

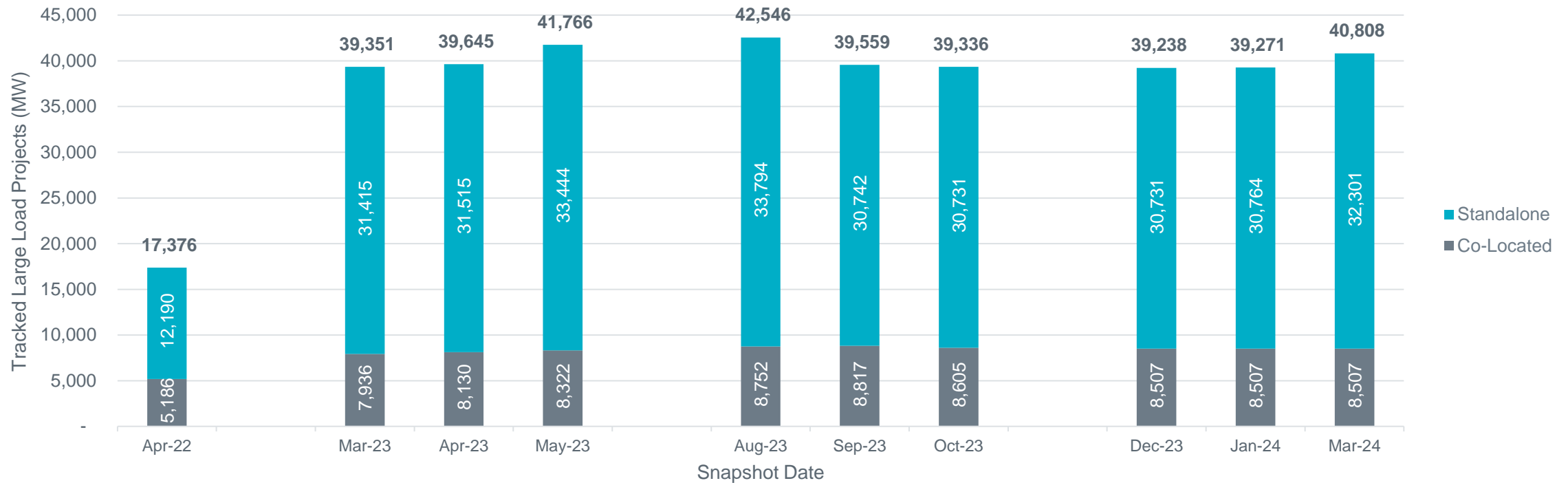


Large Load Interconnection Status & Analytics Update

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Large Load Integration

April 1, 2024

Large Load Queue – Past 12 Months

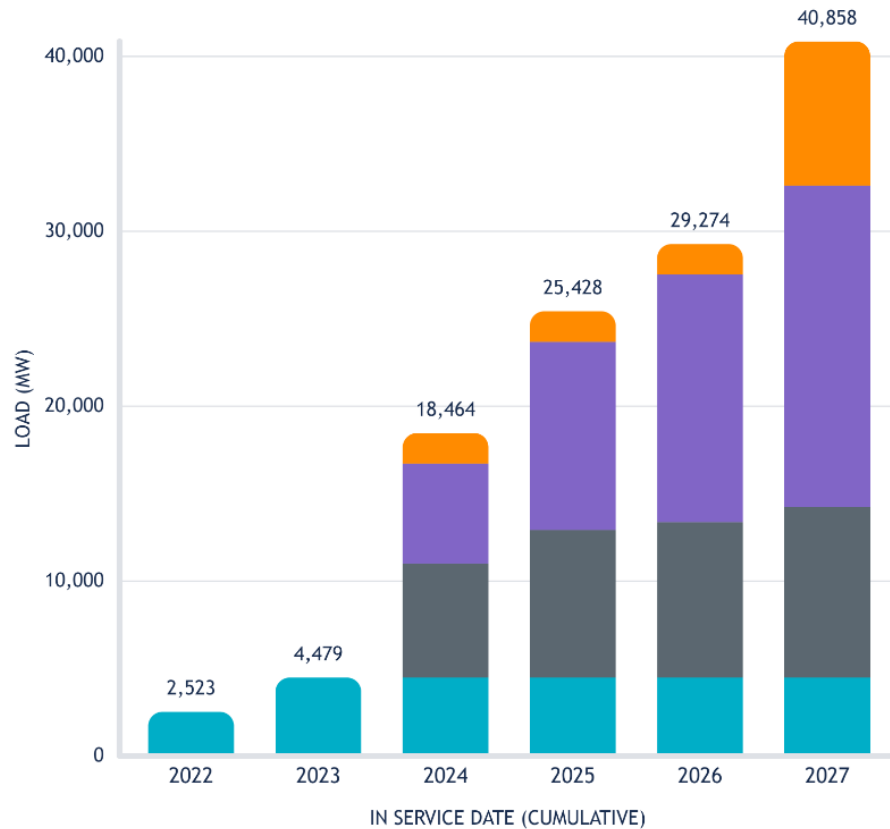


Changes since January Queue Update

- In the past months there have been several new standalone projects added to the queue, increasing total queue capacity by 1,537 MW.

