DMM report on the resource sufficiency evaluation

Kyle Westendorf
Department of Market Monitoring

September 11, 2023

Overview

- **July 2023 report published**

  - http://www.caiso.com/Documents/Jul-2023-Metrics-Report-on-Resource-Sufficiency-Evaluation-in-WEIM-Aug-31-2023.pdf

- **Overview of the capacity and flexibility tests**

- **Changes to the resource sufficiency evaluation**

  - Uncertainty calculation adjusted on *February 1*

  - Implementation of RSE enhancements phase 2 (track 1) on *July 1*

    - Adjustment for lower priority exports in CAISO's RSE

    - Assistance Energy Transfers

Overview of the bid-range capacity test (capacity test)

Upward capacity test requires that each area have incremental bid-in capacity above generation and import base schedules to meet export base schedules and forecasted load.

California ISO
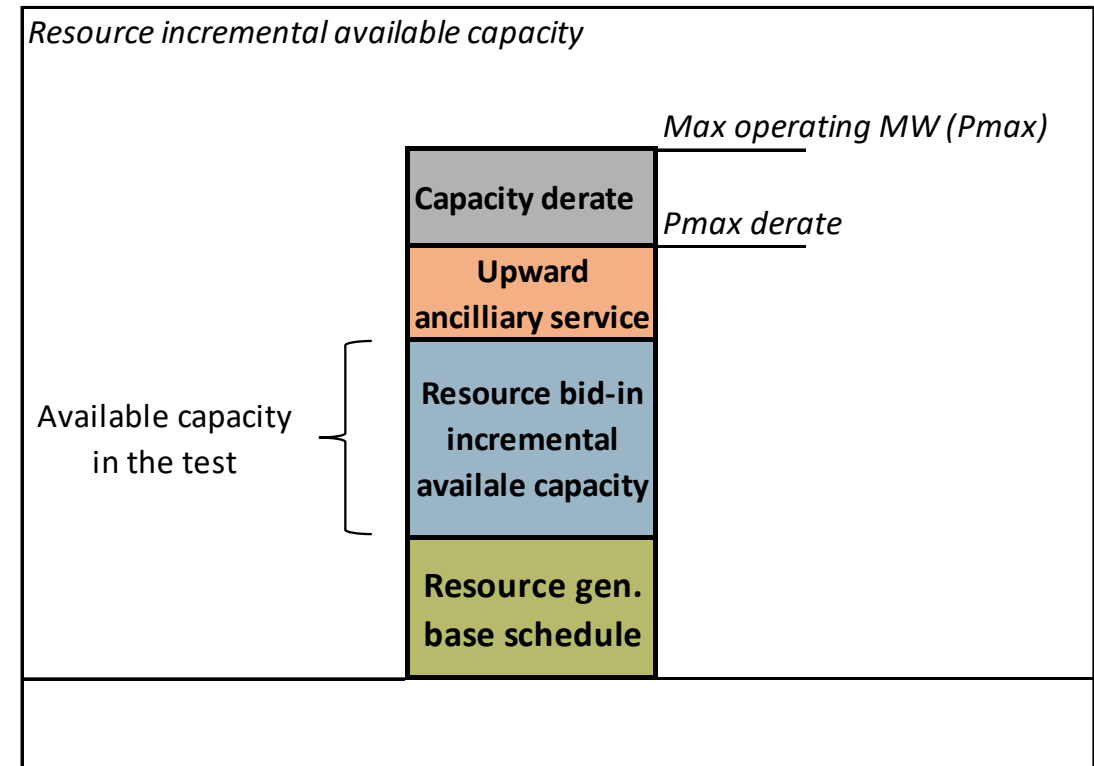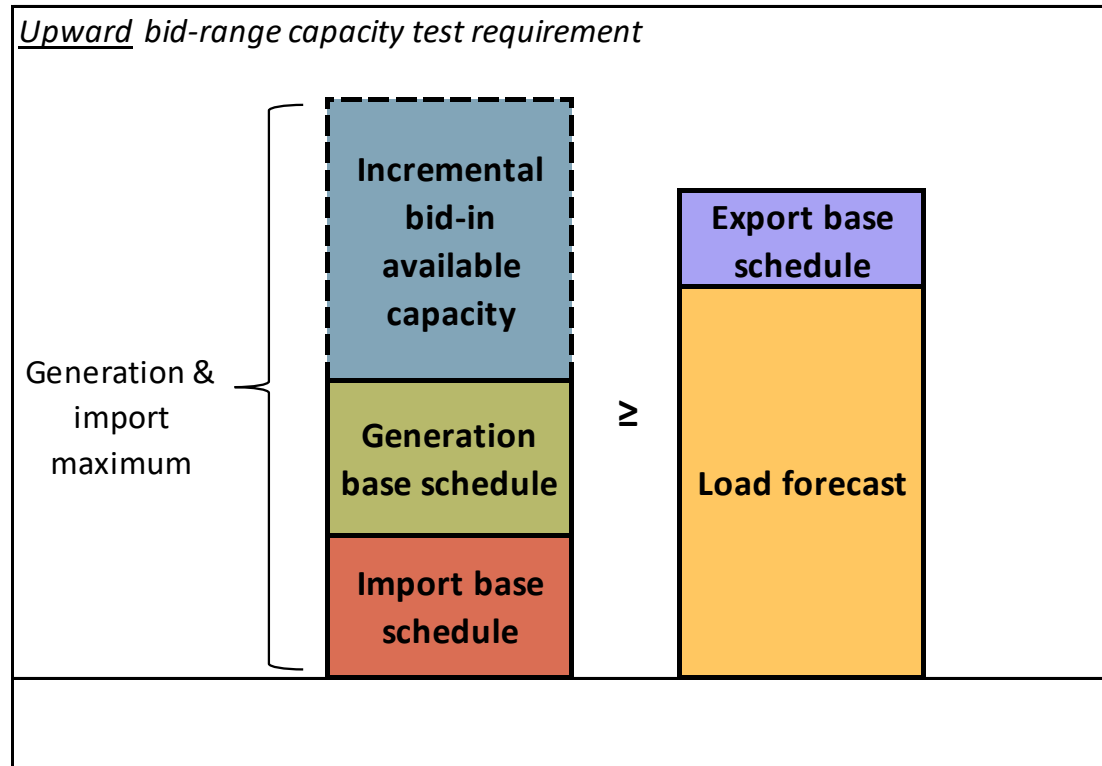
Overview of the flexible ramp sufficiency test (flexibility test)

Flexibility test requires that each area have ramping capacity to meet <u>forecasted changes in demand as well as net load uncertainty</u> from the interval prior to the hour to each of the four 15-minute intervals within the evaluation hour.

