RMDSTF Regulation Requirement
PJM's Proposal Development

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RMDSTF

December 20, 2022

- Introduced an initial dynamic regulation requirement proposal
  - Baseline MW with seasonal, weather alert adders
  - Influenced by annually installed renewable MW
  - Defines new on- and off-peak hours
- **Received requests to dig into the underlying data**
  - **Seasonality of load and renewables**
  - **ACE breakdown and investigation**
- Received additional considerations
  - Interactions with other proposal elements
  - Timeframe for communicating the requirement (1 day ahead)

- Load Hourly Deltas
  - Year over year and seasonal averages
- Solar/Wind Hourly Actuals and Deltas
  - Year over year average hourly patterns for "peak" season
- Historic Area Control Error Statistics
  - Various statistics for 1-min ACE, basic and using thresholds

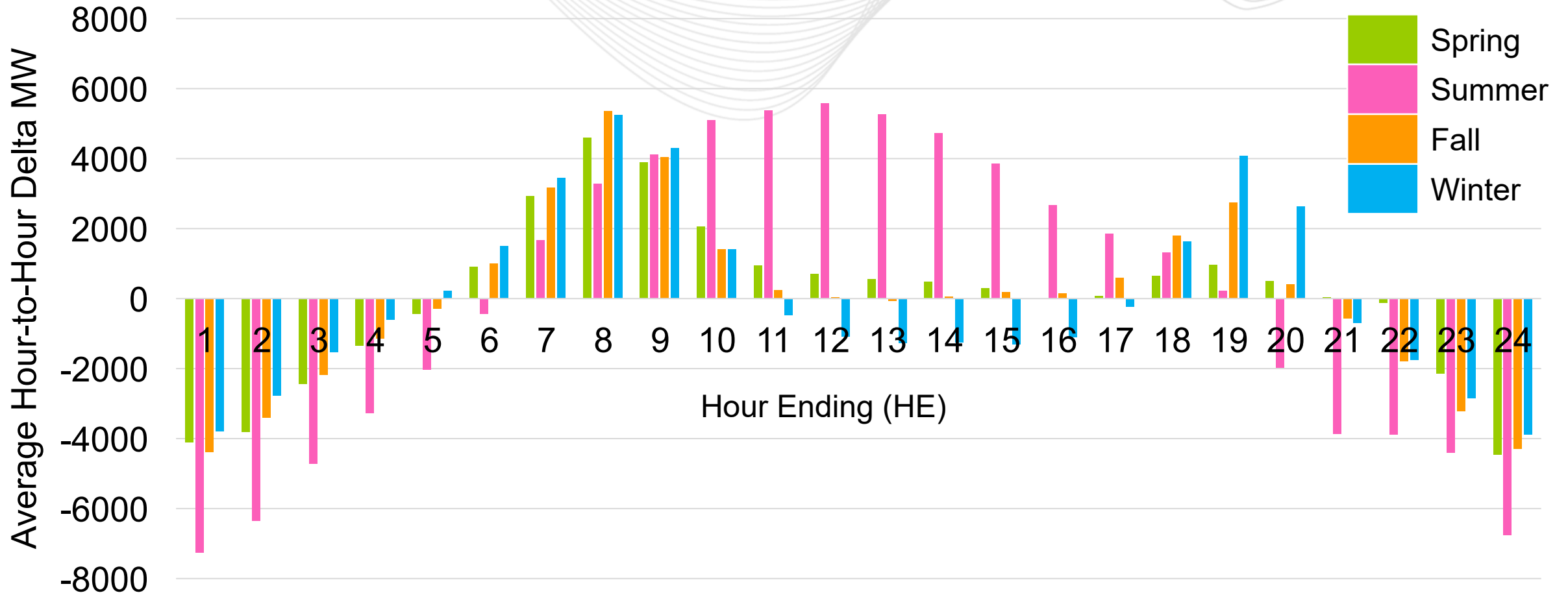*Note*: Seasonal designations for the data in this presentation are as follows:

- Spring   March 1 – June 15
- Summer   June 15 – September 15
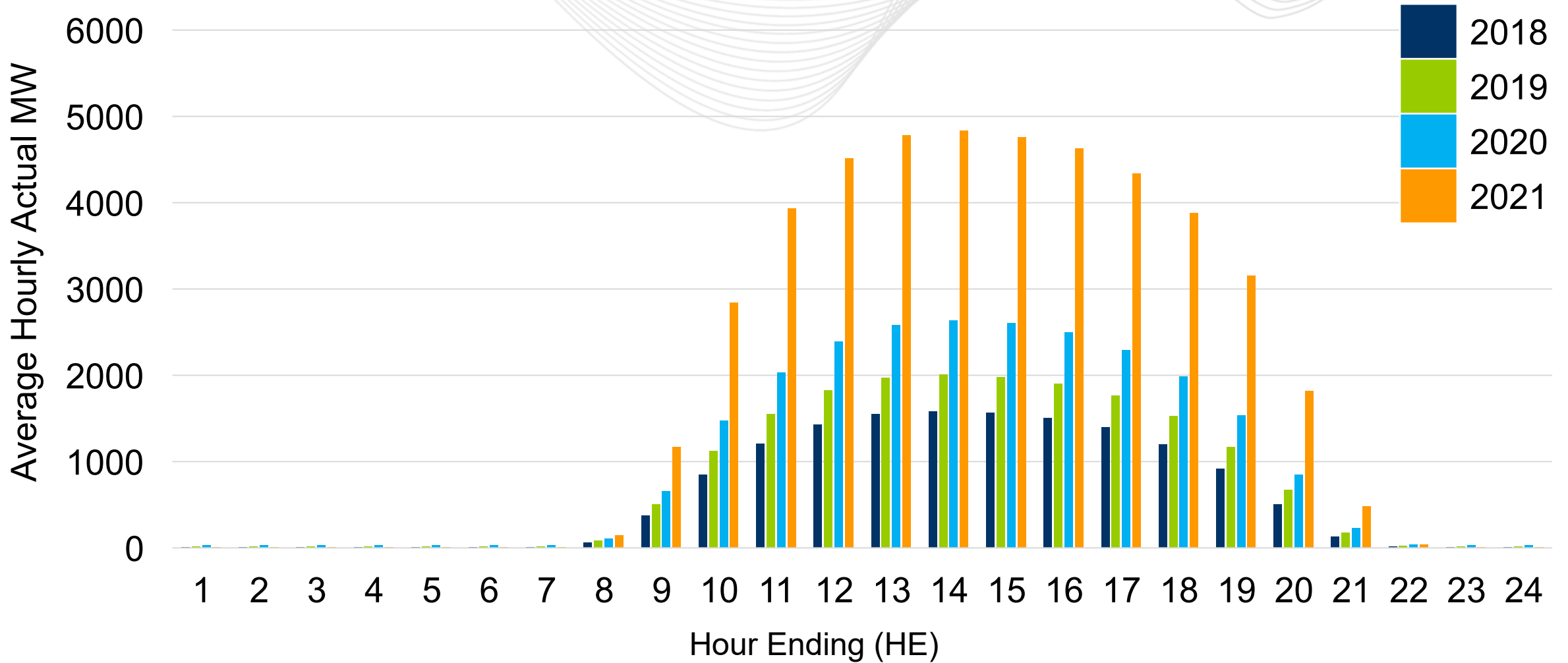- Fall   September 15 – December 31
- Winter   December 31 – March 1