Current Large Load Interconnection Queue

Actual and Projected LFL Growth 2022-2027



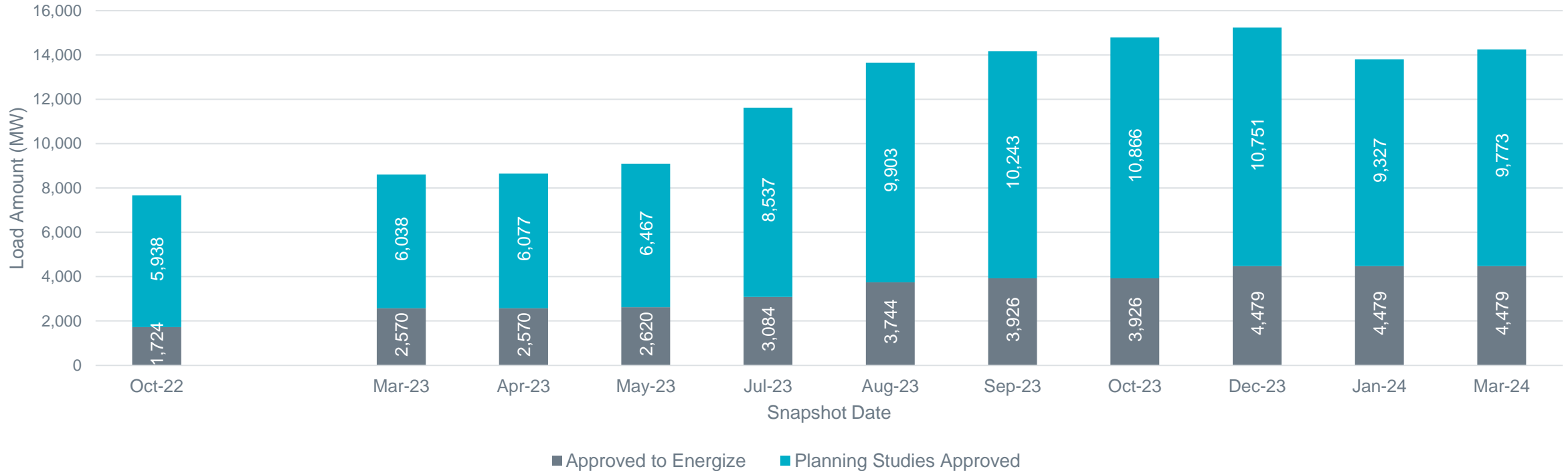
Project Status	2022	2023	2024	2025	2026	2027
No Studies Submitted	-	-	1,750	1,750	1,750	8,245
Under ERCOT Review	-	-	5,724	10,762	14,162	18,362
Planning Studies Approved	-	-	6,511	8,437	8,883	9,773
Approved to Energize	2,523	4,479	4,479	4,479	4,479	4,479
Total (MW)	2,523	4,479	18,464	25,428	29,274	40,858

NOTE: In January 2024 ERCOT identified several projects that had been previously misclassified in this chart. This error was corrected, resulting in a higher 2023 total of approved load than was previously reported. The overall size of the queue was not impacted by this error. The charts on slides 4, 5, and 6 were also corrected.

- **Approved to Energize** – Projects that have received Approval to Energize from ERCOT Operations. NOTE: not all MWs in this category have been observed to be operational (see next slide)
- **Planning Studies Approved** – Projects that have received ERCOT approval of required interconnection studies. Any MWs that were not approved are reclassified as No Studies Submitted.
- **Under ERCOT Review** – Projects that have studies under review by ERCOT
- **No Studies Submitted** – Projects that are tracked by ERCOT but that have not yet provided sufficient information for ERCOT to begin review. Additionally, MWs that were not approved by ERCOT after review of planning studies are included in this category until a path to interconnect these MWs is identified, or the customer cancels the interconnection request.

