



California ISO

# Forecasting Forum – Q4 2026

Short Term Forecasting

3 November 2026

# Housekeeping



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The meeting is structured to stimulate dialogue and engage different perspectives.



Please engage in a respectful and professional manner. Introduce yourself and your organization when speaking. Follow the facilitator's guidance for speaking or asking questions.



Please keep comments brief and avoid repeating points already made to ensure everyone has an opportunity to participate in a robust discussion.



You can access Closed Captioning and the Transparency Viewer using the controls located at the bottom of the Webex screen.

# Instructions for Raising Your Hand to Ask a Question



Please remember to state your name and affiliation before making your comment.



If you are connected to audio through your computer or used the 'call me' option, select the raise hand icon located on the bottom of your screen. Start speaking a couple of seconds after you're unmuted.



If you are connected on the phone line only and not the Webex dial \*3 to be added to the queue.



You may also send questions via chat to all panelists.



If you need technical assistance during the meeting, please send a chat to the event producer, Intellor Events.

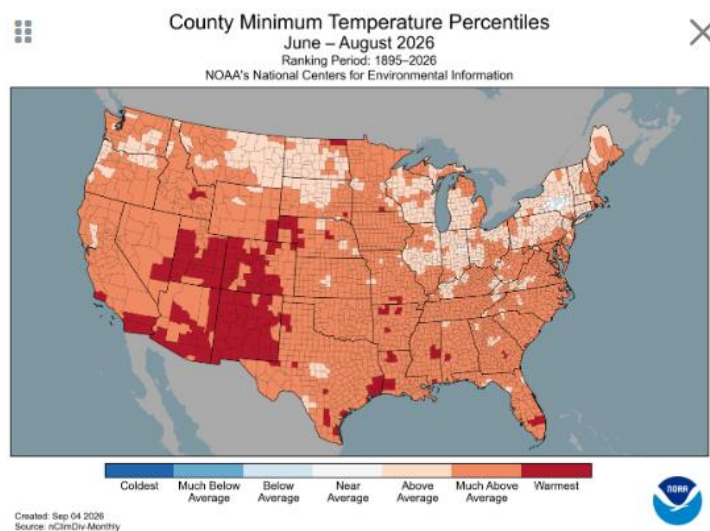
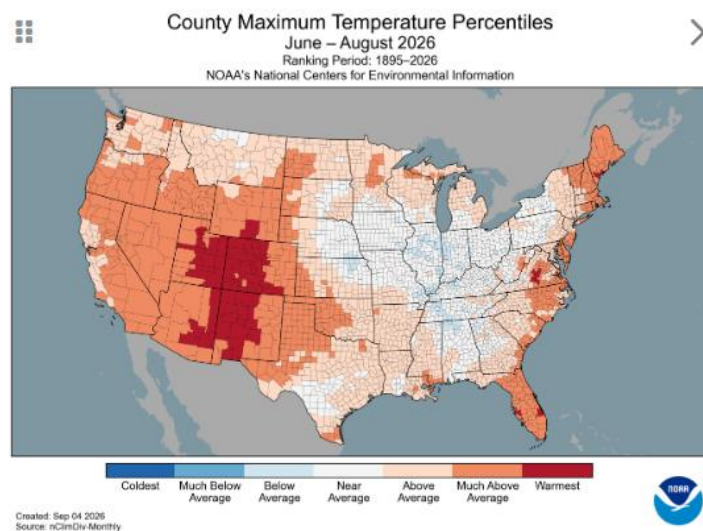
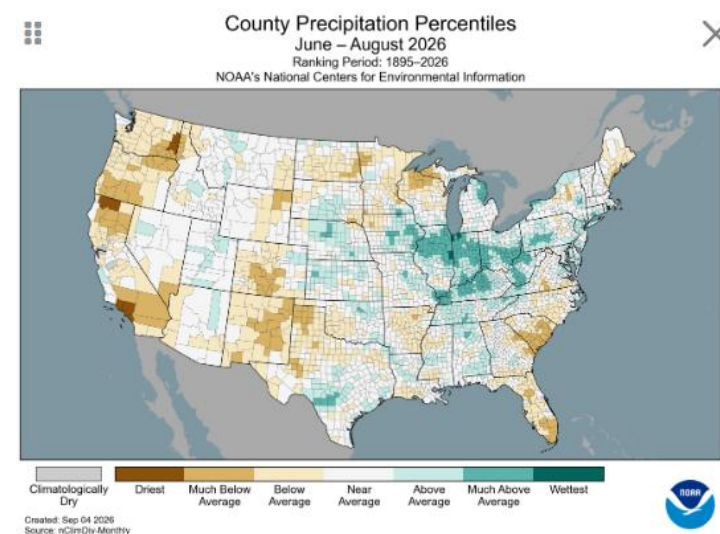
# Meeting Agenda

| Time             | Topic                                        | Target Audience | Presenter                                             |
|------------------|----------------------------------------------|-----------------|-------------------------------------------------------|
| 9:00 – 9:05 AM   | Welcome                                      |                 | Christina Guimera                                     |
| 9:05 – 9:50 AM   | Summer in Review                             | WEIM/EDAM       | Jessica Stewart<br>Lysha Matsunobu<br>David Tolentino |
| 9:50 – 10:05 AM  | Winter Meteorological Outlook                | WEIM/EDAM       | Jessica Stewart                                       |
| 10:05 – 10:20 AM | Demand Forecast Adjustment (DFA) BPM Updates | WEIM/EDAM       | John Rudolph                                          |
| 10:20 – 10:30 AM | Break                                        |                 |                                                       |
| 10:30 – 10:40 AM | Load Transfer Process                        | WEIM/EDAM       | Zach Ricciardulli                                     |
| 10:40 – 11:20 AM | IR Requirement Highlight                     | EDAM            | Jesse Saechao<br>Tobiah Steckel                       |
| 11:20 – 11:30 AM | Wrap up                                      |                 | Christina Guimera                                     |

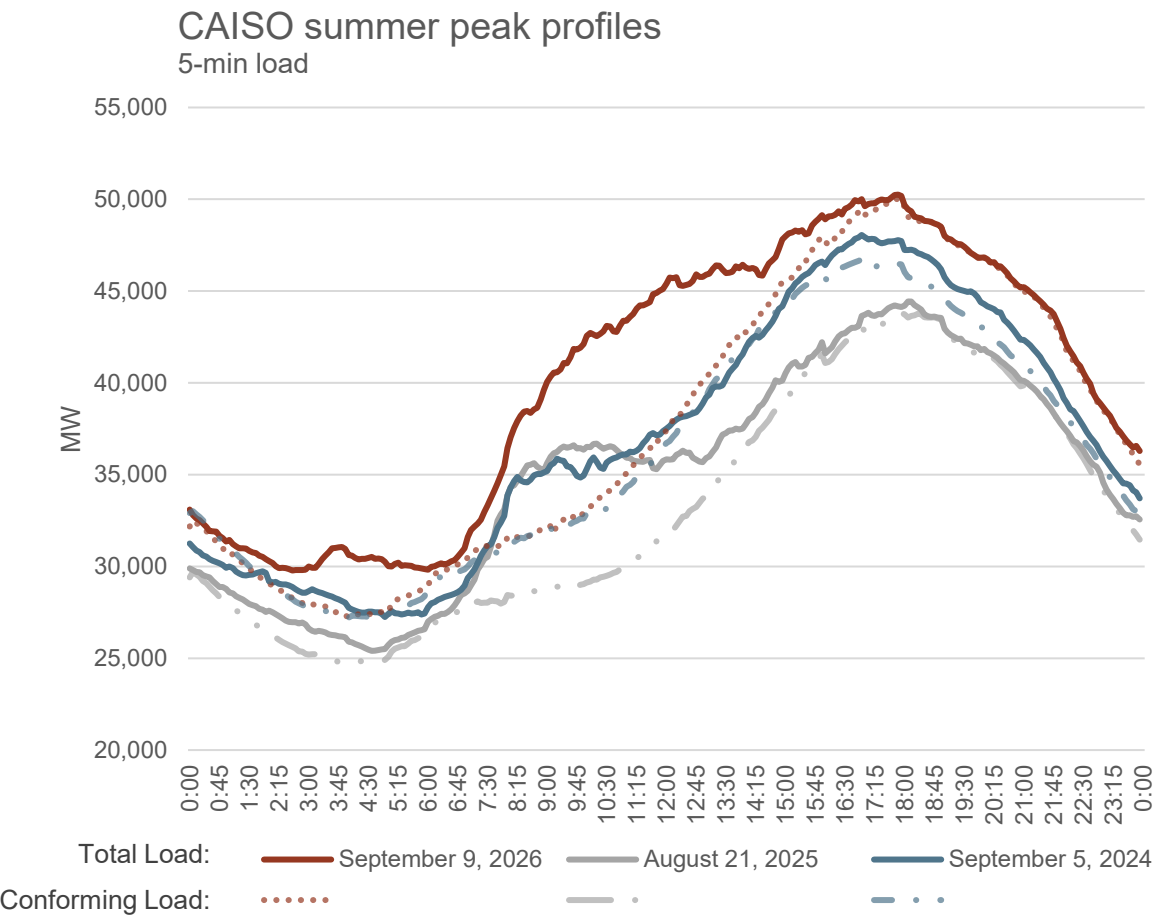
# SUMMER IN REVIEW

# 2026 Summer Meteorological Observations

- CAISO
  - Relatively cool first half of the summer; strongest heat came later in the season
- WEIM/EDAM
  - Periods of below normal temperatures, but above normal anomalies were more frequent and more extreme
  - Desert SW had their warmest summer on record
- Near to below normal monsoon rainfall

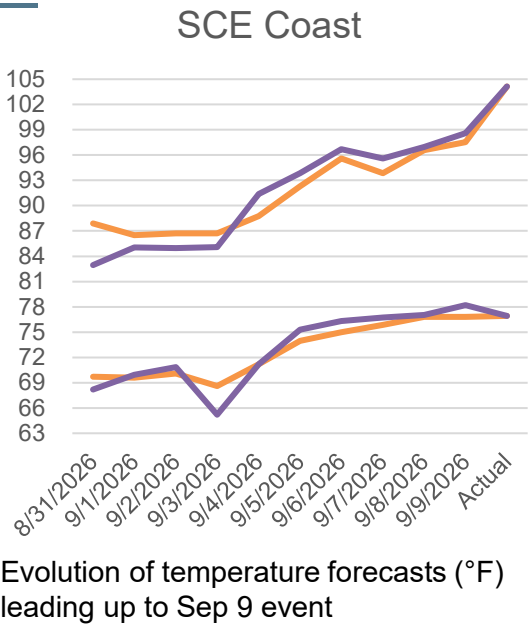


# CAISO BAA demand reached second-highest record peak – 50,335 MW on Sep 9



## Summer peak (September 9, 2026)

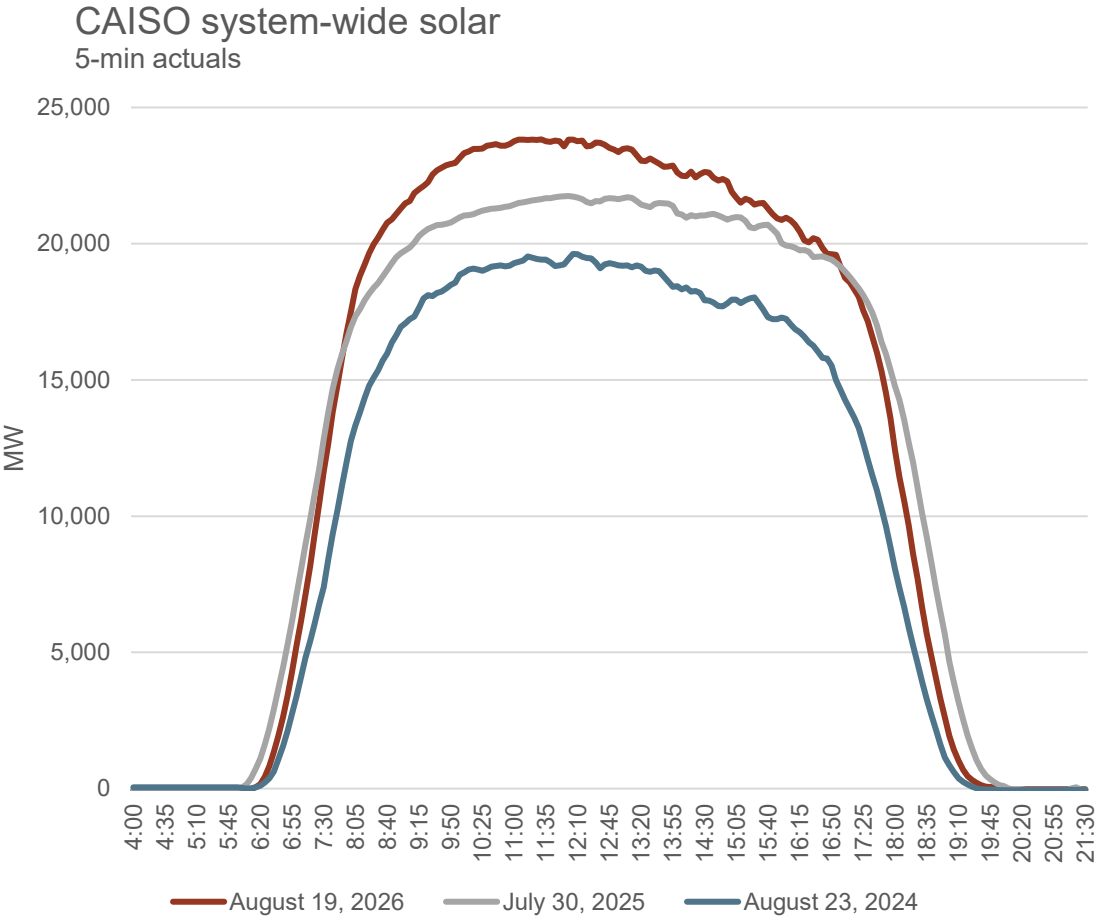
- Rapid weather regime change
- Humidity amplified the event
- Flatter profile than previous peak days



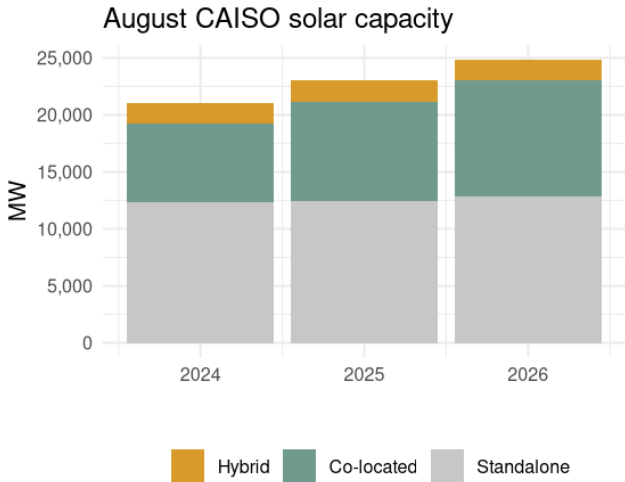
| Year | Date   | Total Load Peak | Conforming Load Peak |
|------|--------|-----------------|----------------------|
| 2026 | Sep 9  | 50,335 MW       | 50,085 MW            |
| 2025 | Aug 21 | 44,506 MW       | 43,889 MW            |
| 2024 | Sep 6  | 48,323 MW       | 46,851 MW            |

CAISO peak load history:  
[www.caiso.com/documents/californiaisopeakloadhistory.pdf](http://www.caiso.com/documents/californiaisopeakloadhistory.pdf)

# New CAISO BAA solar peak – 23,896 MW on Aug 19



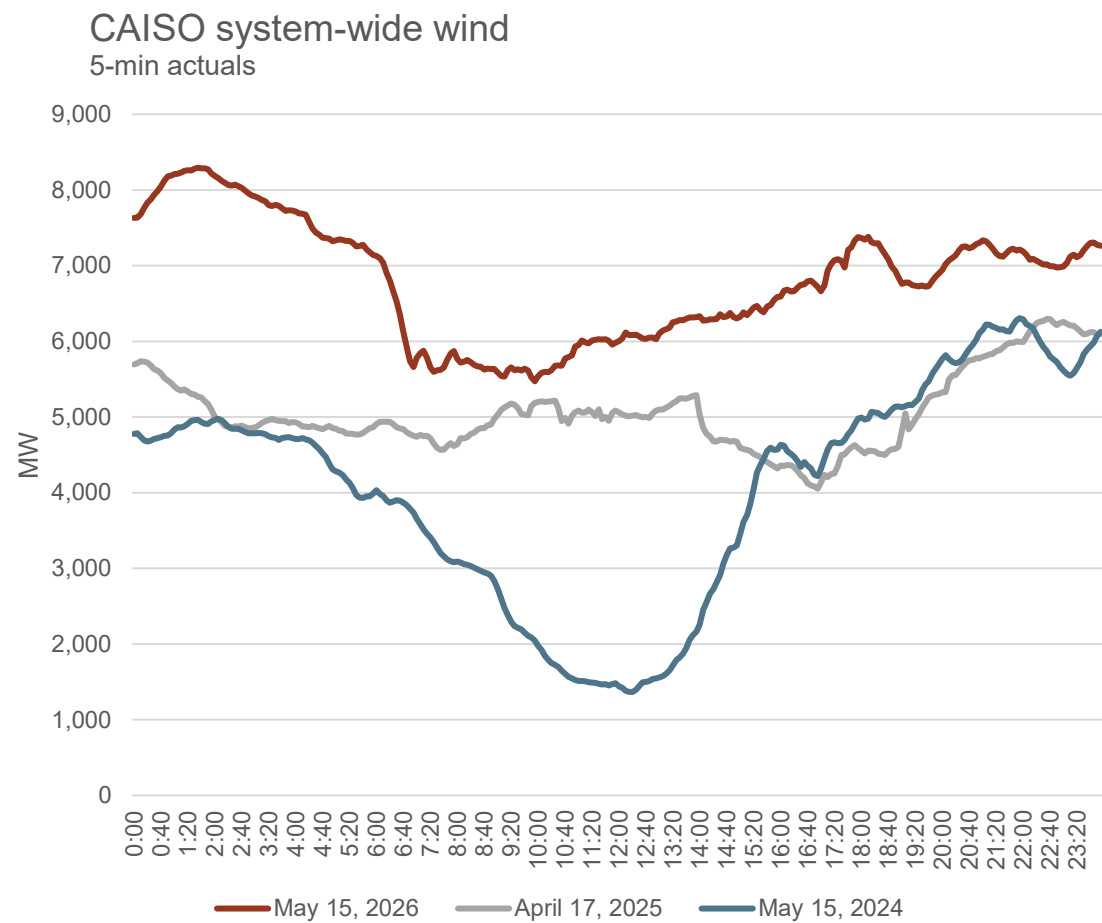
Solar capacity growth drives new peaks each summer



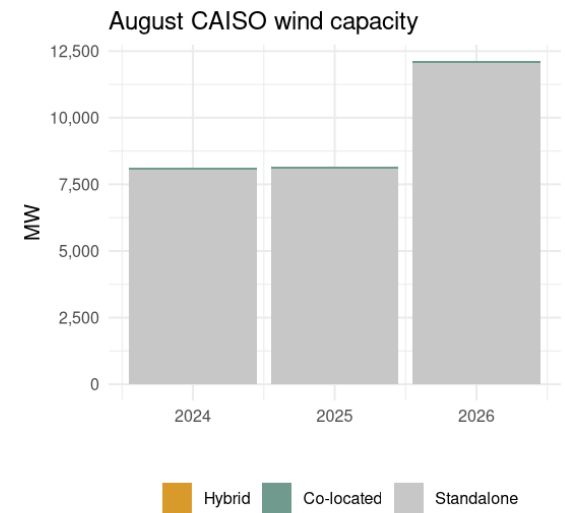
| Year | Date   | Peak      |
|------|--------|-----------|
| 2026 | Aug 19 | 23,896 MW |
| 2025 | Jul 30 | 21,774 MW |
| 2024 | Aug 23 | 19,650 MW |

Monthly CAISO statistics:  
[www.caiso.com/library/key-statistics](http://www.caiso.com/library/key-statistics)

# New CAISO BAA wind peak – 8,312 MW on May 15



Large wind capacity growth led to new wind peaks this year

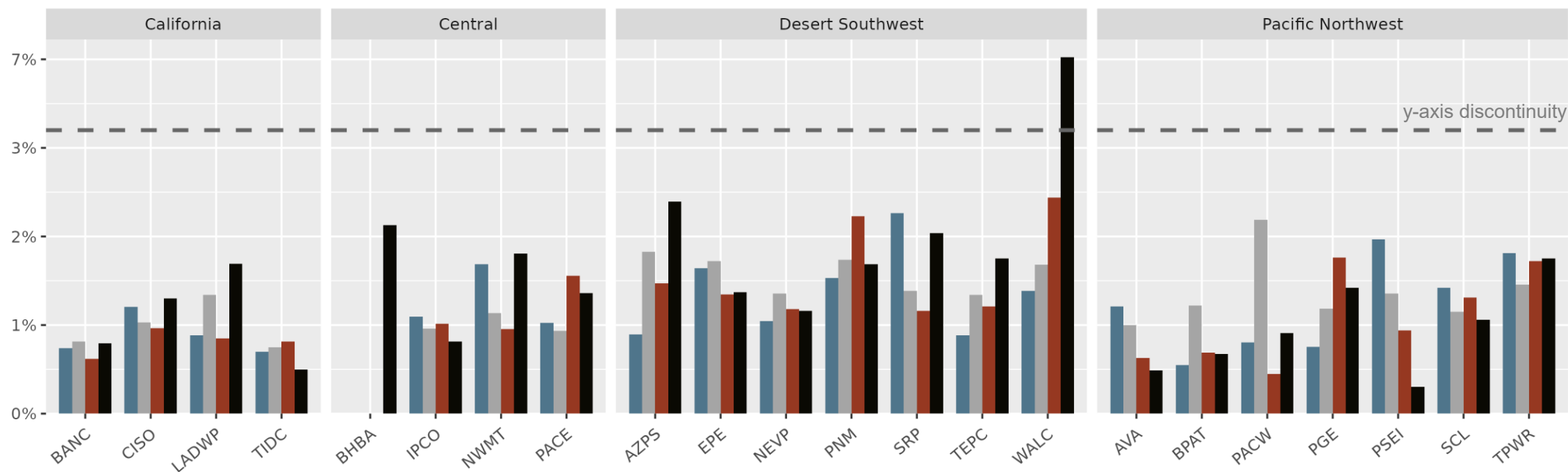


| Year | Date   | Peak     |
|------|--------|----------|
| 2026 | May 15 | 8,312 MW |
| 2025 | Apr 17 | 6,313 MW |
| 2024 | May 15 | 6,322 MW |

Monthly CAISO statistics:  
[www.caiso.com/library/key-statistics](http://www.caiso.com/library/key-statistics)

# 2026 accuracy on high load days so far (WALC 2026 removed)

T-60 Accuracy During Peak Hour  
Average for 10 highest load days



Most regions trending well for 2026.

BAs in California and DSW trending to see slightly higher MAPE in 2026 than 2025. Summer 2026 had higher peak load days than 2025, contributing to higher average error.

2023 2024 2025 2026

Sample current through 2026-10-10

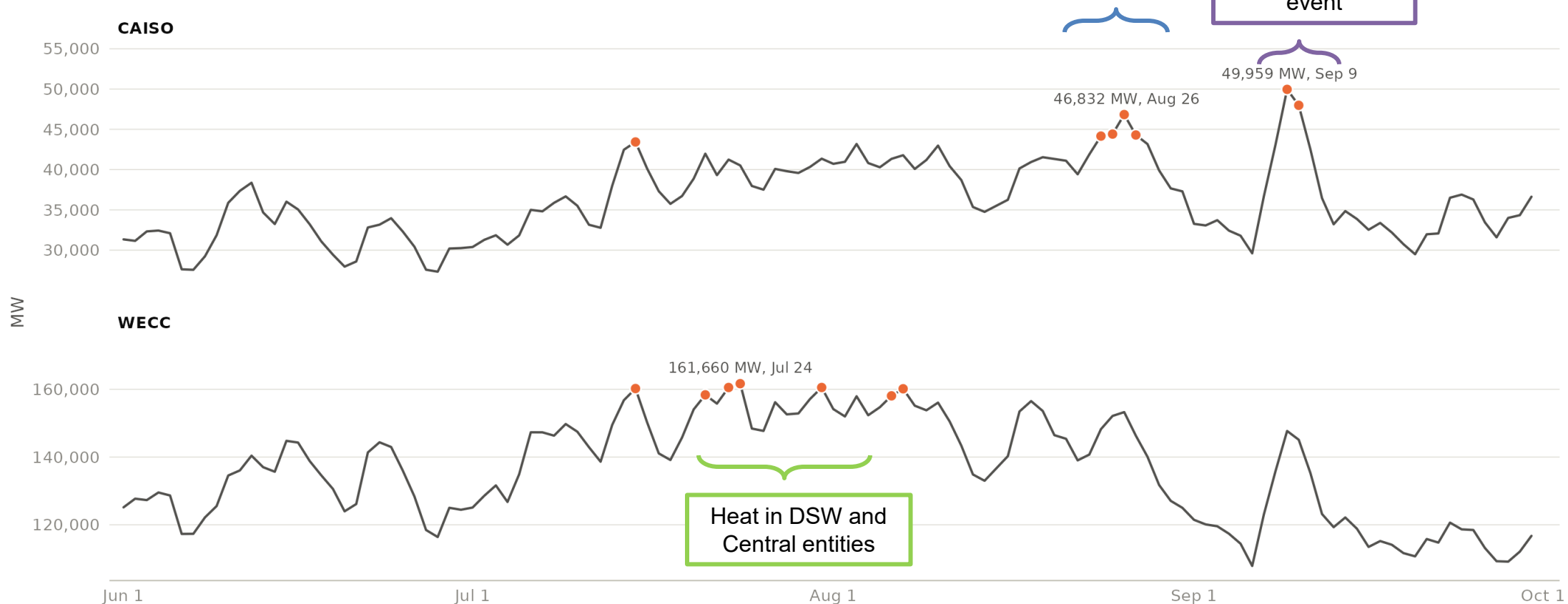
WALC metrics affected by extended data quality issue.

# Western heat occurred in distinct regional waves

## Daily peak load, June-September 2026

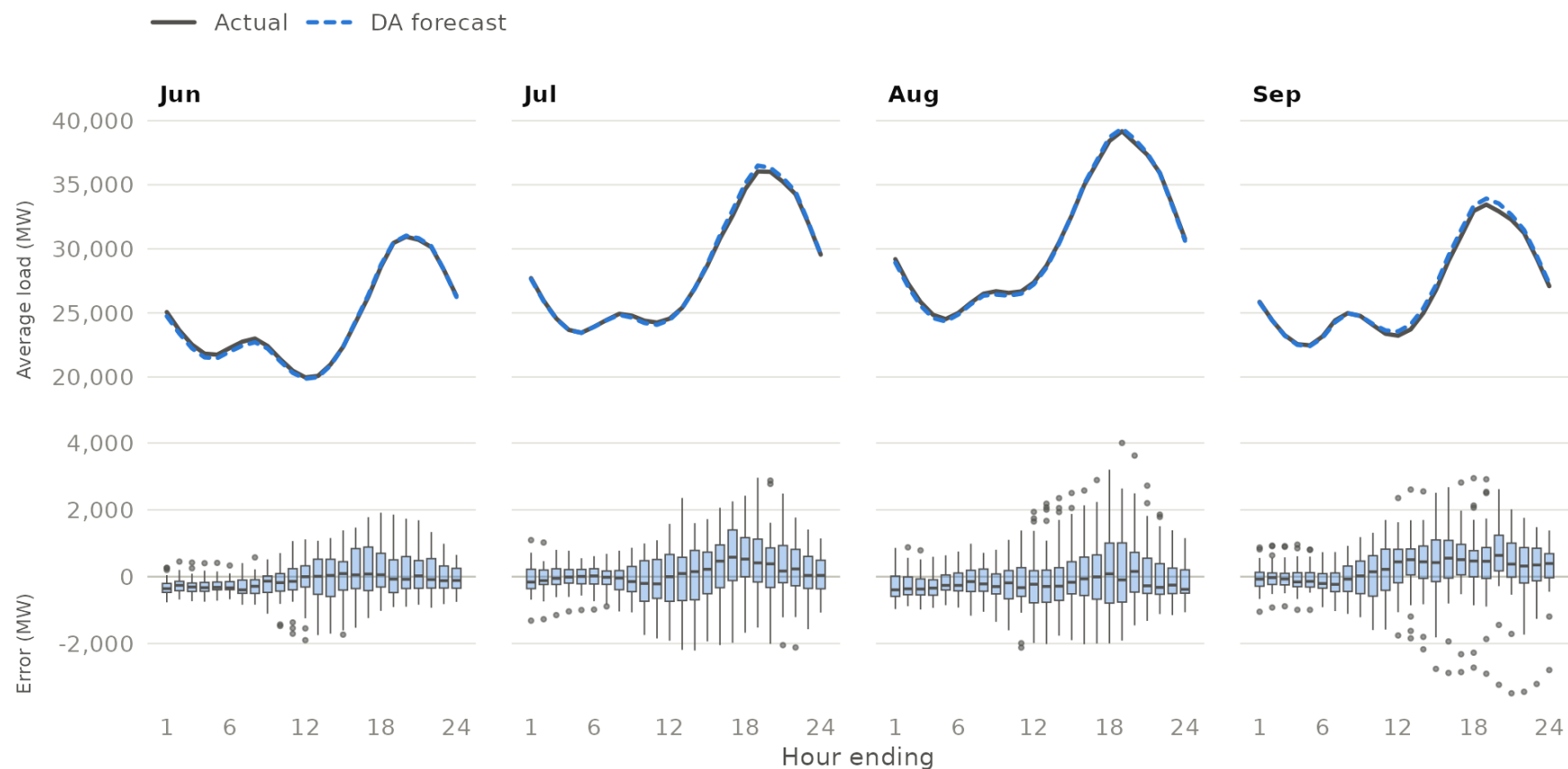
Highest hourly average load each day

● Region's highest-load 5% of days



# CAISO summer load and bias

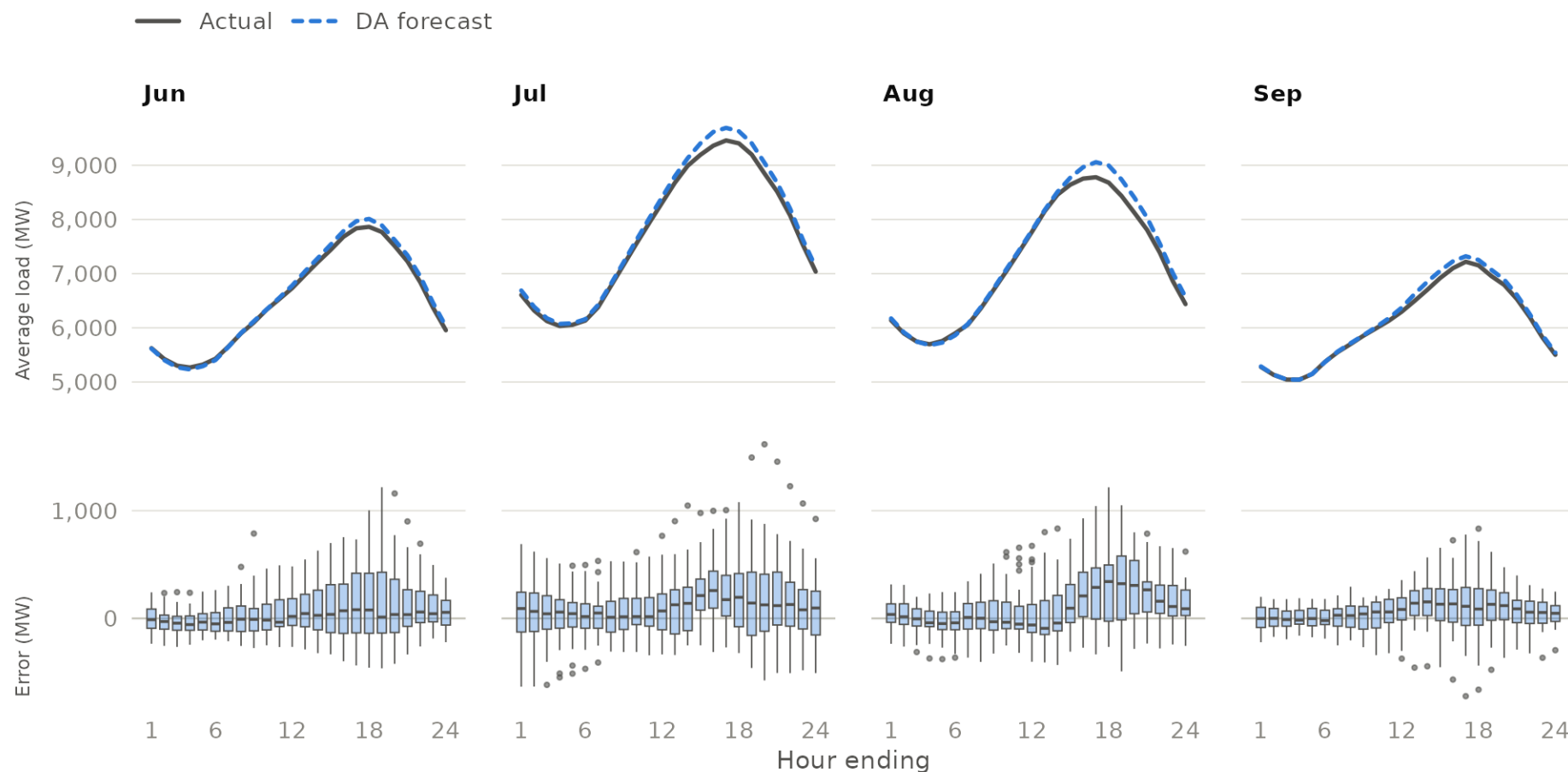
## CAISO: average DA load and forecast error by hour, summer 2026



CAISO load, June-September 2026. Error = forecast - actual.

# PACE summer load and bias

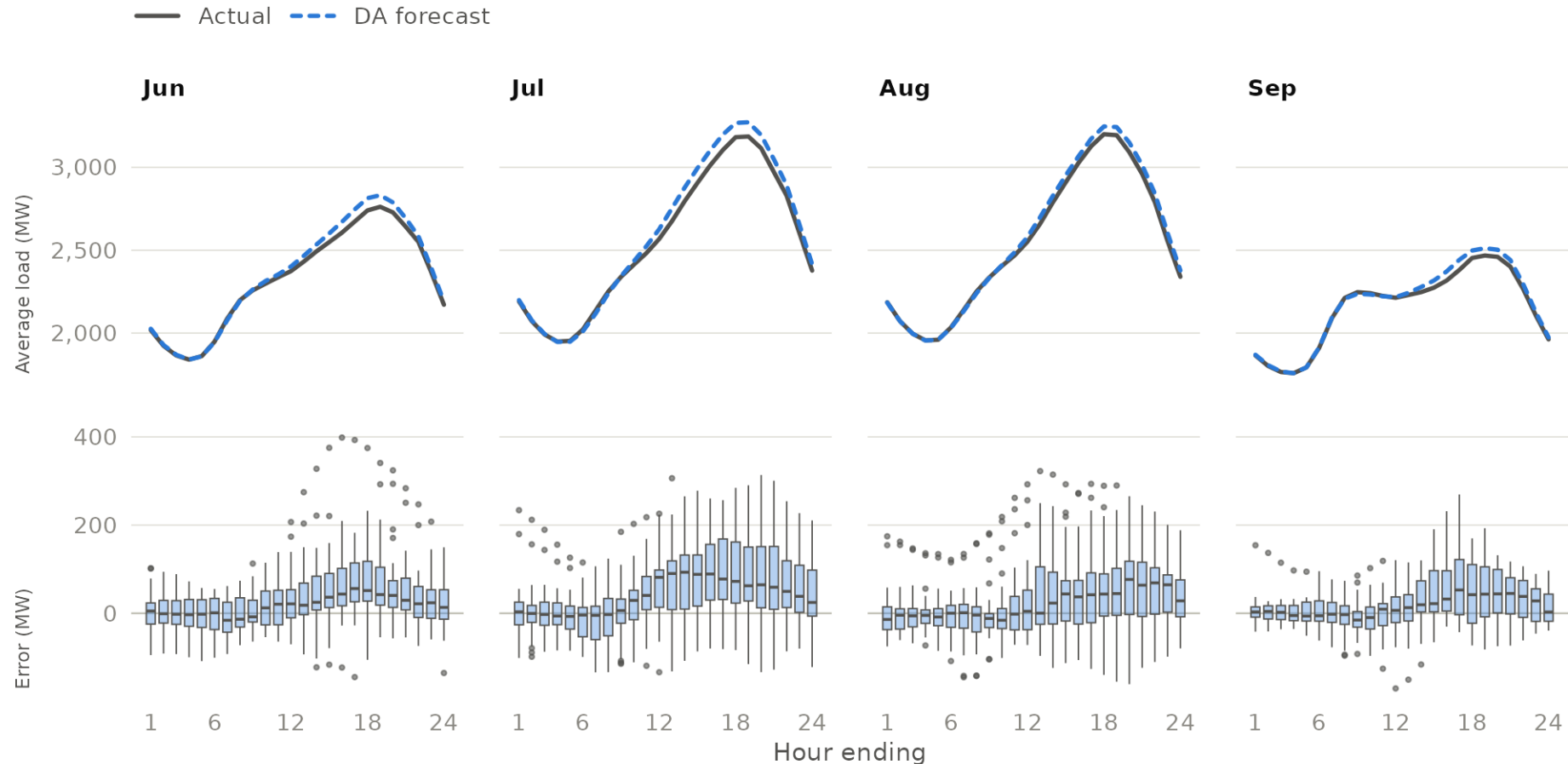
## PACE: average DA load and forecast error by hour, summer 2026



PACE load, June-September 2026. Error = forecast - actual.