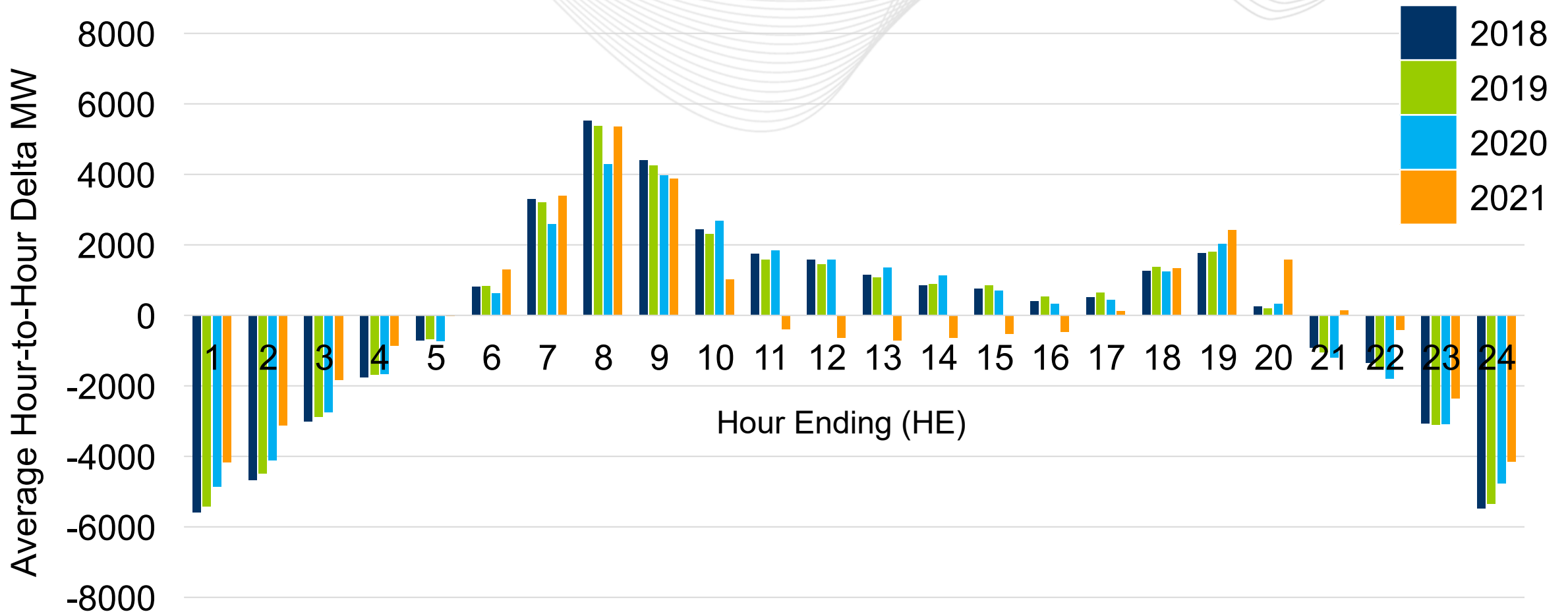
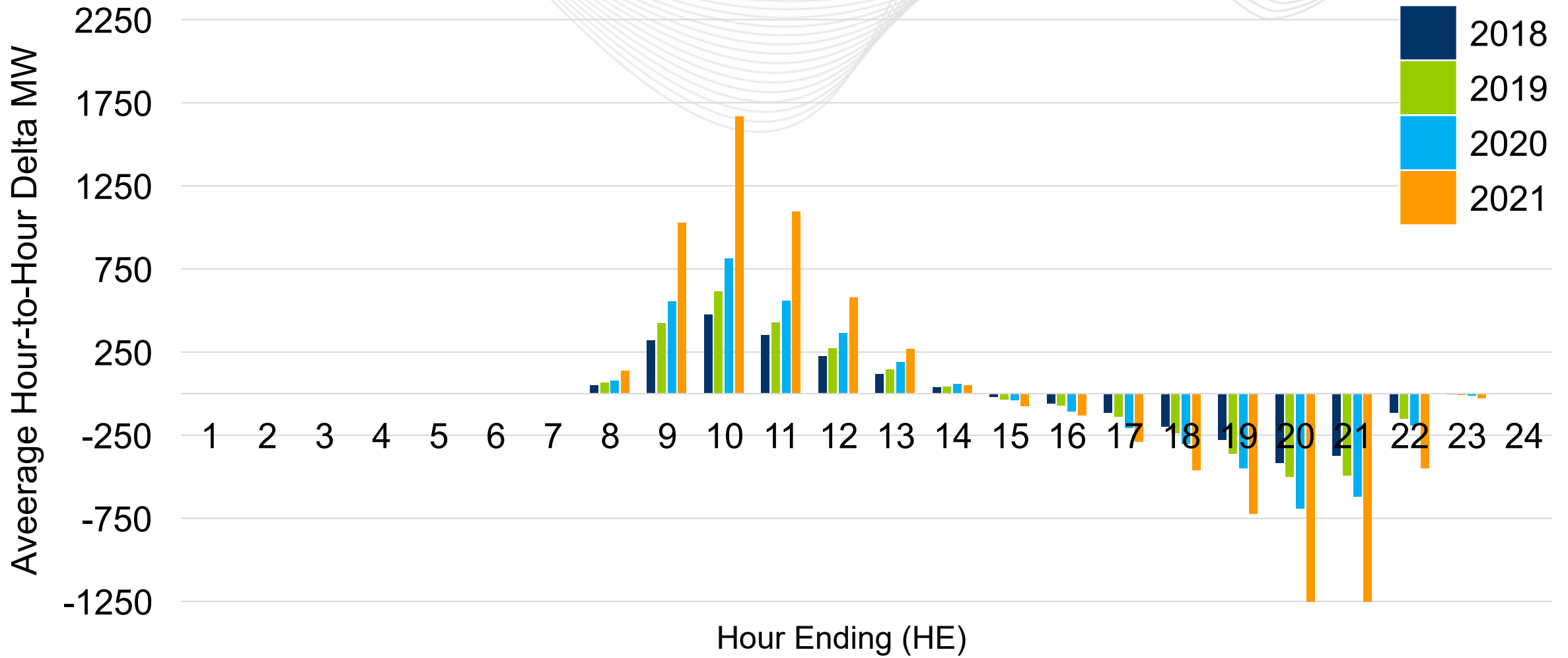- Note the change in 2021 profile versus historic—cause TBD