ERCOT Approvals – Past 12 Months

Approved Large Load - Growth in the Past Year

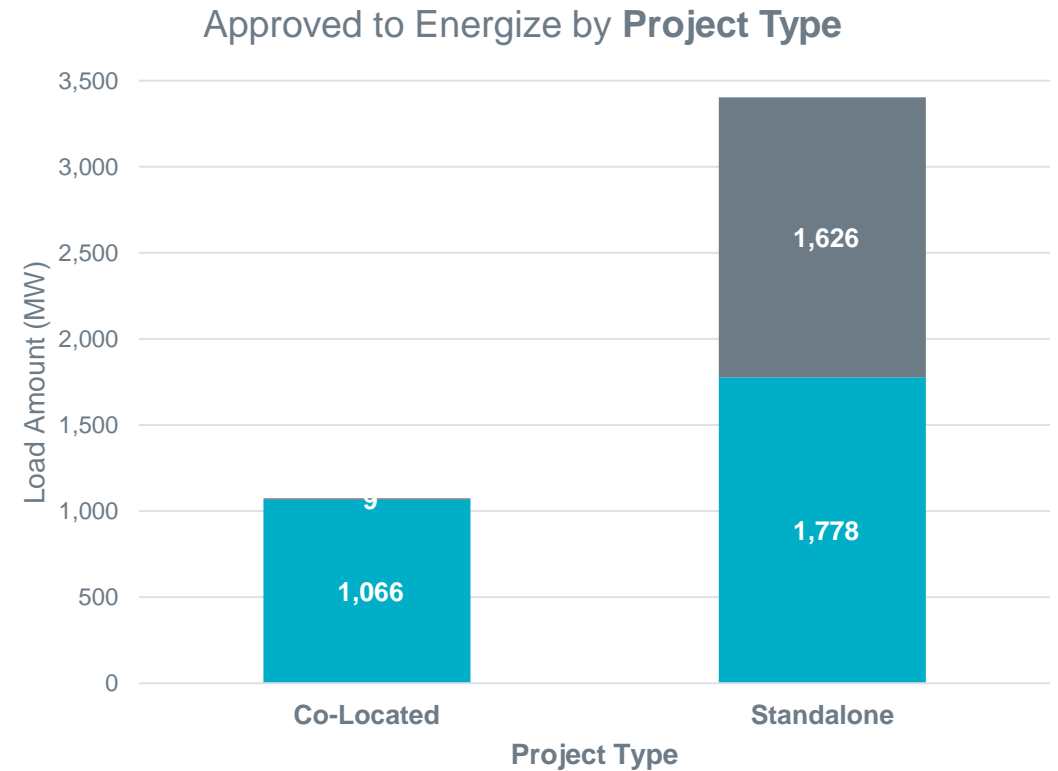
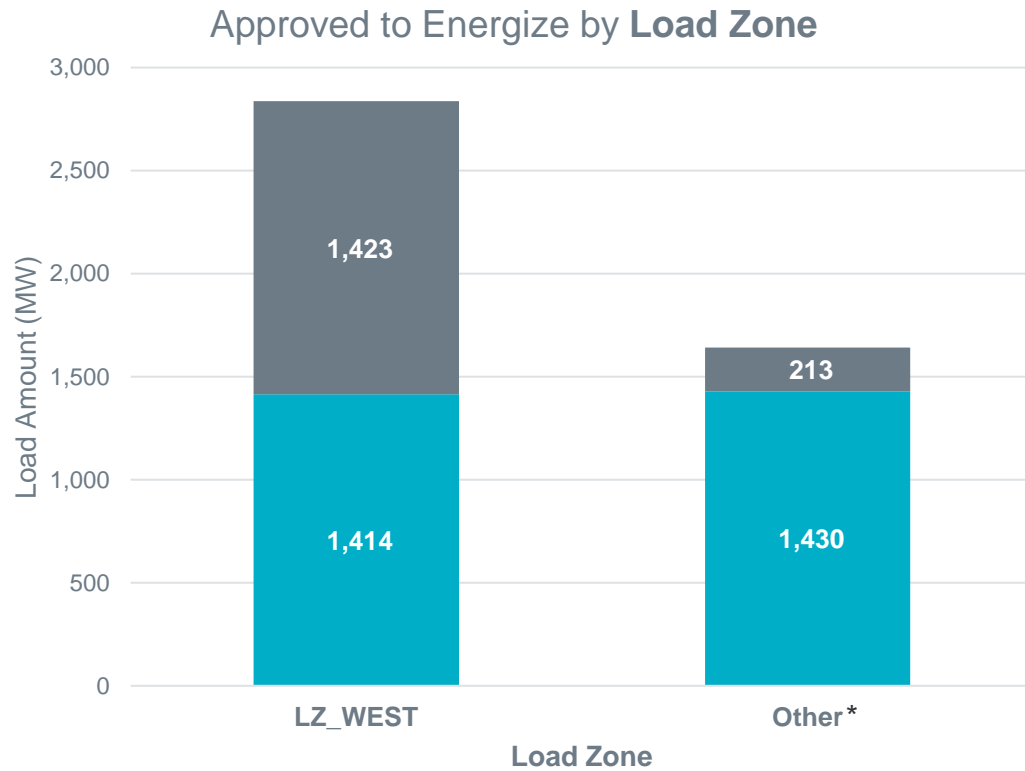


