



California ISO

WESTERN ENERGY IMBALANCE MARKET (WEIM)

Briefing on load conformance including residual unit commitment adjustments

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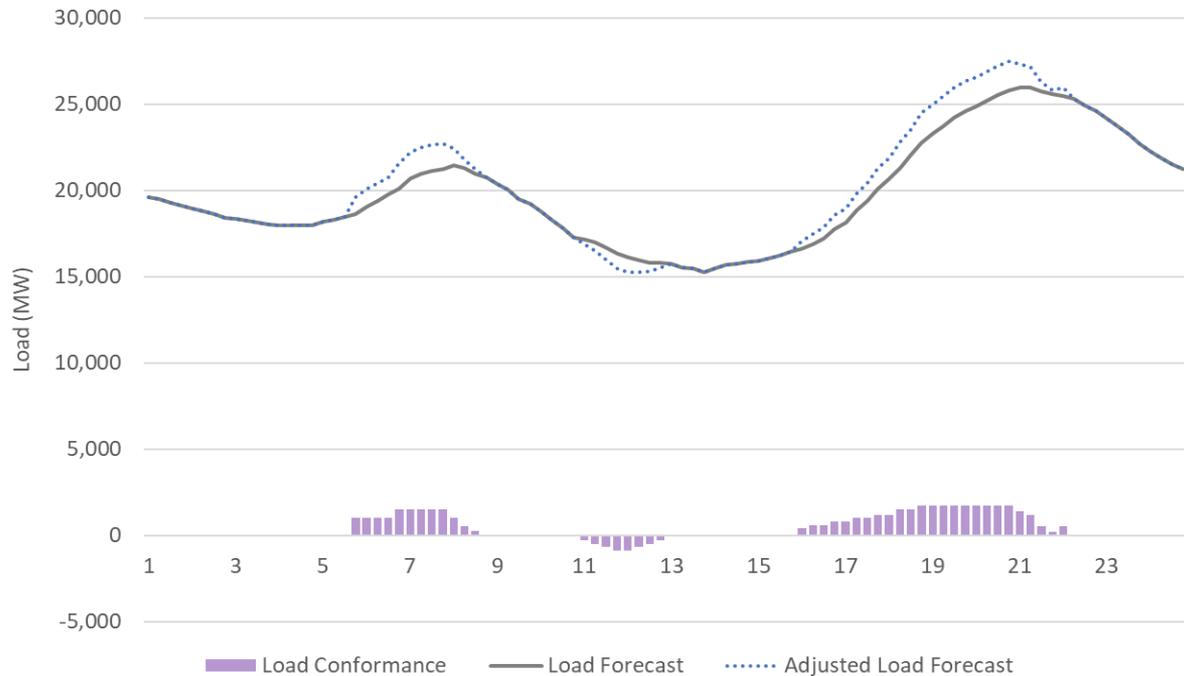
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General Session

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Load conformance is an adjustment applied to the load forecast used in the RUC and RT market



- Load conformance can increase (positive) or decrease (negative) the load forecast
- The total load requirement in the market to clear supply will include the load conformance

System operators can apply load conformance to their respective balancing area in the various markets

- Day-ahead
 - Only Residual Unit Commitment: Hourly interval
 - Guided by estimates of calculated-based RUC net-load uncertainty
 - Guided also by other operational risks
- Real-time and WEIM markets
 - Hour ahead: 15-minute interval
 - Fifteen minute market: 15-minute interval
 - Real-time dispatch: 5-minute interval
 - Determined by operator's assessment of system conditions

There are multiple drivers for the use of load conformance

Load conformance is last-opportunity to address current and projected mismatch between markets and the system



The primary objective of load conformance is different for each market

Residual Unit Commitment
(RUC adjustments):

Commit sufficient capacity to meet operational risks, including net-load uncertainty

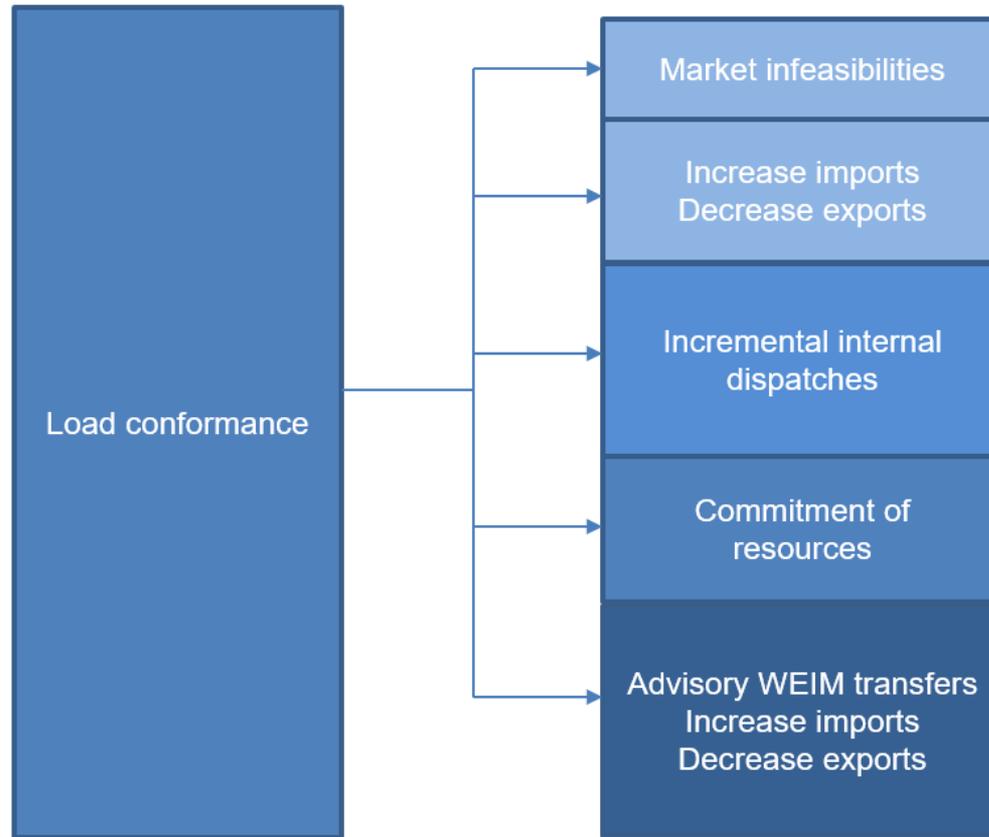
Hour-Ahead/Fifteen minute market:

Position resources to have needed supply and ramp capability

Real-time Dispatch:

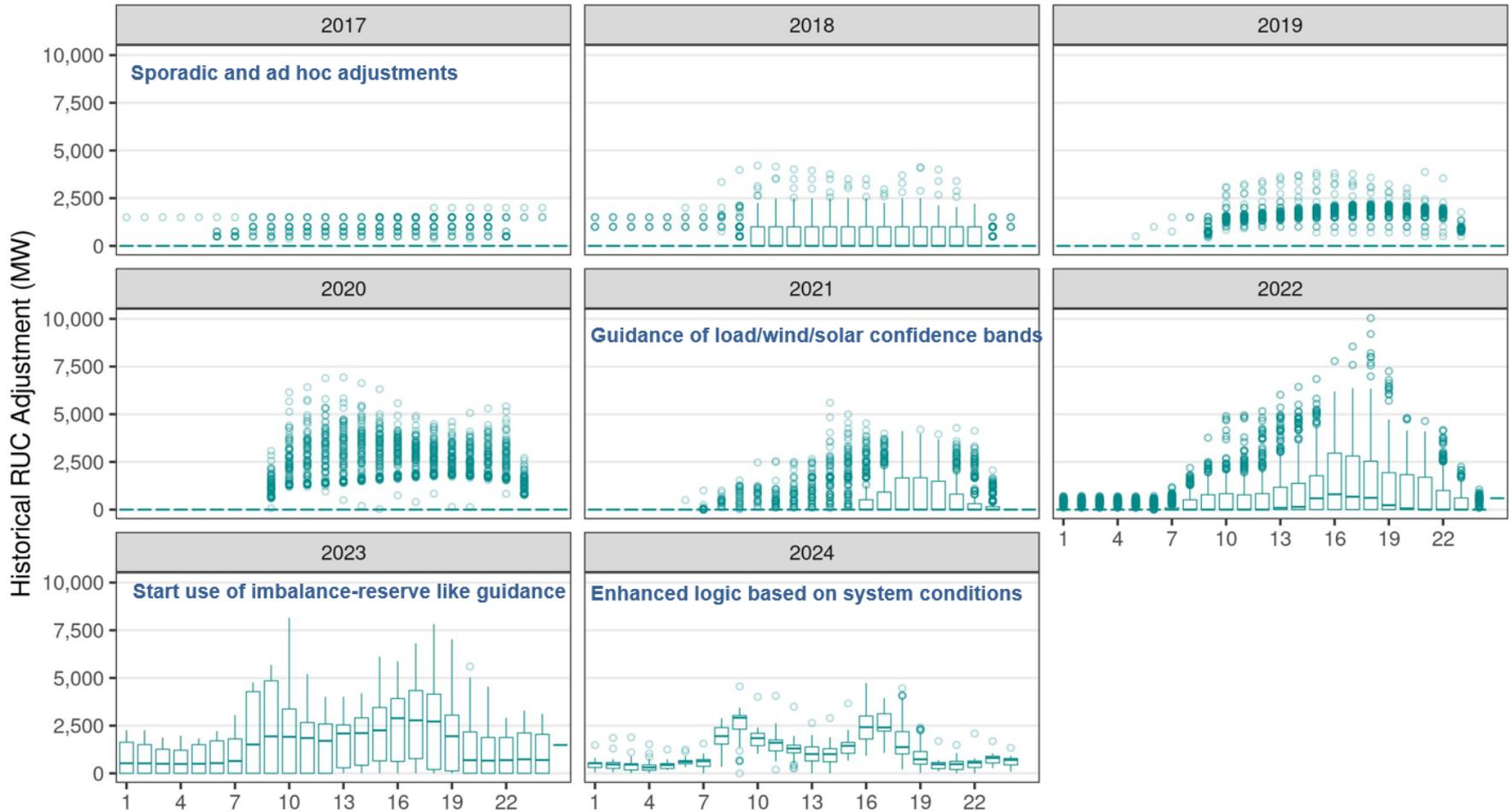
Manage deviations and power imbalances

Load conformance adds demand which will be met by supply or identify infeasibilities in the market clearing process



