



# IMM Quarterly Markets Performance Report

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*Spring 2023 Report Highlights*  
*March 2023 – May 2023 outcomes*

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# Summary for Spring 2023

- **Wholesale market costs** totaled \$1.40bn, a 47% decrease (down \$1.25bn) on Spring 2022 costs of \$2.65bn, due to lower energy costs
  - Energy market costs made up 64% of total wholesale costs; capacity costs made up 30%
- Decrease in **energy costs** (totaled \$0.90bn, down by \$1.19bn or 57%), driven by lower natural gas prices
  - Avg. day-ahead and real-time **Hub LMPs** were \$29.62/MWh and \$27.04/MWh; 57-60% lower than in Spring 2022
  - Avg. **natural gas price** was \$2.24/MMBtu, down 69% on the Spring 2022 price of \$7.14/MMBtu; effect of lower gas prices on LMPs was muted by supply mix factors
  - Smaller share of nuclear generation (down 354 MW) in the supply mix due to refueling outages and unplanned outage continuation
  - Spring 2023 net imports were 276 MW less than in Spring 2022
- **Capacity market costs** were down by 21% (totaled \$423m, down by \$110m) on Spring 2022
  - Spring 2023 was the fourth quarter of the FCA 13 commitment period, with clearing prices of \$3.80/kw-month for rest-of-system, lower than the FCA 12 price of \$4.63/kw-month

Seasons: Winter: Dec-Feb    **Spring: Mar-May**    Summer: Jun-Aug    Fall: Sep-Nov

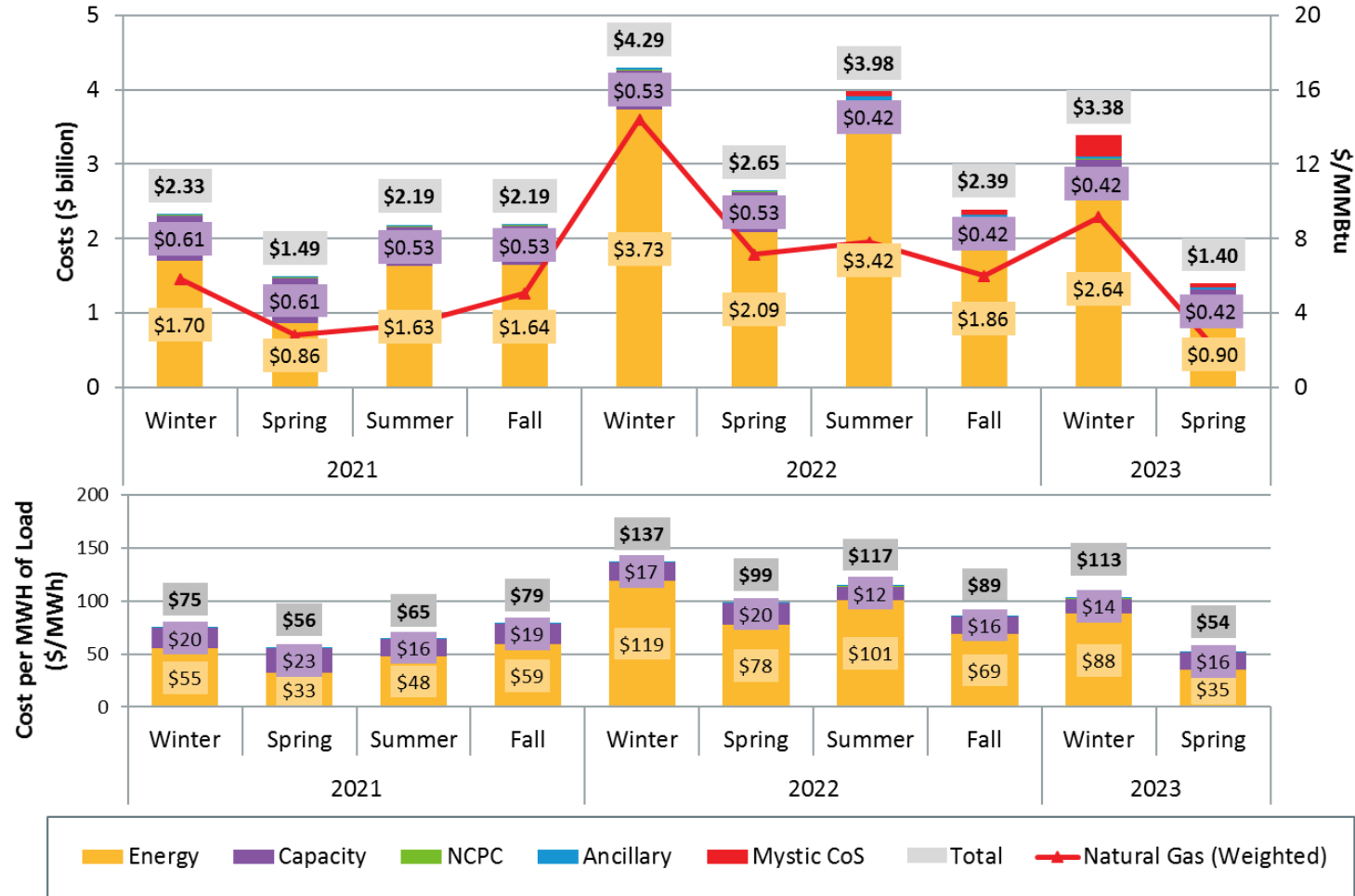
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# Summary for Spring 2023 (cont.)