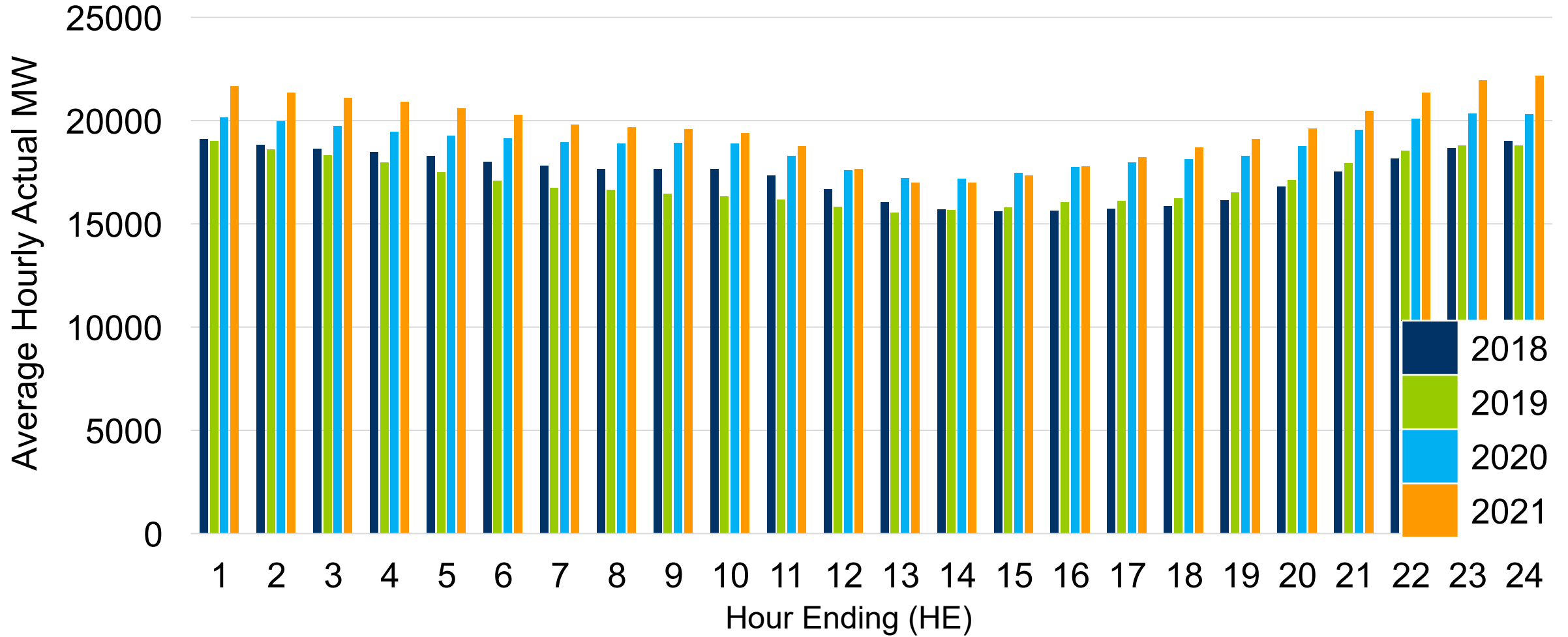- Used hourly load actuals for **calendar year 2021** only