# PACW summer load and bias

## PACW: average DA load and forecast error by hour, summer 2026

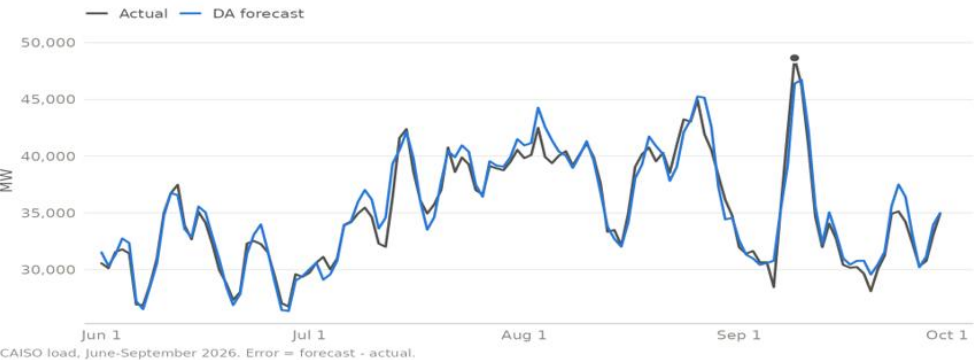


PACW load, June-September 2026. Error = forecast - actual.

# CAISO: Highest error days tended to correlate with high load

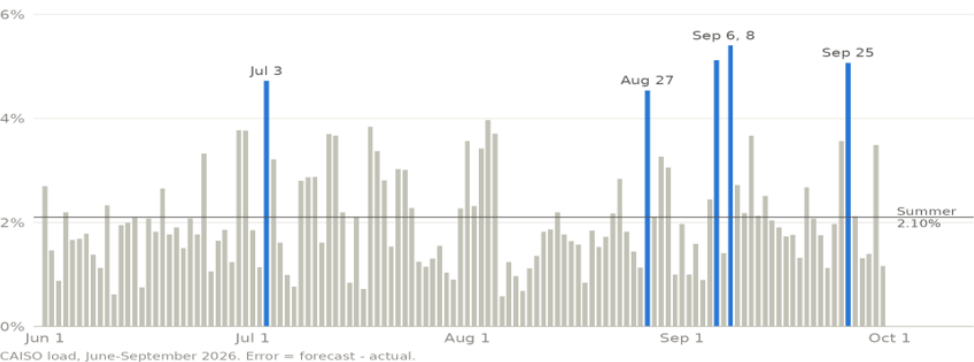
## Daily peak load

**CAISO: daily peak load, actual vs DA forecast, summer 2026**  
Highest hourly value each day. Summer peak (marked): 48,654 MW on Sep 9, HE 18



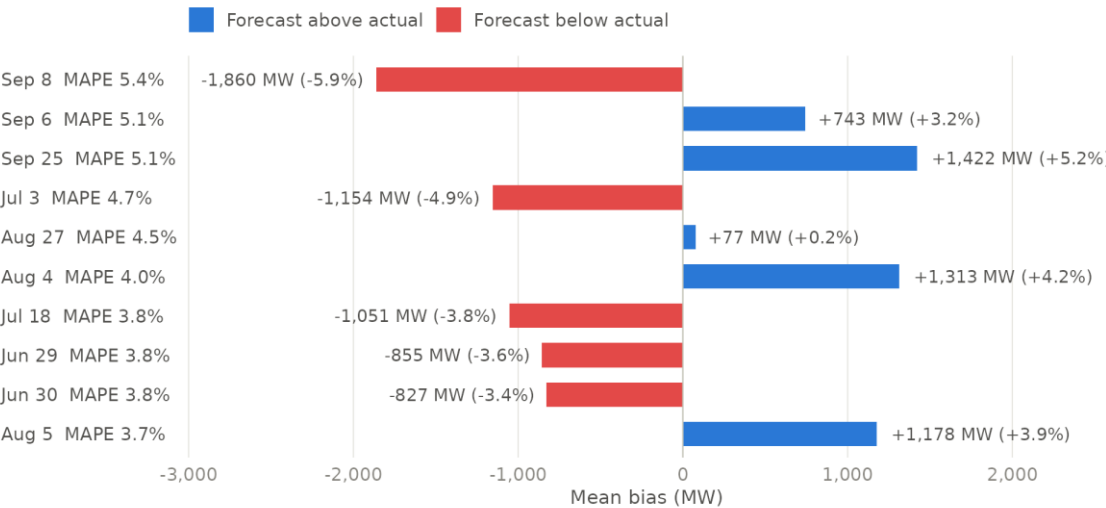
## Daily forecast error

**CAISO: daily DA load forecast MAPE, summer 2026**  
The 5 highest-error days are highlighted and labeled



## Bias on highest-error days

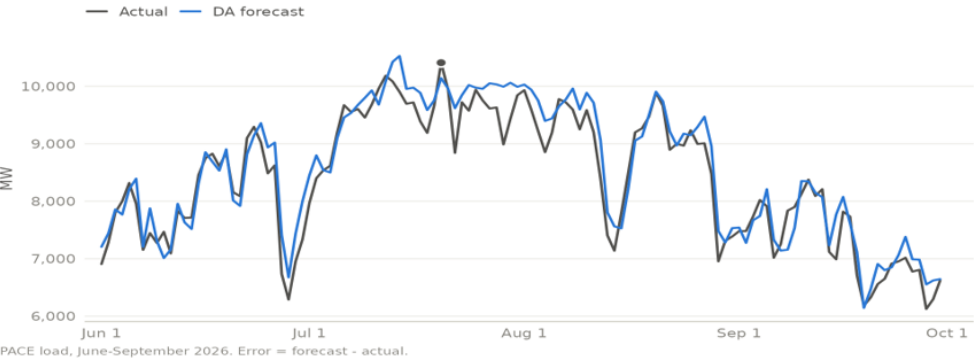
**CAISO: DA bias on the 10 highest-error days, summer 2026**  
Days ordered by daily MAPE, highest at the top. Bar = mean forecast minus actual over the day



# PACE: Highest error days tended to correlate with high load

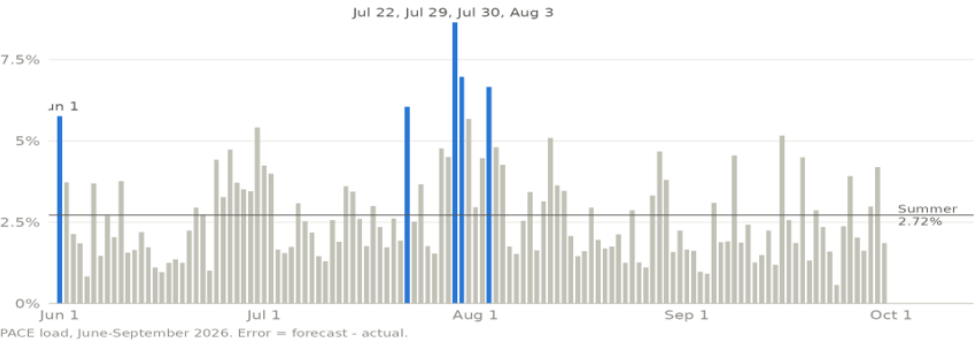
## Daily peak load

**PACE: daily peak load, actual vs DA forecast, summer 2026**  
Highest hourly value each day. Summer peak (marked): 10,410 MW on Jul 20, HE 17



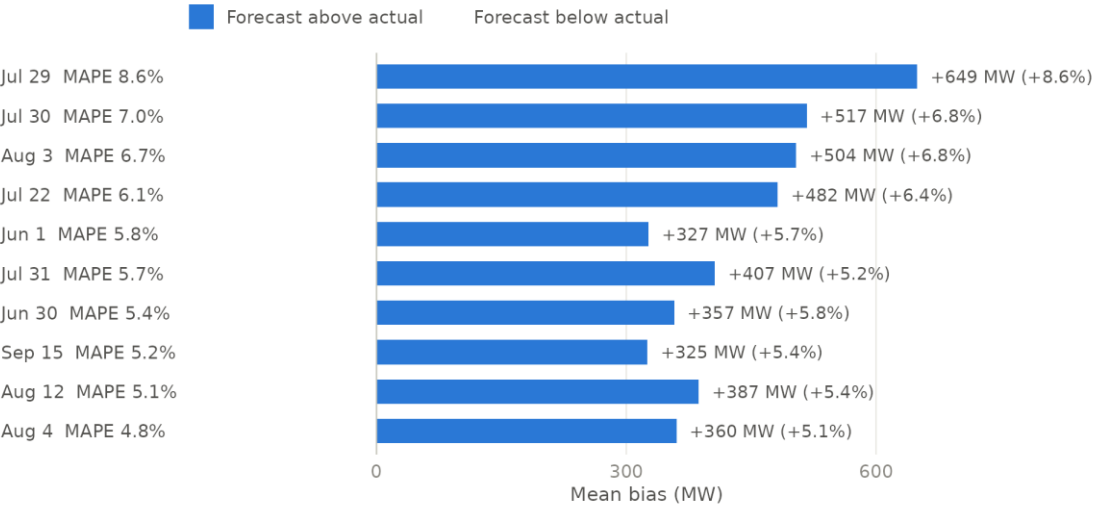
## Daily forecast error

**PACE: daily DA load forecast MAPE, summer 2026**  
The 5 highest-error days are highlighted and labeled



## Bias on highest-error days

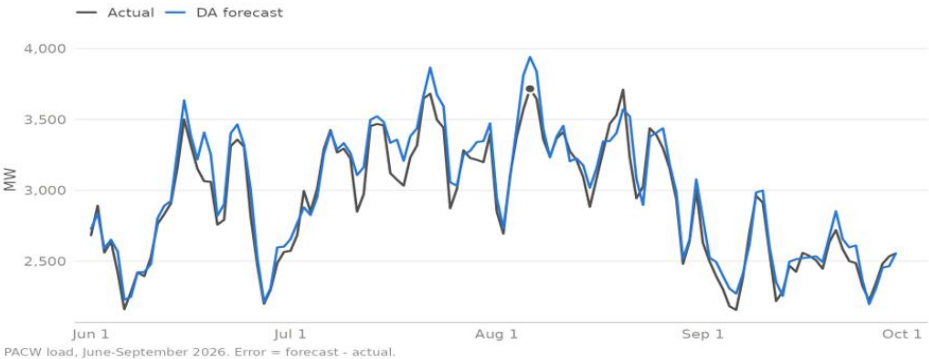
**PACE: DA bias on the 10 highest-error days, summer 2026**  
Days ordered by daily MAPE, highest at the top. Bar = mean forecast minus actual over the day



# PACW: Highest error days tended to correlate with high load

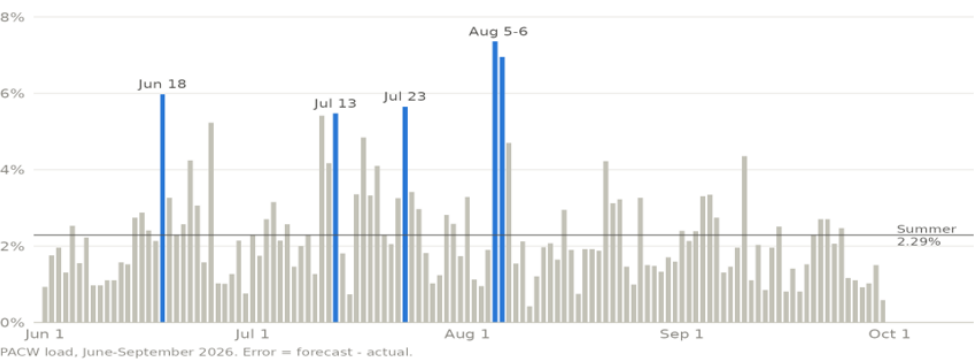
## Daily peak load

**PACW: daily peak load, actual vs DA forecast, summer 2026**  
Highest hourly value each day. Summer peak (marked): 3,717 MW on Aug 6, HE 18



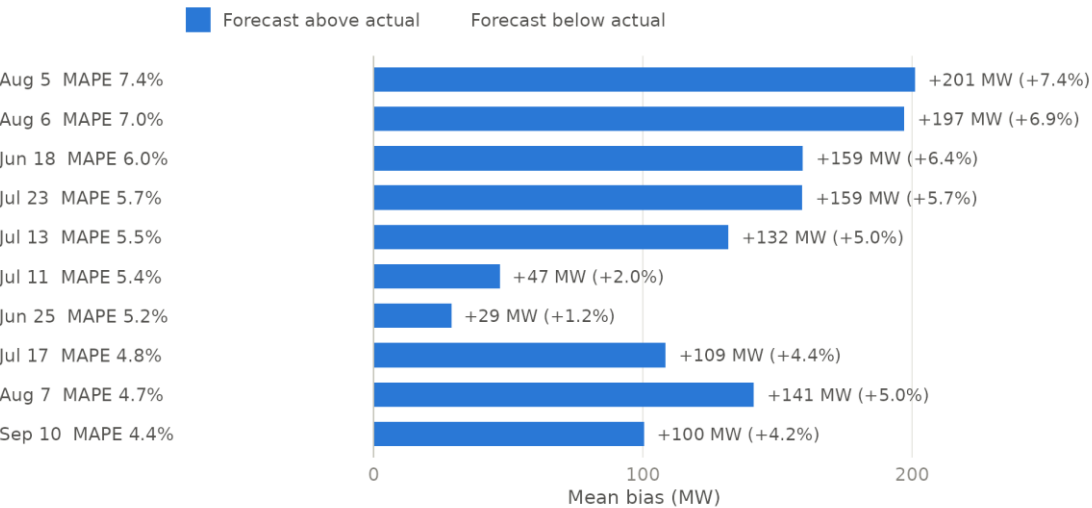
## Daily forecast error

**PACW: daily DA load forecast MAPE, summer 2026**  
The 5 highest-error days are highlighted and labeled



## Bias on highest-error days

**PACW: DA bias on the 10 highest-error days, summer 2026**  
Days ordered by daily MAPE, highest at the top. Bar = mean forecast minus actual over the day



# Takeaways from STF metrics focusing on Jun - Sep

This slide summarizes metrics in Appendix.

## **Highlights:**

- Most regions saw average seasonal forecast performance
- IPCO and SCL had notably positive trends with lower T60 MAPEs compared to 2025 and FRP Q3 coverage on target
- IR coverage was closer to target in Q3 over Q2

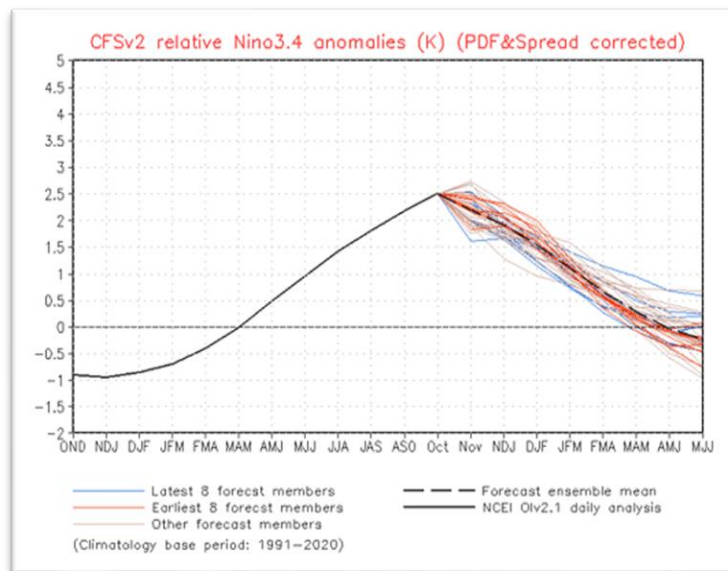
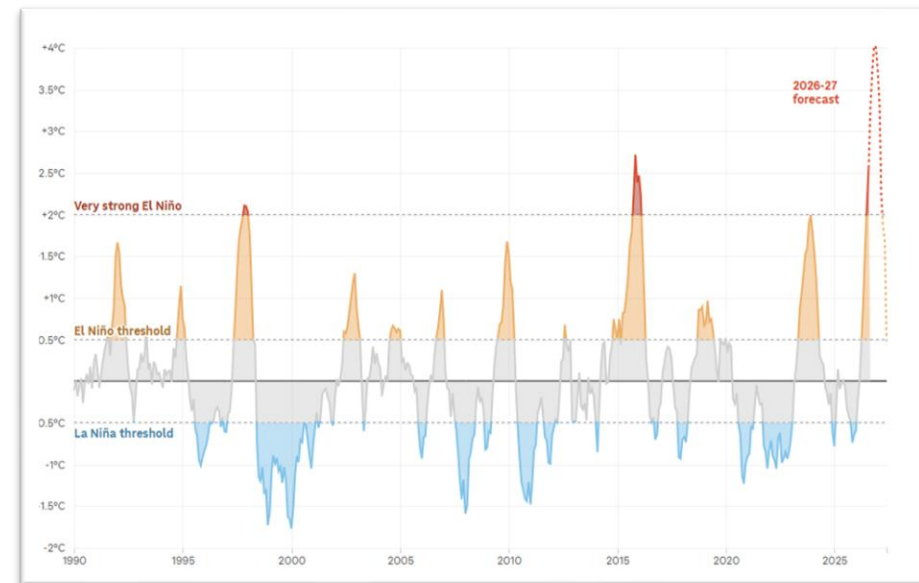
## **Areas STF is actively reviewing:**

- Desert Southwest regions (APS, SRP, TEP) saw higher loads and higher error relative to baseline during summer 2026
- Continue monitoring WALC load data quality

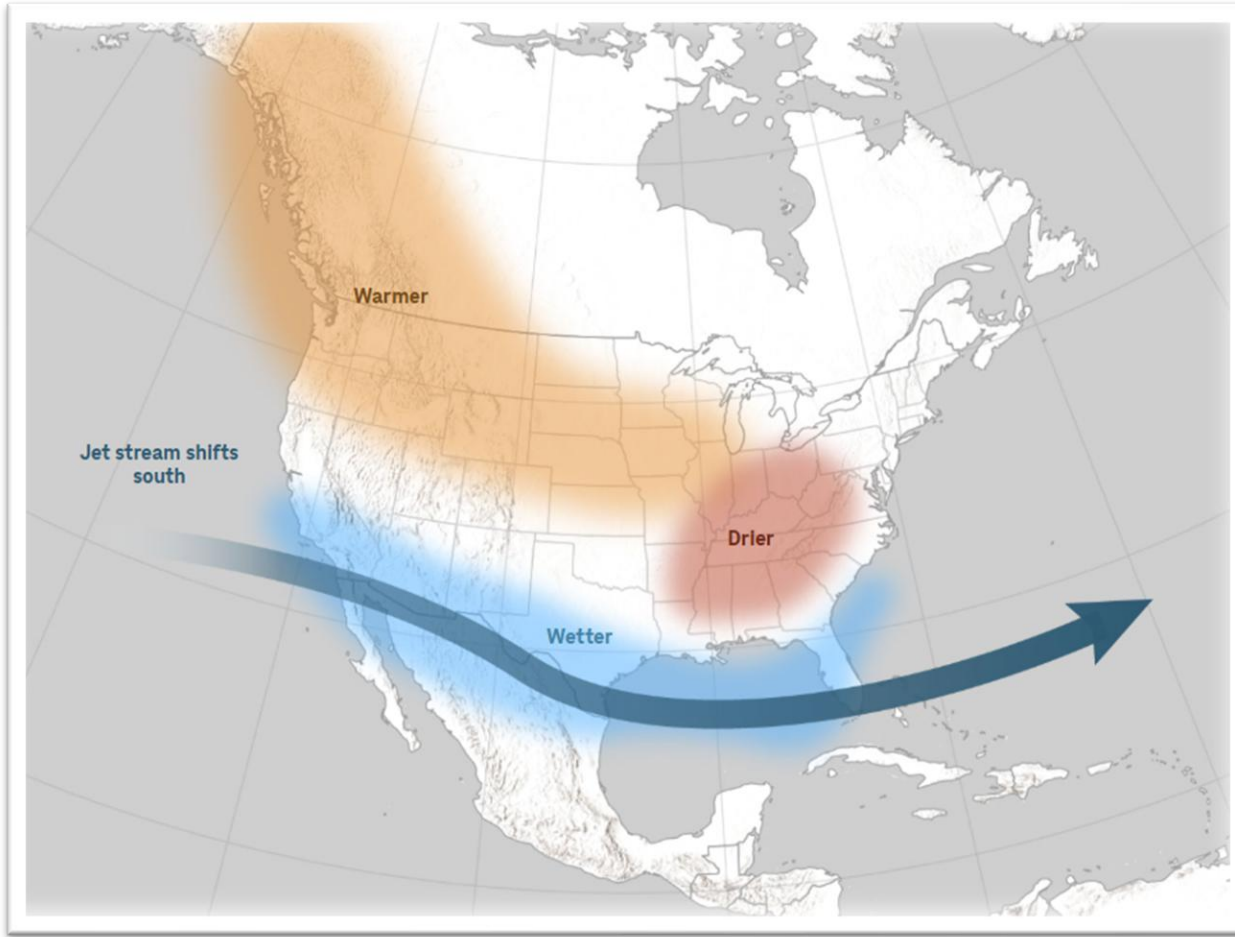
# WINTER METEOROLOGICAL OUTLOOK

# Inputs into the winter forecast

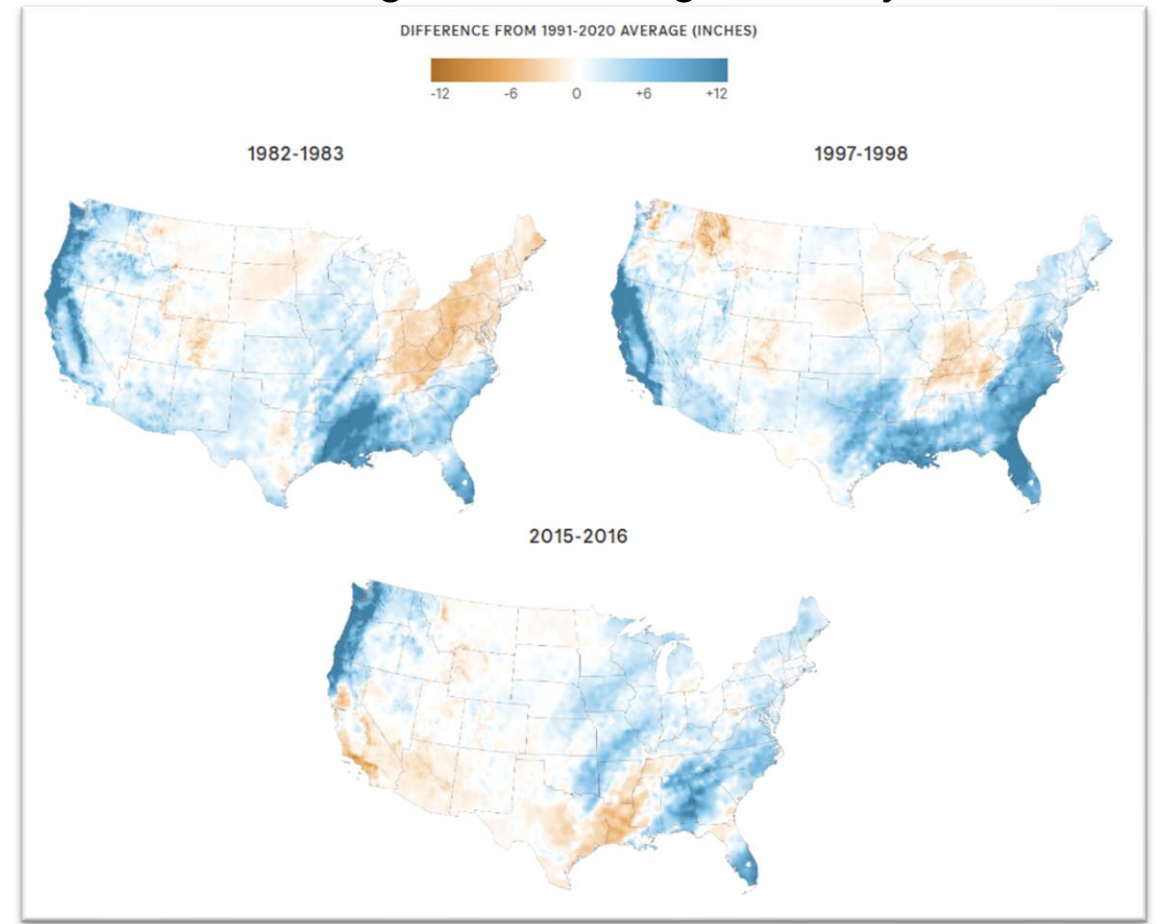
- El Nino: Sea surface temperatures (SSTs) are well above average across the tropical Pacific
- El Nino forecast to continue strengthening with a  $> 80\%$  chance for the strongest El Nino on record this fall
  - Expected to remain strong-to-very strong through spring



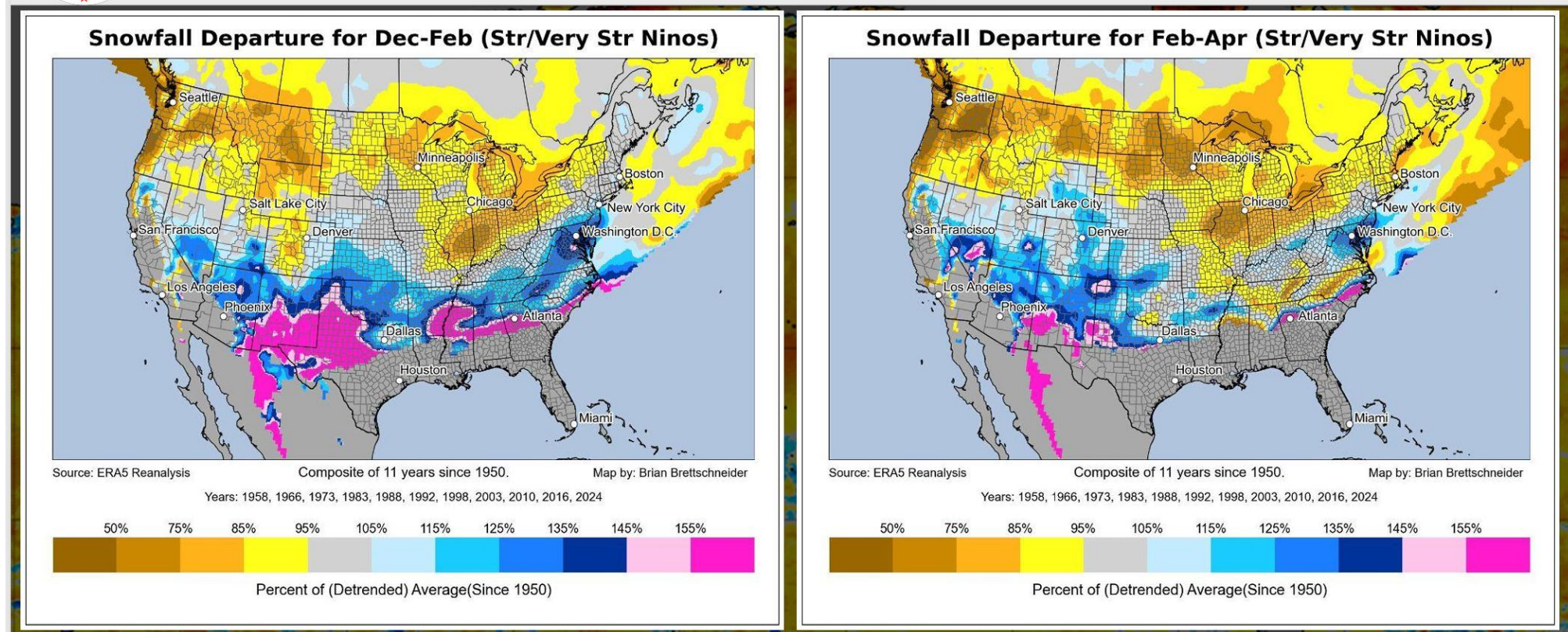
# El Nino can favor a more active storm track for California



## Rainfall during recent strong El Nino years



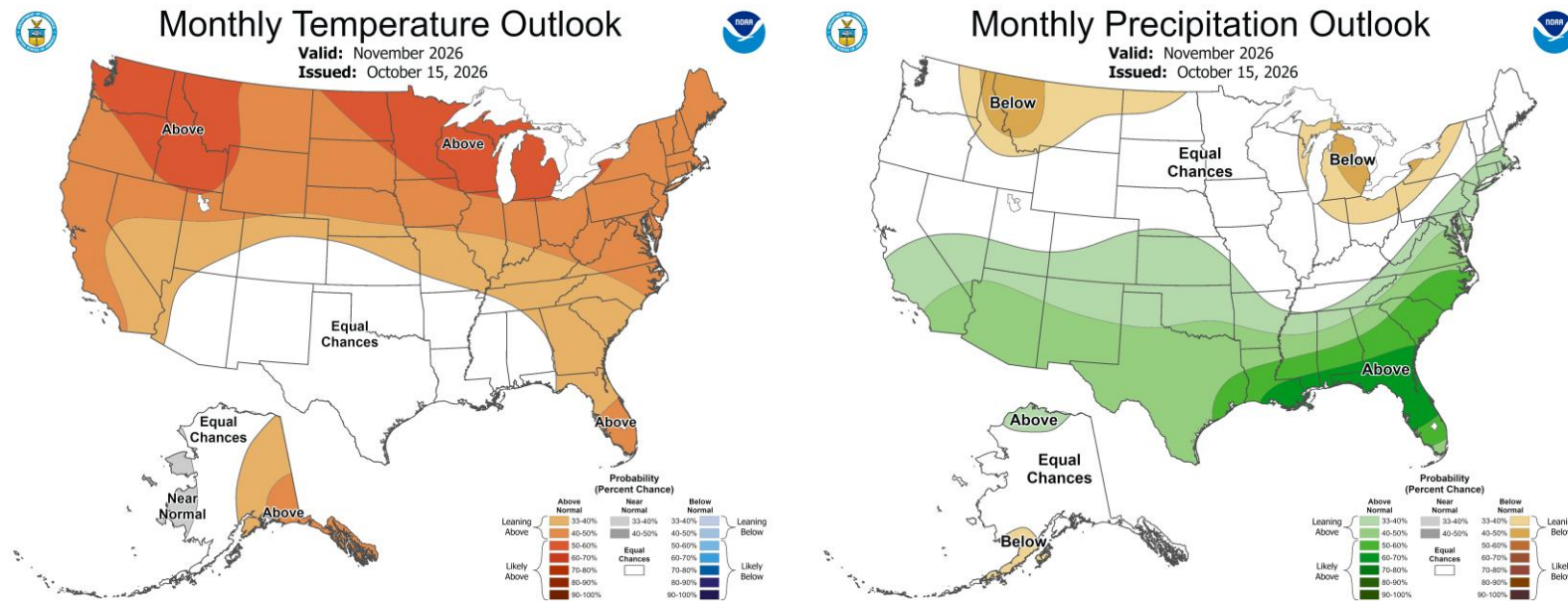
# Strong El Nino years favor above normal snowfall for California and the Desert SW but below normal for the northern US



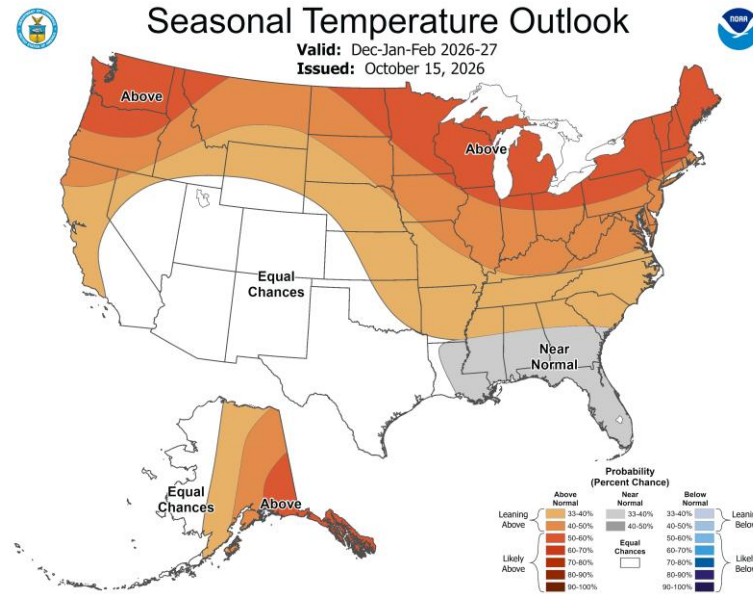
Source: NWS

# November Outlook

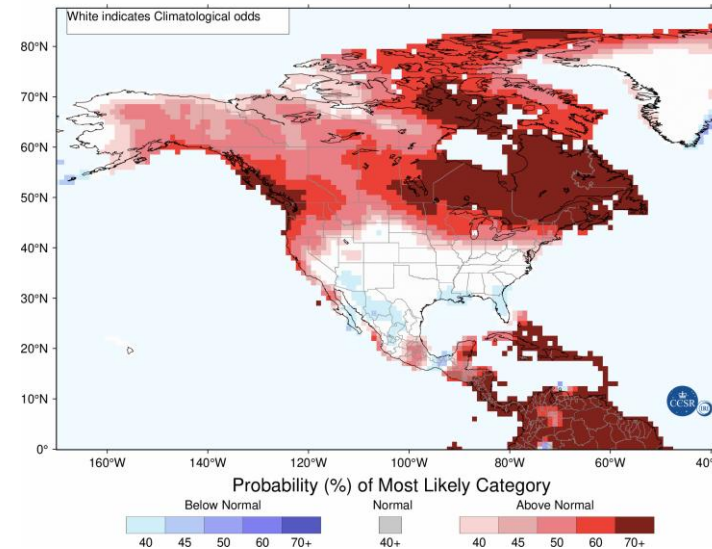
- Off to an early start to the wet season, especially for SoCal in October
- Indications that November will continue to bring an active pattern further south
- Chance for above normal temperatures increases moving north



# Winter Temperature Outlook December - February



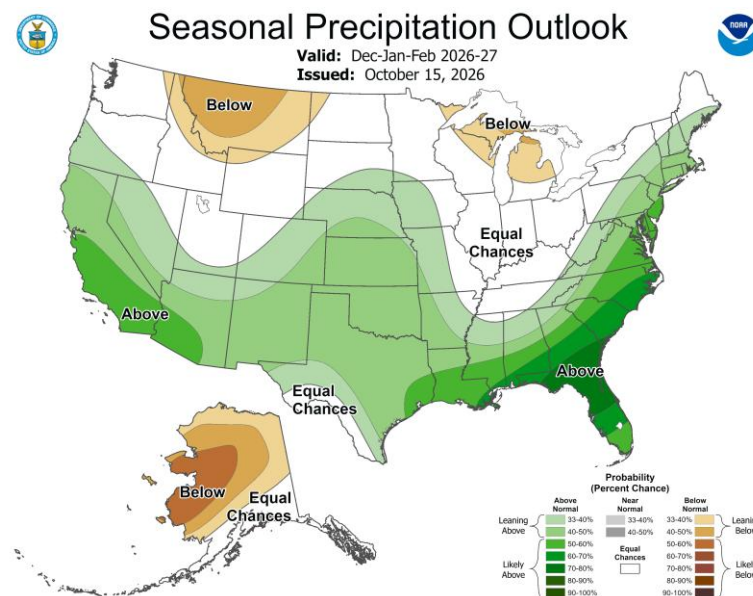
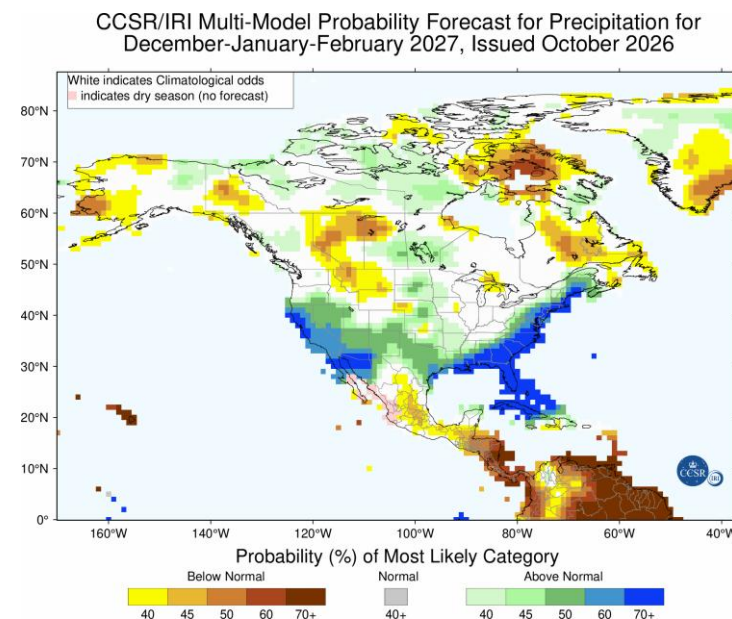
CCSR/IRI Multi-Model Probability Forecast for Temperature for December-January-February 2027, Issued October 2026



- Increased potential for above normal winter temperatures across the Pacific Northwest and north central US
- No strong signal either way for the Desert Southwest and southern California
- Increased chances for Canada to have above normal temperatures as well, which could lower risk for extreme cold dropping further south

# Winter Precipitation Outlook

## December - February



- Expected southern shift of the storm track leads to increased potential for above normal rainfall further south
- Increased chances for near-to-below normal precipitation across the Pacific Northwest and north central US

# **BPM CHANGES FOR THE DEMAND FORECAST ADJUSTMENT (DFA) PROCESS**

# Agenda

- Why BPM changes are being made for Demand Forecast Adjustment (DFA) process?
- Background on the DFA process.
- Detail on proposed BPM structural changes.

## Why are BPM changes being made for DFA process?

**Document new API service for DFA:** With EDAM go-live new API service was released to allow for automated submittals of a DFA and the new process requires documentation.

**Clean up existing DFA related BPMs:** Existing BPMs that cover DFA and other non-market DR processes could be better centralized and described. Documentation currently spread across Demand Response, WEIM & EDAM BPMs.

# Background on the DFA process

## What is the DFA?

Mechanism used by ALFS to pass Non-Market demand response (NMDR)\* to the demand forecast used in WEIM and EDAM. Separate signed attestation letters required for WEIM and EDAM.

## What are the benefits of using the DFA?

1. Can improve accuracy of the demand forecast especially for larger NMDR events
2. Accounting for NMDR via the ALFS demand forecast feeds into RSE obligations
3. Helps avoid demand forecast validation rules getting triggered
4. Can help prevent need for operator real-time load biasing

# Overview of BPM structural changes

Currently DFA processes spread across multiple BPMs

## Demand Response

- **Section 17:** Accounting for Non-Participating DR in the RSE
- **Section 18:** Accounting for Non-Participating DR in the ALFS Forecast

## WEIM

- **Section 11.3.2:** Accounting for Non-Participating DR Schedules in the RSE

## EDAM

- **Section 21.1.3.1.4:** Demand response/load modification adjustments that are not RDRR

Proposing to centralize DFA process in Market Operations BPM. Demand Response, WEIM and EDAM will include cross references.

