



Day-Ahead Market Enhancement Analysis

Guillermo Bautista Alderete, Ph.D.
Kun Zhao, Ph.D.

Market Analysis and Forecasting

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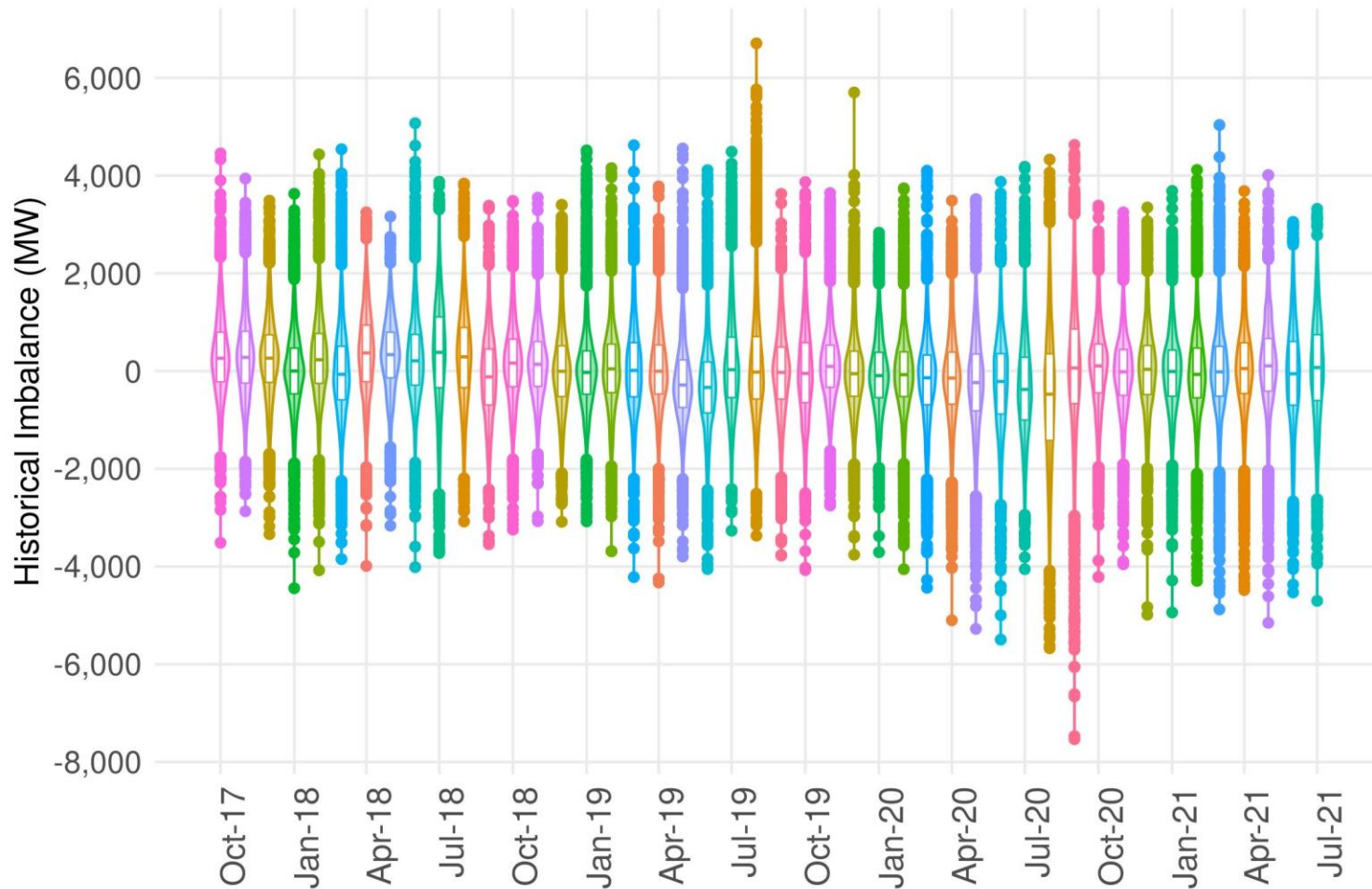
Objective

Analyze performance and trends in the areas of the day-ahead market that relate to the DAME initiative:

- Historical imbalances
- Imbalance reserve requirements
- RUC adjustments and upper confidence band
- RUC capacity

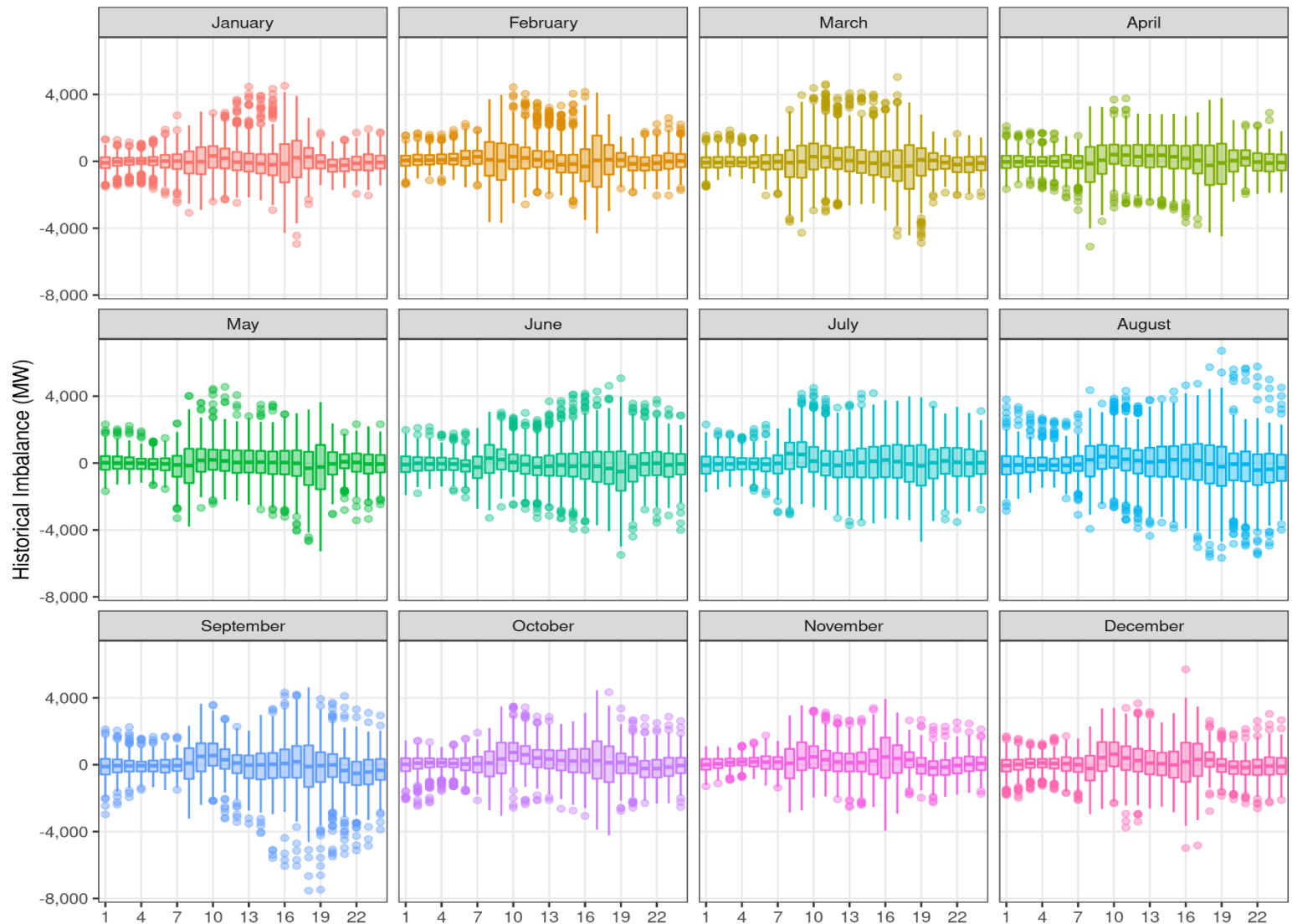
This presentation is based on the analysis report posted on the CAISO website

