%*	*-10%*
Eastern Coal	🟢	$1.80	*-7%*	*-63%*
Load (GW)[2]				
Average Load	🟢	75.5	*5%*	*-1%*
Peak Load	🟢	107.1	*-7%*	*0%*
% Scheduled DA (Peak Hour)	🟢	99.8%	100.5%	98.4%
Transmission Congestion ($M)				
Real-Time Congestion Value	🟣	$510.1	*-13%*	*-37%*
Day-Ahead Congestion Revenue	🟣	$371.4	*1%*	*18%*
Balancing Congestion Revenue[3]	🟢	$17.1	$20.1	-$48.5
Ancillary Service Prices ($/MWh)				
Regulation	🟢	$9.21	*-18%*	*-43%*
Spinning Reserves	🟢	$1.82	*-38%*	*-62%*
Supplemental Reserves	🟢	$0.17	*-63%*	*-94%*

		Value	Change[1] Prior Qtr.	Change[1] Prior Year
FTR Funding (%)	🟢	97%	95%	104%
Wind Output (MW/hr)	🟣	11,792	*8%*	*-6%*
Wind Curtailed (MW/hr)	🟣	402	*-27%*	*-13%*
Guarantee Payments ($M)[4]				
Real-Time RSG	🟣	$13.2	*179%*	*-63%*
Day-Ahead RSG	🟣	$11.4	*23%*	*-4%*
Day-Ahead Margin Assurance	🟣	$11.7	*-6%*	*-62%*
Real-Time Offer Rev. Sufficiency	🟢	$2.0	*71%*	*139%*
Price Convergence[5]				
Market-wide DA Premium	🟢	8.7%	-1.2%	-15.7%
Virtual Trading				
Cleared Quantity (MW/hr)	🟢	22,334	*-6%*	*-5%*
% Price Insensitive	🟢	48%	47%	52%
% Screened for Review	🟢	2%	3%	2%
Profitability ($/MW)	🟢	$0.3	$0.9	$1.8
Dispatch of Peaking Units (MW/hr)	🟢	1,316	1,509	761
Output Gap- Low Thresh. (MW/hr)	🟢	63	36	141

Key:
- 🟢 Expected
- 🟣 Monitor/Discuss
- 🔴 Concern

Notes:
1. Values not in italics are the values for the past period rather than the change.
2. Comparisons adjusted for any change in membership.
3. Net real-time congestion collection, unadjusted for M2M settlements.
4. Includes effects of market power mitigation.
5. Values include allocation of RSG.

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Highlights for Winter 2024

Gas Prices and Market Impacts (Slides 14-16, 34-35)

- Gas prices fell between 25 and 28 percent, impacting energy prices, the gas share of energy output, congestion, and uplift.
  - ✓ Excluding Winter Storm Heather, gas prices fell between 40 and 50 percent.
  - ✓ High production, and high storage levels and low withdrawals led to falling gas prices, reaching the lowest prices adjusted for inflation since 1997.
  - ✓ Real-time energy prices fell more than a third, and prices for ancillary services fell between 43 and 94 percent.
- Day-ahead RSG fell 4 percent, while real-time RSG fell 63 percent.
  - ✓ While gas prices have contributed to much of this reduction, MISO has also made significant improvements in its commitment processes.
  - ✓ Removal of the online headroom requirement in LAC in January 2023 led to a significant decrease in recommended real-time commitments.

Highlights for Winter 2024

Congestion Patterns in MISO Footprint (Slides 27-32)

- Real-time congestion fell 37 percent year over year, in line with falling gas prices, while day-ahead congestion rose 18 percent.
  - ✓ Lower average wind and exports on net to Manitoba due to ongoing drought conditions there led to different congestion patterns year over year.
  - ✓ Hourly exports to Manitoba averaged almost 100 MW.
  - ✓ Flows across the RDT were typically in the South to North direction during the quarter, except during Winter Storm Heather when flows were North to South.
- MISO operators took fewer out of market actions to manage difficult constraints, resulting in more efficient market outcomes.
  - ✓ MISO took 84 percent fewer manual re-dispatch actions than last winter;
  - ✓ Instead, it utilized transmission constraint demand curve (TCDC) increases twice as much, which allows the market to secure more congestion relief.
- Roughly half of the $32 million FTR shortfall was caused by a late-reported transmission outage requested in early December to begin in January.
- Almost one third of all real-time congestion occurred on just 4 days during Winter Storm Heather, which we discuss in detail.

Highlights for Winter 2024

Summary of Winter Storm Heather (Slide 19)

- In mid-January, significant storms impacted the MISO region in close succession. MISO effectively managed the system with no emergencies.
  - ✓ A polar vortex produced record low temperatures in most of Midwest, including SPP, MISO, and later Southern Company and TVA during a holiday weekend.
  - ✓ Multiple pipelines signaled restrictions would likely be declared to manage the competing gas demands for power and heating.
  - ✓ Because gas trading is limited over the holiday weekend, concerns about fuel supply led multiple units to increased notification times.
  - ✓ Gas prices were volatile and we actively managed and updated generators' reference levels to avoid inappropriate market power mitigation.
- MISO managed the system reliably, applying lessons learned from prior storms
  - ✓ MISO increased its STR requirements to reflect the added uncertainty, which improved the markets' commitments and pricing.
  - ✓ MISO did not declare an emergency or substantially overcommit resources.
  - ✓ Wind set a new record at almost 26 GW and averaged roughly 16 GW throughout the event.
  - ✓ System-wide hourly real-time prices peaked at just over $200/MWh.

Highlights for Winter 2024

<u>Interchange and Interface Pricing in Winter Storm Heather (Slides 20-22)</u>

- As in prior storms, wheels and external transactions were unusually large.
- MISO supported extensive exports and wheels from PJM and Canada to SPP in the first two days of the storm.
  - ✓ Almost 1.2 GW of power wheeled west through MISO vs. 1.5 GW in Uri.
    - – Fewer generation outages in Heather facilitated congestion management around the wheels, and the wheels caused fewer constraints that were hard to manage.
- As the storm moved east, transaction patterns changed on January 16 and 17.
  - ✓ Imports from PJM and wheels to SPP dropped sharply.
  - ✓ Ontario began wheeling power to PJM and MISO began exporting up to 2000 MW to Southern Co. while maintaining roughly 1200 MW of exports to SPP.
- The flaws in the calculation of the interface prices at the border with SPP and PJM distort the incentives to schedule imports and exports.
  - ✓ At the SPP interface, MISO includes external congestion in its interface price that is fully priced in SPP's interface price ("double pricing" the congestion).
  - ✓ During this event, this flaw reduced the incentive to flow power from MISO to SPP by $10.60 per MWh on average, although the distortion can be volatile.

Highlights for Winter 2024

<u>Uncertainty Management and Virtual Load during Heather (Slides 25)</u>

- MISO anticipated increased uncertainty going into the events and adjusted the Short-Term Reserve requirements to manage it, leading to fewer commitments.
  - ✓ STR requirements averaged over 5000 MW and were as high as 6000 MW, compared to a range of 4000 MW to 4300 MW during Elliott.
  - ✓ MISO exercised good judgment in commitment decisions and avoided unnecessary uplift, deferring decisions until necessitated by offered lead times.
- Virtual load scheduled high in the day-ahead market, likely because of real-time price expectations based on experiences during Uri and Elliot.
  - ✓ This led to high day-ahead scheduled load and commitments in the day-ahead, reducing the need for MISO to make additional commitments, lowering RSG.
    - – Real-time RSG totaled $5 million, compared to almost $90 million incurred in Winter Storm Uri and $15 million in Elliott.
  - ✓ On net, virtual demand lost $31 million, compared to profits of $28 million and $97 million in Winter Storms Uri and Elliott, respectively.
    - – Most of the losses were related to high day-ahead energy components of LMPs, as the high expected real-time prices failed to materialize.

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Highlights for Winter 2024

<u>Congestion Issues During Winter Storm Heather (Slides 23-24)</u>

- Overall, congestion was more manageable during Heather than in prior storms.
- On January 14, poor information on transmission flows led to a large transmission violation – post-contingent flows > 150% of the rating.
  - ✓ This caused MISO to declared a Safe Operating Mode to be able to redispatch generation in PJM.
  - ✓ This raises substantial concerns regarding the information some participants provide to MISO, which can impact reliability.
  - ✓ The same participant failed to provide SCADA data on a nuclear unit, which impacted MISO’s response to it tripping offline in mid-February.
- On January 15 and 16, MISO effectively ran out of generation in the Southeast Texas Load pocket, resulting in severe congestion.
  - ✓ The concerns were mitigated after generation dually-connected with ERCOT switched to MISO on the morning of January 16.
  - ✓ This underscores our concern that MISO’s capacity zones do not reflect clear load pockets that have discrete needs – this prevents the market from providing incentives to address such concerns.

Other Issues

Demand Response Participation in MISO

- FERC has agreed to settlements totaling more than $100 million with Demand Response Resources (DRR) that we referred to FERC for market manipulation.
  - ✓ The latest DRR agreed to a settlement of more than $66 million in January, of which 84 percent is disgorgement that will be returned to MISO customers.
  - ✓ We have been working with MISO on tariff changes to reduce its exposure to manipulation from DRRs, which is inherent when demand is treated as supply.
- FERC is also seeking $27 million from a DR provider that allegedly offered DR fraudulently in the PRA from customers not under contract.
  - ✓ This conduct is reminiscent of concerns we have had previously regarding substantial quantities of energy efficiency from an entity that had no contracts with customers and took no actions to cause any load reductions.
  - ✓ In this case, following an audit by the IMM, MISO disqualified the participant.
- These cases highlight a concern that MISO should be much more active in enforcing compliance with its tariff and validating information provided by participants in general, and particularly for DR providers.

Reliability Imperative, Attributes and Planning

- NERC recently issued a report finding serious reliability concerns in MISO.
- In its response to the Reliability Imperative, MISO endorsed these concerns that largely derive from the loss of attributes as dispatchable resources retire.
- MISO is soon taking a critical step by filing a proposal to accredit capacity resources based on their marginal reliability value, which provides:
  - ✓ Critical incentives to invest and maintain resources that provide key attributes;
  - ✓ Important signals to inform state and utility planning efforts.
- These efforts and messages are having meaningful effects as multiple utilities have announced multi-billion initiatives to build new gas-fired resources.
  - ✓ Together with proposed projects in the queue, new gas resources total more than 30 GW of new and re-powered gas-fired resources.
  - ✓ These initiatives, together with proposed storage and hybrid resources, are critical for reliability but are not consistent with MISO's planning Futures.
  - ✓ We remain concerned that reliance on increasingly unrealistic Future 2A (and 1A) will lead to poor and costly long-range transmission planning decisions.
    - – We continue to discuss the process and potential improvements with MISO planning staff and market participants.

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Submittals to External Entities and Other Issues

During the Winter Quarter, we:

- Responded to several FERC questions related to prior referrals and FERC investigations, and we responded to requests for information on market issues.
- Presented the IMM Fall Quarterly report to the MSC and recent market results to the ERSC.
- Filed comments in support of MDU’s complaint regarding market-to-market coordination of the Charlie Creek constraint in SPP.
- Continued working with MISO to review proposals to revise the M2M “firm flow entitlement” allocation, which will have large economic impacts.
- Worked with MISO on recommended operational improvements and produced memos and summaries of the recommendations.
- Met with OMS on market issues and transmission planning issues.
- Continued working with MISO and participants to address concerns with the results of Future 2A to be used for LRTP Tranche 2.

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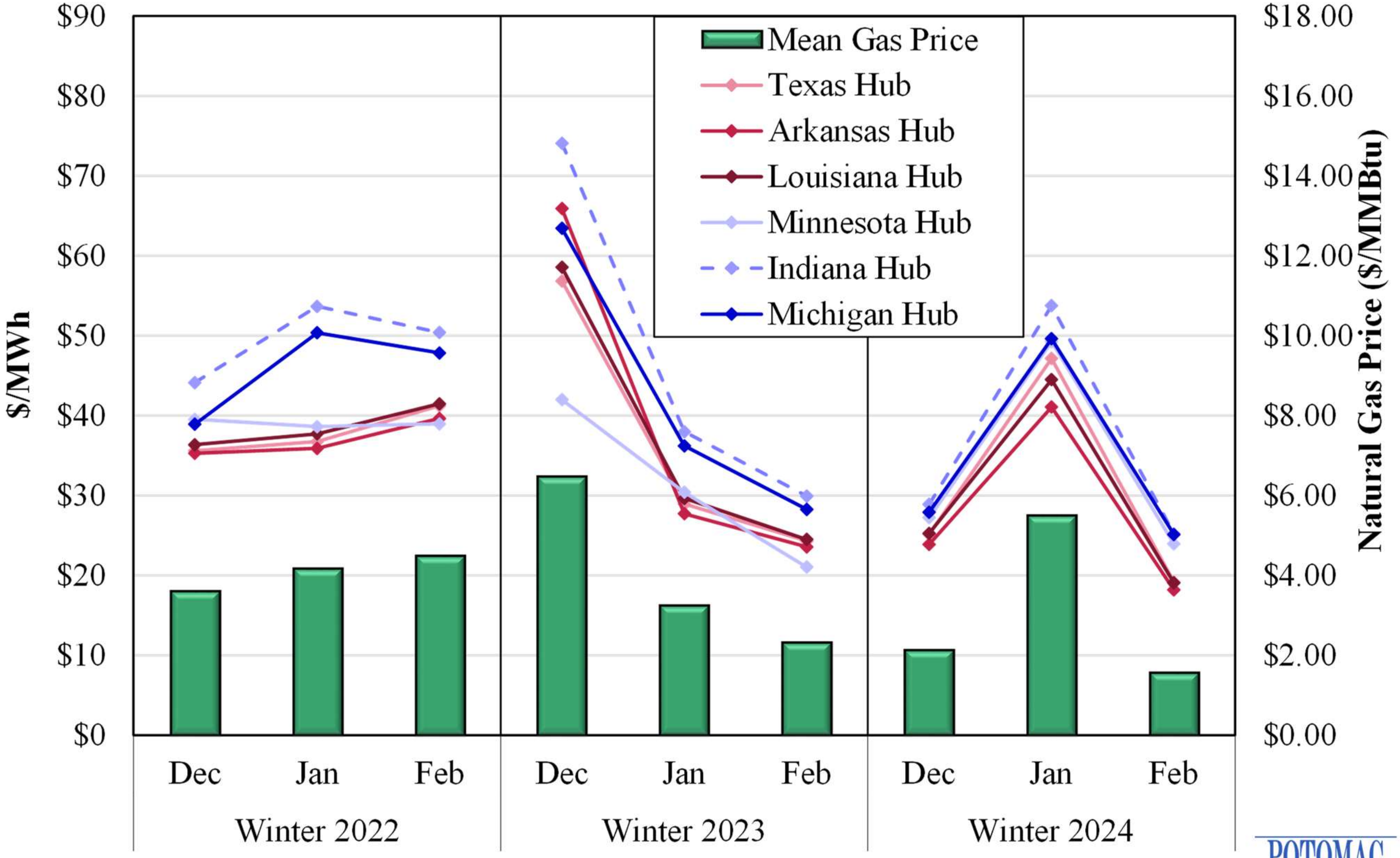
Day-Ahead Average Monthly Hub Prices Winter 2022–2024



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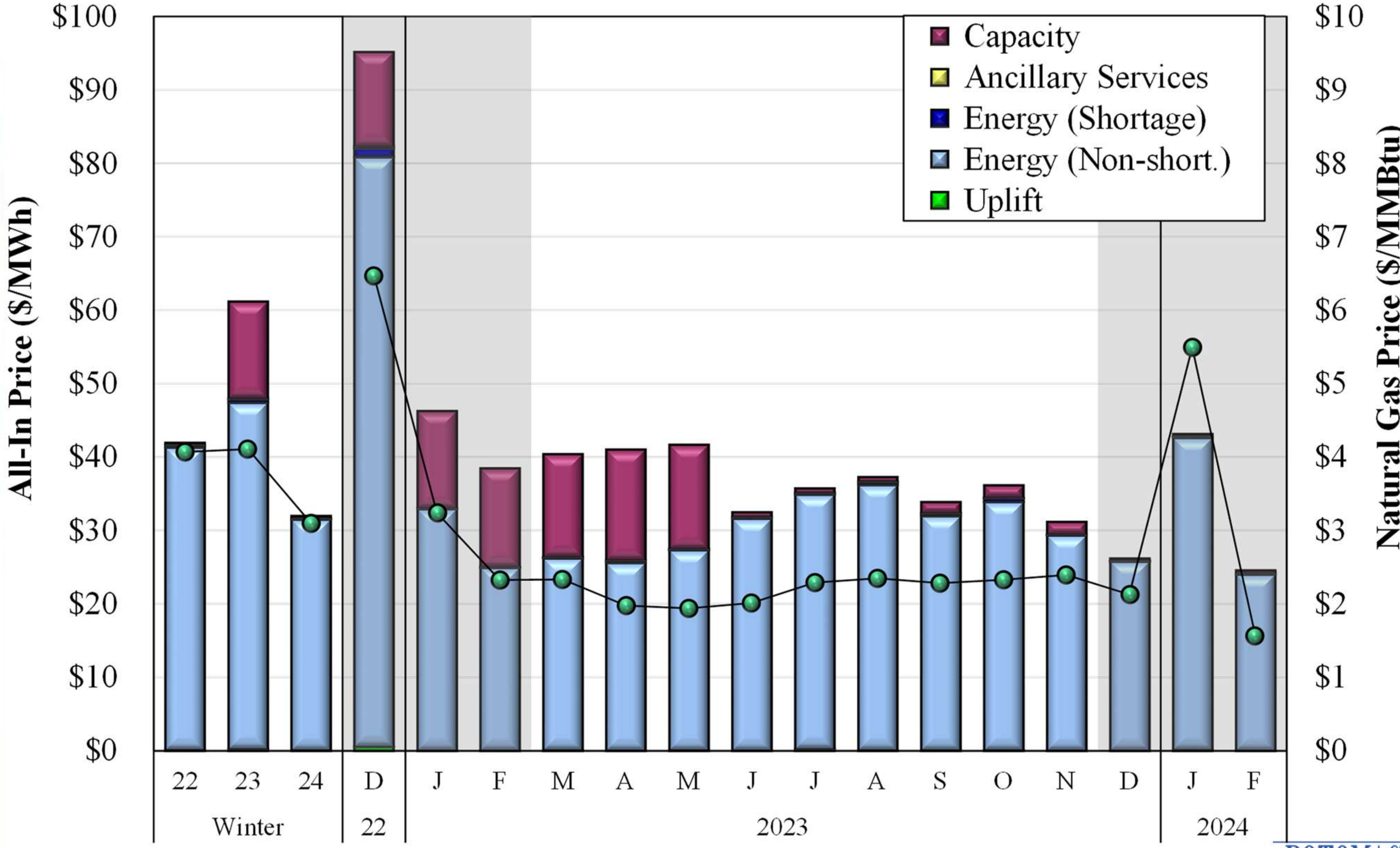
All-In Price
Winter 2022 – 2024