ERCOT Approvals Since March 2023 (Observations)

- Total load with planning studies approved began increasing again in March 2024 after temporarily decreasing earlier in the year. In the past year load with planning studies approved has increased **62%** compared to a **57%** increase in load approved to energize.

Loads Approved to Energize – By Zone & Project Type

- Of the 4,479 MW that have received Approval to Energize, 2,837 MW resides in LZ_WEST and 1,642 MW resides in the other load zones.
- Of that total, 3,404 MW consists of standalone projects and 1,075 MW consist of co-located projects.



■ Observed Non-Simultaneous Peak ■ Remaining Approved to Energize Load

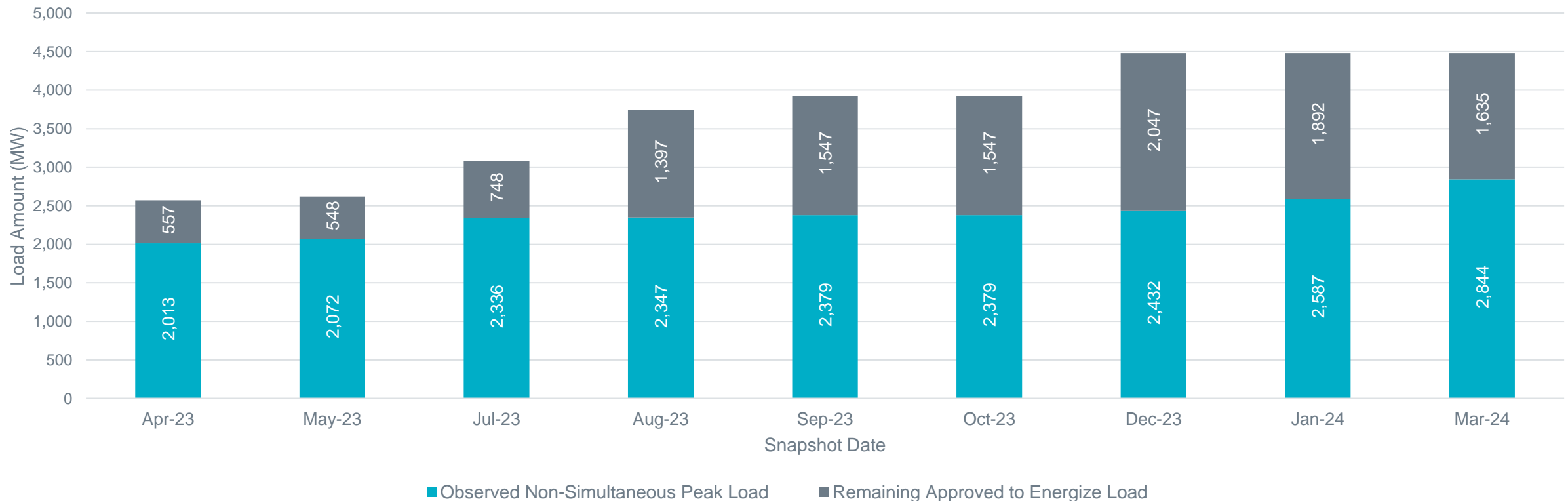
■ Observed Non-Simultaneous Peak ■ Remaining Approved to Energize Load