California ISO
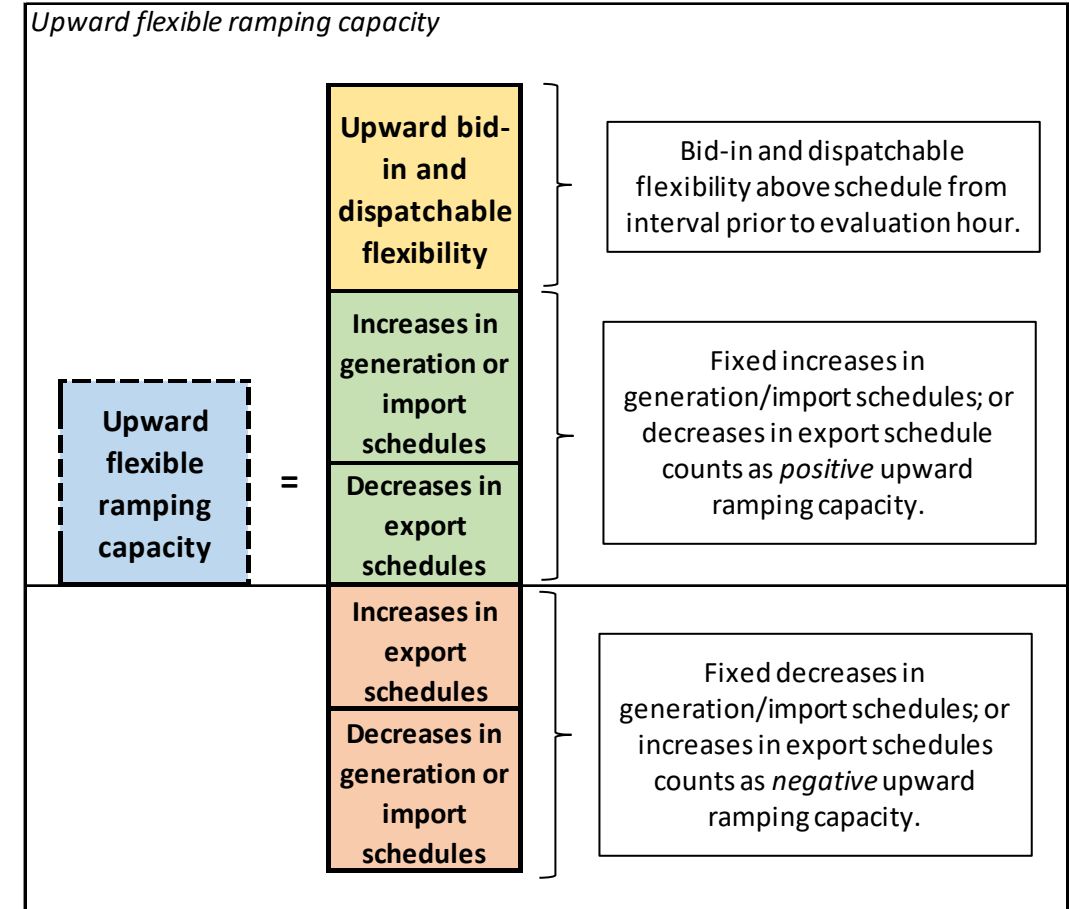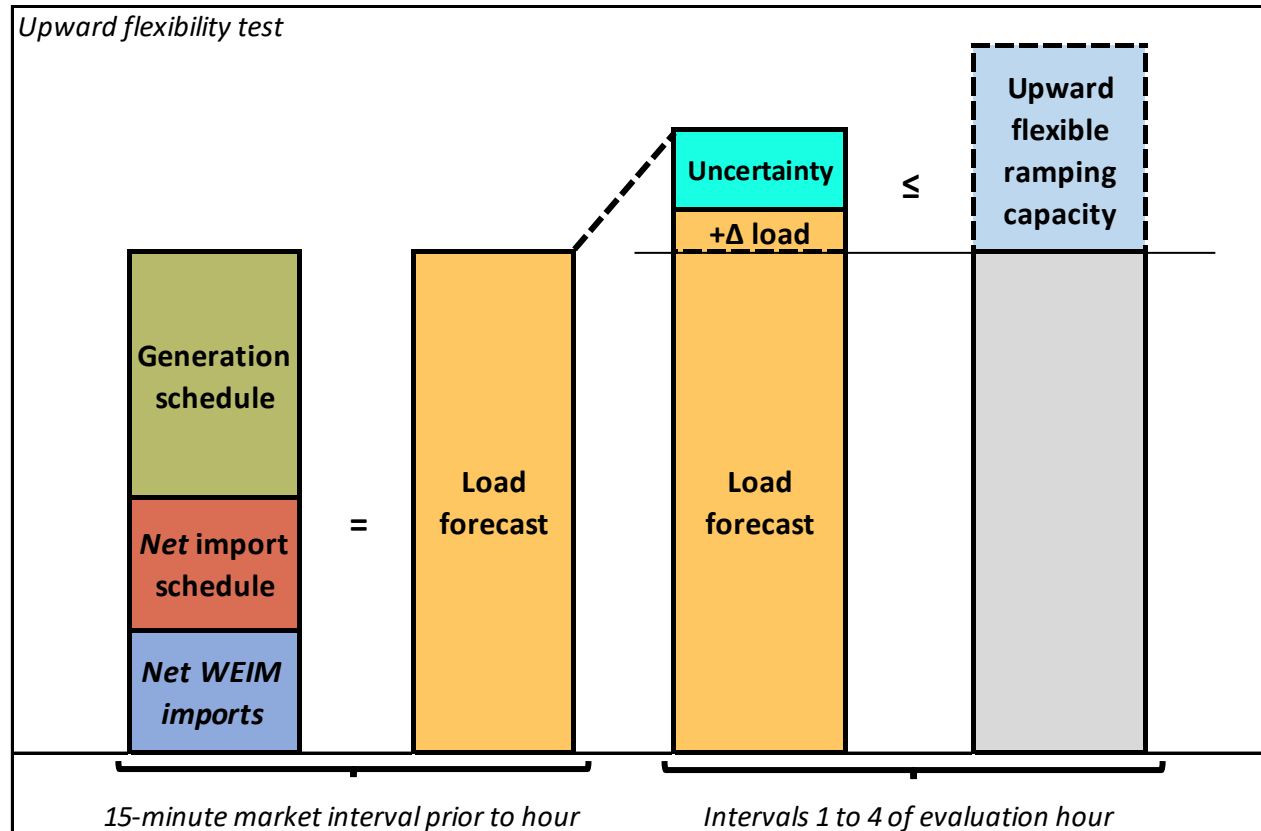
Mosaic quantile regression for calculating net load uncertainty in RSE