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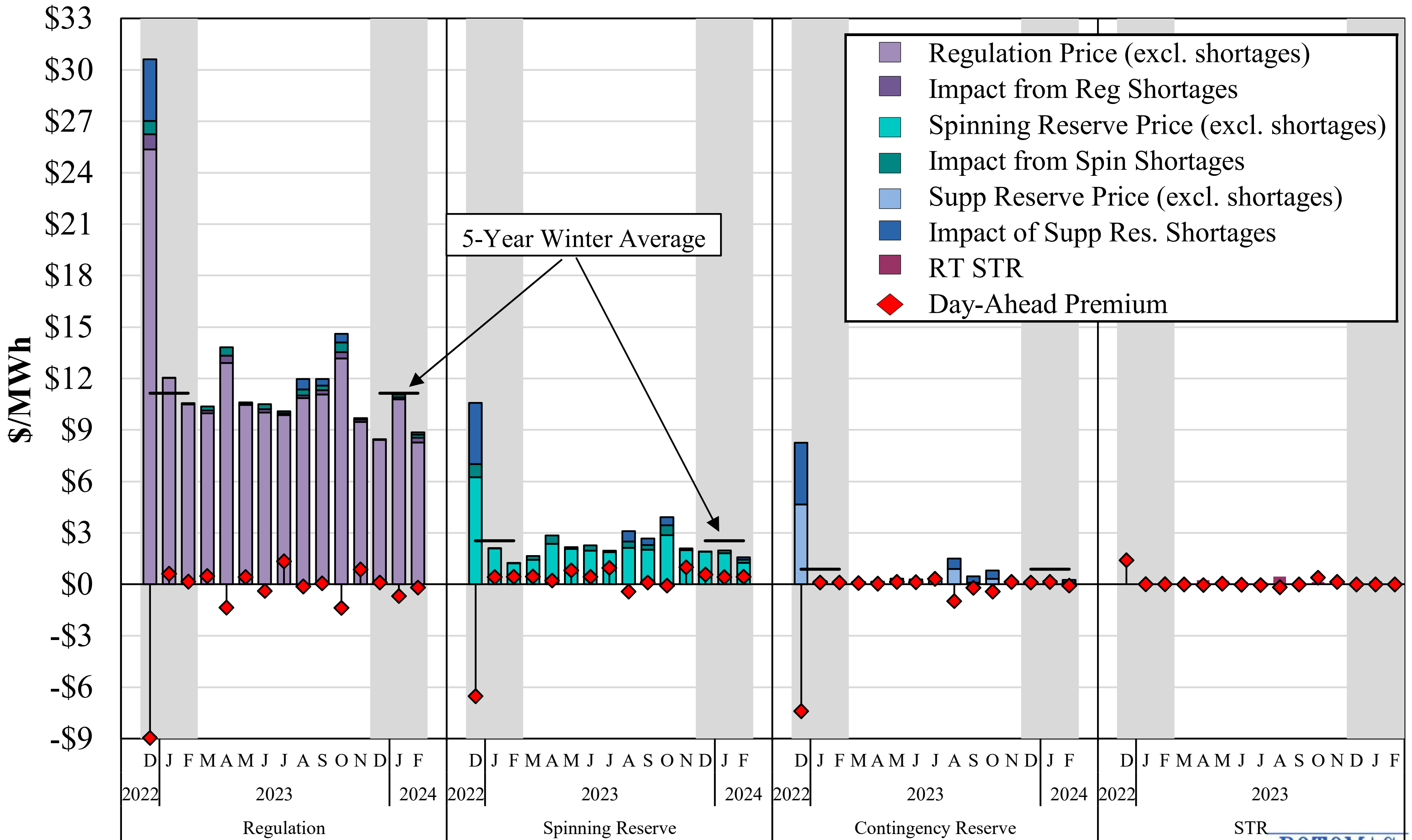
Ancillary Services Prices
Winter 2023–2024



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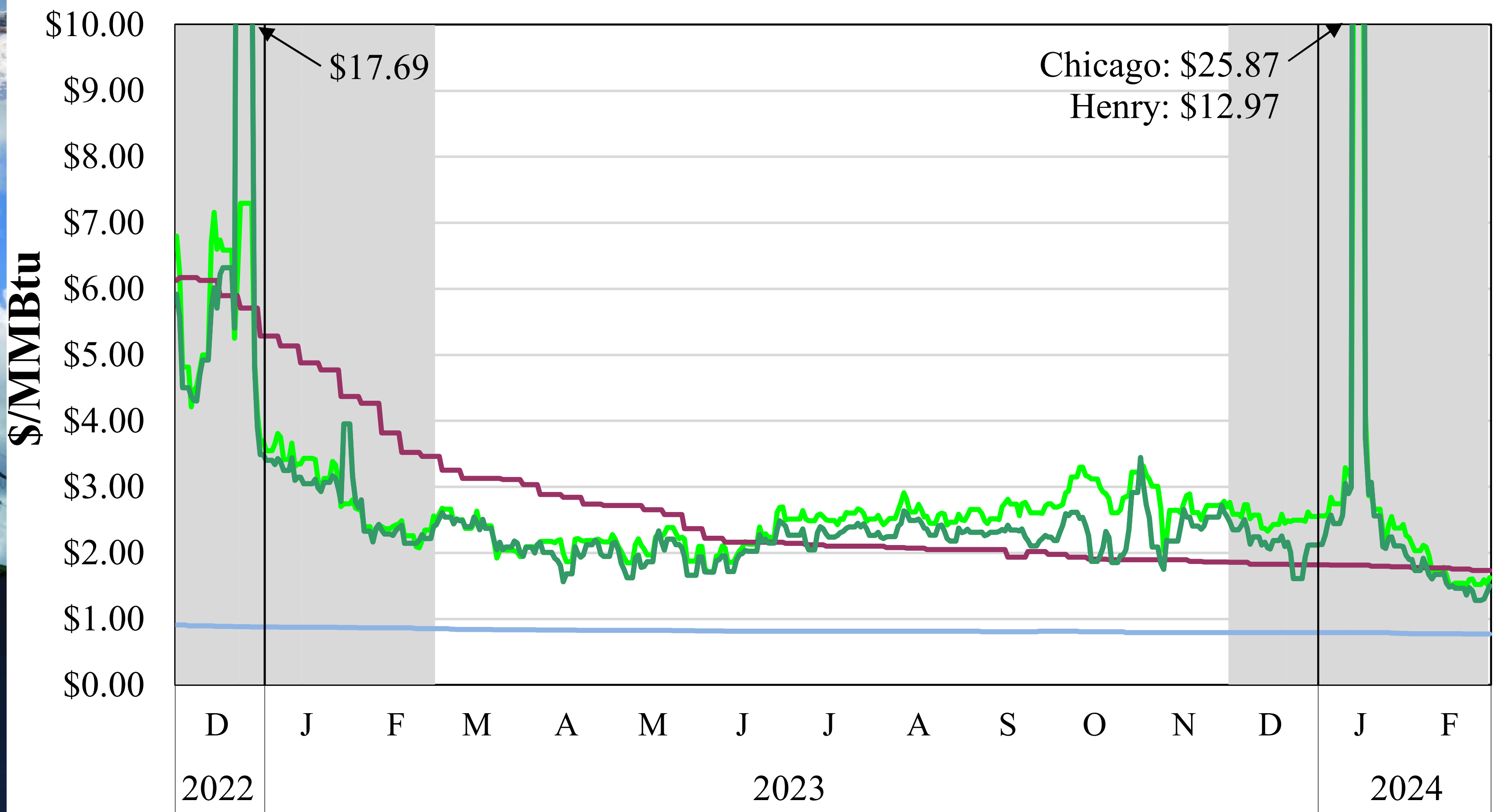
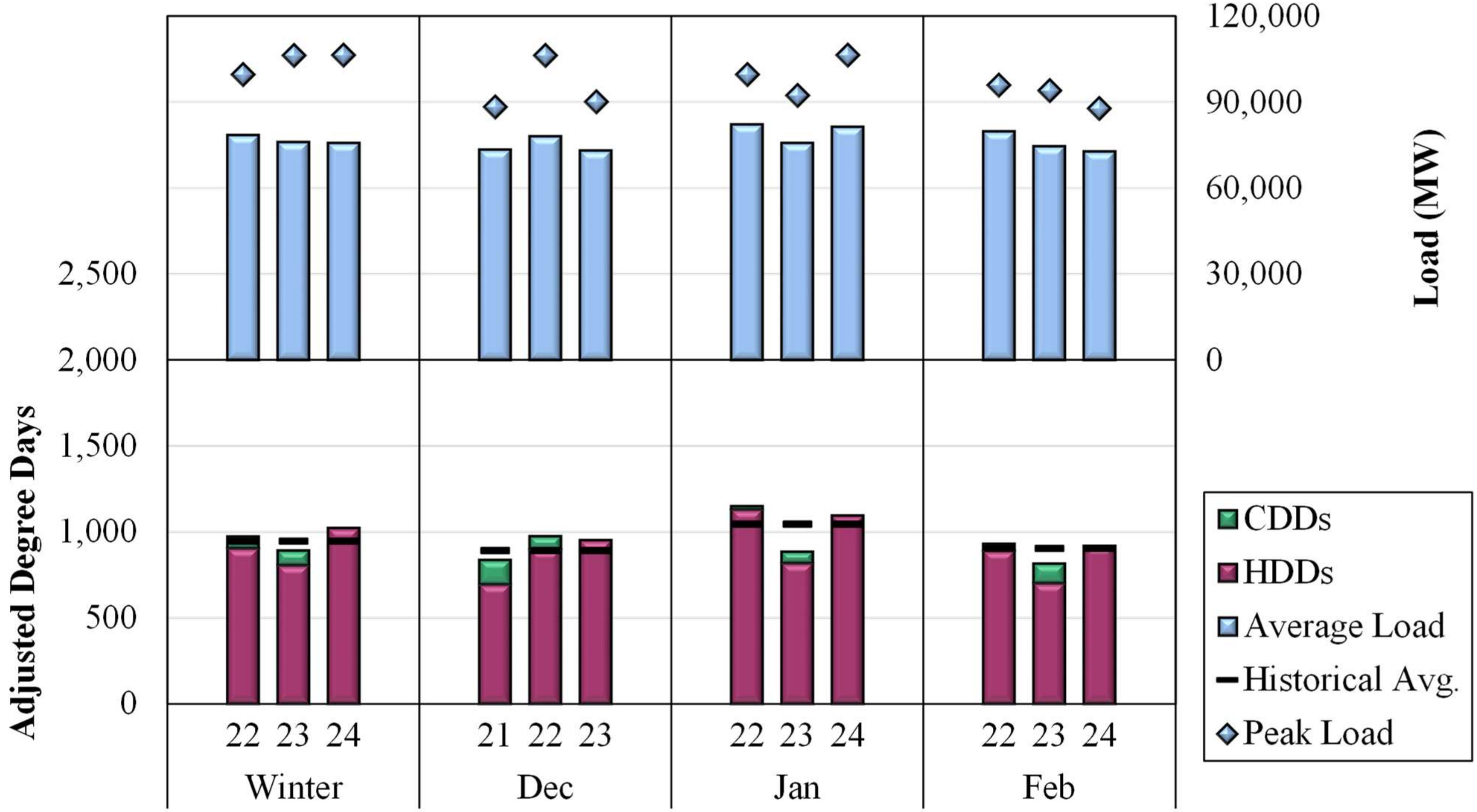
MISO Fuel Prices 2023–2024



Winter Average	2022	2023	2024
Chicago NG	$4.07	$4.11	$3.10
Henry NG	$4.20	$3.85	$2.78

Winter Average	2022	2023	2024
IB Coal	$3.53	$4.92	$1.82
PRB Coal	$1.45	$0.88	$0.79

Load and Weather Patterns
Winter 2022–2024



Notes: Midwest degree day calculations include four reprentative cities: Indianapolis, Detroit, Milwaukee and Minneapolis. The South region includes Little Rock and New Orleans.

Capacity, Energy and Price Setting Share Winter 2023–2024

Winter	Unforced Capacity				Energy Output		Price Setting			
	Total (MW)		Share (%)		Share (%)		SMP (%)		LMP (%)	
	2023	2024	2023	2024	2023	2024	2023	2024	2023	2024
Nuclear	10,905	10,823	9%	8%	16%	13%	0%	0%	0%	0%
Coal	40,267	38,595	32%	30%	30%	31%	30%	43%	71%	82%
Natural Gas	60,600	62,317	48%	48%	33%	38%	69%	57%	94%	95%
Oil	1,448	1,469	1%	1%	0%	0%	0%	0%	0%	1%
Hydro	4,034	4,221	3%	3%	1%	1%	1%	0%	2%	1%
Wind	4,769	4,948	4%	4%	17%	16%	0%	0%	65%	53%
Solar	2,268	4,398	2%	3%	0%	1%	0%	0%	1%	2%
Other	2,855	2,679	2%	2%	3%	0%	0%	0%	2%	1%
Total	**127,147**	**129,451**								

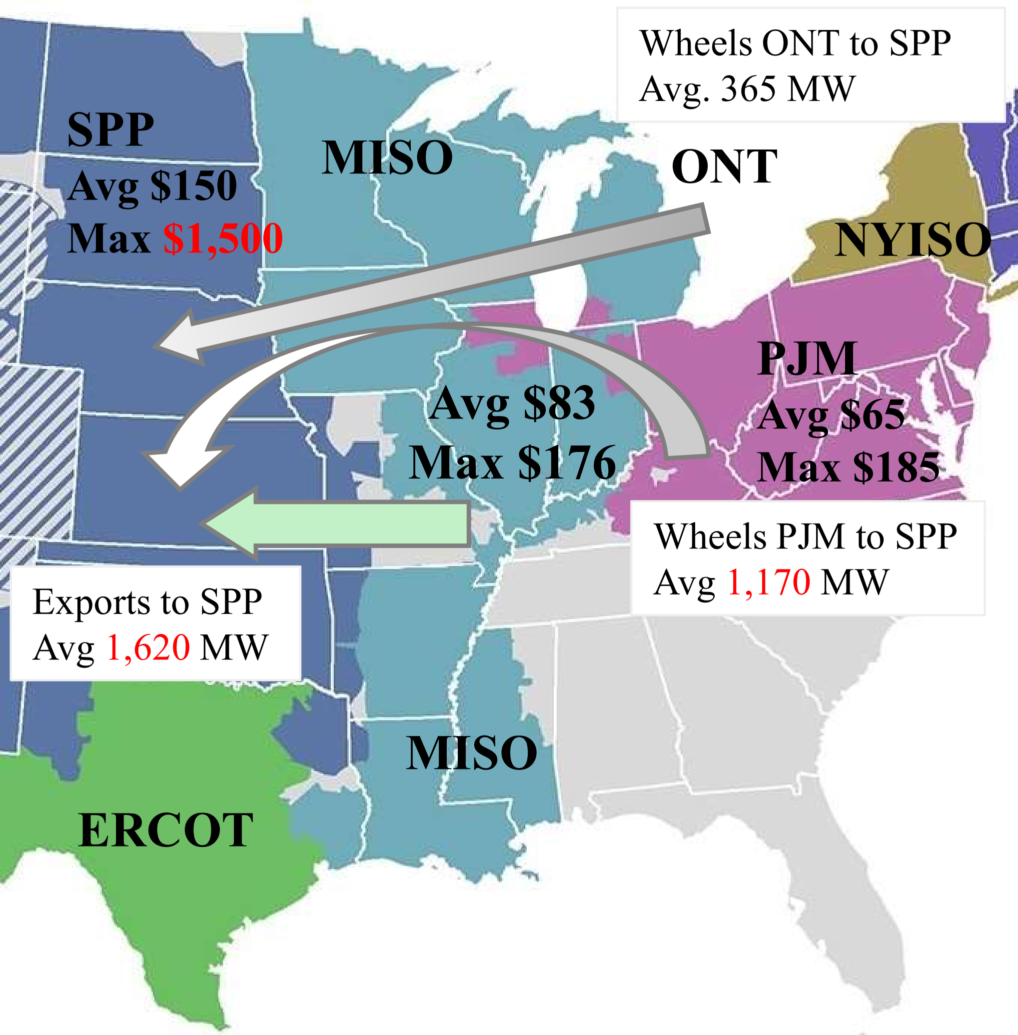
Lowest Daily Temperatures
January 2024 Winter Storms

	Hist. Avg.	Jan-2024				
		13	**14**	**15**	**16**	**17**
Minneapolis	**8**	-5	-8	-8	-4	2
Des Moines	**14**	-14	-17	-16	-10	0
Detroit	**20**	20	1	0	6	5
Indianapolis	**21**	12	-4	-5	2	4
Chicago	**19**	2	-9	-9	-4	4
Little Rock	**31**	25	12	10	9	0
New Orleans	**46**	41	39	36	25	26
Houston	**46**	35	37	26	20	24

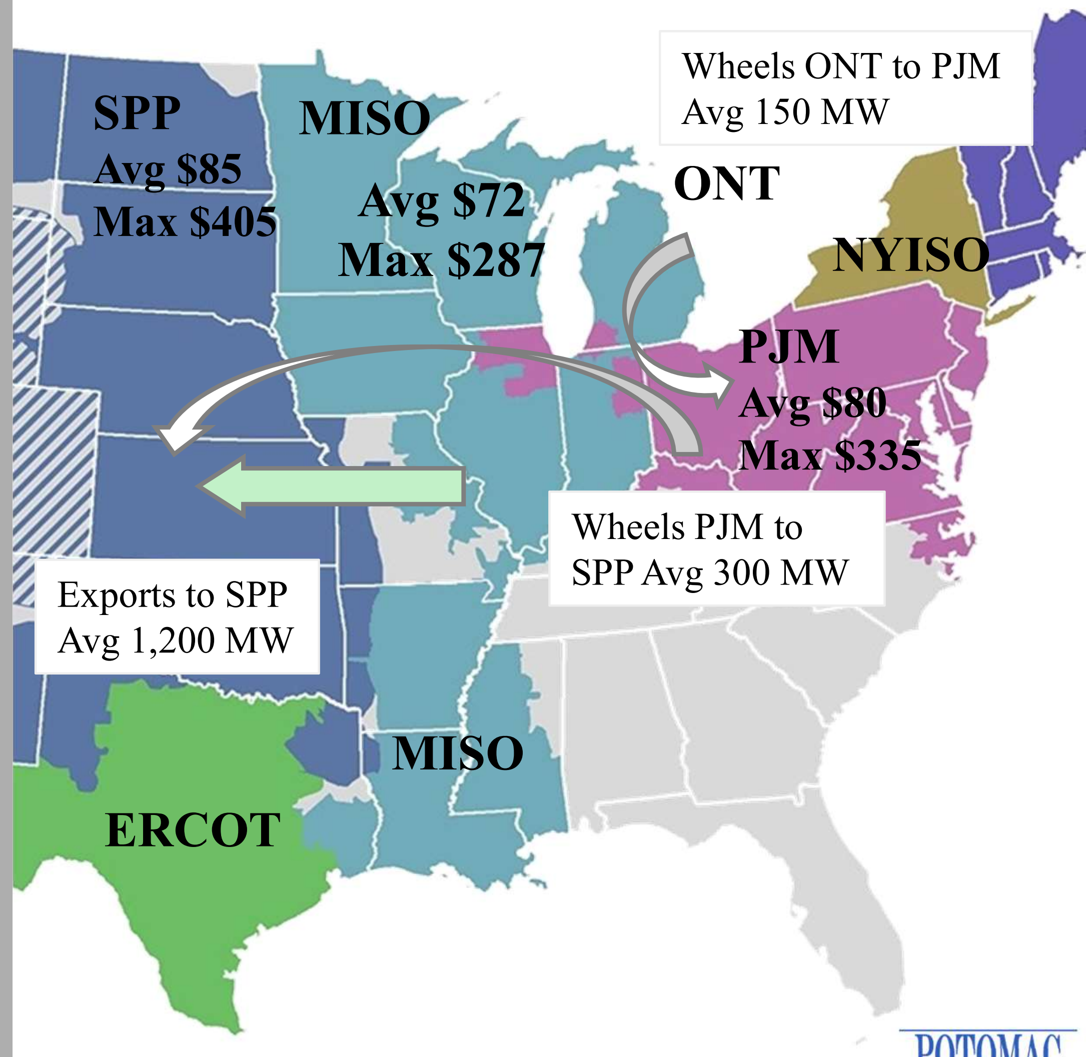
Note: Pink indicates temperatures at least 10 degrees less than normal low temperatures.