* Includes LZ_NORTH, LZ_SOUTH, and LZ_HOUSTON



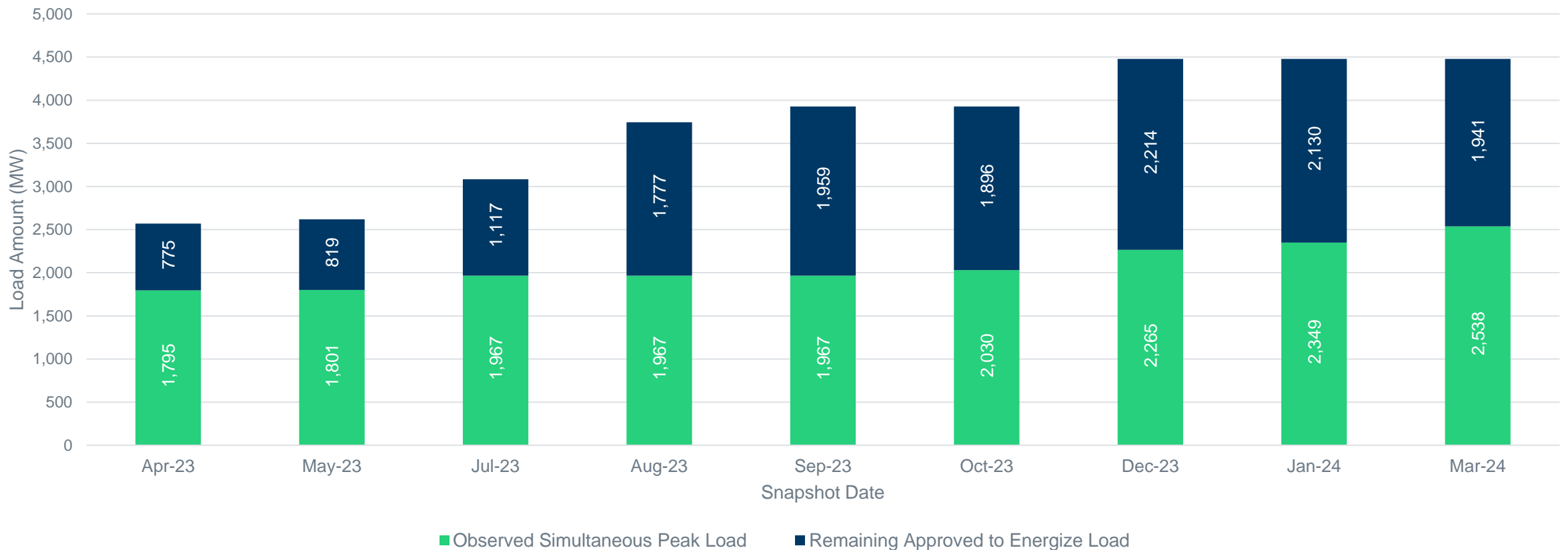
Loads Approved to Energize – Observations

- Of the 4,479 MW that have received Approval to Energize, ERCOT has observed a **non-simultaneous** peak consumption of 2,844 MW.
 - This is calculated as the sum of the maximum value for each individual load regardless of when that maximum occurred
 - This value represents how much approved load ERCOT believes is now operational



Loads Approved to Energize – Observations

- ERCOT has observed a **simultaneous** peak consumption of 2,538 MW.
 - This is the maximum value of the sum of all the individual loads
 - This value is the maximum amount of large load that ERCOT has had to serve at a single point in time



Analytics Update

Large Load Analytics Update

- Moving forward ERCOT will be bringing periodic updates to the LFLTF on various ongoing analyses and observations. The topics include, but are not limited to:
 - Voltage Ride Through (VRT) Events
 - Ramping Behavior (not covered today)
 - Price Responsiveness
 - Significant Events (such as winter storms or EEA)
- The goal is to provide market participants with a transparent view into operational impacts of large loads on grid reliability.

Analysis of Price Responsive Behavior – Background

Objective – Determine the amount of price responsive behavior exhibited by large loads tracked via the interim process once in operation.

Methodology

- For every 5 min interval from Sep-23 through Feb-24 the theoretical strike price for an S21 was calculated and compared to respective LZ settlement prices.
 - If the settlement price exceeded the theoretical strike price, it was assumed that the load should curtail for that interval. Strike prices ranged from approximately **\$140/MWh to \$310/MWh**.
- The loads were considered to have curtailed if their consumption at the end of the interval was less than 20% of their rolling 24-hour maximum consumption (MW).
- Ancillary service obligations were subtracted from the calculation as to not skew the data. A load with AS obligations greater than 75% of its 24h max consumption was considered “not to have curtailed”.
- Percentages of intervals where the load curtailed when expected to were calculated for all loads based on the following criteria:
 - S21 Strike Price
 - \$500/MWh Static Strike Price
 - \$1000/MWh Static Strike Price

