

# WINTER 2023

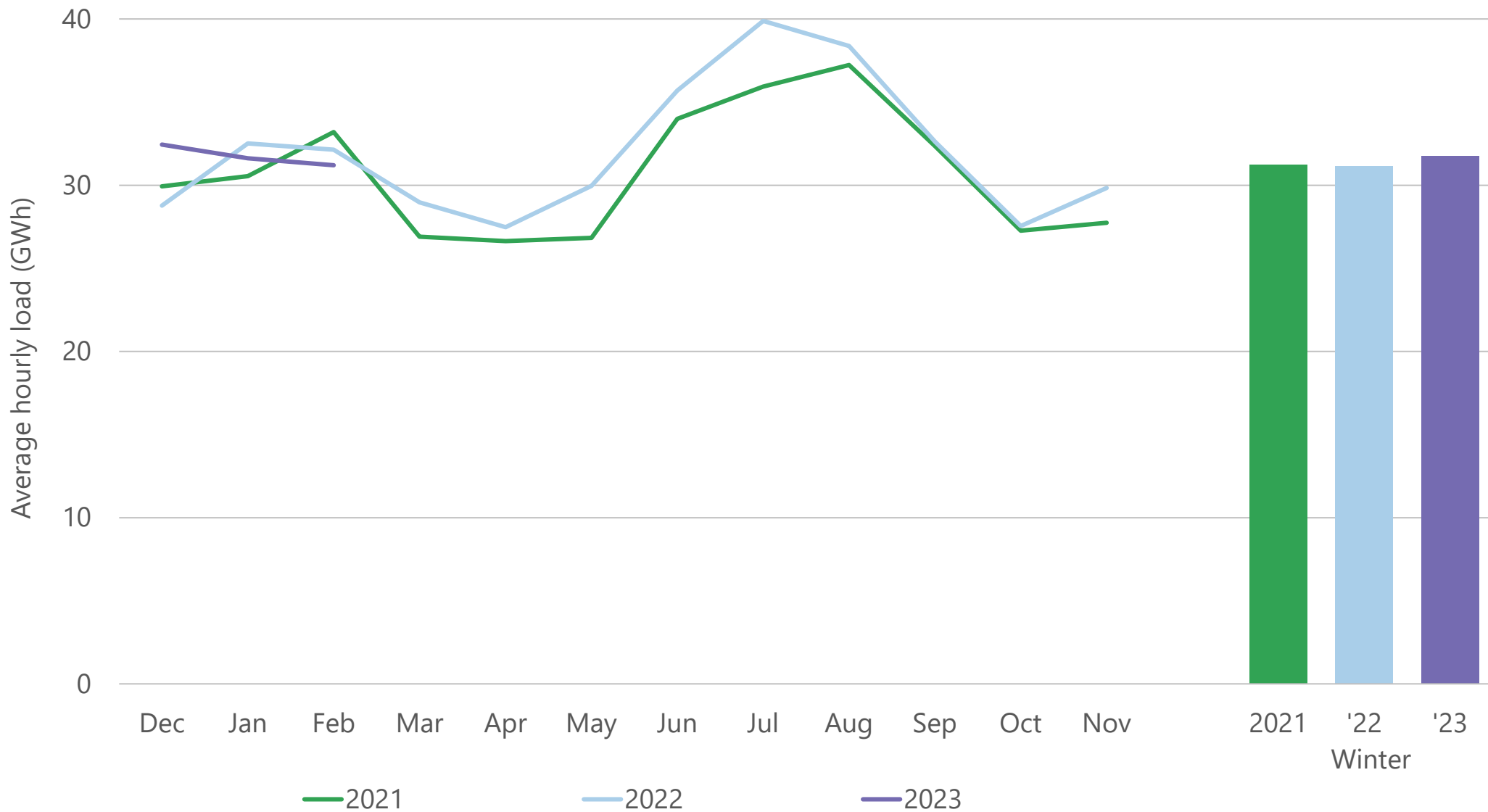
DECEMBER 2022 – FEBRUARY 2023

## QUARTERLY REPORT

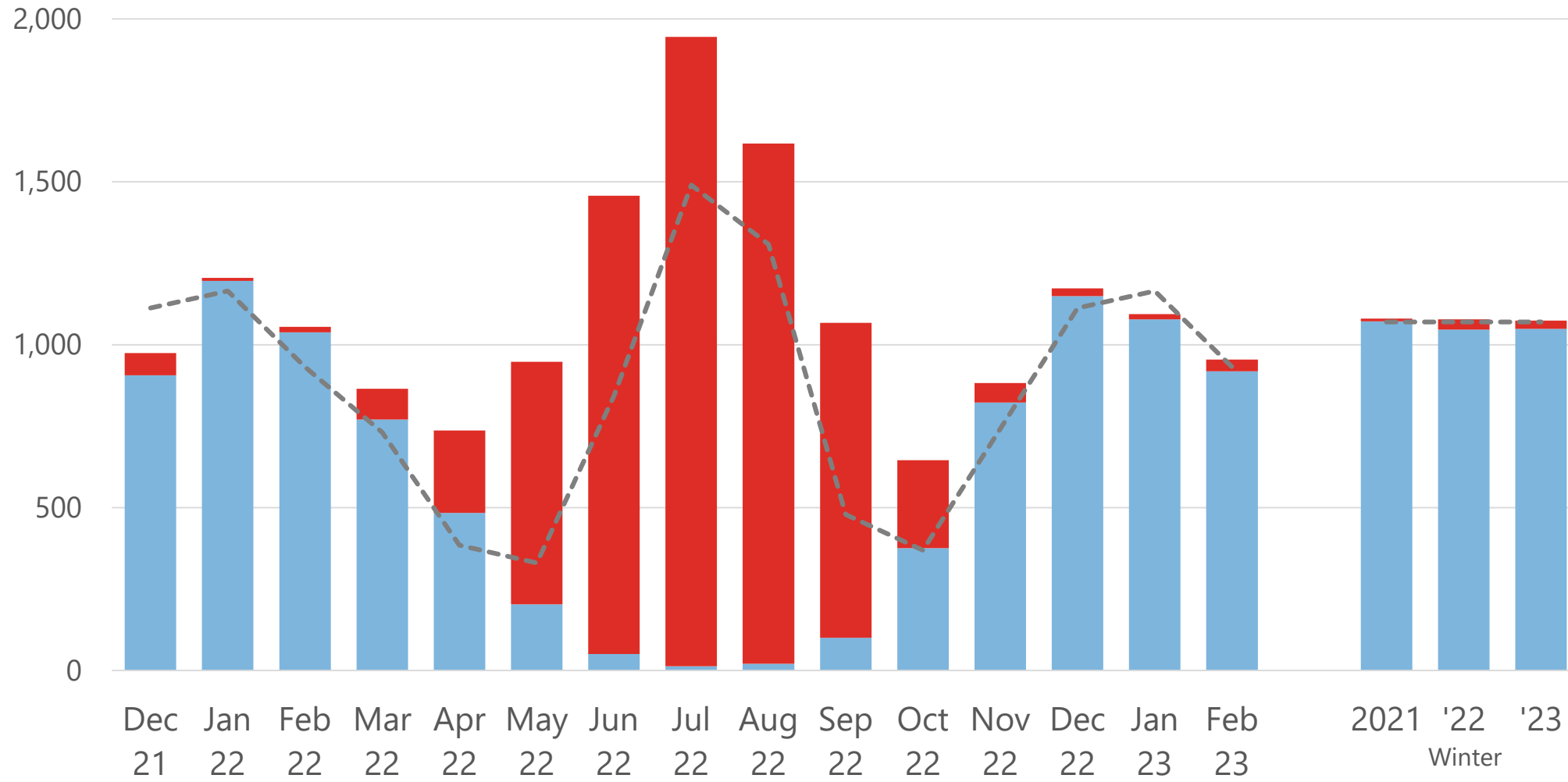
# WINTER 2023 HIGHLIGHTS

- Wind generation was the primary fuel type in terms of generation during the winter 2023 quarter.
- Load was up 2% for winter 2023 in comparison to 2022.
- The average gas price at the Panhandle Eastern hub was down 17%, while day-ahead and real-time prices were up.
- The most congested flowgate for winter 2023 was near the North Dakota – Minnesota border.
- Make-whole payments were up for winter 2023, while revenue neutrality uplift was down.
- Special issues – December 2022 winter storm