Historical Imbalances between day ahead and real time continue to be significant

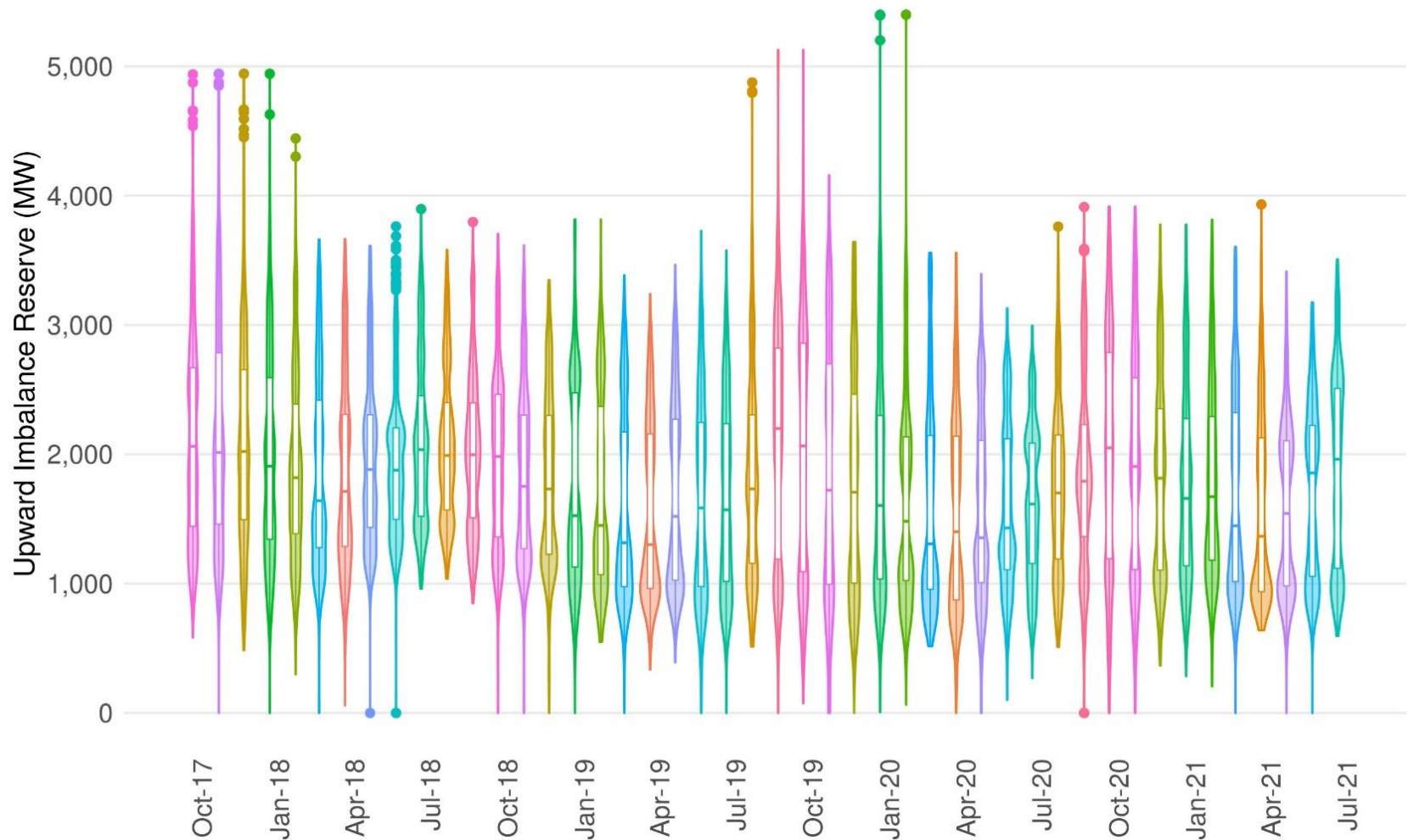


Violin plots shows the density and type of distribution of Imbalances

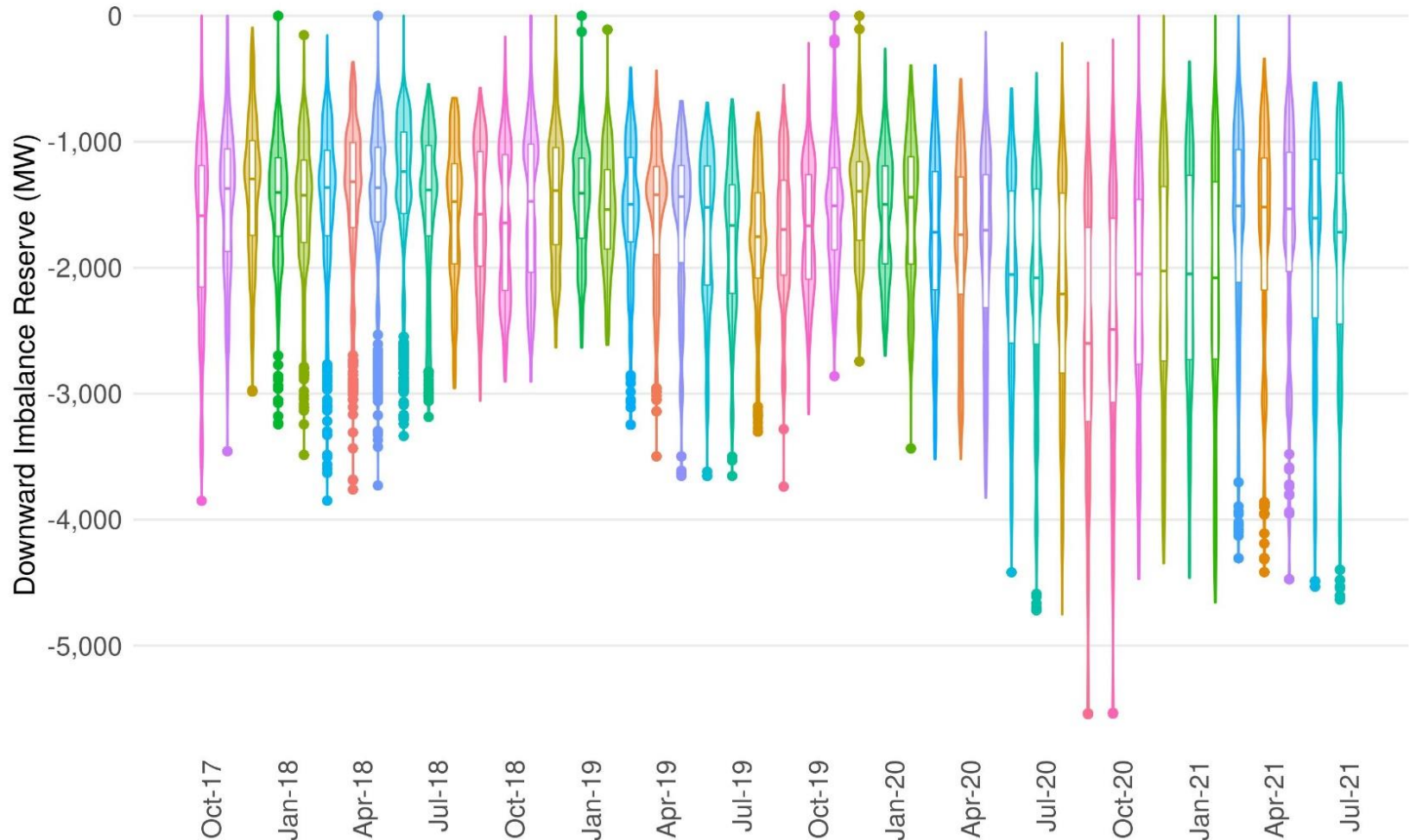
The level of imbalances varies by time of the year and day



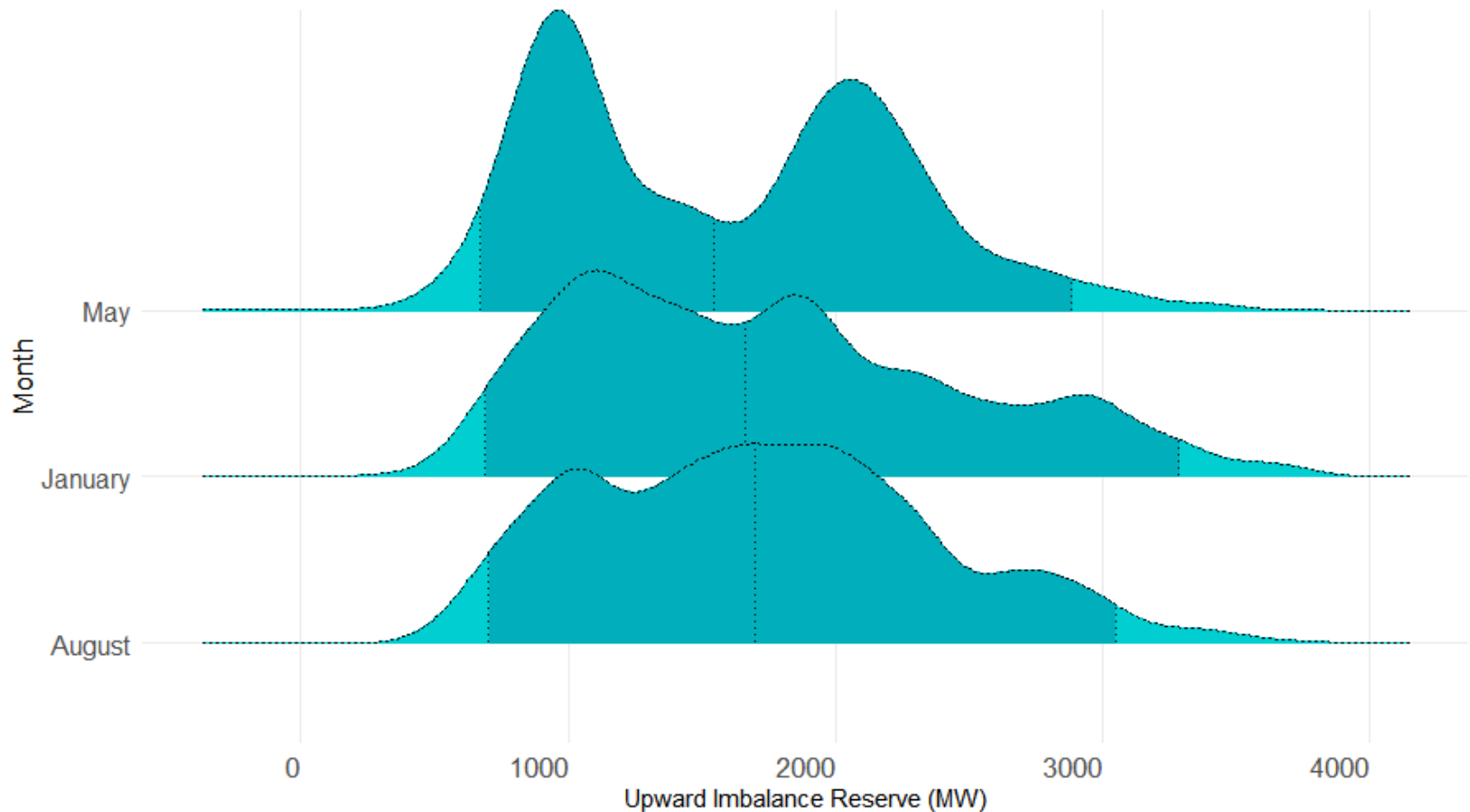
Imbalance reserves (IR) using a quantile regression approach yields the estimation of requirements -Upward IR