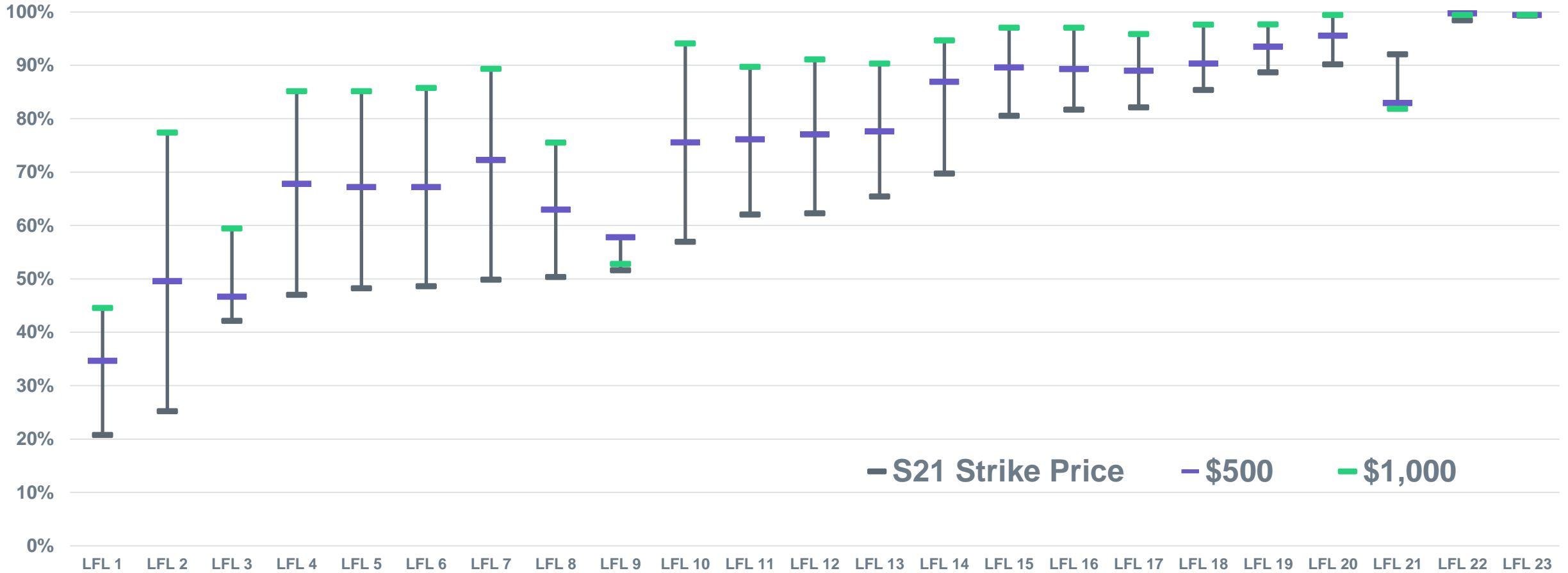
Analysis of Price Responsive Behavior – ERCOT Observations

	% Curtailed \$21	% Curtailed \$500	% Curtailed \$1000
LFL 1	20.8%	34.6%	44.5%
LFL 2	25.2%	49.6%	77.4%
LFL 3	42.1%	46.6%	59.4%
LFL 4	47.0%	67.8%	85.1%
LFL 5	48.2%	67.2%	85.1%
LFL 6	48.6%	67.2%	85.7%
LFL 7	49.8%	72.2%	89.3%
LFL 8	50.3%	62.9%	75.5%
LFL 9	51.6%	57.8%	52.8%
LFL 10	56.9%	75.5%	94.0%
LFL 11	62.0%	76.1%	89.7%
LFL 12	62.2%	77.0%	91.1%
LFL 13	65.4%	77.6%	90.3%
LFL 14	69.7%	86.9%	94.6%
LFL 15	80.5%	89.6%	97.0%
LFL 16	81.6%	89.3%	97.0%
LFL 17	82.1%	89.0%	95.8%
LFL 18	85.4%	90.3%	97.6%
LFL 19	88.7%	93.4%	97.6%
LFL 20	90.2%	95.5%	99.4%
LFL 21	92.0%	82.9%	81.8%
LFL 22	98.4%	99.7%	99.4%
LFL 23	99.3%	99.4%	99.4%
AVG	65%	76%	86%
AVG (Weighted)	56%	67%	78%

- Price responsive behavior continue to vary between large loads.
- Large loads have a much higher “success rate” responding to very high prices (characterized as greater than \$1000/MWh) than they do to prices closer to a hypothetical Bitcoin mining breakeven.
- Despite using a higher strike price than the Sept meeting analysis (S21 vs S19 XP), several loads demonstrated behavior that was significantly less price responsive than previously reported.
- Additionally, several loads demonstrated behavior that was significantly more price responsive.
- Large loads with greater peak demand continue to be less price responsive on average.