- **Real-time reserve payments** were at the low end of the historical range at just \$0.9m, down \$3.3m from \$5.2 million in Spring 2022, and reflective of high margins and the absence of major instances of stressed conditions
  - Most payments (80%) were for ten-minute spinning reserves; lower price of \$9.16/MWh was consistent with lower natural gas and real-time energy prices; there were fewer intervals (7% of total hours) with non-zero prices
  - \$0.2m in payments for non-spinning reserves (10-min offline product); less than two hours of non-zero pricing for 10-min (avg. price of \$85/MWh); no non-zero 30-min pricing
- Total **regulation payments** were \$4.8m, down by \$1.4m (23%) compared to Spring 2022
  - Increase primarily reflected lower regulation capacity prices, which resulted from lower energy market opportunity costs (decreased LMPs in Spring 2023)
- **Uplift or Net Commitment Period Compensation (NCPC)** costs totaled \$3.9m, down by 64% (by \$06.9m) on the prior spring, consistent with lower energy prices
  - Uplift costs were the lowest of the study period, and represented just 0.4% of total energy costs
  - Uplift to economically committed and dispatched resources made up 98% of the total (\$3.8m in “economic” uplift); the remainder went to local reliability commitments
- Forward Reserve Auction (FRA) for the Summer 2023 delivery period was structurally uncompetitive and IMM recommends updating the auction’s price cap
  - System TMOR and TMNSR products both cleared at prices of \$7,499/MW-month

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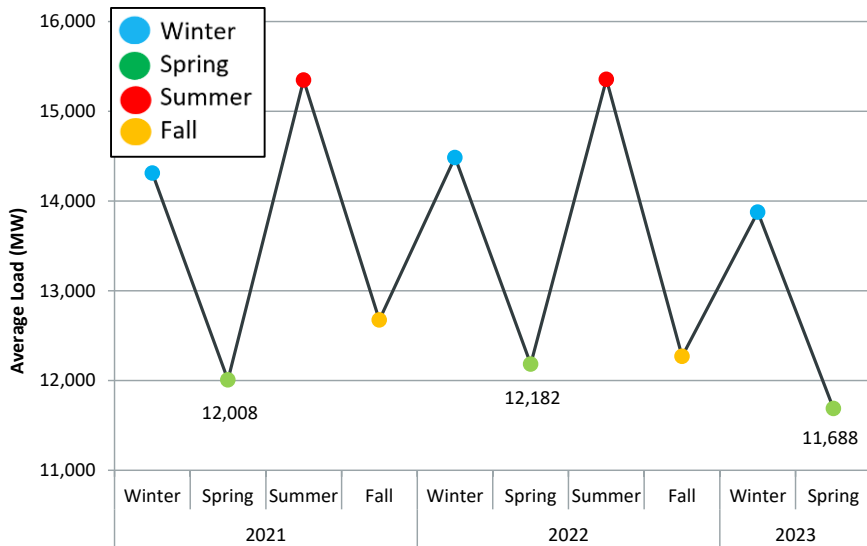
# Wholesale electricity cost down 47% on prior Spring; lower energy and capacity costs



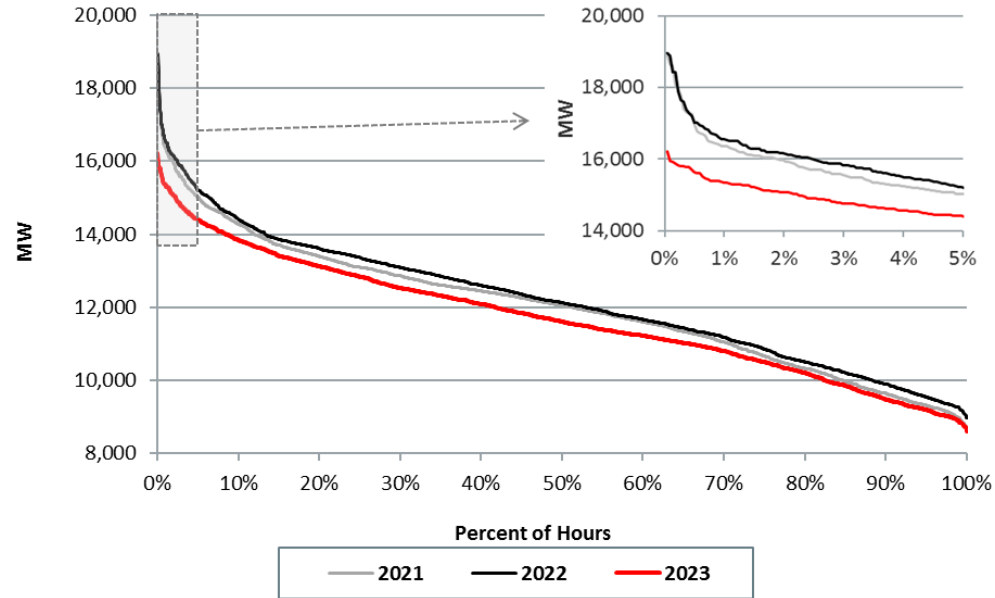
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# Lowest average load of the reporting period, driven by cooler temperatures in May