# OVERALL LOAD UP TWO PERCENT



# DEGREE DAY IMPACT FLAT

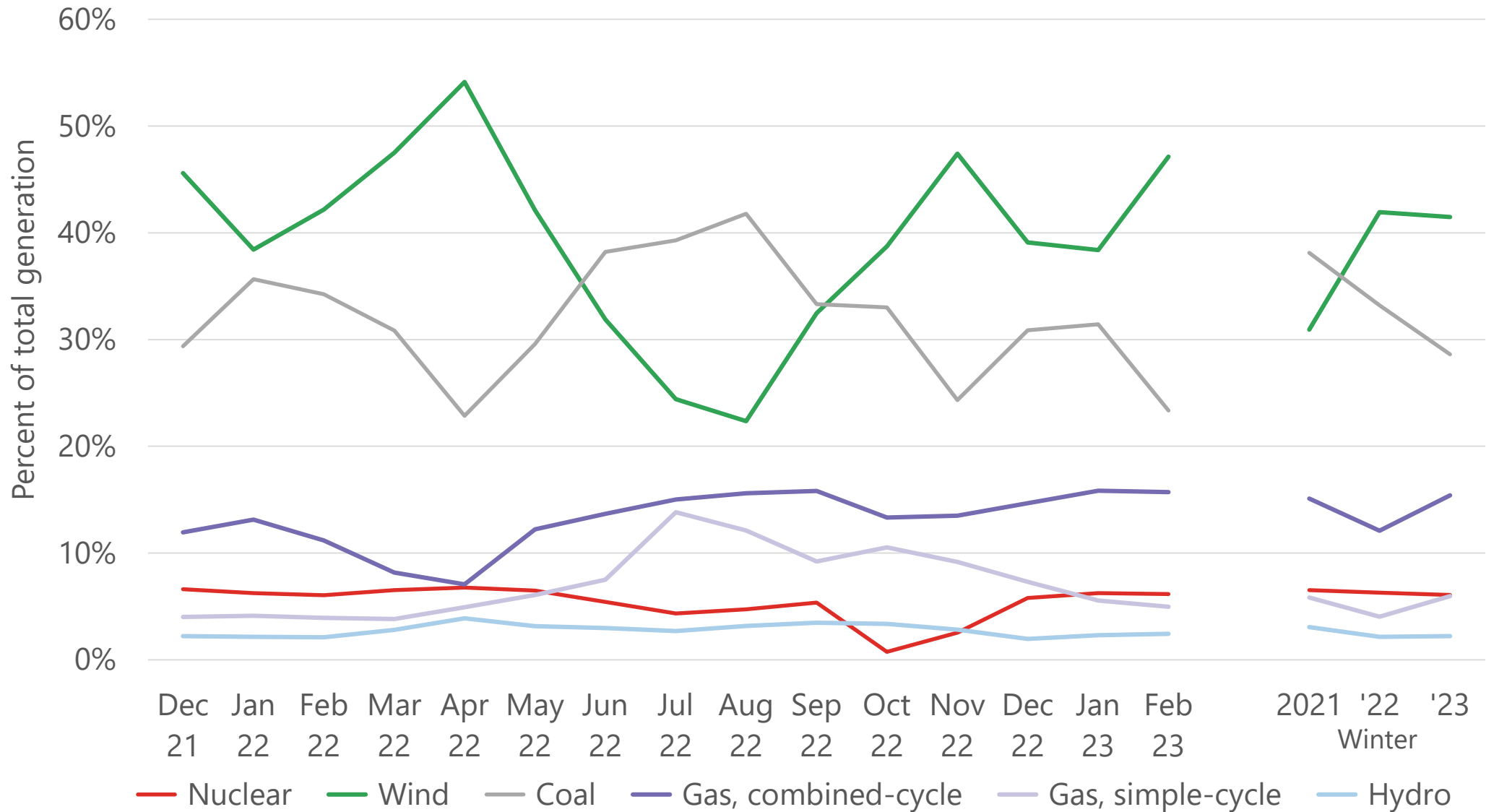


■ Heating degree days

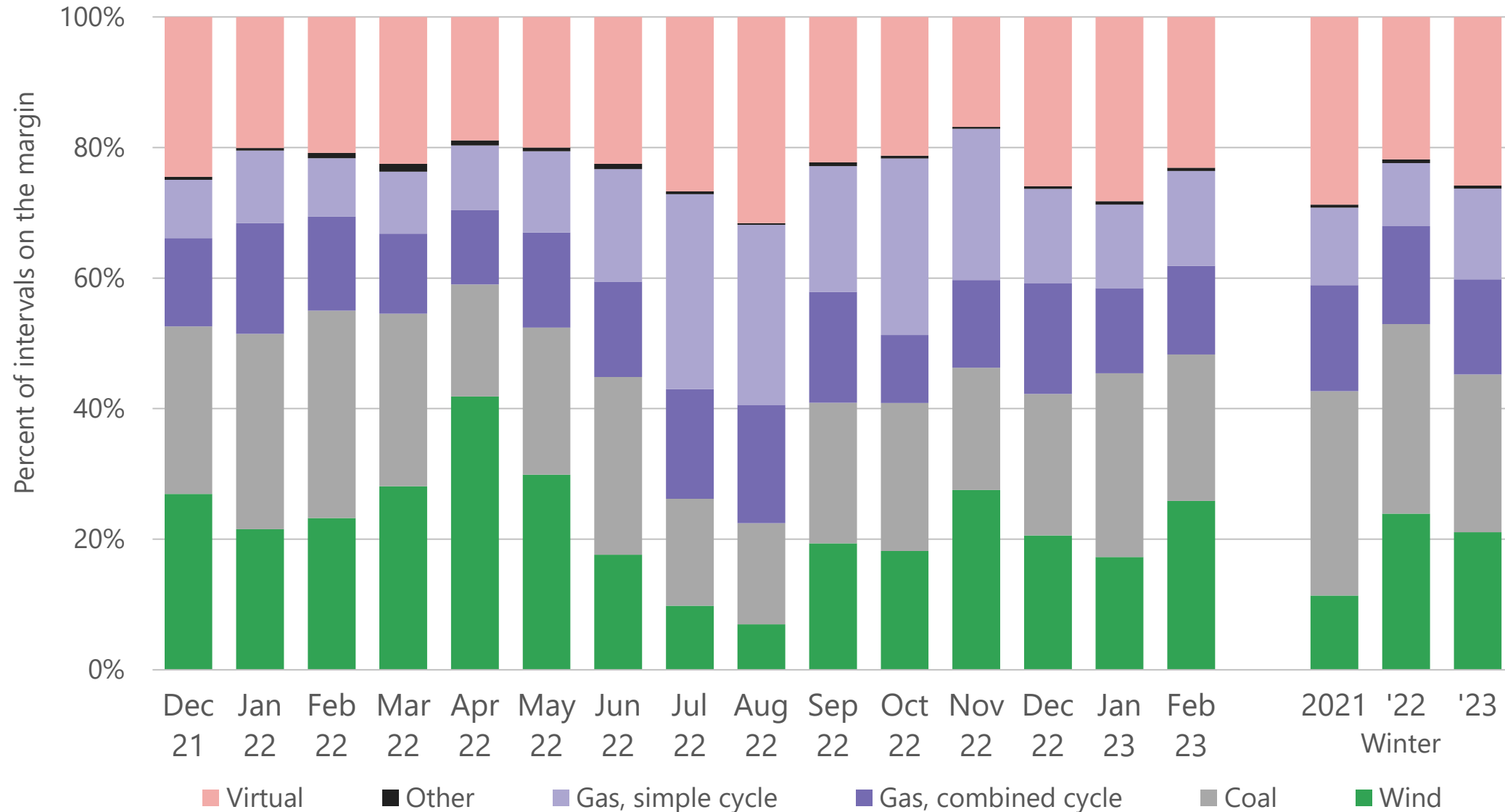
■ Cooling degree days

--- Normal

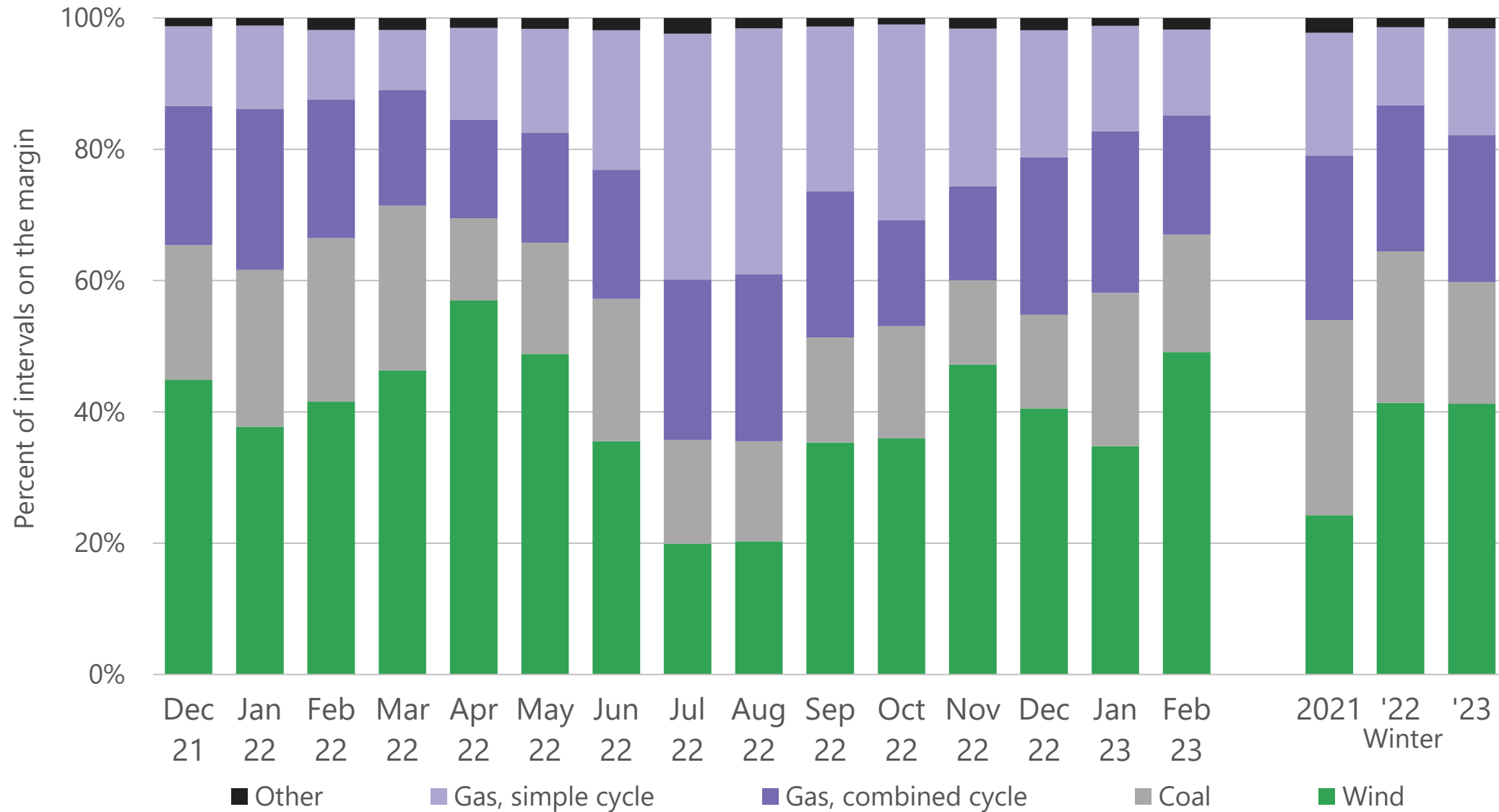
# WIND HAD HIGHEST GENERATION BY FUEL TYPE



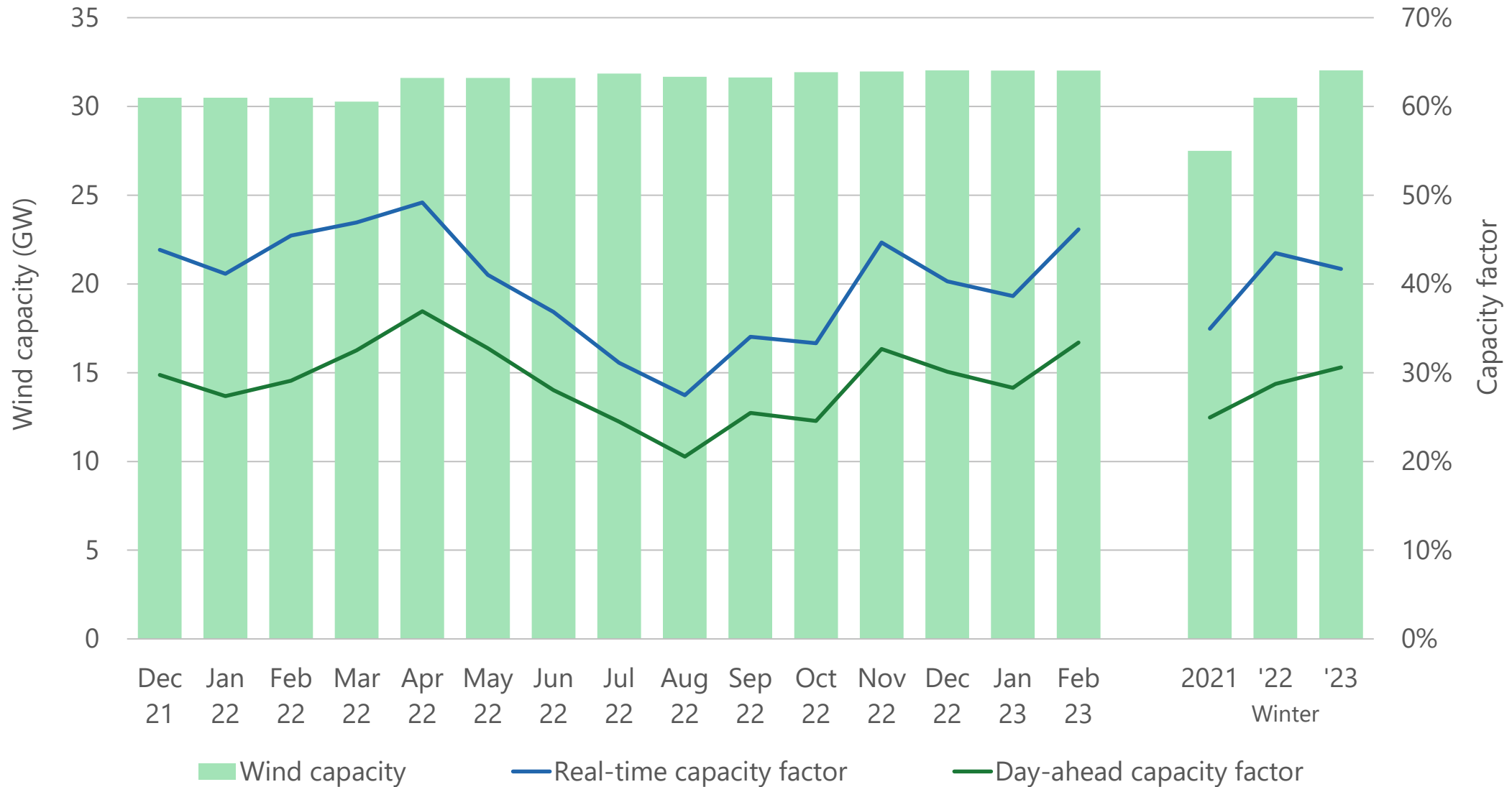
# VIRTUALS SET PRICES MOST FREQUENTLY IN DAY-AHEAD



# WIND SET PRICES MOST FREQUENTLY IN REAL-TIME

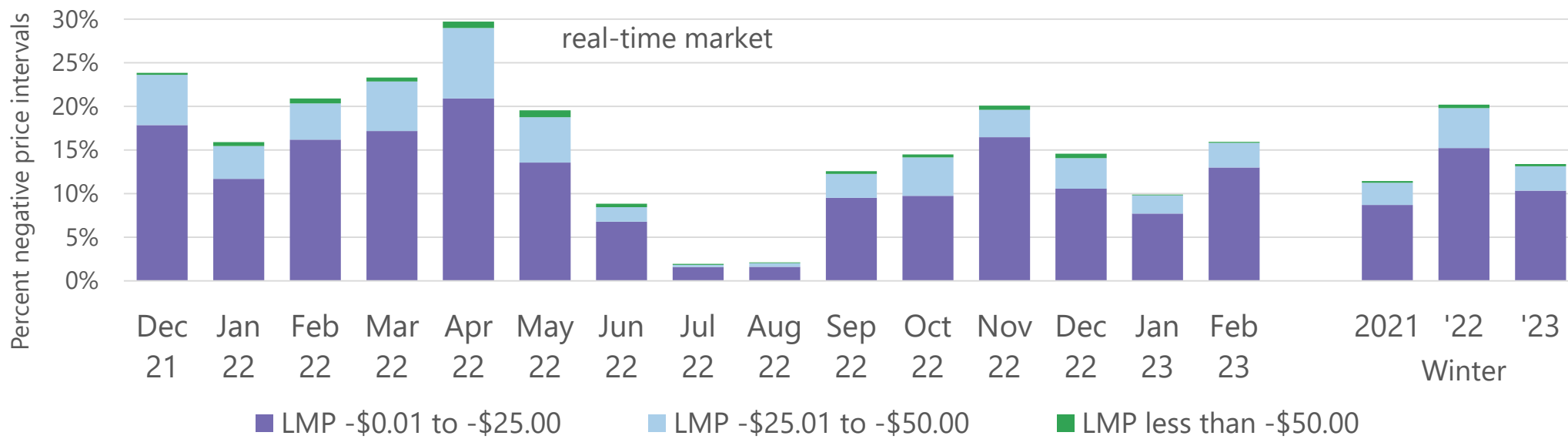
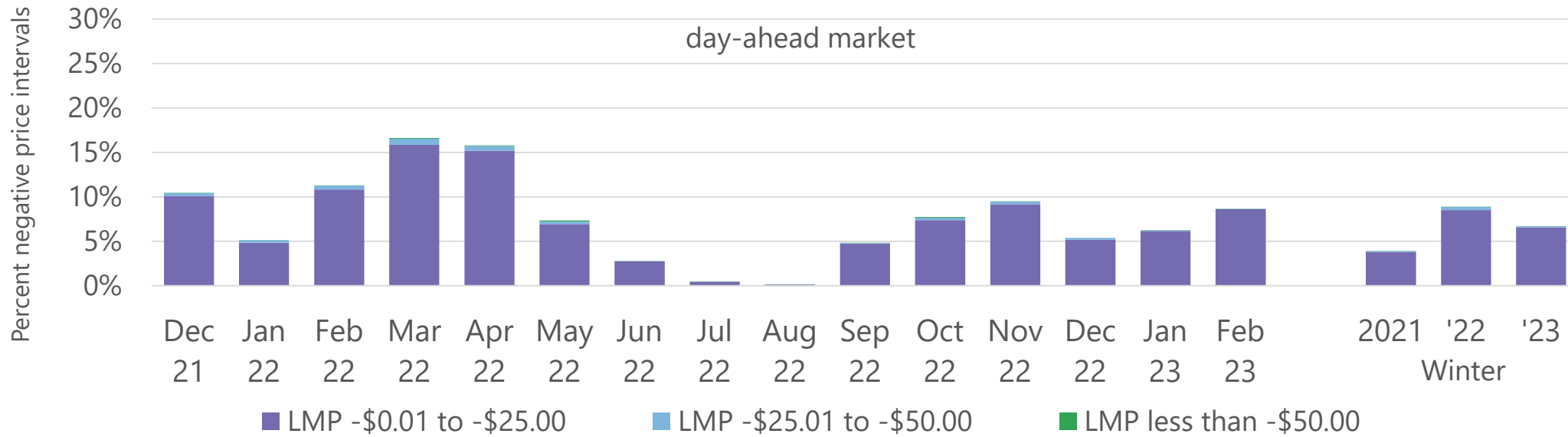