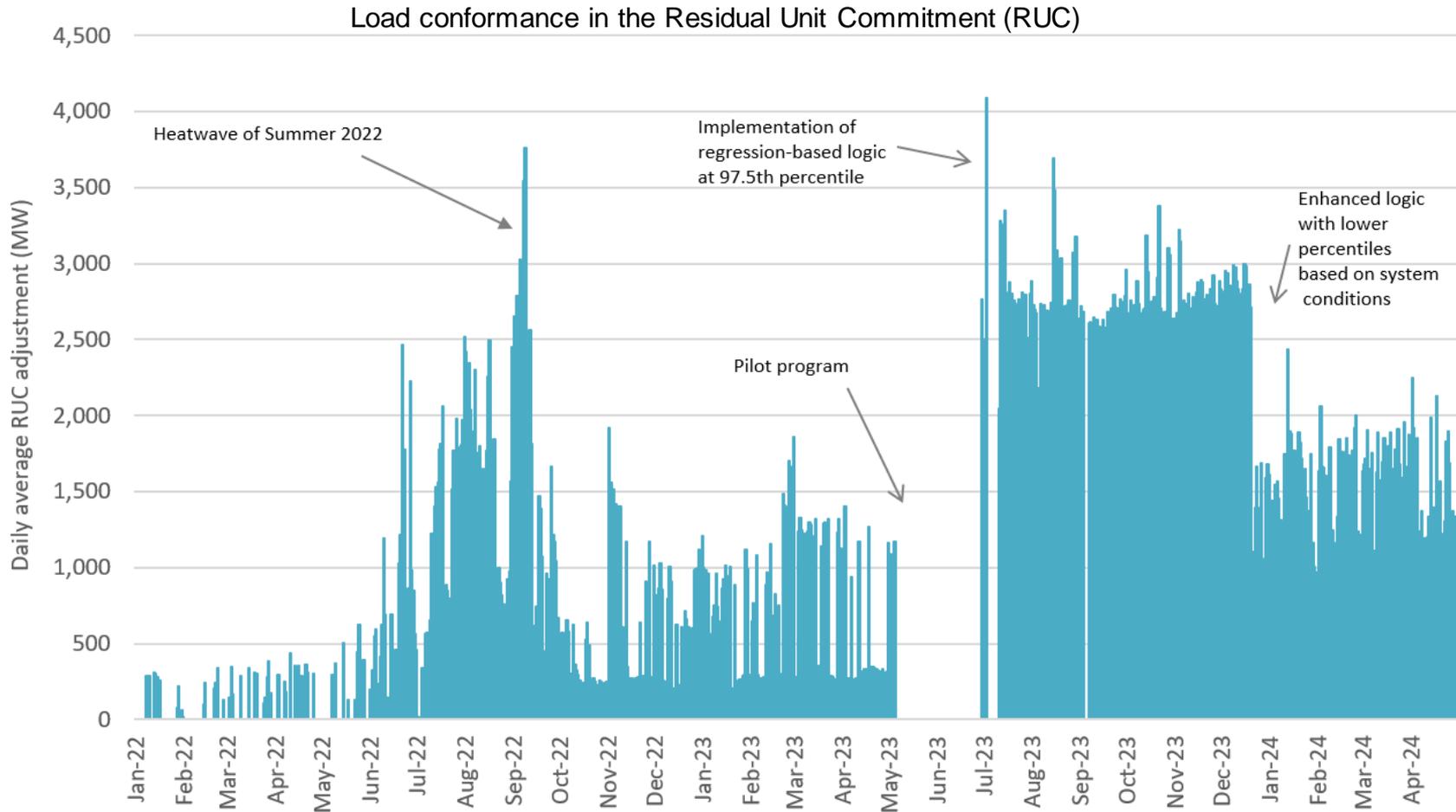
The overall market economics will determine the mix of supply that meets additional demand from load conformance

The guidance, magnitude and frequency of RUC adjustments have evolved over the years



Over this period there has been a significant evolution of the resource mix including growth of utility-based and behind-the-meter solar generation

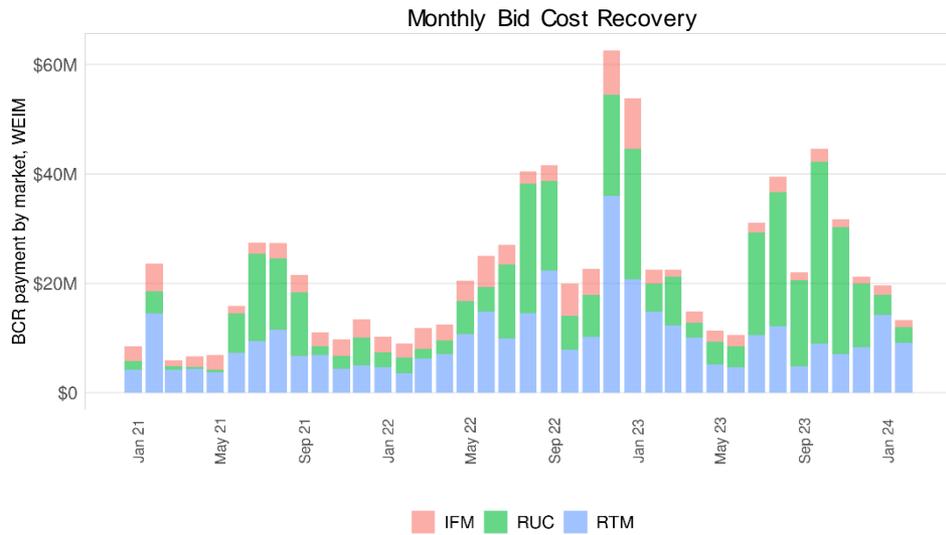
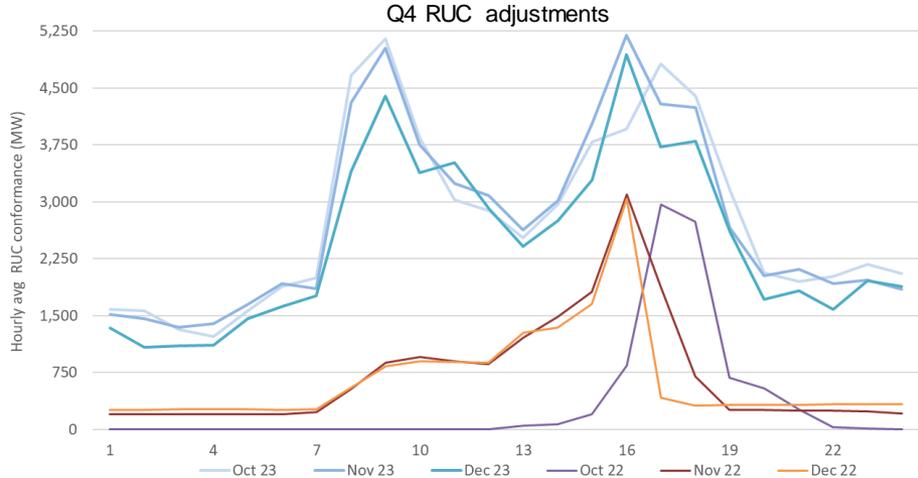
ISO started a pilot program in 2023 to assess the utilization and implications of load conformance across markets



Results of pilot case study provided preliminary insights on the merits of RUC adjustments

Bid cost recovery associated with RUC increased significantly when higher RUC adjustments were in place since July 2023

- With new methodology implemented on July 2023, there were RUC adjustments in all hours of the day
- RUC adjustment remained high in Q4 2023
- Less flexible gas resources were committed due to RUC adjustments in all hours
- RUC adjustments for midday hours can exacerbate oversupply, requiring more renewable curtailments
- Q4 observed high bid-cost recovery associated with the RUC market