- Net load uncertainty included in the flexibility test, but not in the capacity test

- New method for calculating uncertainty called *mosaic quantile regression*

- Regression-based estimate of uncertainty based on:
  - Historical load, solar, and wind information (previous 180 days for same hour)
  - Difference between binding 5-minute market forecasts and advisory 15-minute market forecasts
  - 95 percent confidence interval

- Resulting regression <u>coefficients</u> are combined with <u>current load/solar/wind forecast</u> information to forecast the extreme range of net load uncertainty that might materialize (95% confidence)

Two thresholds in place to <u>cap</u> regression-based estimate of uncertainty

- **Histogram threshold:** 1st and 99th percentile of net load error using observations from the previous 180 days for the same hour (updated each day)
- **Mosaic (seasonal) threshold:** 1st and 99th percentiles using quantile regression method using observations from the previous 90 days (updated each quarter)

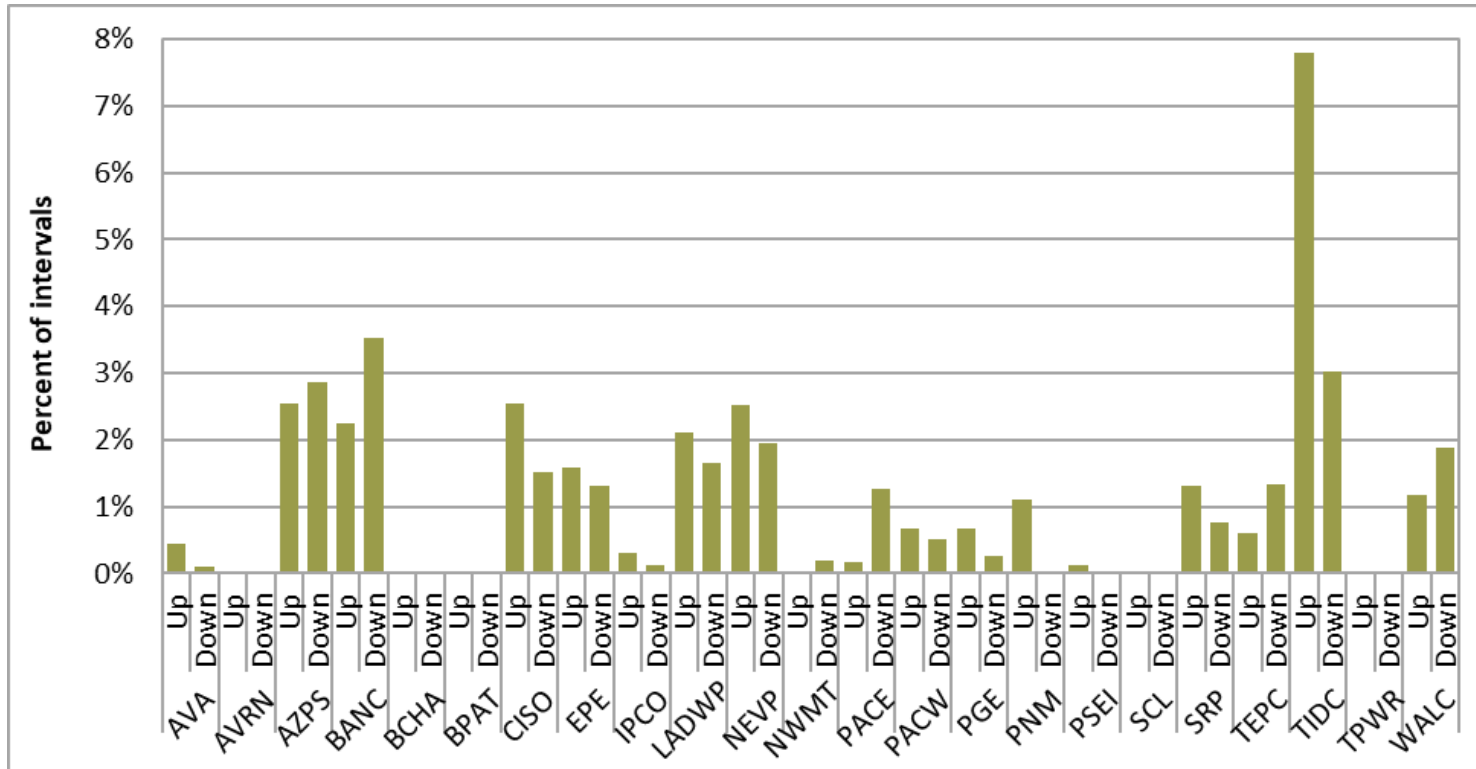**Uncertainty capped by mosaic or histogram thresholds** (July 2023)
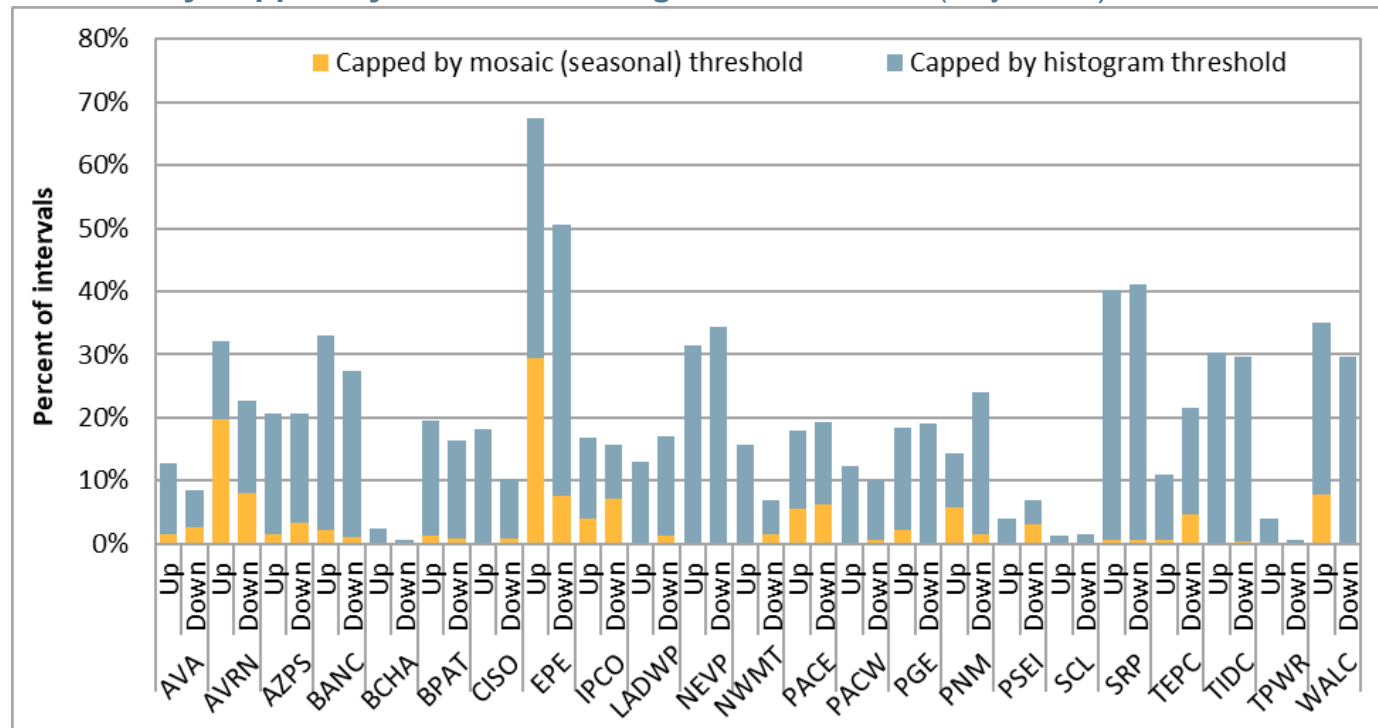
CAISO PUBLIC