Transactions During Winter Storm Heather

January 14 – 15



January 16 – 17



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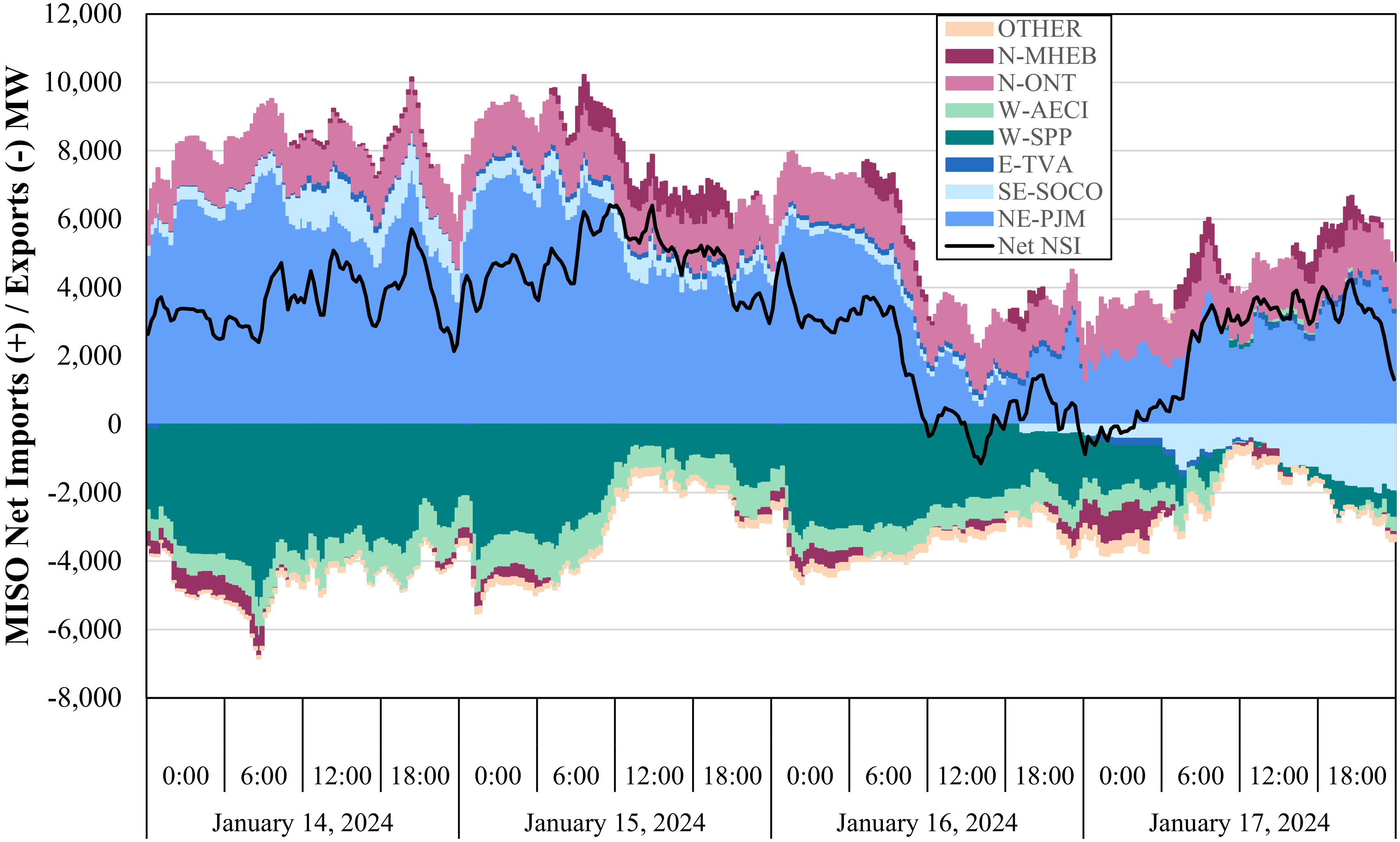
Winter Storm Heather Net Scheduled Interchange



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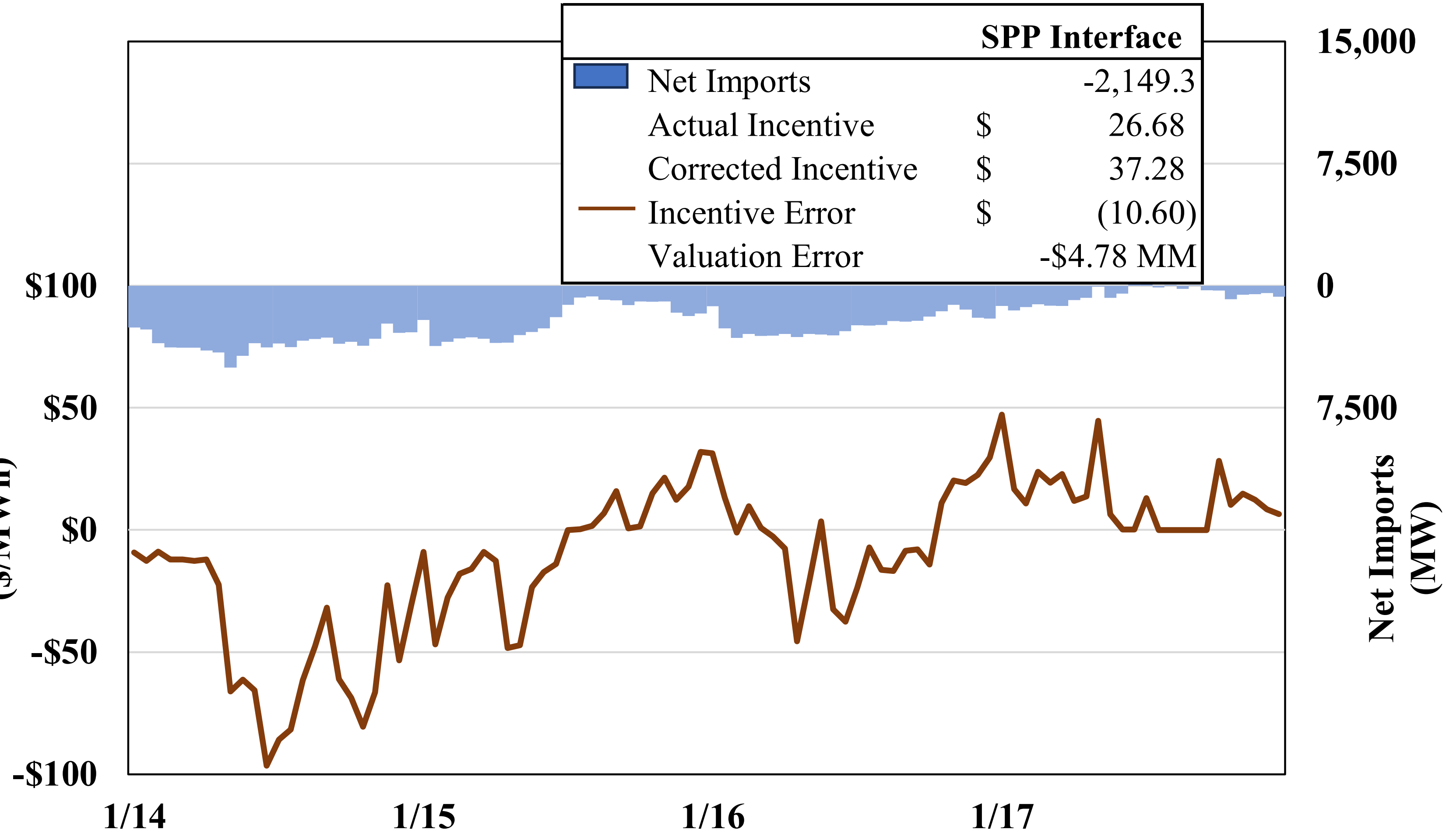
SPP Interface Pricing Flaw
Winter Storm Heather



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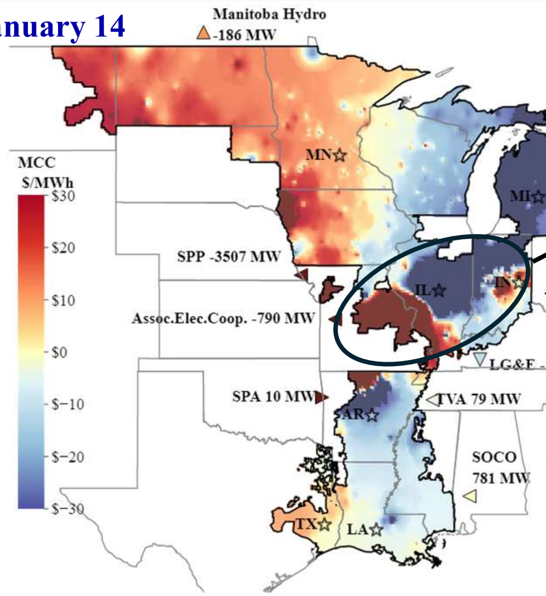
Daily Average Congestion During Winter Storm Heather

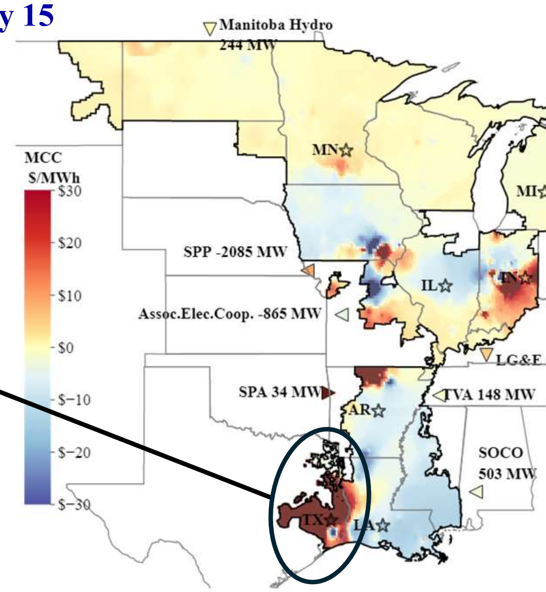
January 14



Hub	MCC
AR	$-10.53
IL	$-62.57
IN	$-4.59
LA	$-5.09
MI	$-28.70
MN	$8.64
TX	$-0.91

Poor transmission flow data led to a severe violation and use of conservative operations.

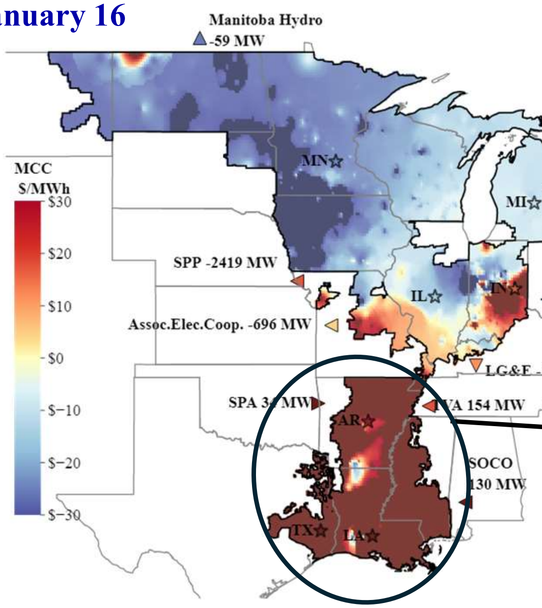
January 15



Hub	MCC
AR	$-5.64
IL	$-7.28
IN	$7.56
LA	$-15.81
MI	$-0.37
MN	$1.88
TX	$43.54

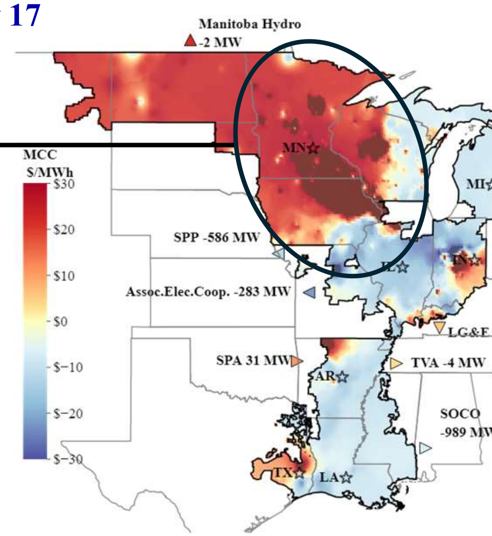
High load, a transmission outage, and inadequate generation caused severe congestion in the SE Texas load pocket.

January 16



Hub	MCC
AR	$60.03
IL	$-13.67
IN	$14.80
LA	$43.26
MI	$-9.04
MN	$-25.25
TX	$125.08

January 17



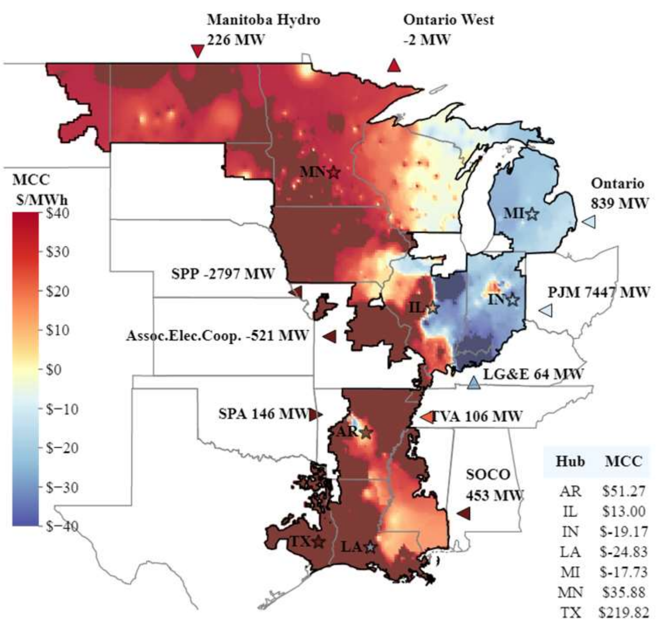
Hub	MCC
AR	$-9.42
IL	$-17.50
IN	$-5.19
LA	$-9.08
MI	$-7.25
MN	$28.86
TX	$-5.90

Wind fell from over 20 GW in the morning to less than 5 GW later in the day, causing east to west flows and high congestion.

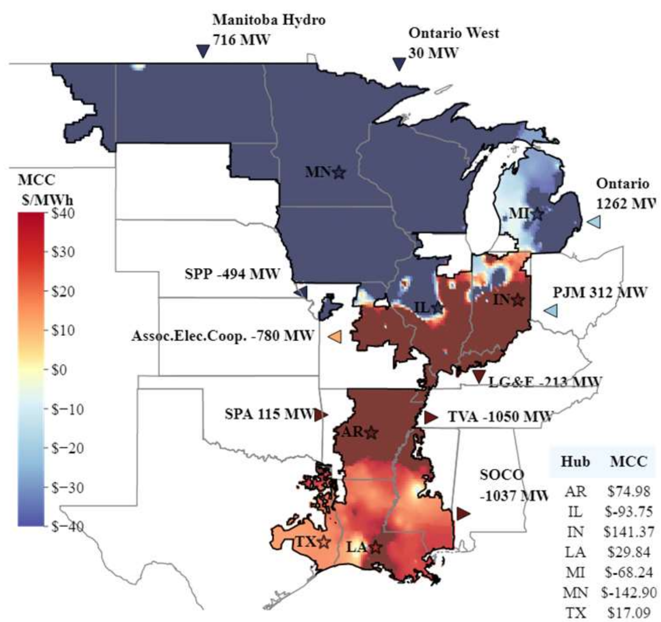
Transmission outages, high wind output, and large westward flows led to congestion into the South, and severe congestion resulted from multiple violations on a number of constraints in the South.

Comparison of Winter Storms
Average and Total Congestion

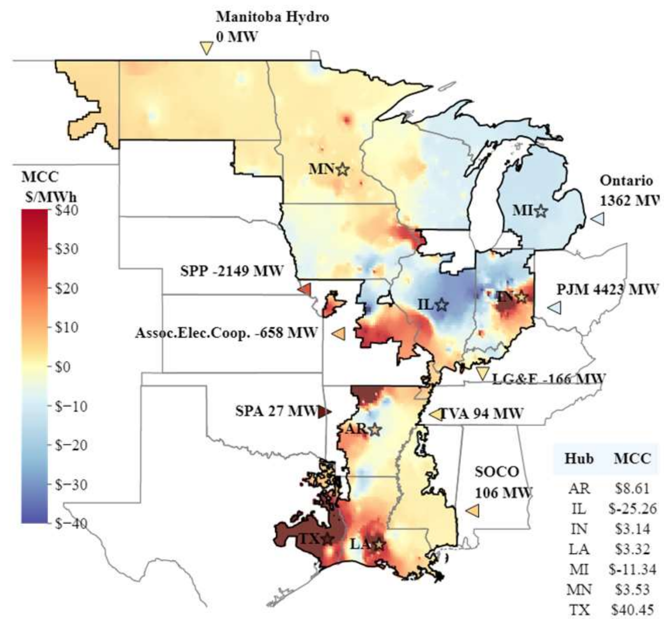
Winter Storm Uri



Winter Storm Elliott



Winter Storm Heather



Total Congestion:

Winter Storm Uri	Winter Storm Elliott	Winter Storm Heather
$744.0 Million	$381.4 Million	$152.6 Million

- Massive westward transactions and flows led to severe congestion during Uri, while large eastward flows during Elliot contributed to substantial (but less) congestion.
- Flows and congestion during Heather were lower and more manageable.