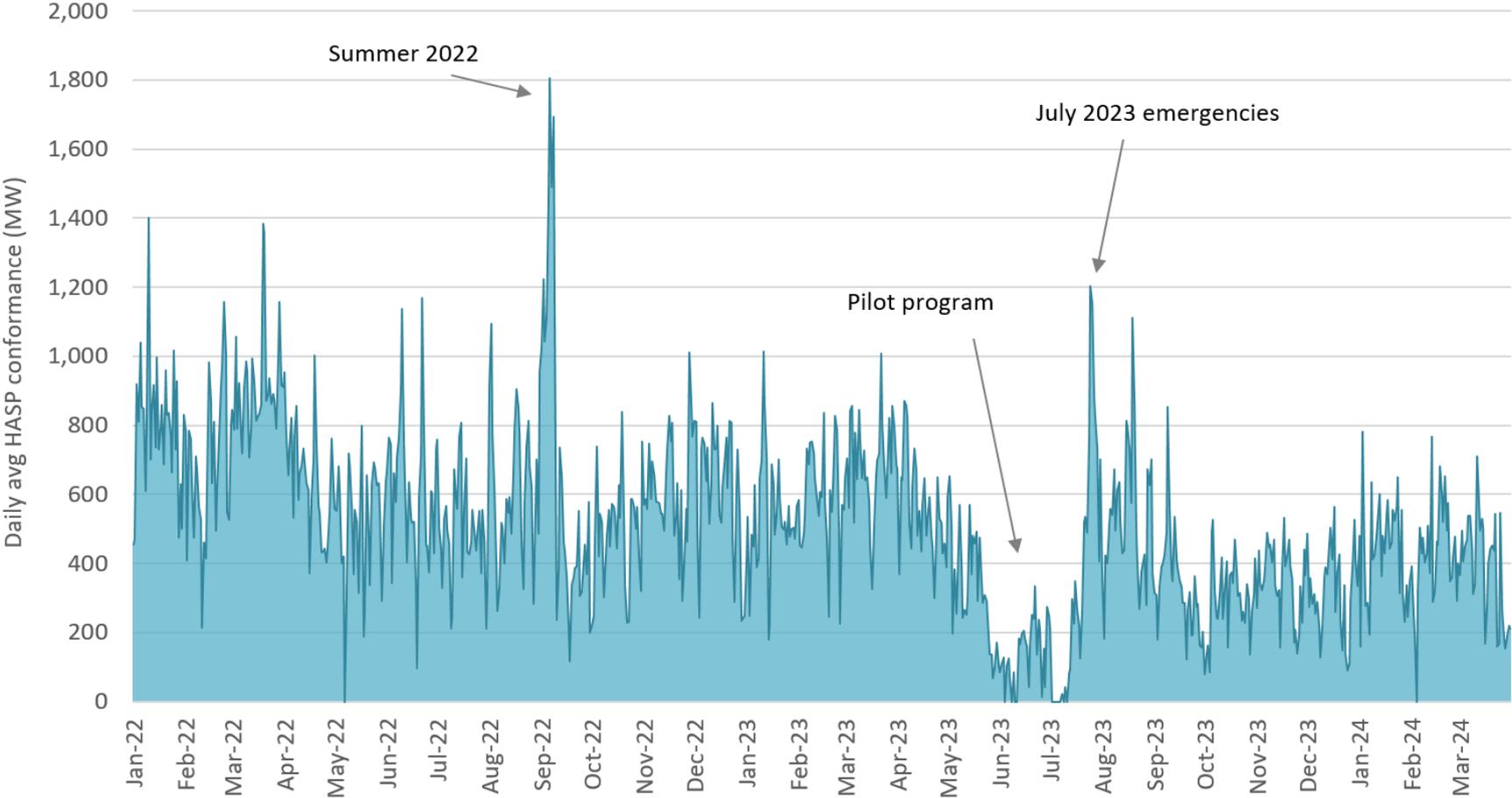


ISO has continued to assess the need to use RUC adjustments in non-summer months and their cost-benefit

- On December 21, 2023, ISO adjusted the logic to use different percentiles based on system conditions
- ISO further tuned the logic on May 7, 2024, reducing further the percentiles and targeting peak hours
- These enhancements have resulted in lower requirements
- Both enhancements consider projected supply available, and weather conditions in ISO area and wider footprint
- These logic enhancements were captured in updates to the public ISO Operating Procedure 1210
- RUC adjustments are posted publicly

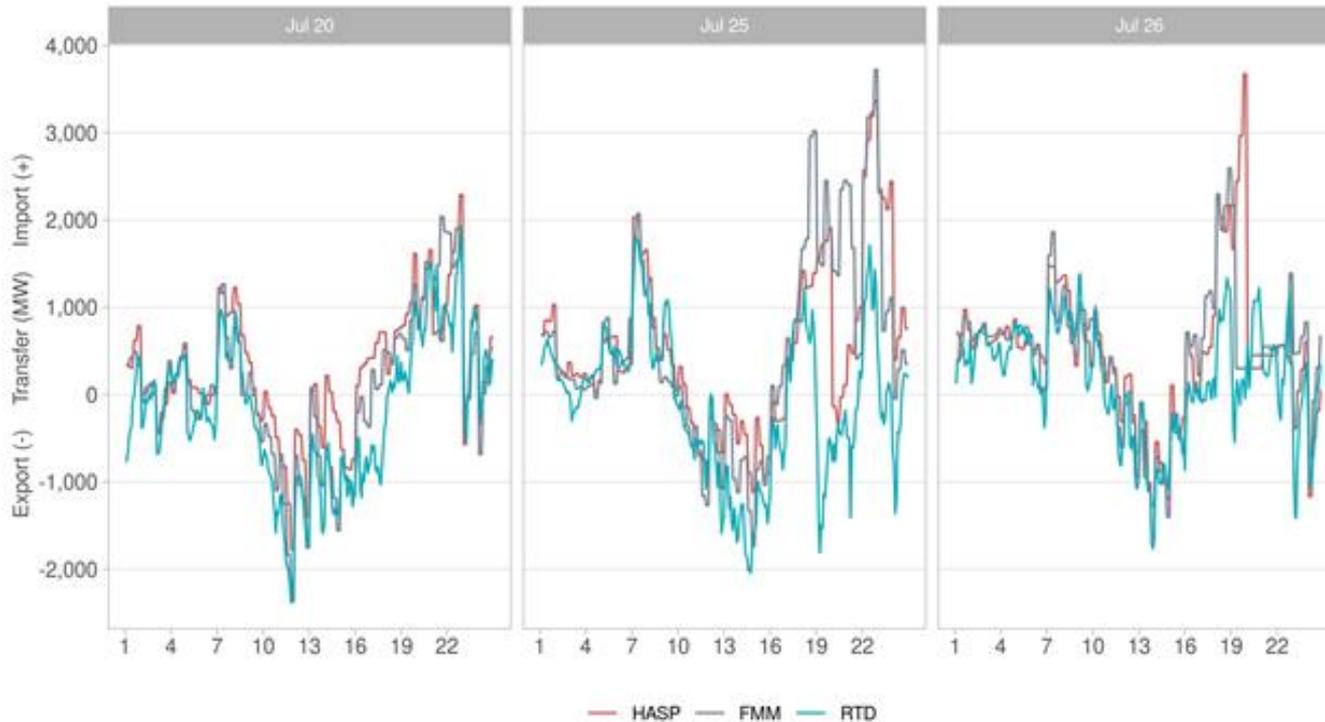
ISO has been evaluating the use and implications of load conformance in the real-time market as well