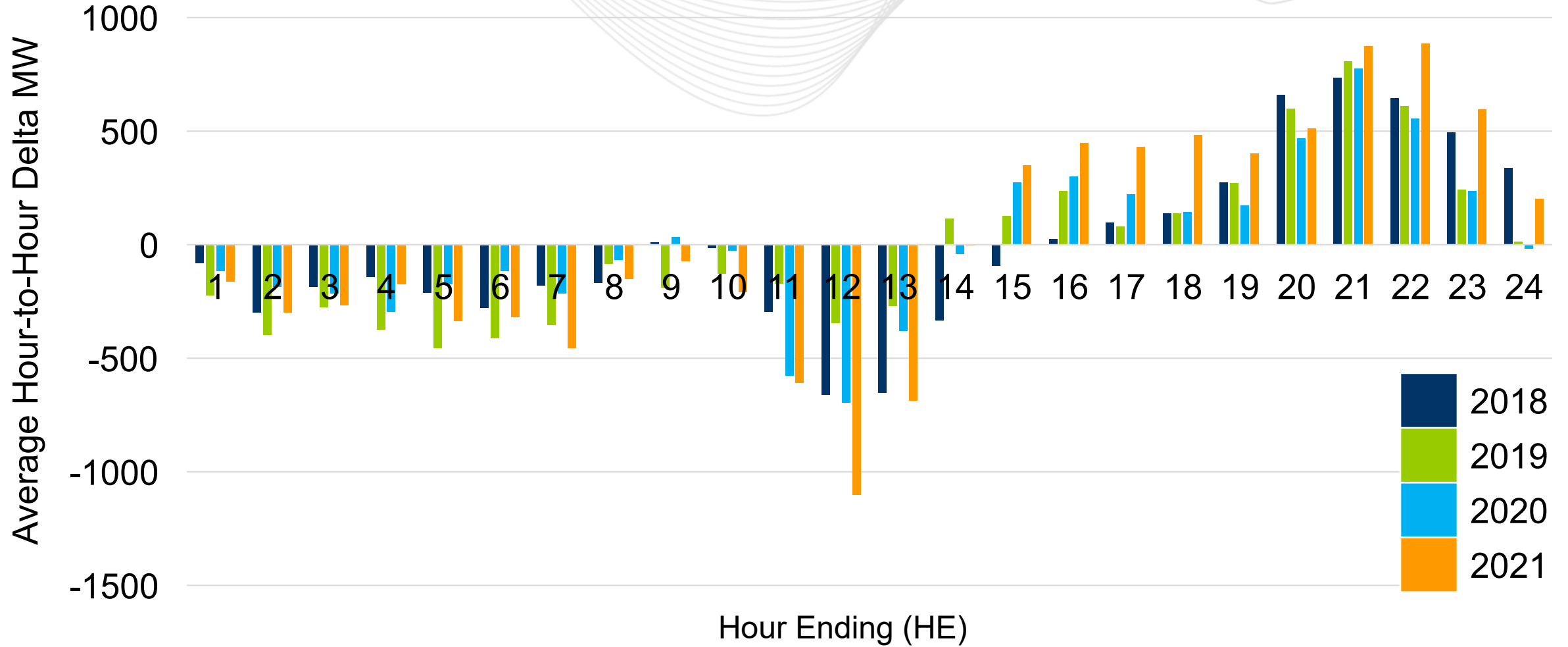Year over Year Hourly Summer Solar Actuals