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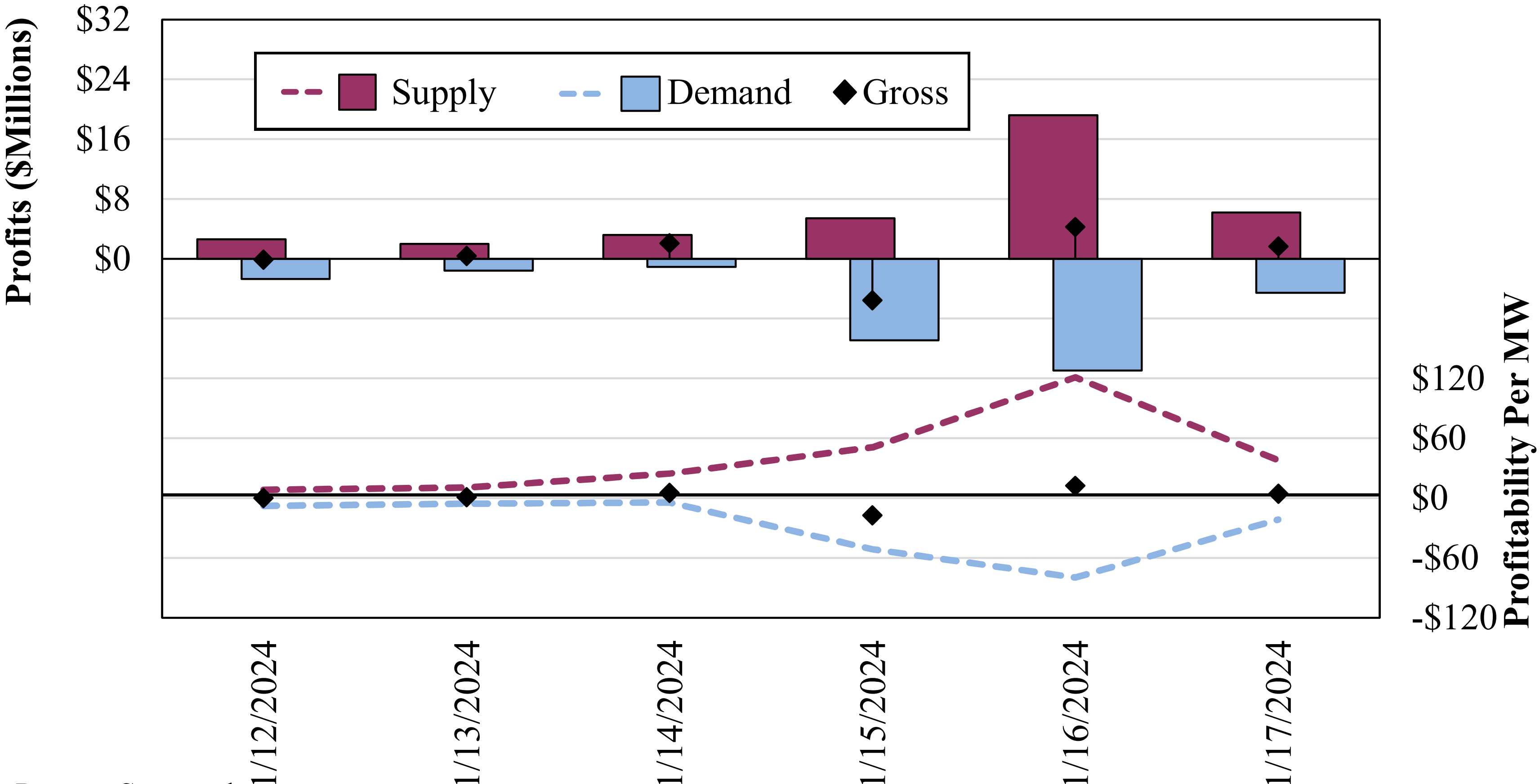
Virtual Activity and Profits and Losses Winter Storm Heather



Percent Screened

	1/12/2024	1/13/2024	1/14/2024	1/15/2024	1/16/2024	1/17/2024
Supply	2.2	5.4	2.9	0.3	0.2	3.2
Demand	6.2	10.2	18.9	16.2	23.7	17.9
Total	4.3	8.3	13.6	10.9	13.0	11.5

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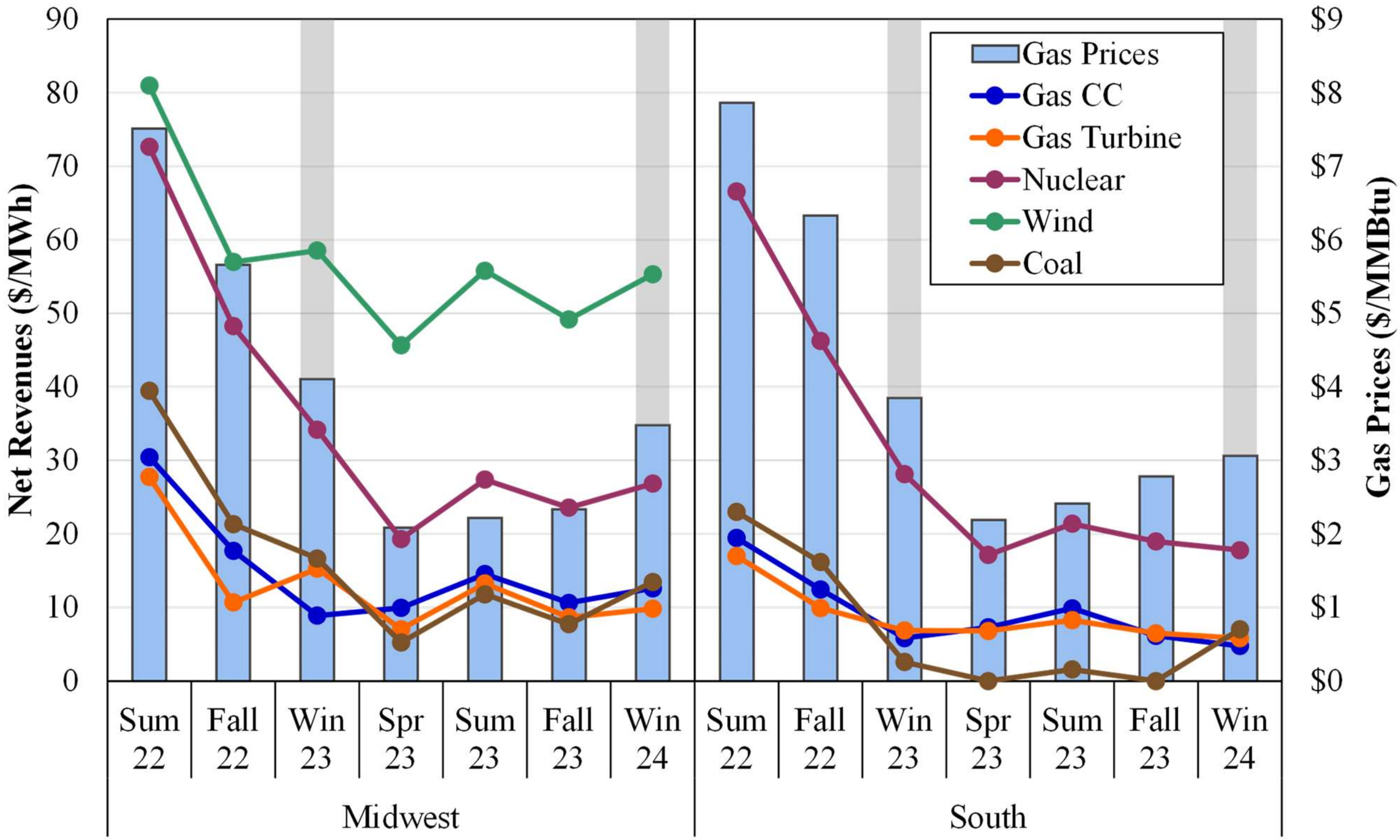
Net Revenues by Technology 2023-2024



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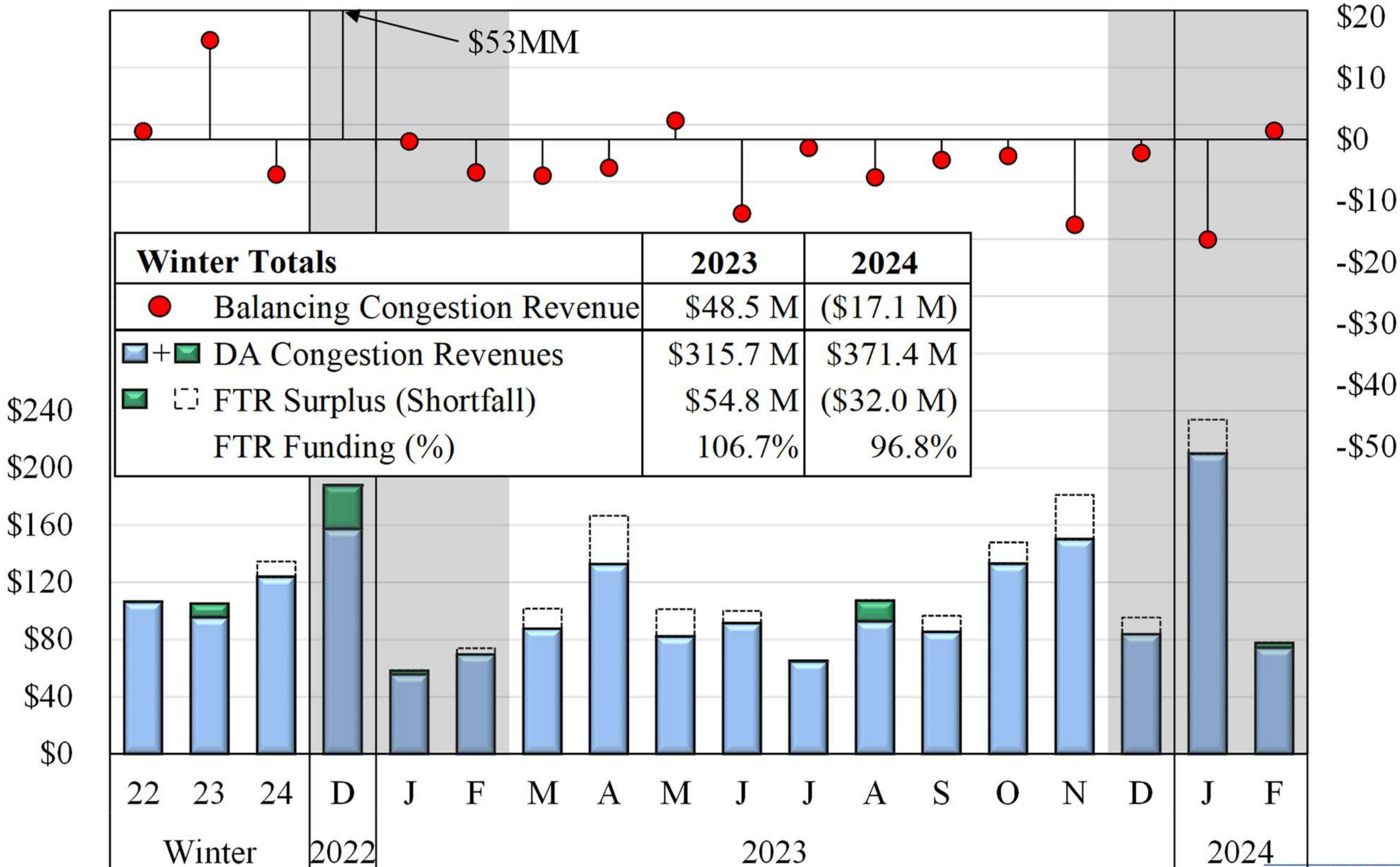
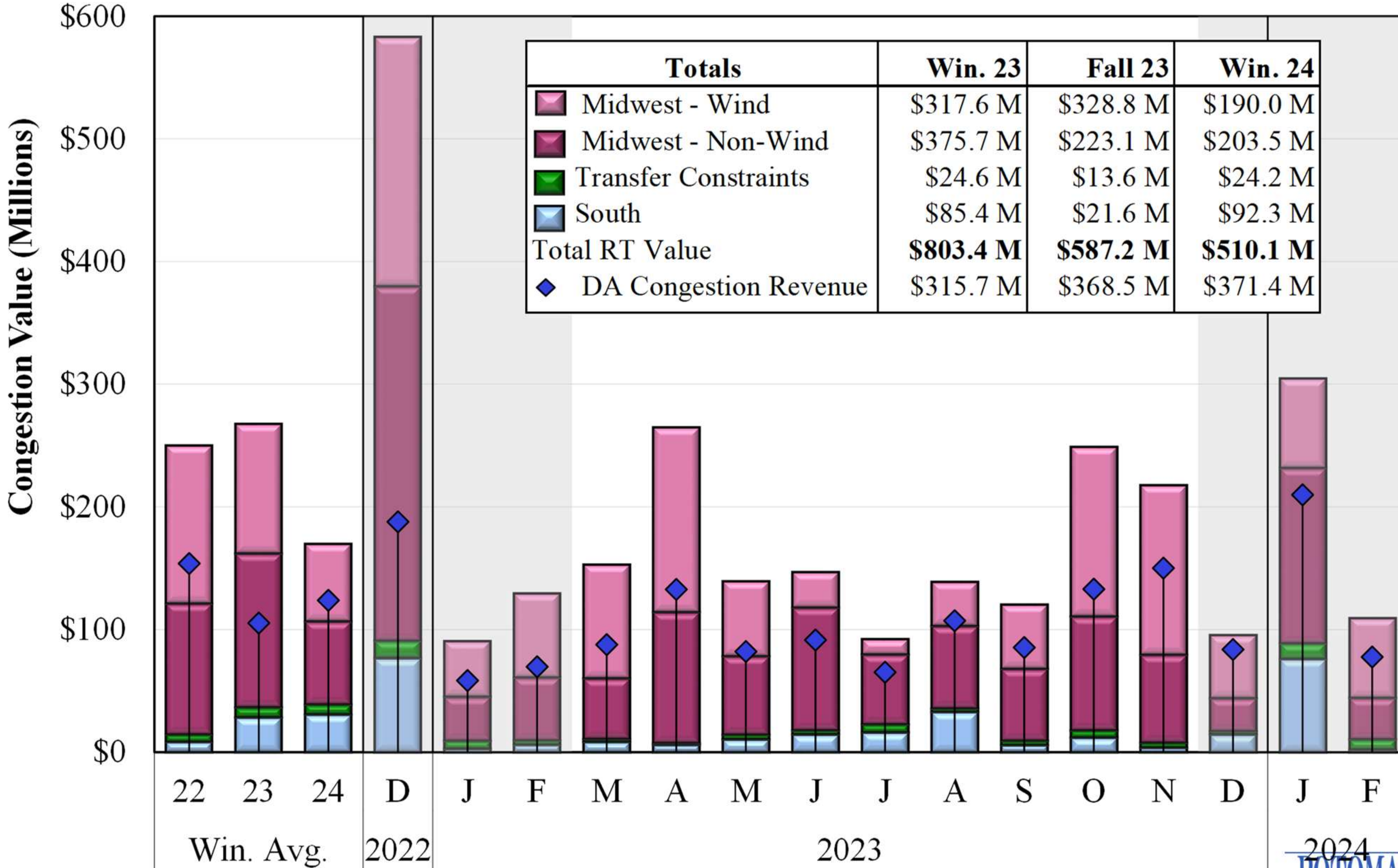
Day-Ahead Congestion, Balancing Congestion, and FTR Underfunding



Winter Totals	2023	2024
● Balancing Congestion Revenue	$48.5 M	($17.1 M)
▭+▭ DA Congestion Revenues	$315.7 M	$371.4 M
▭ ⬚ FTR Surplus (Shortfall)	$54.8 M	($32.0 M)
FTR Funding (%)	106.7%	96.8%

Value of Real-Time Congestion Winter 2022–2024



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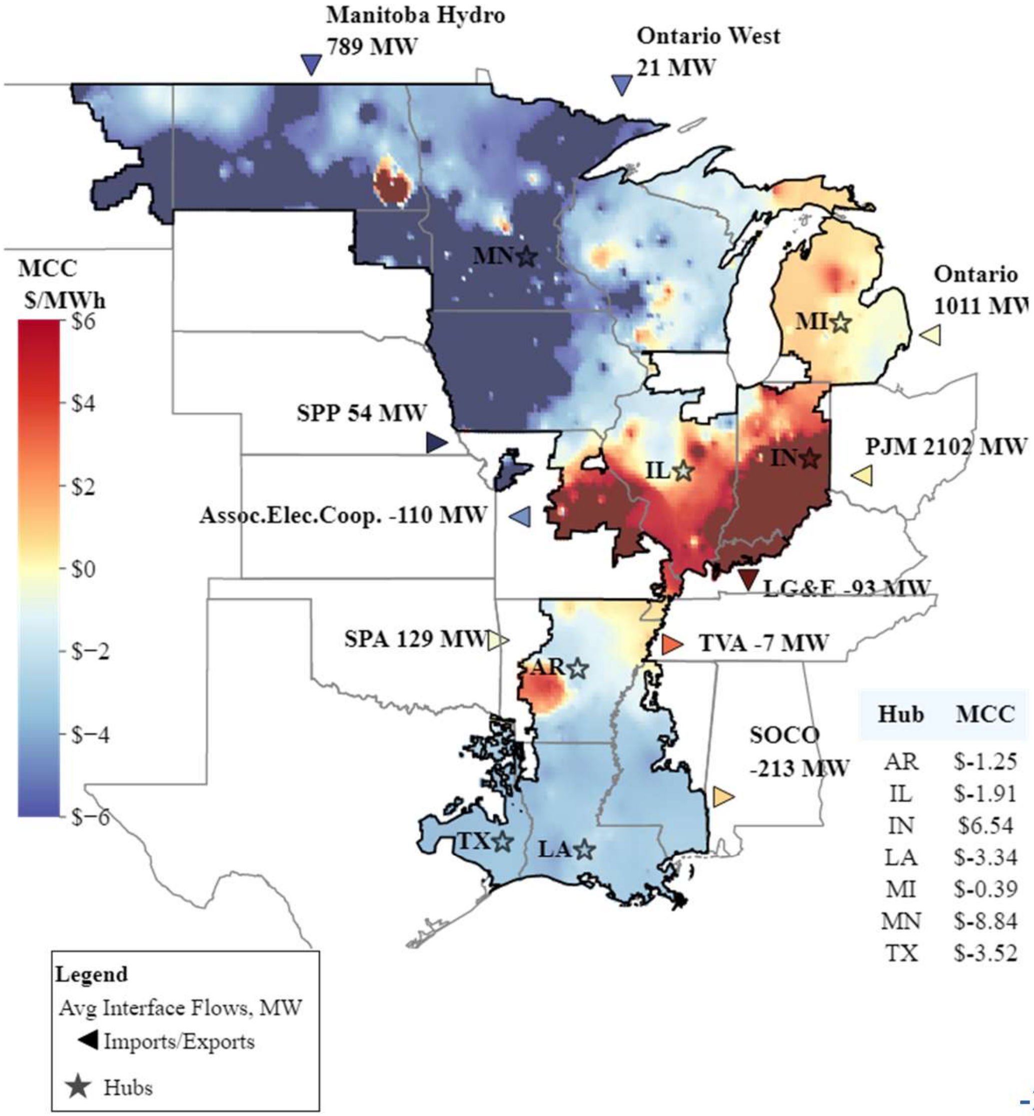
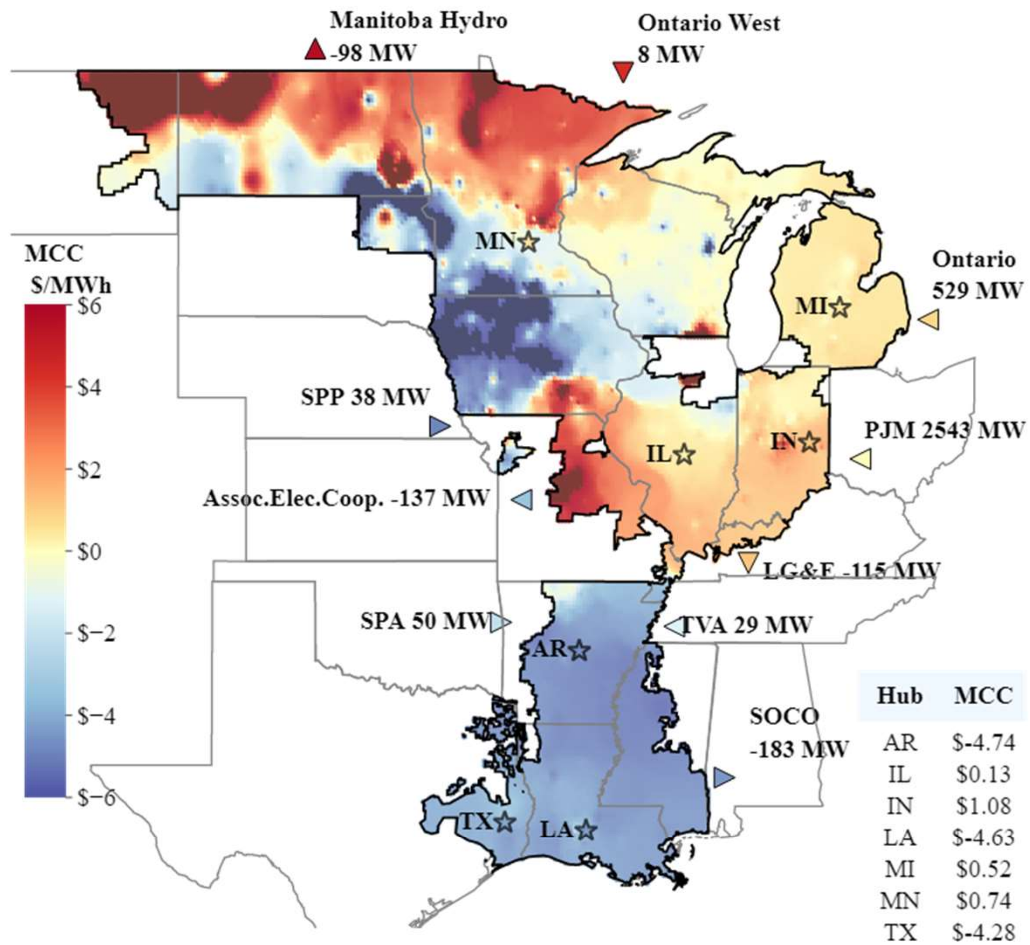
Average Real-Time Congestion Components Winter 2023 – 2024