Imbalance reserves using a quantile regression approach yields the estimation of requirements - Downward IR



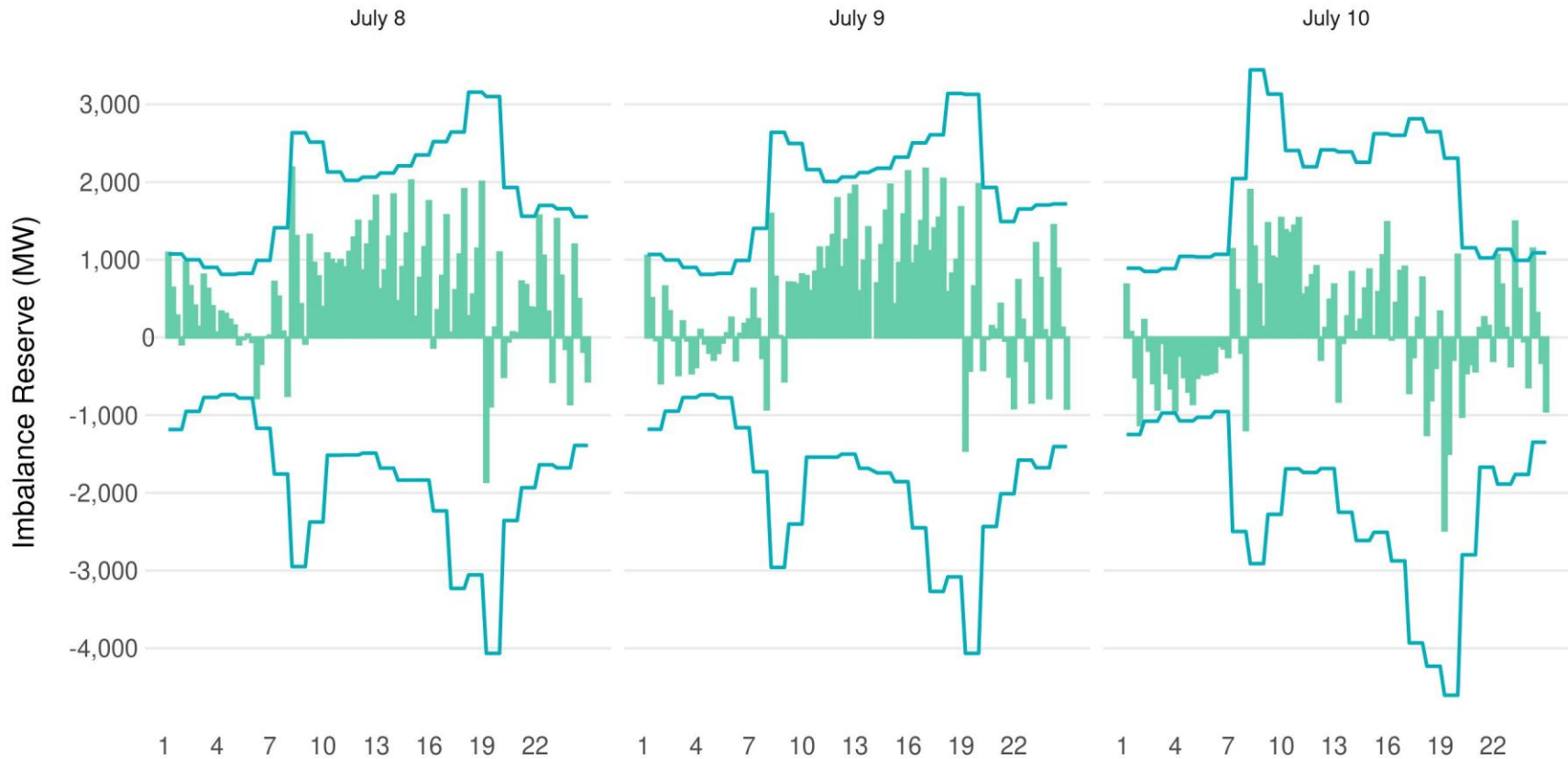
IR requirements varies by time of the year, tracking the net load uncertainty and forecast levels



Lighter blue sections show the 2.5th and 97.5th percentiles

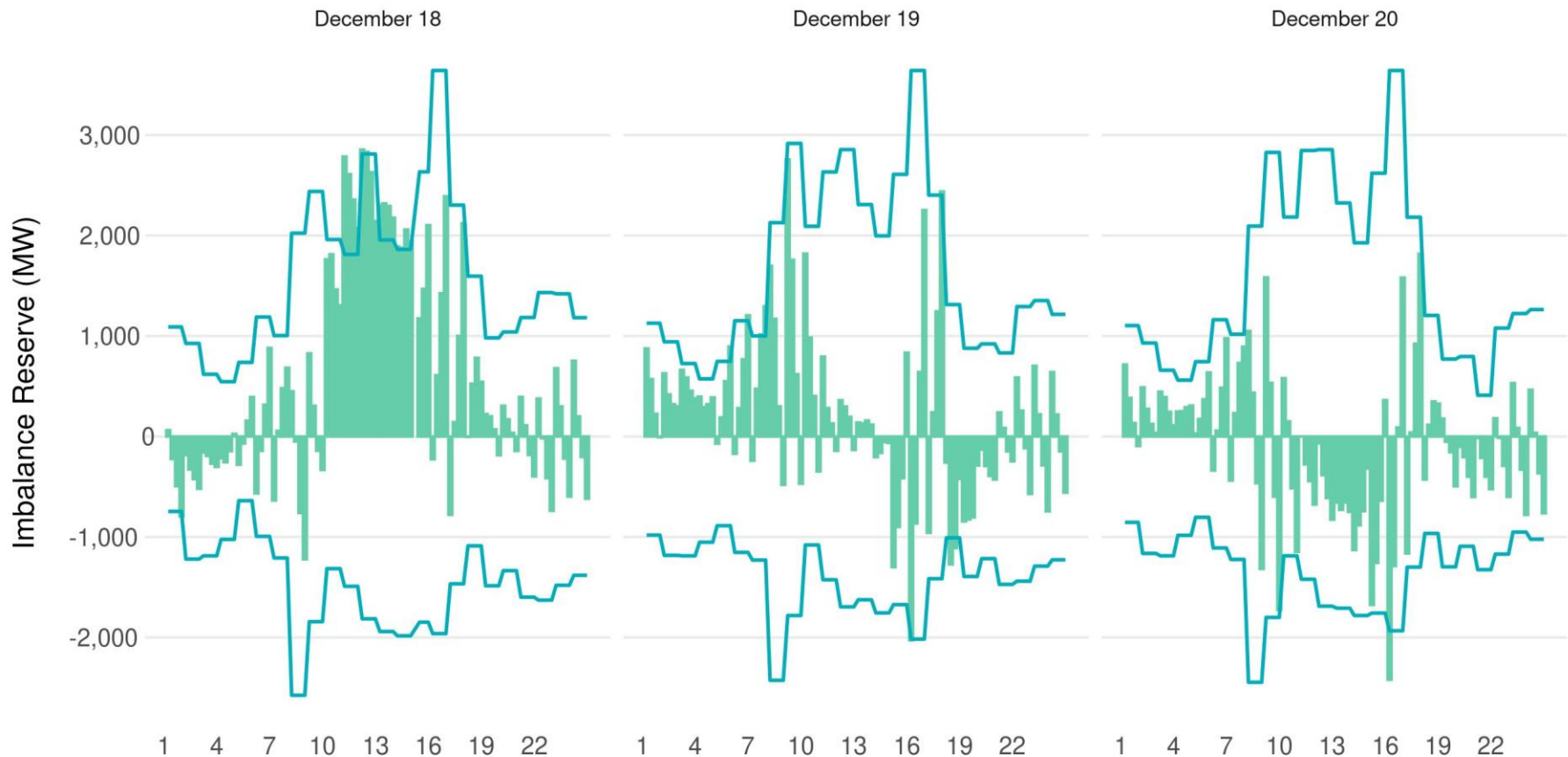
Months covered: Aug 2020, Jan 2021 and May 2021

Sample of imbalances and estimated IR requirements for summer 2021 days with tight supply conditions