Analysis of Price Responsive Behavior – ERCOT Observations

Percentage of 5-min Intervals where LFLs Curtailed for High Prices (SEP-23 through FEB-24)

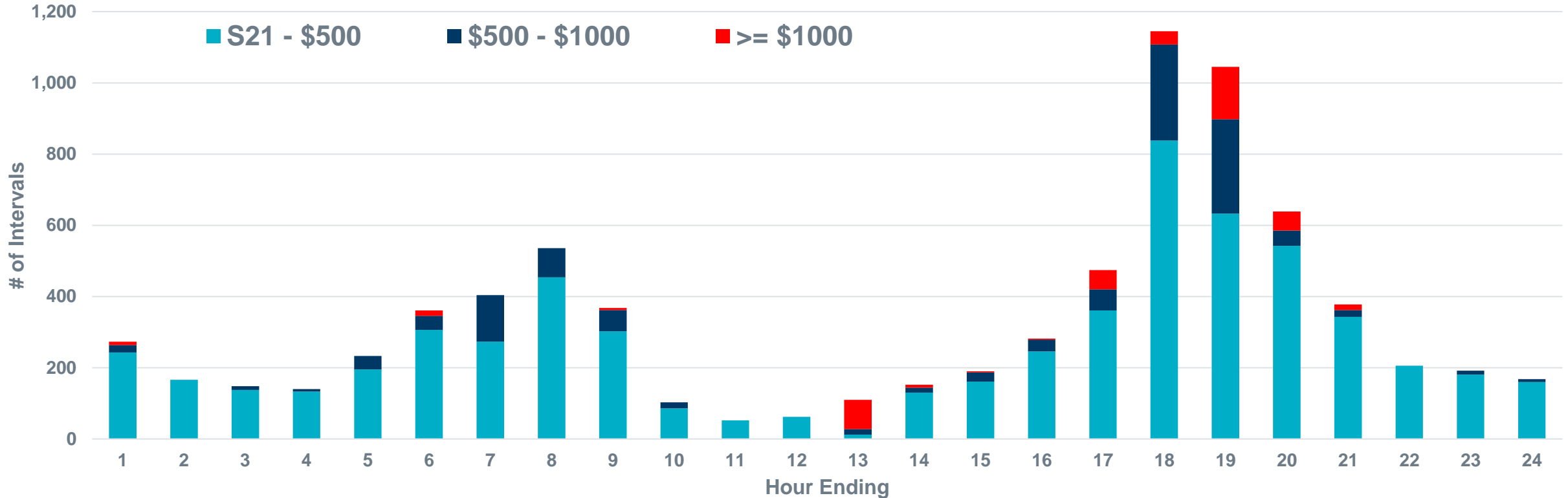


- Note that this chart is showing different metrics than it was in the Sept 2023 meeting.



Analysis of Price Responsive Behavior – ERCOT Observations

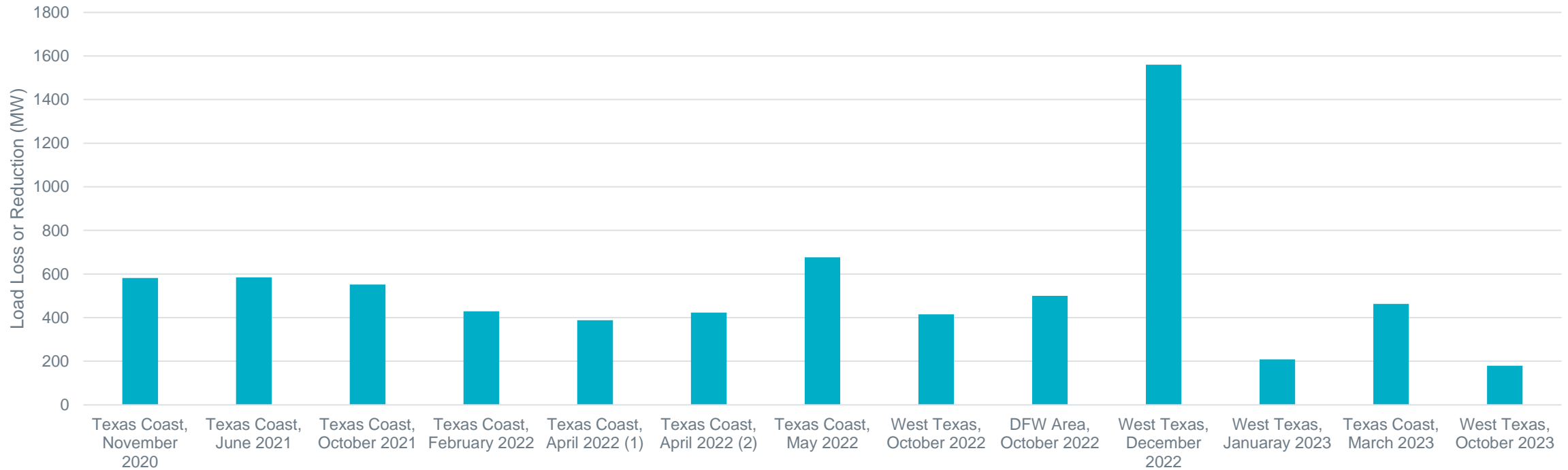
Count of 5-min Intervals where LFLs did not Curtail During High Prices