Winter 2023



Hub	MCC
AR	$-1.25
IL	$-1.91
IN	$6.54
LA	$-3.34
MI	$-0.39
MN	$-8.84
TX	$-3.52

Winter 2024



Hub	MCC
AR	$-4.74
IL	$0.13
IN	$1.08
LA	$-4.63
MI	$0.52
MN	$0.74
TX	$-4.28

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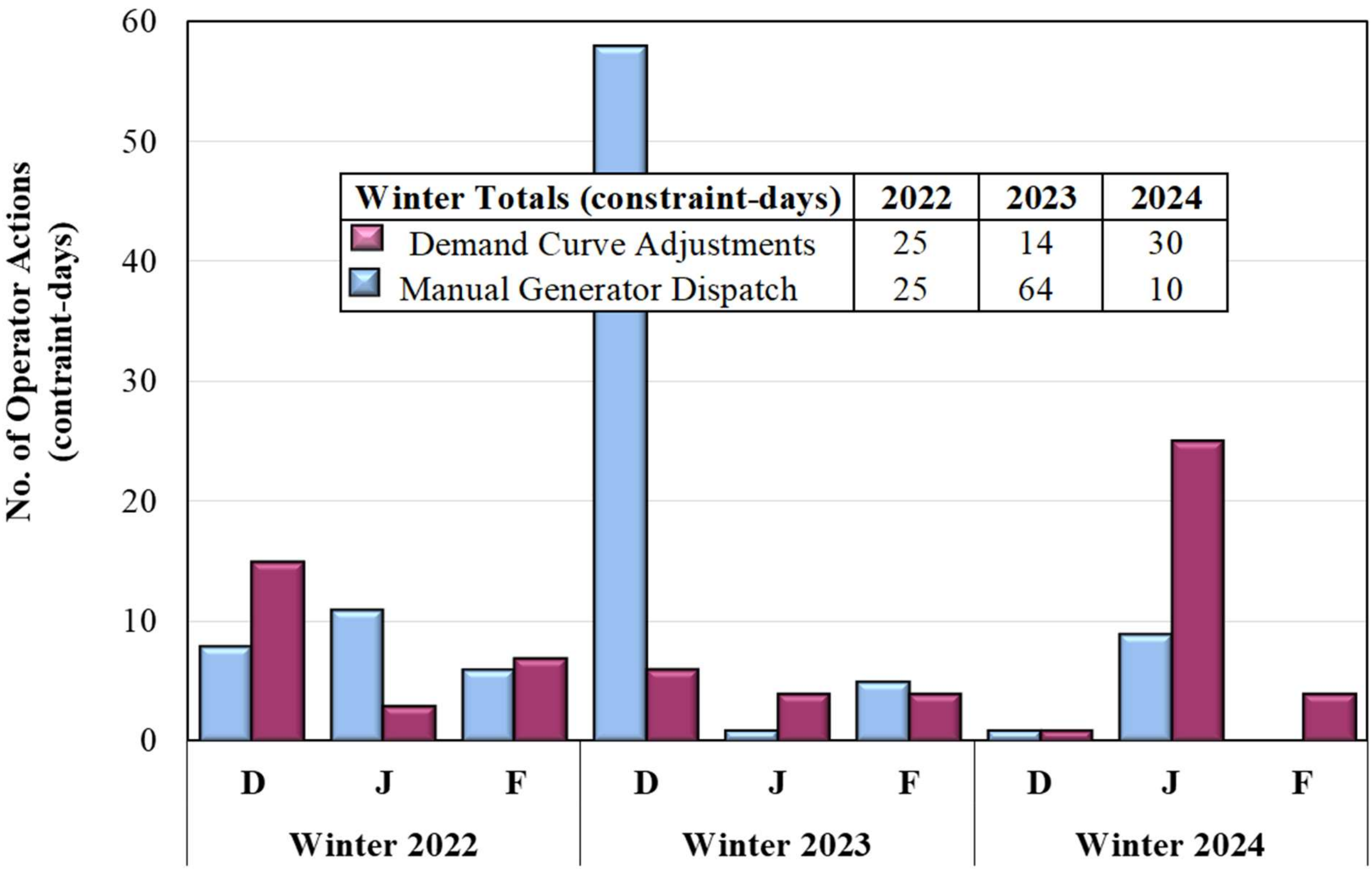
Changes in MISO Operator Actions For Congestion Management



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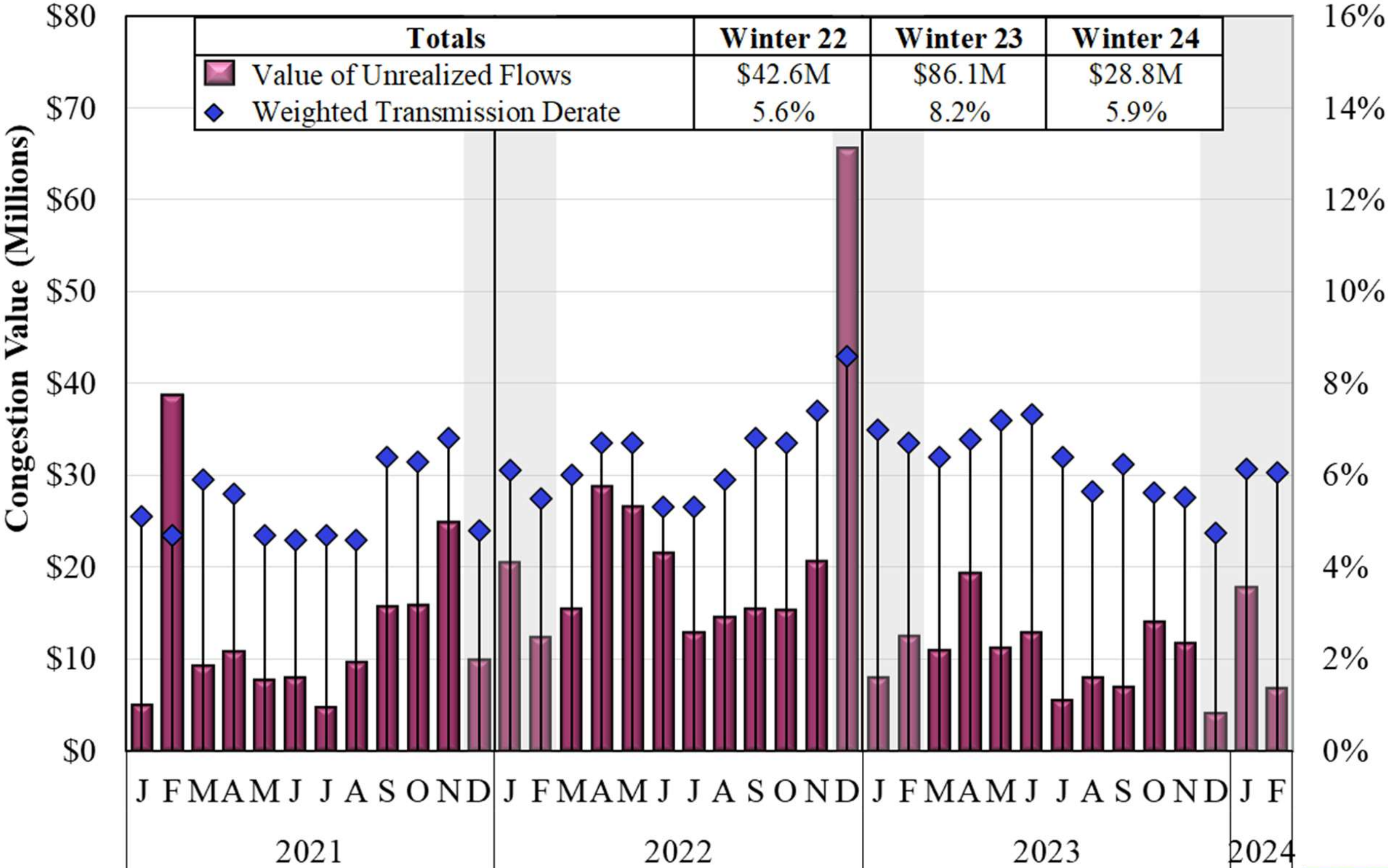
Value of Unrealized Transmission Flows Due to Use of Limit Control



Benefits of Ambient-Adjusted and Emergency Ratings Winter 2023–2024

Winter		Savings ($ Millions)			# of Facilites for 2/3 of Savings	Share of Congestion
		Ambient Adj. Ratings	Emergency Ratings	Total		
2023	**Midwest**	$112.9	$37.98	$150.8	7	21.4%
	South	$4.8	$10.15	$14.9	1	14.0%
	Total	**$117.6**	**$48.1**	**$165.8**	**8**	**20.4%**
2024	**Midwest**	$33.9	$20.40	$54.3	5	14.2%
	South	$8.5	$5.07	$13.5	1	14.6%
	Total	**$42.3**	**$25.5**	**$67.8**	**6**	**14.3%**

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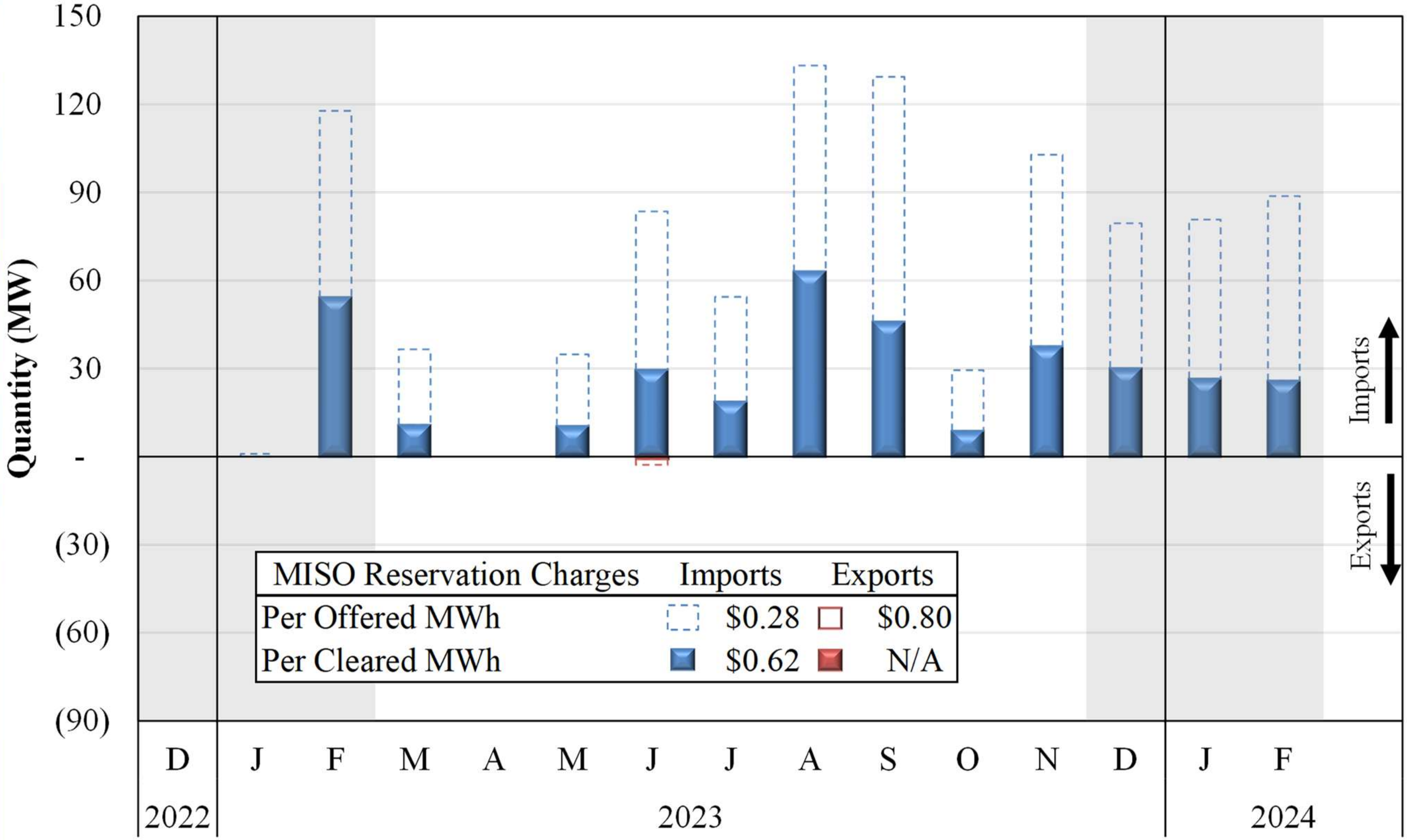
Coordinated Transaction Scheduling (CTS) Winter 2023–2024



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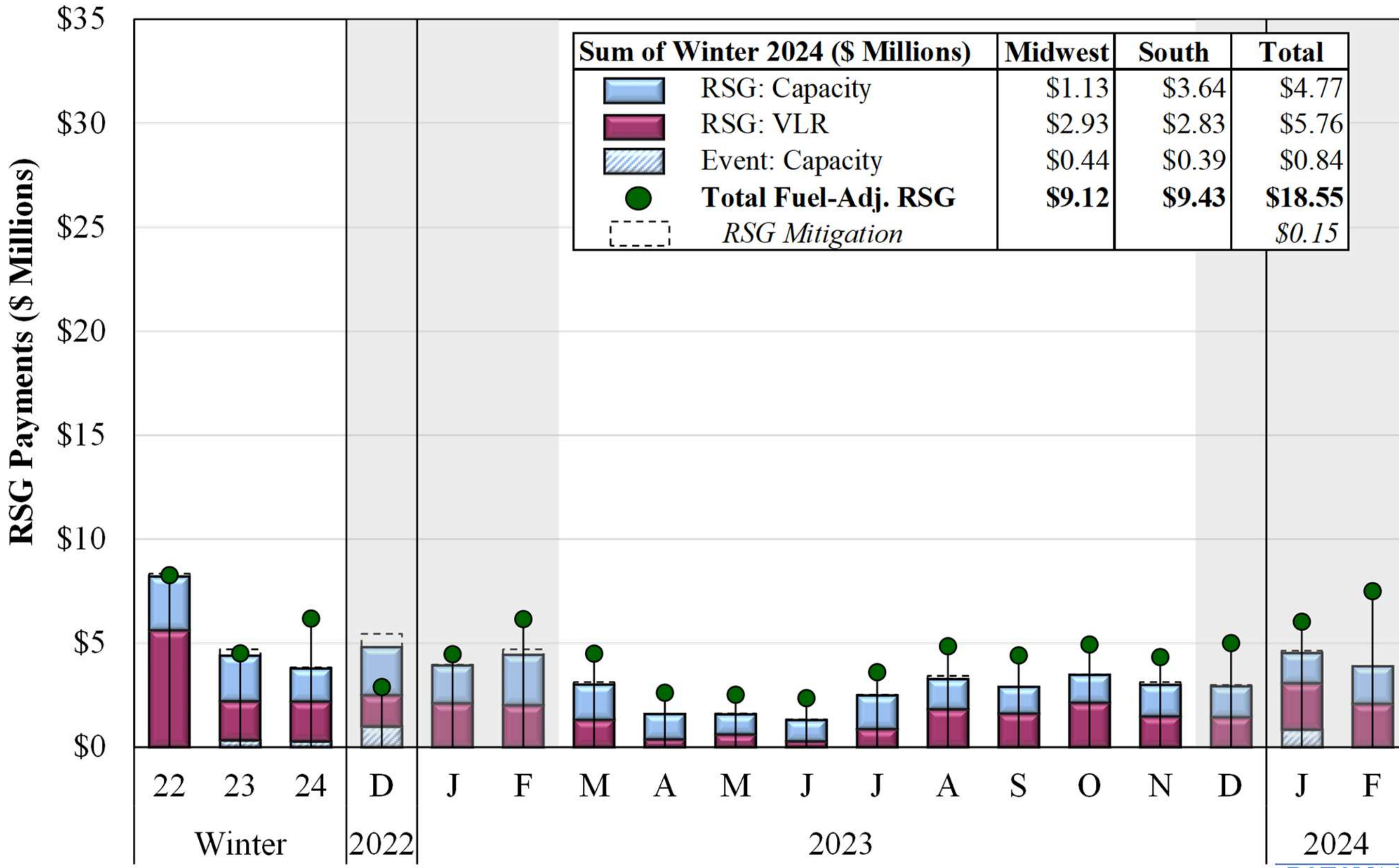
Day-Ahead RSG Payments Winter 2023–2024



Sum of Winter 2024 ($ Millions)	Midwest	South	Total
RSG: Capacity	$1.13	$3.64	$4.77
RSG: VLR	$2.93	$2.83	$5.76
Event: Capacity	$0.44	$0.39	$0.84
Total Fuel-Adj. RSG	**$9.12**	**$9.43**	**$18.55**
RSG Mitigation			*$0.15*