A floor of 0.1 MW is also applied to regression-based estimate of uncertainty

- Upward and downward uncertainty is set near zero when the uncertainty calculated from quantile regression would be negative
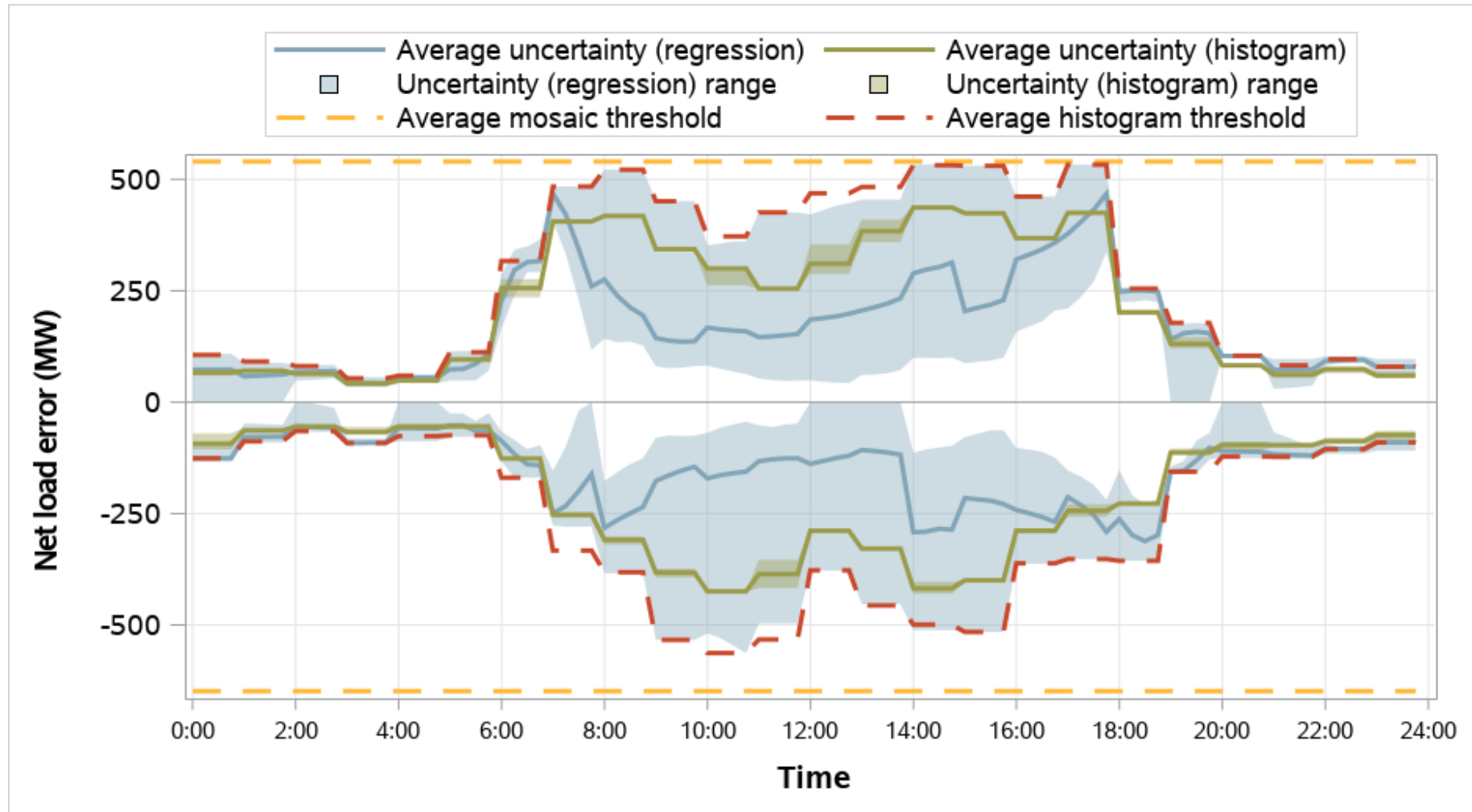
Uncertainty set near zero by floor (July 2023)
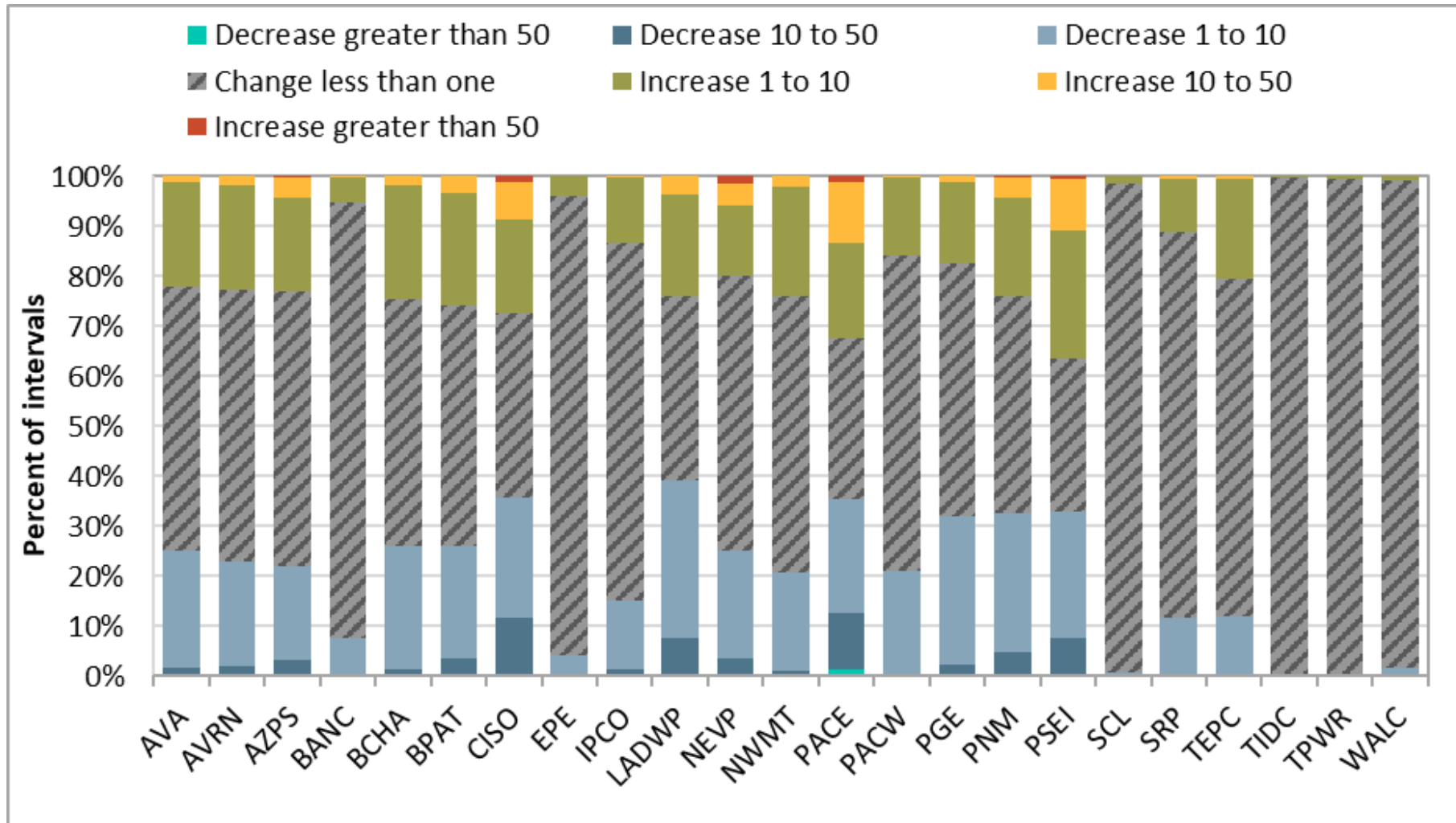
Example — NV Energy net load uncertainty
(Weekdays, July 2023)

Megawatt change in upward uncertainty between T-75 and T-55 RSE
(July 2023)

Load and renewable forecasts are held fixed between second (T-55) and final (T-40) RSE runs. Uncertainty also doesn't change.