Load conformance in the Hourly Ahead Process (HASP)



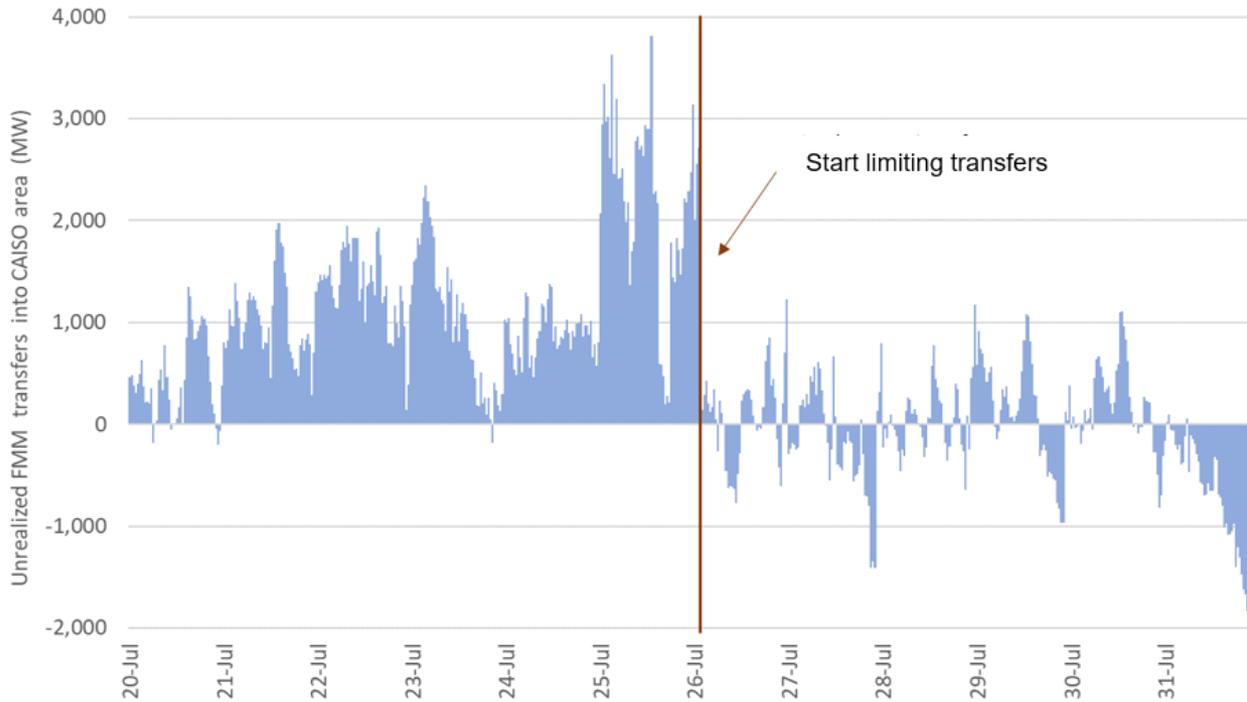
Preliminary results of pilot case study provided preliminary insights for guidance on real-time conformance

Emerging supply and demand changes in the system-wide area resulted in unrealized WEIM import transfers



- ISO resources were scheduled and exports cleared in the hourly process relying on the availability of the advisory WEIM import transfers
- Transfers in the hourly and pre-dispatch markets are advisory and re-evaluated in the five-minute market, representing a loss of supply for ISO area if they do not materialize

In the evening ramp hours of the emergencies, the unrealized WEIM transfers were over 3,000 MW



On the evening of July 26, ISO started to limit the reliance on dynamic import transfers into the ISO area

- Limiting dynamic import transfers allowed more reliable market clearing of ISO's load obligation and exports based only on internal resources or supplementary hourly import transactions
- This practice also provided more certainty to flow for cleared exports transactions

This practice continued until a series of issues posing operational risks were addressed by November 16

- ISO started to limit presumed WEIM import transfers to ISO area on July 26; the limitation applied to only:
 - import transfers to ISO area; export transfers to other WEIM areas from ISO continued to be available
 - dynamic transfers; static transfers were not limited
 - peak hours HE19-21
 - hourly and pre-dispatch markets; real-time dispatch was not limited
 - hourly ISO intertie transactions were not limited
- This practice was in place until the ISO could address identified market issues
 - Inaccurate display of dispatchable capability in the market
 - Scheduling and tagging processes that had enabled participants to not follow export reductions
 - Inconsistent treatment of intertie transactions between balancing areas that exacerbated congestion