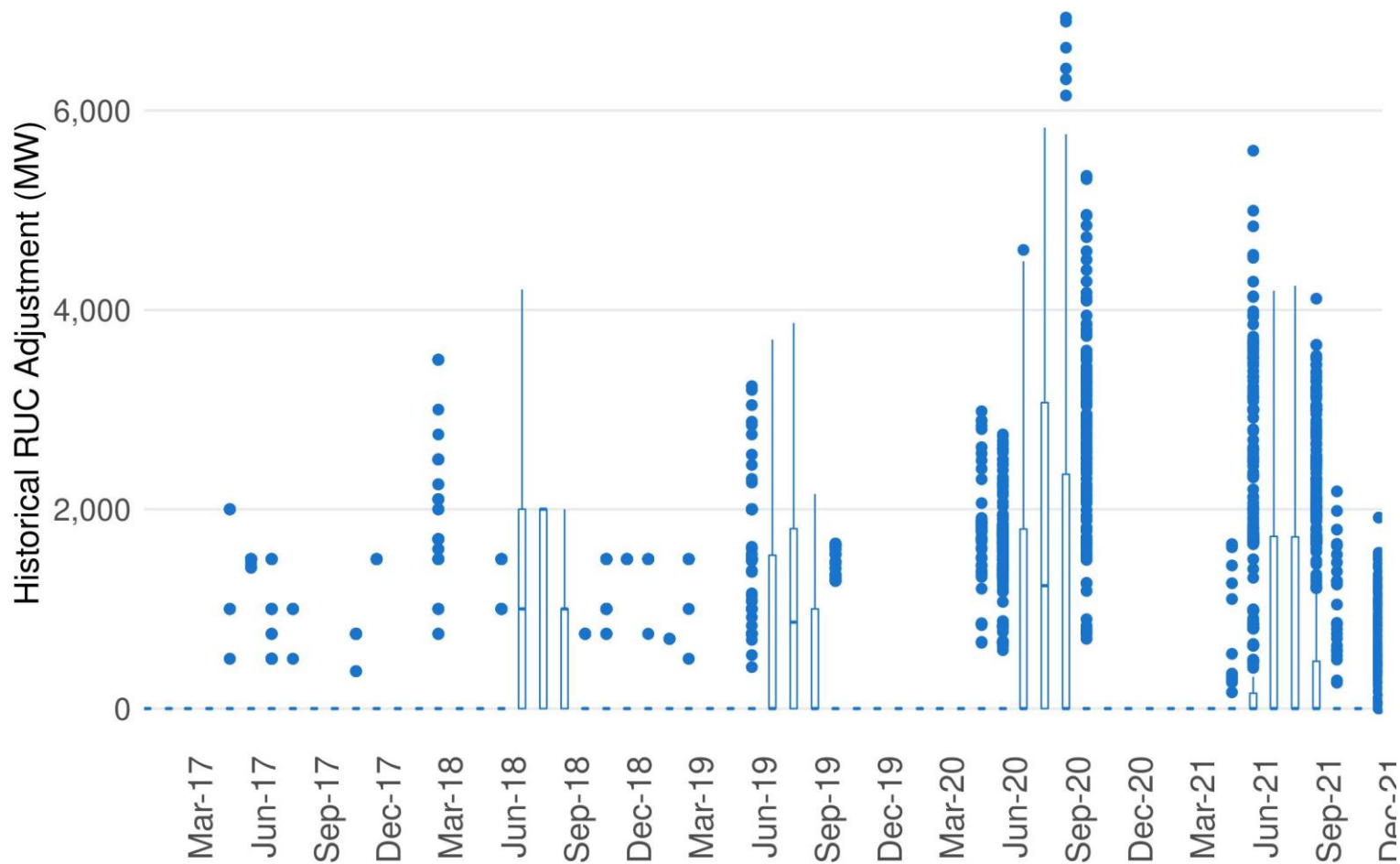
Green bars stand for actual imbalances while blue lines represent the upward and downward IR requirements

Sample of imbalances and estimated IR requirements for volatile conditions in December 2020

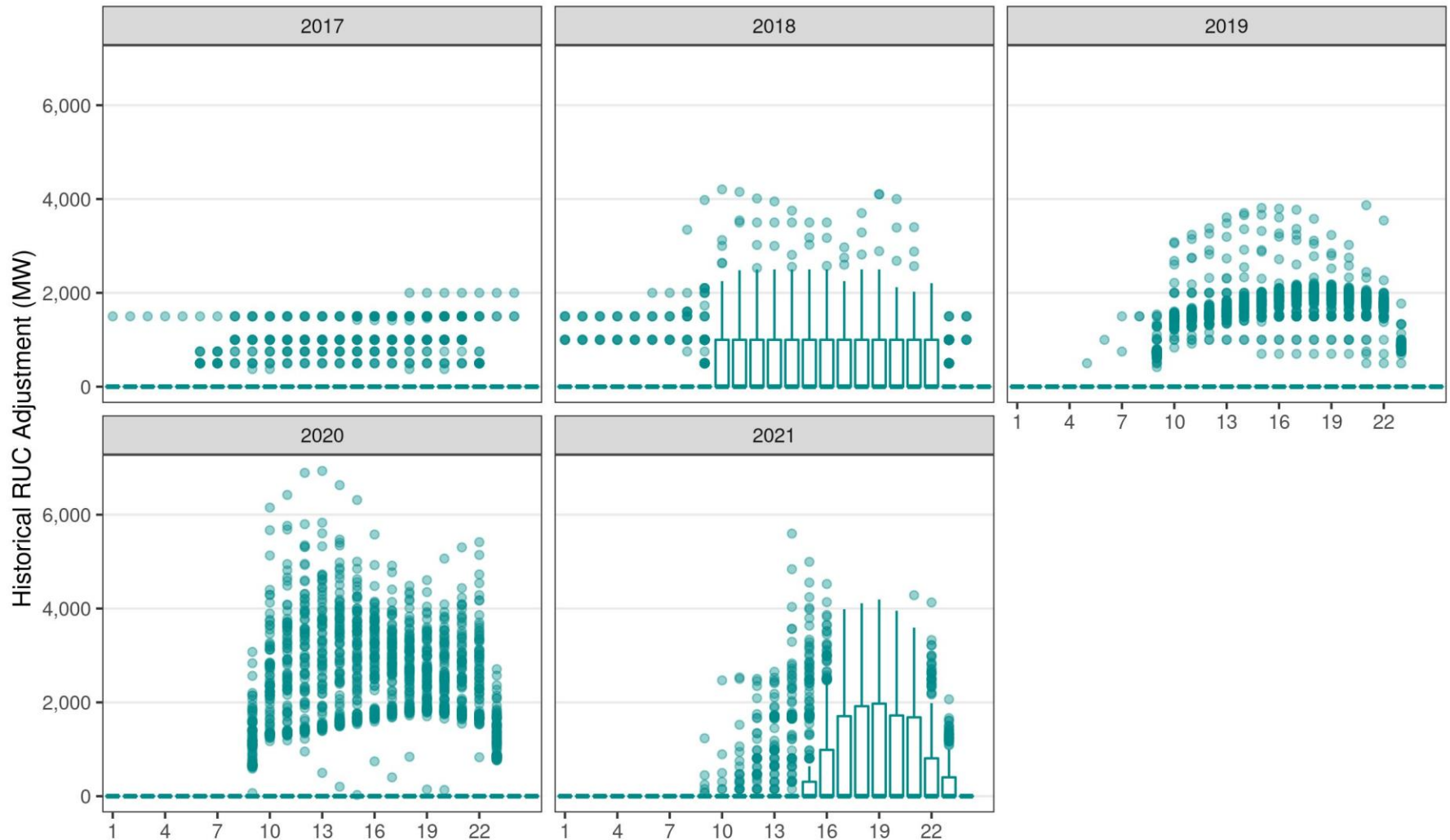


Green bars stand for actual imbalances while blue lines represent the upward and downward IR requirements

RUC adjustments have been used more frequently in summer months and reached the highest level on 2020