Implementation of phase 2 (track 1) of resource sufficiency evaluation enhancements on July 1, 2023

- Real-time low priority (RT LPT) and economic exports are no longer strictly counted as part of CAISO's demand obligation

- Implementation of assistance energy transfers

California ISO

Treatment of export schedules in CAISO's capacity test requirement
(Peak hours, July 17 – July 27, 2023)
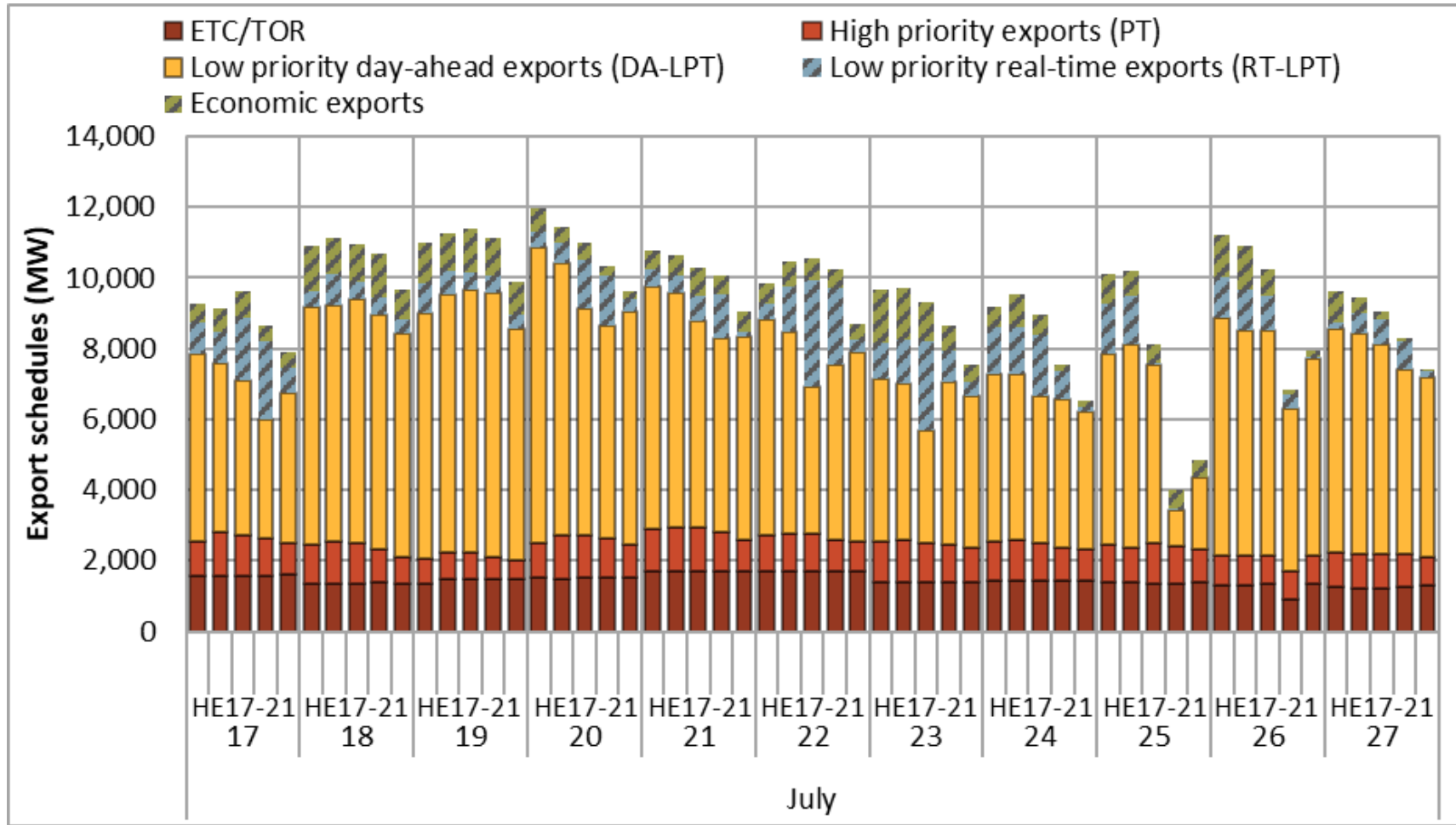
Real-time low priority (RT LPT) and economic exports are now counted as <u>upward available capacity</u> when calculating <u>supply</u> in the capacity test.

This cancels out additional <u>demand</u> that these exports add to capacity test requirement.