## Average Hourly Load



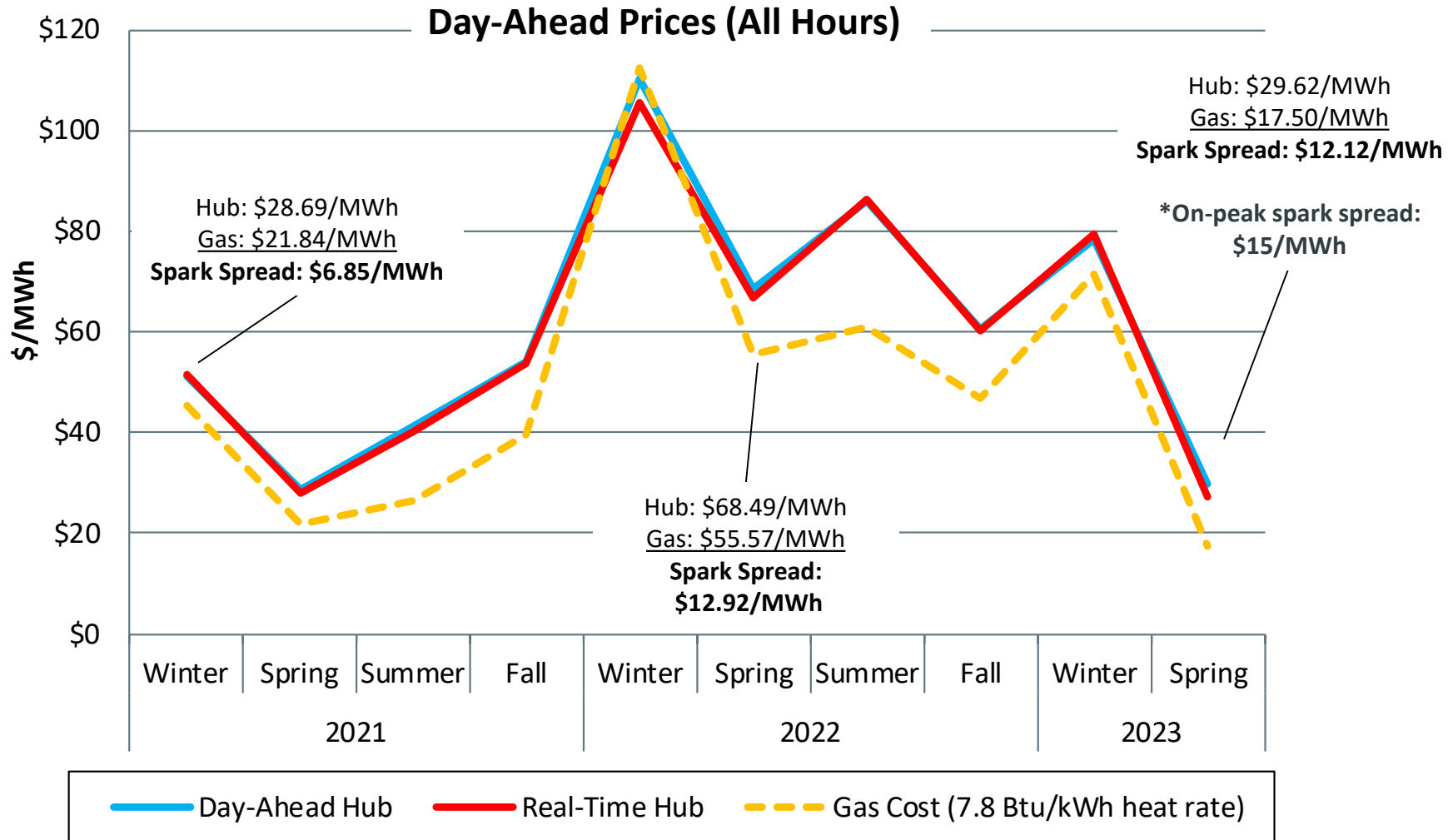
## Load Duration Curves



Seasons: Winter: Dec-Feb   **Spring: Mar-May**   Summer: Jun-Aug   Fall: Sep-Nov

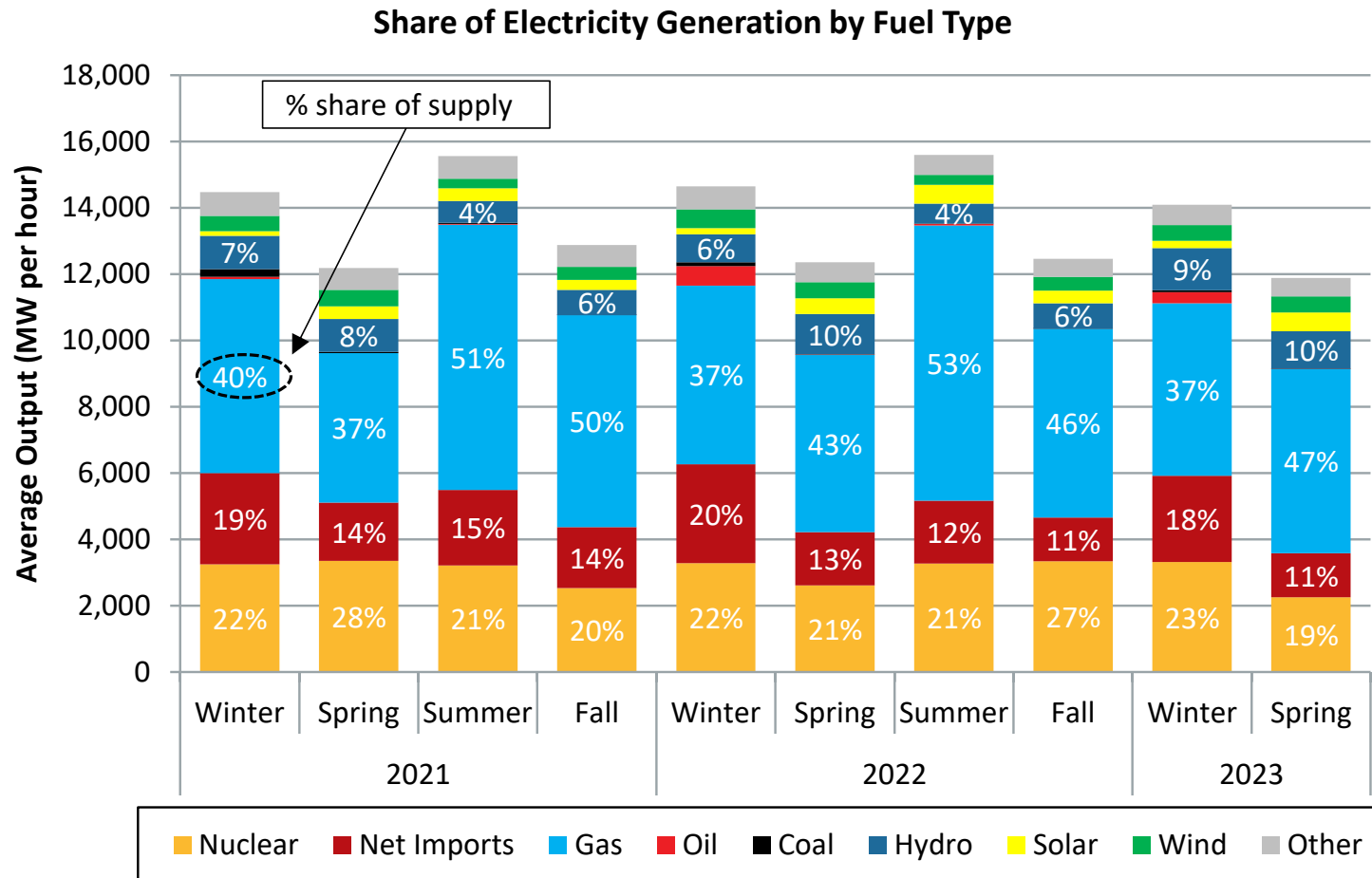


# Lower gas prices drove lower energy prices; decreased nuclear gen. and net imports offset some downward pressure on LMPs



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# Decrease in nuclear generation from Spring 2022 due to more outages; increase in gas generation