RUC adjustments are mostly concentrated on peak hours and for upward capacity



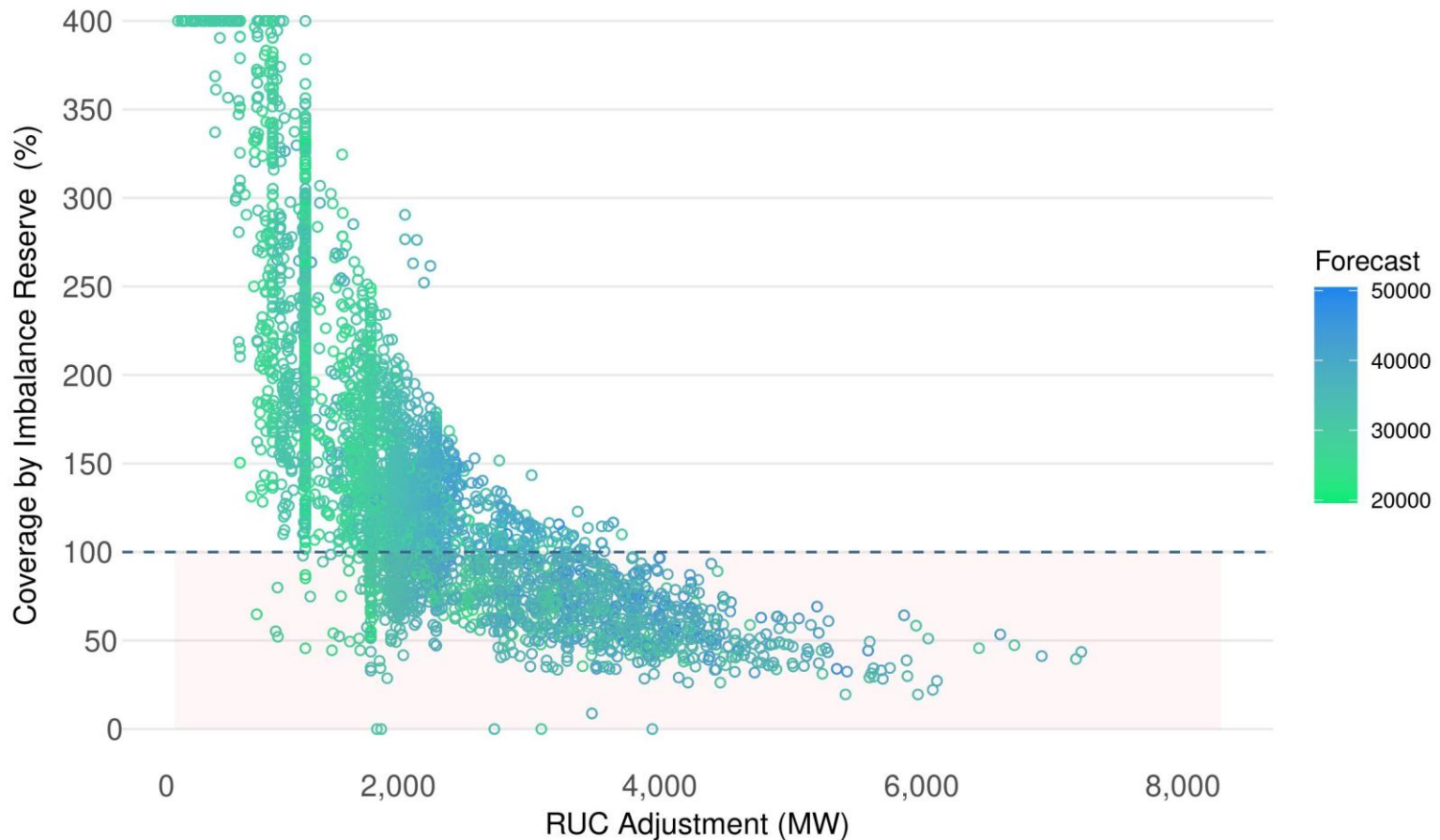
The correlation between RUC adjustments and Imbalance reserve needs is weak

- RUC adjustments is generally for upward needs
- RUC adjustments are generally for peak hours only
- Imbalance reserve needs are bi-directional
- Imbalance reserves needs are generally for all hours



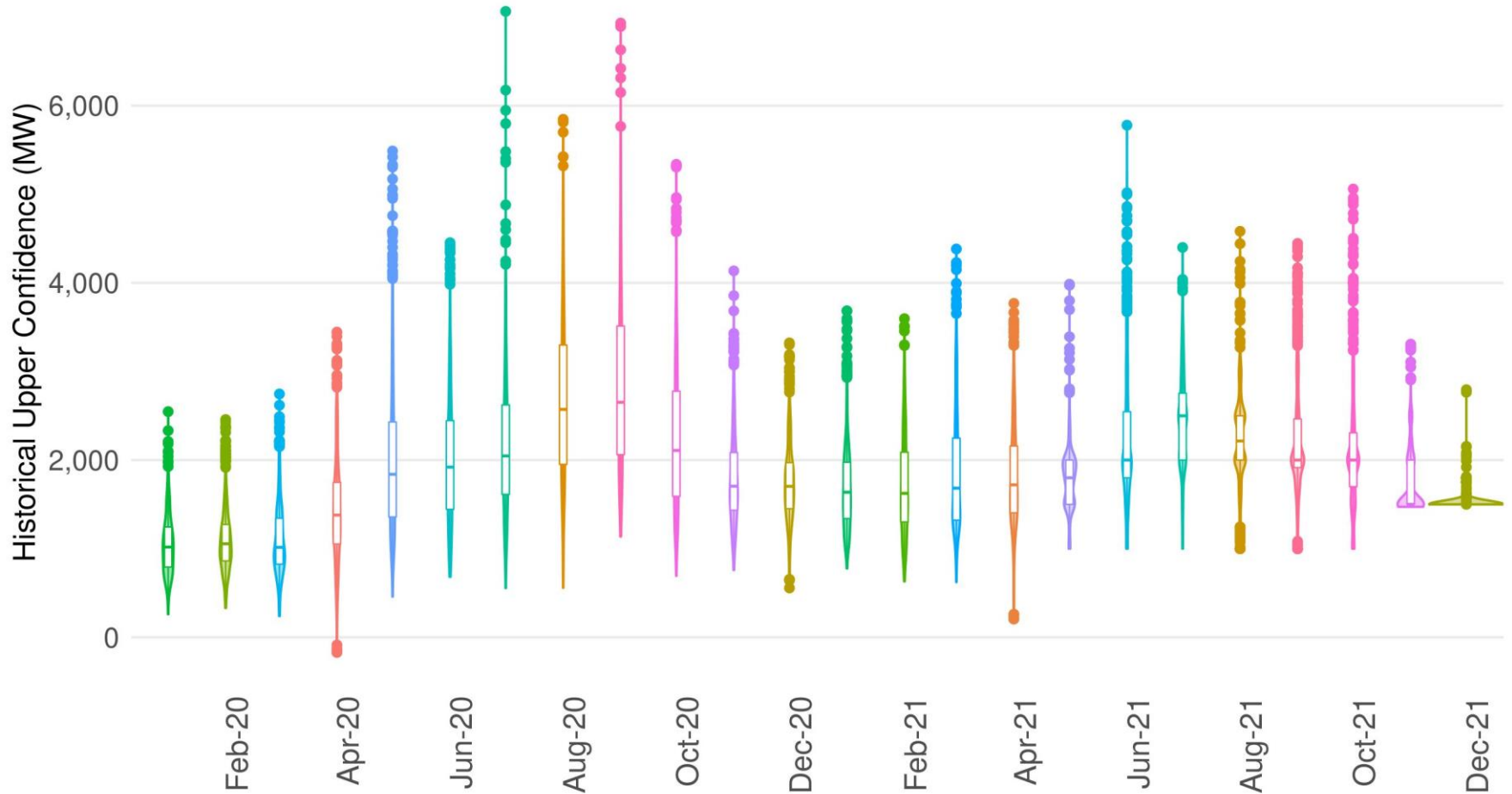
The color of the dots represent the level of load forecast

The IR coverage of RUC adjustments decreases as the RUC adjustments increases. IR covered about 40% and 60% of RUC adjustments in 2020 and 2021