# WIND CAPACITY UP

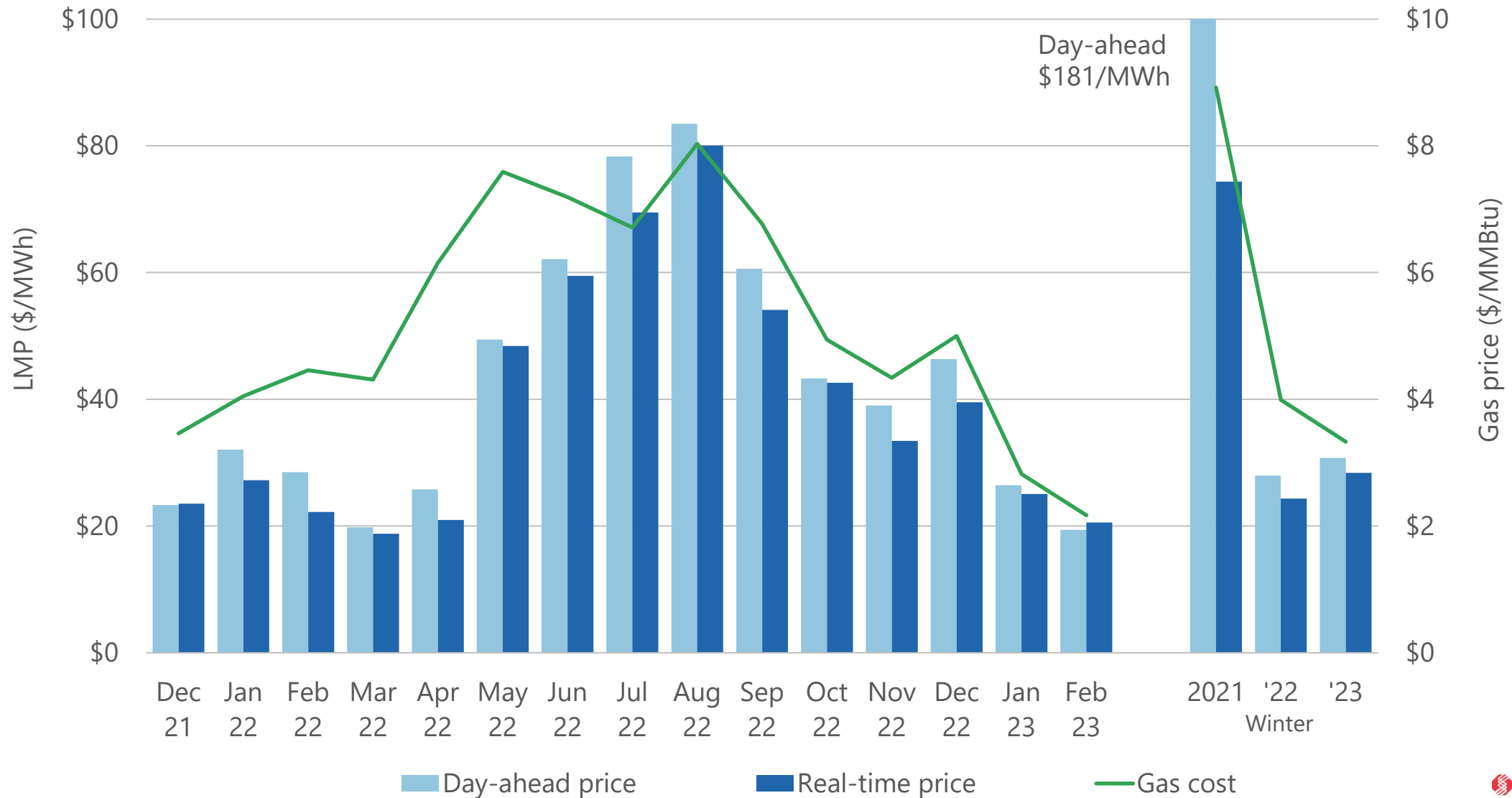




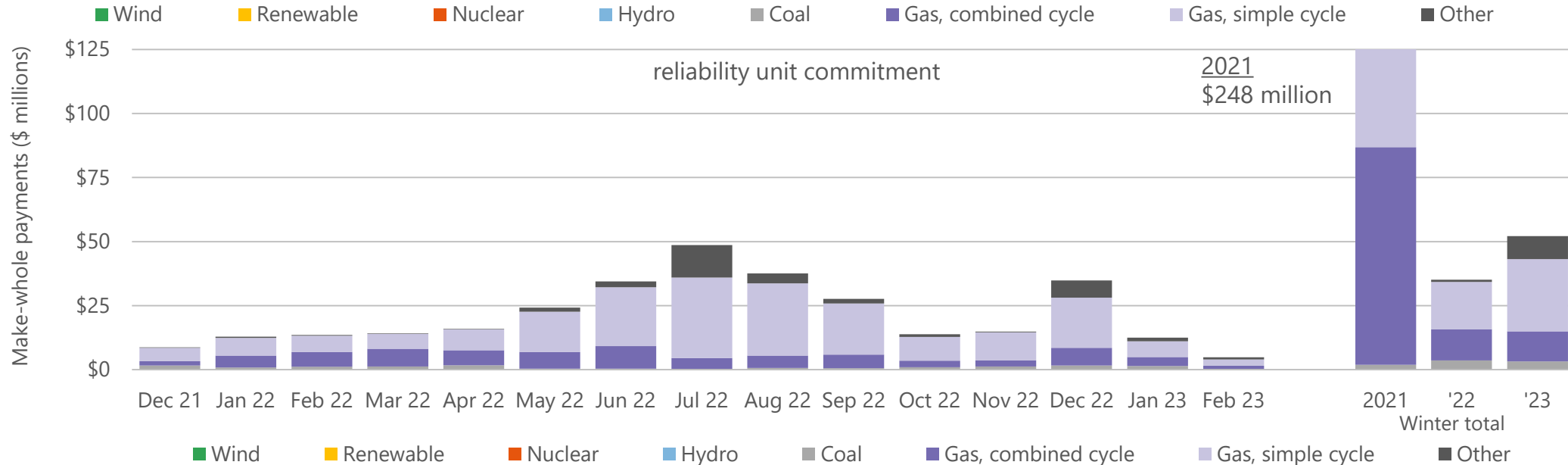
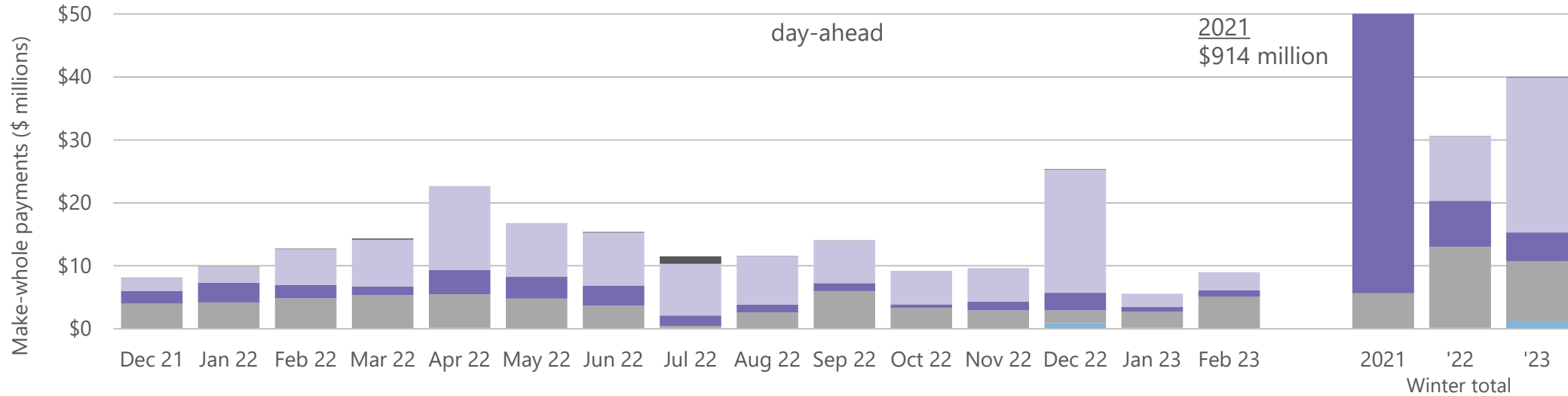
# NEGATIVE PRICES WERE DOWN



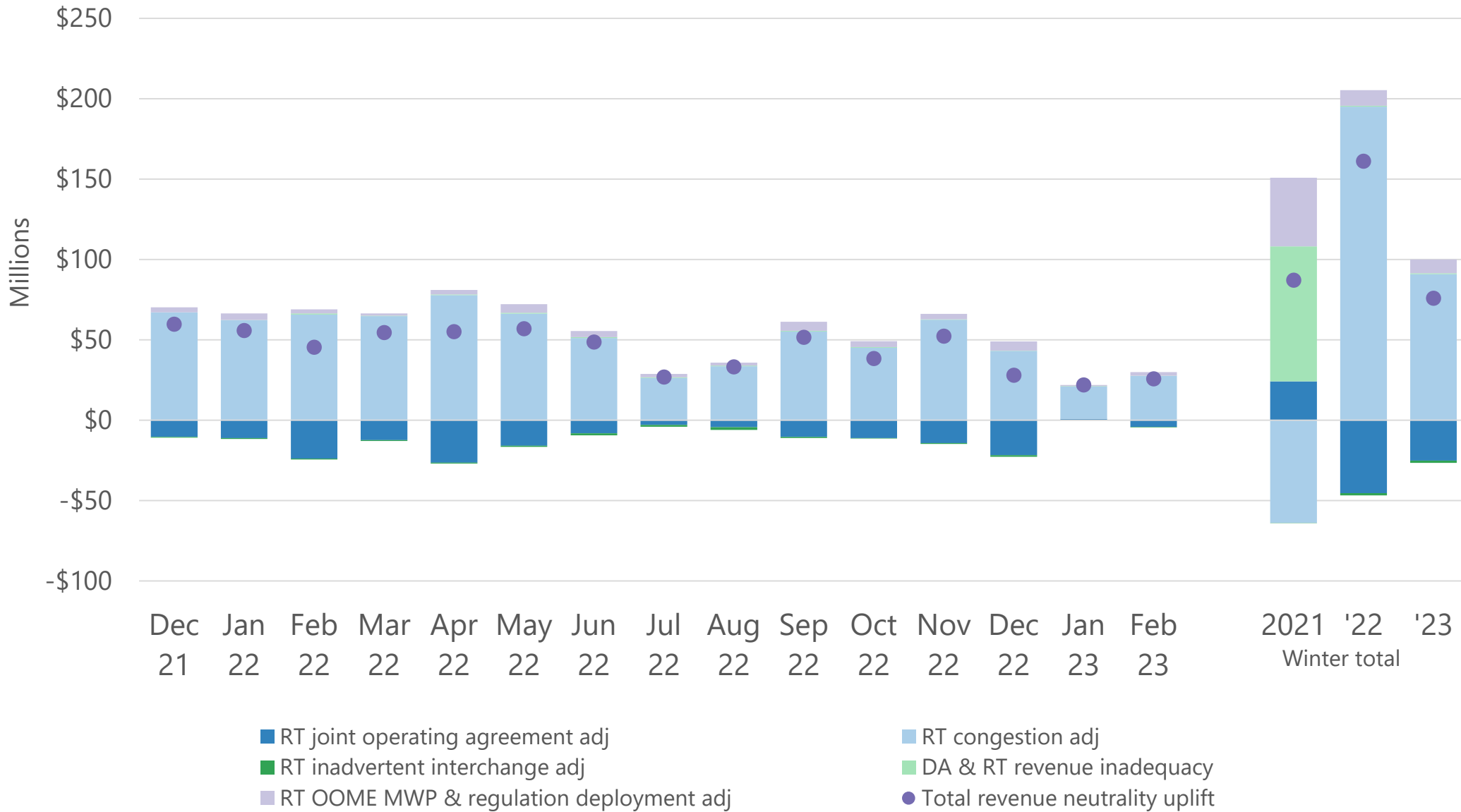
# ELECTRICITY PRICES INCREASED, WHILE GAS PRICES DECREASED