Year over Year Hourly Summer Solar Deltas

Year over Year Hourly Winter Wind Actuals

Year over Year Hourly Winter Wind Deltas

- Determine a threshold for ACE below which we might consider control error "acceptable"

  – ACE outside of this threshold may be prioritized for the purposes of determining regulation need

- Initial proposal is a threshold of **+/- 247 MW**

  – Estimate based on the NERC guidelines around frequency response obligation (FRO) allocations for PJM (2021-2022)

  – Link to 2023 report: BAL-003-2 FRO Allocation for OY2023

- This threshold is tentative and subject to change pending PJM Operations feedback
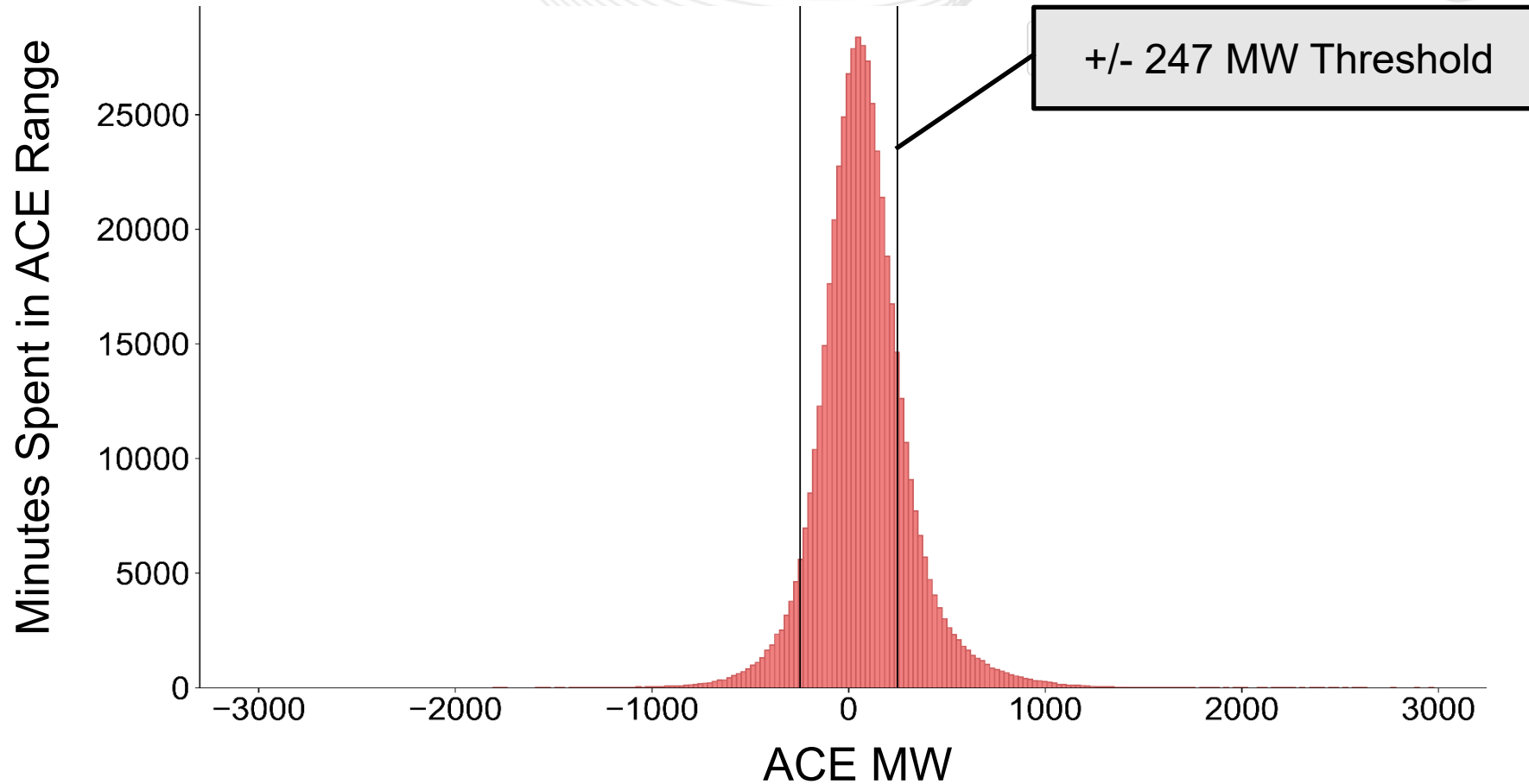
- Slight left skew, tends toward the right of 0 MW
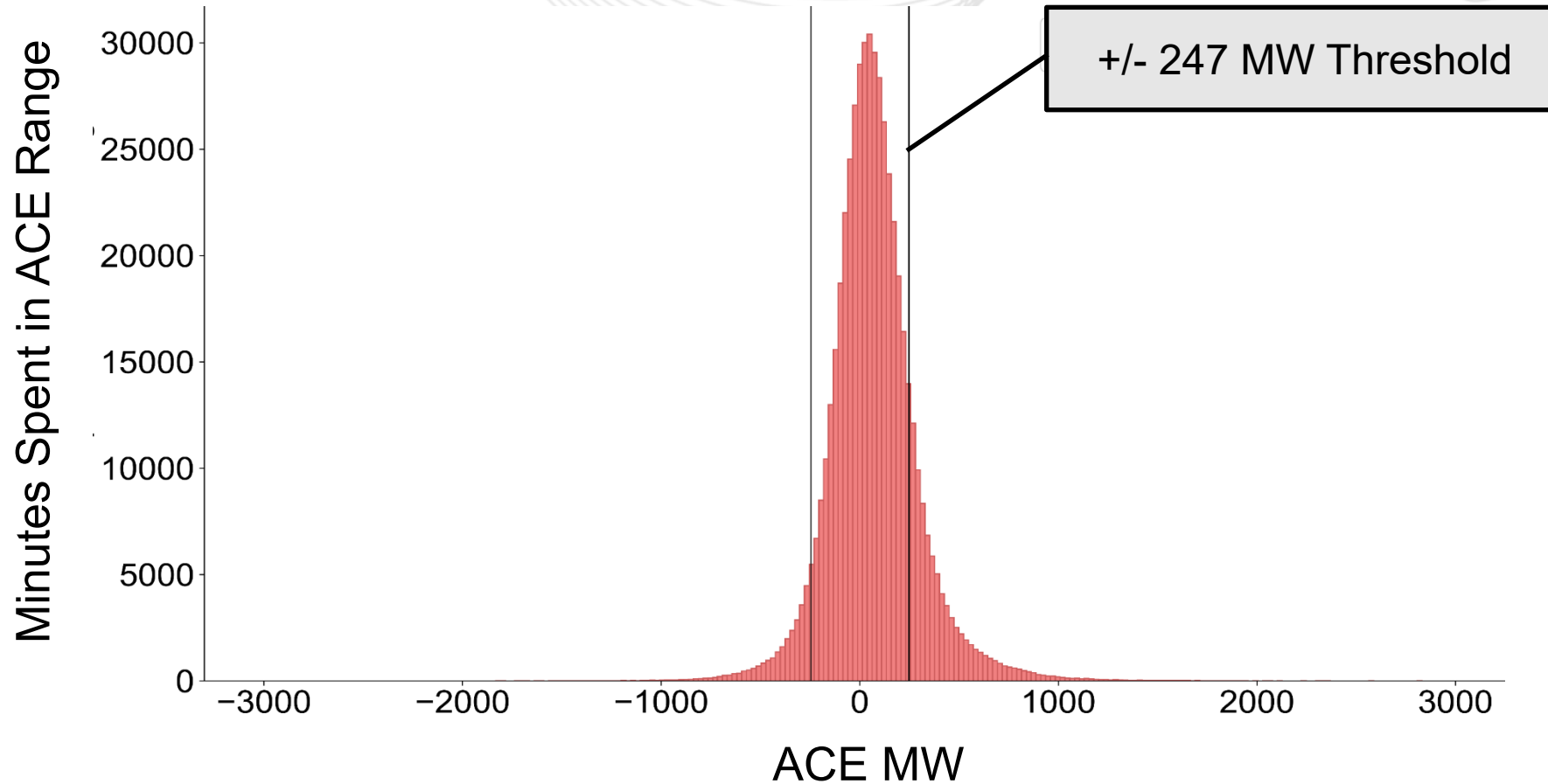
- Very similar shapes for 2019, 2018—omitted from this presentation