## Market Operations

- **[NEW]Section 6.4.8:** Adjustment to the CAISO Forecast of BAA Demand for DAM
- **[NEW] Section 7.3.5:** Adjustments to the CAISO Forecast of BAA Demand for RTM
- **Rebranding**
  - Load Forecast Adjustment (LFA) -> Demand Forecast Adjustment (DFA)

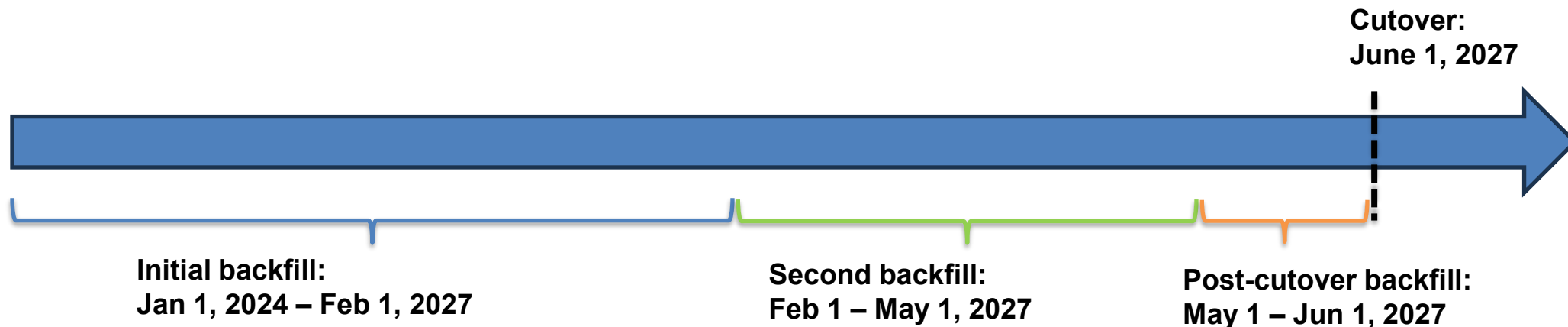
# LOAD TRANSFER PROCESS

# Load Transfer Process

- Process utilized to adjust historical training data when an entity changes its served load
- Process allows for forecasts models to be trained on current conditions while continuing to have sufficient training data
  - Need to scrub out the transferred load from historical actuals for entity transferring load
  - Need to add in transferred load to historical actuals for entity receiving load
- Example: Load of 100 MW transfers between 2 entities
  - Before Cutover
    - Entity 1 serves 1,000 MW of demand
    - Entity 2 serves 500 MW of demand
  - After Cutover
    - Entity 1 serves 900 MW of demand
    - Entity 2 serves 600 MW of demand

# Process and Data Requirements for Load Transfers

- Submit a CIDI ticket notifying that load transfer will be initiated (3-6 months notice). Ticket should include:
  - Scheduled Cutover Date
  - Entity receiving load transfer
  - Conforming or Nonconforming Load shape?
  - Initial 5-minute telemetry data spanning January 1 of three years prior – Present in Pacific Prevailing Time
    - Initial backfill to be conducted so that training data can be prepped prior to cutover
    - Typically provided 3-6 months prior to cutover
  - Second 5-minute telemetry data spanning initial dataset to 1-month prior to cutover
  - Post-cutover “catchup” backfill spanning 2<sup>nd</sup> backfill to cutover



# IR REQUIREMENT HIGHLIGHTS

# Imbalance Reserve (IR) Product

## CAISO

July performed as expected

August upward coverage falls below target and September downward coverage falls below target

## PACE

Consistent performance in July and August

September upward coverage falls below target

## PACW

July downward falls coverage below target

August is performing as expected and September upward coverage is below target

CAISO

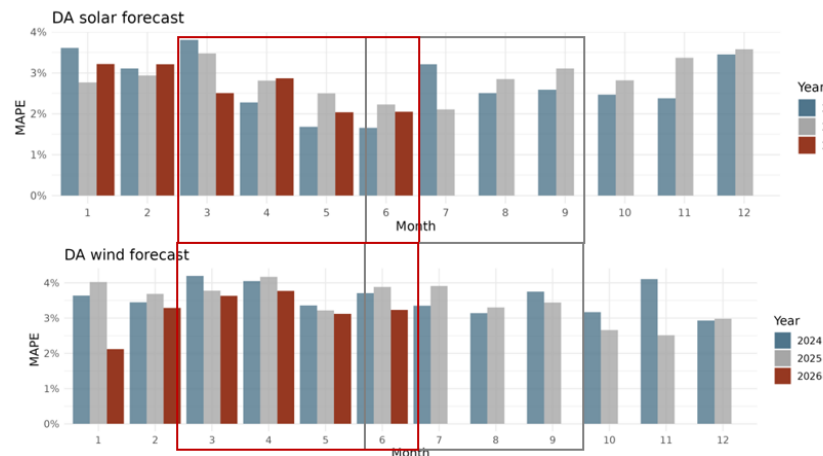
PACE

PACW

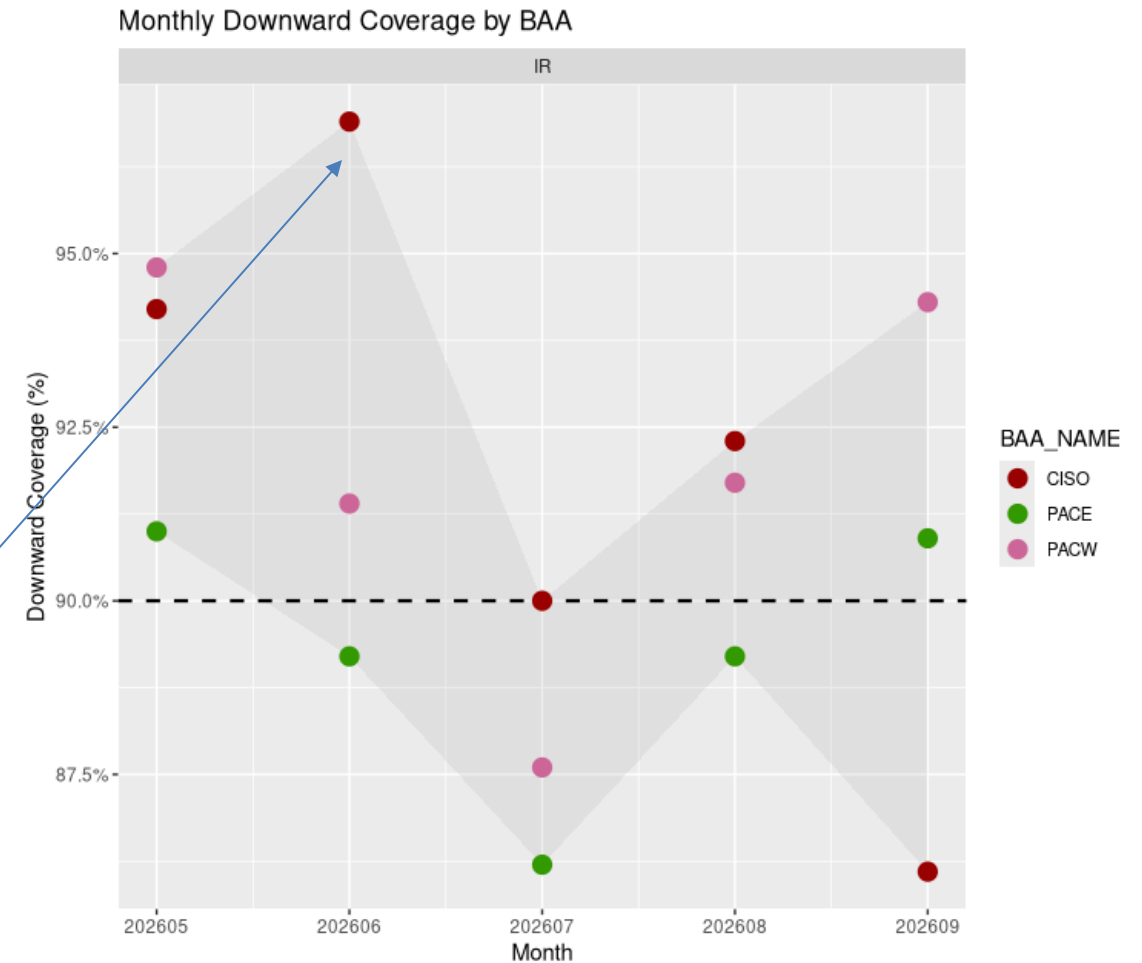
| July                                                                                                                                                                                                                                                                                                                                                                                                                   |       | August      |  | September |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------|--|-----------|-------|-----------------|------|-----------------------|------|-------------------|------|-------------------------|-------|---------------------------|-----|-----------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------|--|------|-------|-----------------|------|-----------------------|------|-------------------|------|-------------------------|-------|---------------------------|-----|-----------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------|--|------|-------|-----------------|------|-----------------------|------|-------------------|------|-------------------------|-------|---------------------------|-----|-----------------------------|------|
| <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.92</td></tr><tr><td>IR Avg Up Requirement</td><td>1636</td></tr><tr><td>IR Covered Down %</td><td>0.91</td></tr><tr><td>IR Avg Down Requirement</td><td>-2121</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>524</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-327</td></tr></table> |       | IR Coverage |  | Type      | Value | IR Covered Up % | 0.92 | IR Avg Up Requirement | 1636 | IR Covered Down % | 0.91 | IR Avg Down Requirement | -2121 | IR Avg Up Exceedance (MW) | 524 | IR Avg Down Exceedance (MW) | -327 | <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.85</td></tr><tr><td>IR Avg Up Requirement</td><td>1660</td></tr><tr><td>IR Covered Down %</td><td>0.92</td></tr><tr><td>IR Avg Down Requirement</td><td>-2320</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>435</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-476</td></tr></table> |  | IR Coverage |  | Type | Value | IR Covered Up % | 0.85 | IR Avg Up Requirement | 1660 | IR Covered Down % | 0.92 | IR Avg Down Requirement | -2320 | IR Avg Up Exceedance (MW) | 435 | IR Avg Down Exceedance (MW) | -476 | <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.9</td></tr><tr><td>IR Avg Up Requirement</td><td>1749</td></tr><tr><td>IR Covered Down %</td><td>0.86</td></tr><tr><td>IR Avg Down Requirement</td><td>-2092</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>436</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-481</td></tr></table> |  | IR Coverage |  | Type | Value | IR Covered Up % | 0.9  | IR Avg Up Requirement | 1749 | IR Covered Down % | 0.86 | IR Avg Down Requirement | -2092 | IR Avg Up Exceedance (MW) | 436 | IR Avg Down Exceedance (MW) | -481 |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.92  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 1636  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.91  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -2121 |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 524   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -327  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.85  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 1660  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.92  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -2320 |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 435   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -476  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.9   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 1749  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.86  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -2092 |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 436   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -481  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.93</td></tr><tr><td>IR Avg Up Requirement</td><td>494</td></tr><tr><td>IR Covered Down %</td><td>0.88</td></tr><tr><td>IR Avg Down Requirement</td><td>-761</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>164</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-178</td></tr></table>   |       | IR Coverage |  | Type      | Value | IR Covered Up % | 0.93 | IR Avg Up Requirement | 494  | IR Covered Down % | 0.88 | IR Avg Down Requirement | -761  | IR Avg Up Exceedance (MW) | 164 | IR Avg Down Exceedance (MW) | -178 | <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.91</td></tr><tr><td>IR Avg Up Requirement</td><td>522</td></tr><tr><td>IR Covered Down %</td><td>0.89</td></tr><tr><td>IR Avg Down Requirement</td><td>-745</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>132</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-260</td></tr></table>   |  | IR Coverage |  | Type | Value | IR Covered Up % | 0.91 | IR Avg Up Requirement | 522  | IR Covered Down % | 0.89 | IR Avg Down Requirement | -745  | IR Avg Up Exceedance (MW) | 132 | IR Avg Down Exceedance (MW) | -260 | <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.86</td></tr><tr><td>IR Avg Up Requirement</td><td>517</td></tr><tr><td>IR Covered Down %</td><td>0.9</td></tr><tr><td>IR Avg Down Requirement</td><td>-662</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>219</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-231</td></tr></table>   |  | IR Coverage |  | Type | Value | IR Covered Up % | 0.86 | IR Avg Up Requirement | 517  | IR Covered Down % | 0.9  | IR Avg Down Requirement | -662  | IR Avg Up Exceedance (MW) | 219 | IR Avg Down Exceedance (MW) | -231 |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.93  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 494   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.88  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -761  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 164   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -178  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.91  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 522   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.89  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -745  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 132   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -260  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.86  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 517   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.9   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -662  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 219   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -231  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.92</td></tr><tr><td>IR Avg Up Requirement</td><td>139</td></tr><tr><td>IR Covered Down %</td><td>0.87</td></tr><tr><td>IR Avg Down Requirement</td><td>-182</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>37</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-47</td></tr></table>     |       | IR Coverage |  | Type      | Value | IR Covered Up % | 0.92 | IR Avg Up Requirement | 139  | IR Covered Down % | 0.87 | IR Avg Down Requirement | -182  | IR Avg Up Exceedance (MW) | 37  | IR Avg Down Exceedance (MW) | -47  | <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.9</td></tr><tr><td>IR Avg Up Requirement</td><td>114</td></tr><tr><td>IR Covered Down %</td><td>0.92</td></tr><tr><td>IR Avg Down Requirement</td><td>-183</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>32</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-40</td></tr></table>      |  | IR Coverage |  | Type | Value | IR Covered Up % | 0.9  | IR Avg Up Requirement | 114  | IR Covered Down % | 0.92 | IR Avg Down Requirement | -183  | IR Avg Up Exceedance (MW) | 32  | IR Avg Down Exceedance (MW) | -40  | <table><tr><th colspan="2">IR Coverage</th></tr><tr><th>Type</th><th>Value</th></tr><tr><td>IR Covered Up %</td><td>0.86</td></tr><tr><td>IR Avg Up Requirement</td><td>86</td></tr><tr><td>IR Covered Down %</td><td>0.94</td></tr><tr><td>IR Avg Down Requirement</td><td>-153</td></tr><tr><td>IR Avg Up Exceedance (MW)</td><td>41</td></tr><tr><td>IR Avg Down Exceedance (MW)</td><td>-38</td></tr></table>     |  | IR Coverage |  | Type | Value | IR Covered Up % | 0.86 | IR Avg Up Requirement | 86   | IR Covered Down % | 0.94 | IR Avg Down Requirement | -153  | IR Avg Up Exceedance (MW) | 41  | IR Avg Down Exceedance (MW) | -38  |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.92  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 139   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.87  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -182  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 37    |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -47   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.9   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 114   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.92  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -183  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 32    |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -40   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Coverage                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                   | Value |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Up %                                                                                                                                                                                                                                                                                                                                                                                                        | 0.86  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Requirement                                                                                                                                                                                                                                                                                                                                                                                                  | 86    |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Covered Down %                                                                                                                                                                                                                                                                                                                                                                                                      | 0.94  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Requirement                                                                                                                                                                                                                                                                                                                                                                                                | -153  |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Up Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                              | 41    |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |
| IR Avg Down Exceedance (MW)                                                                                                                                                                                                                                                                                                                                                                                            | -38   |             |  |           |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                        |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |             |  |      |       |                 |      |                       |      |                   |      |                         |       |                           |     |                             |      |

# Initial “Over-Coverage” for IRD Appears Related to Increased Skill of VER Forecasts

The training set “sees” larger relative error if there is larger error over the historical sample (last 3 ½ Months (red) and the “forward” 3 ½ Months (gray)) compared to the calculation date

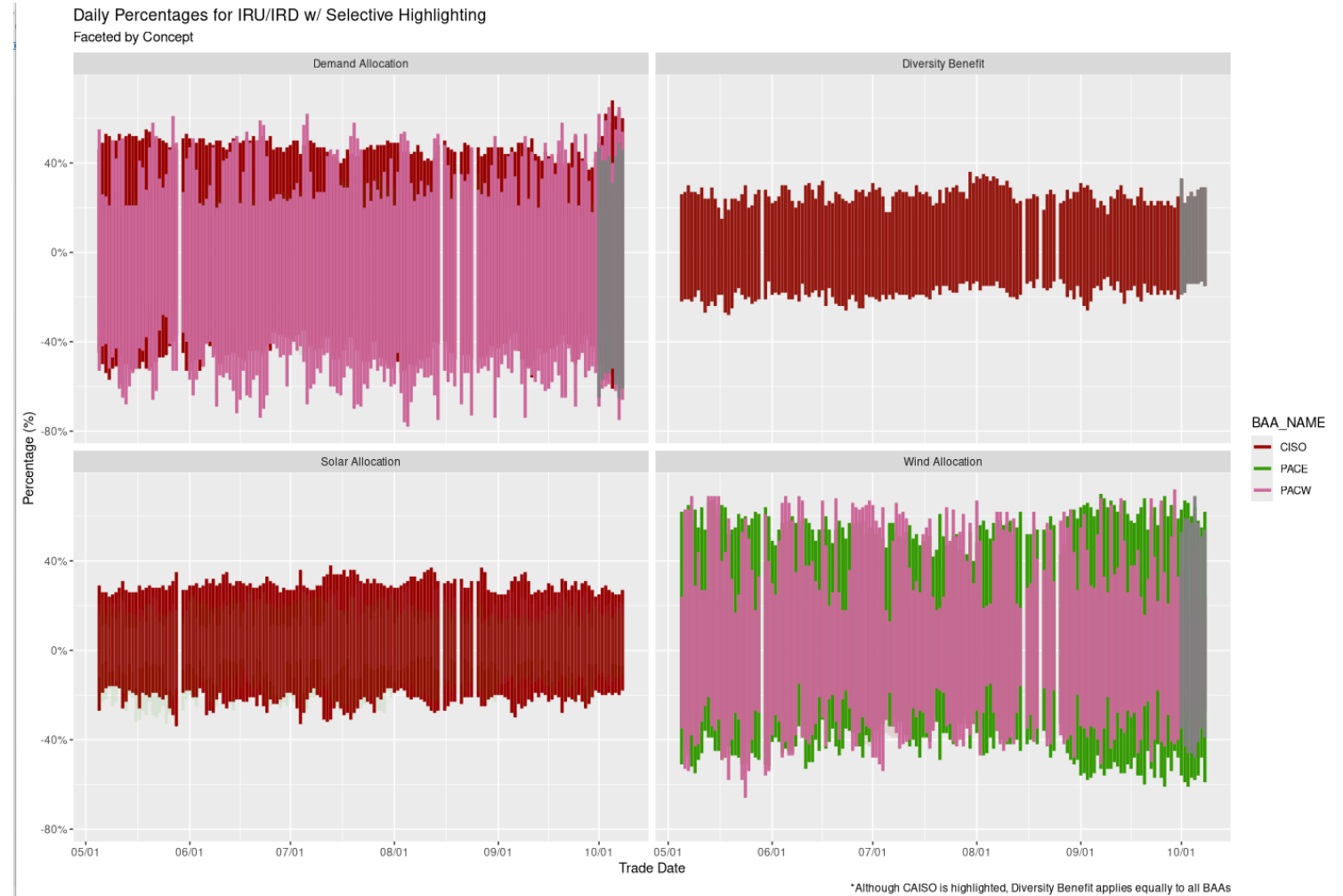


For CAISO BAA, we can highlight the relatively larger error in training data for historical June vs. observed June 2026 data



# Diversity Benefit and Relative Demand, Wind and Solar Contributions

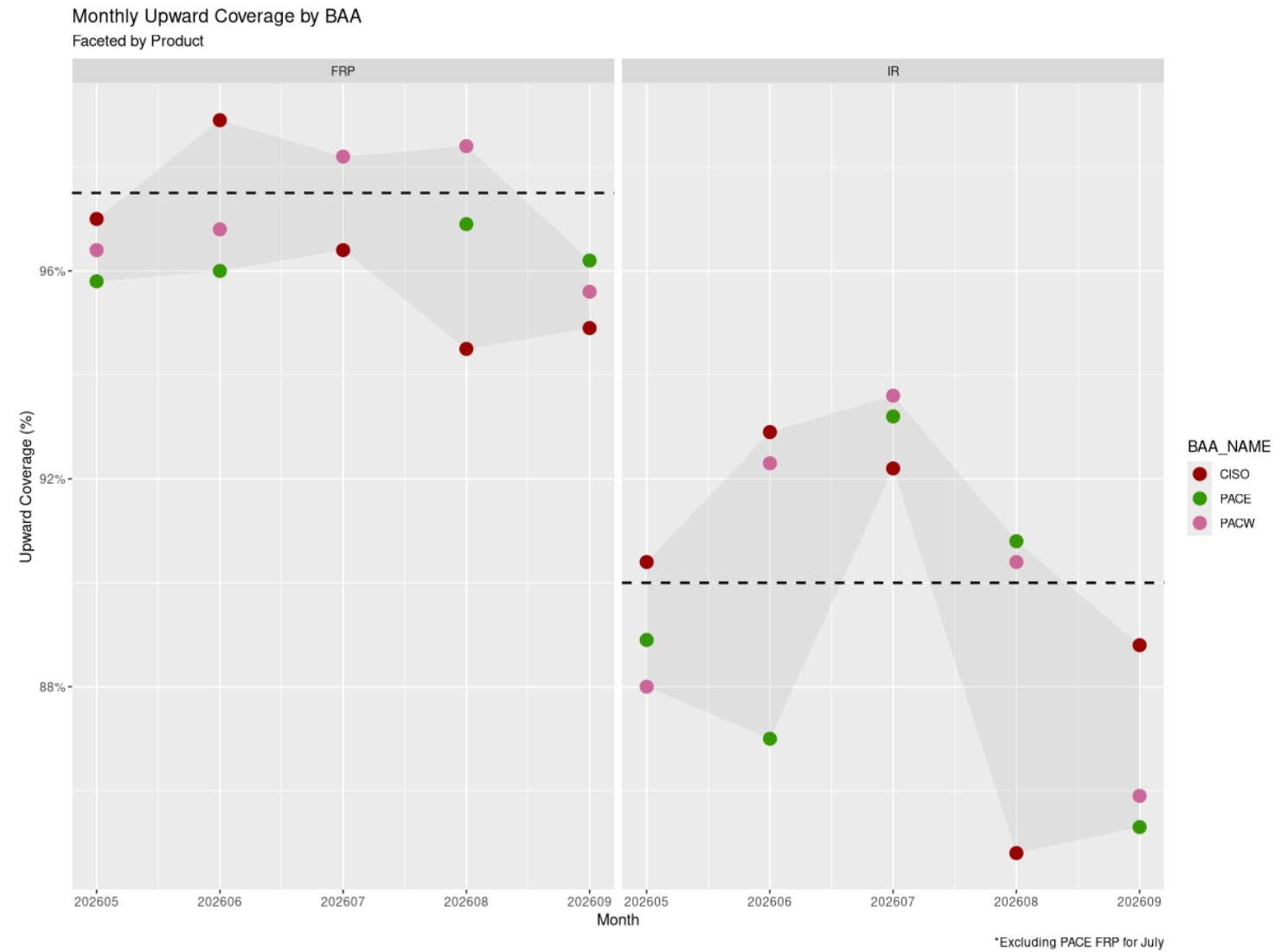
- **Diversity Benefit** is greater for IRU (Averages: 26% IRU, 19% IRD)
- CAISO BAA IRU is primarily driven by **Demand Uncertainty**, whereas PacifiCorp is driven by **Wind Uncertainty**
- **Contributions** vary day to day with respect to weather conditions



# **IMBALANCE RESERVES (IR) AND FLEXIBLE RAMP PRODUCT (FRP) COMPARISON**

# Monthly Coverage for IRU is more variable than FRU

Though the average IR upward coverage over all 5 months is **well-calibrated**, the month-to-month coverage values have more **variability**



# Static Threshold Differences

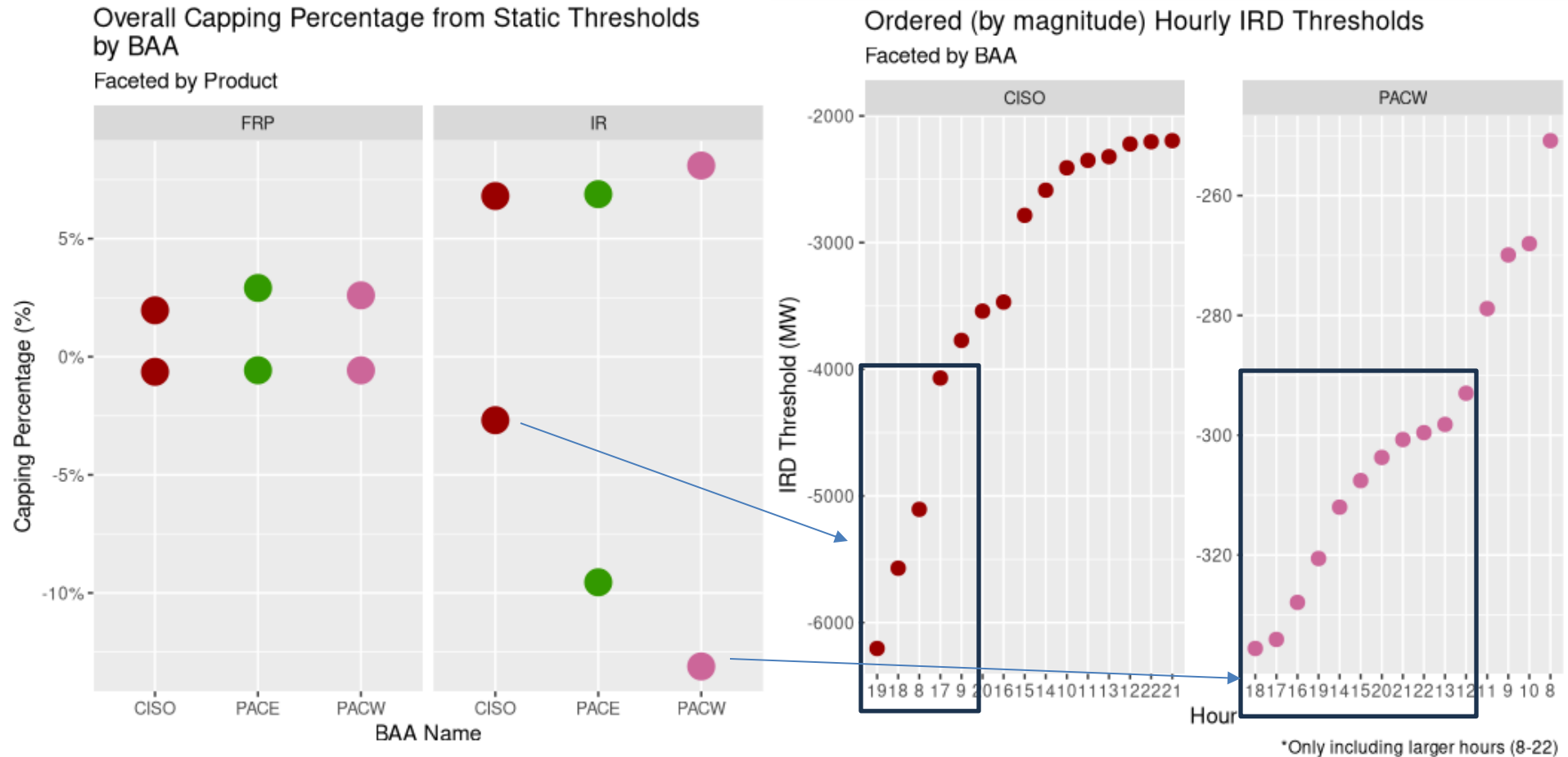
## Flexible Ramp Product (FRP)

- Take **1<sup>st</sup>, 99<sup>th</sup>** Percentile of Net-Demand Uncertainty for all 24 hours
- From those 24 values (per percentile) take Max value
- That Max value is then applied to all 24 hours for next ~Quarter

## Imbalance Reserve (IR)

- Take **9<sup>th</sup>, 91<sup>st</sup>** Percentile of Net-Demand Uncertainty for all 24 hours
- From those 24 values (per percentile) take Max value
- That Max value is then applied to all 24 hours for next ~Quarter

# Notably Increased Capping from Static Threshold in IR vs. FRP



-More frequent "Capping" is expected given the reduction of standard and static percentile gap

- "Capping" frequency is more for some BAAs when there is less hourly variability

# Takeaways

- **Key Takeaways from the First Five Months of IR Performance**

- *IR is performing as expected overall, but month to month coverage can be improved. Monthly calibration variability remains the primary opportunity to enhance confidence and stability in the product.*
- *IR provides meaningful risk coverage, but it is not designed to capture all extreme events.*

- **How does IR compare to FRP?**

- *FRP performs better than IR comparatively, with respect to coverage, though both models share same modeling framework. This should not be seen as a deficiency but a natural consequence of longer lead time, among other factors*

- **What insights have we gained that should influence future product improvements or operational decisions?**

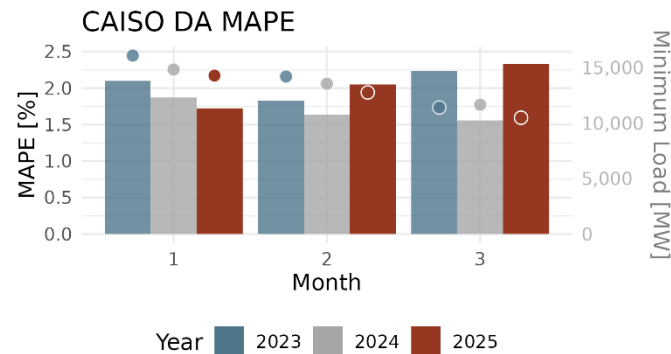
- *EVALUATE: Expand and diversify the training data with capacity correction (e.g., sample scheme). Performance patterns observed during CAISO and PACE over-coverage periods in early summer suggest that broadening the sampling approach could improve robustness under seasonal transitions*
- *EVALUATE: demand-driven uncertainty for DA timeframe.*

# APPENDIX – METRICS REFERENCE

# Interpreting load forecast accuracy plots

Mean absolute percent error (MAPE)

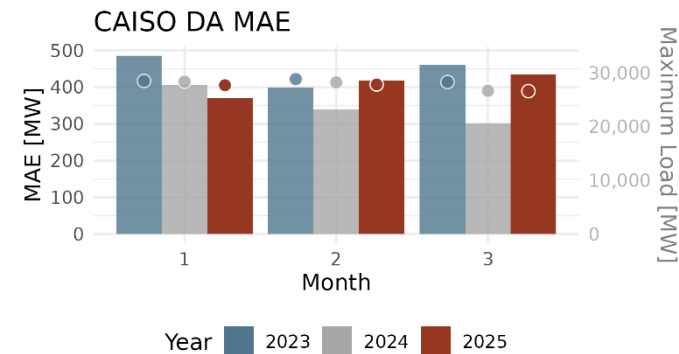
$$\text{MAPE} = \frac{1}{N} \sum_{i=1}^N \left( \frac{|\text{Forecast} - \text{Actual}|}{\text{Actual}} \right)_i$$



- MAPE is shown with *minimum* load per month on a secondary y-axis.
- **Expected:** Low midday loads will lead to higher MAPE. More BTM solar and DERs will decrease midday load.
- **Desired:** MAPE decreases over time.

Mean absolute error (MAE)

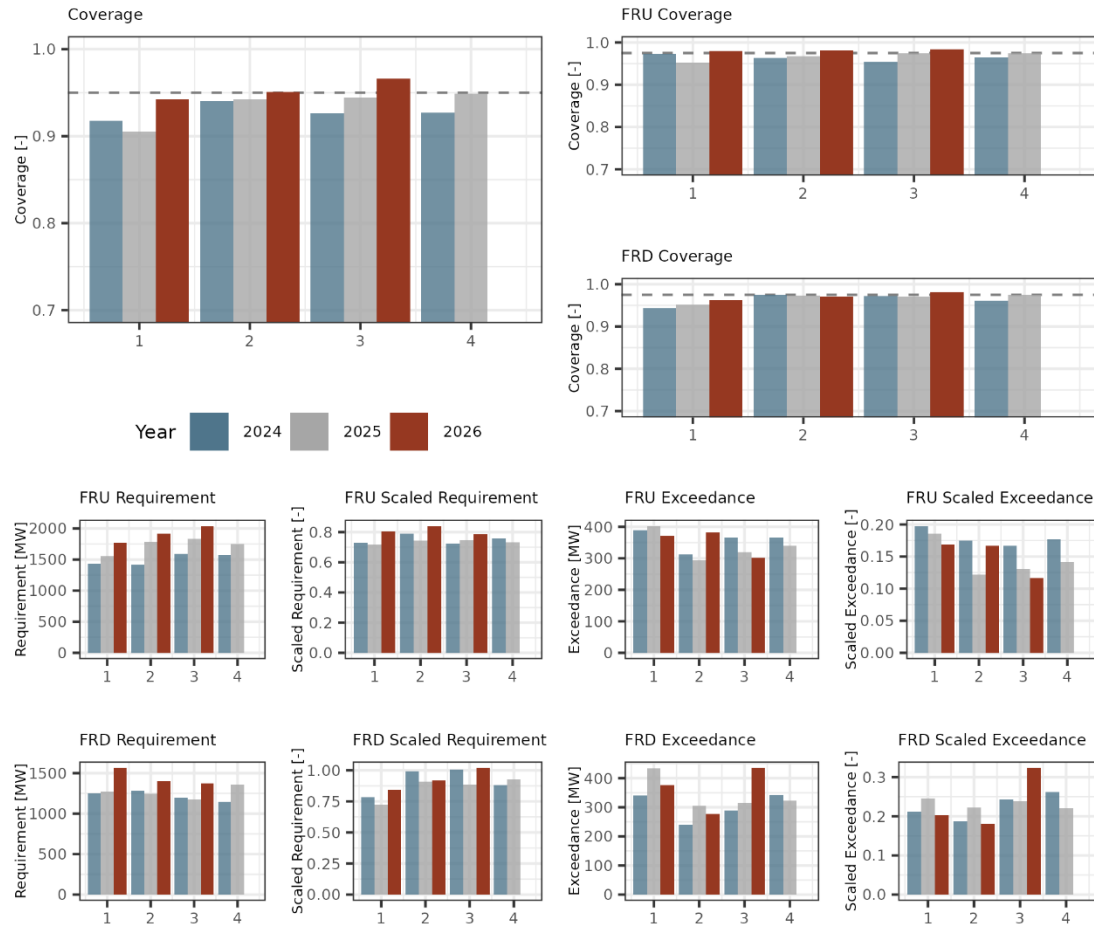
$$\text{MAE} = \frac{1}{N} \sum_{i=1}^N (|\text{Forecast} - \text{Actual}|)_i$$



- MAE is shown with *maximum* load per month on a secondary y-axis.
- **Expected:** Higher loads will lead to higher MAE. Peak loads may grow over time.
- **Desired:** MAE decreases over time.

# Interpreting uncertainty plots

## EIM AREA



Data current to 2026-07-06. Quarter number on x-axis.

Uncertainty plots show quarterly coverage, directional coverage, directional requirement and exceedance, and scaled directional requirement and exceedance.

FRP statistics reflect RTPD where uncertainty is the RTD binding forecast minus RTPD advisory forecast. IR statistics reflect uncertainty defined as the RTPD binding forecast minus DA advisory forecast.

Goal:

- Obtain coverage near target
- Keep requirement magnitudes comparable to observed net demand uncertainty
- Decrease average exceedance

Quarters are defined by calendar month. Quarter 1 is Jan – Mar, Quarter 2 is Apr – Jun, etc. Note, we provide reporting on incomplete quarters, whose metrics will update with the next reporting cycle.

Caption notes the latest trade date included in the current quarter evaluation as MPPF slides are prepared prior to the end of the quarter.

# Uncertainty metrics

Applicable for flex ramp product (FRP) and imbalance reserve (IR).

Both products have an upward and downward requirement representing a high and low percentile probabilistic forecast that estimates net demand uncertainty.

Coverage captures the percentage of time when uncertainty falls within the requirement range.

$$\text{overall coverage} = \frac{1}{N} \sum_{i=1}^N (\text{RD} \leq x \leq \text{RU})_i$$

$$\text{RU coverage} = \frac{1}{N} \sum_{i=1}^N (x \leq \text{RU})_i$$

$$\text{RD coverage} = \frac{1}{N} \sum_{i=1}^N (x \geq \text{RD})_i$$

Requirement captures average directional requirement MW value.

$$\text{RU requirement} = \frac{1}{N} \sum_{i=1}^N (\text{RU})_i$$

$$\text{RD requirement} = \frac{1}{N} \sum_{i=1}^N (\text{RD})_i$$

Exceedance captures average MW value that observed uncertainty exceeds the directional requirement.