Upward flexible ramp capacity from exports in CAISO's flexibility test

(Peak hours, July 17 – July 27, 2023)
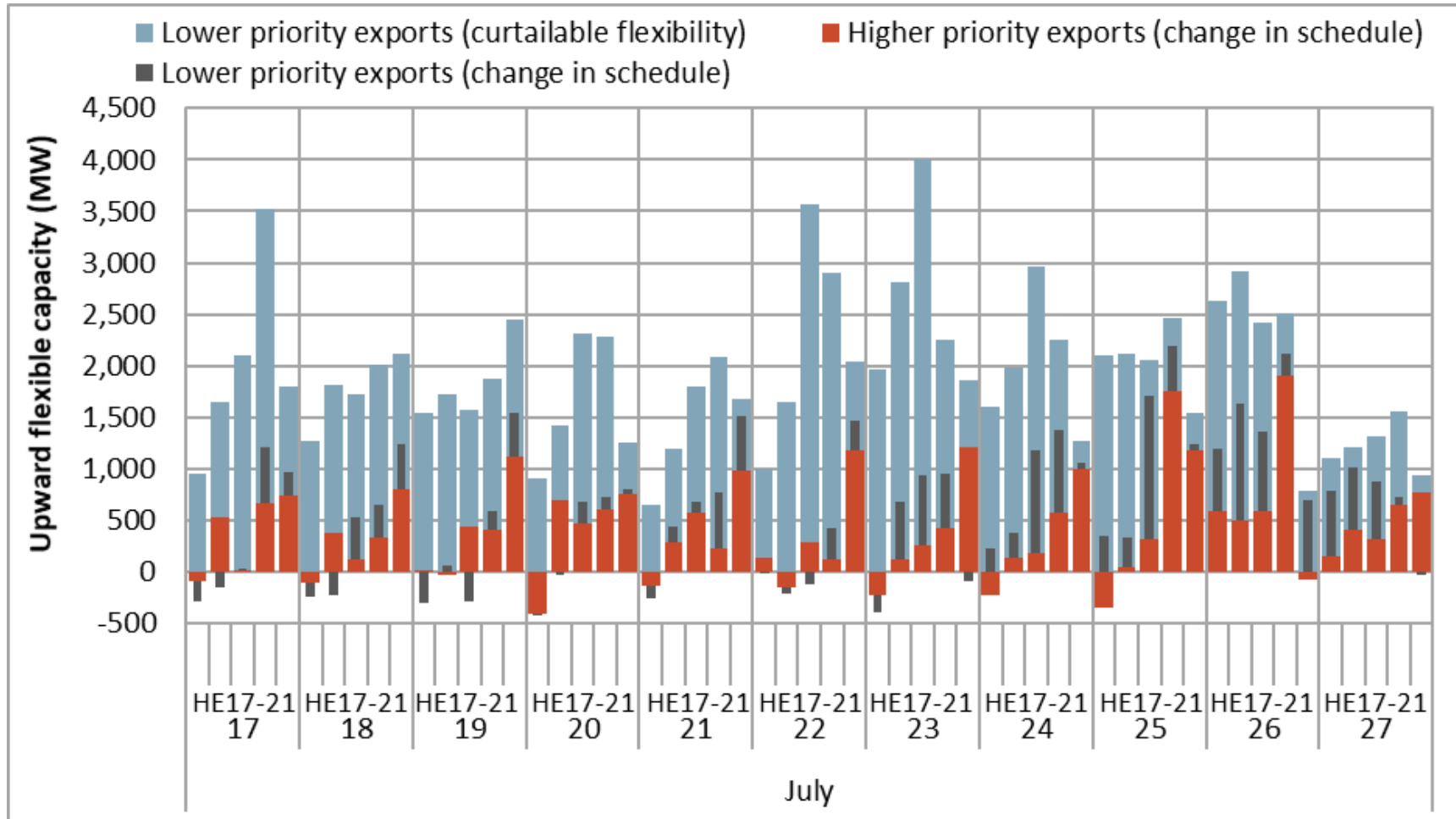
Higher priority exports

- **ETC/TOR, high-priority, and DA-LPT** (red bars).

- Still counted in the flexibility test based on their *change* in schedule.

Lower priority exports

- **RT-LPT and economic exports** (light blue bars).

- Now assumed to be curtailable and counted as upward flexible capacity based on schedule in interval prior to the evaluation hour.

CAISO PUBLIC

Assistance Energy Transfers (AET)

- Allow access to excess WEIM supply that may not have been available otherwise following a resource sufficiency evaluation failure.

- Prevent WEIM imports from being limited during a test failure, but subject to an ex-post surcharge.