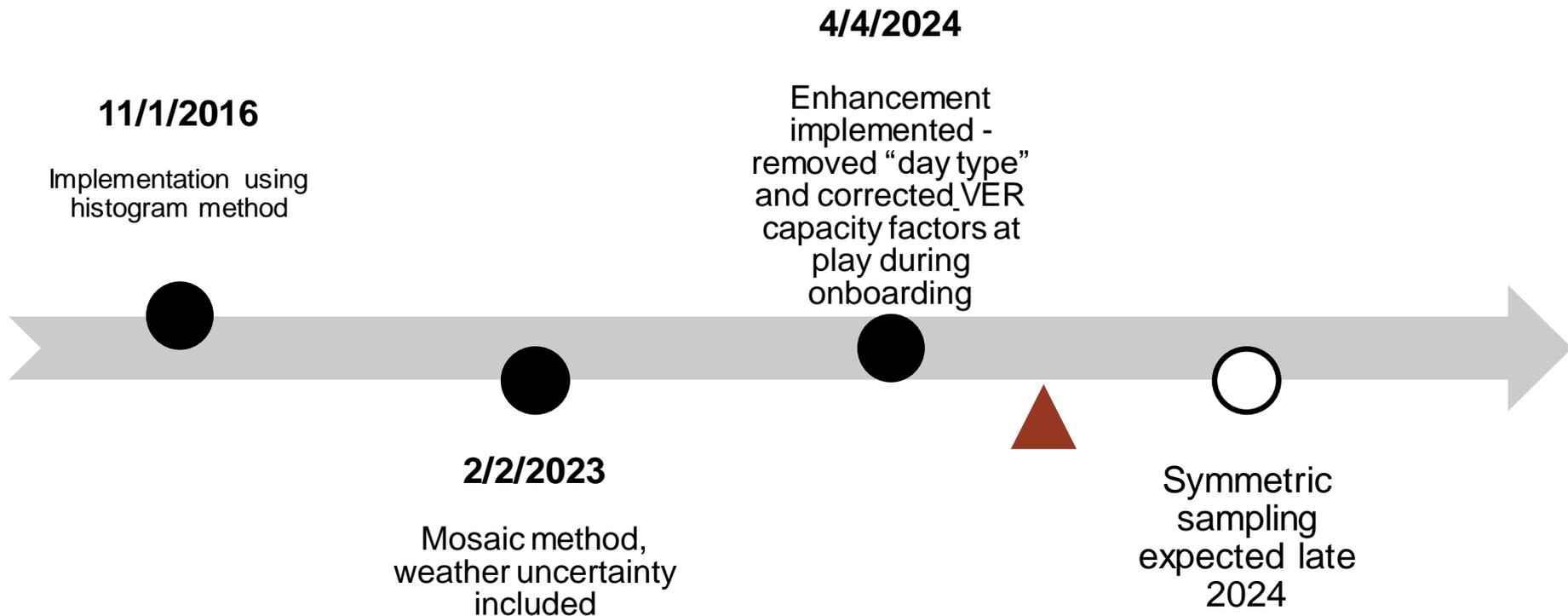
WEIM balancing areas have the ability to limit transfers

- This action could lead to price separation:
 - Higher prices in ISO area
 - Lower and economic prices in other WEIM areas
 - WEIM areas were not detrimentally impacted by this price separation as it isolated them through congestion
- This lead to redistribution of transfers among other balancing areas
- Given dynamic real-time conditions, July emergencies were not projected in the day-ahead market to take actions in advance
- Similar circumstances may arise this summer and the ISO may deploy this limitation again
- ISO expects to use this limitation on targeted intervals based on expected real-time conditions
- ISO does not have a net import/export constraint to use like other WEIM areas have in their toolkit