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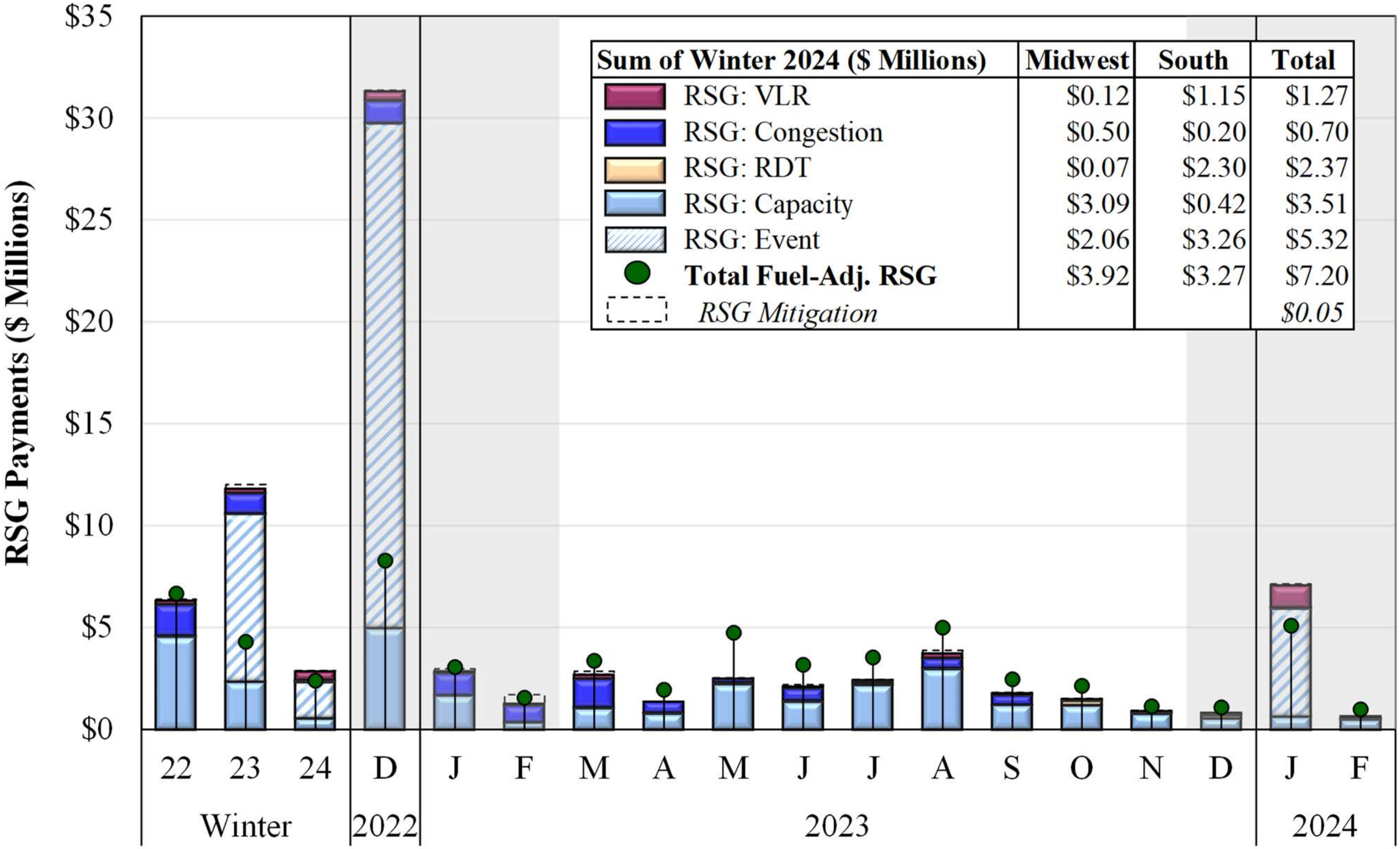
Real-Time RSG Payments Winter 2023–2024



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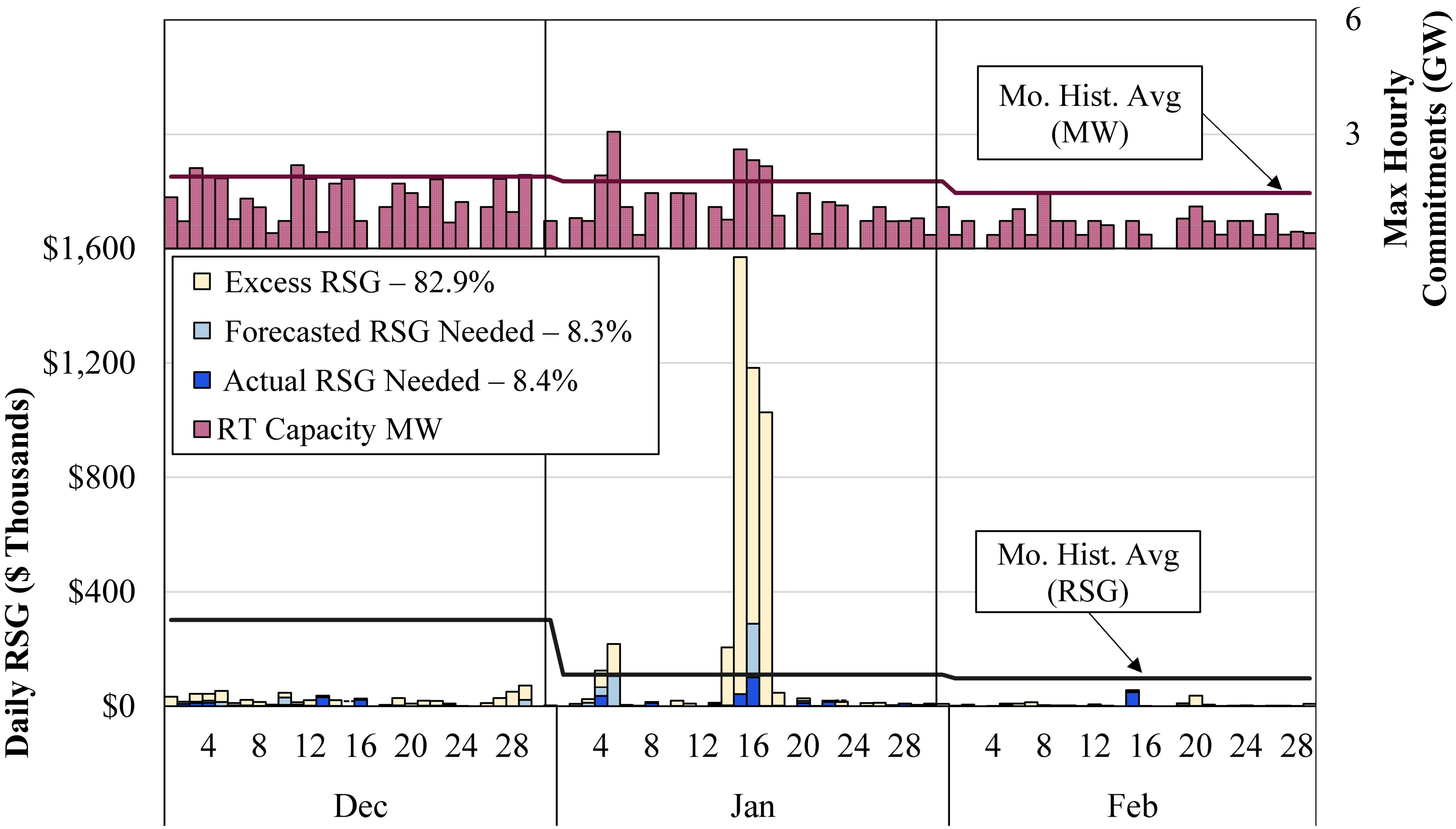
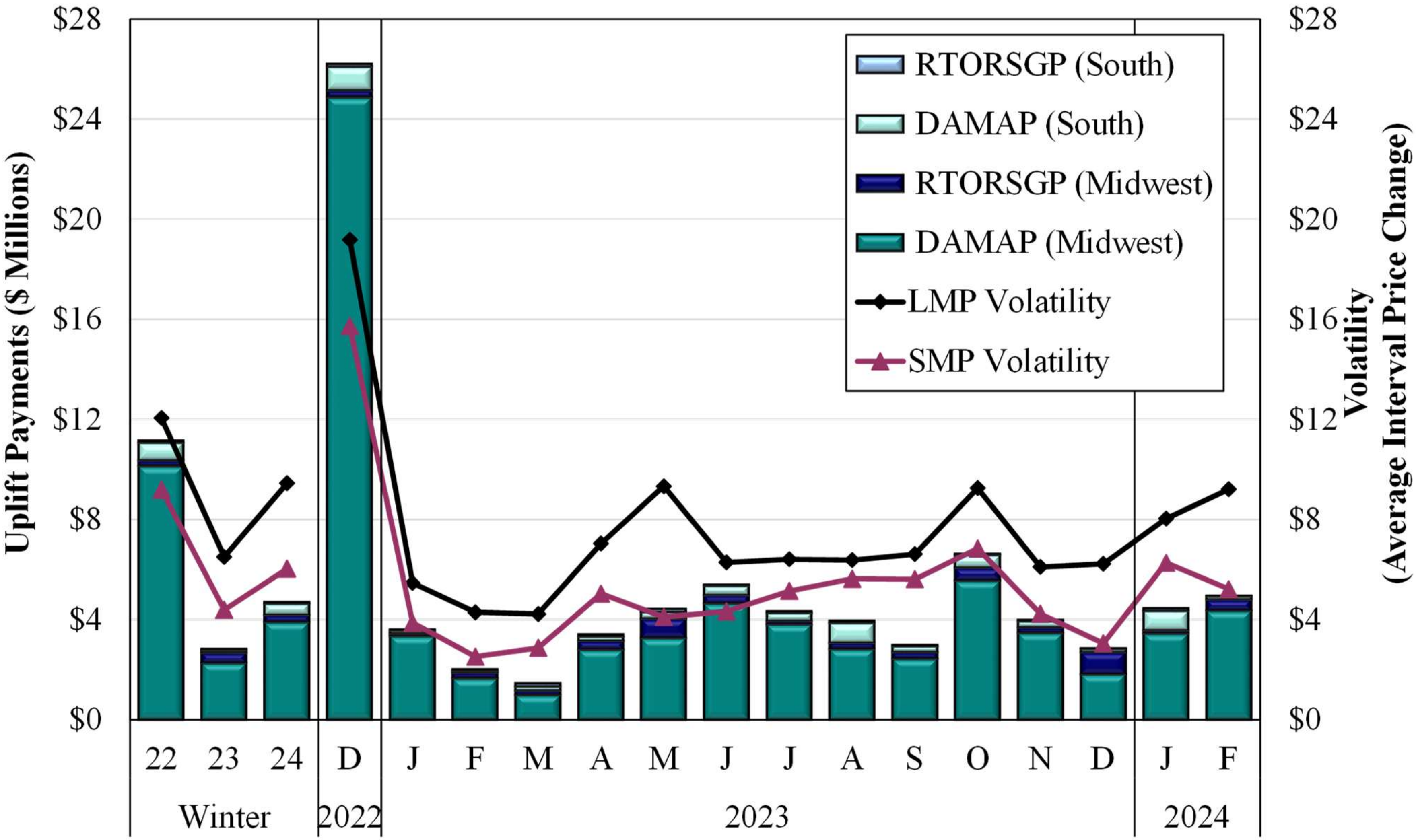
Real-Time Capacity Commitment and RSG Winter 2024

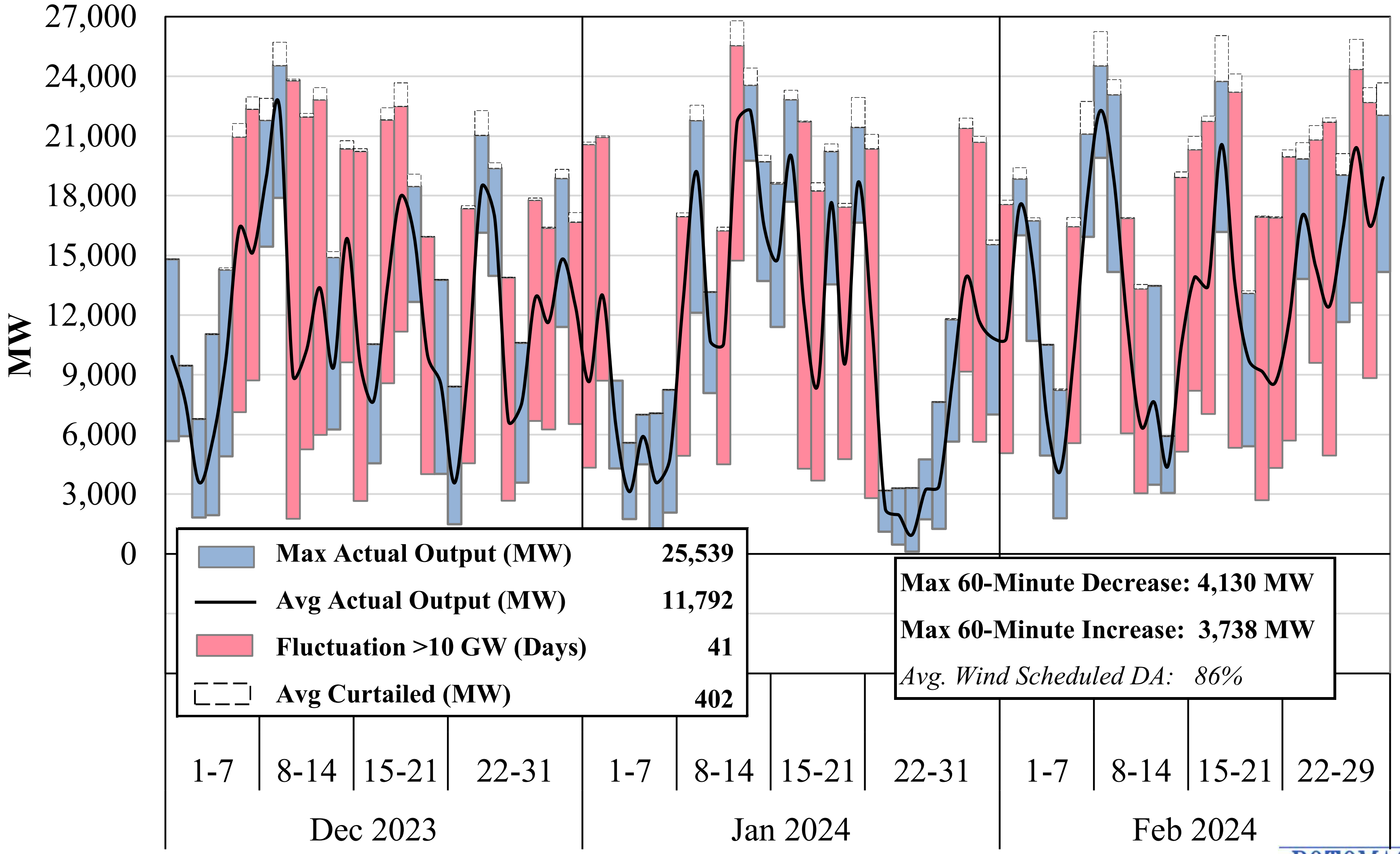


* <1% of the RSG could not be classified due to gaps in market data and is shown in the transparent bars.

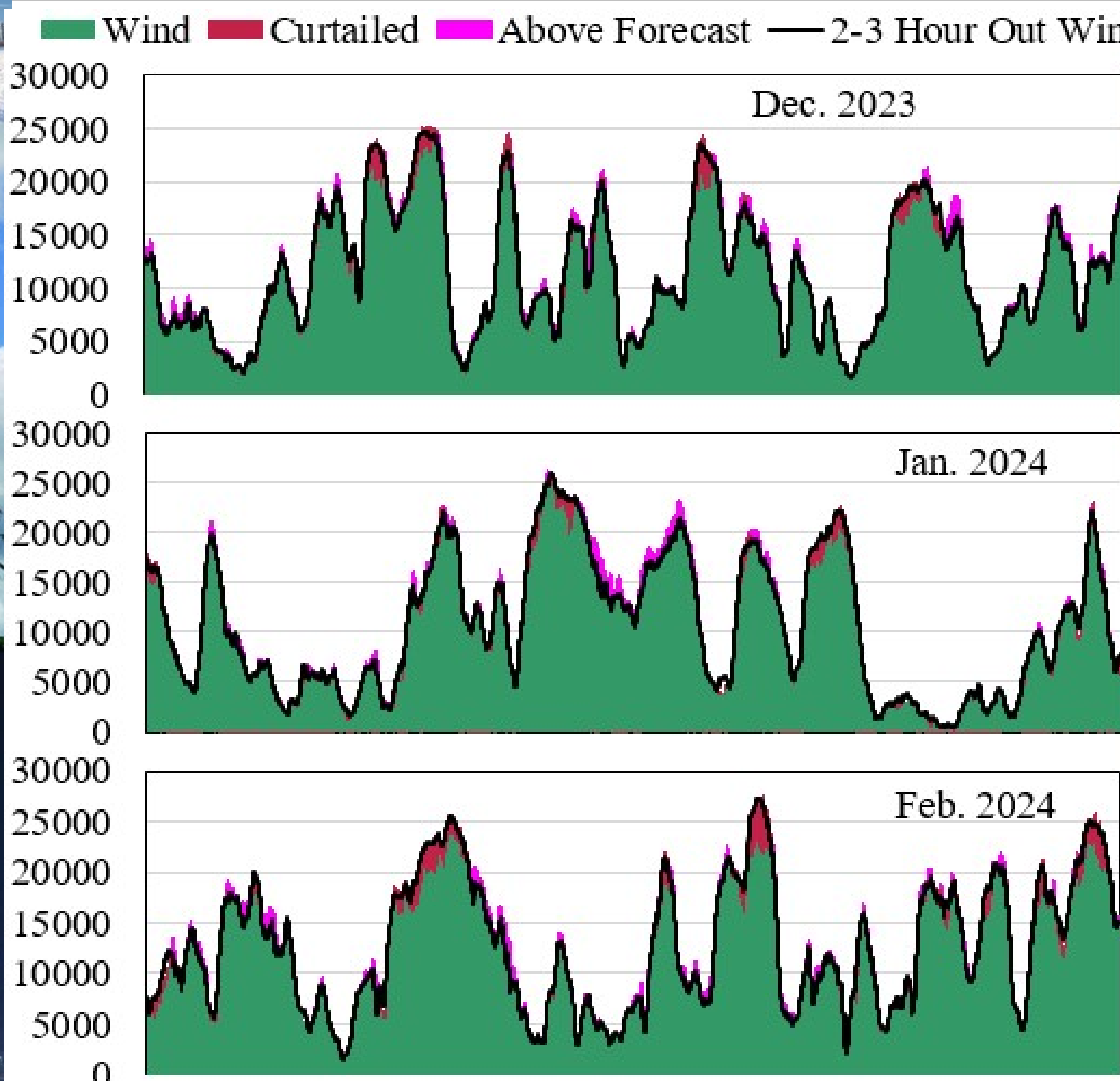
Price Volatility Make Whole Payments Winter 2022–2024



Wind Output in Real Time
Daily Range and Average



Wind Forecast and Actual Output Winter 2024



Win 2024	
Real-Time Wind (MW)	11,792
Day-Ahead Wind (MW)	10,136
Avg Curtailments (MW)	402
Forecast Errors (%)	-0.9%
Absolute Errors (%)	8.2%
Win 2023	
Real-Time Wind (MW)	12,491
Day-Ahead Wind (MW)	10,579
Avg Curtailments (MW)	446
Forecast Errors (%)	0.8%
Absolute Errors (%)	7.5%
Fall 2023	
Real-Time Wind (MW)	10,949
Day-Ahead Wind (MW)	9,872
Avg Curtailments (MW)	548
Forecast Errors (%)	-0.3%
Absolute Errors (%)	8.3%