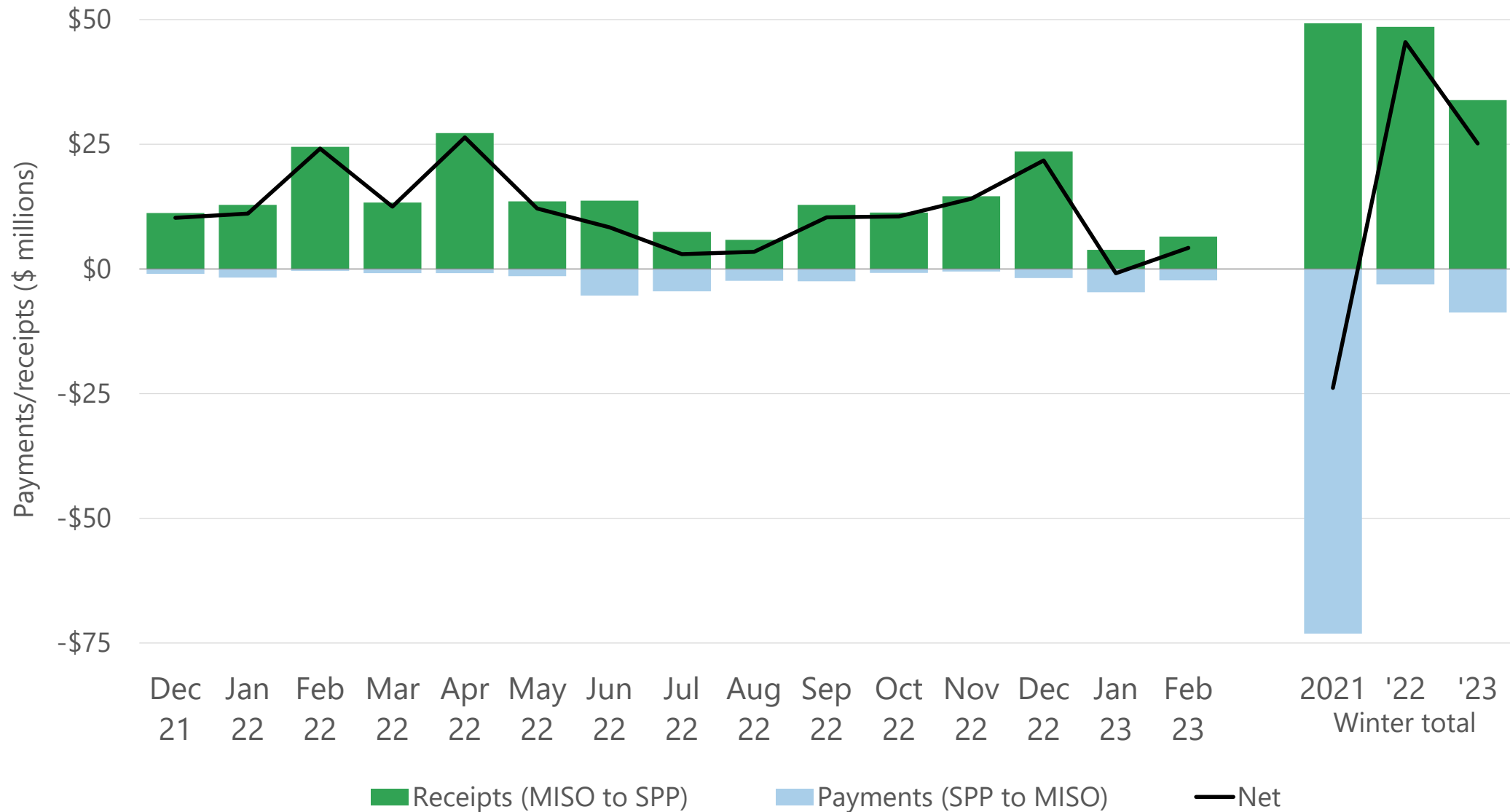
# MAKE-WHOLE PAYMENTS ARE UP



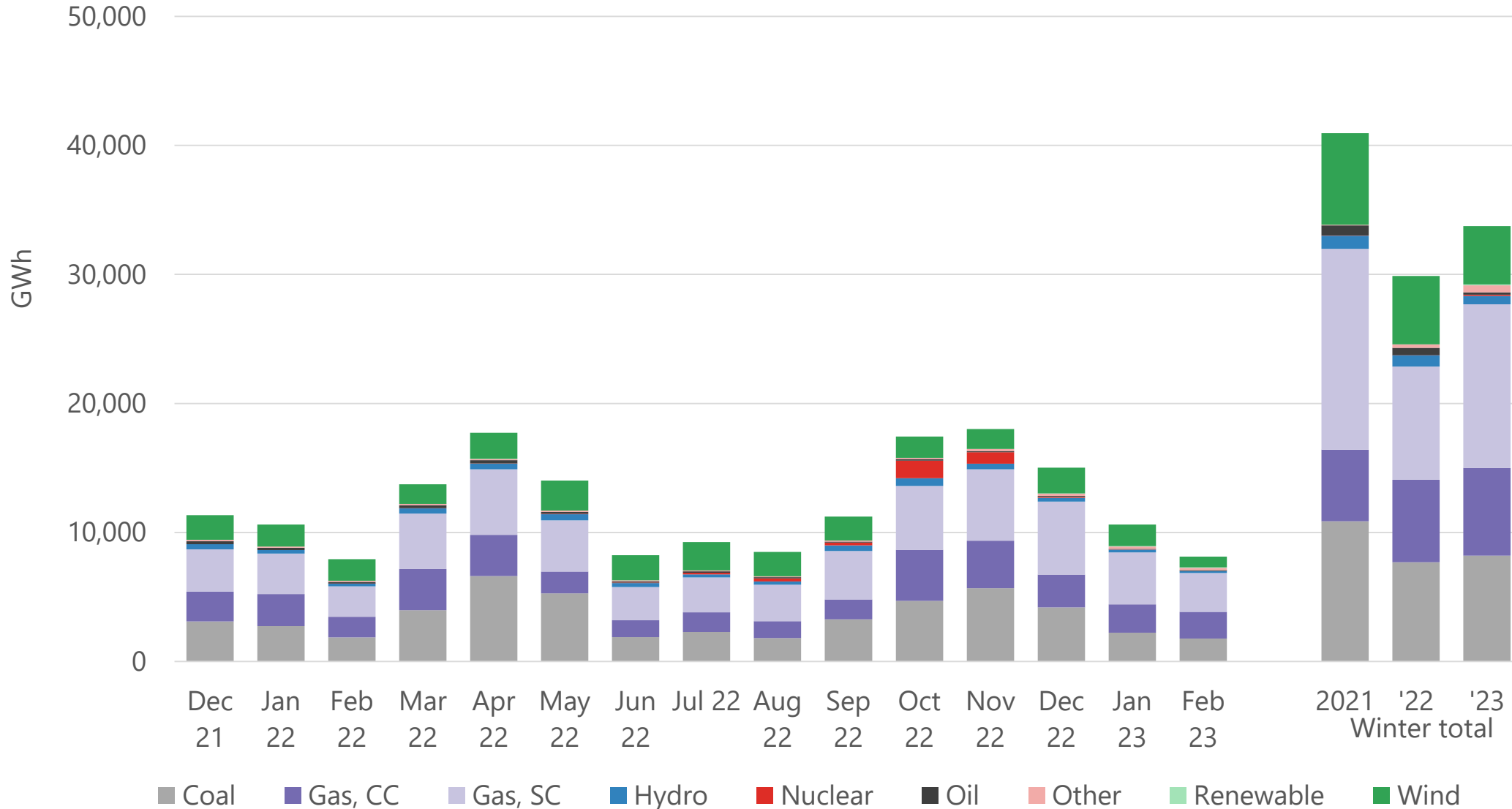
# REVENUE NEUTRALITY UPLIFT WAS DOWN



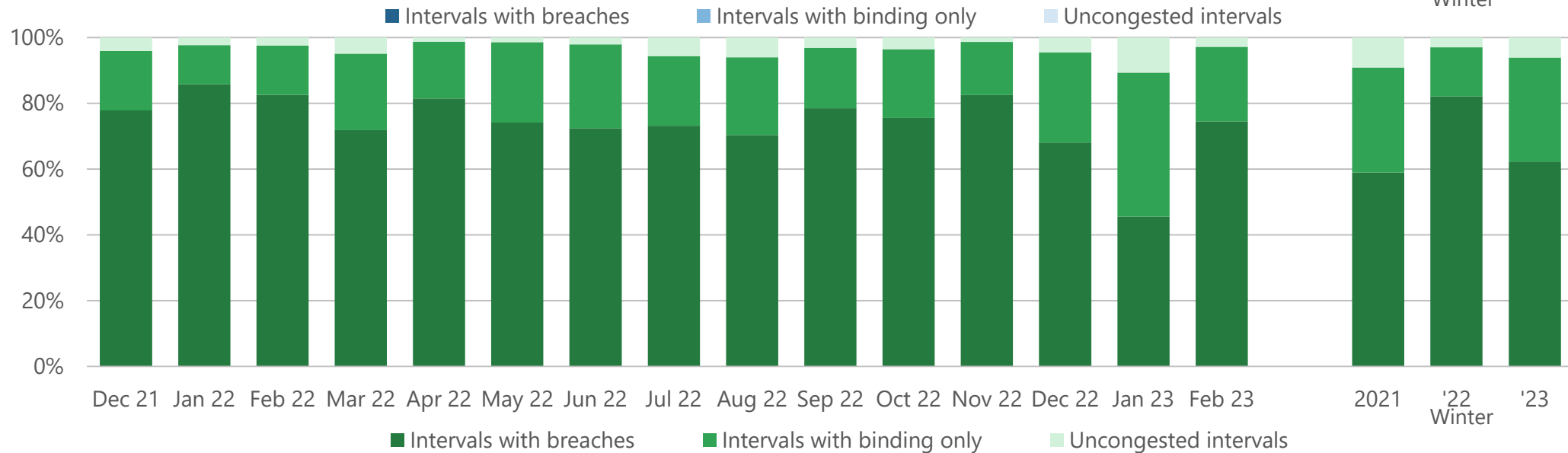
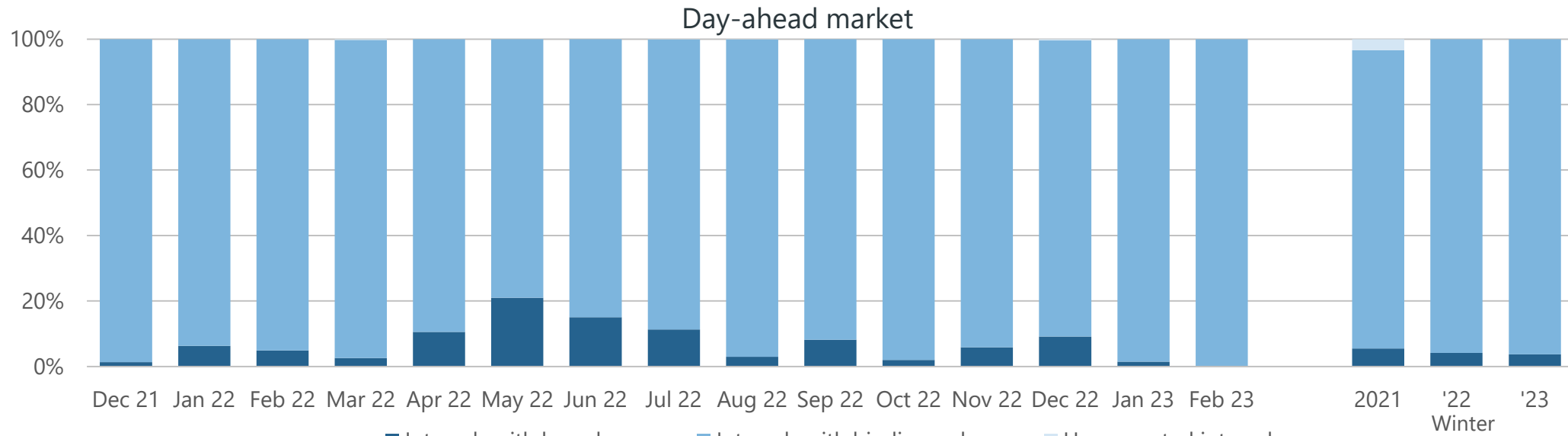
# MARKET-TO-MARKET PAYMENTS DECREASED