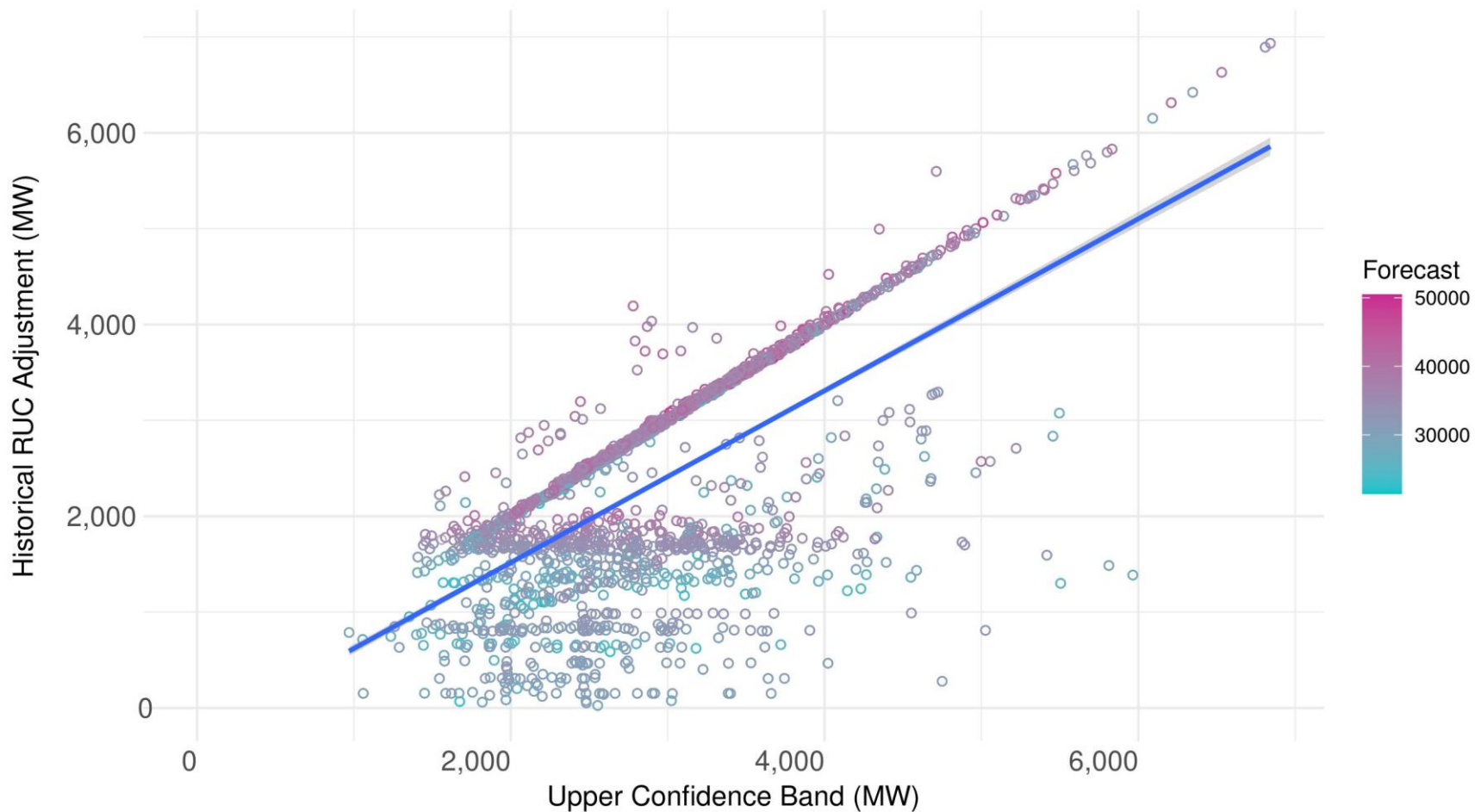


Coverage values capped at 400% for display purposes

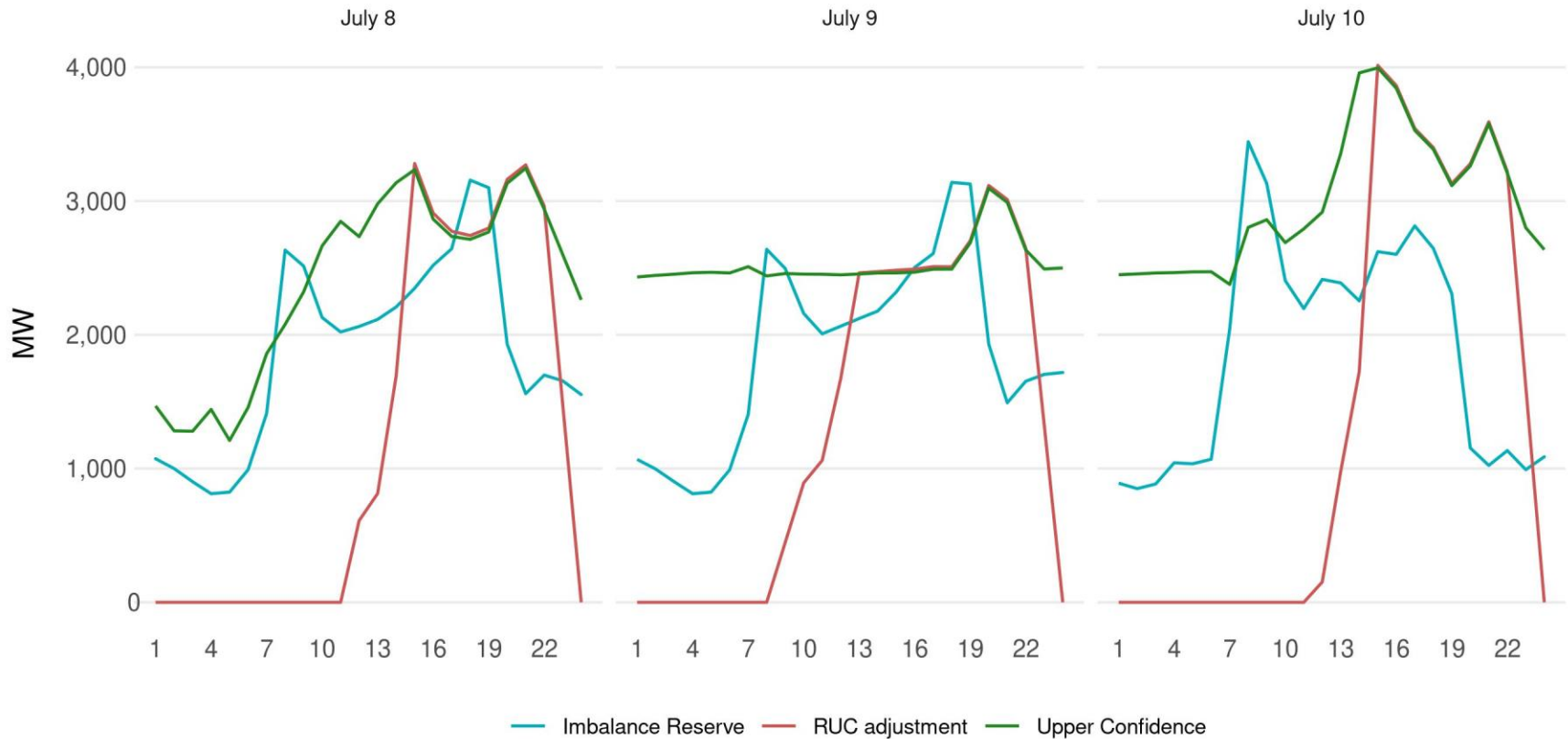
RUC Adjustments in recent months have been guided by a rough estimation of an upper-confidence load forecast



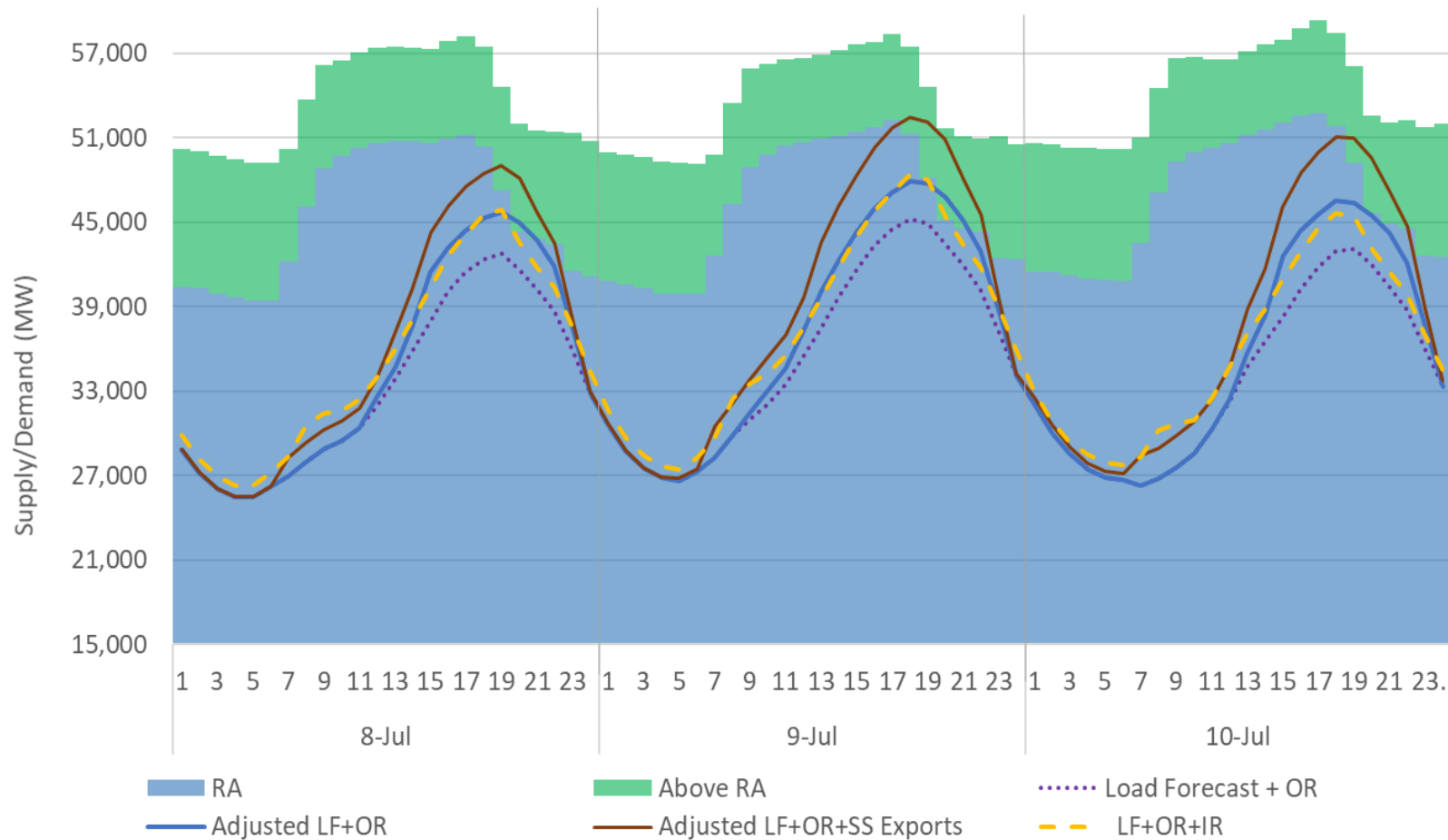
About 16% of the RUC adjustments were the same magnitude of the upper confidence value (dots at 45 degree)