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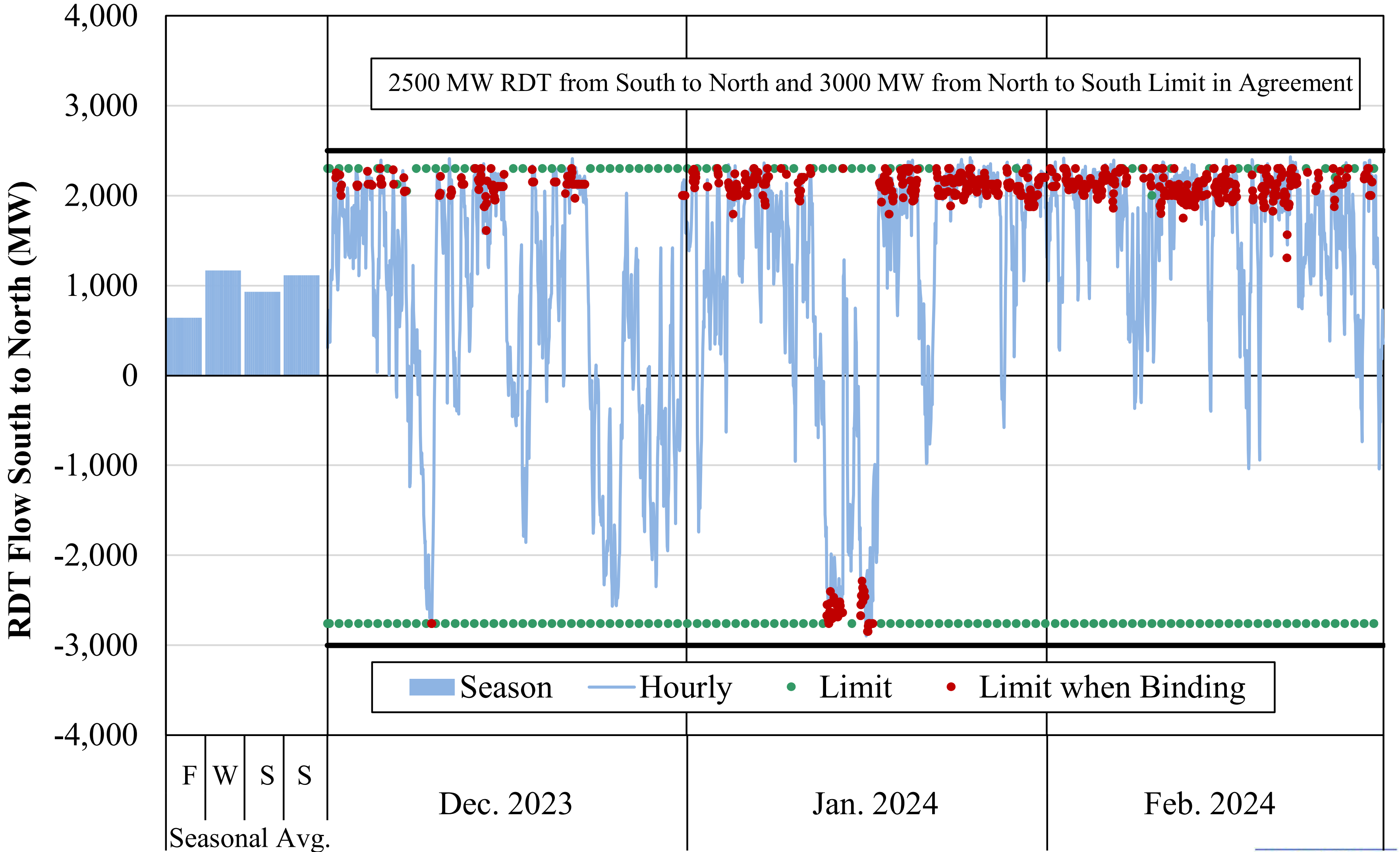
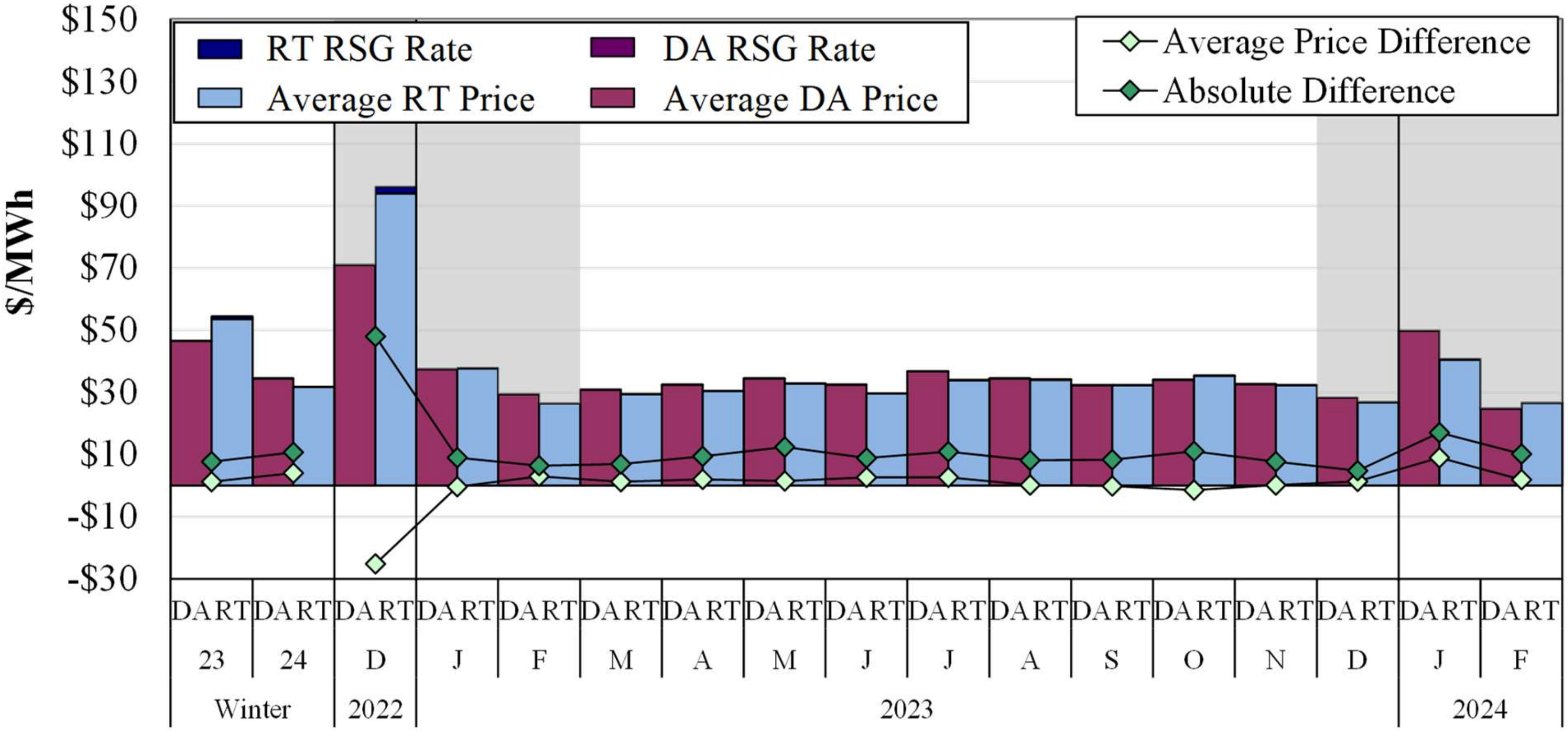
Real-Time Hourly Inter-Regional Flows
Winter 2024



Day-Ahead and Real-Time Price Convergence Winter 2023–2024



Average DA-RT Price Difference Including RSG (% of Real-Time Price)

Indiana Hub	-5	7	-26	-1	11	4	7	5	9	8	0	0	-4	1	5	22	-7
Michigan Hub	-1	6	-21	5	12	6	4	1	6	8	2	-5	-7	1	3	22	-5
Minnesota Hub	-8	1	-17	-1	-7	-6	-10	13	-4	4	-6	-2	-3	7	1	5	-4
Arkansas Hub	-5	5	-18	-1	3	5	0	5	6	5	2	-3	-4	3	5	14	-4
Texas Hub	-5	2	-24	1	7	5	5	4	7	11	4	3	-3	5	3	6	-3
Louisiana Hub	-6	4	-23	0	6	1	3	4	11	13	4	0	-3	6	3	13	-3

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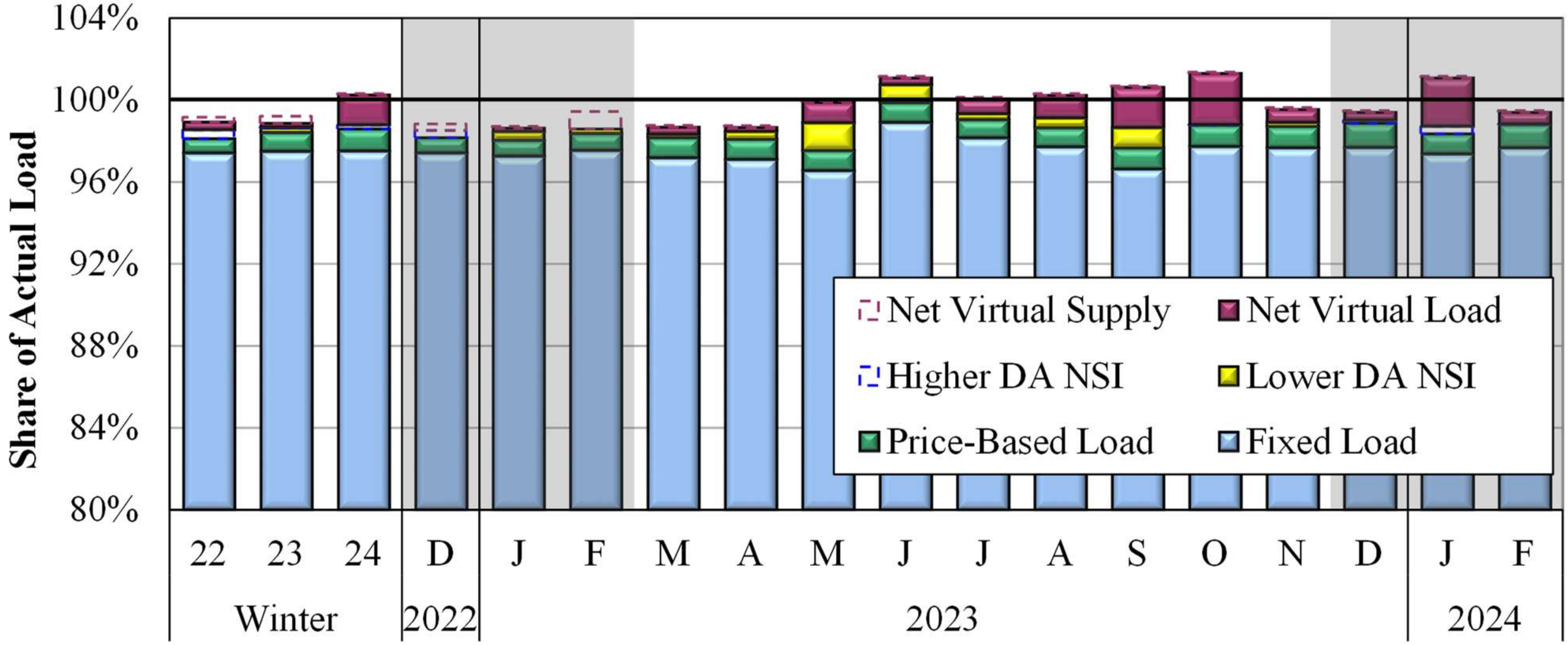
Day-Ahead Peak Hour Load Scheduling Winter 2022–2024



Share of Actual Load (%)

All Hours	98.5	98.7	99.9	98.7	99.0	98.4	98.9	99.1	99.7	101.0	101.6	101.0	100.6	100.3	99.1	98.6	100.5	99.2
Peak Hours Midwest	98.8	99.2	100.2	98.5	99.2	98.8	98.6	98.9	98.8	100.6	99.4	99.8	100.3	101.7	99.7	99.5	100.8	99.6
Peak Hours South	99.9	99.8	100.3	100.8	99.7	98.5	101.4	99.7	102.9	102.4	101.3	101.7	100.7	102.1	100.7	101.3	101.5	99.2

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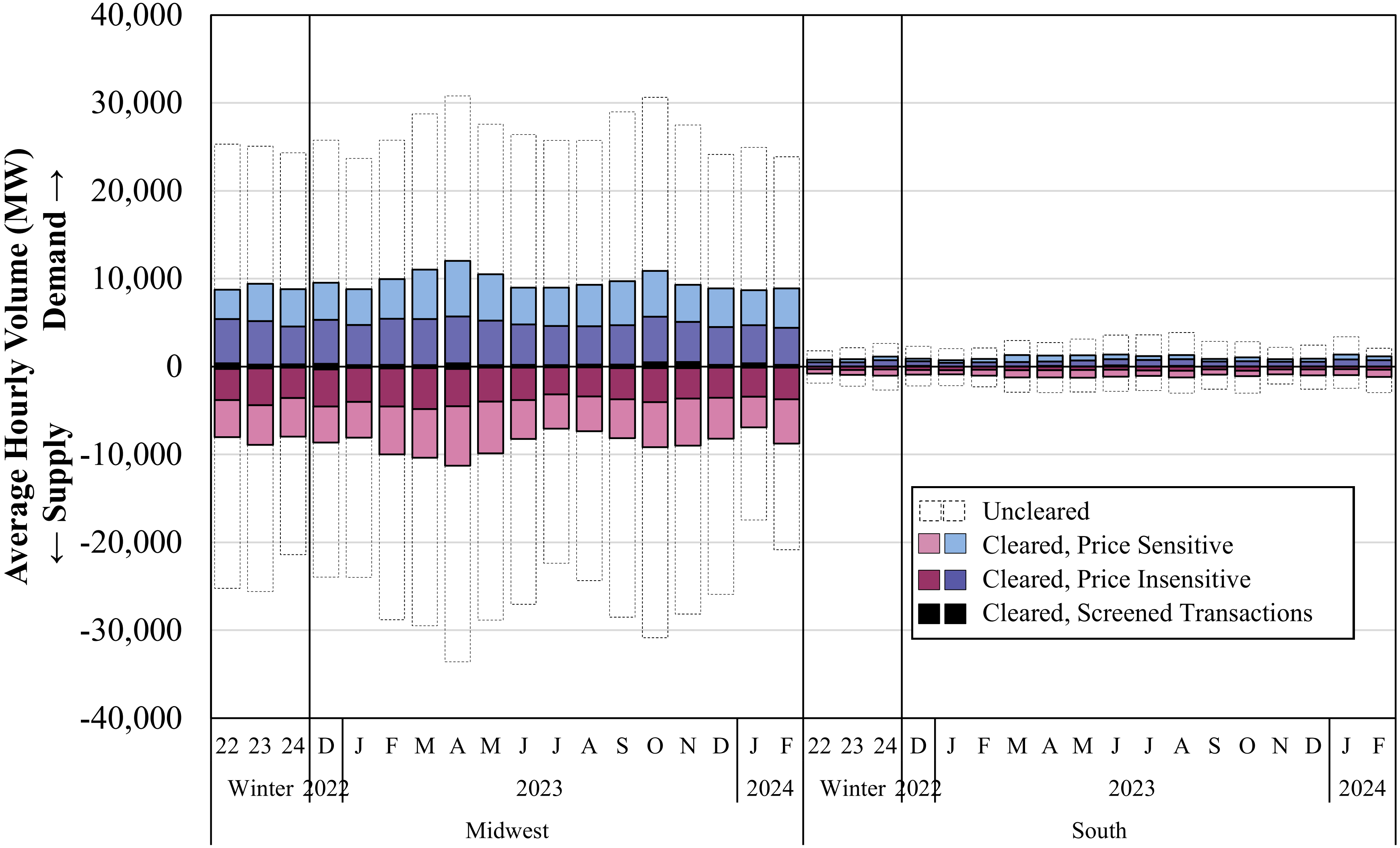
Virtual Load and Supply
Winter 2022–2024



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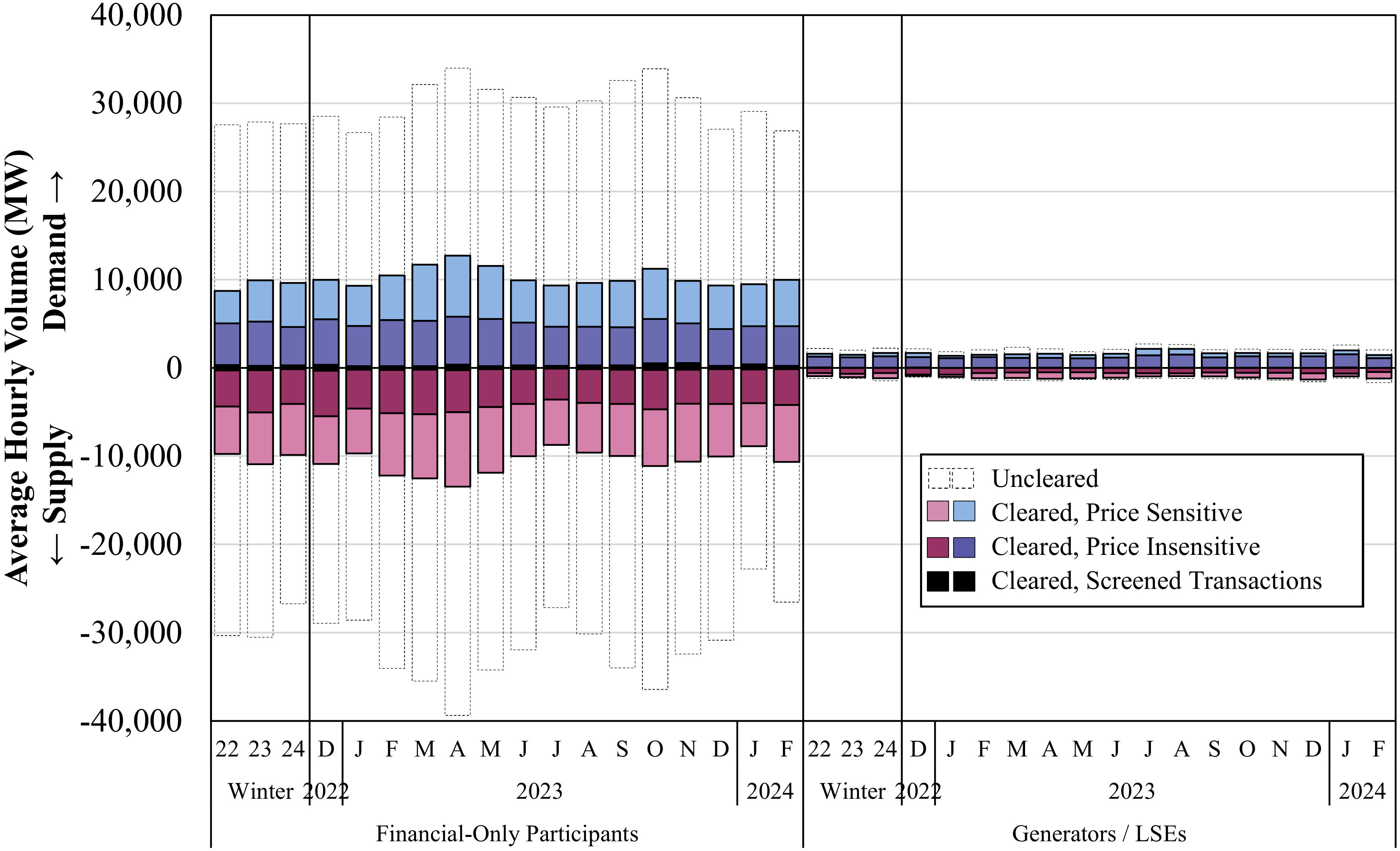
Virtual Load and Supply by Participant Type Winter 2022–2024