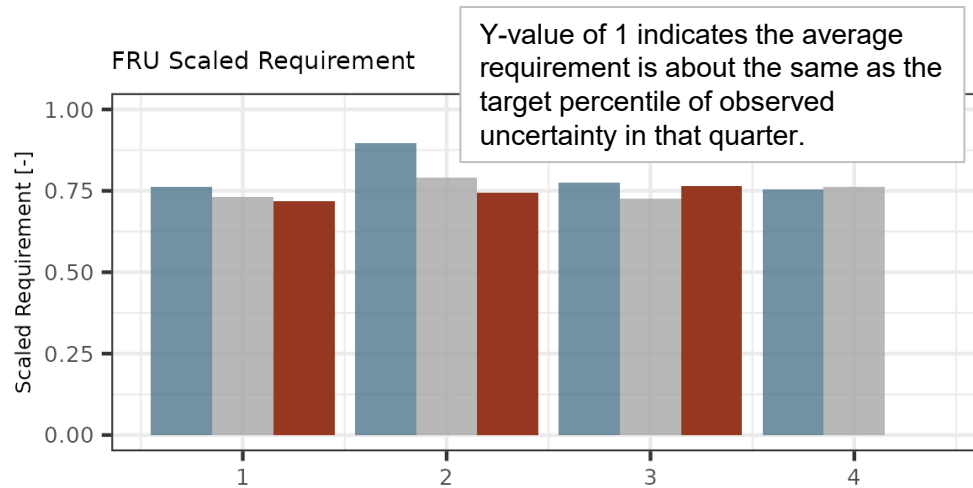
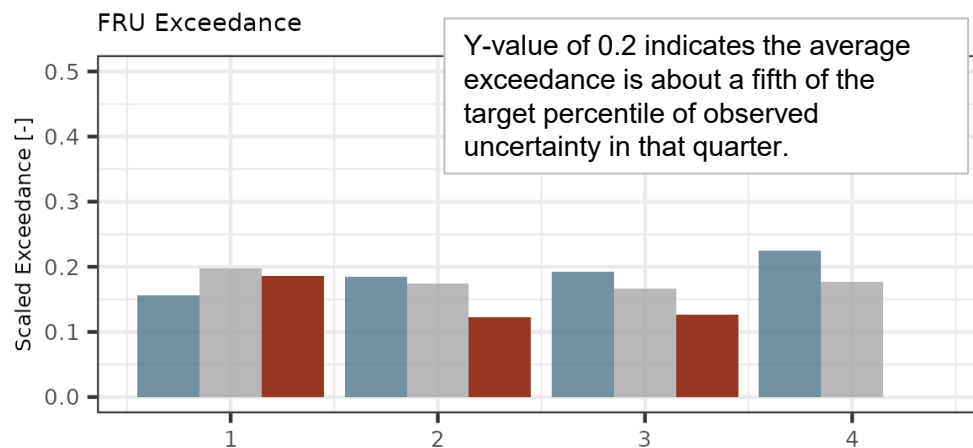
$$\text{RU exceedance} = \frac{1}{M} \sum_{j=1}^M (x - \text{RU})_j, \text{ for interval } j \text{ where } x_j > \text{RU}$$

$$\text{RD exceedance} = \frac{1}{M} \sum_{j=1}^M (x - \text{RD})_j, \text{ for interval } j \text{ where } x_j < \text{RD}$$

| Symbol | Name                                                                            |
|--------|---------------------------------------------------------------------------------|
| RU     | Upward requirement; requirement at the high percentile (FRU or IRU)             |
| RD     | Downward requirement; requirement at the low percentile (FRD or IRD)            |
| $x$    | Realized uncertainty                                                            |
| $N$    | Total number of intervals under evaluation                                      |
| $M$    | Number of intervals under evaluation where realized uncertainty was not covered |

# Interpreting uncertainty metrics: scaled requirement and exceedance

Scaling requirement and exceedance adds another dimension for evaluation, where these MW metrics are reviewed in the context of uncertainty patterns.



## Scaled requirement

- Presented as positive factor
- **Requirement / realized uncertainty**
  - Upward requirement / 97.5<sup>th</sup> uncertainty for FRU
  - Downward requirement / 2.5<sup>th</sup> uncertainty for FRD
  - Upward requirement / 90<sup>th</sup> uncertainty for IRU
  - Downward requirement / 10<sup>th</sup> uncertainty for IRD
- Scaled requirements may generally be near ~1 as requirements should be comparable to target uncertainty

## Scaled exceedance

- Presented as positive factor
- **Exceedance / realized uncertainty**
  - Upward exceedance / 97.5<sup>th</sup> uncertainty for FRU
  - Downward exceedance / 2.5<sup>th</sup> uncertainty for FRD
  - Upward exceedance / 90<sup>th</sup> uncertainty for IRU
  - Downward exceedance / 10<sup>th</sup> uncertainty for IRD
- Exceedance sample size will vary per quarter. If a historical value is missing post-onboarding, it indicates a quarter in which there was no exceedance

# Interpreting scaled requirements

**Ideally:** Overall coverage is on target and scaled requirement < 1

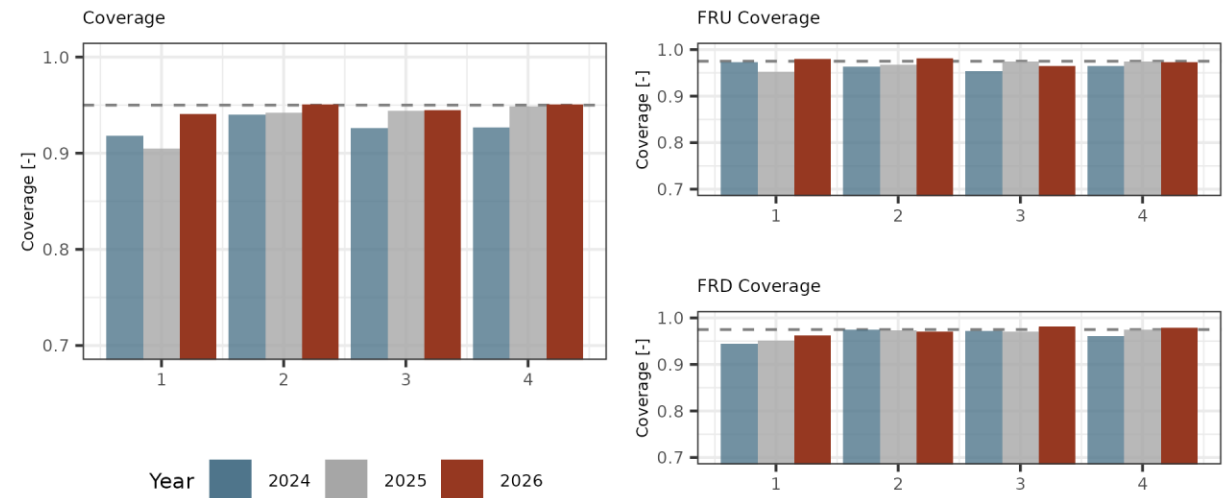
For probabilistic forecasting, there's a trade off between accuracy and efficiency, i.e. coverage and requirements. We aim to maximize efficiency (minimize requirements) without compromising coverage. A scaled requirement of ~1 is generally meeting performance expectations. In addition, comparing the requirement to scaled requirement trends help indicate performance as outlined below.

| Requirement trend year-on-year per quarter | Scaled requirement trend year-on-year per quarter | Scenario description                                                                                               | Interpretation, assuming coverage is about the same                                                                                                                                                                                             |
|--------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decreasing                                 | Decreasing                                        | Requirements are decreasing faster than observed uncertainty (uncertainty is staying about the same or increasing) | Great                                                                                                                                                                                                                                           |
|                                            | Staying the same                                  | Requirements are decreasing at about the same rate as observed uncertainty                                         | Performance is meeting expectations. Overall, this is a good trend since uncertainty is decreasing.                                                                                                                                             |
|                                            | Increasing                                        | Requirements are decreasing on average, but observed uncertainty is decreasing at a faster rate                    | Good from an operations standpoint since requirements are decreasing. Neutral to negative on mosaic performance as the model may be lagging the uncertainty trend; requirements tend to be larger than needed.                                  |
| Staying the same                           | Decreasing                                        | Requirements are staying the same despite observed uncertainty increasing                                          | Maintenance – mosaic is looking more efficient                                                                                                                                                                                                  |
|                                            | Staying the same                                  | Requirements and observed uncertainty are staying consistent for the season                                        | Maintenance – fair                                                                                                                                                                                                                              |
|                                            | Increasing                                        | Requirements are staying the same, but observed uncertainty is decreasing                                          | Maintenance – mosaic has been less efficient                                                                                                                                                                                                    |
| Increasing                                 | Decreasing                                        | Requirements are increasing at a slower rate than observed uncertainty                                             | Good from model performance standpoint as mosaic is looking efficient. May be challenging operationally since requirements are increasing.                                                                                                      |
|                                            | Staying the same                                  | Requirements are increasing at about the same rate as observed uncertainty                                         | Performance is meeting expectations. Entity may want further review to identify why uncertainty is increasing. Review coverage metrics, scaled requirements relative to 1, renewable capacity growth, and load and renewable forecast accuracy. |
|                                            | Increasing                                        | Requirements are increasing faster than observed uncertainty (uncertainty is staying about the same or decreasing) | Bad. This is challenging operationally since requirements are increasing and mosaic has been less efficient.                                                                                                                                    |

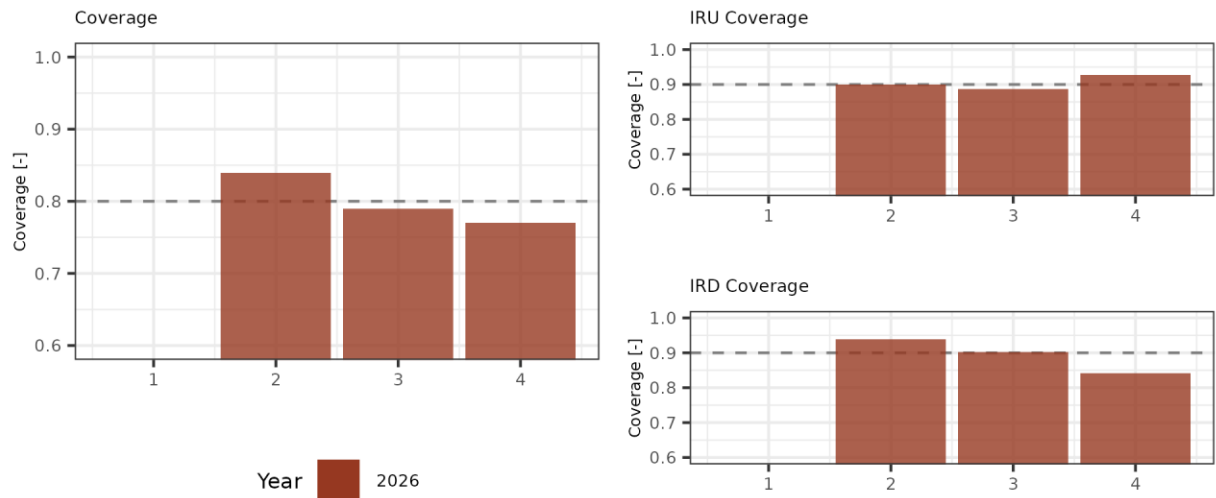
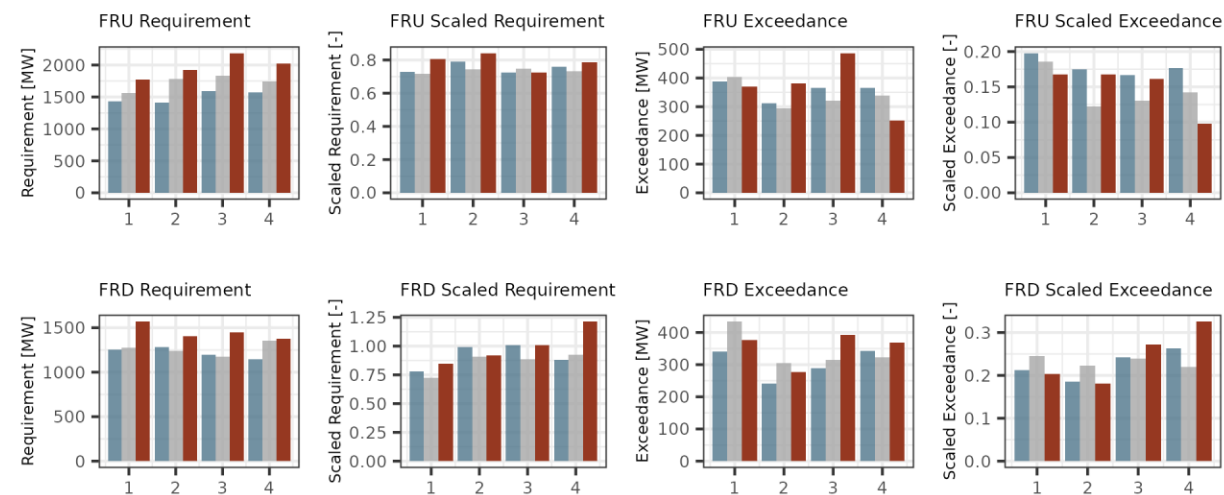
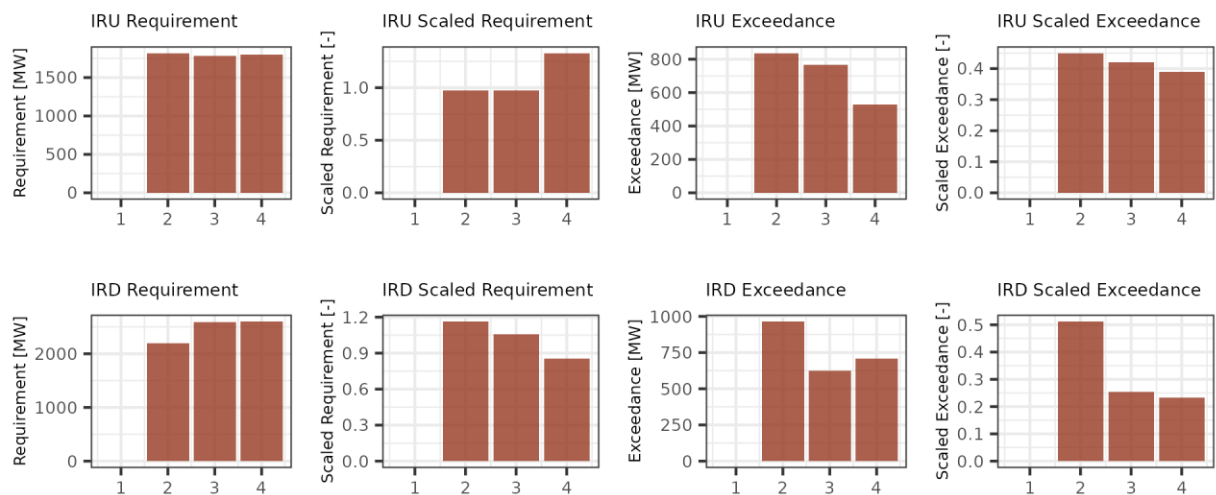
# APPENDIX – LOAD AND UNCERTAINTY

# FRP and IR metrics for aggregated areas

EIM AREA



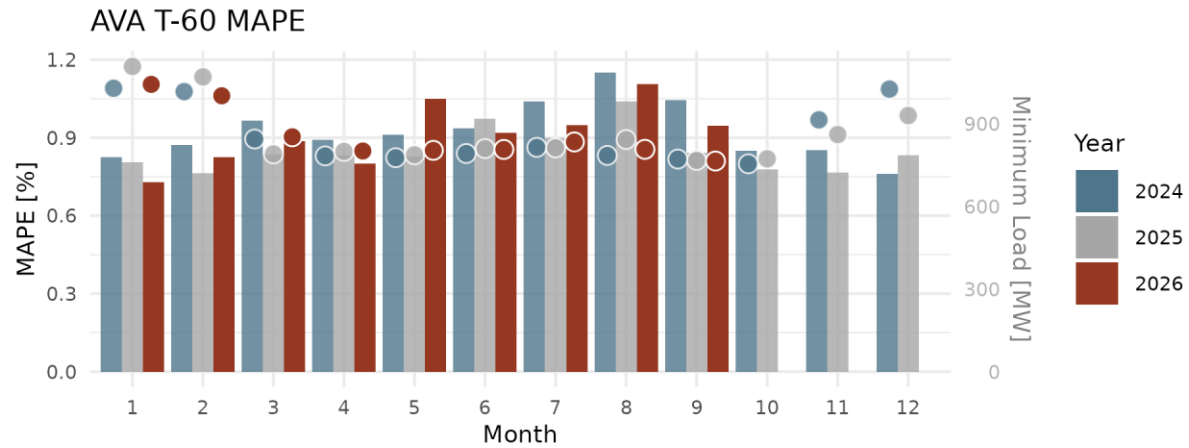
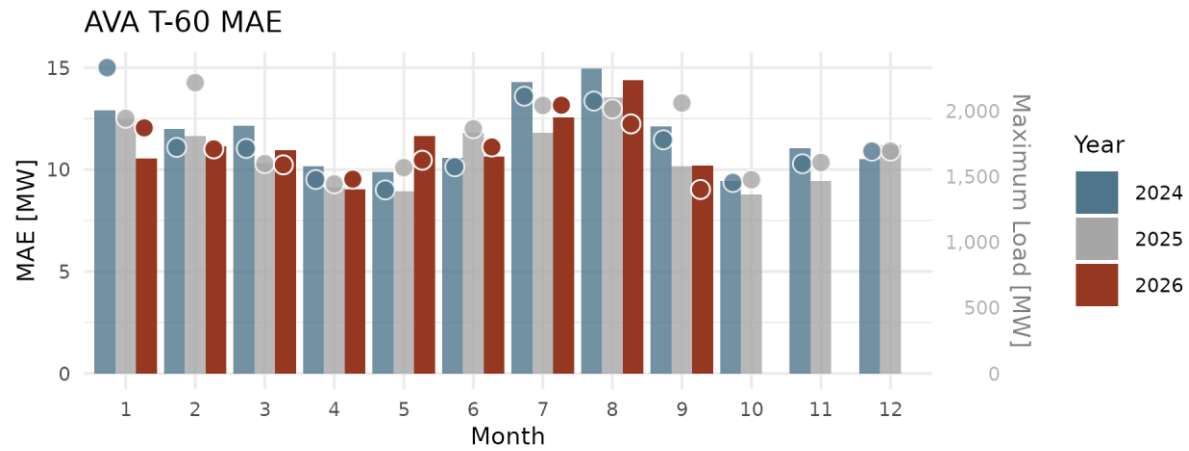
EDAM AREA



Data current to 2026-10-11. Quarter number on x-axis.

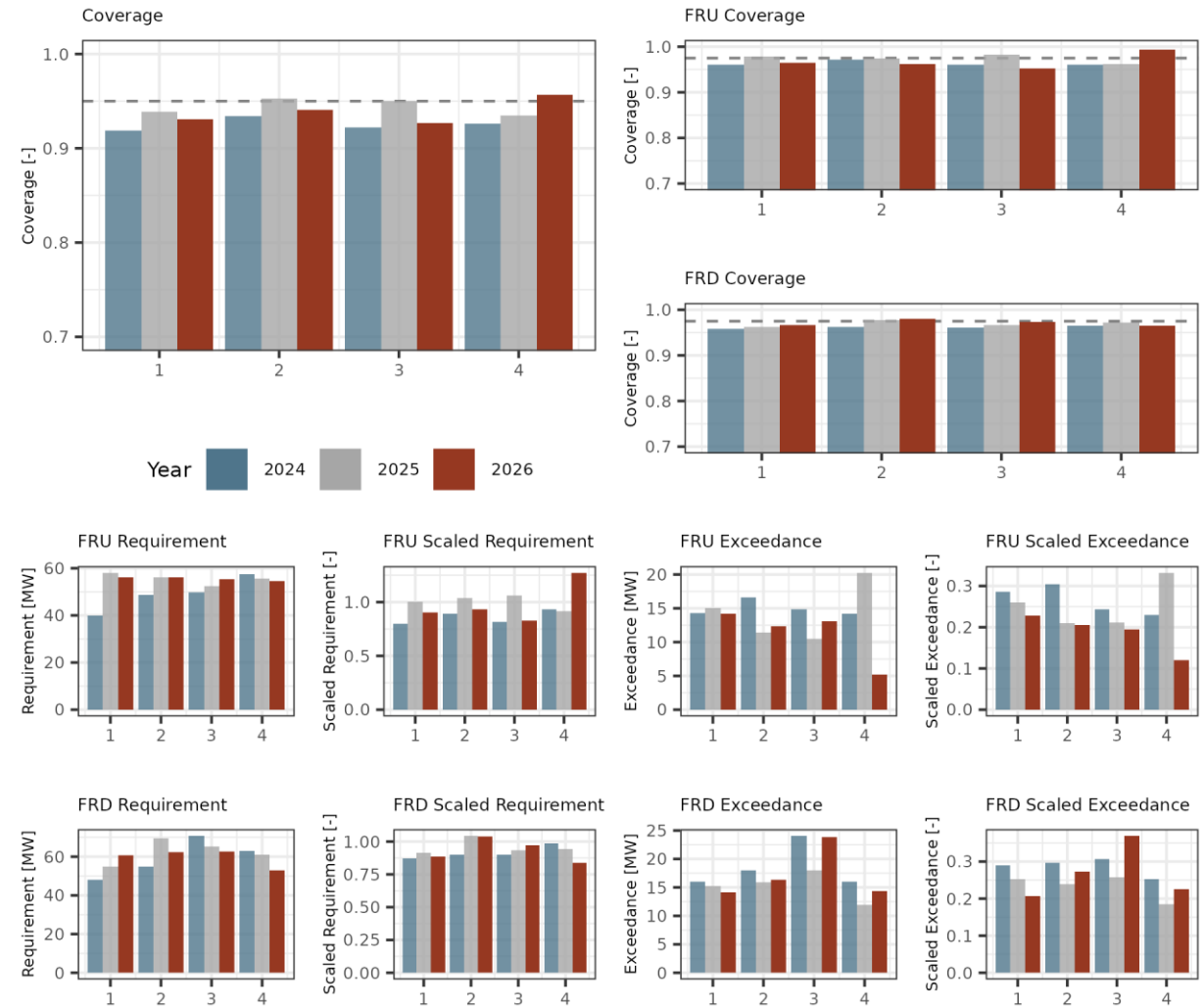
Data current to 2026-10-18. Quarter number on x-axis.

# AVA



Bars use primary y-axis at left. Points use secondary y-axis at right.

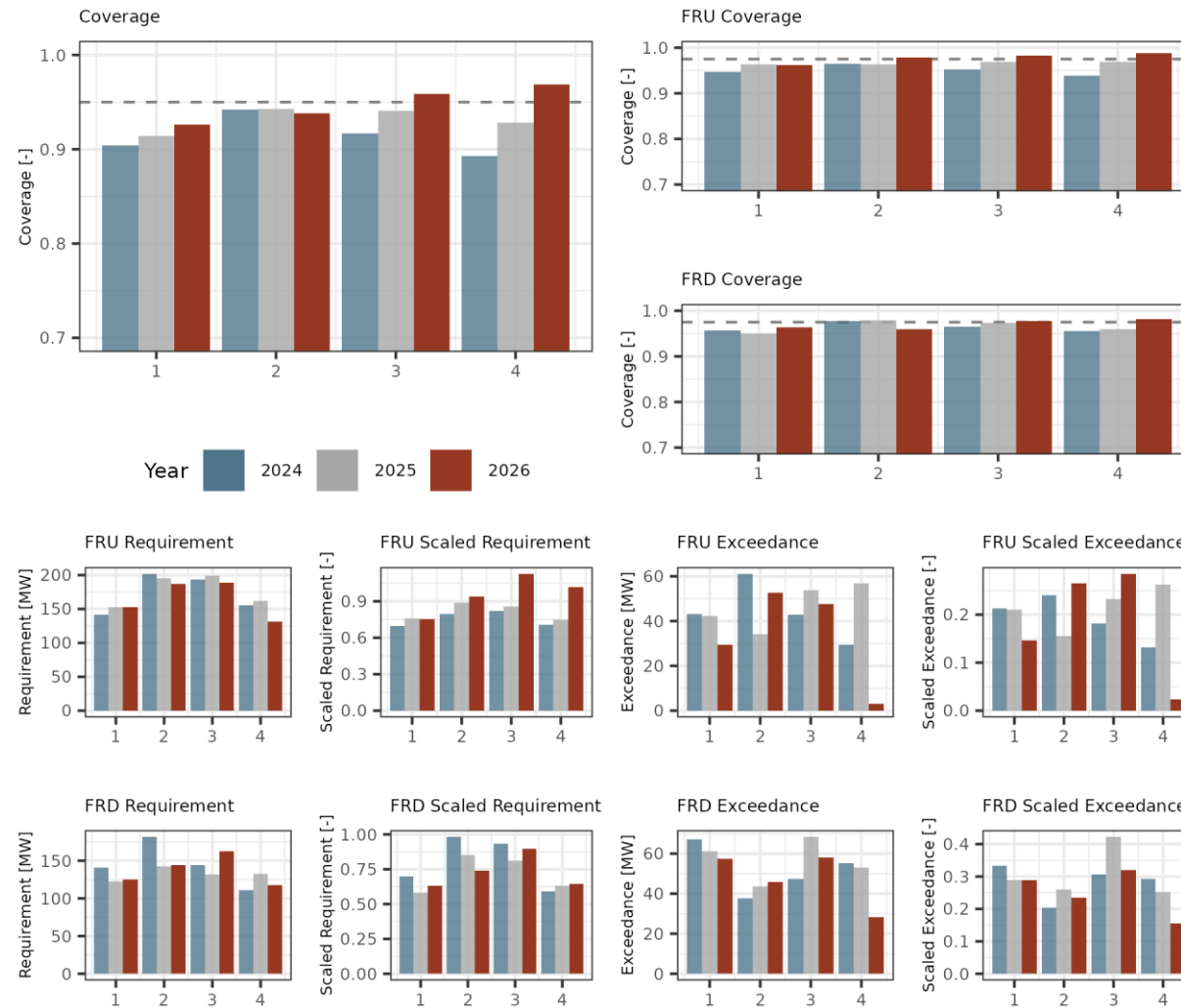
# AVA



Data current to 2026-10-11. Quarter number on x-axis.

# AVRN

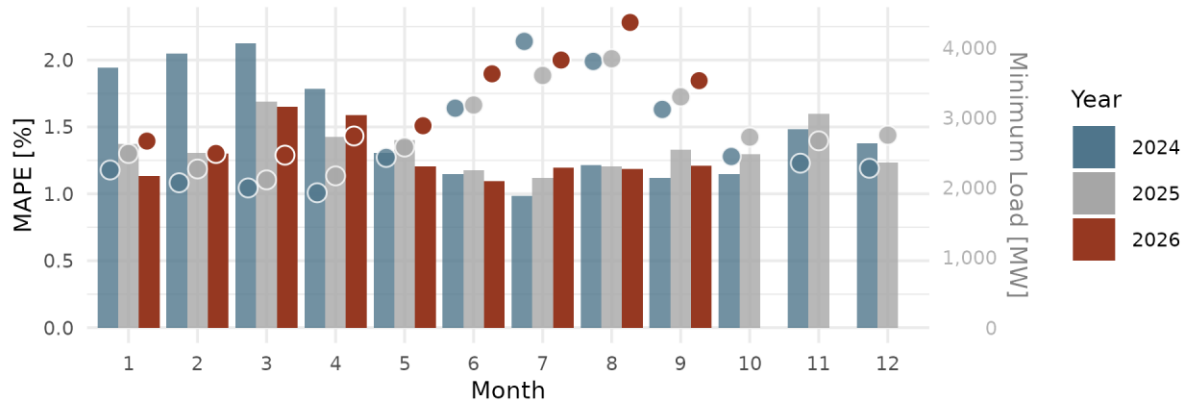
## AVRN



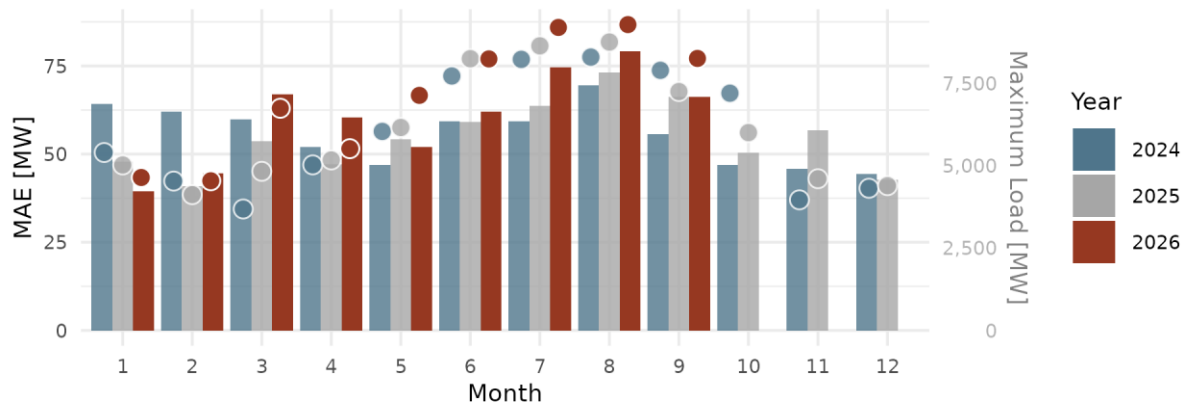
Data current to 2026-10-11. Quarter number on x-axis.

# APS

APS T-60 MAPE

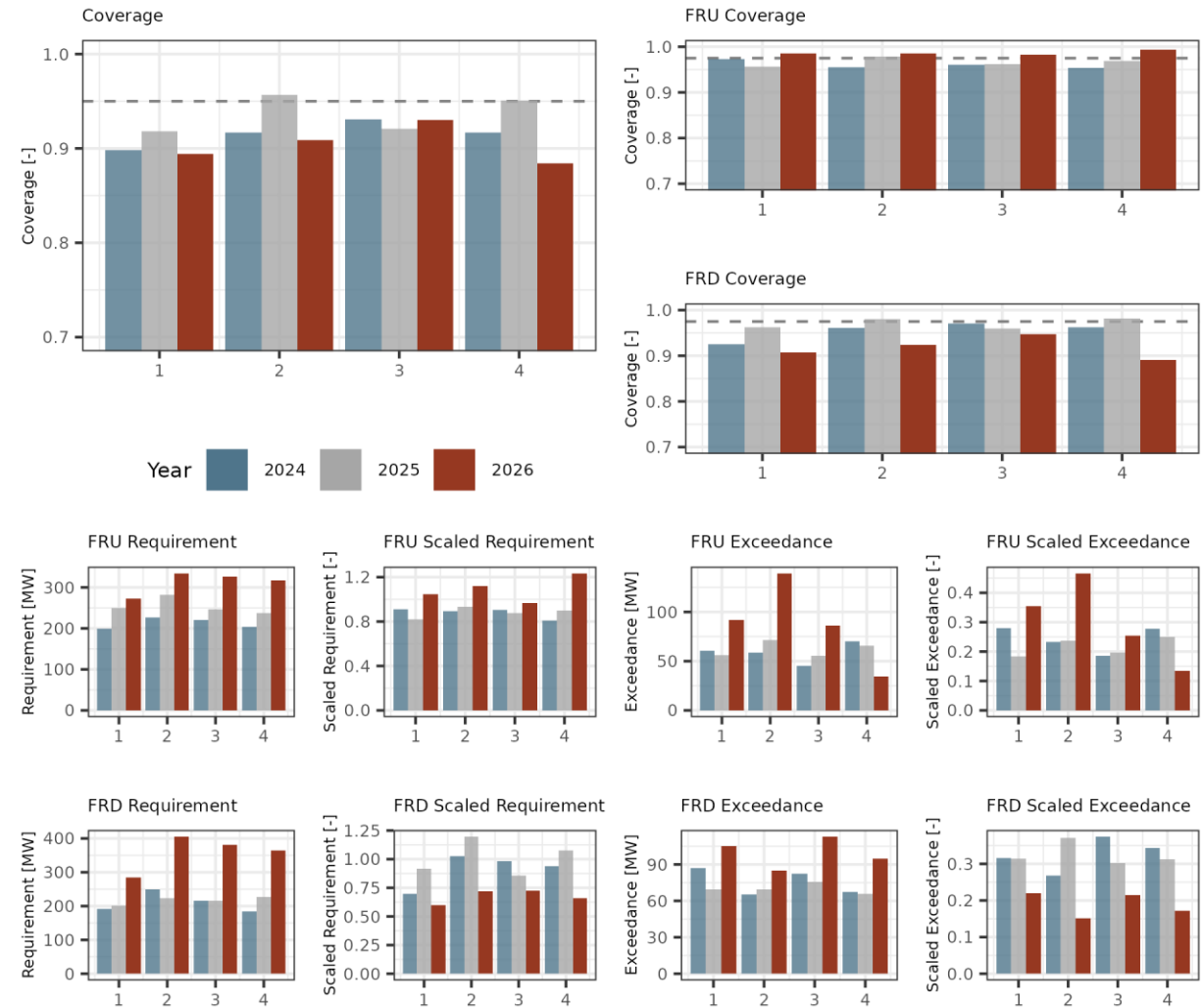


APS T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

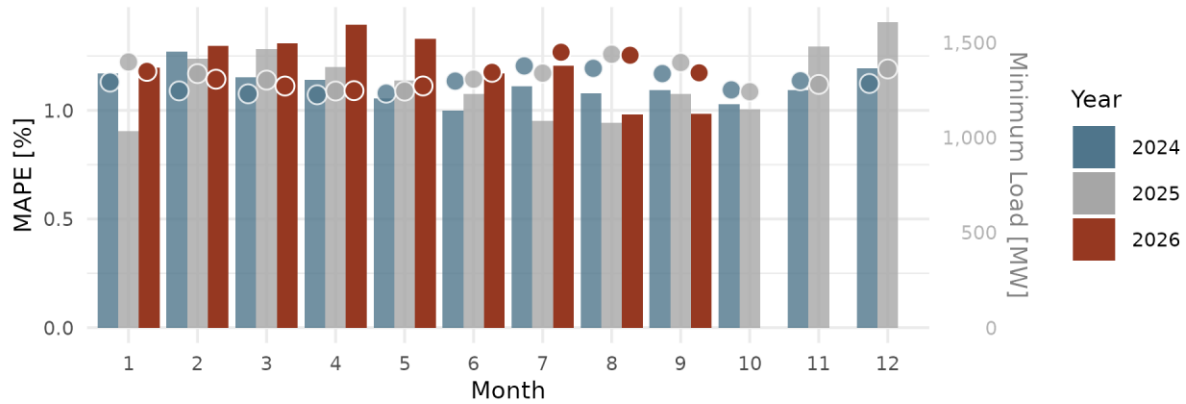
# APS



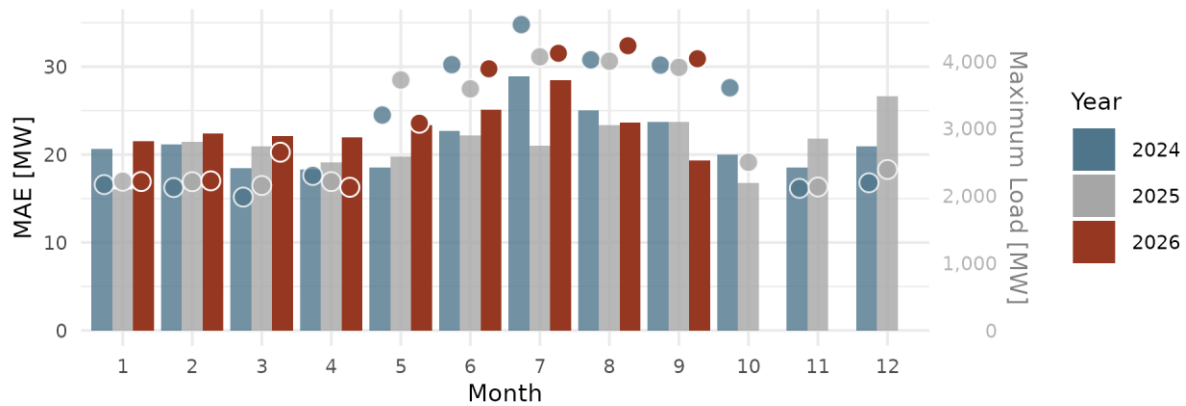
Data current to 2026-10-11. Quarter number on x-axis.