# OUTAGES INCREASED

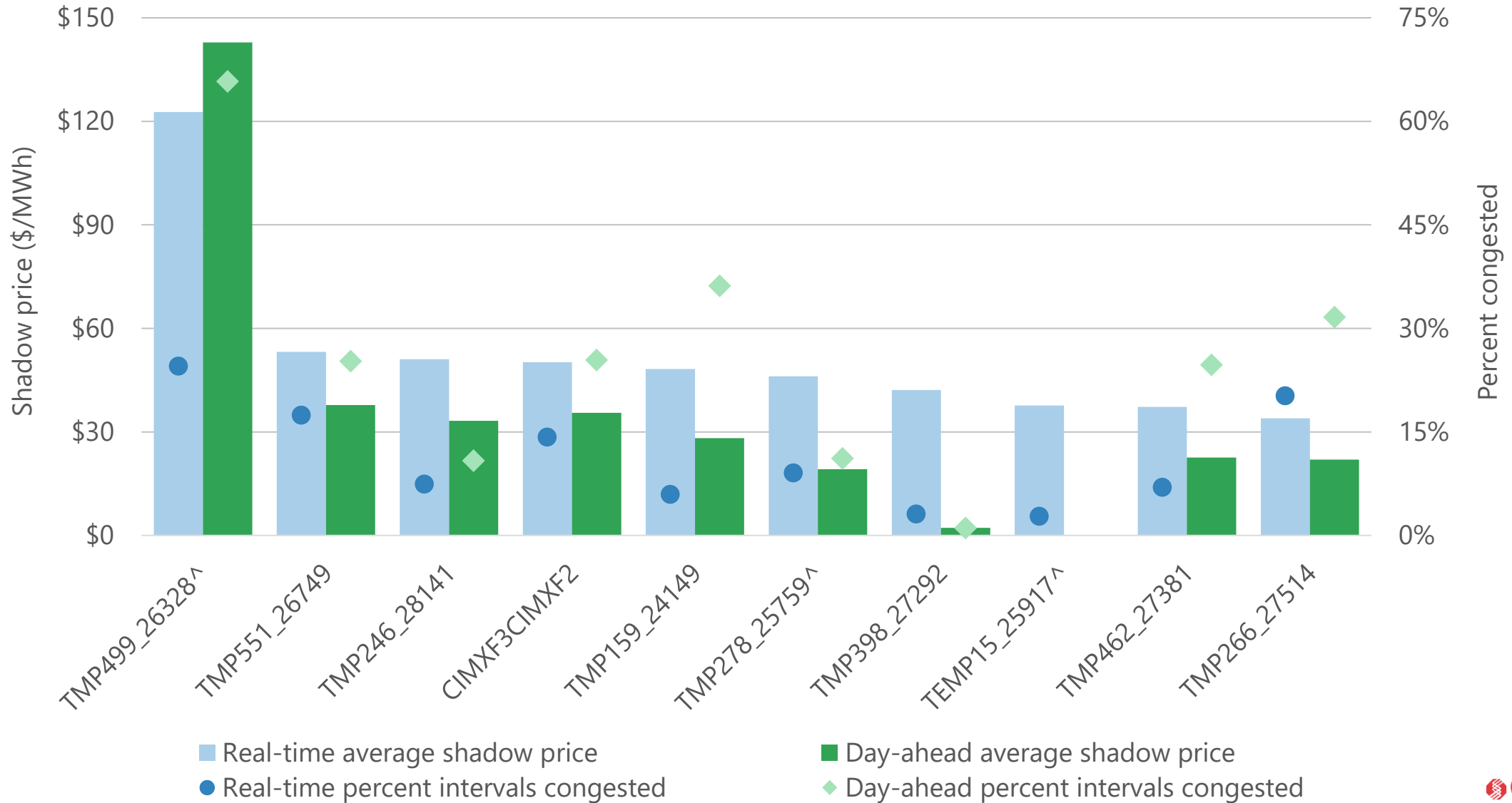


# CONGESTION HAS DECREASED



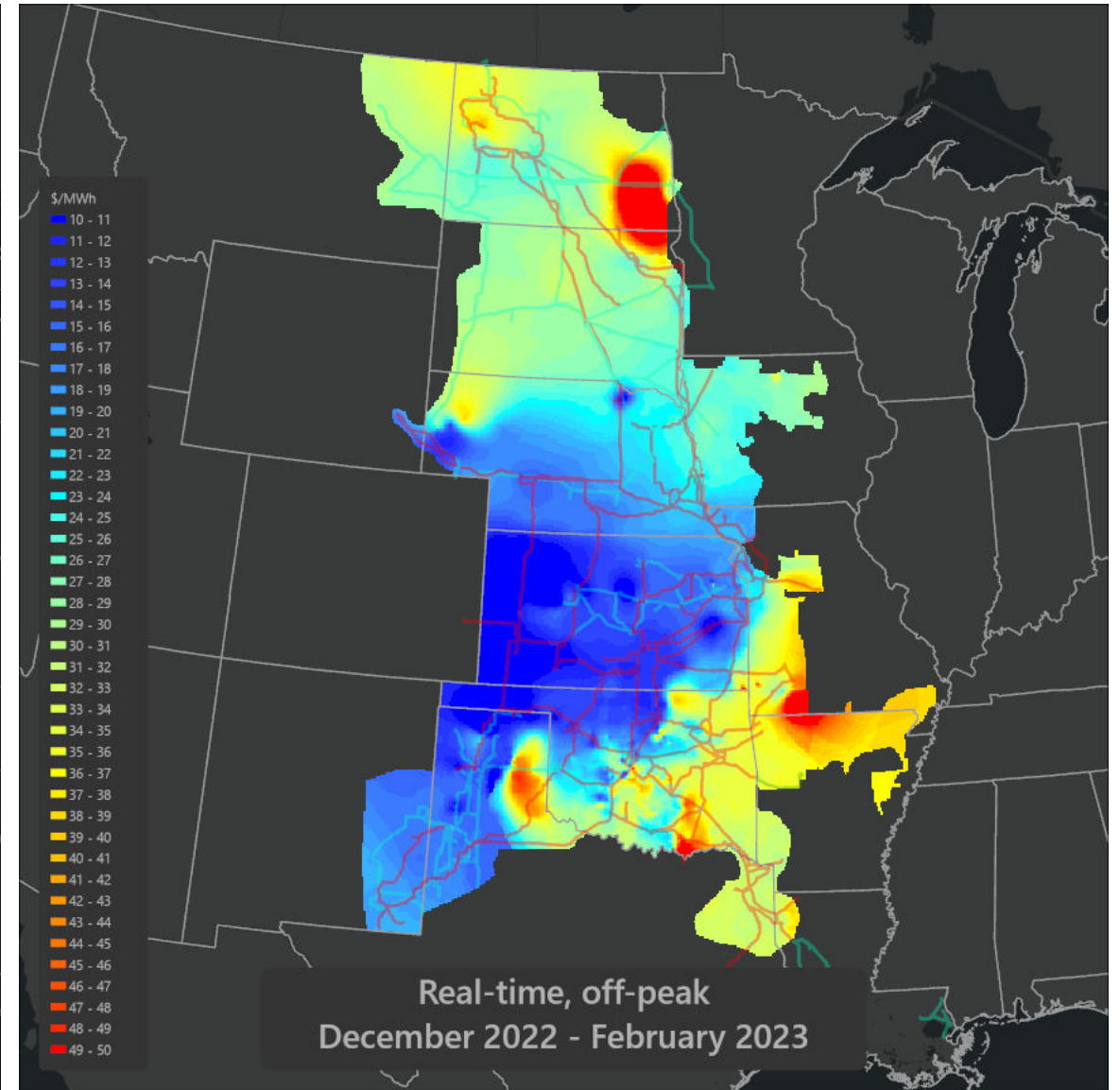
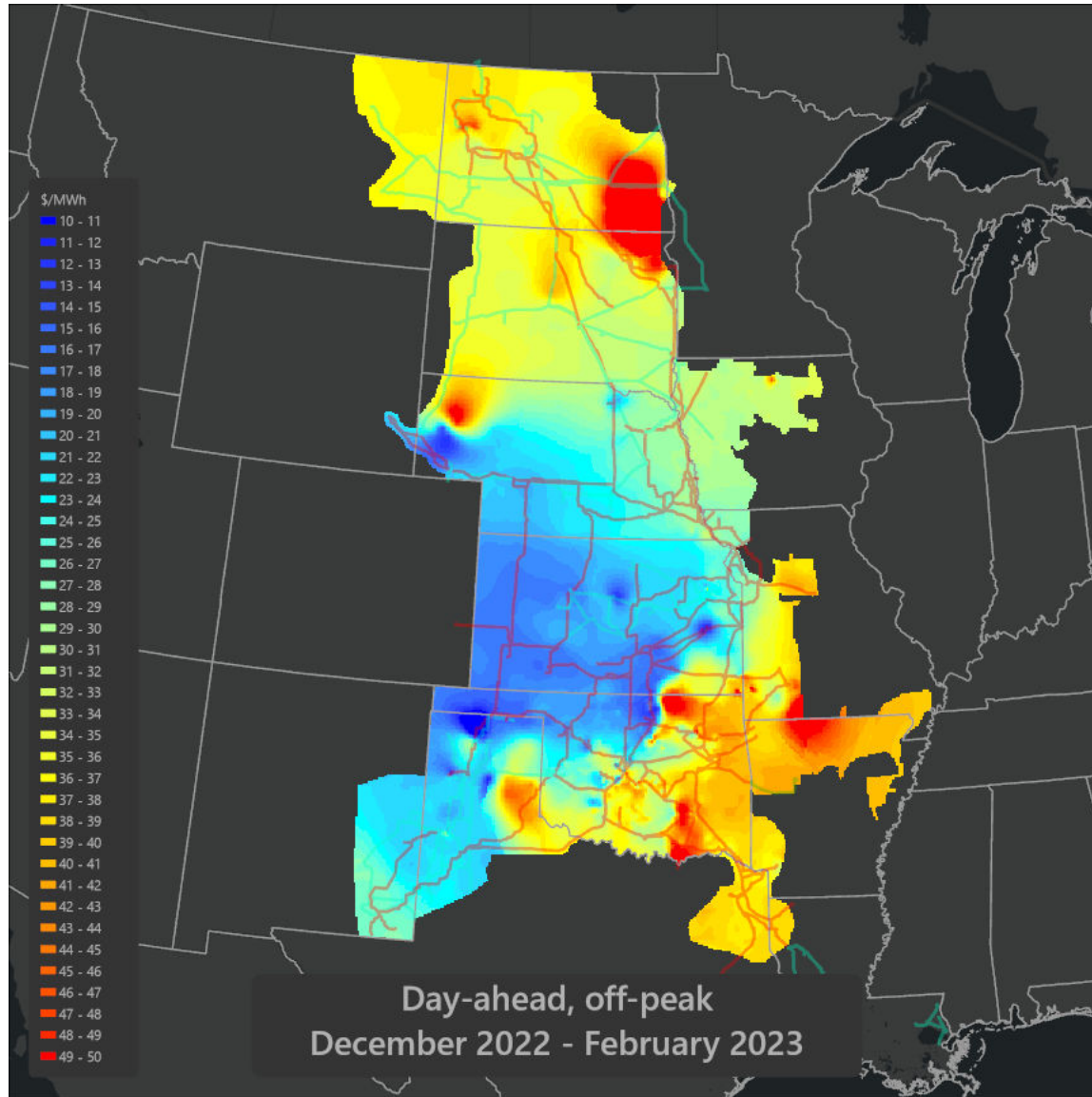
Real-time market

# HIGHEST CONGESTION NEAR NORTH DAKOTA-MINNESOTA BORDER

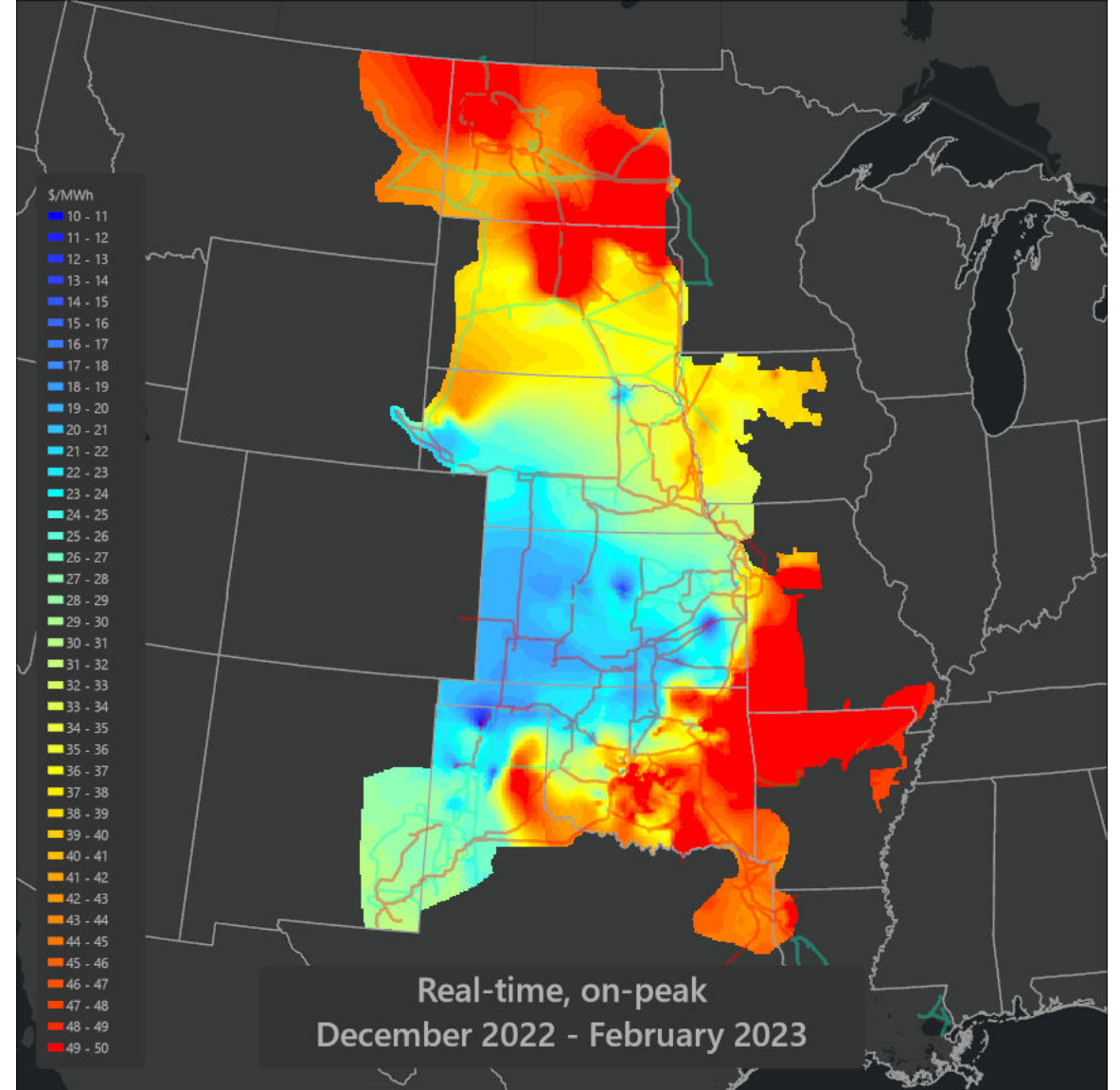
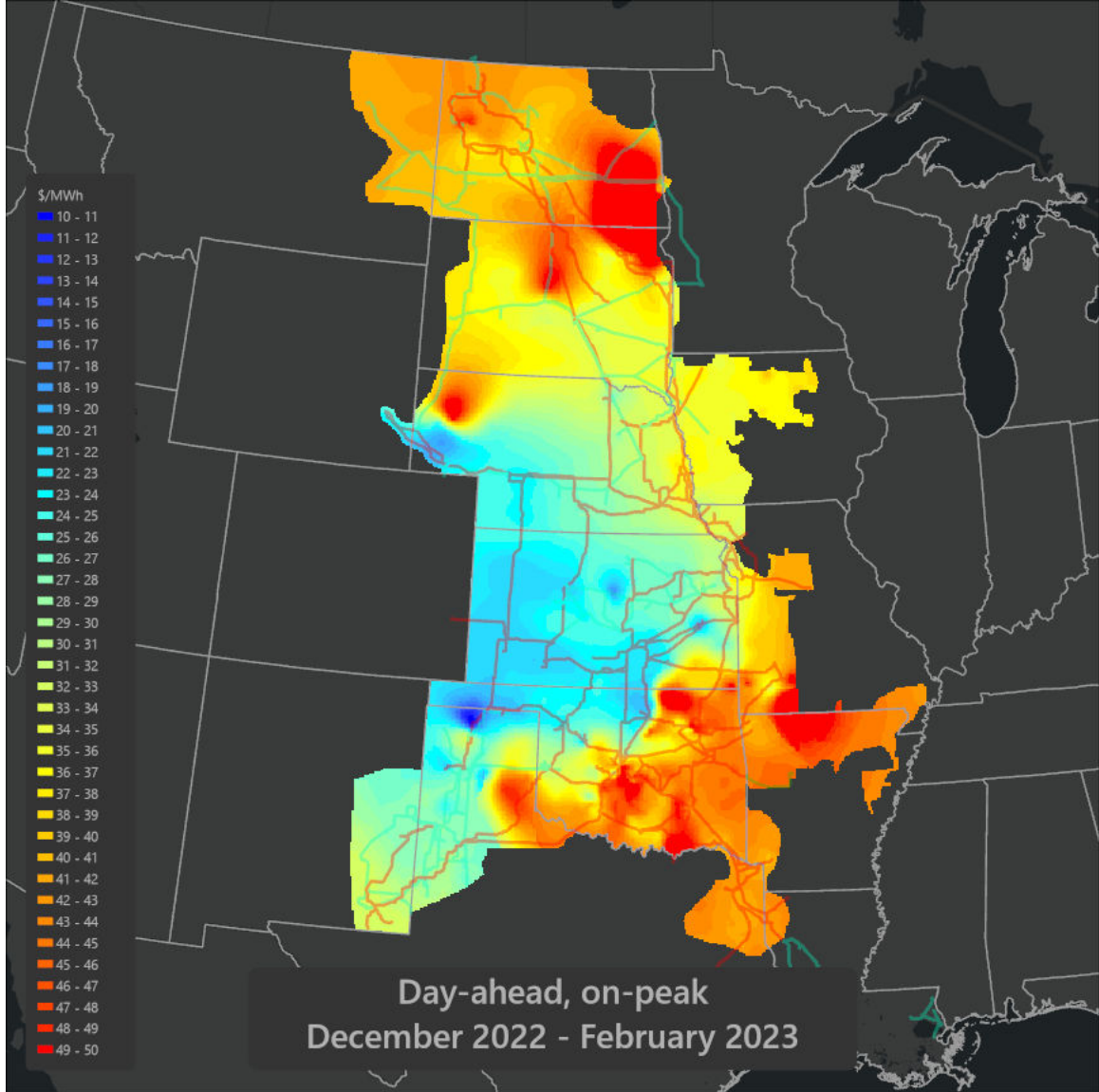