	2018	**2019**	**2020**	**2021**
Mean	64	73	70	78
St. Deviation	245	234	224	238
25%	-71	-58	-55	-55
Median (50%)	54	61	58	65
75%	188	190	180	195

Note: ACE statistics provided here are rounded to whole numbers.

- Statistics confirm the year-over-year similarity

Threshold Range	2018	2019	2020	2021
+/- 247 MW	75%	76%	79%	75.8%
+/- 494 MW	19%	18.6%	17%	18.5%
+/- 741 MW	4%	4%	3%	4%
+/- 988 MW	1%	1%	0.9%	1.2%
> +/- 988 MW	0.5%	0.4%	0.3%	0.4%

- Each row is 1x, 2x, 3x, 4x, and >4x the +/-247 threshold

Hours with Greatest Statistical ACE Outliers by Year

2018		2019		2020		2021	
HE	Rel. Freq.	HE	Rel. Freq.	HE	Rel. Freq.	HE	Rel. Freq.
10	7%	6	11%	5	12%	0	9%
14	7%	5	8%	11	8%	5	7%
18	6%	18	7%	6	7%	16	7%
6	6%	14	7%	10	7%	6	6%
7	6%	0	6%	0	6%	15	5%

Threshold Range	Spring	Summer	Fall	Winter
+/- 247 MW	76%	75%	76%	76%
+/- 494 MW	18%	19%	18%	18%
+/- 741 MW	4%	4%	4%	4%
+/- 988 MW	1%	1%	1%	1%
> +/- 988 MW	0.4%	0.5%	0.3%	0.4%

- Each row is 1x, 2x, 3x, 4x, and >4x the +/-247 threshold

Hours with Greatest Statistical ACE Outliers by Season

Spring		Summer		Fall		Winter	
HE	**Rel. Freq.**	**HE**	**Rel. Freq.**	**HE**	**Rel. Freq.**	**HE**	**Rel. Freq.**
6	8%	14	10%	18	10%	5	12%
5	7%	0	9%	5	10%	17	10%
0	6%	15	9%	17	9%	6	9%
10	5%	11	7%	6	8%	18	7%
22	5%	13	6%	16	7%	7	6%

- Additional follow-up to be had based on November and other feedback
  - **Impact of single signal on the regulation requirement**
  - Statistics on historic forecast performance for wind, solar, load
  - Statistics on intrahour system volatility
  - Distribution of spin events over time

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Regulation Requirement

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