# BANC

BANC T-60 MAPE

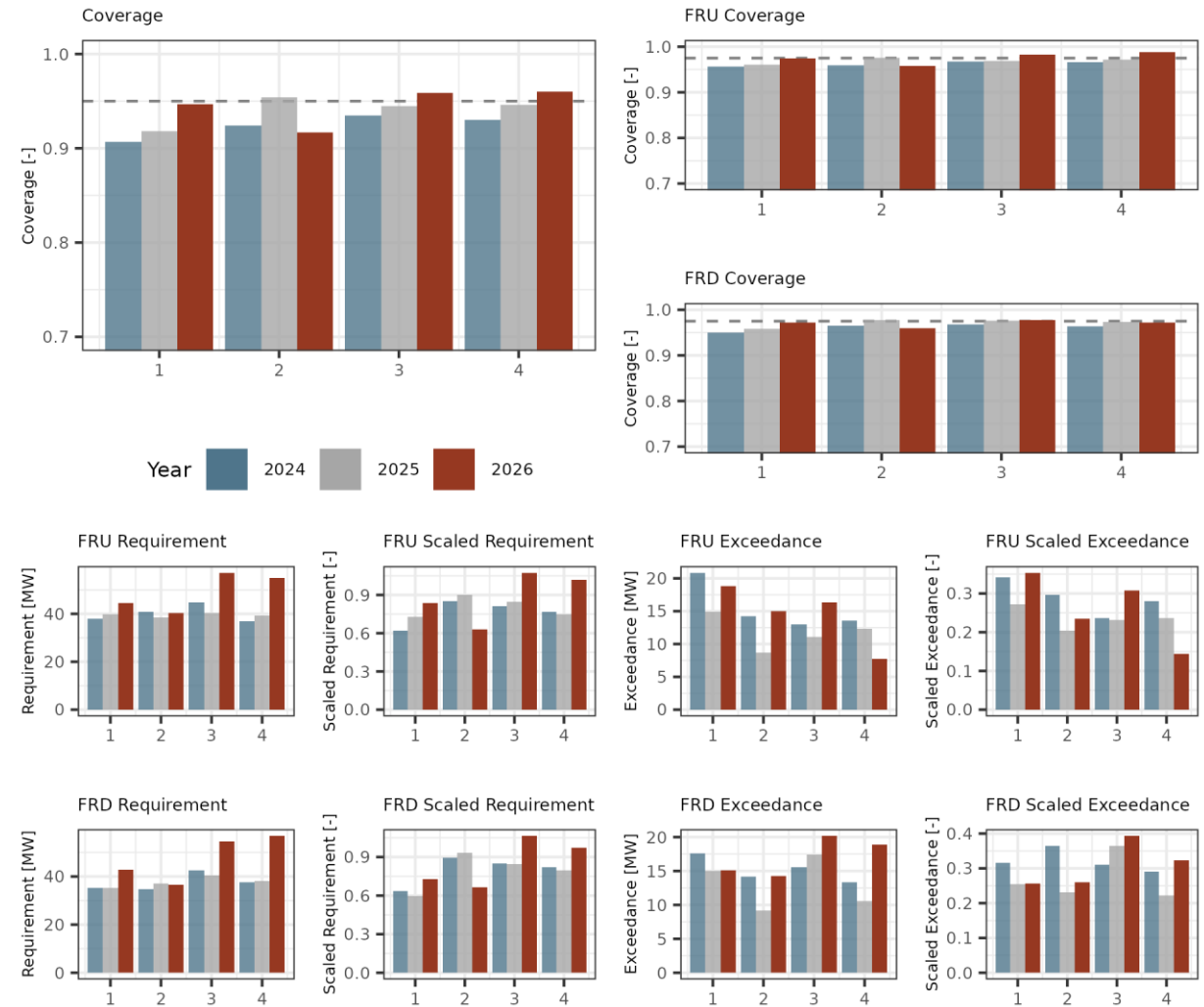


BANC T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

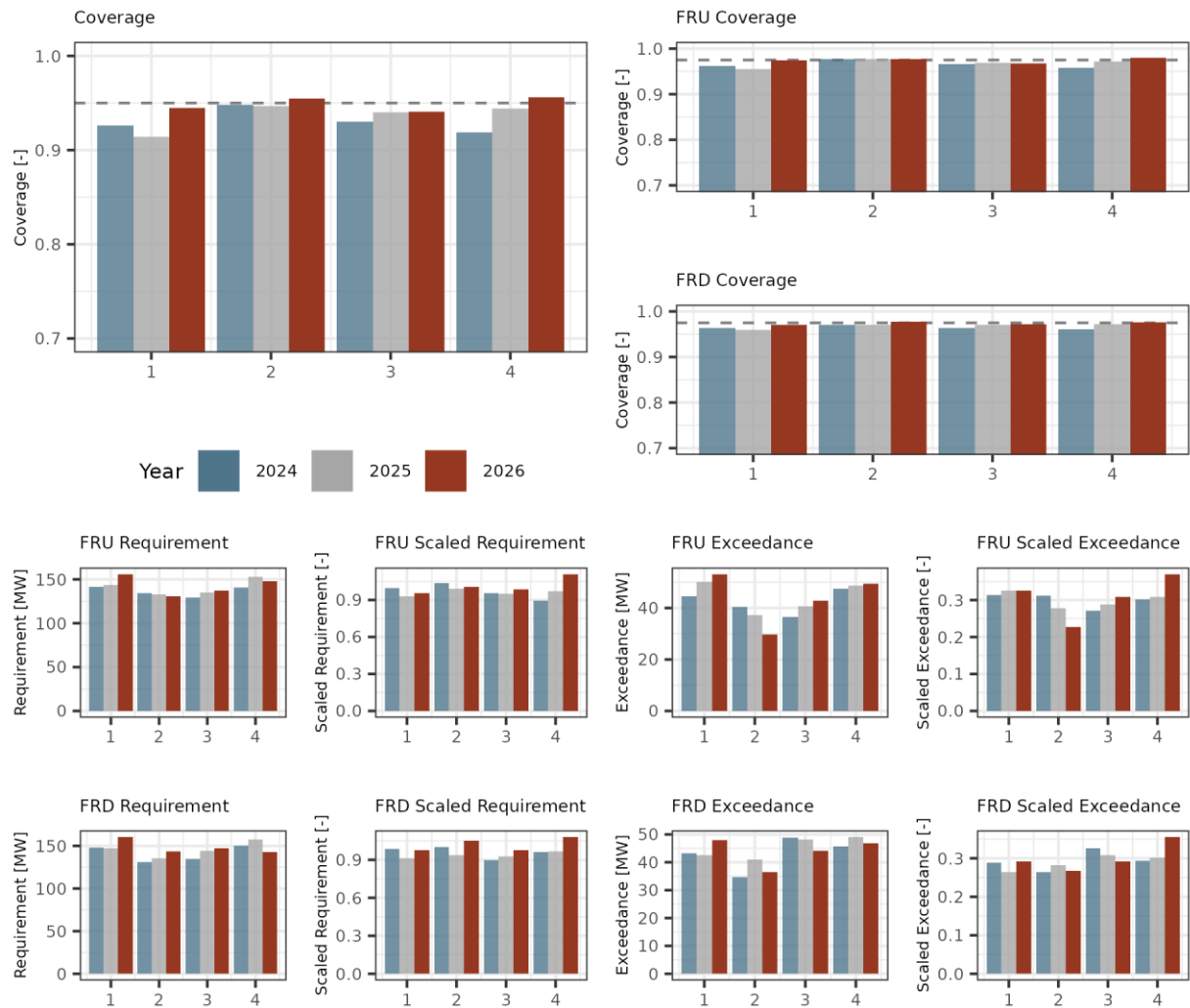
# BANC



Data current to 2026-10-11. Quarter number on x-axis.

# BCHA

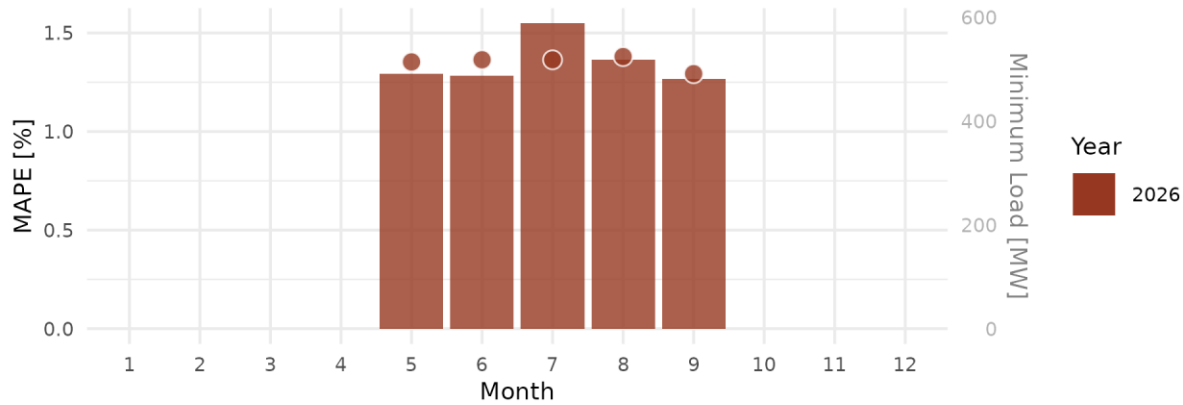
## BCHA



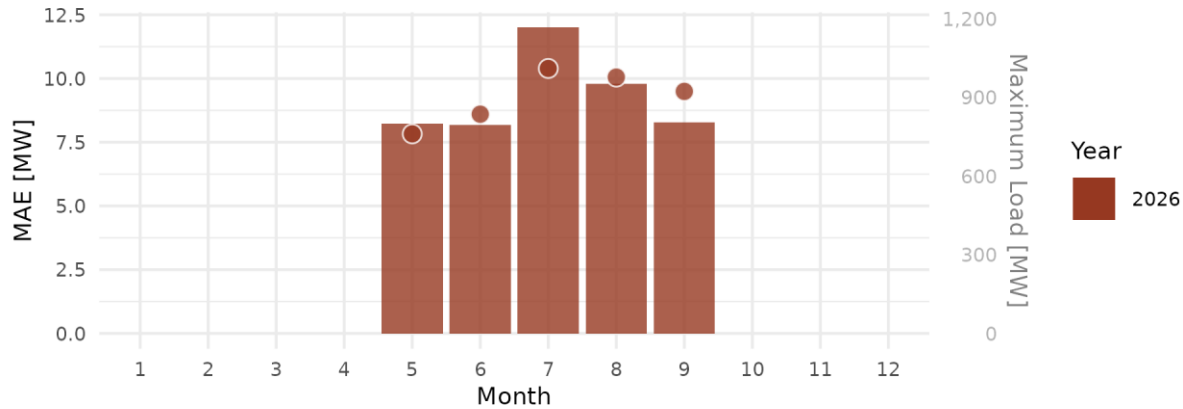
Data current to 2026-10-11. Quarter number on x-axis.

# BHBA

BHBA T-60 MAPE



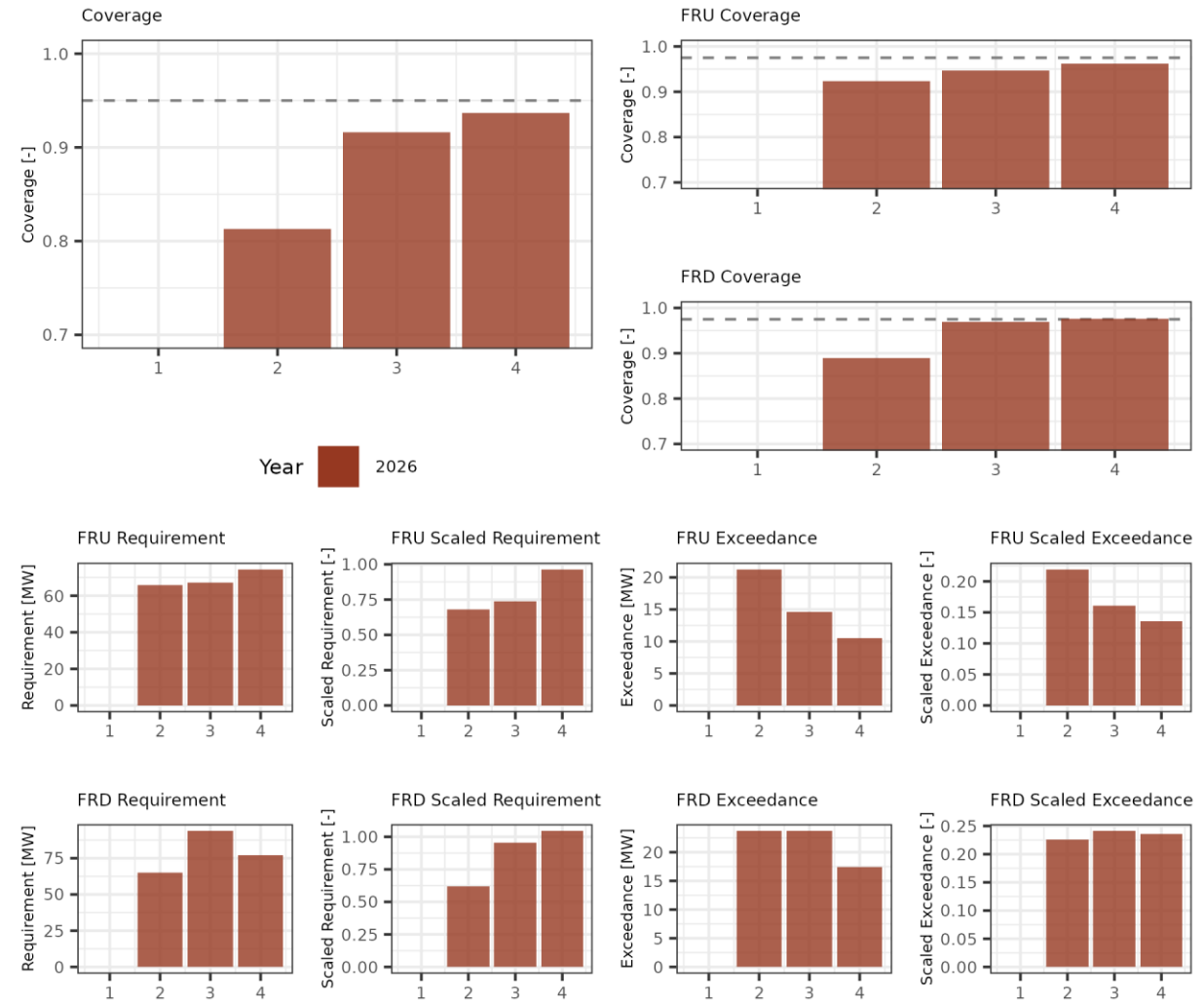
BHBA T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

Note, BHBA went live on May 6. For simplicity, demand forecast metrics start May 1.

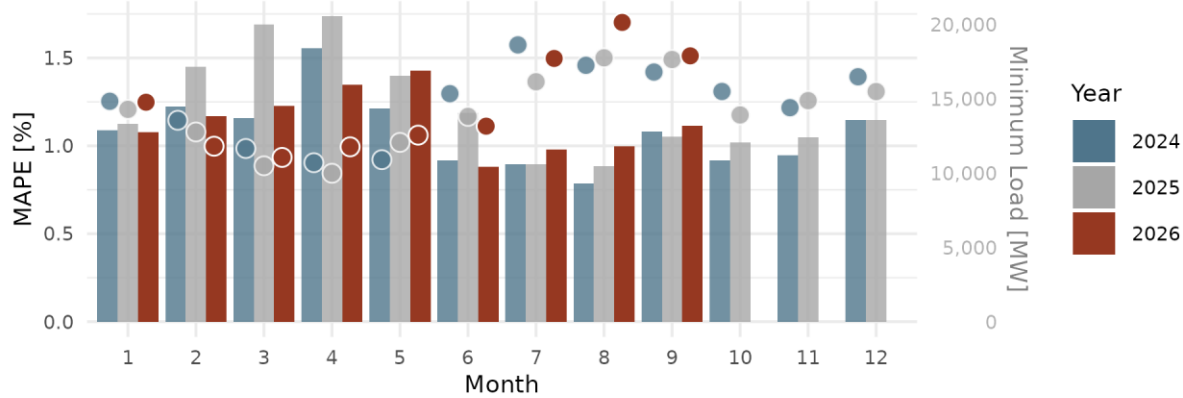
# BHBA



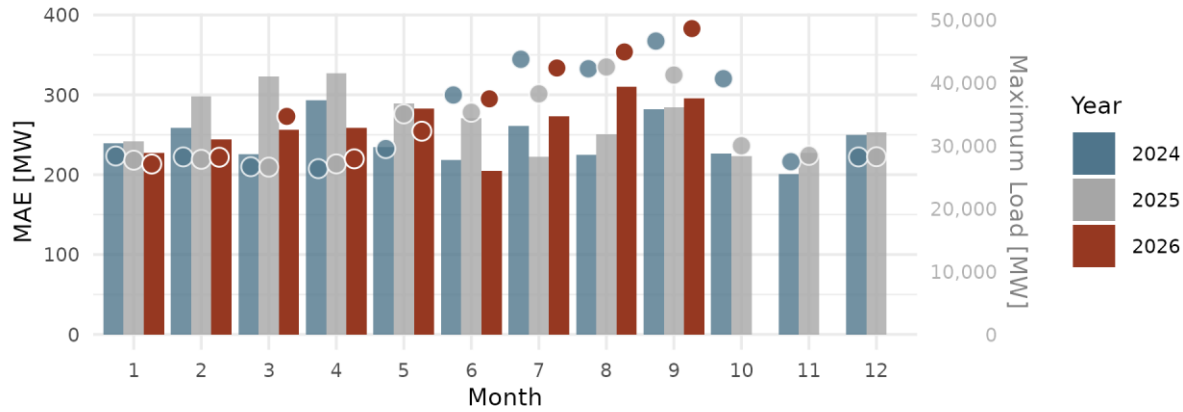
Data current to 2026-10-11. Quarter number on x-axis.

# CAISO

CAISO HASP MAPE

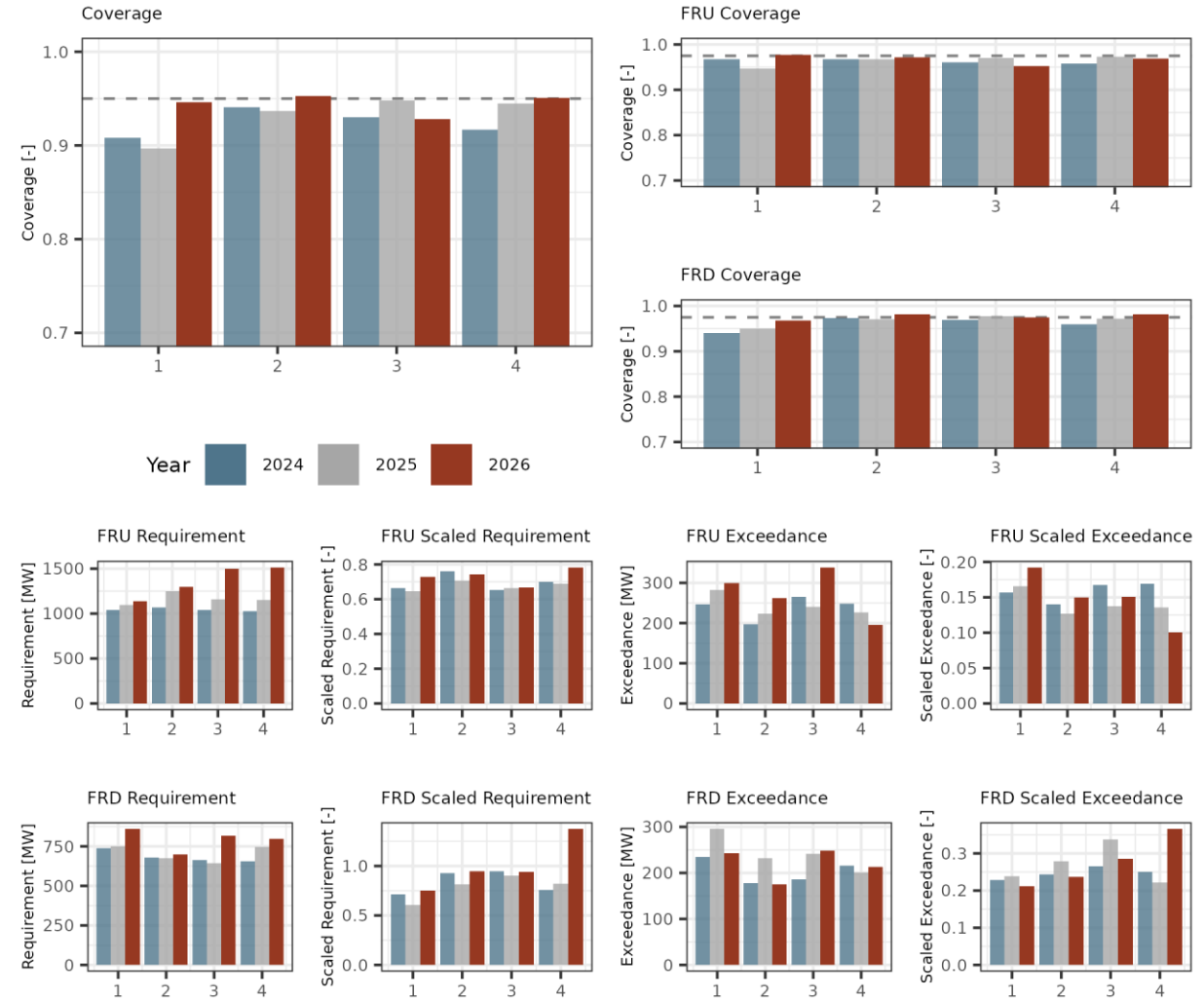


CAISO HASP MAE



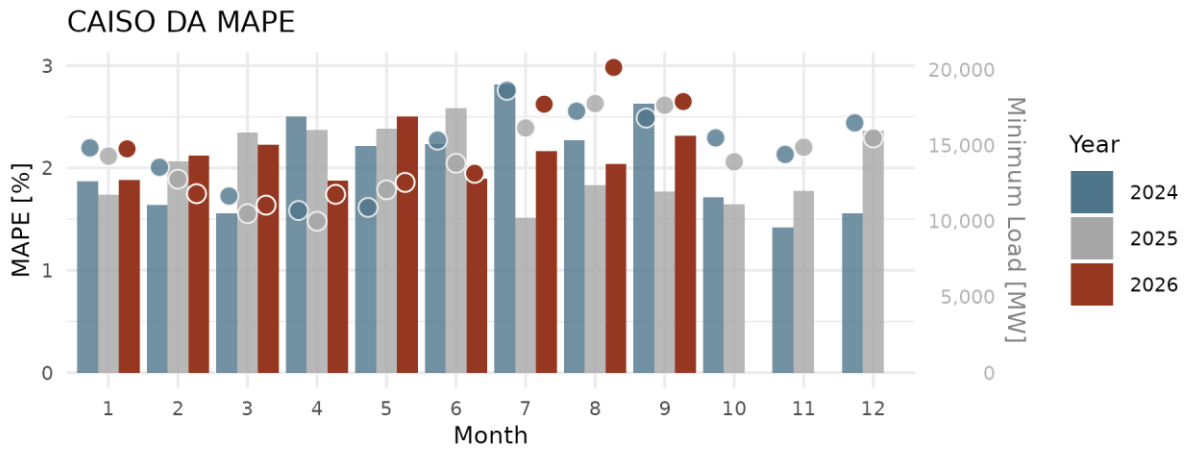
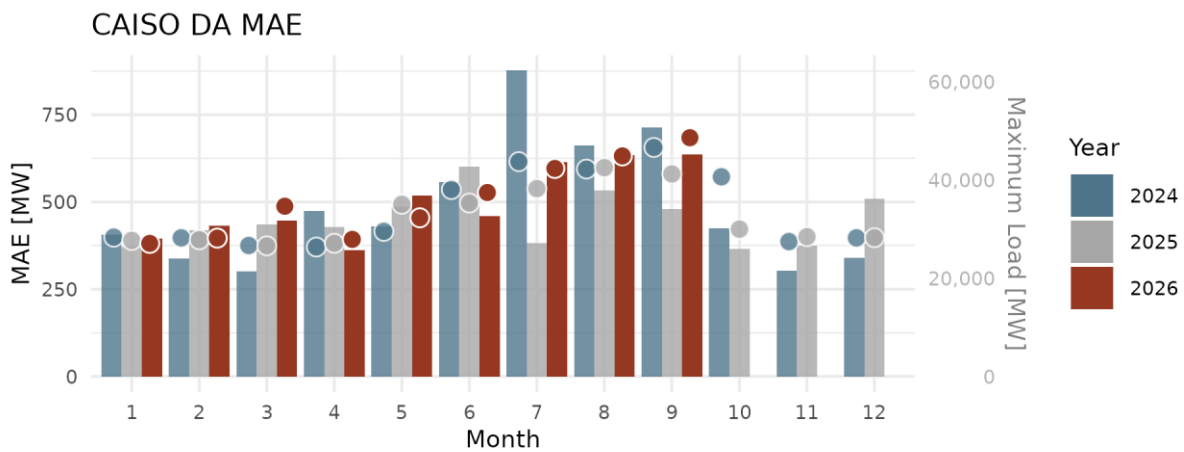
Bars use primary y-axis at left. Points use secondary y-axis at right.

# CAISO



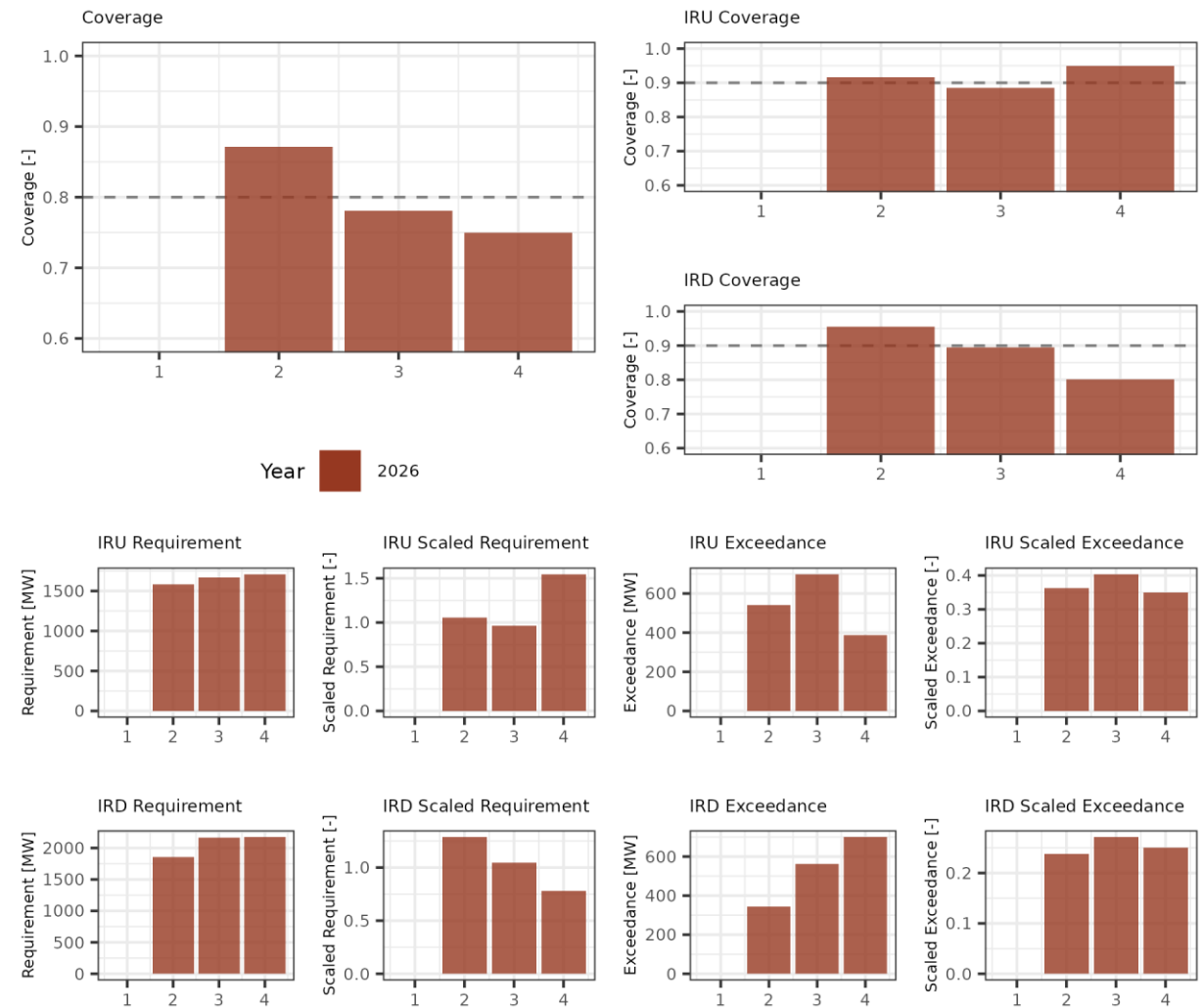
Data current to 2026-10-11. Quarter number on x-axis.

# CAISO



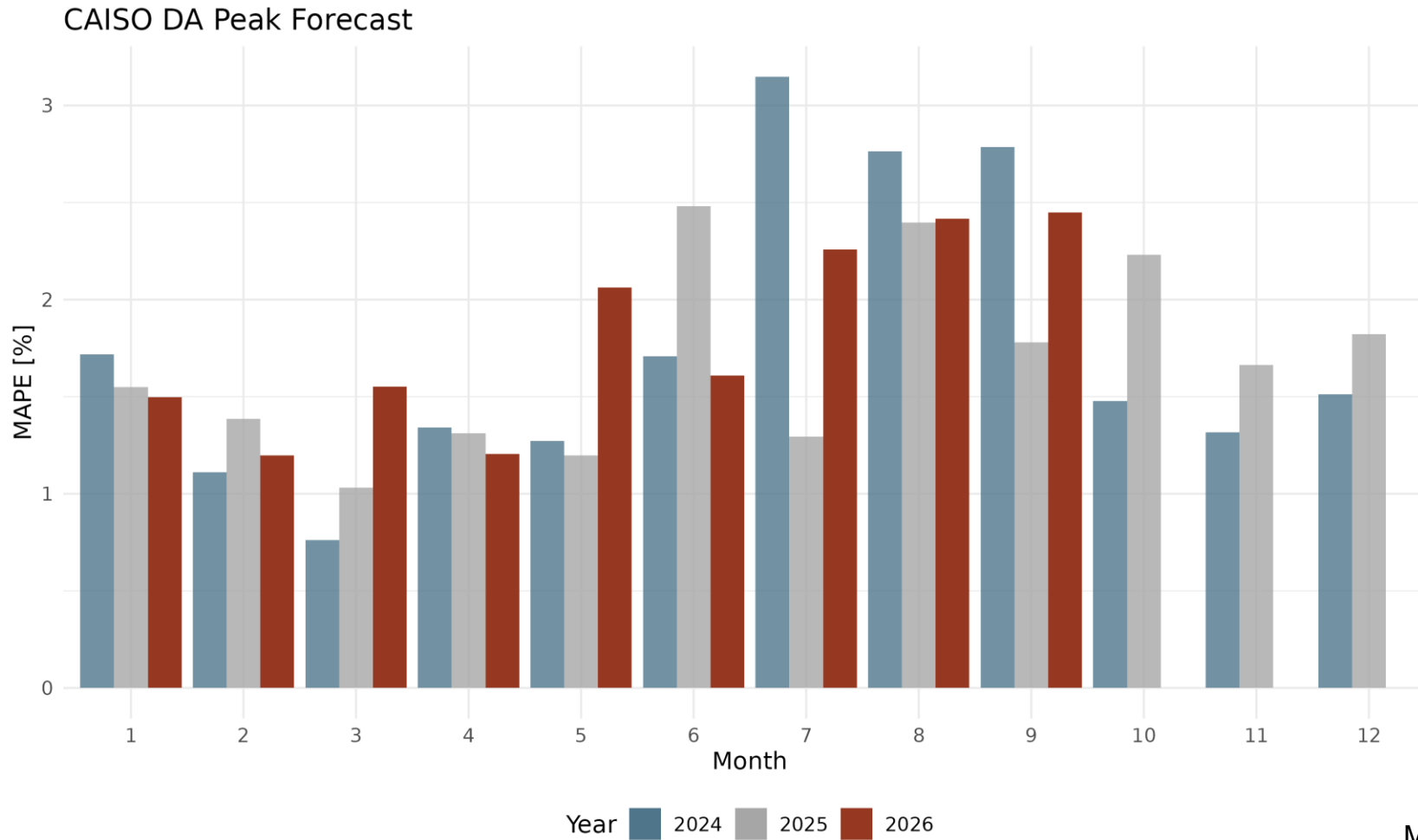
Bars use primary y-axis at left. Points use secondary y-axis at right.

# CAISO



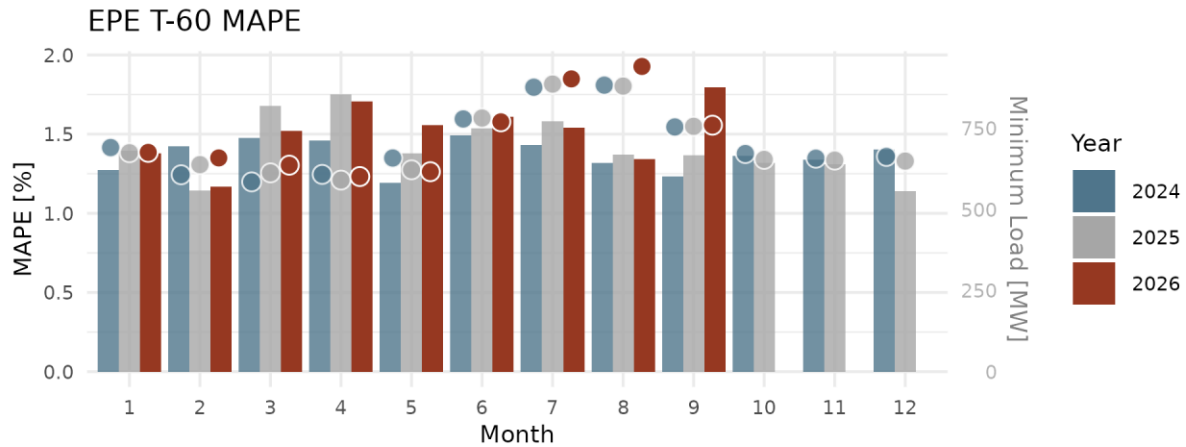
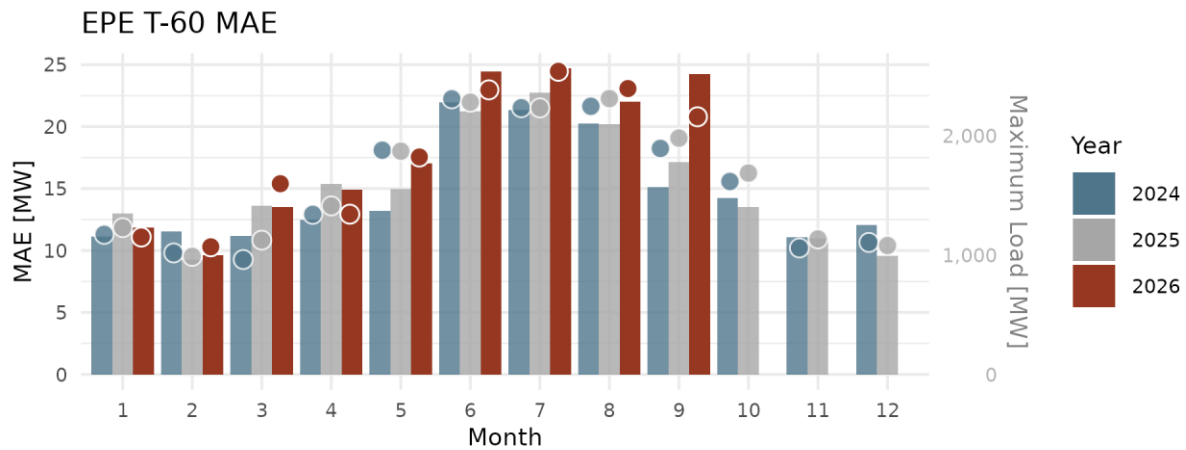
Data current to 2026-10-18. Quarter number on x-axis.

# CAISO DA peak



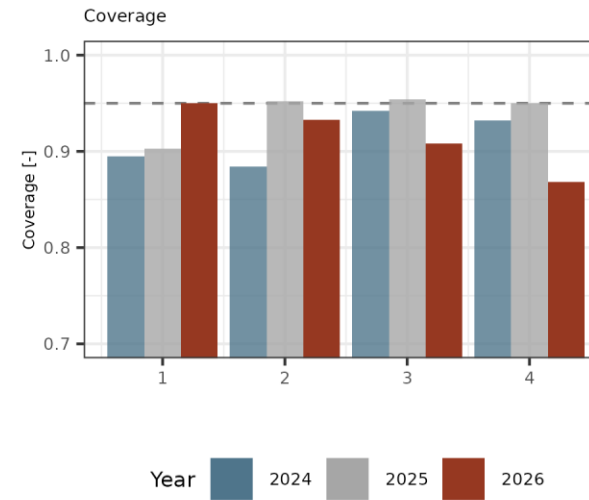
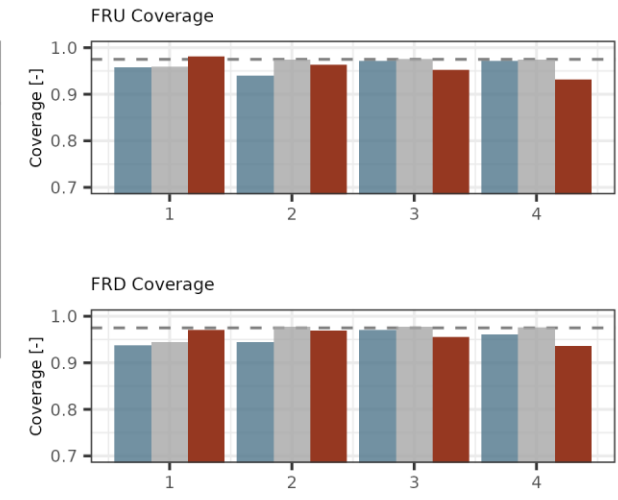
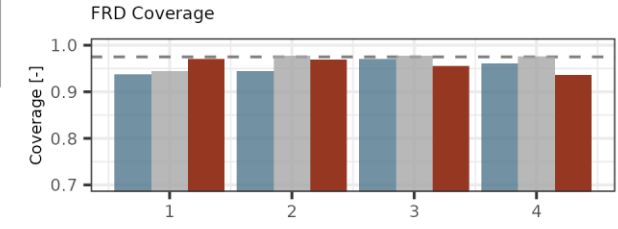
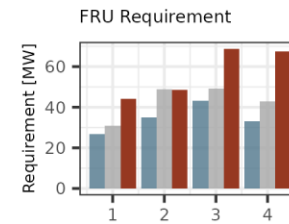
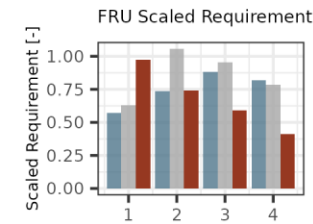
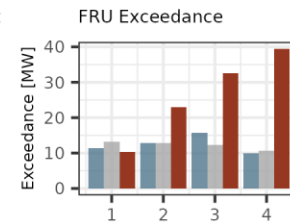
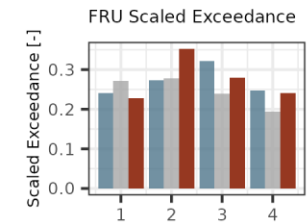
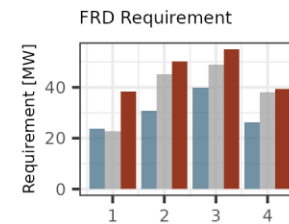
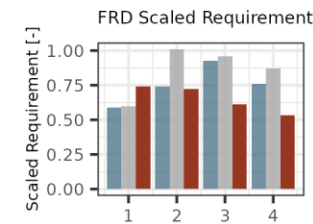
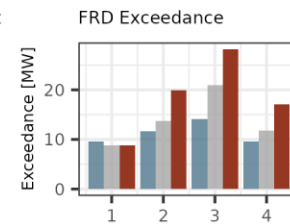
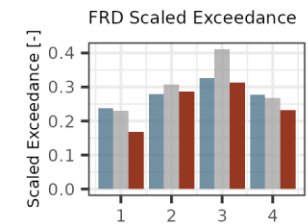
Monthly average DA forecast  
MAPE in peak load hour

# EPE



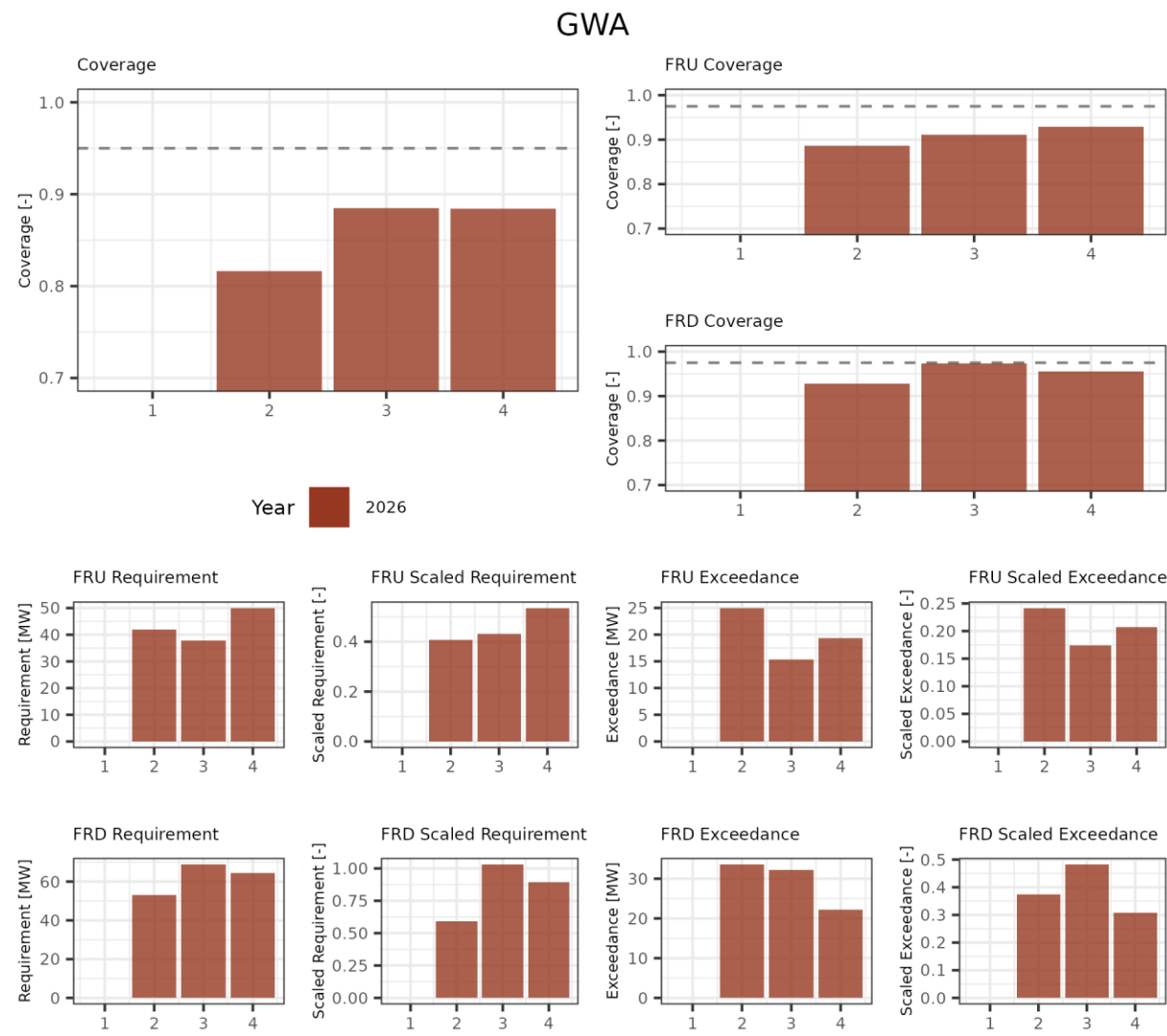
Bars use primary y-axis at left. Points use secondary y-axis at right.