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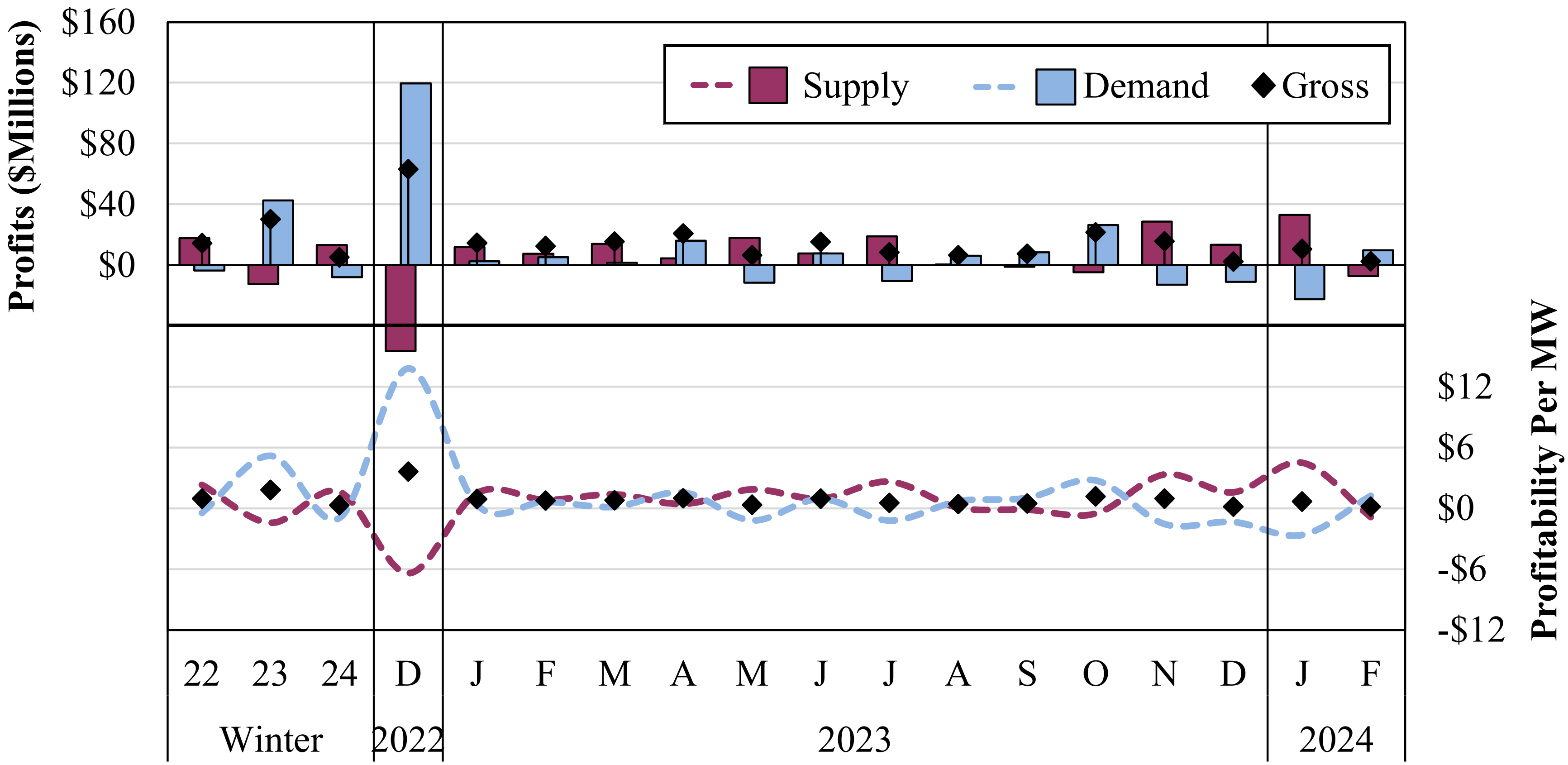
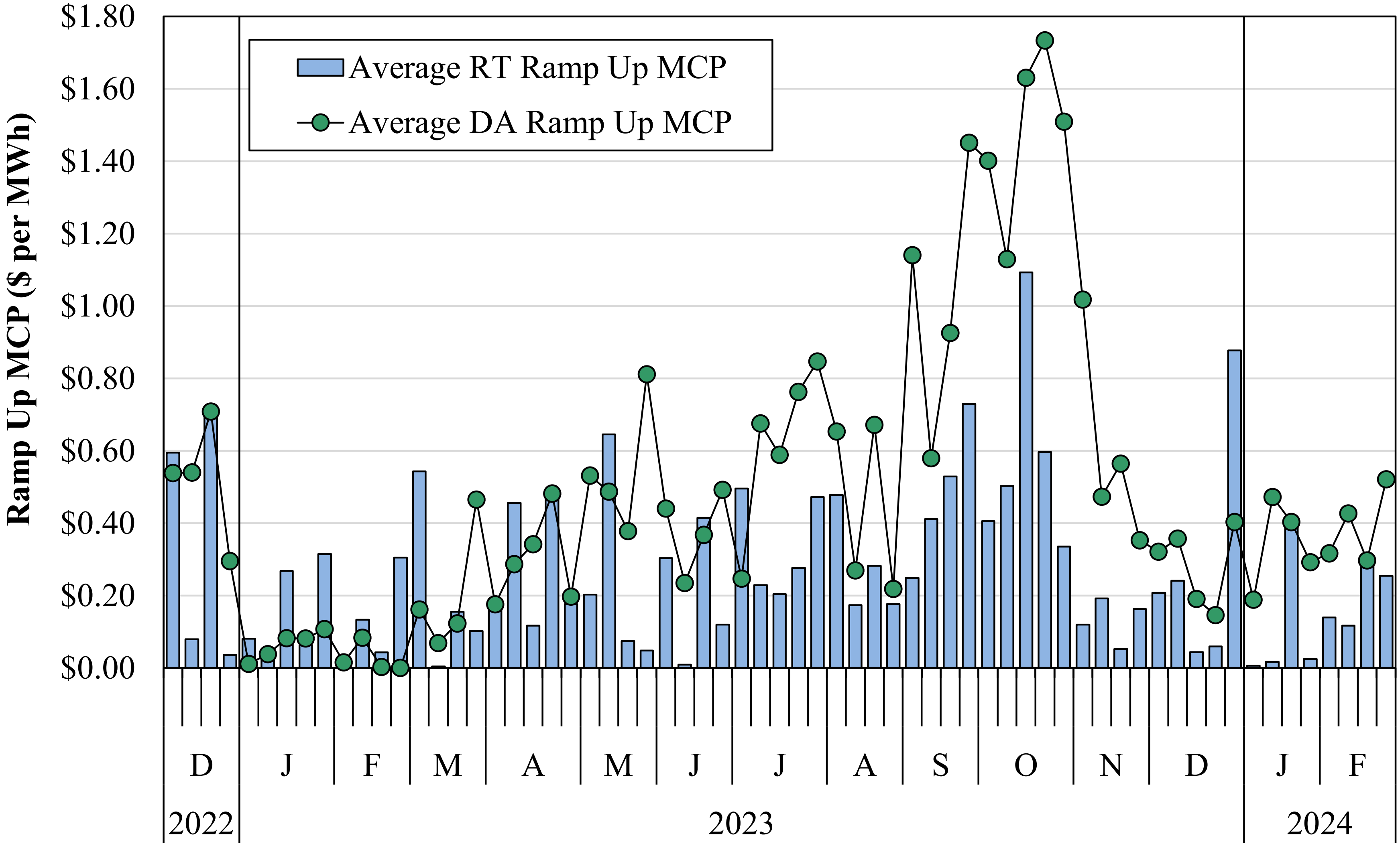
Virtual Profitability
Winter 2022–2024



Percent Screened

Supply	2.9	2.2	1.4	3.0	1.8	1.8	1.5	1.9	1.0	1.4	1.0	1.2	2.0	1.9	1.9	1.3	1.7	1.2
Demand	3.7	2.2	2.8	3.4	1.7	1.6	1.4	2.8	1.6	2.7	2.1	2.7	2.6	4.2	4.9	2.0	4.3	2.1
Total	3.3	2.2	2.1	3.2	1.8	1.7	1.5	2.3	1.3	2.1	1.6	2.0	2.3	3.1	3.4	1.7	3.1	1.6

Day-Ahead and Real-Time Ramp Up Price Winter 2022–2024



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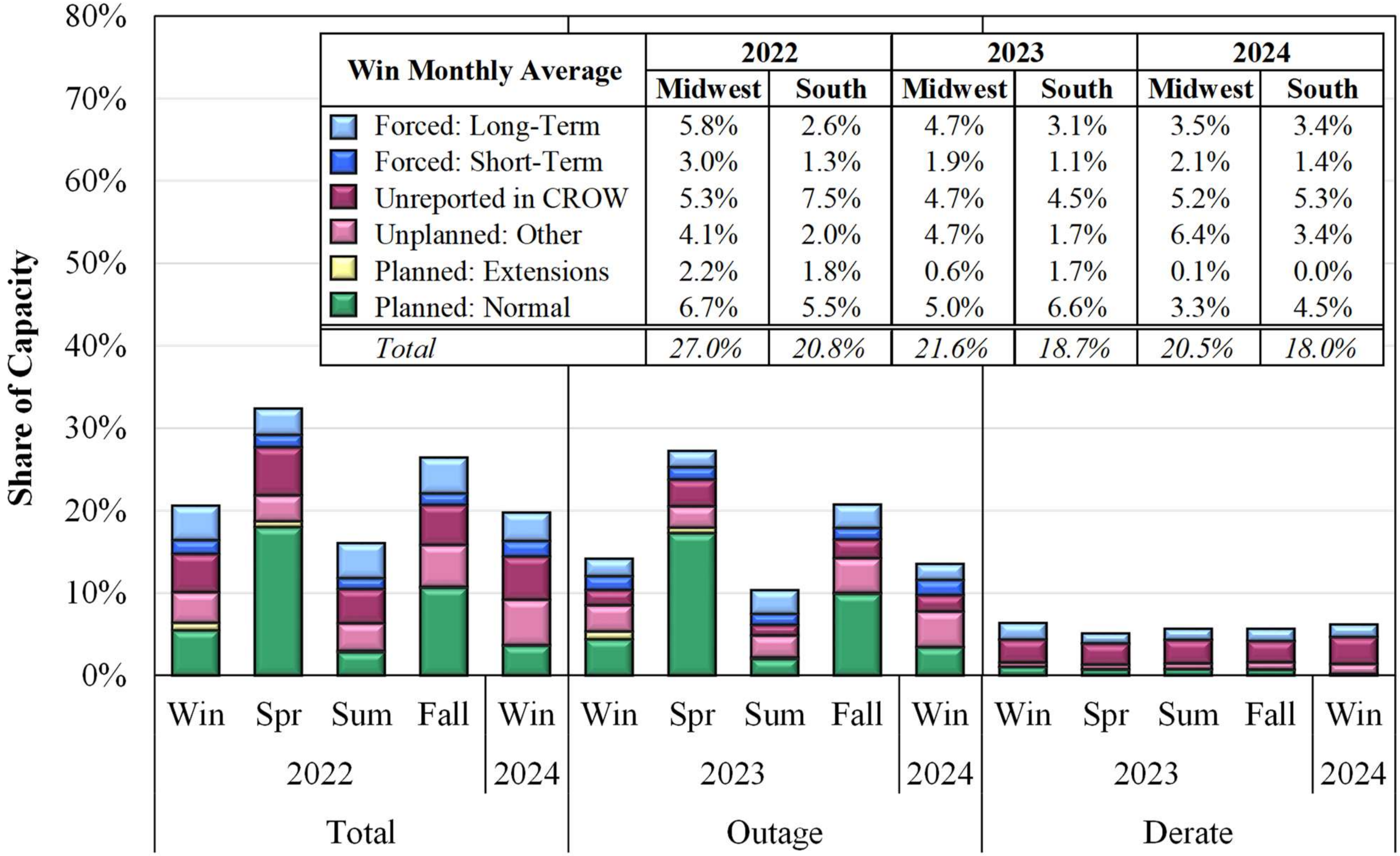
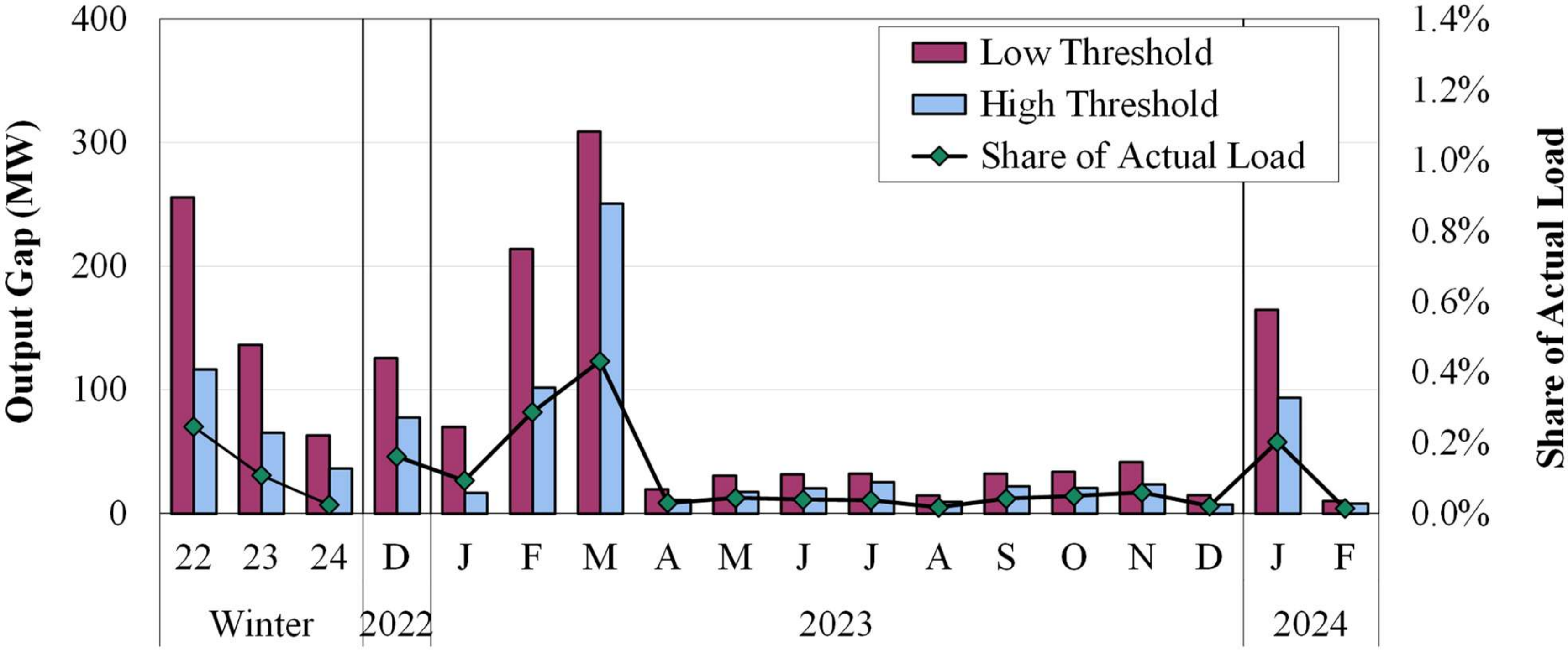
Generation Outages and Deratings Winter 2022–2024



Win Monthly Average	2022		2023		2024	
	Midwest	South	Midwest	South	Midwest	South
Forced: Long-Term	5.8%	2.6%	4.7%	3.1%	3.5%	3.4%
Forced: Short-Term	3.0%	1.3%	1.9%	1.1%	2.1%	1.4%
Unreported in CROW	5.3%	7.5%	4.7%	4.5%	5.2%	5.3%
Unplanned: Other	4.1%	2.0%	4.7%	1.7%	6.4%	3.4%
Planned: Extensions	2.2%	1.8%	0.6%	1.7%	0.1%	0.0%
Planned: Normal	6.7%	5.5%	5.0%	6.6%	3.3%	4.5%
Total	*27.0%*	*20.8%*	*21.6%*	*18.7%*	*20.5%*	*18.0%*

Monthly Output Gap
Winter 2022–2024



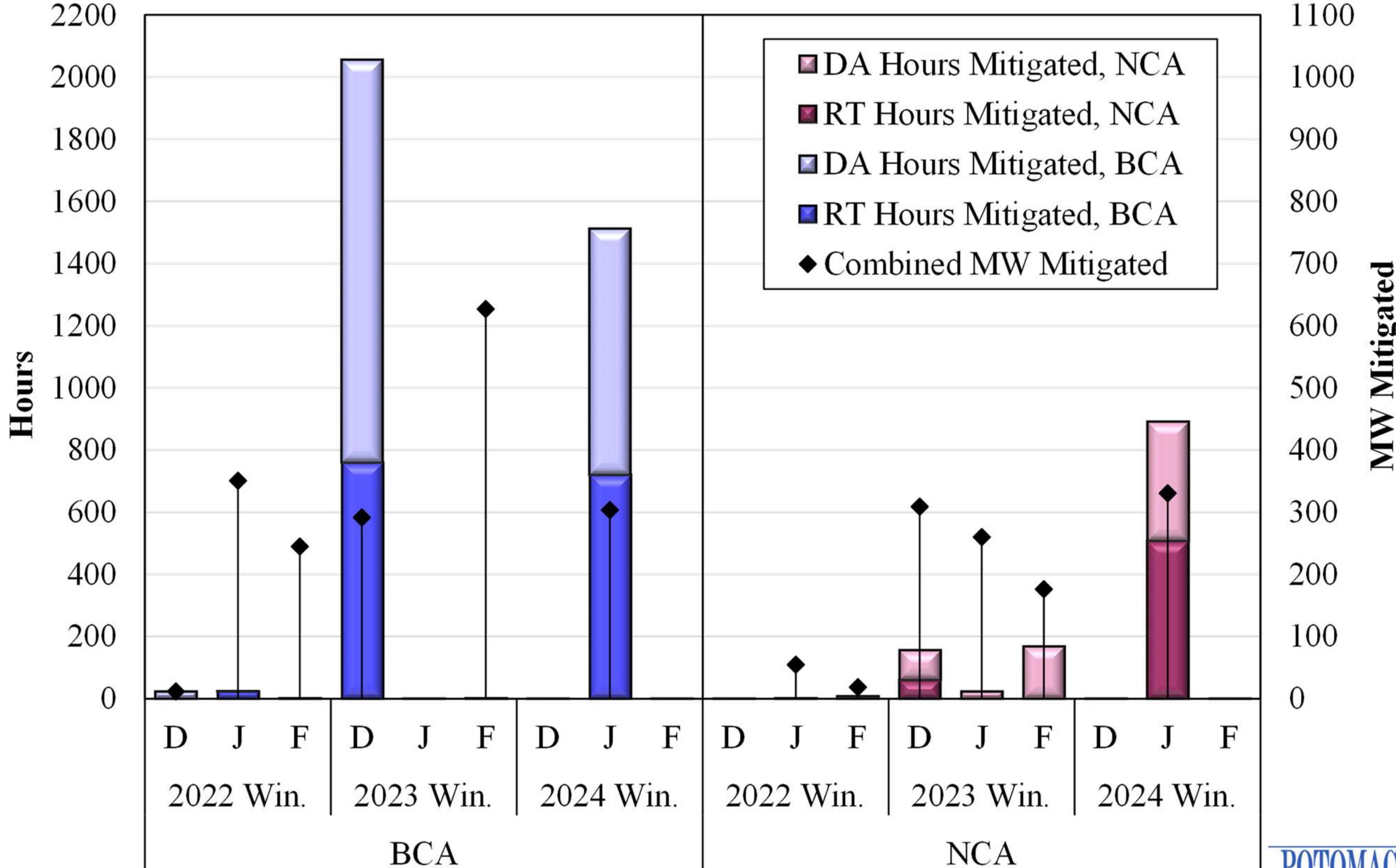
Low Threshold Results by Unit Status (MW)

Offline	18	94	35	82	29	170	301	11	23	22	23	6	25	17	27	4	98	3
Online	237	43	28	43	41	43	8	9	8	10	9	8	7	17	15	11	66	7

High Threshold Results by Unit Status (MW)

Offline	16	55	30	59	12	94	247	6	12	15	21	6	19	16	21	4	84	3
Online	101	10	6	19	5	7	4	5	6	5	5	4	3	5	3	3	9	6

Day-Ahead And Real-Time Energy Mitigation Winter 2022 - 2024



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Day-Ahead and Real-Time RSG Mitigation Winter 2022 - 2024