California ISO

Surcharge for Assistance Energy Transfers (AET)

- The <u>price</u> for AET is the real-time bid cap.

- The <u>quantity</u> that is charged as Assistance Energy Transfers is based on the *lesser* of:

    (1) tagged dynamic WEIM transfers, or

    (2) MW by which area failed the resource sufficiency evaluation

- If the BAA's dynamic WEIM transfers are net exports, then surcharge is zero.

- If the dynamic WEIM transfers are less than the failure amount, then the quantity is also reduced by a credit.

    - For WEIM areas, the credit is for upward *available balancing capacity* (ABC)

    - For CAISO area, the credit is *regulation up capacity*

California ISO

Example — Assistance Energy Transfers (AET)
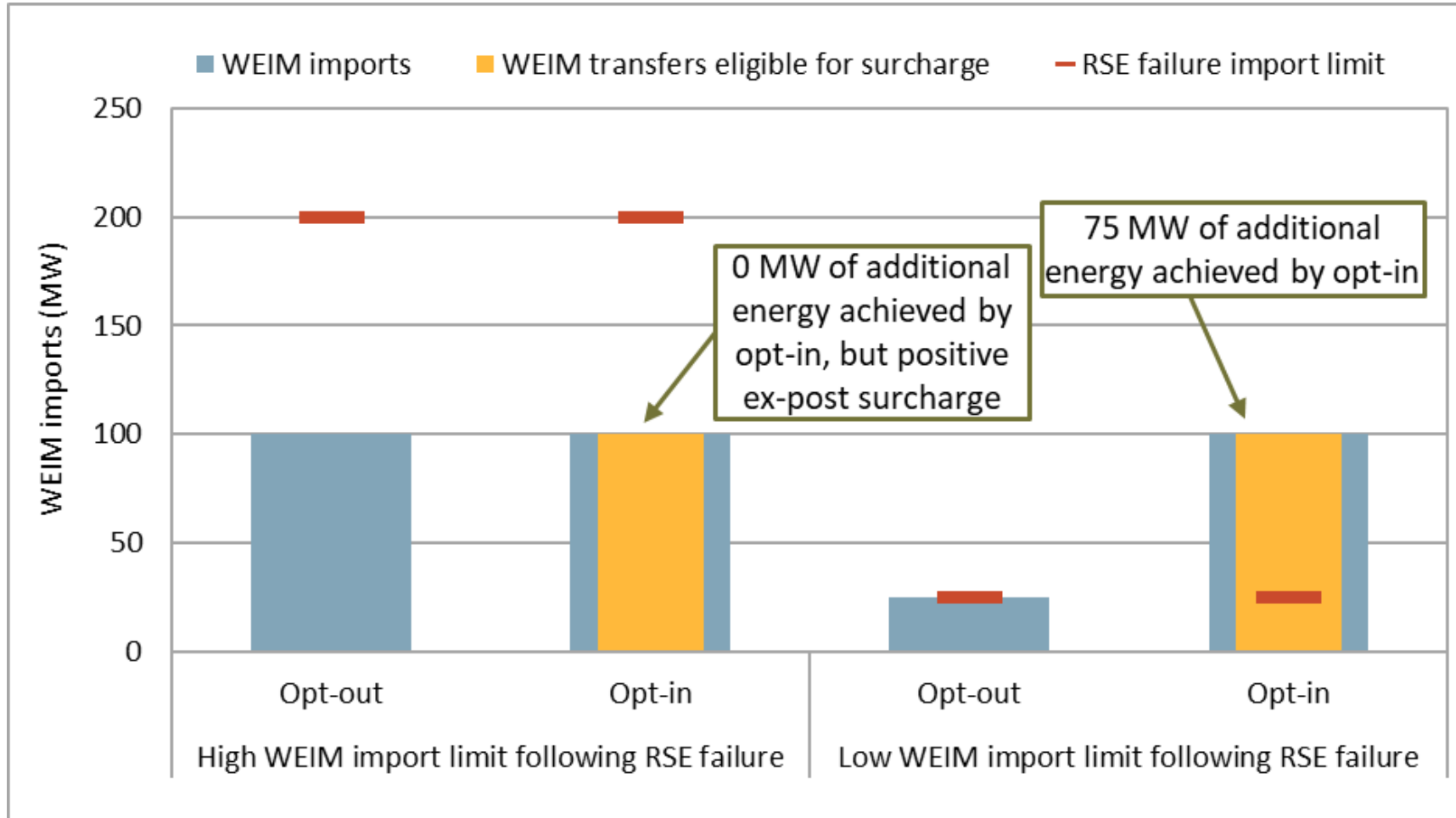
In this example:

- Optimal WEIM import without any limits is 100 MW
- Failed resource sufficiency evaluation by 150 MW
- No ABC or regulation credit
- WEIM import limit following failure is high at 200 MW or low at 25 MW

California ISO

Percent of upward 5-minute failure intervals in which WEIM imports were constrained (or would have been constrained) by test failure
(July 2023)
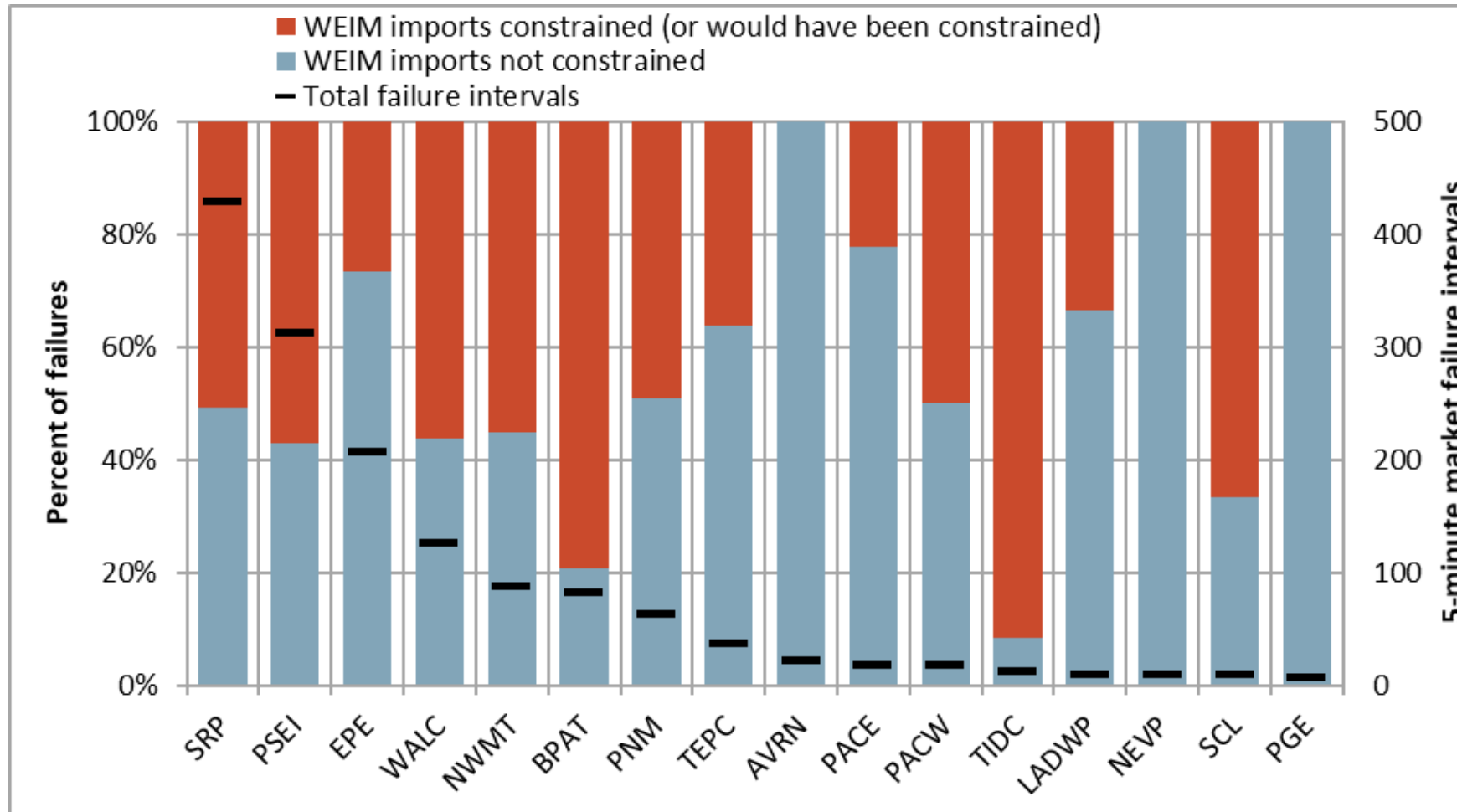
For balancing areas that opted-in to AET, this metric instead summarizes import limits that *would have been in place* following RSE failure without opt-in.

CAISO PUBLIC

California ISO