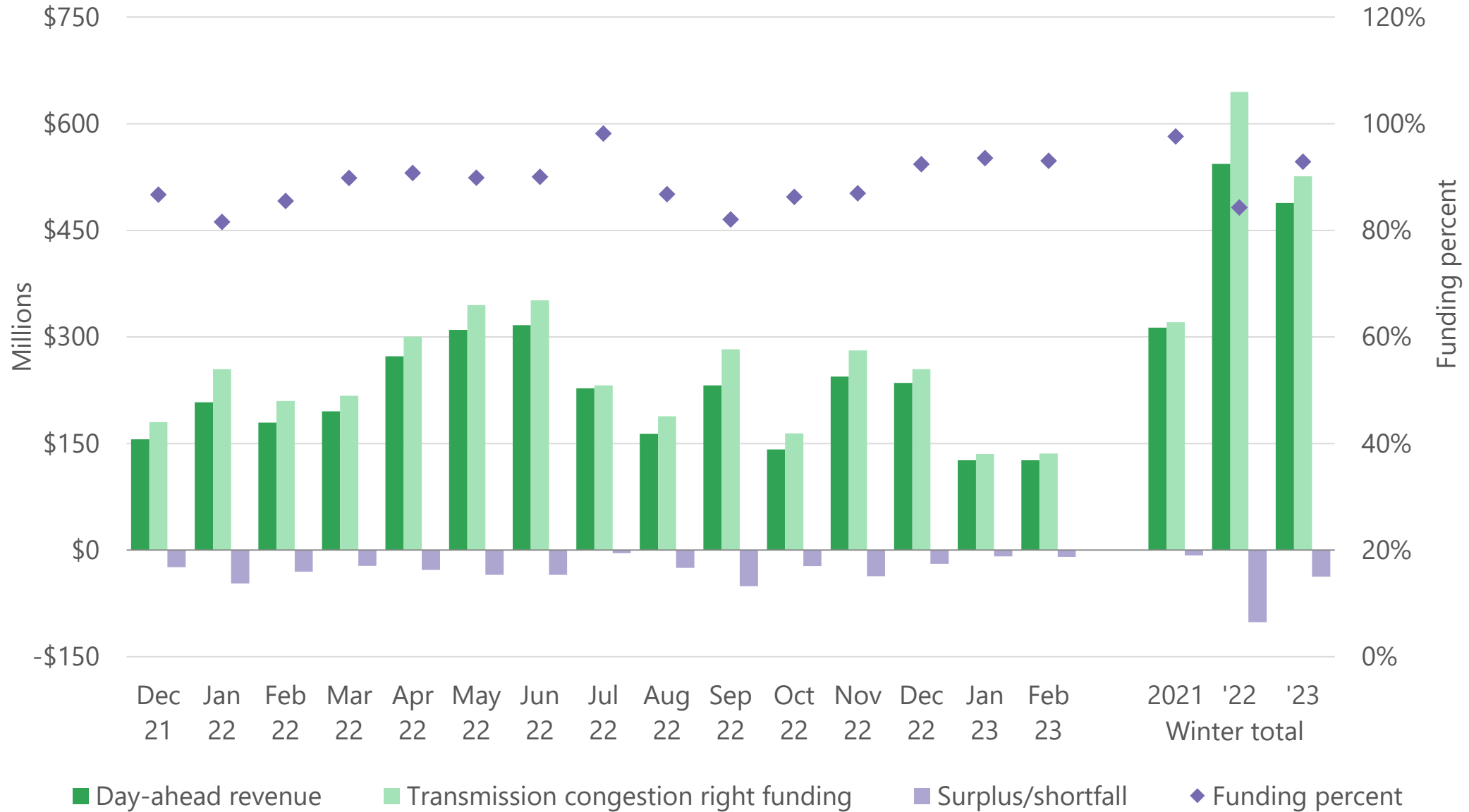
# OFF-PEAK PRICES



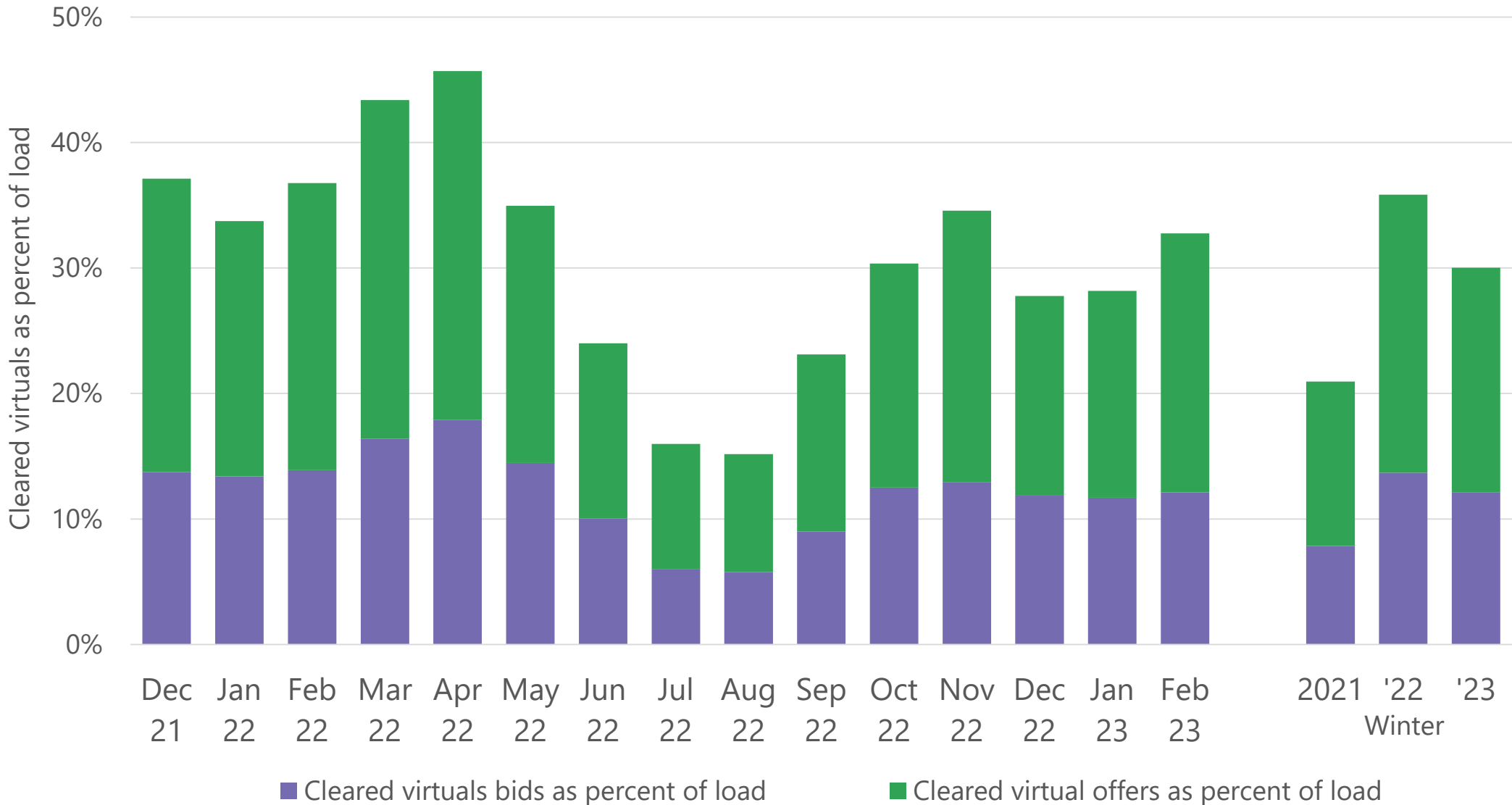
# ON-PEAK PRICES



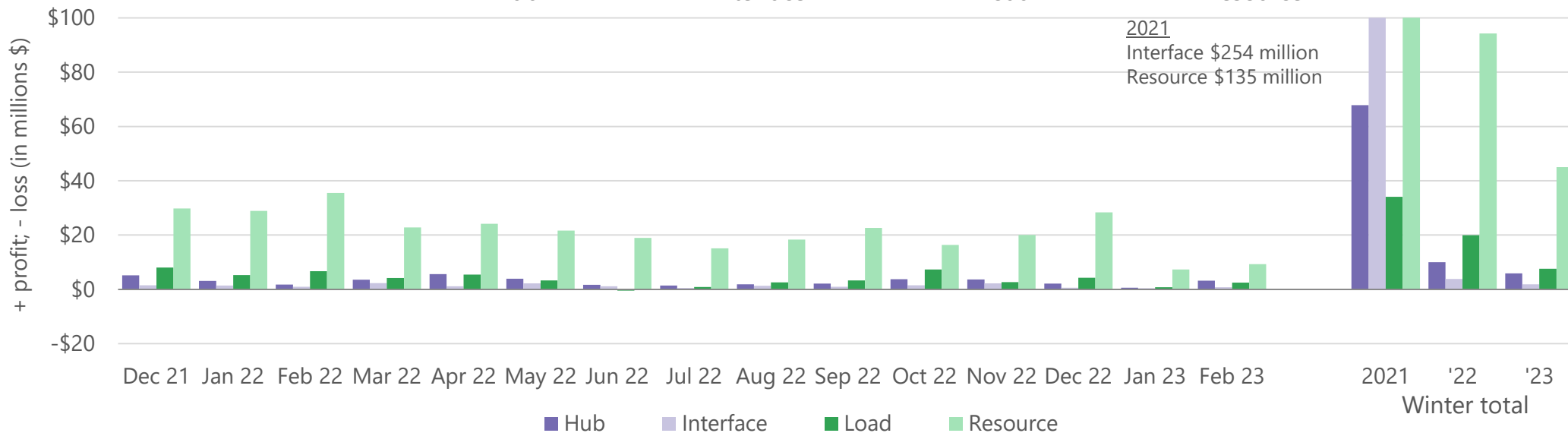
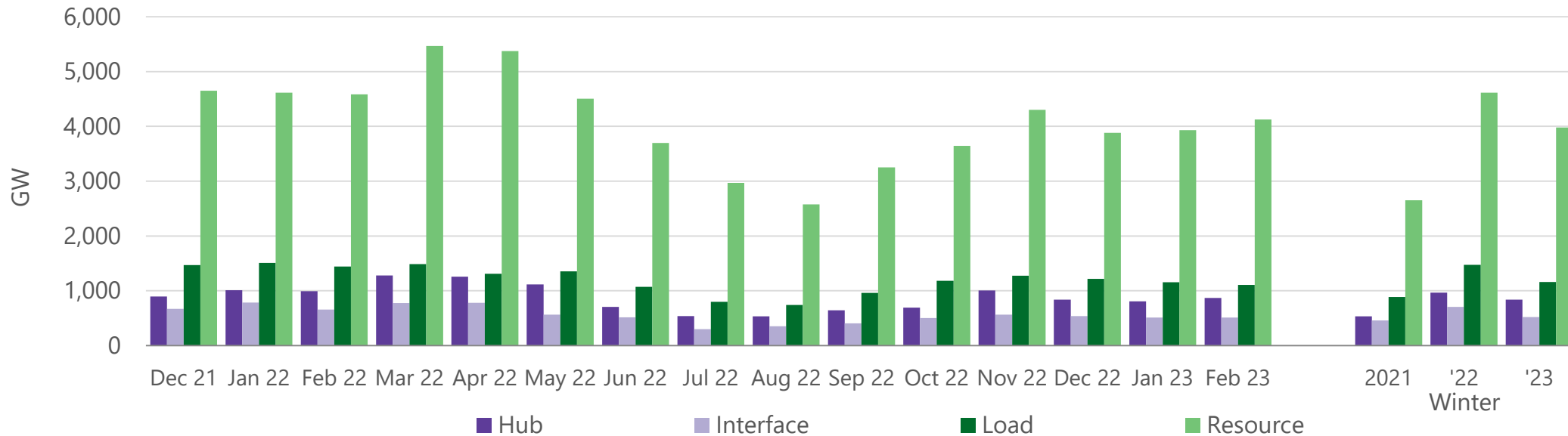
# TCRs UNDERFUNDED



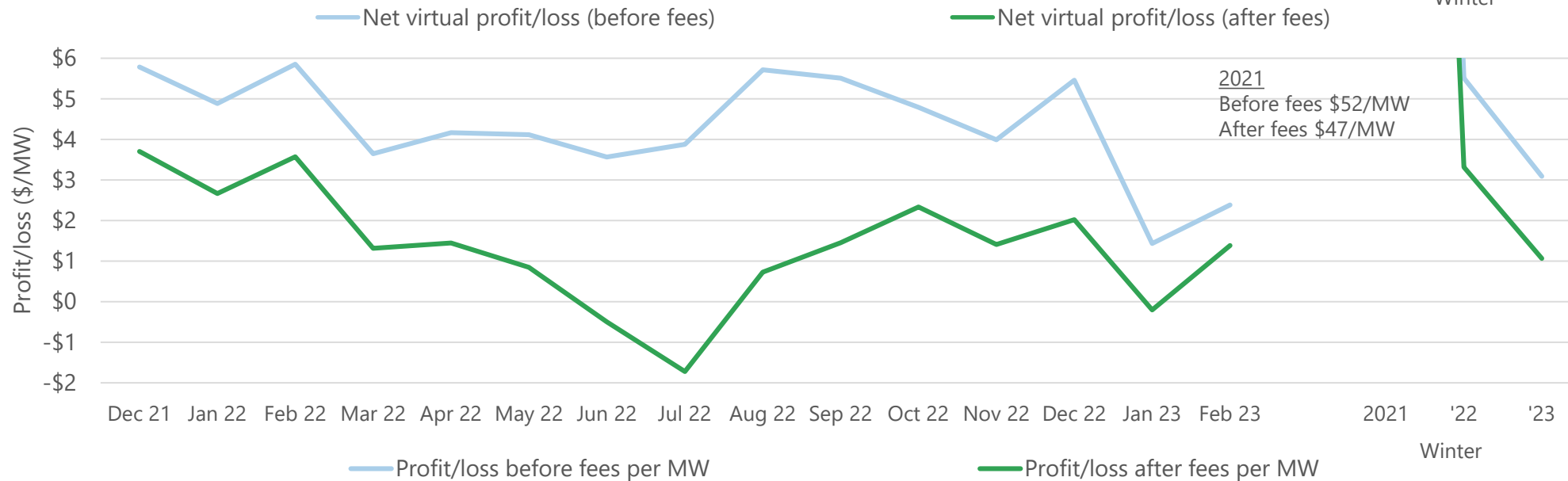
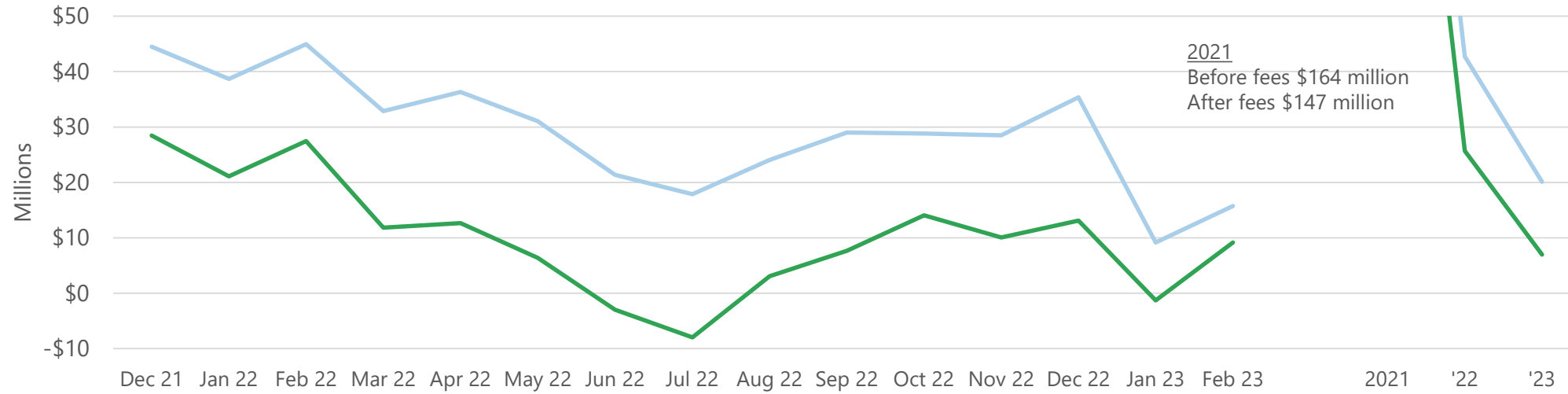
# VIRTUAL GROWTH HAS ABATED SOMEWHAT