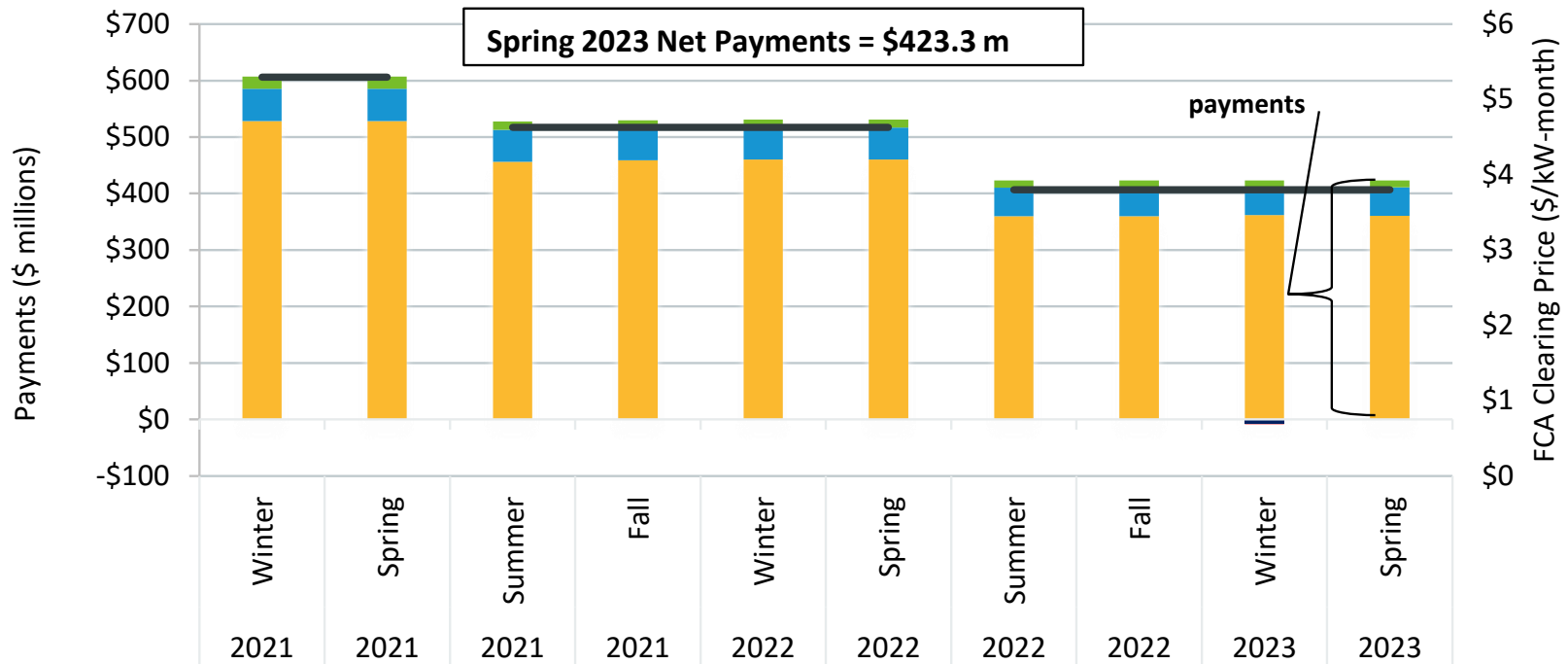


Note: the "Other" category includes energy storage, landfill gas, methane, refuse, steam, and wood

Seasons: Winter: Dec-Feb    **Spring: Mar-May**    Summer: Jun-Aug    Fall: Sep-Nov

# Fourth quarter of FCA13; lower clearing prices

FCA 13 prices: \$3.80/kW-month; was 18% lower than the previous year



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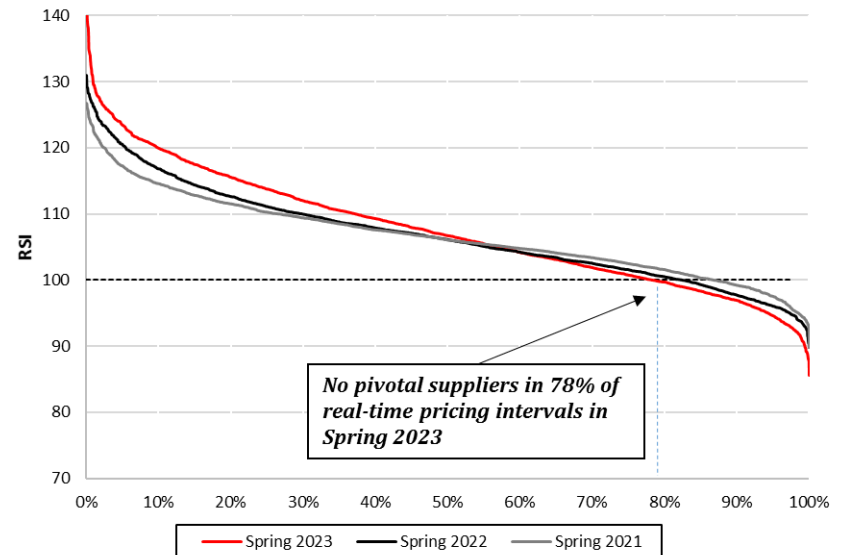
# Energy Market Competitiveness