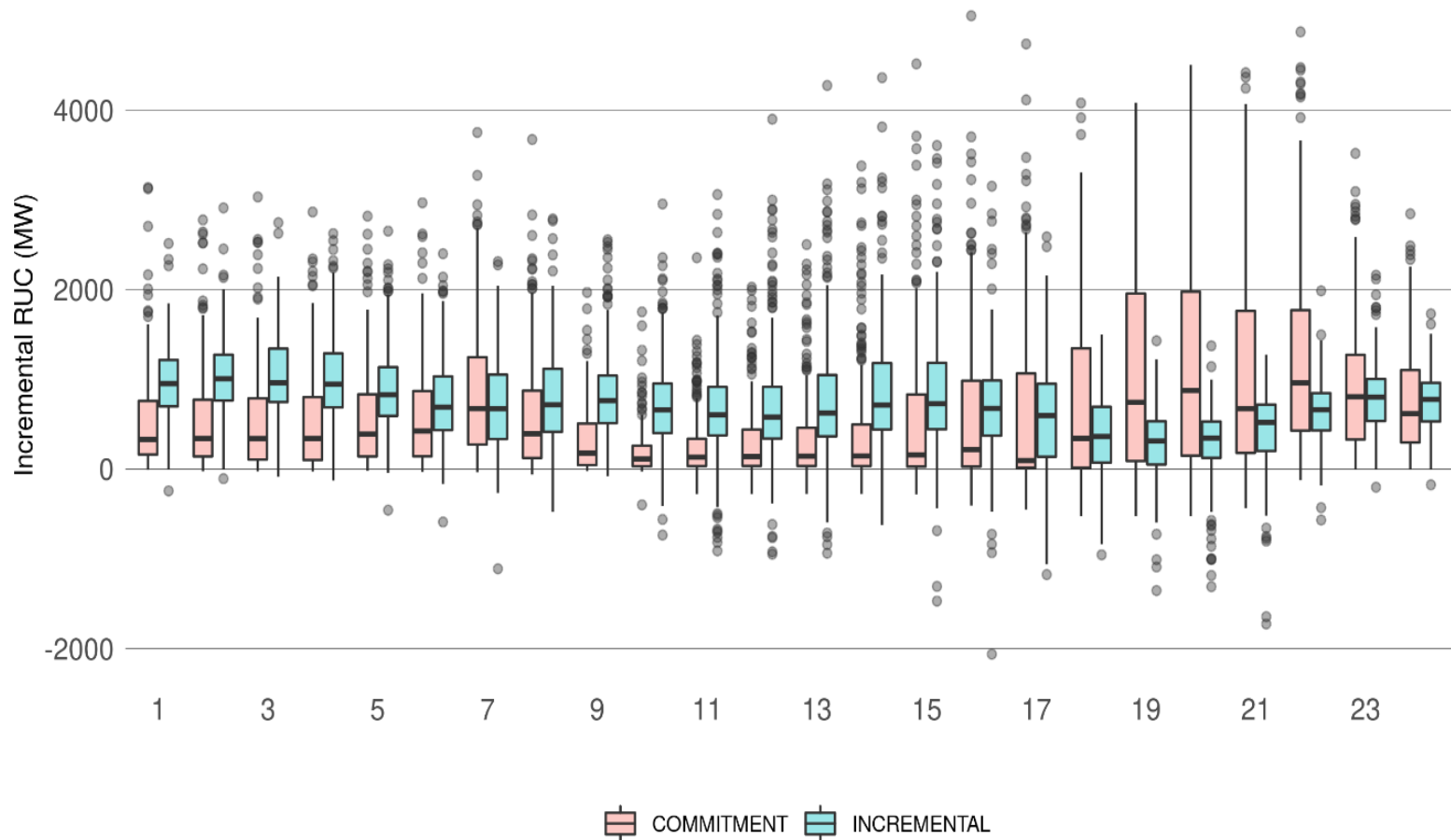
During tight supply days the IR, upper confidence and RUC adjustments tracked relatively close



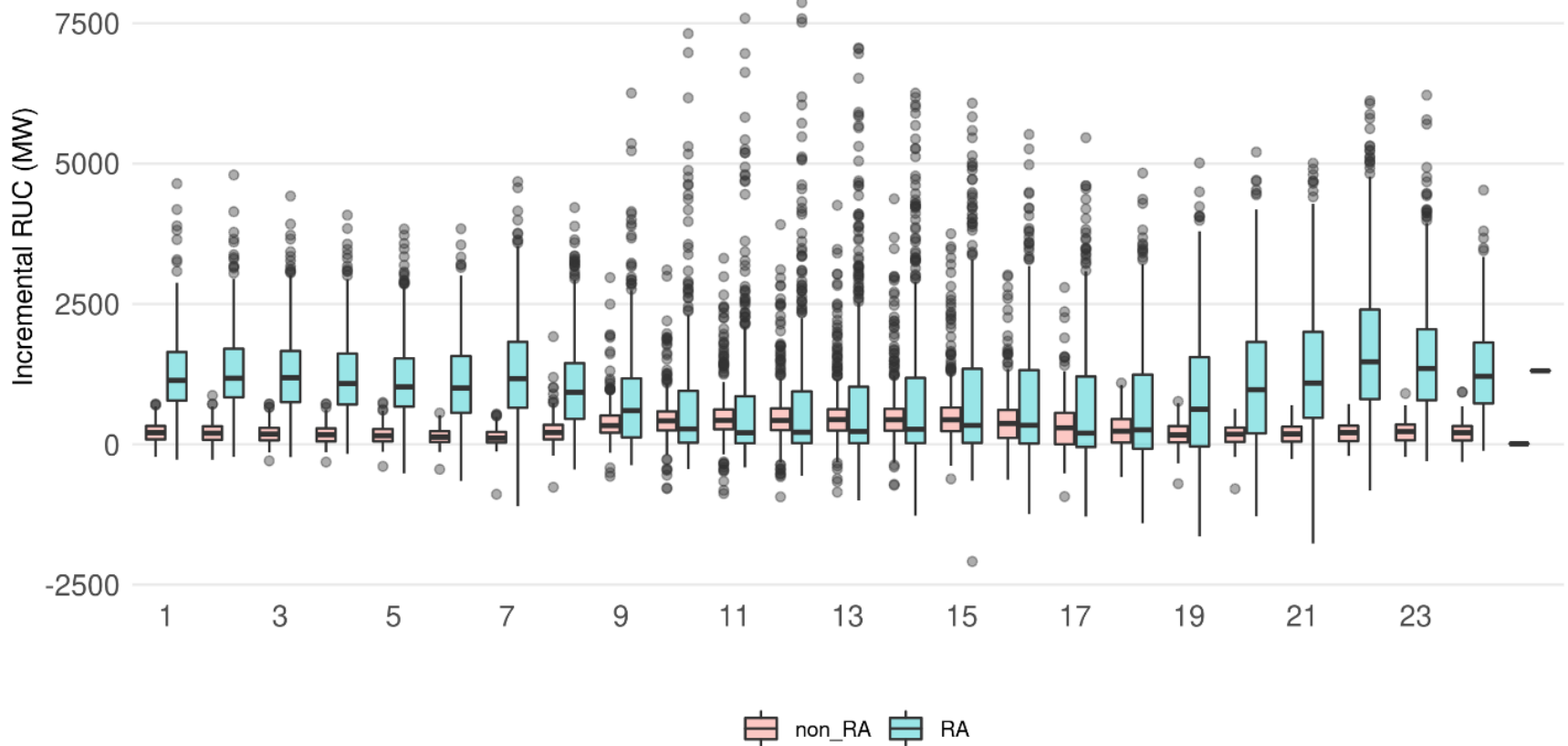
During tight supply days, the IR would have imposed similar requirements to those driven by RUC adjustments



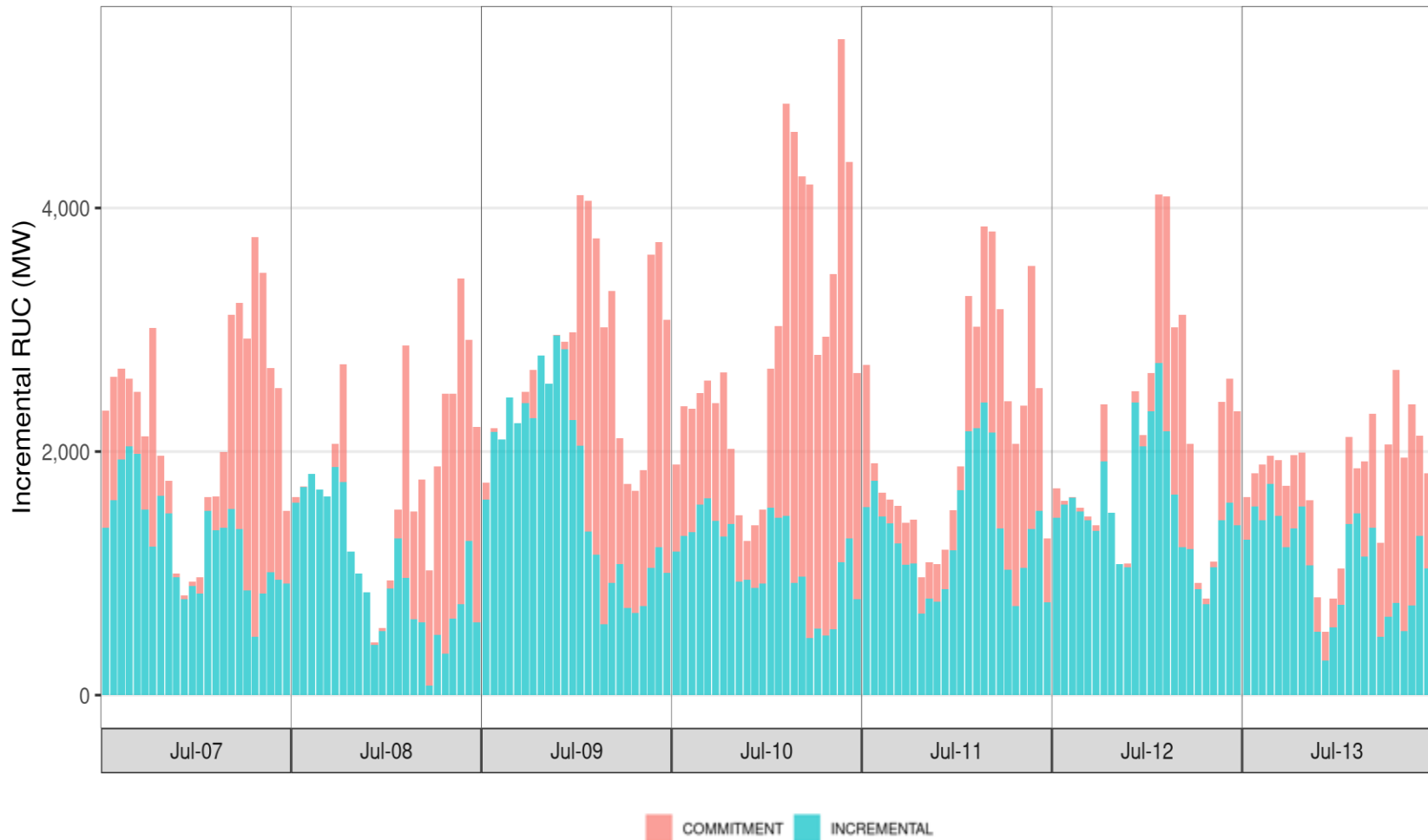
The incremental capacity procured in the RUC process during peak hours is largely supported by units already committed in IFM