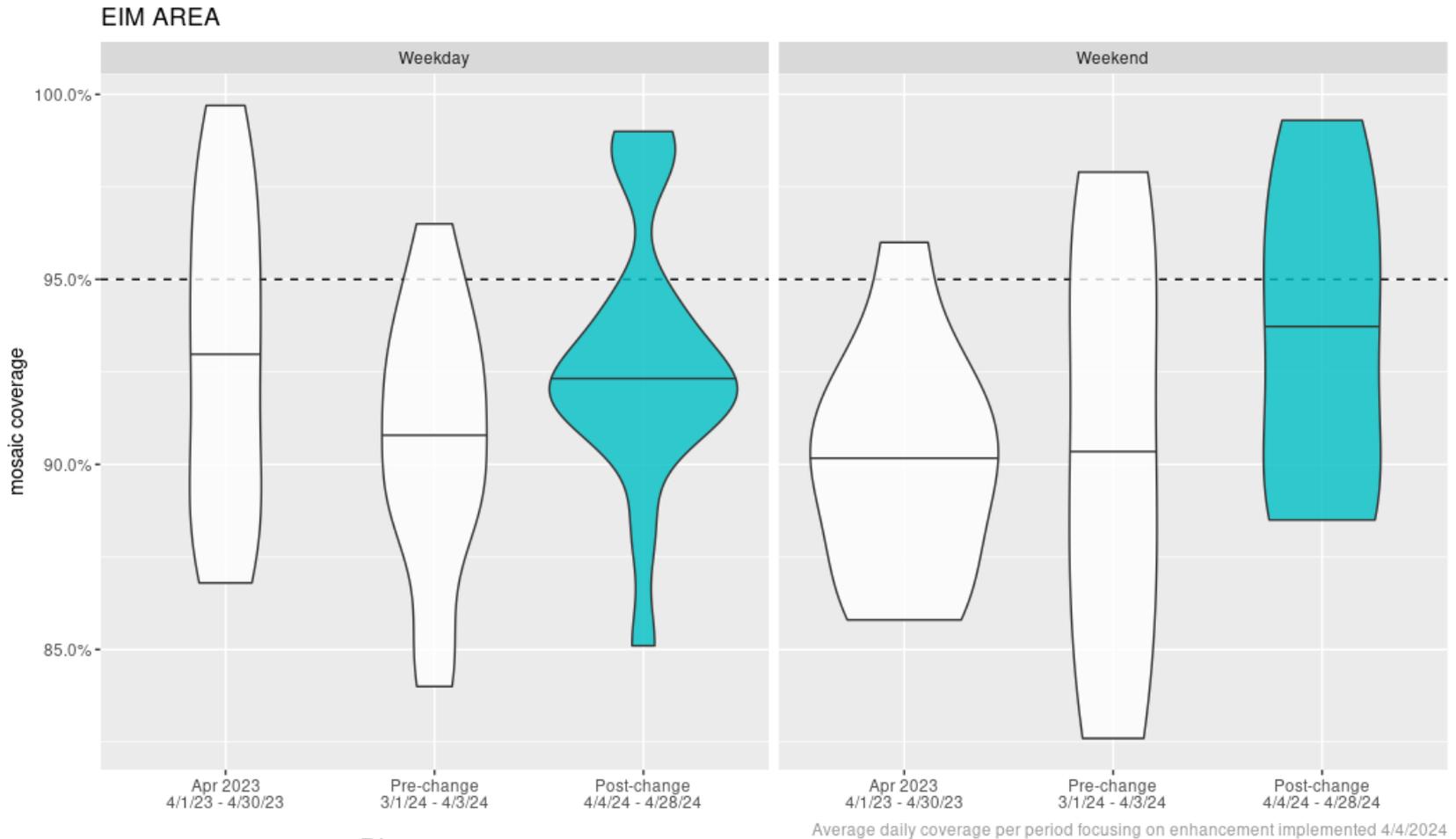
Short Term Forecasting

APPENDIX

FRP Enhancement to Mosaic Implemented



FRP Weekend coverage increased since enhancement



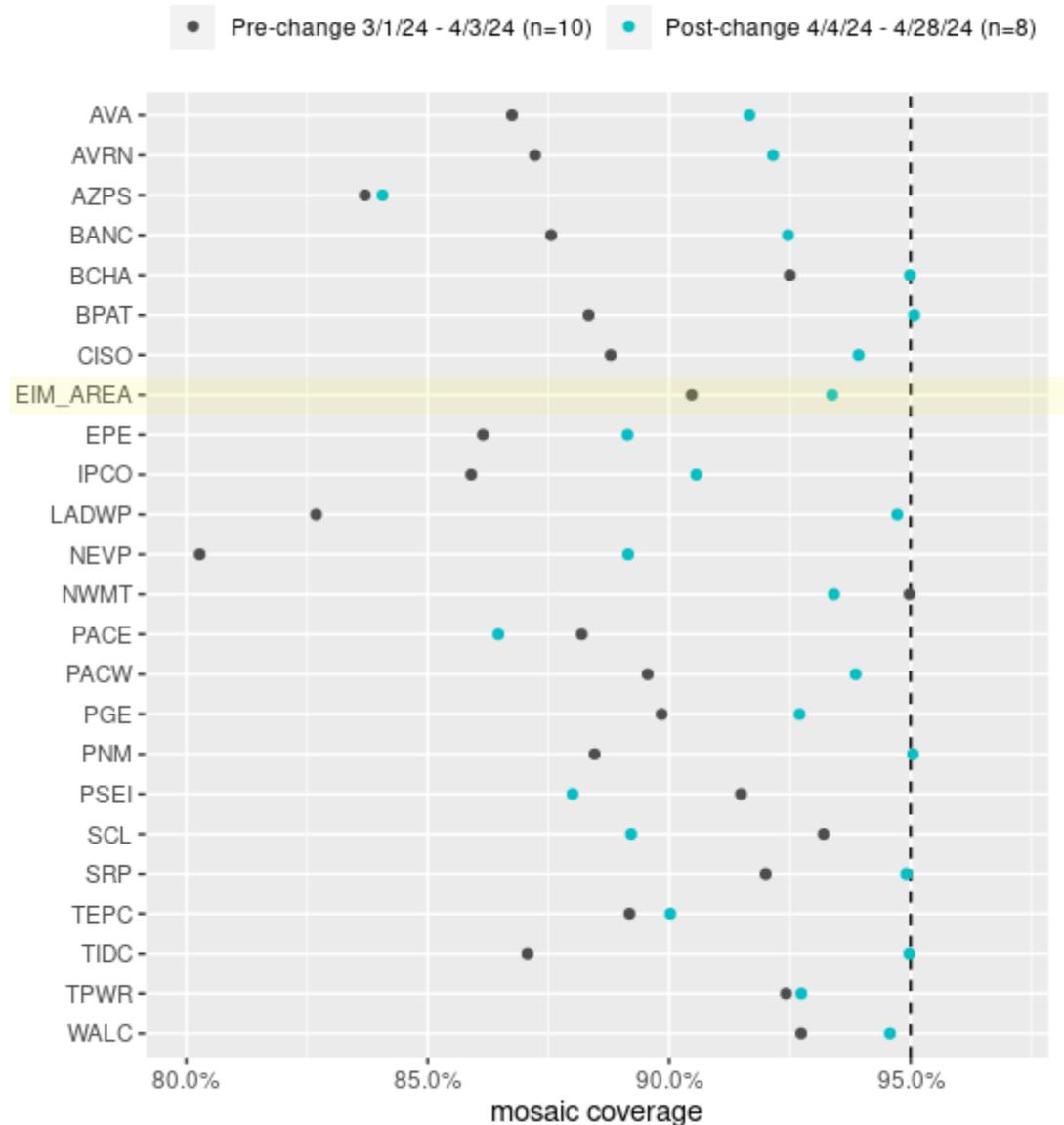
Plot notes:

- Violin plots show distribution of daily average coverage
- Target coverage is 95% for combined FRU and FRD

FRP preliminary results show increased coverage across BAAs

Comparing FRP performance over **weekend days only**, we have **10 days** in the pre-enhancement and **8 days** in the post-enhancement sample.