- At least one pivotal supplier present in the real-time market for 22% of 5-minute intervals in Spring 2022 (vs 19 % the previous spring)
- Presence of structural market power similar to that of Spring 2022; effect of higher avg. reserve margin offset by increase in available supply from large participant
- The residual supply index for the real-time market in Spring 2023 was 108, indicating that on average, the ISO could meet load and the reserve requirement without energy and reserves from the largest supplier

Residual Supply Index and Intervals w/Pivotal Suppliers (RT)

Quarter	RSI	% of Intervals With At Least 1 Pivotal Supplier
Winter 2021	107.9	8%
Spring 2021	106.6	14%
Summer 2021	104.7	27%
Fall 2021	105.0	24%
Winter 2022	106.5	12%
Spring 2022	106.7	19%
Summer 2022	102.6	34%
Fall 2022	104.0	28%
Winter 2023	105.2	20%
Spring 2023	107.7	22%

System-Wide Residual Supply Index Duration Curves



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# Market Power Mitigation in the Energy Market

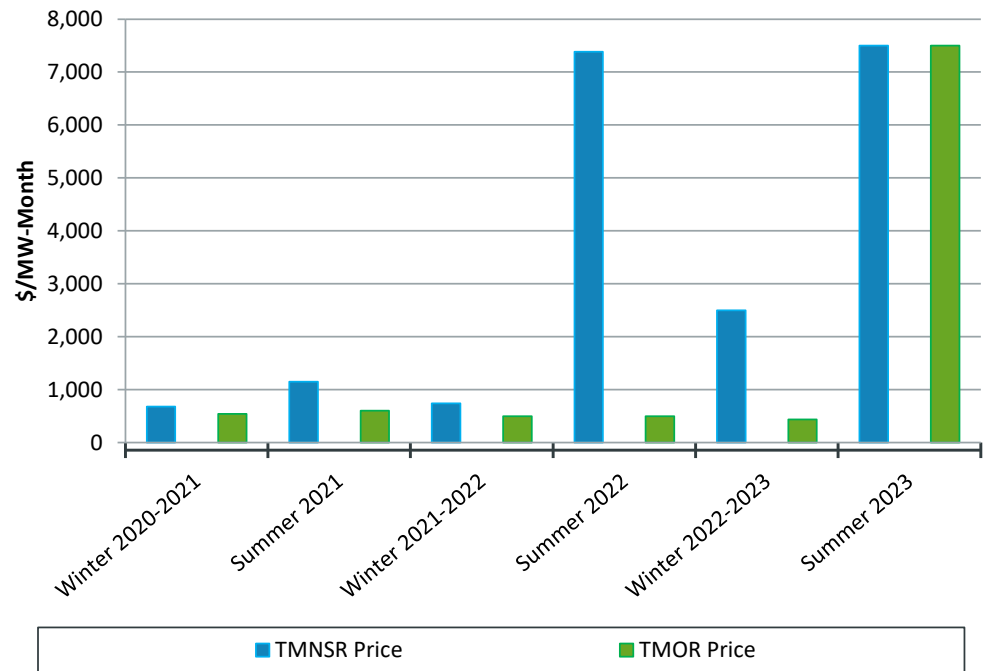
- In general, mitigation occurs very infrequently relative to the structural test failures