The incremental capacity procured in RUC is largely supported by RA supply



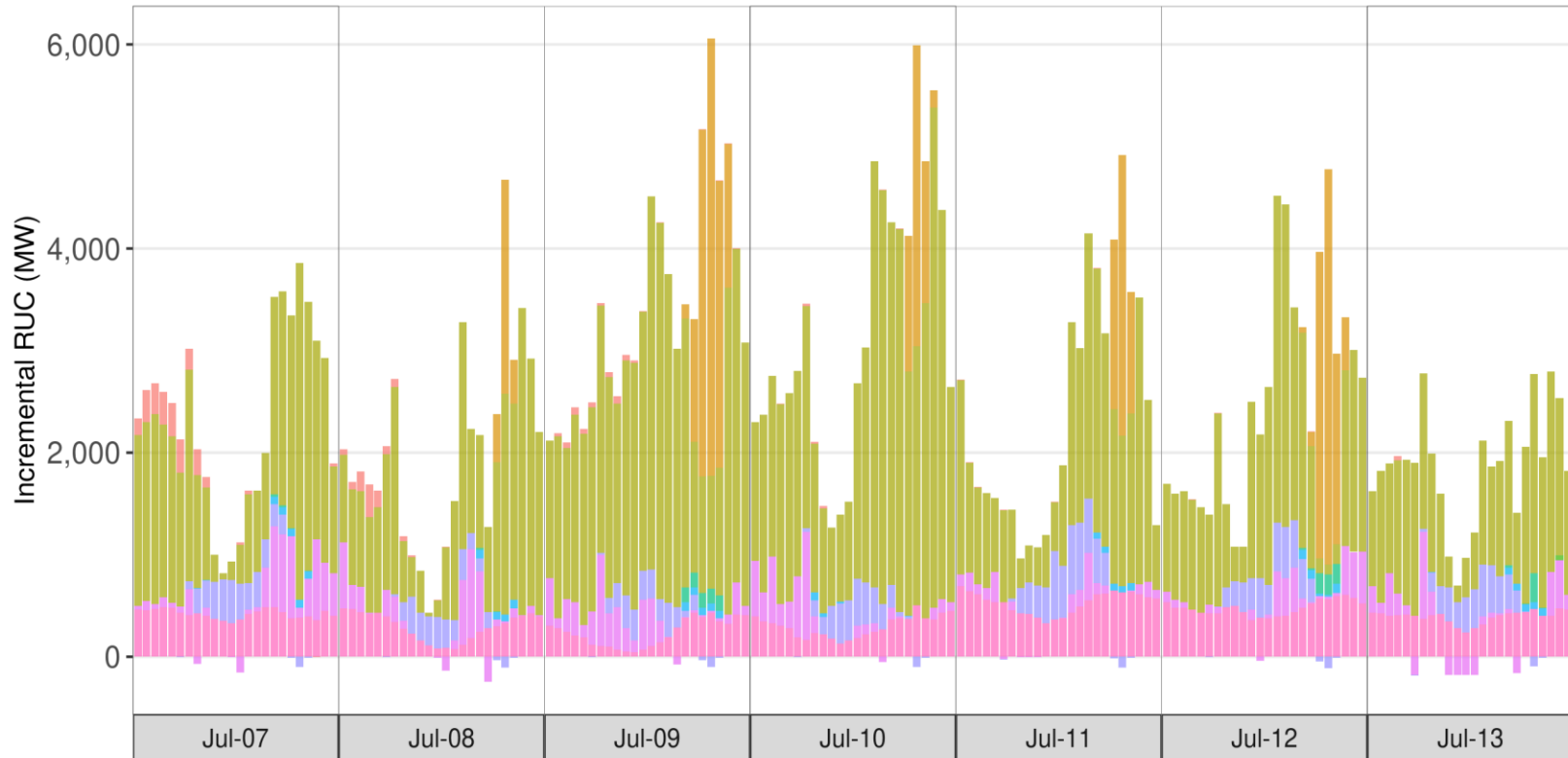
During peak hours in July, RUC capacity was supported by additional unit commitments



RUC incremental dispatches are supported by different technologies, with gas providing a significant share

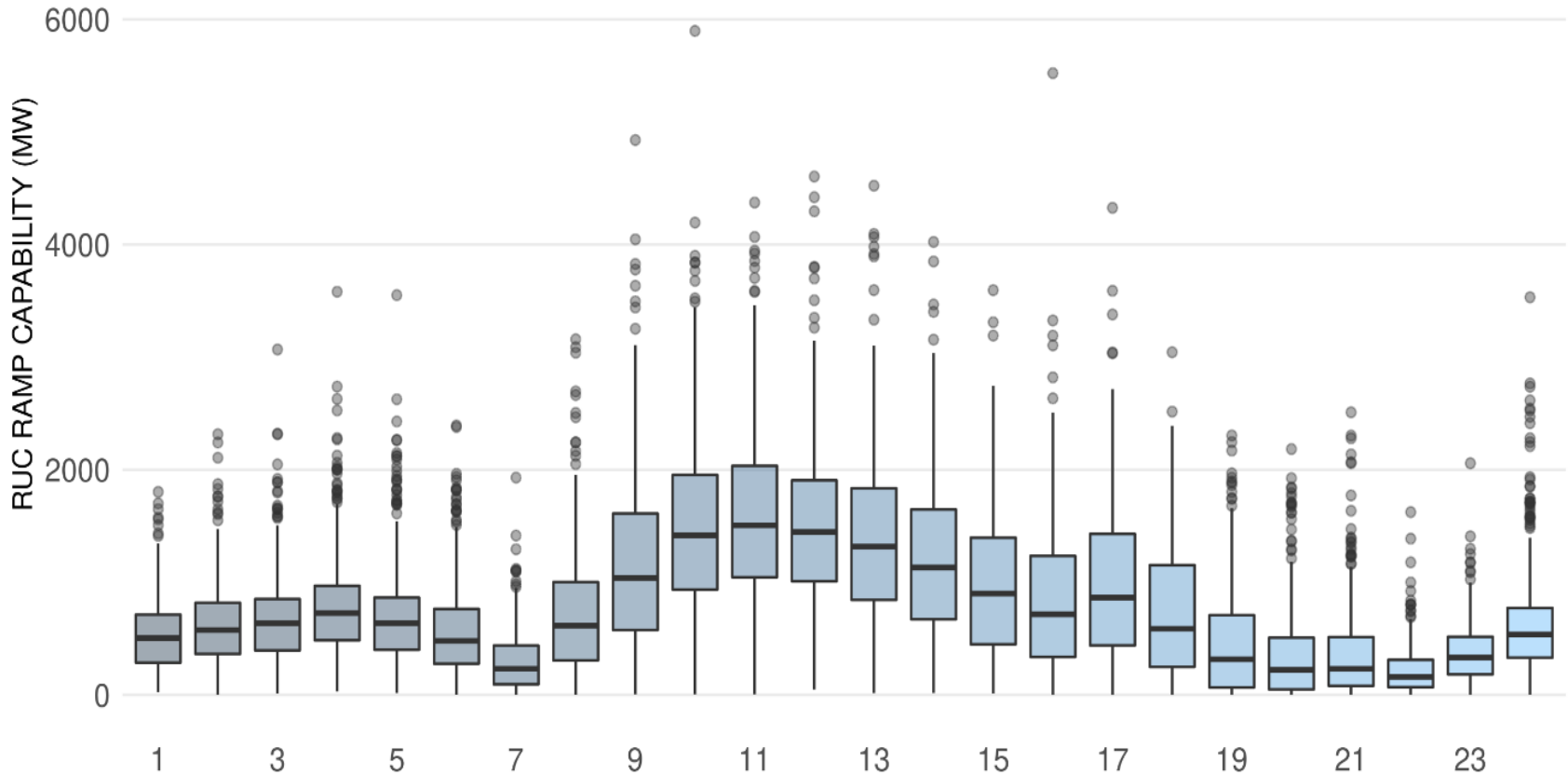


During tight-supply days in July, gas resources were the main contributor to support RUC capacity



COAL EXPORT GAS GEOT IMPORT LESR OTHER SOLAR WATER WIND

Based on RUC schedules, the level of available ramp capability varies by hour, reaching minimum levels in peak hours



Ramp capability gained with RUC dispatches was supported with resources of different ramp speeds