# MOST VIRTUALS AT RESOURCES



# VIRTUAL PROFITS DECREASED



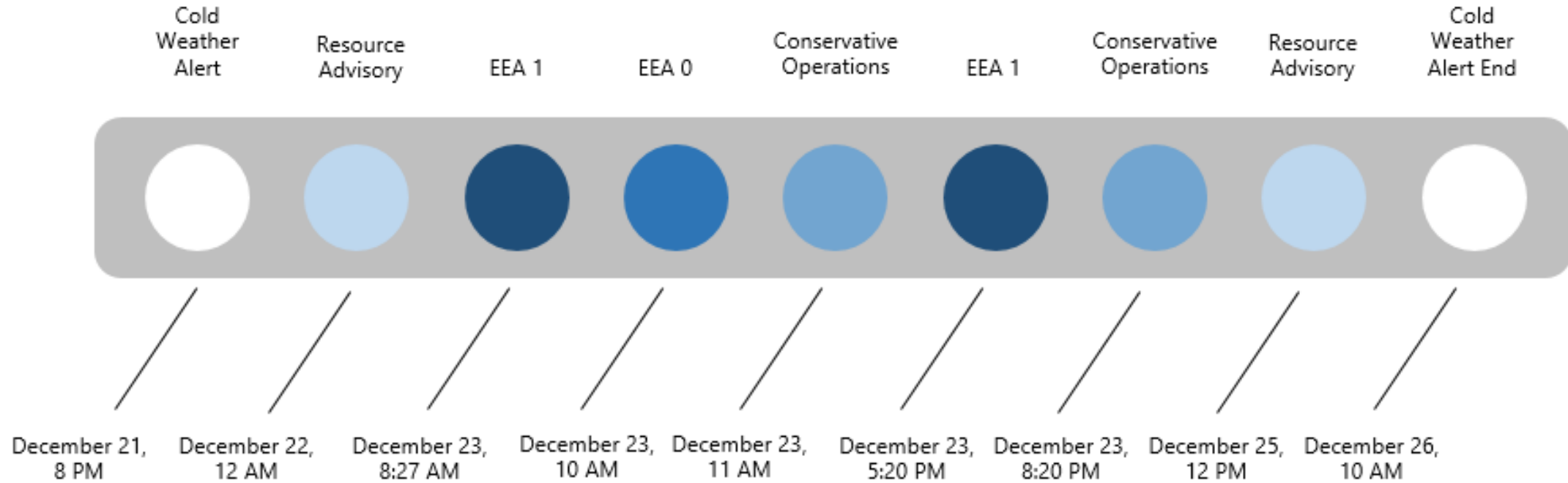
**QUESTIONS?**

# **SPECIAL ISSUES**

DECEMBER 2022 WINTER STORM



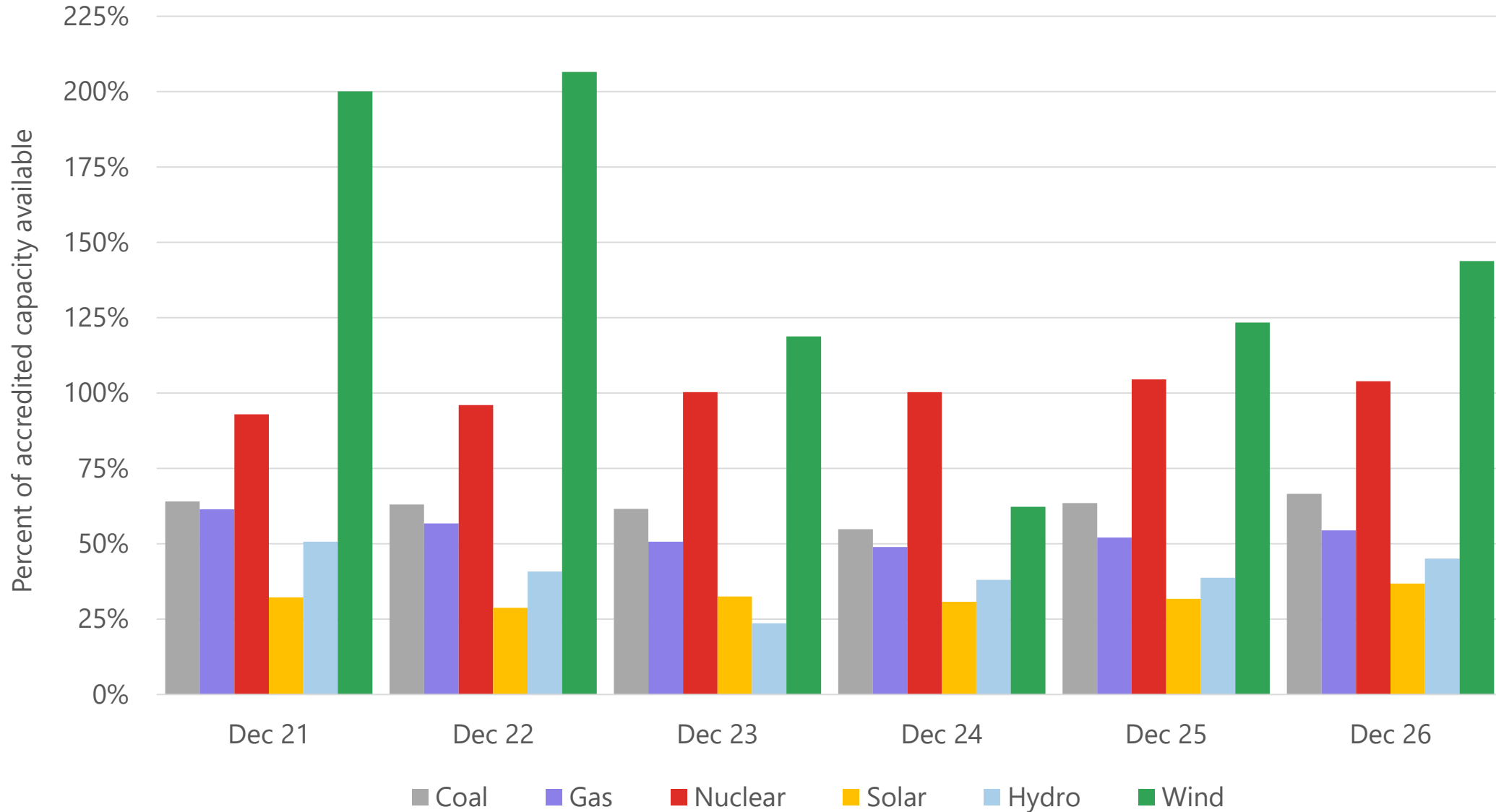
# EVENT TIMELINE



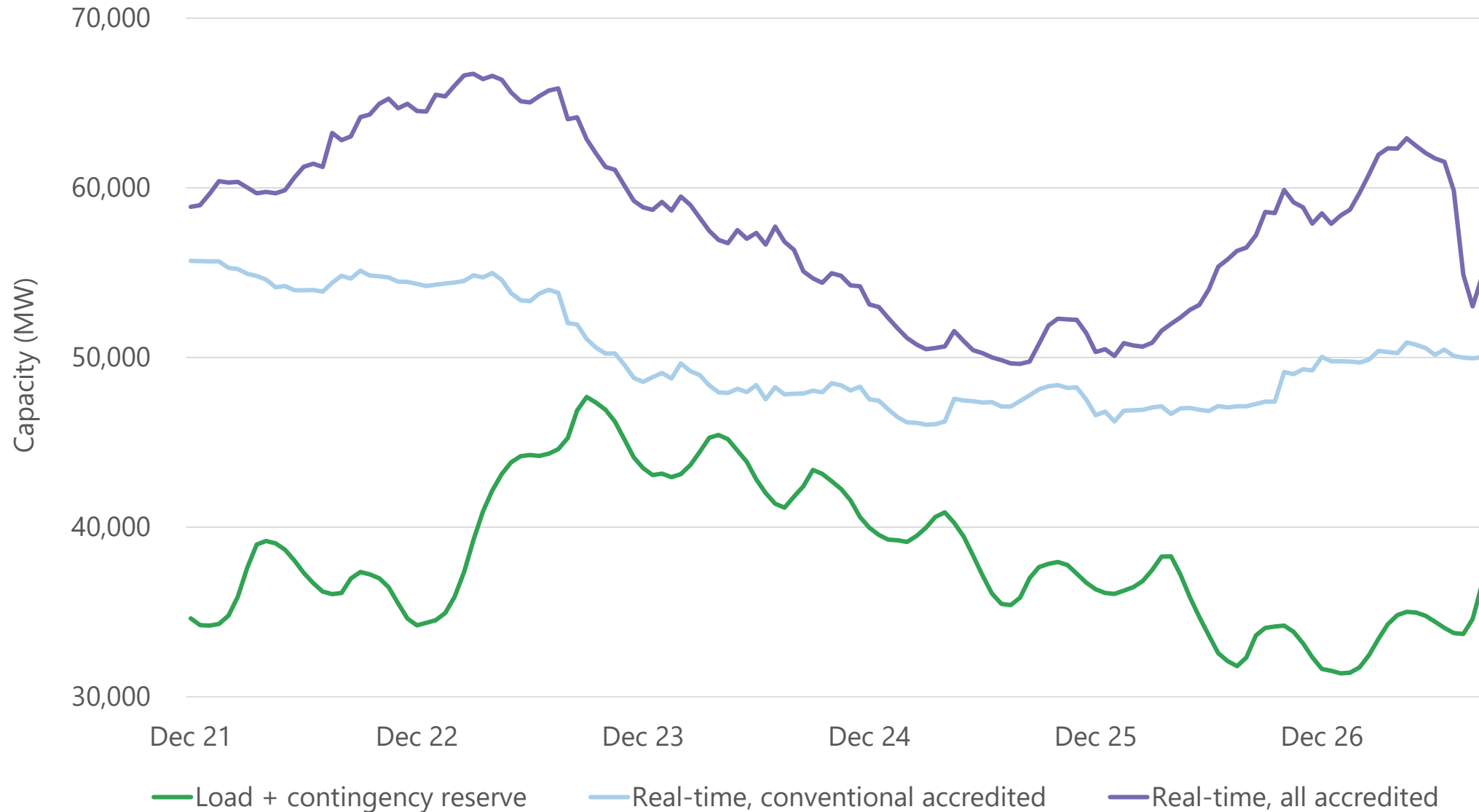
# ACTUAL DEMAND MINUS DAY-AHEAD DEMAND



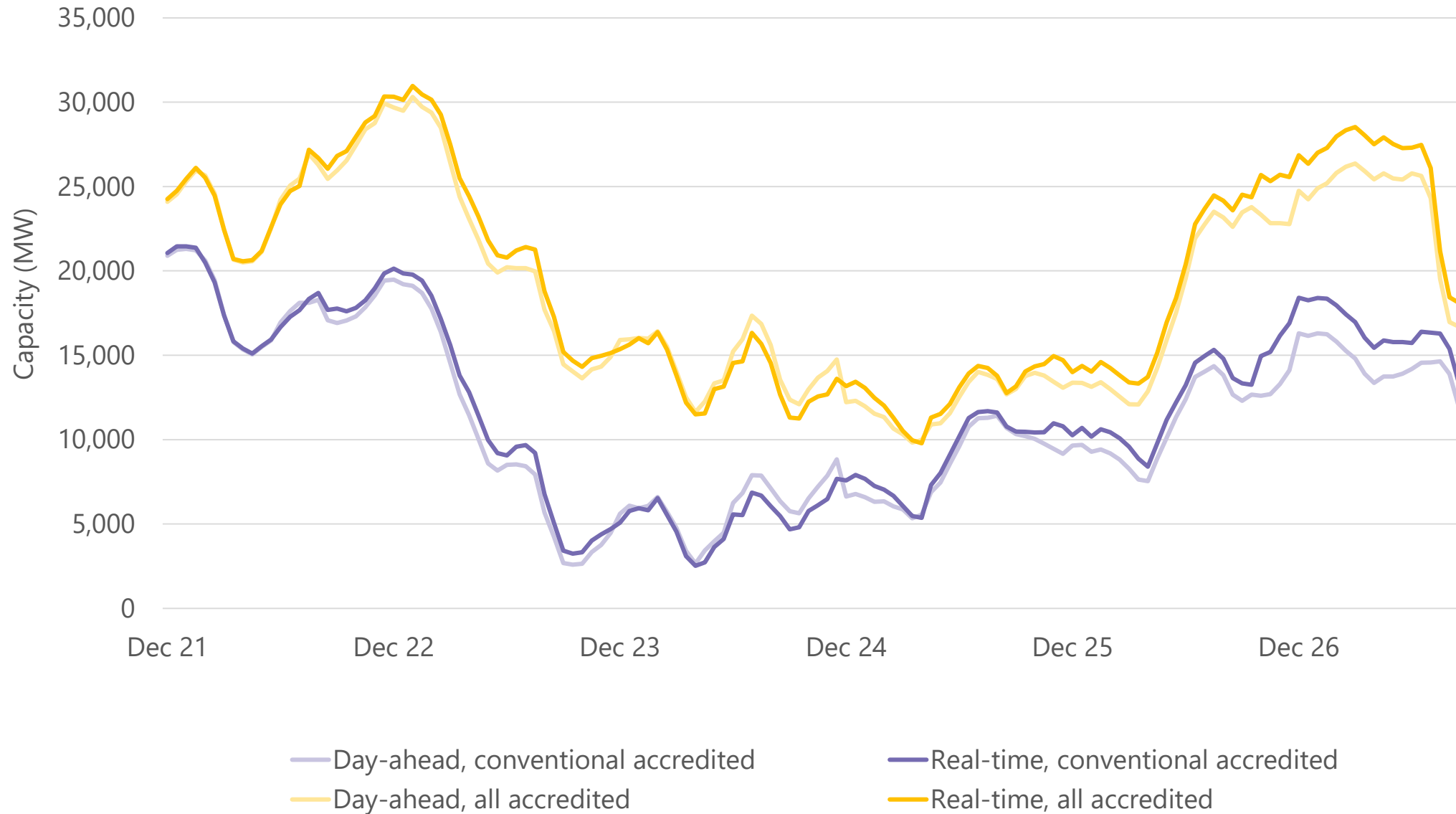
# ACCREDITED CAPACITY AVAILABLE



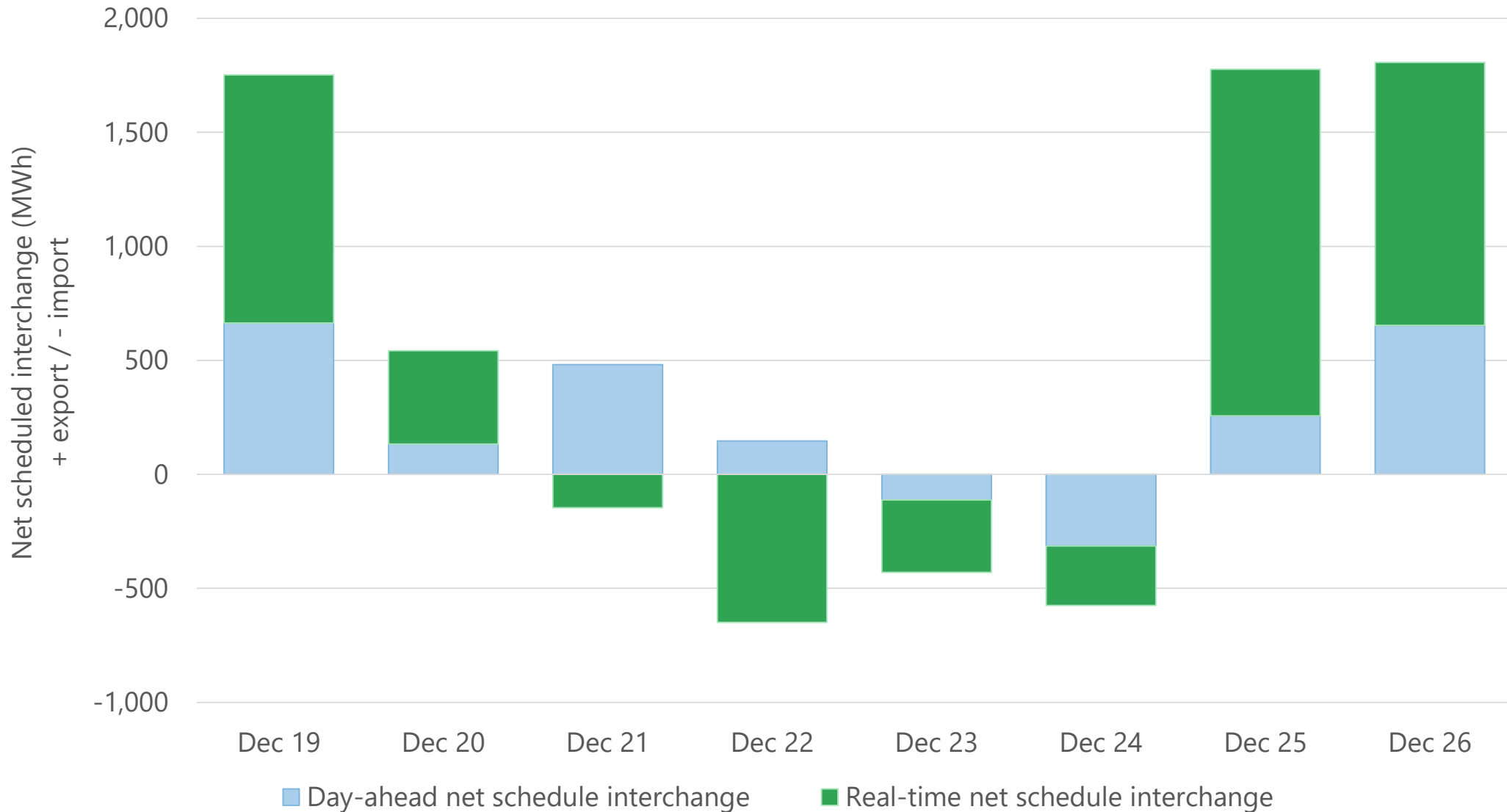
# ACCREDITED CAPACITY VS. LOAD PLUS RESERVES