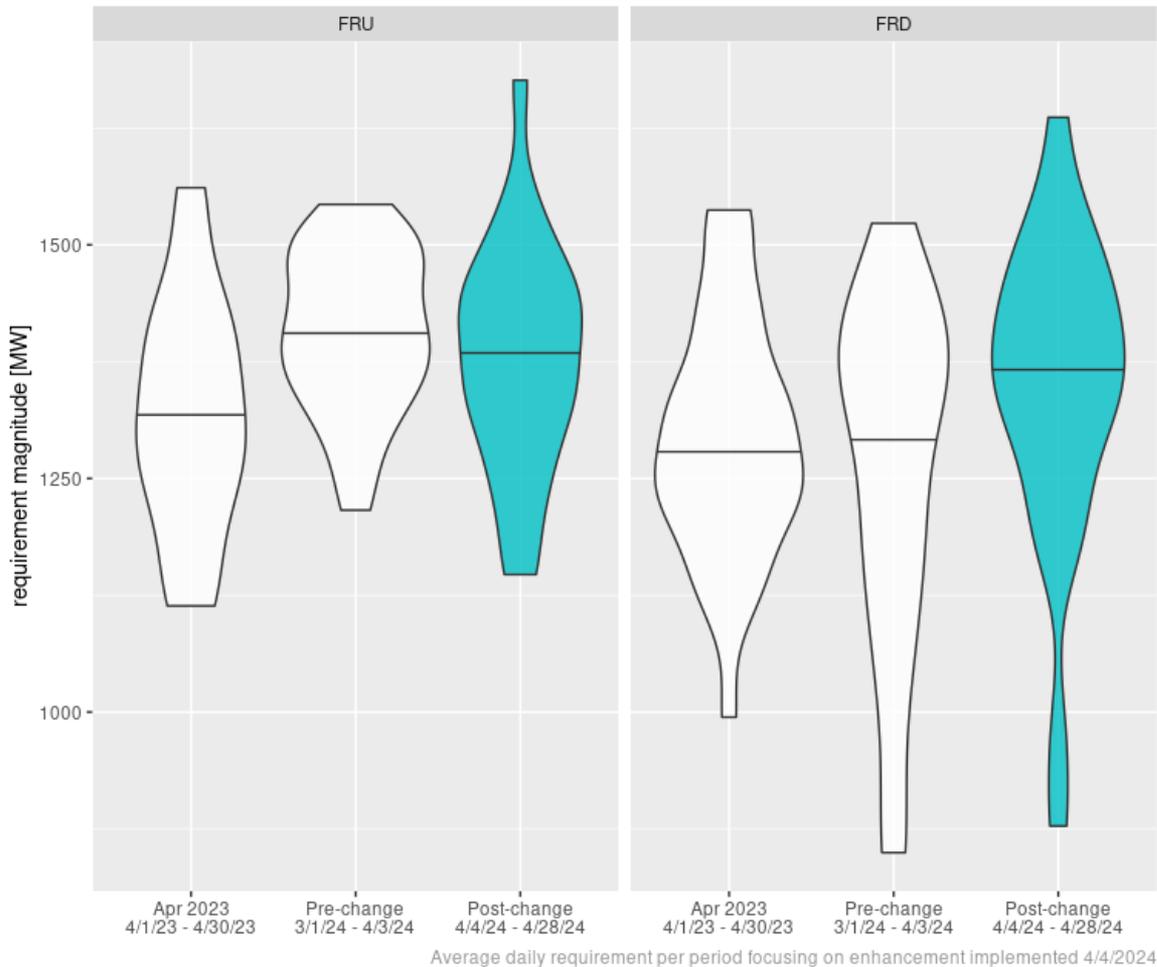
Note that we are making this comparison over the course of a shoulder season and sample sizes for weekend coverage are limited.



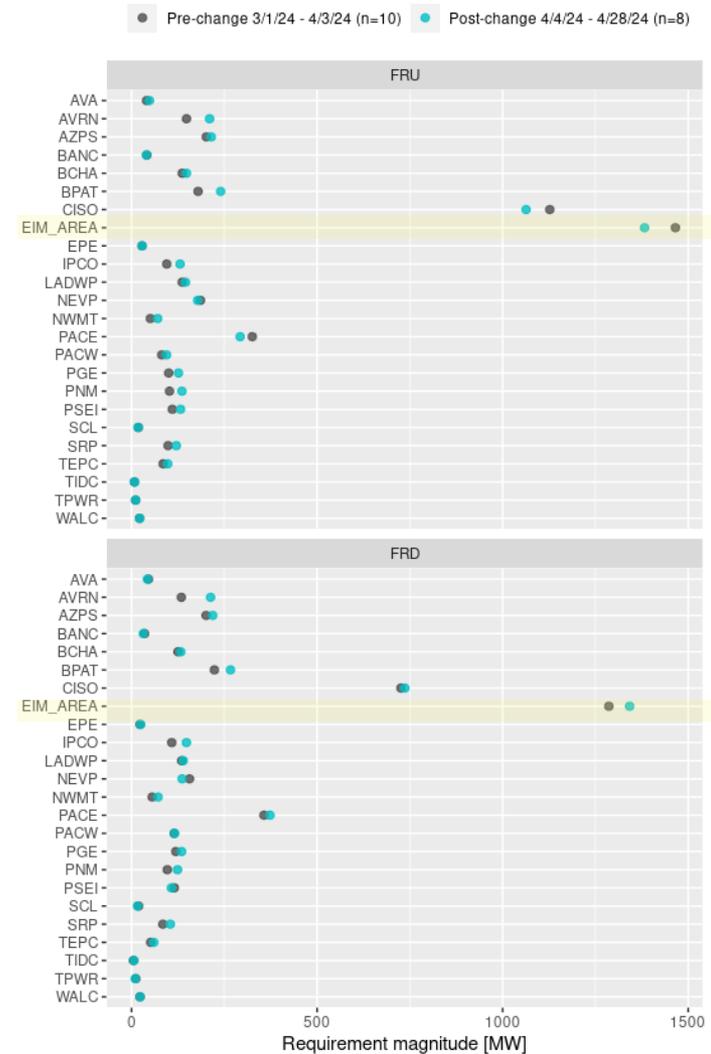
Average daily coverage on weekends pre- and post- enhancement implemented 4/4/2024

FRP Requirements are similar and slightly larger post-change than pre-change, as expected from simulations

Requirement comparison for EIM AREA



Average daily requirement per period focusing on enhancement implemented 4/4/2024



Mosaic Requirement Formulation Next Steps

Description	Benefit	Anticipated Timeline
Change day-type within the mosaic methodology	Weekend model performance	Completed
Change existing model parameters – in relation to historical sample data utilized	Overall model performance especially during seasonal transition	Expected Late 2024 for FRP, continue trialing for IR
Limit hourly changes to mosaic input for RSE	Potential to reduce RSE failures	RSEE 3 Stakeholder Initiative
Dynamic threshold simulations and potential modification	TBD	DAME Configurable Parameter Working group