# Forward Reserve Auction (FRA)

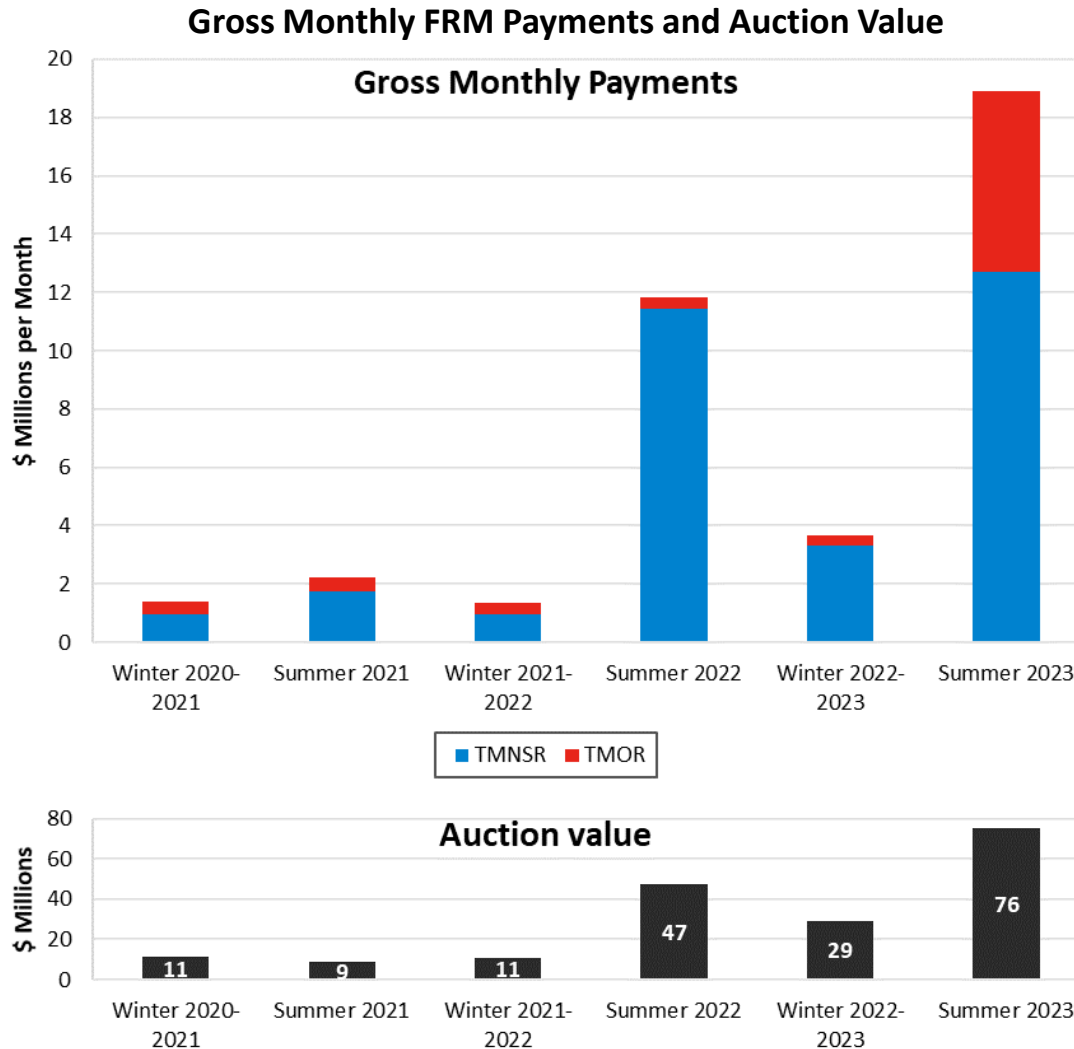
- The Summer 2023 Forward Reserve Auction clearing prices for TMNSR and TMOR increased significantly compared to previous auctions
- The IMM is concerned that the forward reserve auctions, which have been structurally uncompetitive in recent summer auctions, are susceptible to participants exercising market power