# EPE



Data current to 2026-10-11. Quarter number on x-axis.

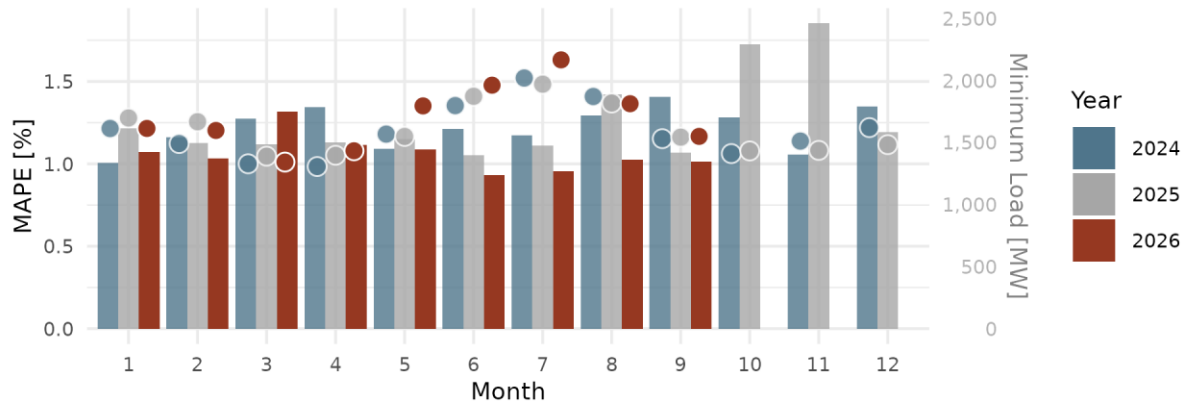
# GWA



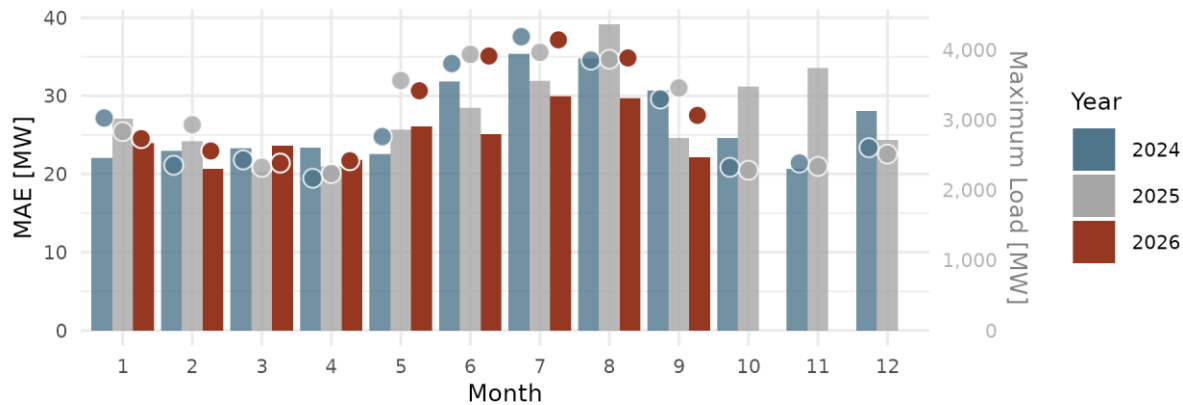
Data current to 2026-10-11. Quarter number on x-axis.

# IPCO

IPCO T-60 MAPE

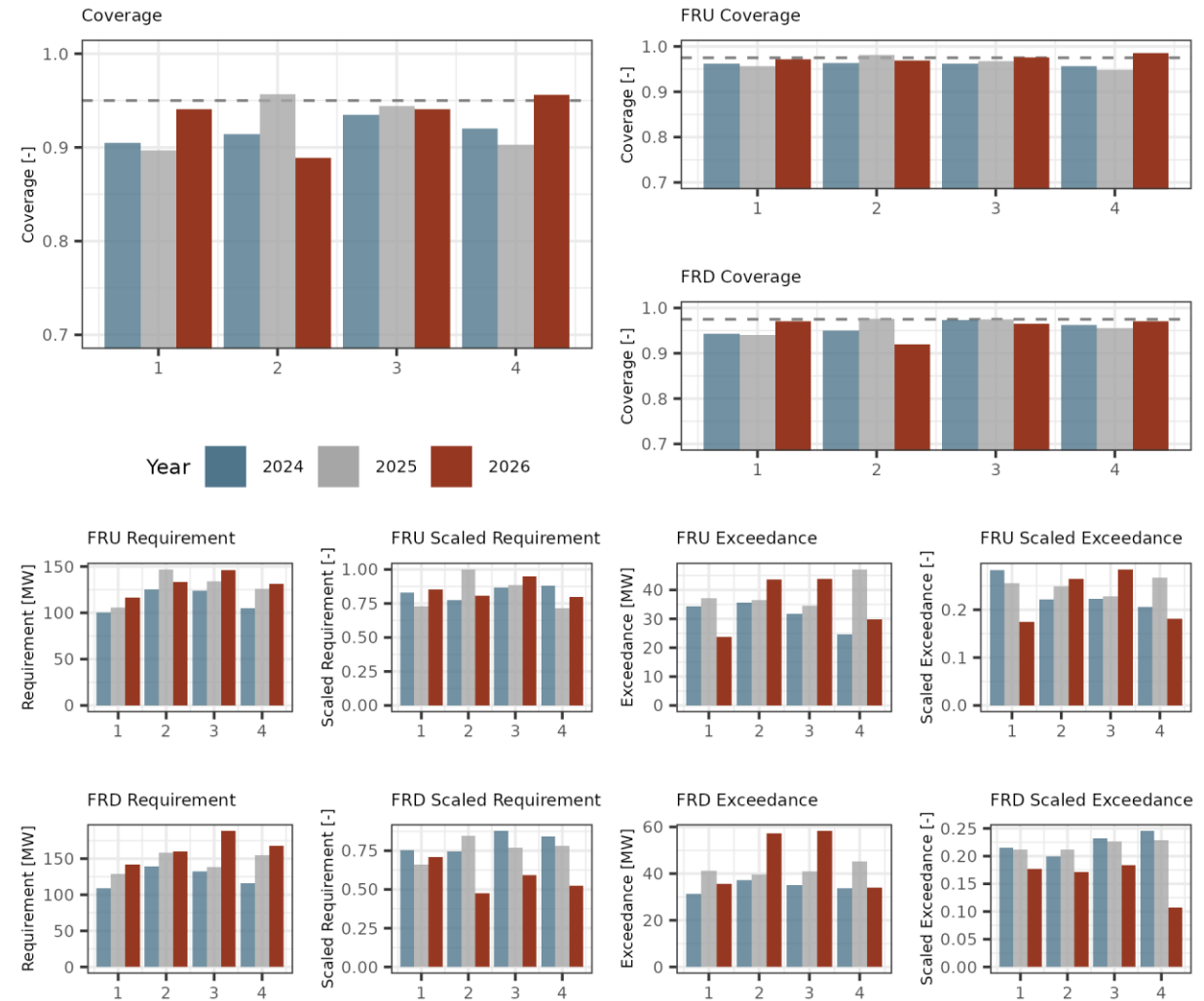


IPCO T-60 MAE



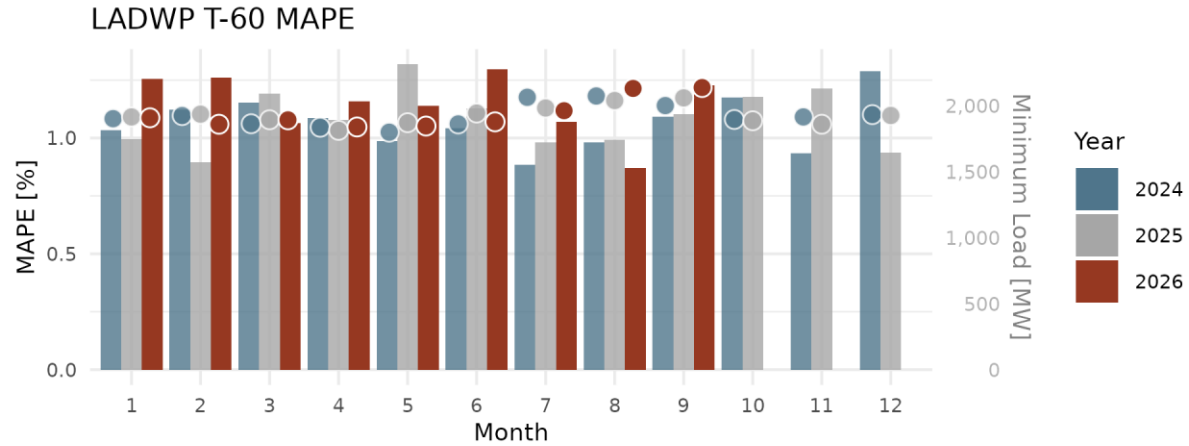
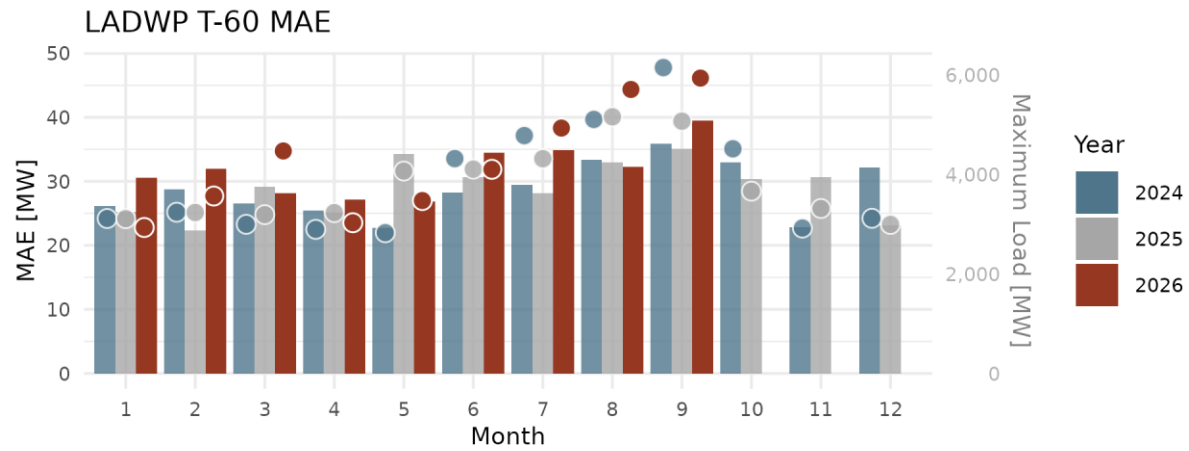
Bars use primary y-axis at left. Points use secondary y-axis at right.

# IPCO



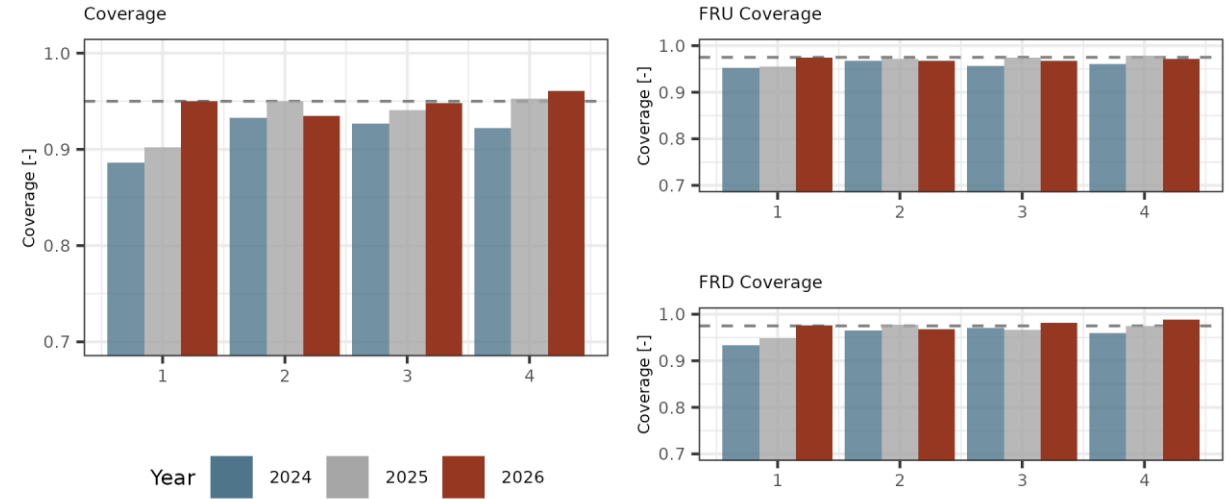
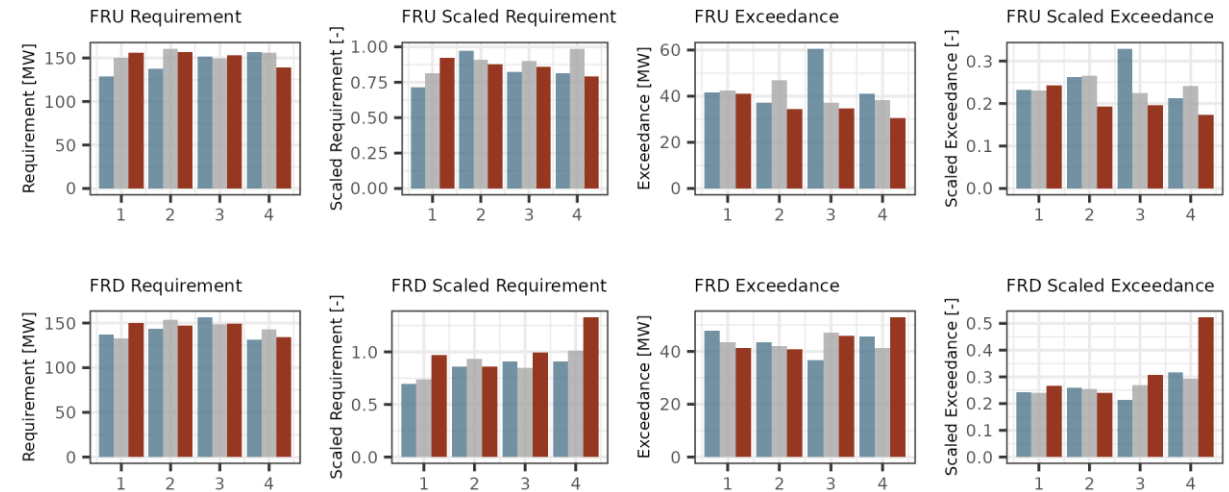
Data current to 2026-10-11. Quarter number on x-axis.

# LADWP



Bars use primary y-axis at left. Points use secondary y-axis at right.

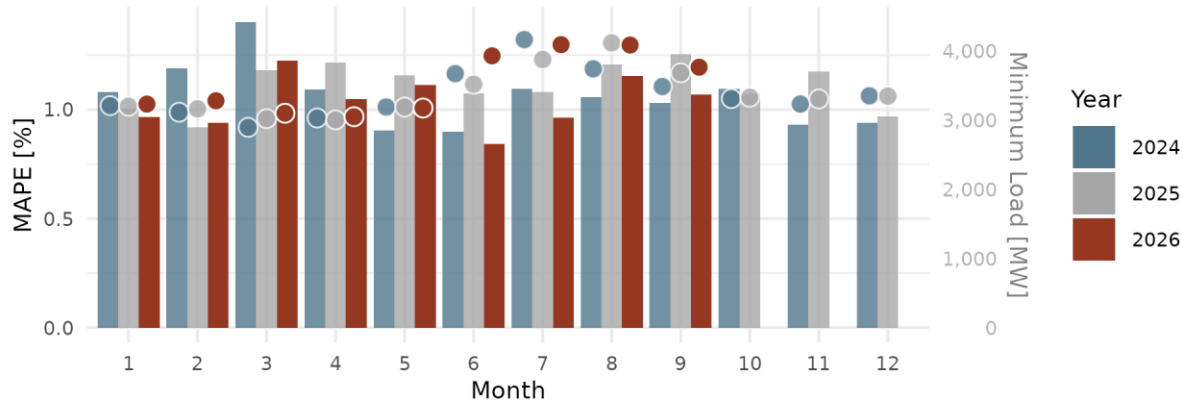
# LADWP



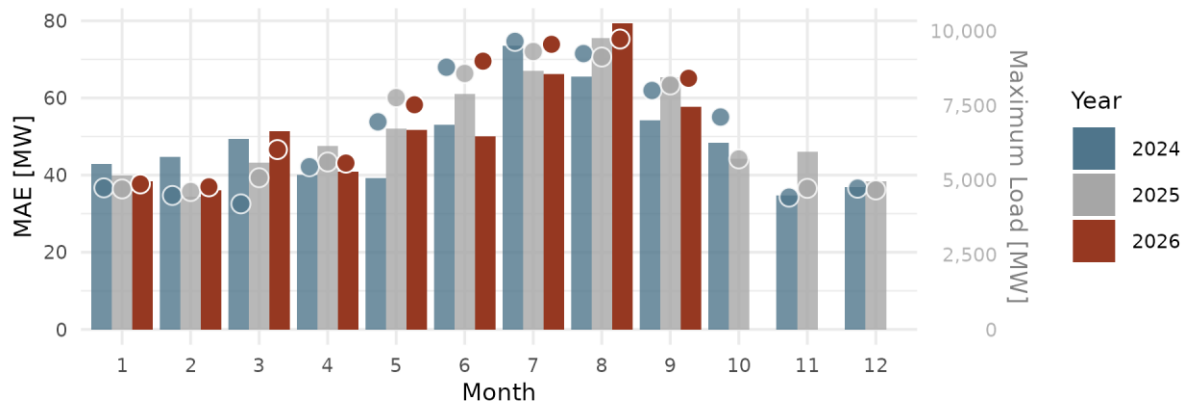
Data current to 2026-10-11. Quarter number on x-axis.

# NVE

NVE T-60 MAPE

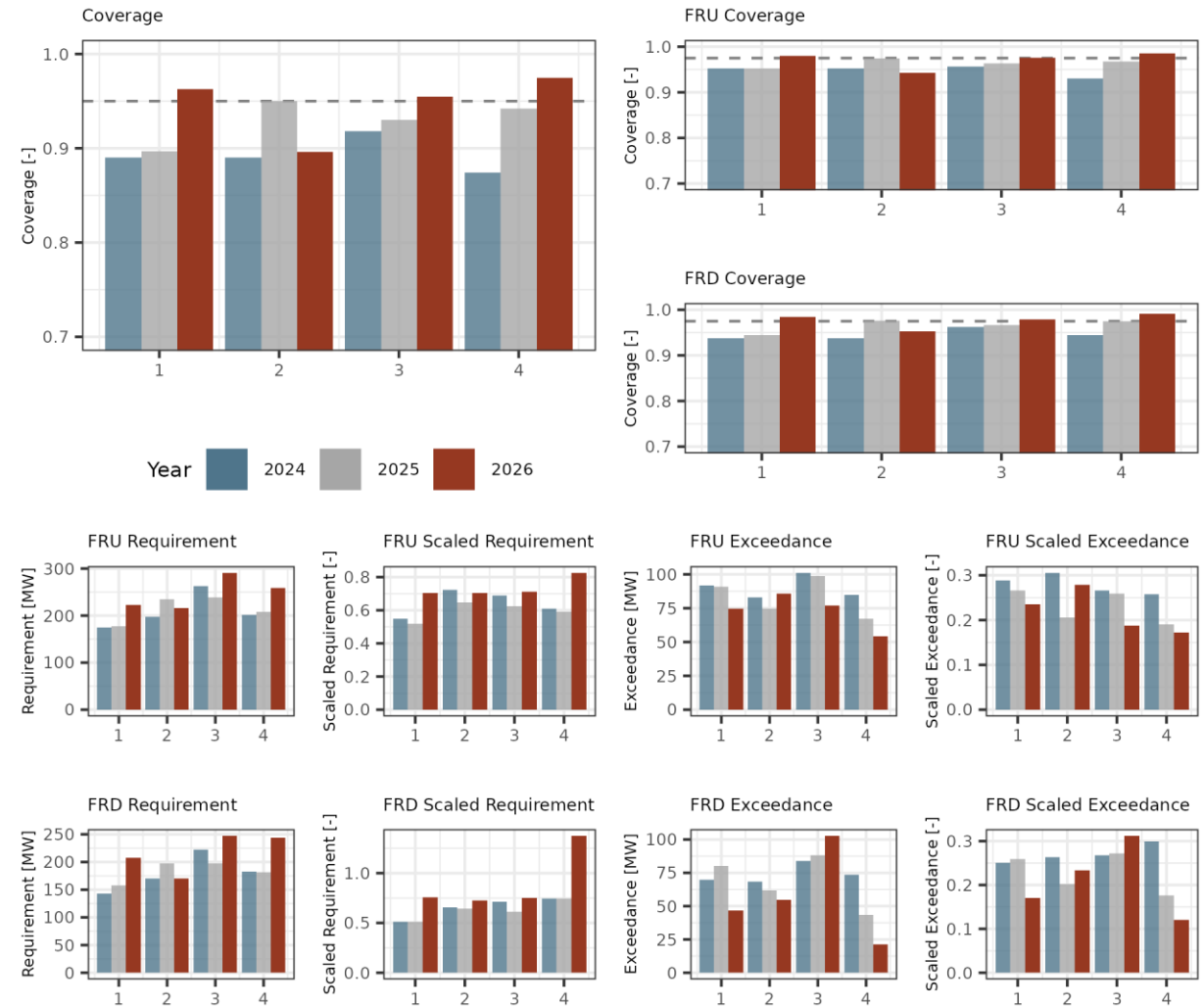


NVE T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

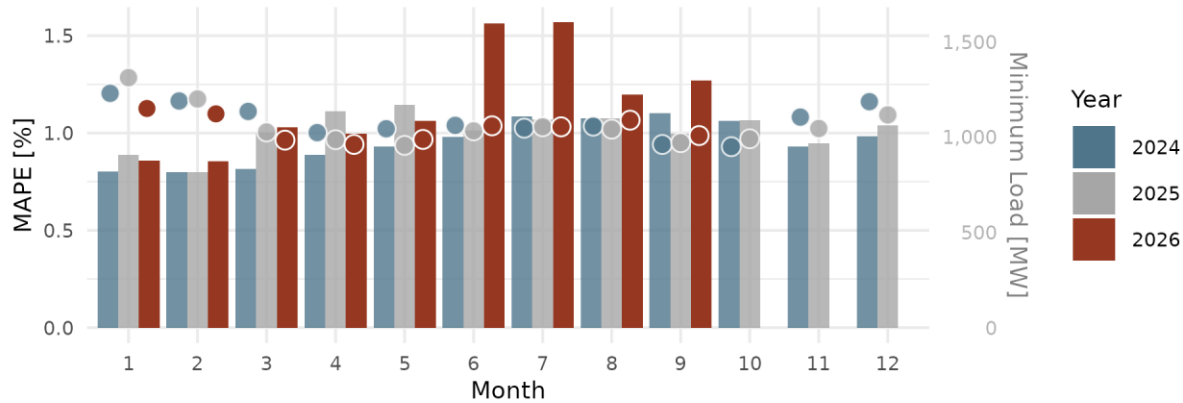
# NVE



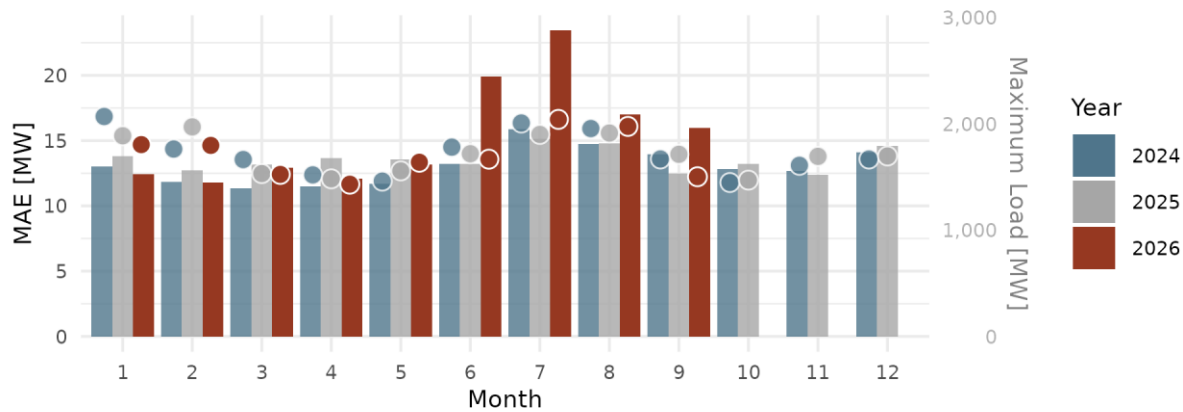
Data current to 2026-10-11. Quarter number on x-axis.

# NWMT

NWMT T-60 MAPE



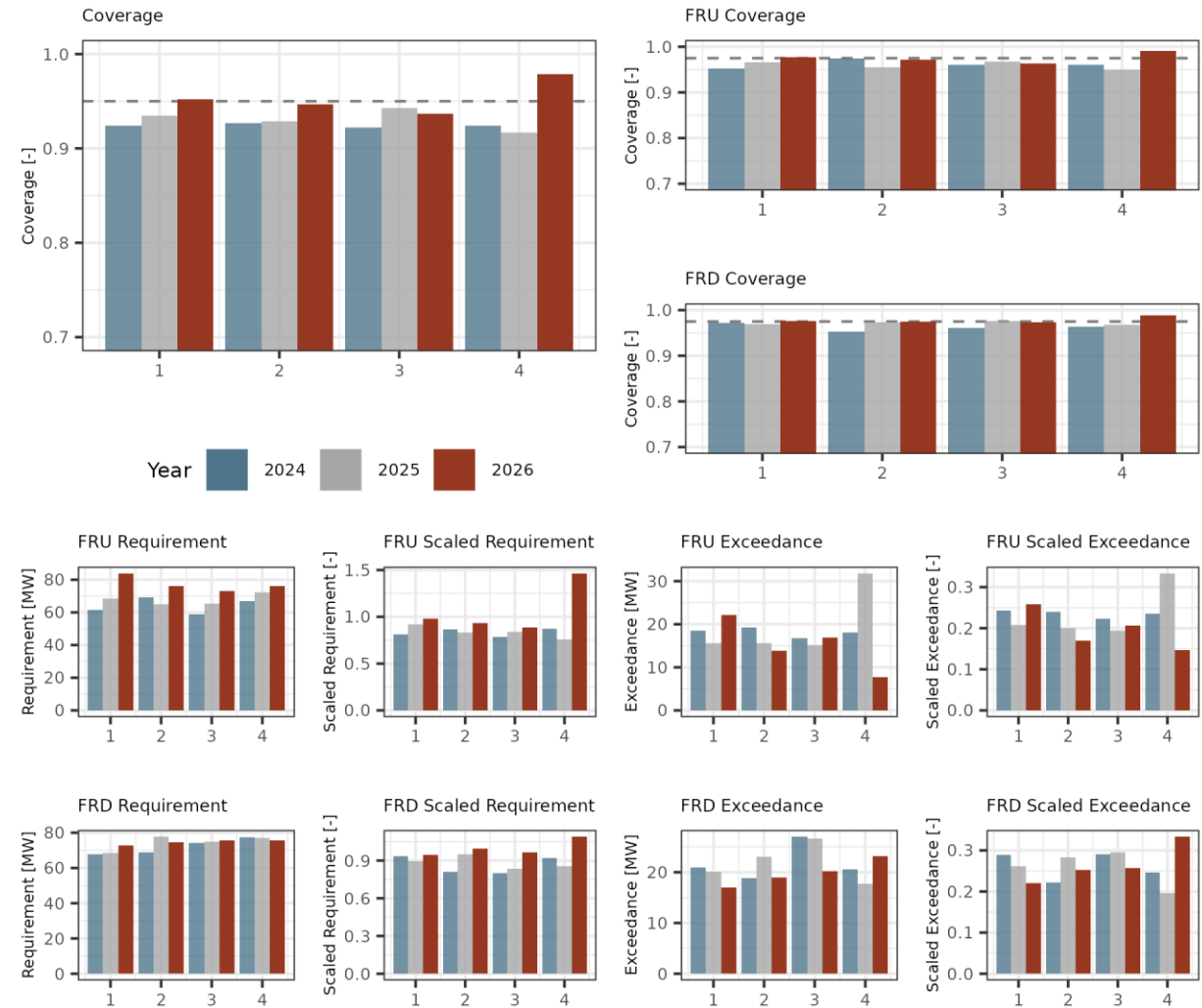
NWMT T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

STF identified and corrected an issue in historical data backfill that was the primary driver of elevated NWMT MAPEs. Issue was resolved in September.

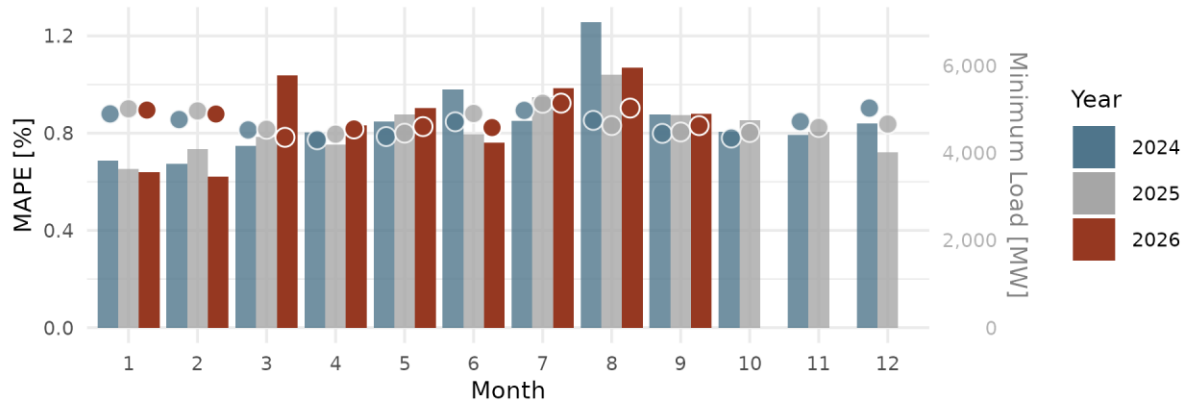
# NWMT



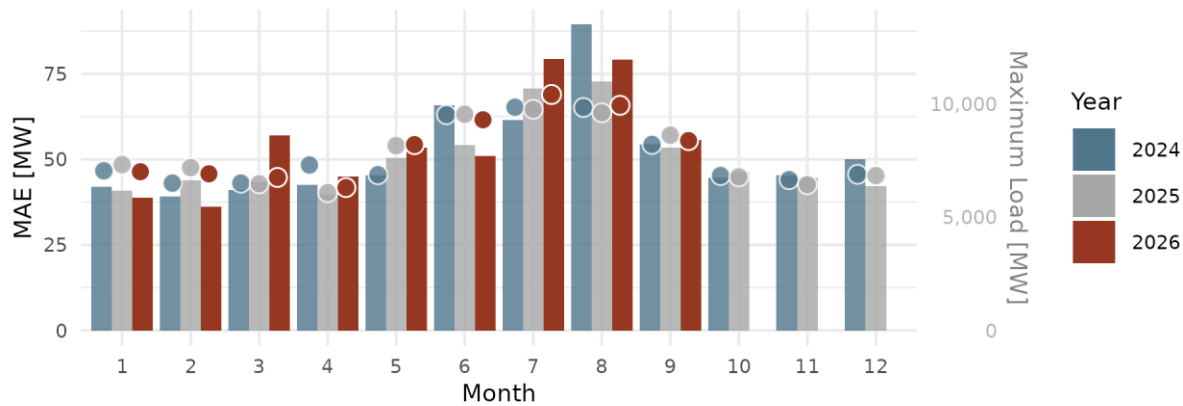
Data current to 2026-10-11. Quarter number on x-axis.