- Chart displays counts of instances where a large load did not reduce consumption below 20% (adjusted for ancillary services) for a single SCED interval.
- Instances of large loads not economically curtailing aligned with times of increased reliability risk.
 - Summer: During the evening solar ramp
 - Winter: During the morning and evening net-load peaks

Recent Loss/Reduction of Load Events

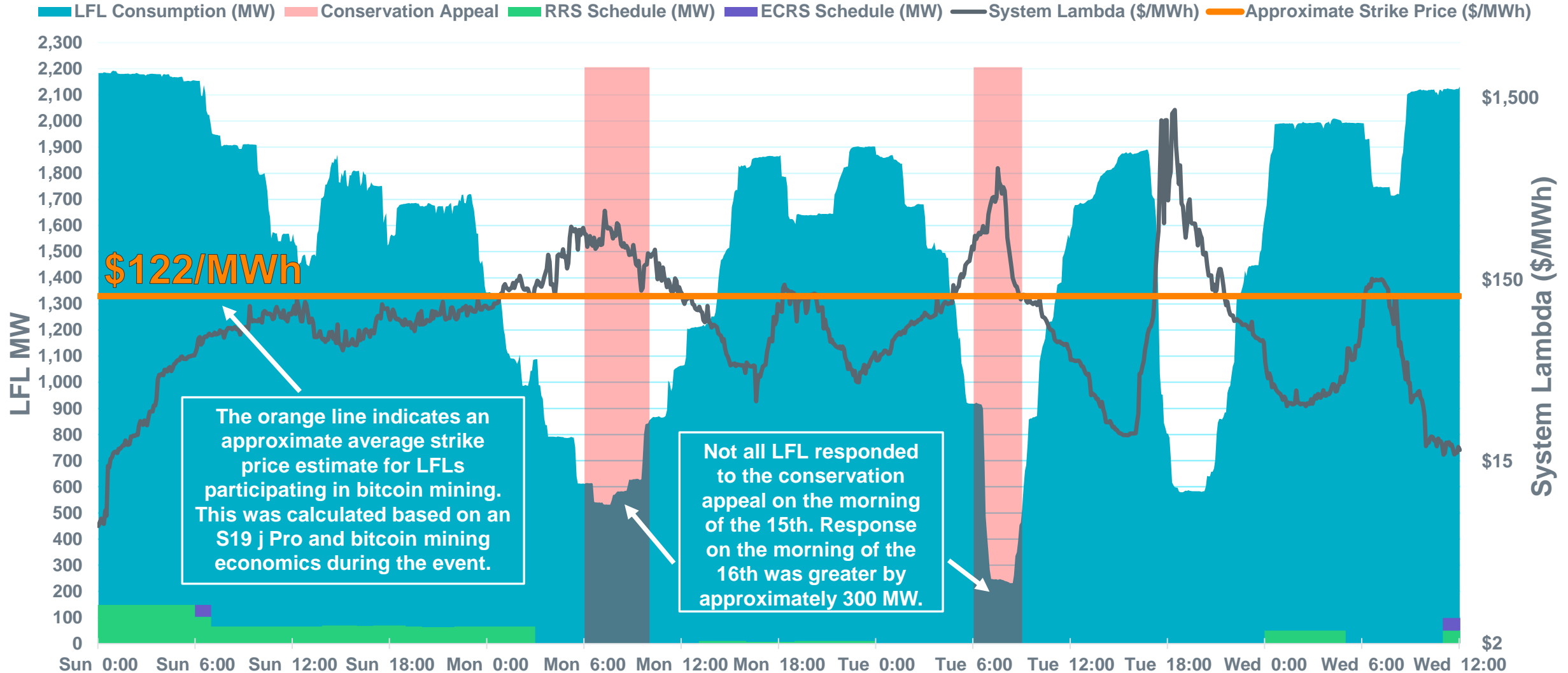
Recent ERCOT Loss/Reduction of Load Events



- In October 2023, another event took place in west Texas following a fault on the system.
 - The event resulted in ~180 MW of load reduction.
- ERCOT has continued to observe single load tripping/reduction events related to VRT that are not displayed on this chart.

Winter Storm Heather Large Load Response

Winter Storm Heather LFL Response



Questions?

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