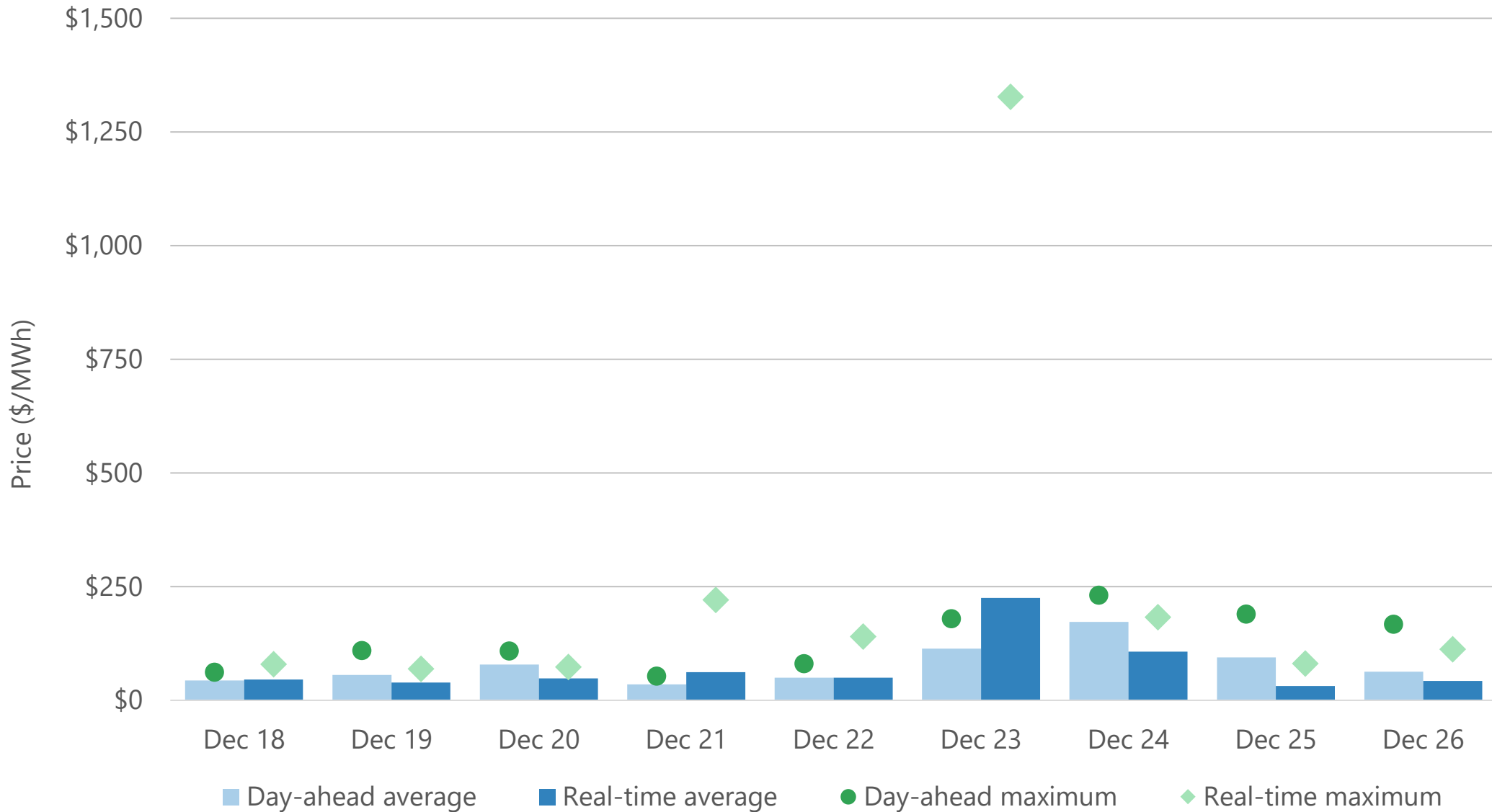
# ACCREDITED MARGIN ABOVE LOAD PLUS RESERVES



# AVERAGE HOURLY NET SCHEDULED INTERCHANGE



# AVERAGE AND MAXIMUM PRICES

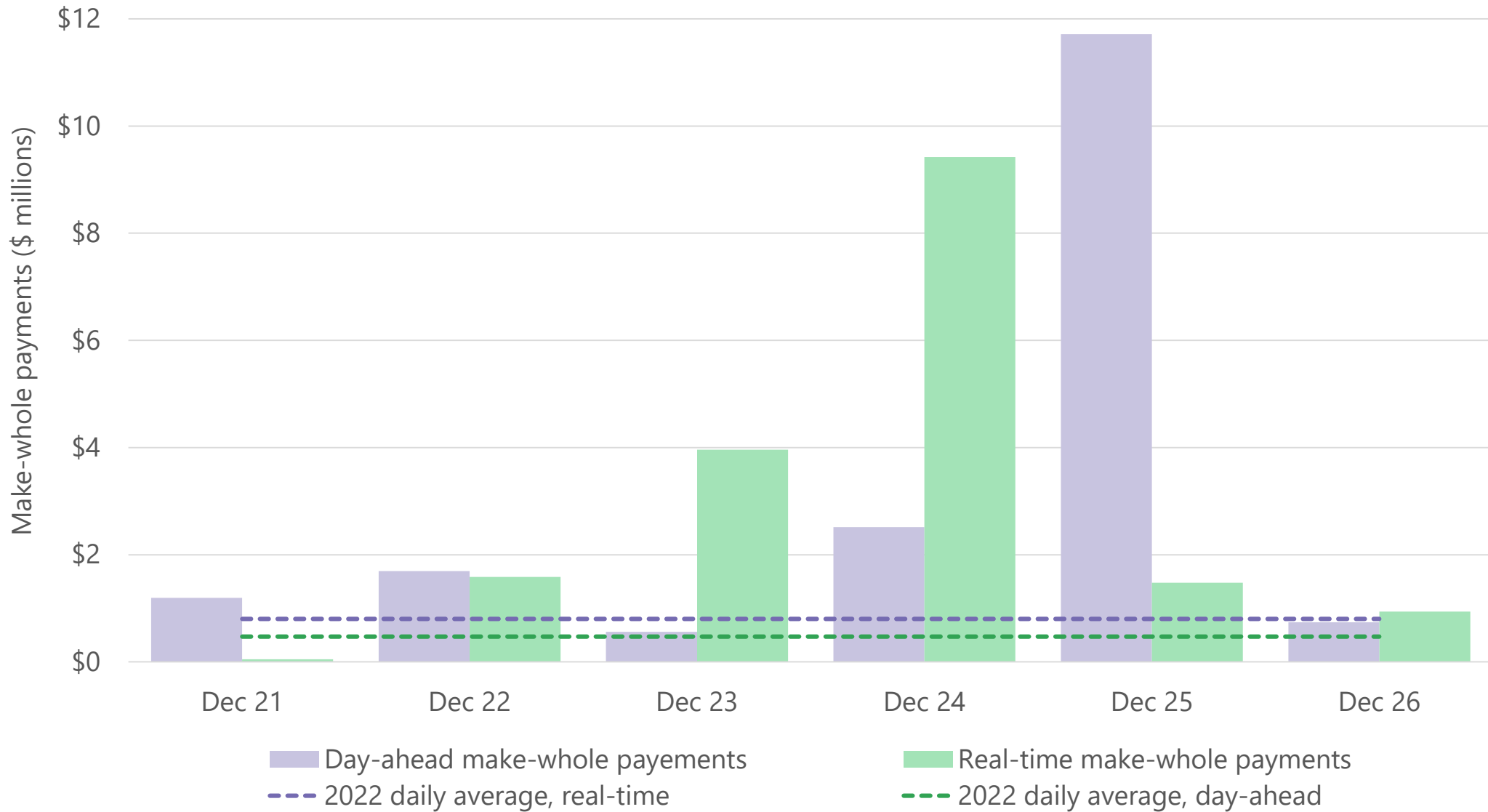


# PRICES DURING THE EVENT

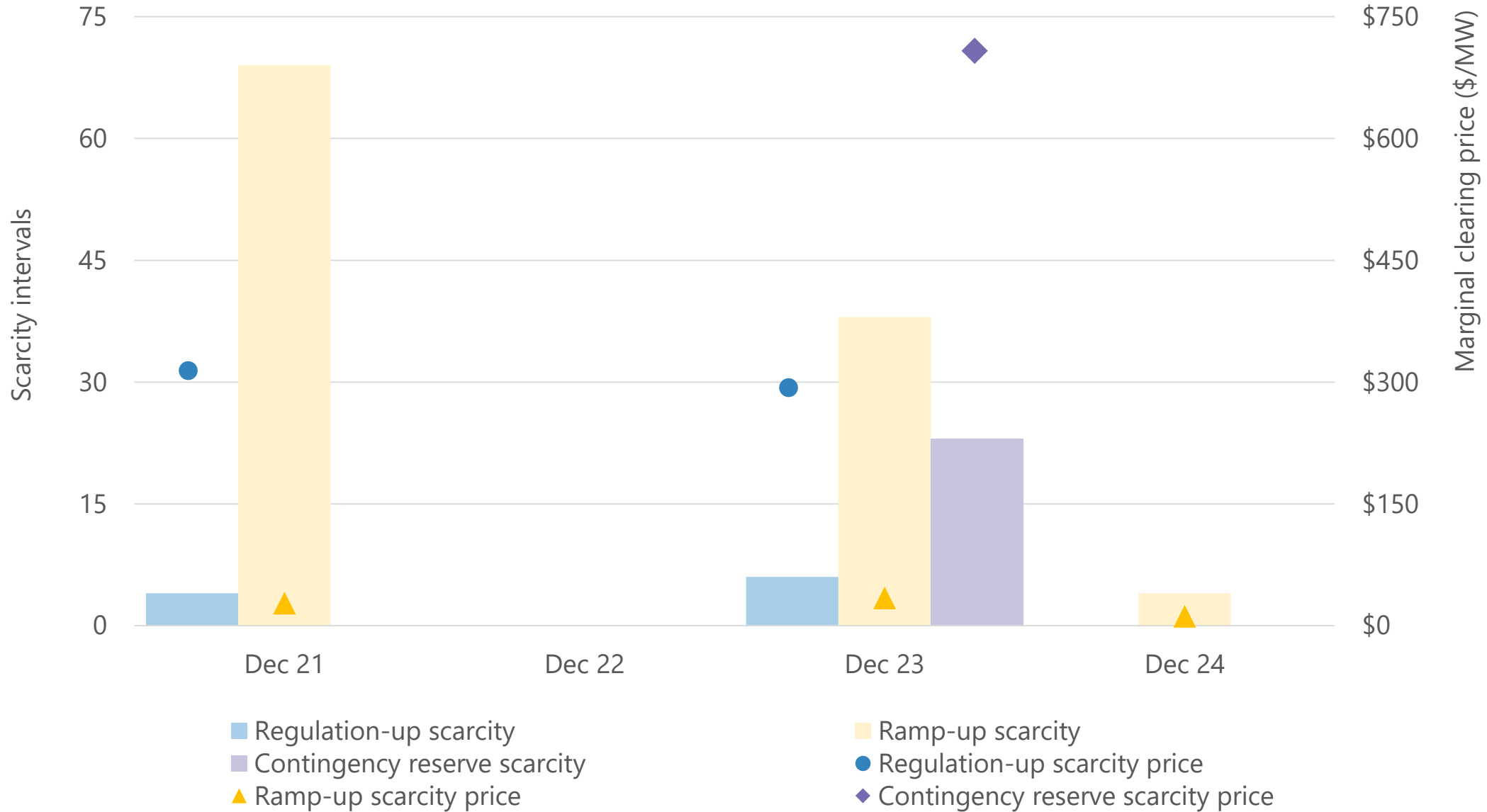
Period	Minimum marginal energy component (\$/MWh)	Average marginal energy component (\$/MWh)	Maximum marginal energy component (\$/MWh)
Conservative operations	\$30	\$113	\$329
Energy emergency alert 1	\$185	\$482	\$1,800
December 18-26, 2022 (not including the above)	-\$32	\$70	\$1,668



# MAKE-WHOLE PAYMENTS



# REAL-TIME SCARCITY INTERVALS AND PRICES



# VIRTUAL PROFITS AND FEES

Operating date	Virtual profit/loss before fees	Virtual transaction fees	RNU charges/credits	DA MWP charges	RT MWP charges	Virtual profit/loss after fees
Dec 18	\$567	\$6	\$116	\$77	\$671	-\$303
Dec 19	\$1,150	\$5	\$125	\$25	\$201	\$794
Dec 20	\$97	\$3	\$0	\$13	\$639	-\$558
Dec 21	-\$387	\$6	\$69	\$131	\$20	-\$614
Dec 22	\$6,020	\$6	\$391	\$183	\$485	\$4,956
Dec 23	\$2,940	\$3	-\$958	\$20	\$958	\$2,916
Dec 24	\$1,413	\$2	-\$25	\$95	\$2,048	-\$708
Dec 25	-\$2,915	\$4	\$28	\$1,101	\$401	-\$4,449
Dec 26	\$1,631	\$4	\$137	\$50	\$361	\$1,079
<b>Total</b>	<b>\$10,516</b>	<b>\$40</b>	<b>-\$117</b>	<b>\$1,693</b>	<b>\$5,785</b>	<b>\$3,113</b>

All figures shown in \$ thousands

# RECOMMENDATIONS

- Resources should be available
- Meaningful incentives related to reliability
- A more frequent resource adequacy requirement
- Plan for shocks to generator availability
- Addition of resource adequacy requirements for shoulder seasons

# QUESTIONS?

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