# PACE

PACE T-60 MAPE

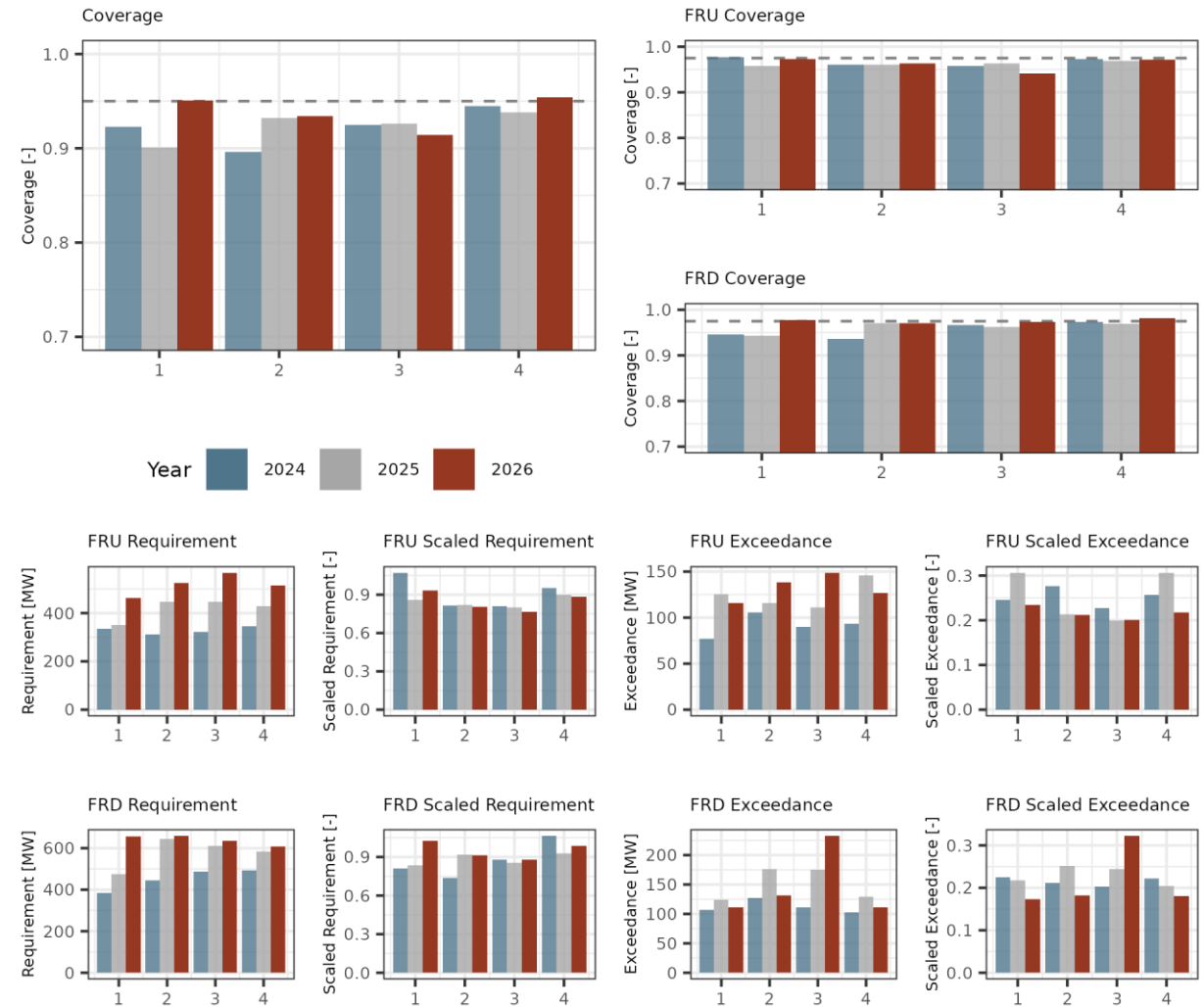


PACE T-60 MAE



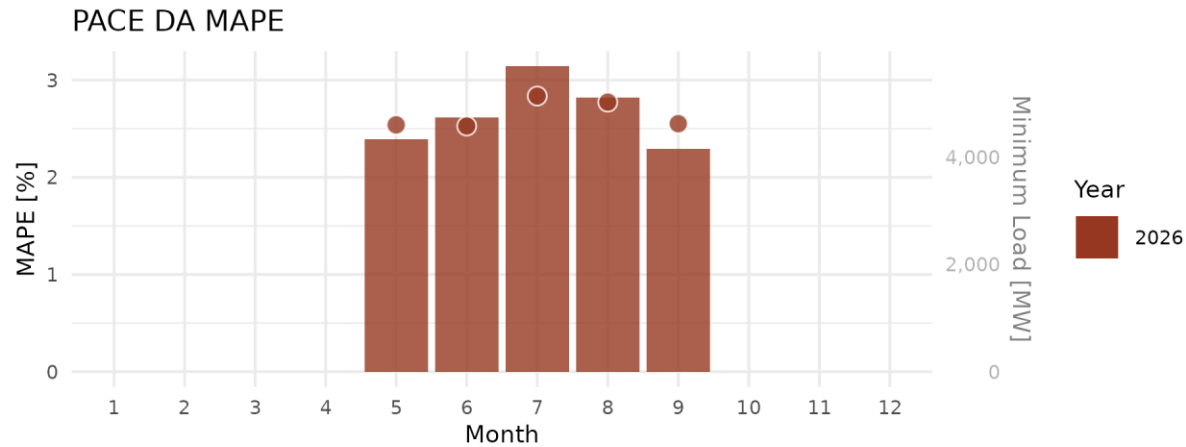
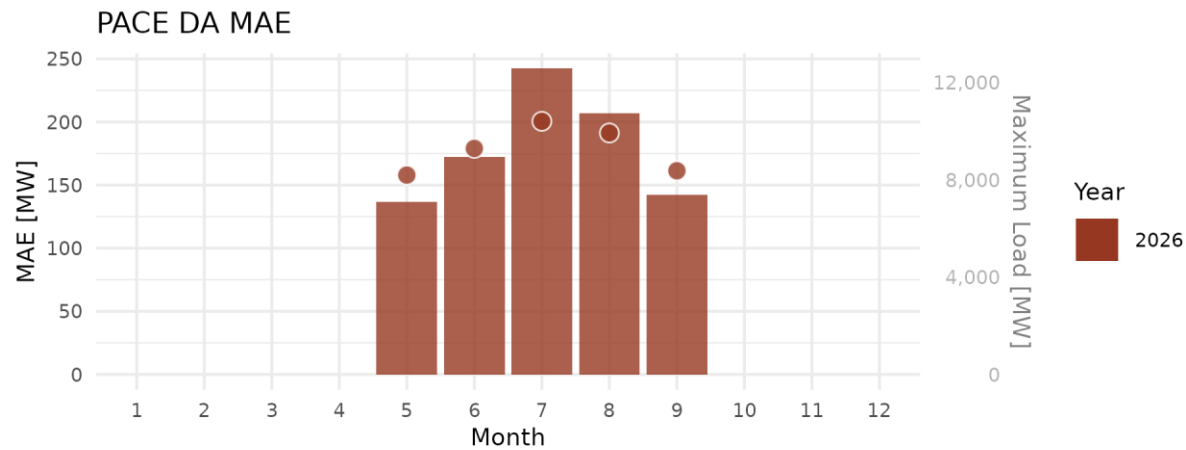
Bars use primary y-axis at left. Points use secondary y-axis at right.

# PACE



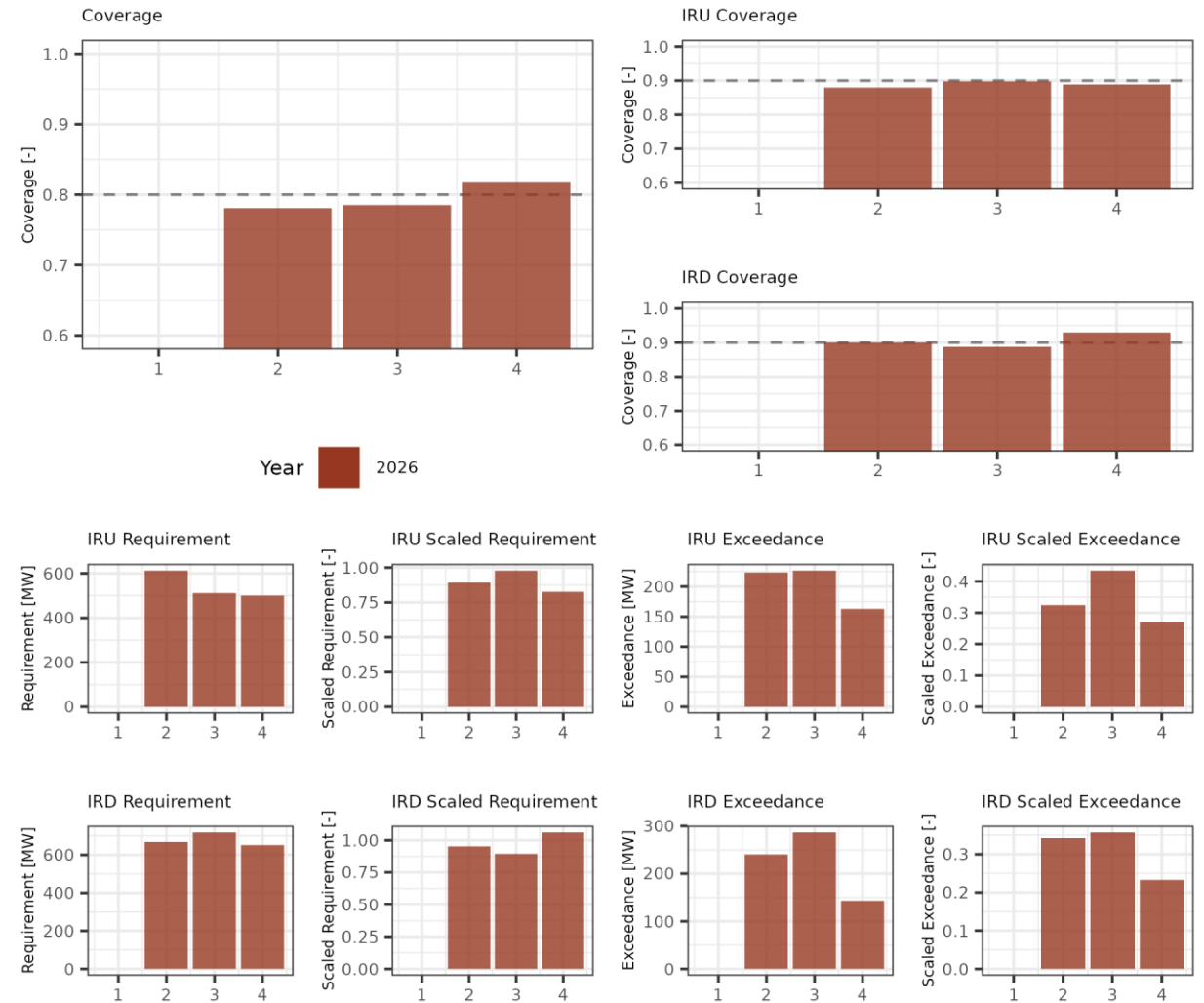
Data current to 2026-10-11. Quarter number on x-axis.

# PACE



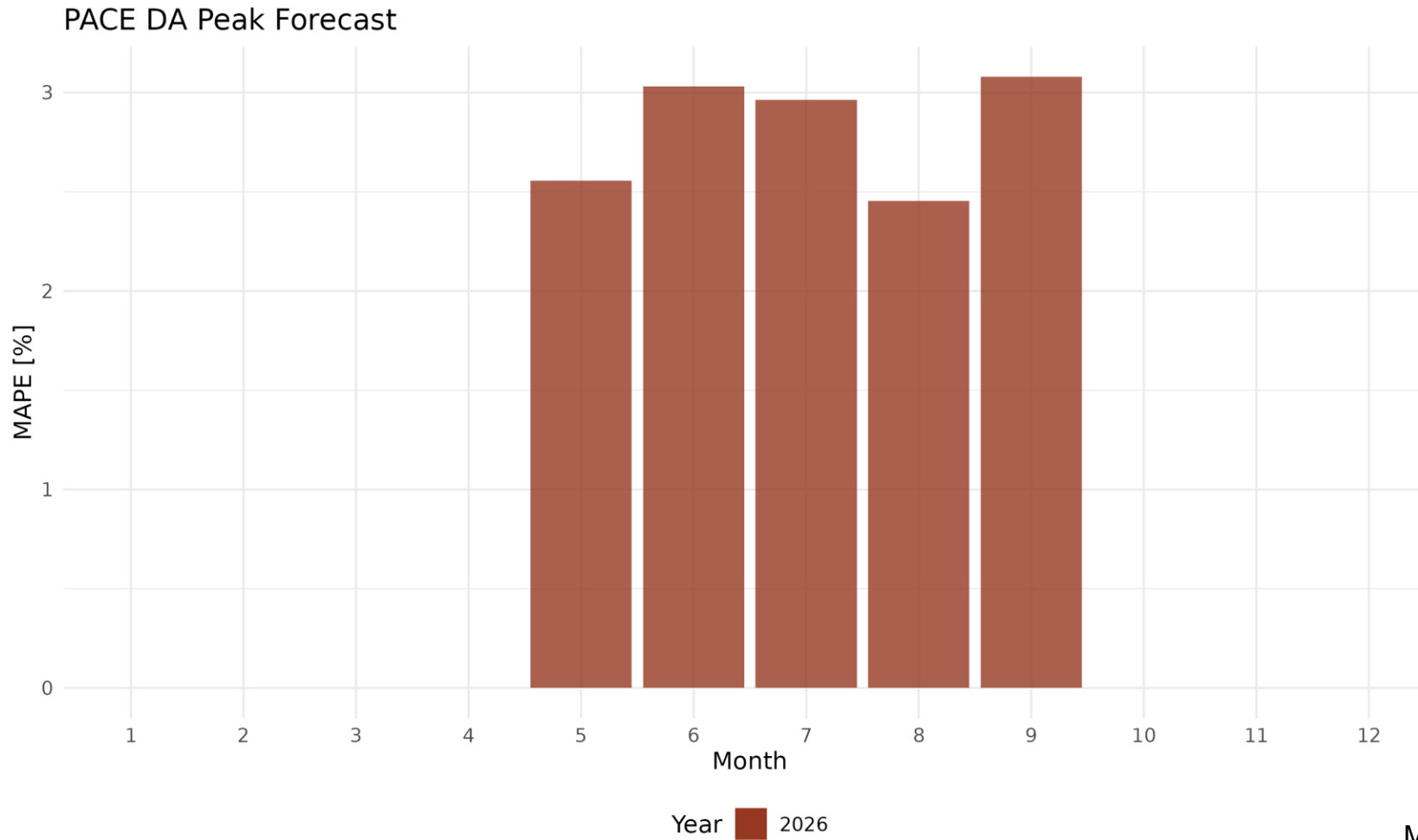
Bars use primary y-axis at left. Points use secondary y-axis at right.

# PACE



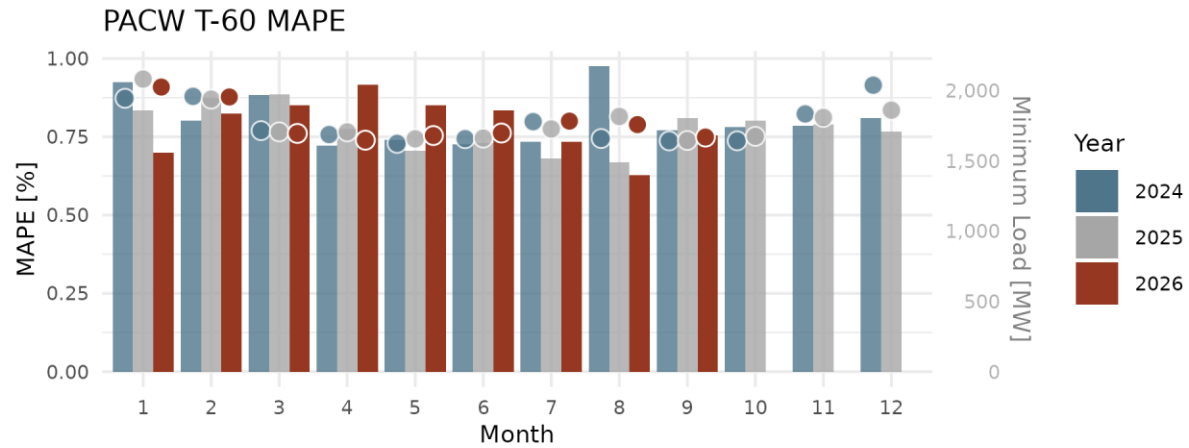
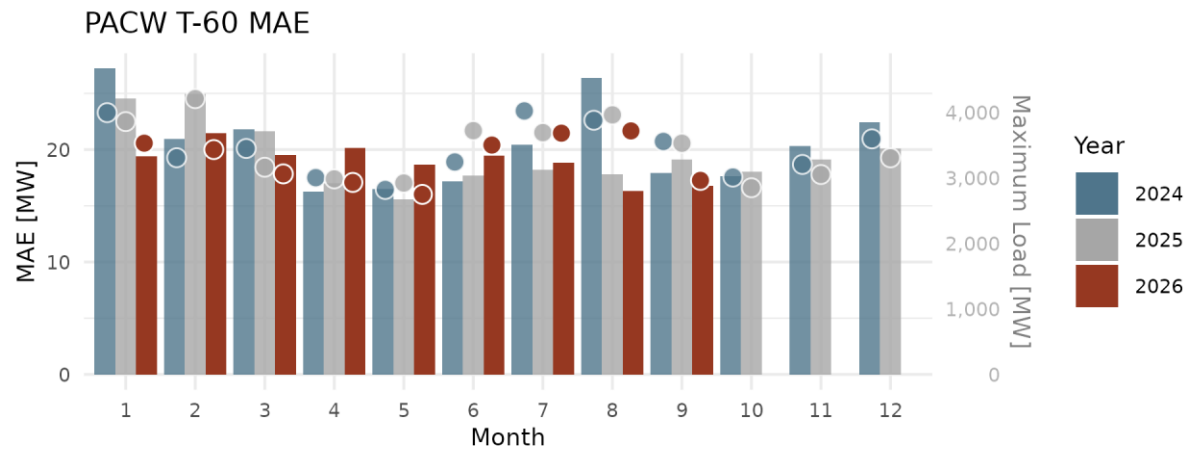
Data current to 2026-10-18. Quarter number on x-axis.

# PACE DA peak



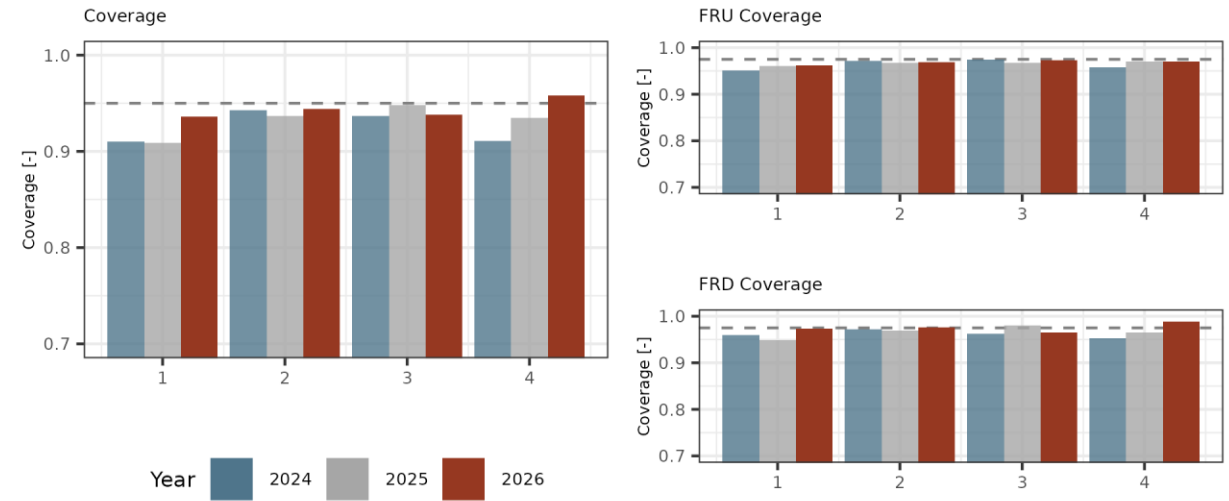
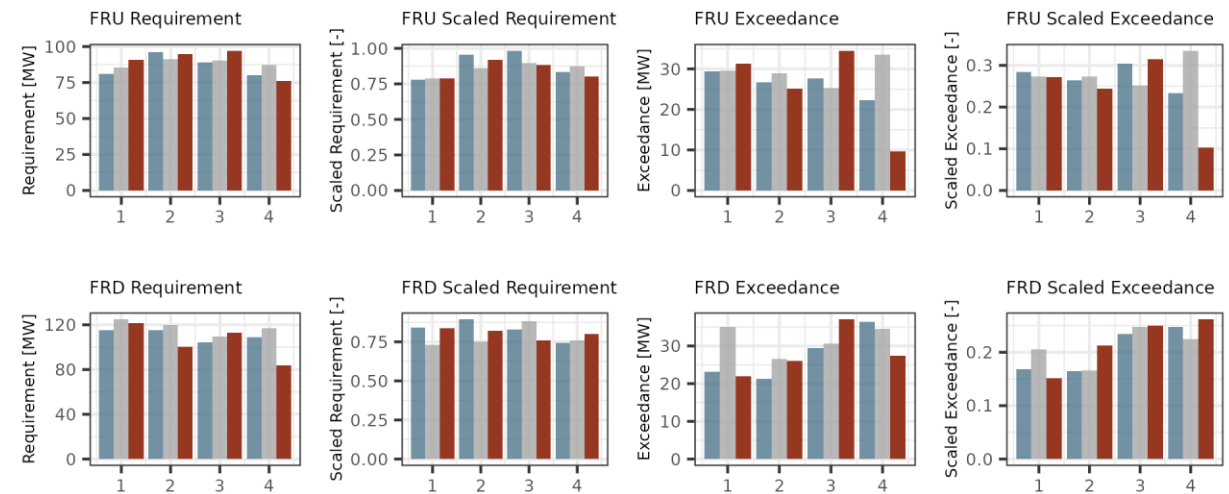
Monthly average DA forecast  
MAPE in peak load hour

# PACW



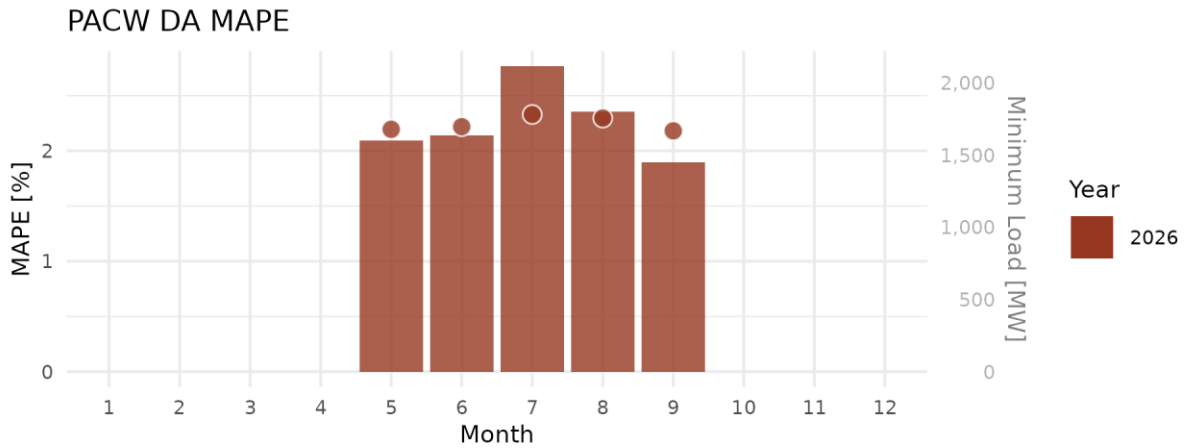
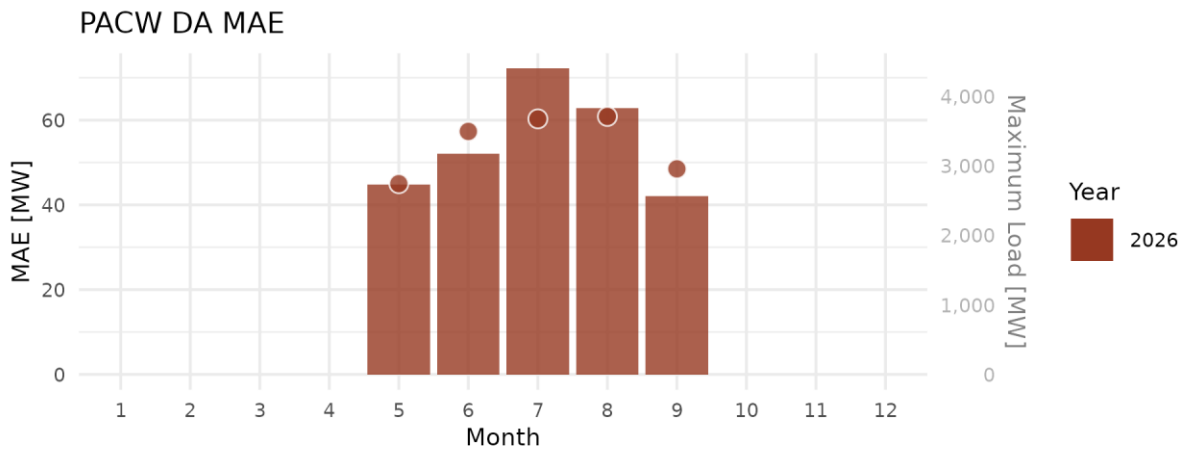
Bars use primary y-axis at left. Points use secondary y-axis at right.

# PACW

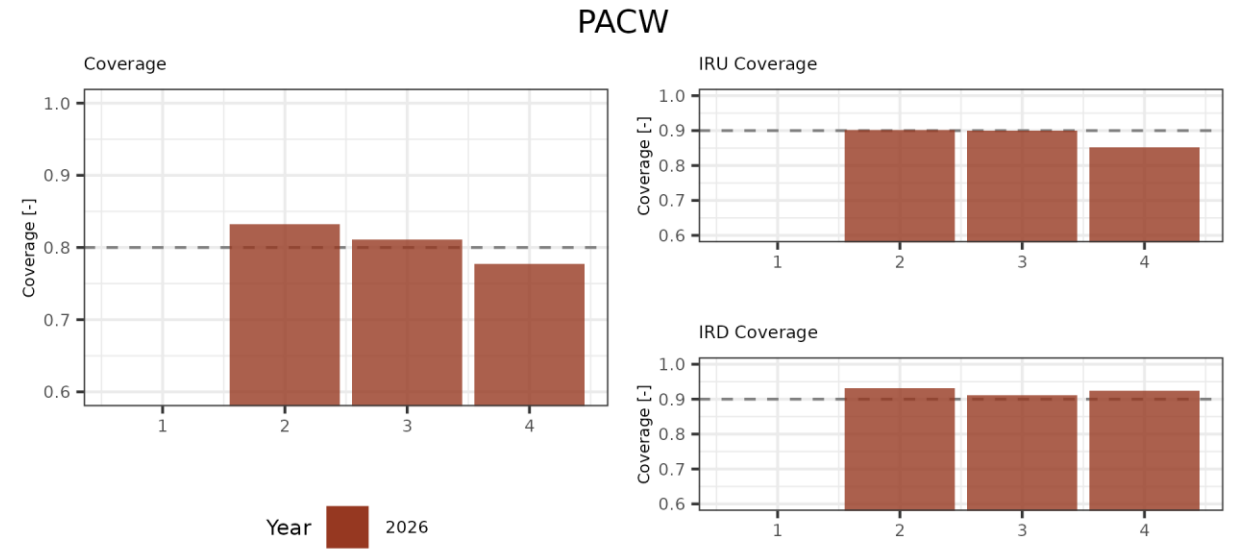
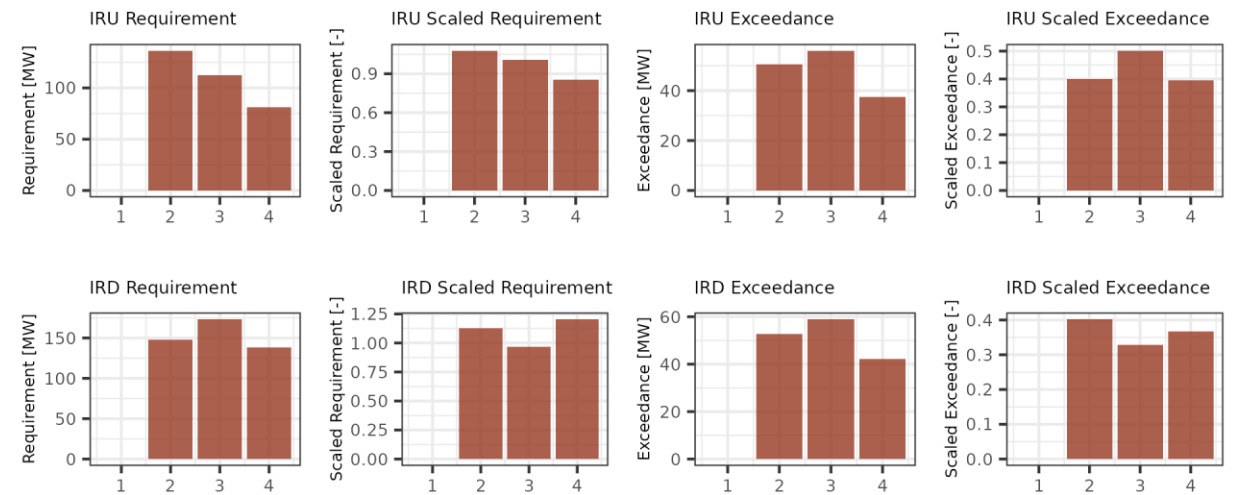


Data current to 2026-10-11. Quarter number on x-axis.

# PACW

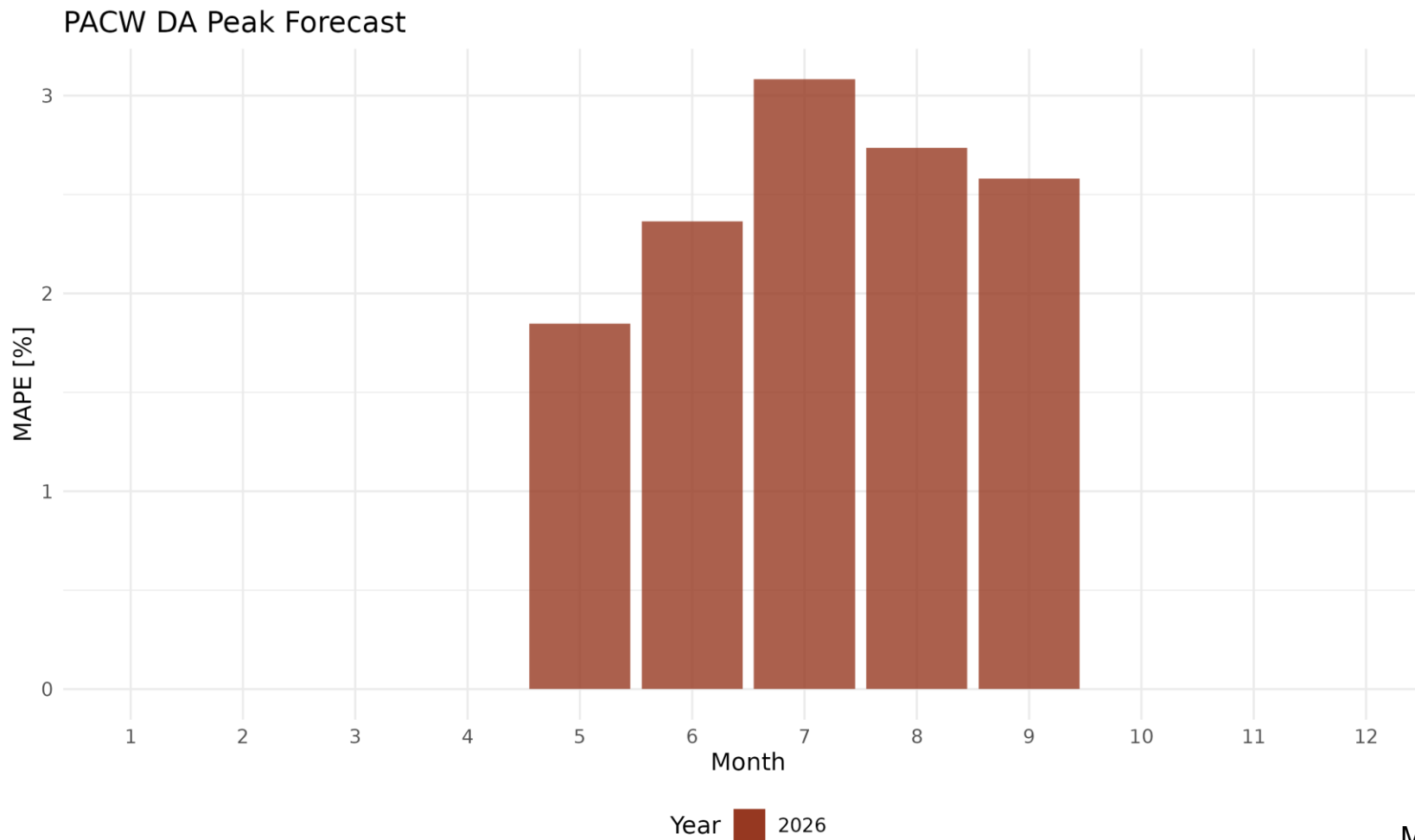


Bars use primary y-axis at left. Points use secondary y-axis at right.



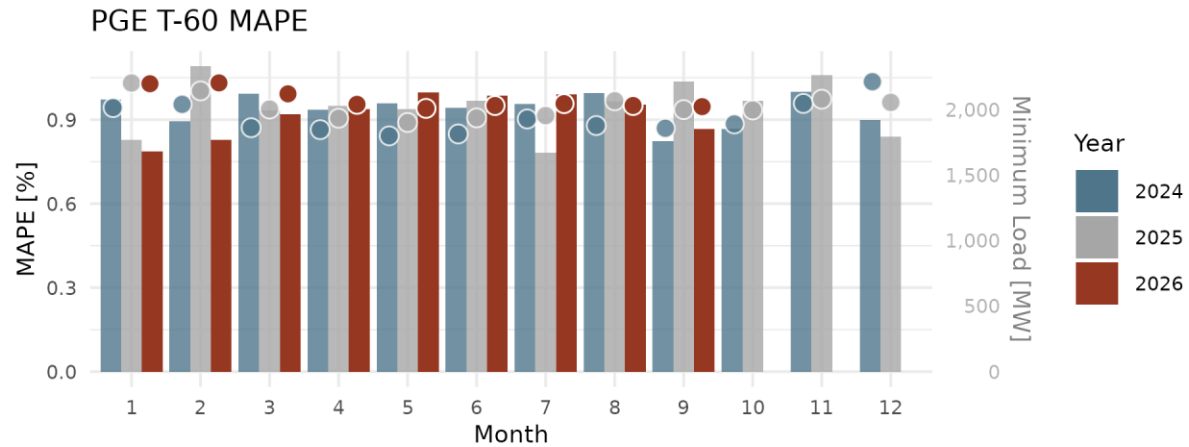
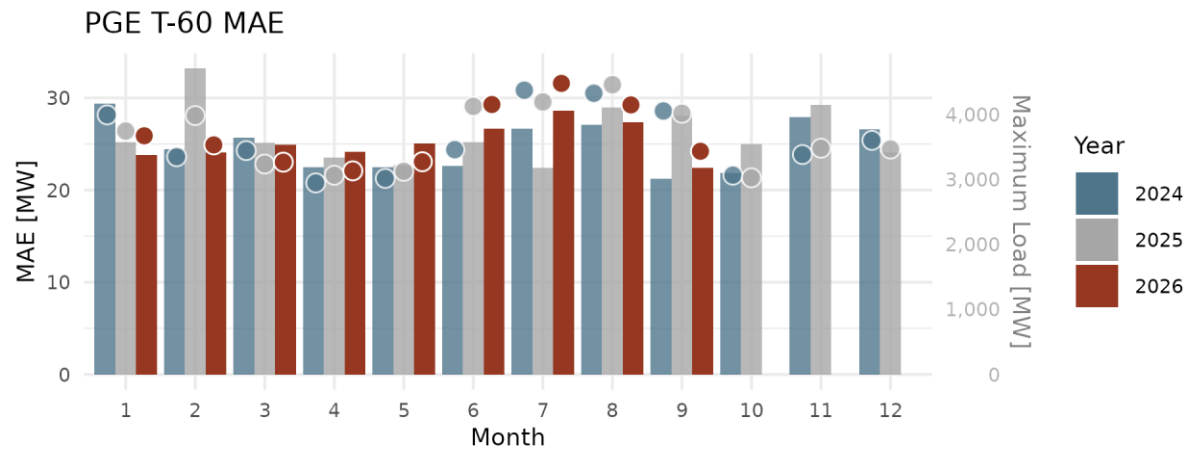
Data current to 2026-10-18. Quarter number on x-axis.

# PACW



Monthly average DA forecast  
MAPE in peak load hour

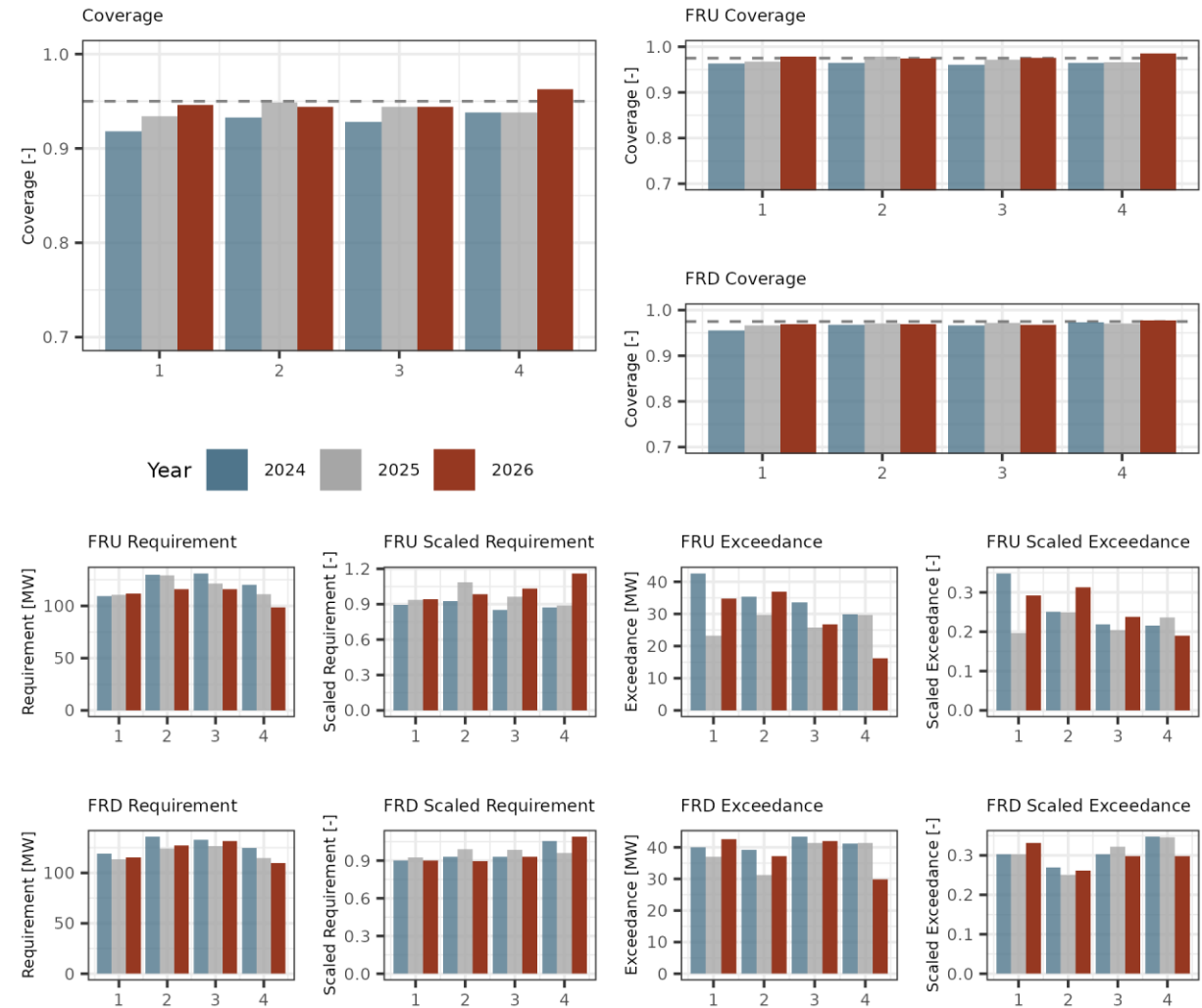
# PGE



Bars use primary y-axis at left. Points use secondary y-axis at right.

PGE DA metrics will be provided in next presentation since this presentation focuses on metrics through September.