- Based on our review of the price cap formulation, we believe it would be prudent to update the cap based on prevailing market and system conditions

FRM Clearing Prices for System-Wide TMNSR and TMOR



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# Forward reserve payments have increased significantly since the Summer 2022 auction



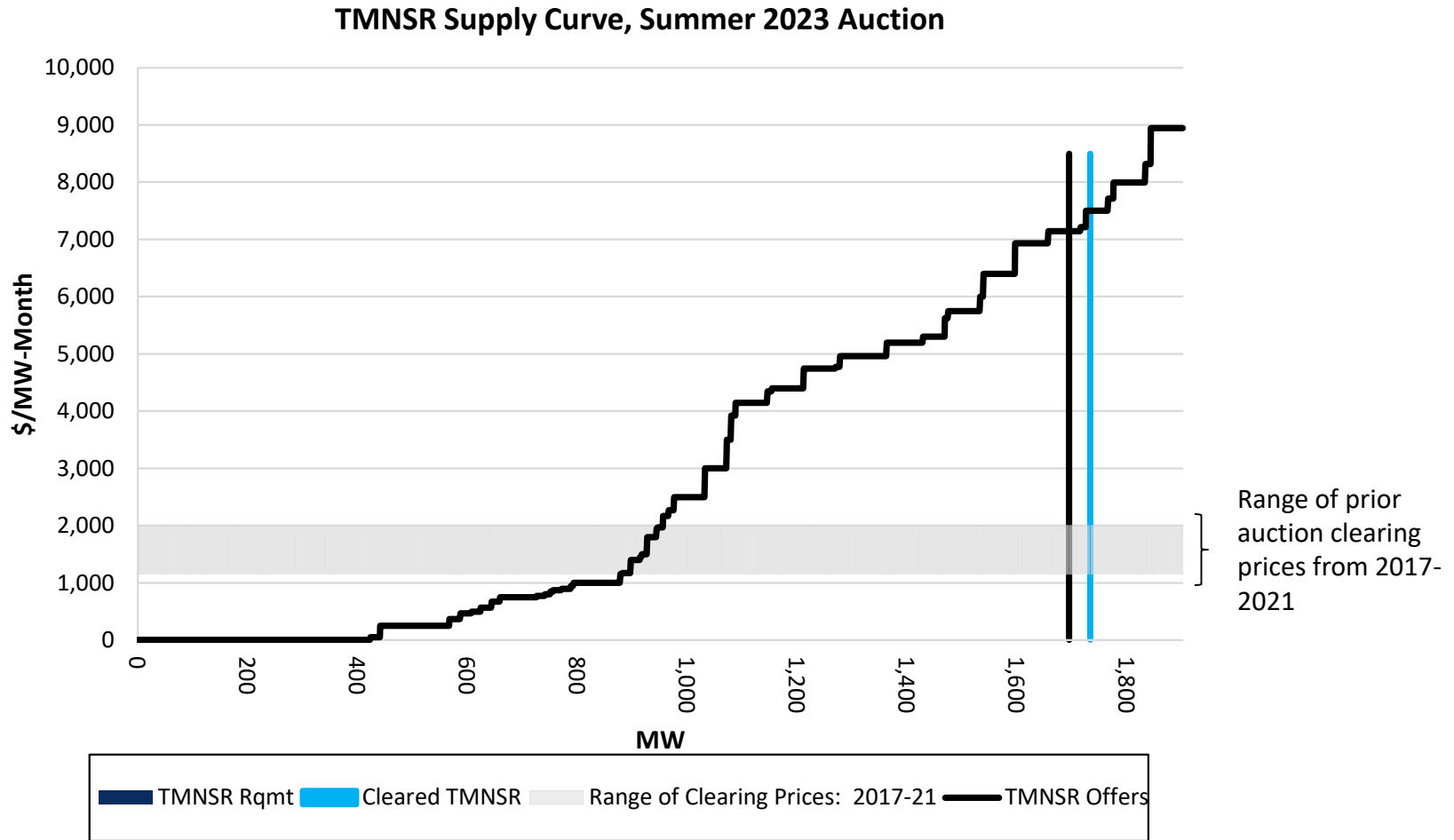
# The Summer FRA has been structurally uncompetitive over the past five years

FRM Auctions, RSI and Clearing Prices for TMNSR

Procurement Period	Offer RSI TMNSR	TMNSR Auction Clearing Price	Offer RSI Total Thirty	TMOR Auction Clearing Price
Summer 2018	112	\$1,780	108	\$1,780
Summer 2019	90	\$1,899	97	\$1,899
Summer 2020	84	\$1,249	97	\$900
Summer 2021	92	\$1,150	108	\$600
Summer 2022	78	\$7,386	90	\$499
Summer 2023	81	\$7,499	86	\$7,499
Winter 2018-19	127	\$800	127	\$750
Winter 2019-20	120	\$799	118	\$799
Winter 2020-21	102	\$678	115	\$540
Winter 2021-22	110	\$740	116	\$499
Winter 2022-23	109	\$2,500	112	\$439

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# Summer 2023 TMNSR offers cleared far above the historical range for the TMNSR clearing price



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# IMM recommendation would update the FRA cap to reflect prevailing market and system conditions

FRM Supply Offer Price Cap Components

Line	Reserve Revenue	Current	Recommended	
a	Capacity Excess/Shortfall (MW)	n/a	2,200	← Capacity surplus after FCA15 ARA 1
b	75th percentile CSC Hours (approx) (hrs)	25.12	2.30	← From ISO's CSC hour estimates for FCA15
c	Transient & Winter Adjustment Hours (Hrs)	n/a	0.27	
d	Seasonal Adjustment (%)	51%	100%	
e	CSC Hours $(=(b+c)*d)$	12.81	2.57	
f	Number of Summer Months	4.00	4.00	← Summer FRA Auction period
g	CSC Hours/Month $(=e/f)$	3.20	0.64	
h	Payment Rate (\$/MWh)	1,075	1,616	← Mean TMNSR CSC reserve price observed over 3.2 summer CSC hours
i	CSC Hour Reserve Revenue (\$/MW-mo) $(=g*h)$	3,443	1,038	
j	Non-CSC Reserve Revenue (\$/MW-mo)	1,500	1,142	← 90 <sup>th</sup> percentile value of available reserve revenue observed over 6 summer seasons
k	Total Reserve Revenue (\$/MW-mo) $(=i+j)$	4,943	2,180	
<b>Non-Reserve Offer Cap Components</b>				
l	Foregone Energy Market Revenue (\$/MW-mo)	700	2,091	← Summer 90 <sup>th</sup> percentile value observed over four summer seasons for a relatively new dual-fuel peaking resource
m	Failure to Activate Penalty (\$/MW-mo)	50	50	
n	Failure to Reserve Penalty (\$/MW-mo) $(=(k+l+m)*0.33)$	1,896	1,426	
o	Risk Premium (\$/MW-mo) $(=(k+l+m+n)*0.15)$	1,138	862	
p	<b>Offer Cap (\$/MW-mo) <math>(=k+l+m+n+o)</math></b>	8,727	6,609	
q	<b>Offer Cap (\$/MW-mo) (rounded)</b>	<b>9,000</b>	<b>6,600</b>	

# Questions