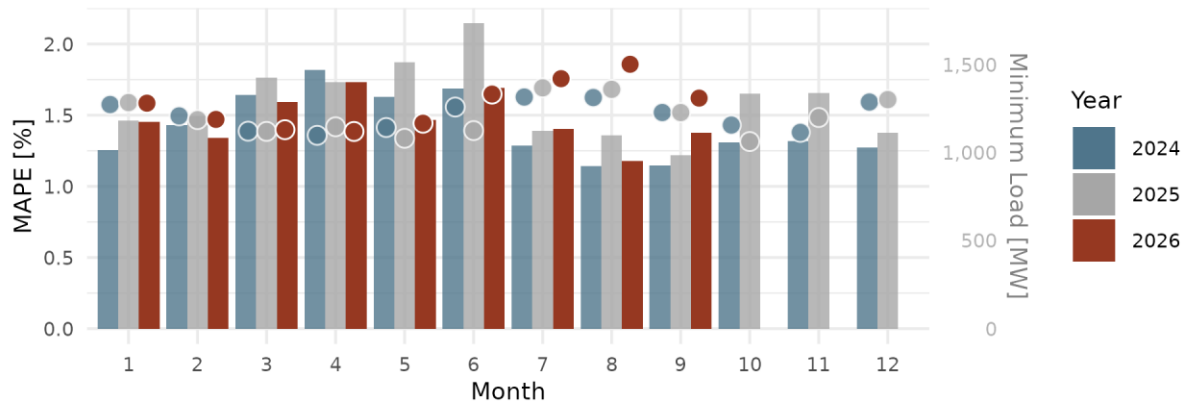
# PGE



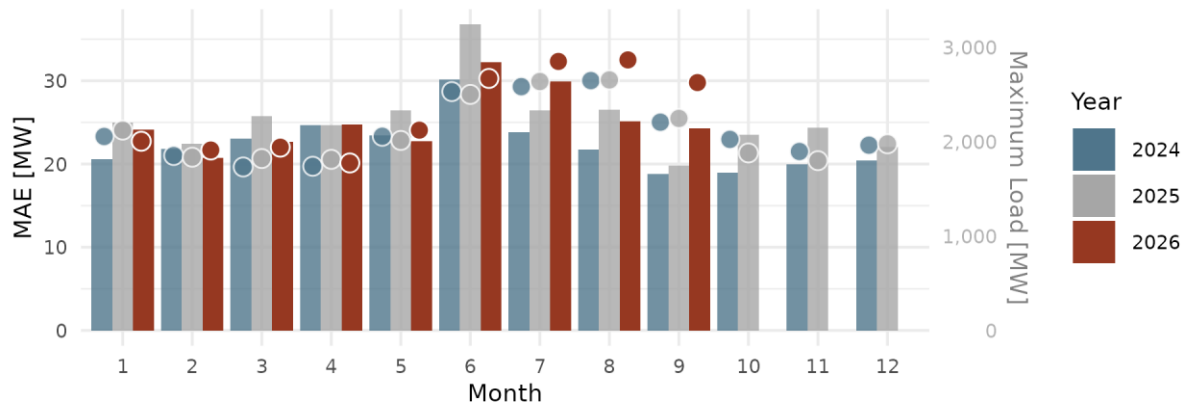
Data current to 2026-10-11. Quarter number on x-axis.

# PNM

PNM T-60 MAPE

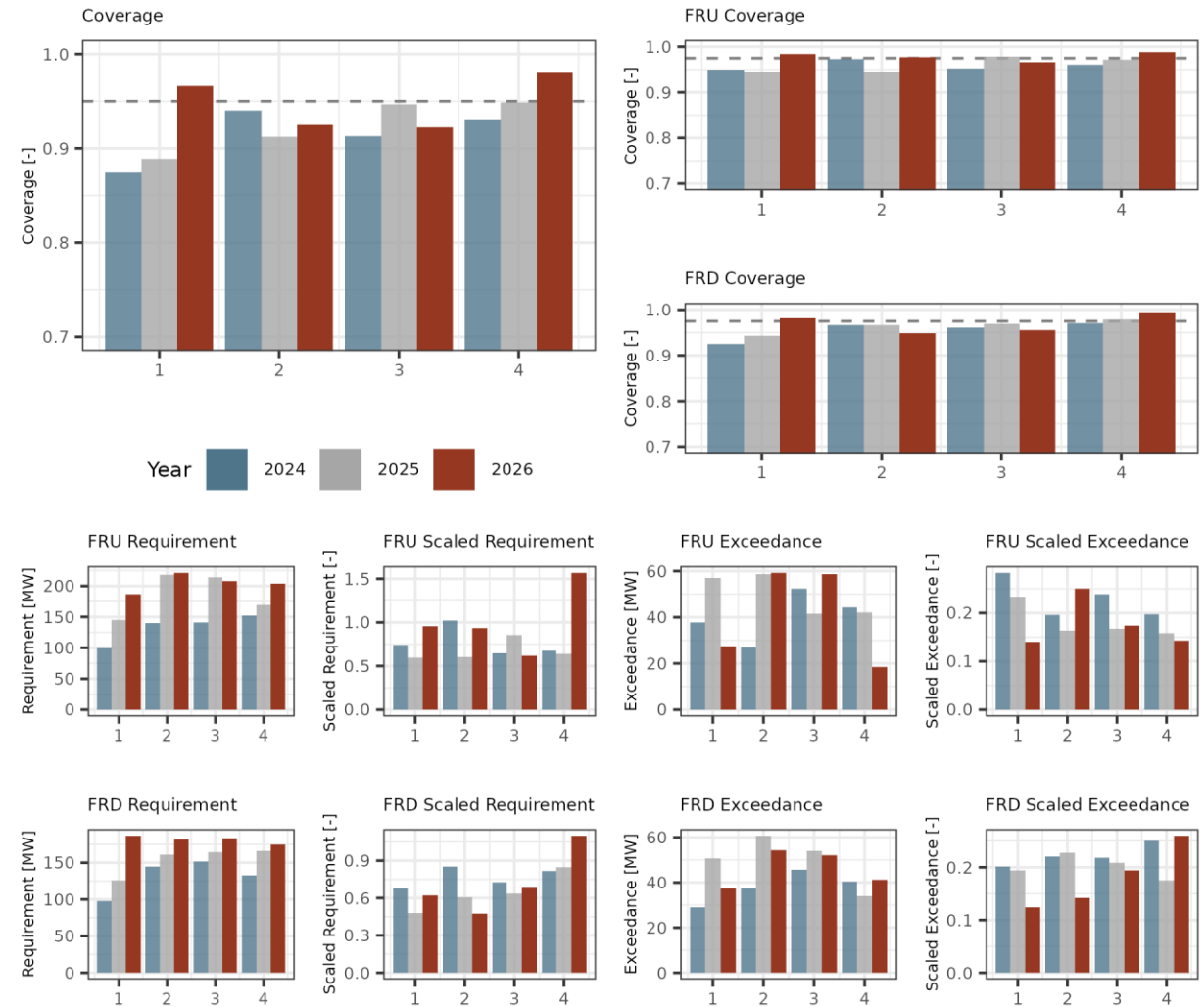


PNM T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

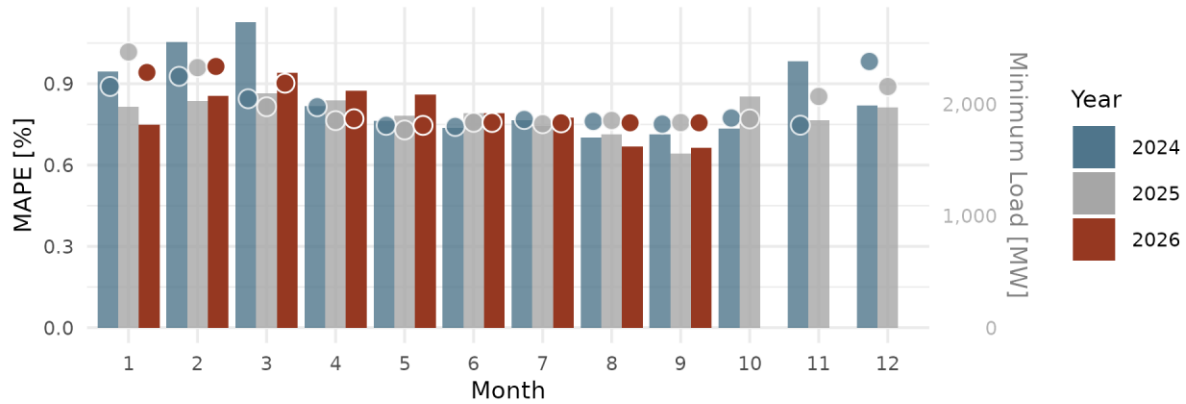
# PNM



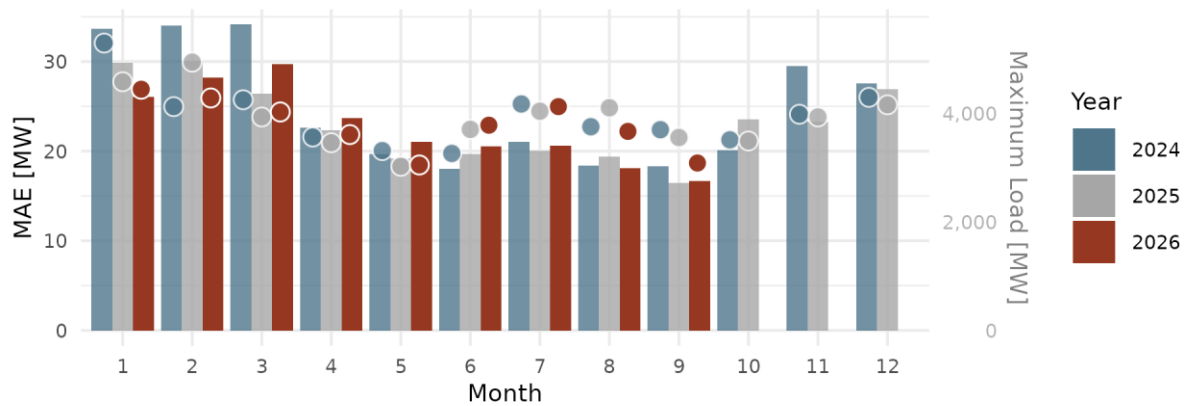
Data current to 2026-10-11. Quarter number on x-axis.

# PSE

PSE T-60 MAPE

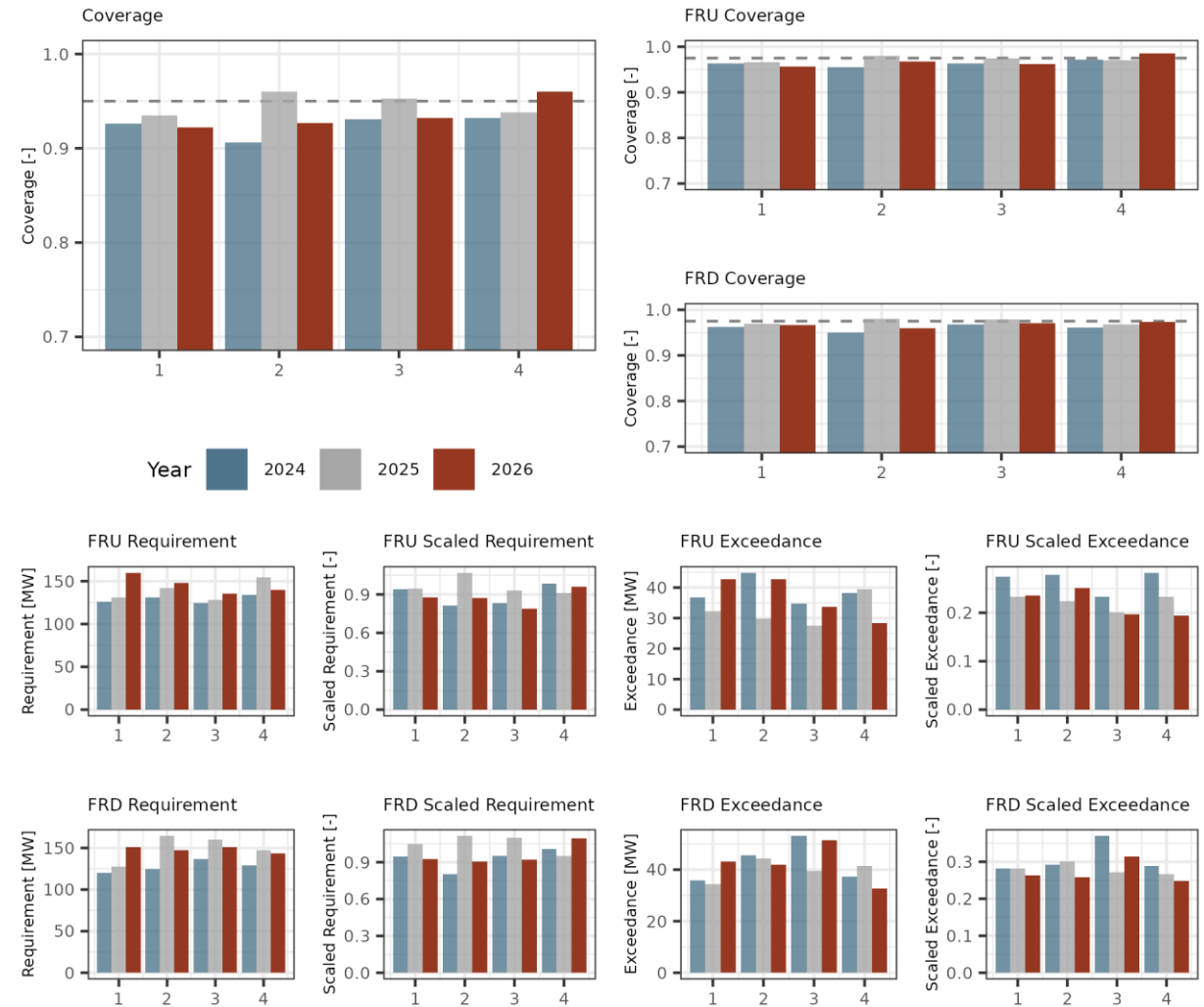


PSE T-60 MAE



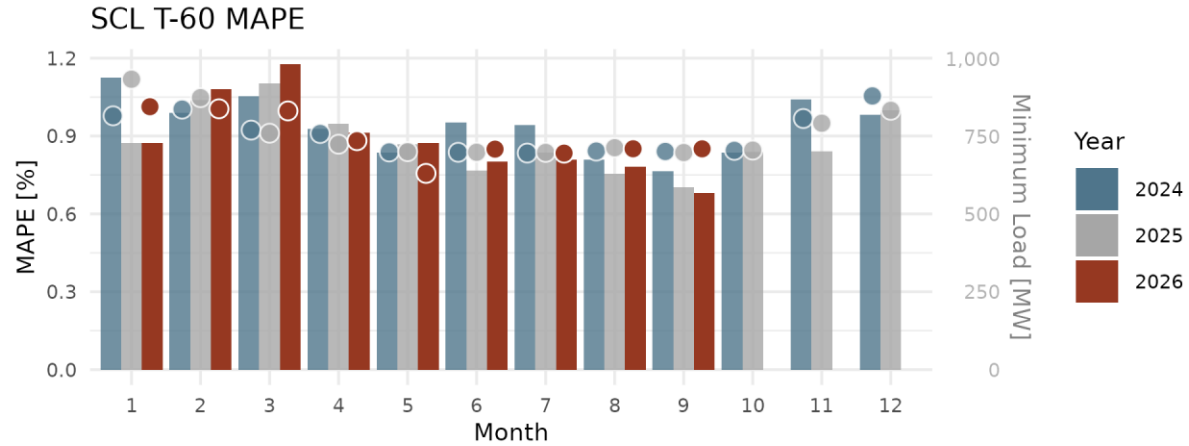
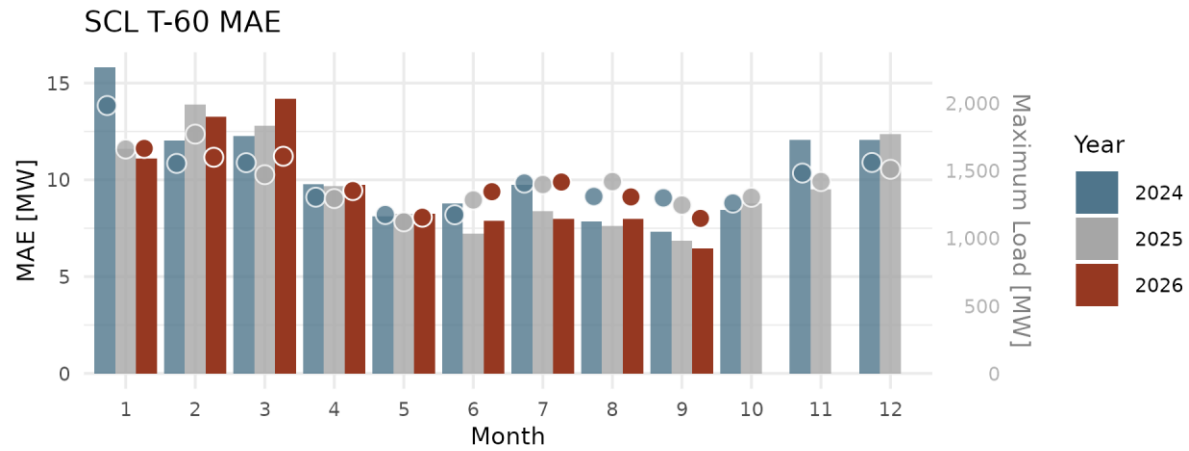
Bars use primary y-axis at left. Points use secondary y-axis at right.

# PSE



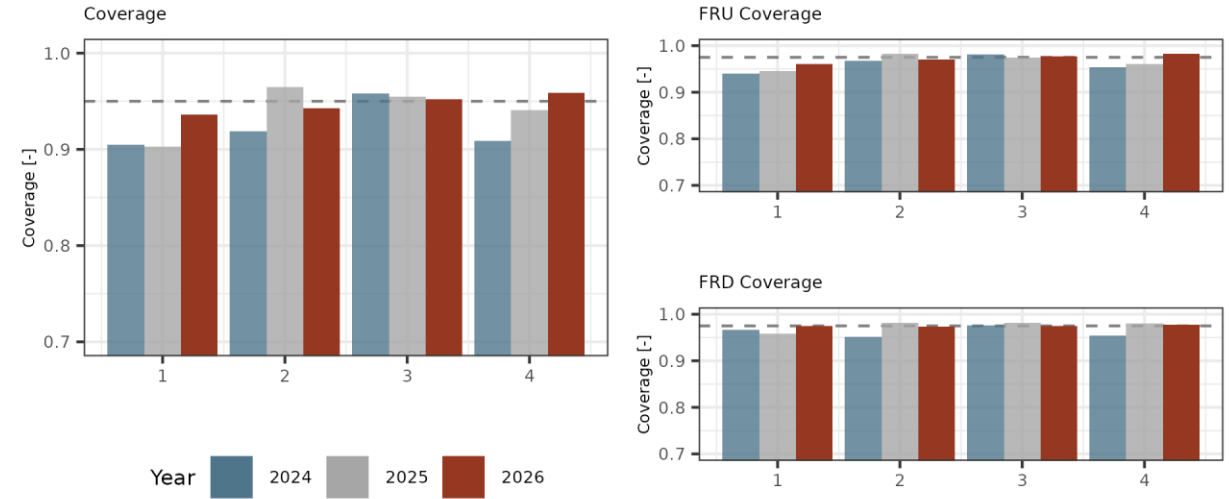
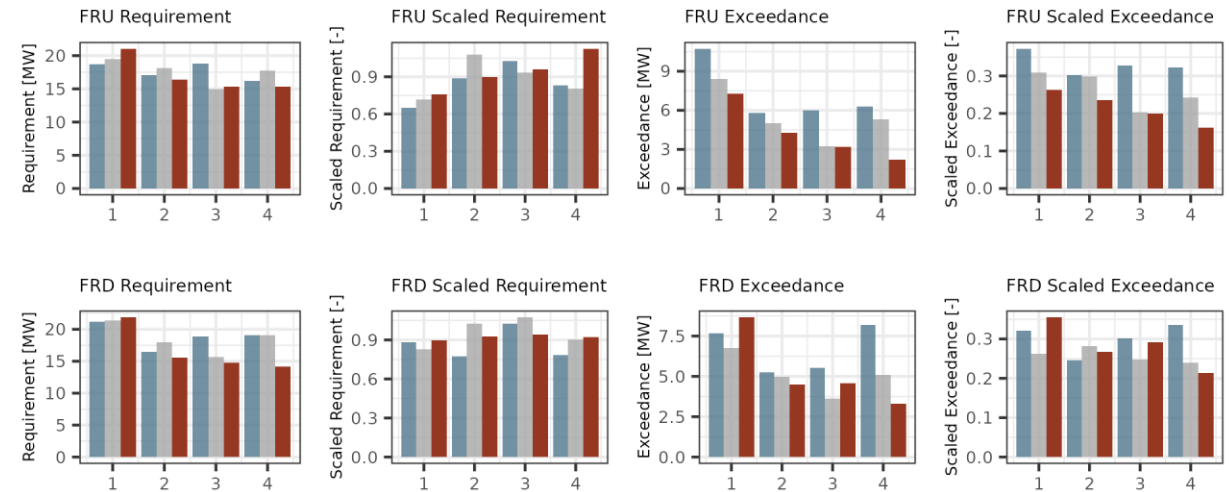
Data current to 2026-10-11. Quarter number on x-axis.

# SCL



Bars use primary y-axis at left. Points use secondary y-axis at right.

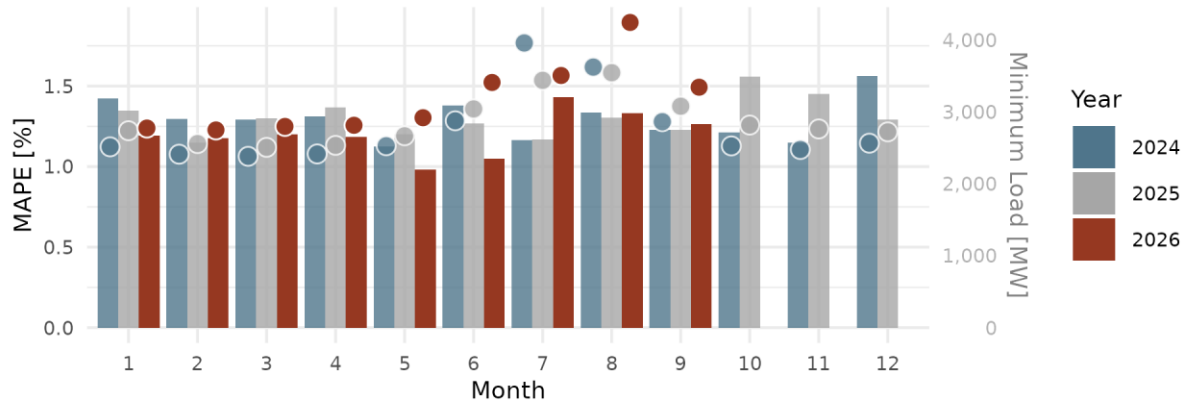
# SCL



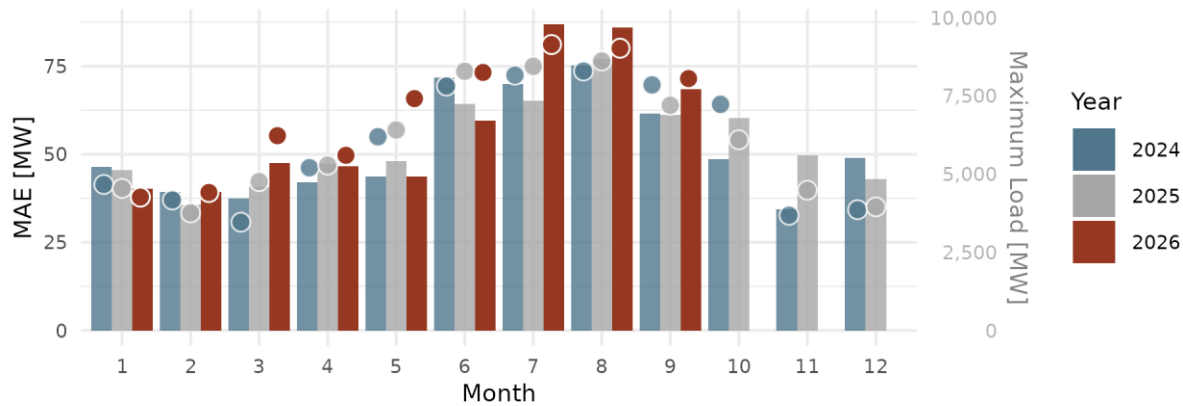
Data current to 2026-10-11. Quarter number on x-axis.

# SRP

SRP T-60 MAPE

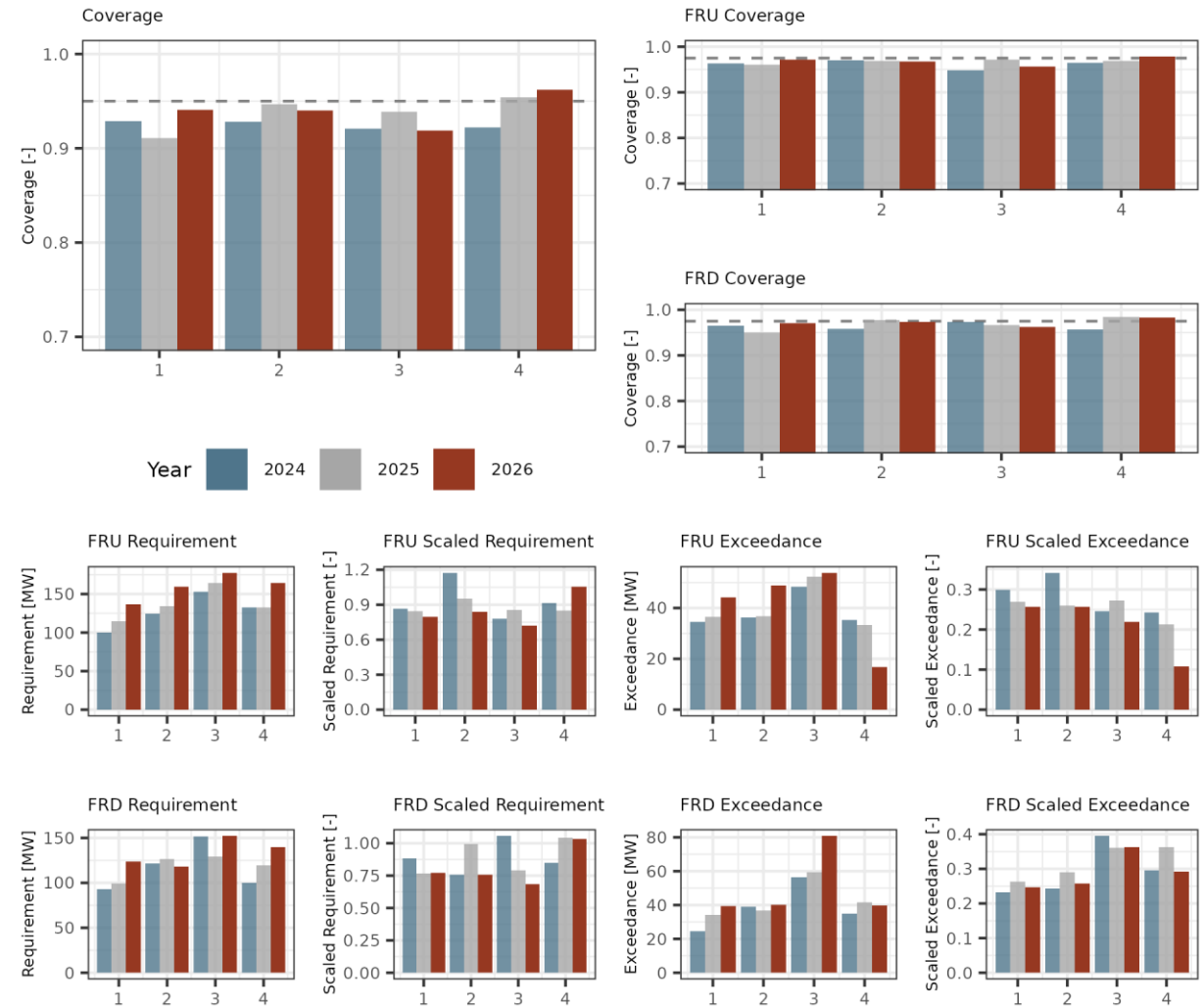


SRP T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

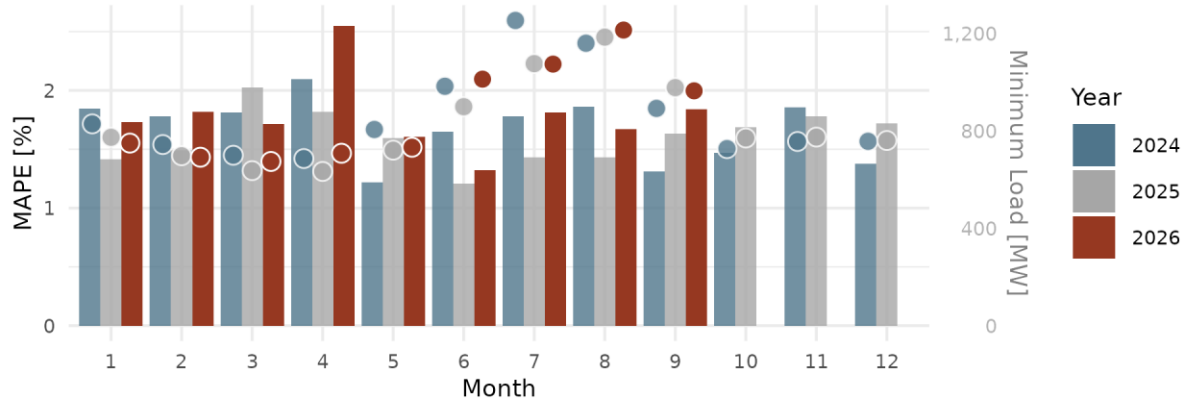
# SRP



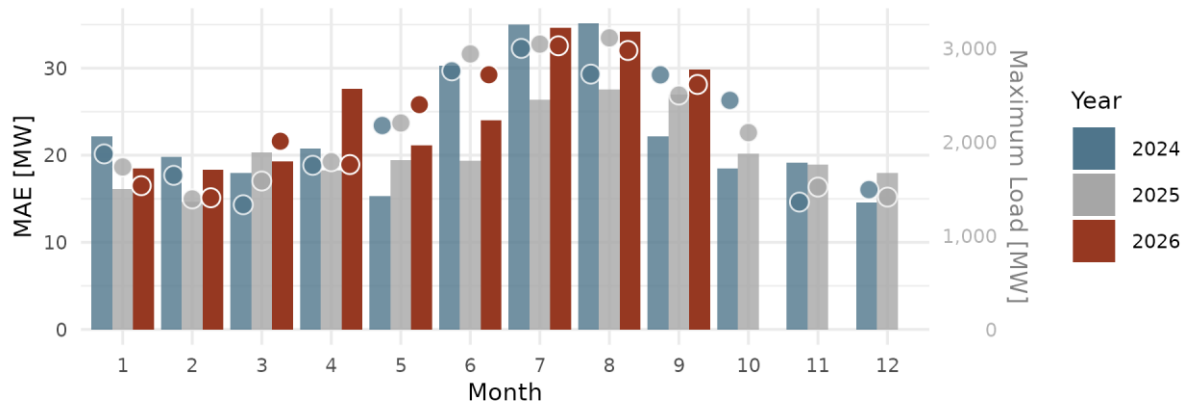
Data current to 2026-10-11. Quarter number on x-axis.

# TEP

TEP T-60 MAPE

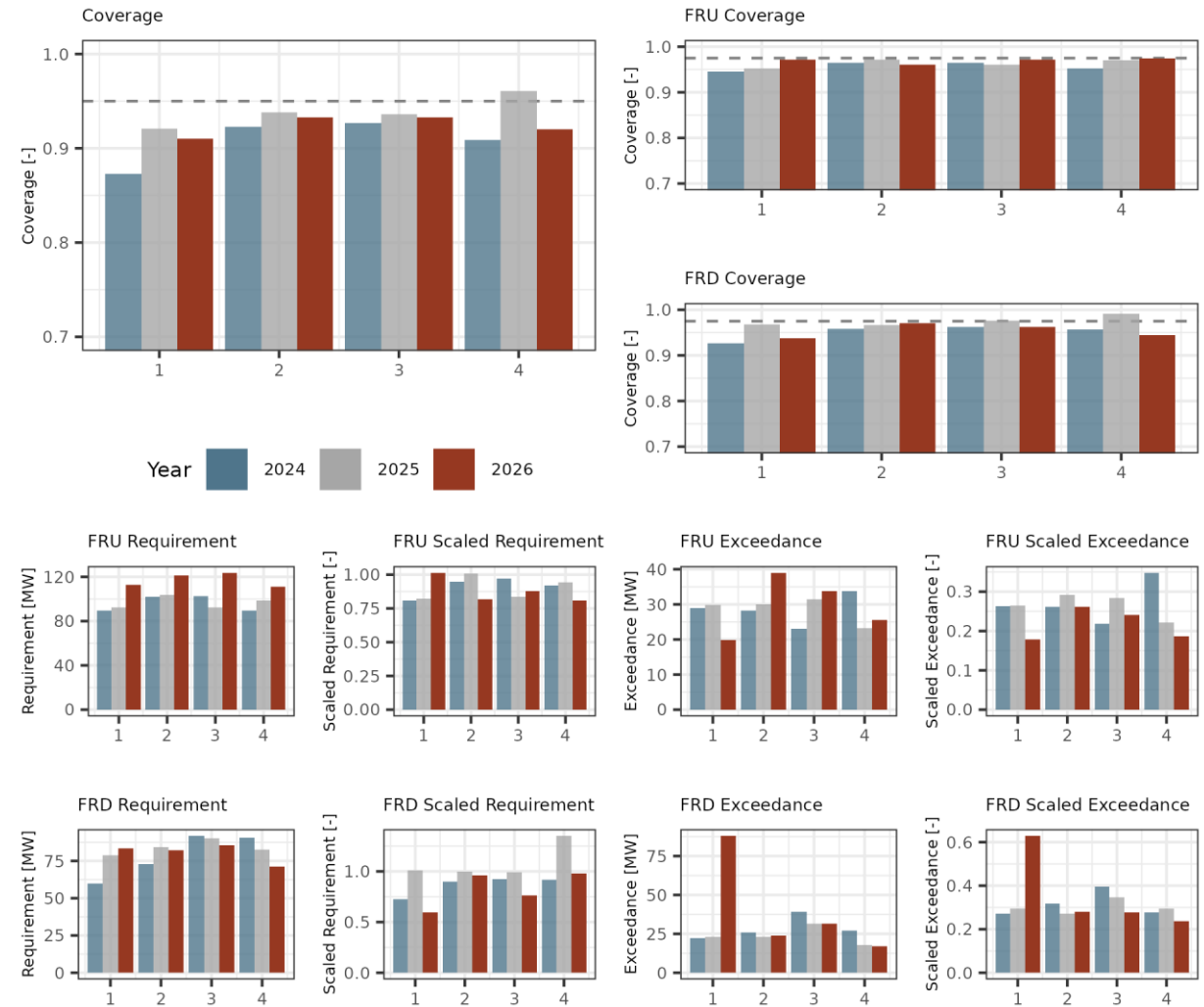


TEP T-60 MAE



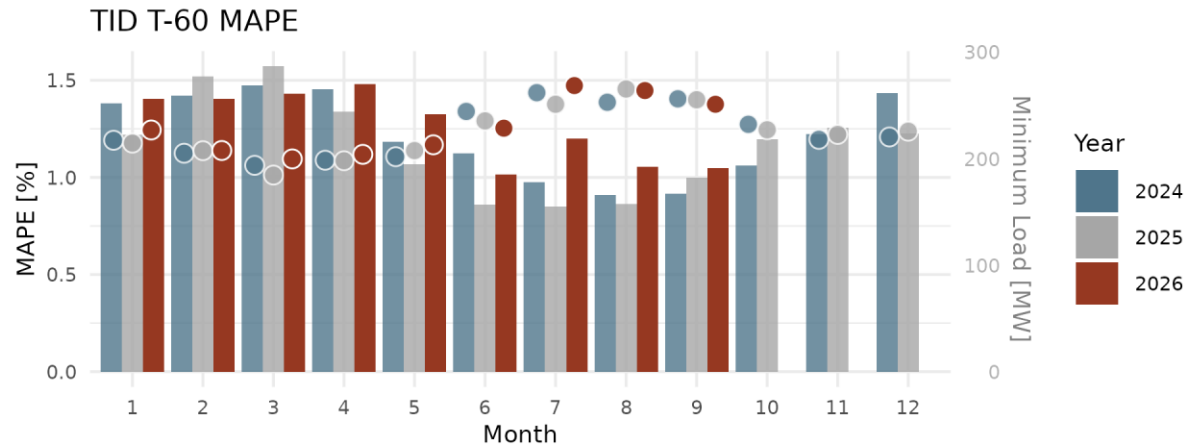
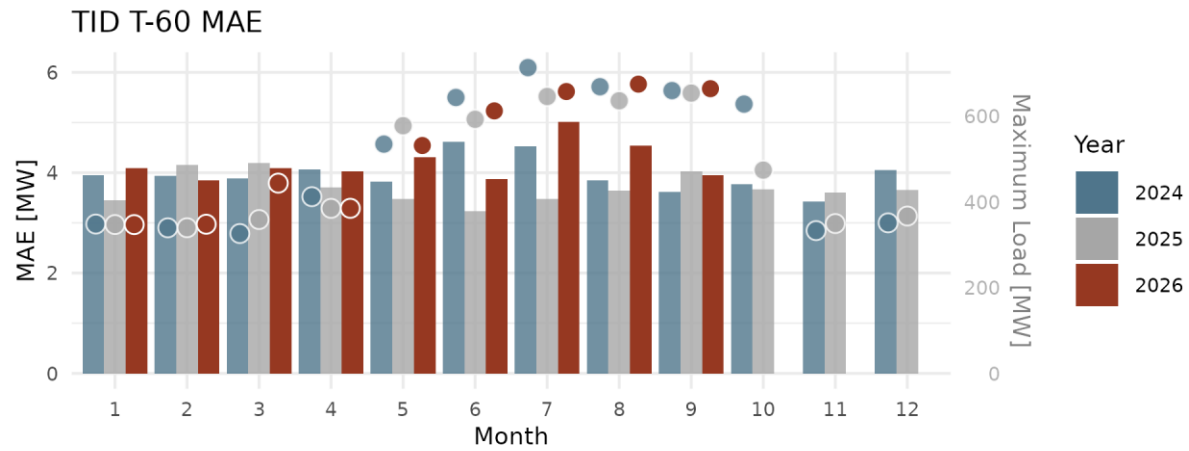
Bars use primary y-axis at left. Points use secondary y-axis at right.

# TEP



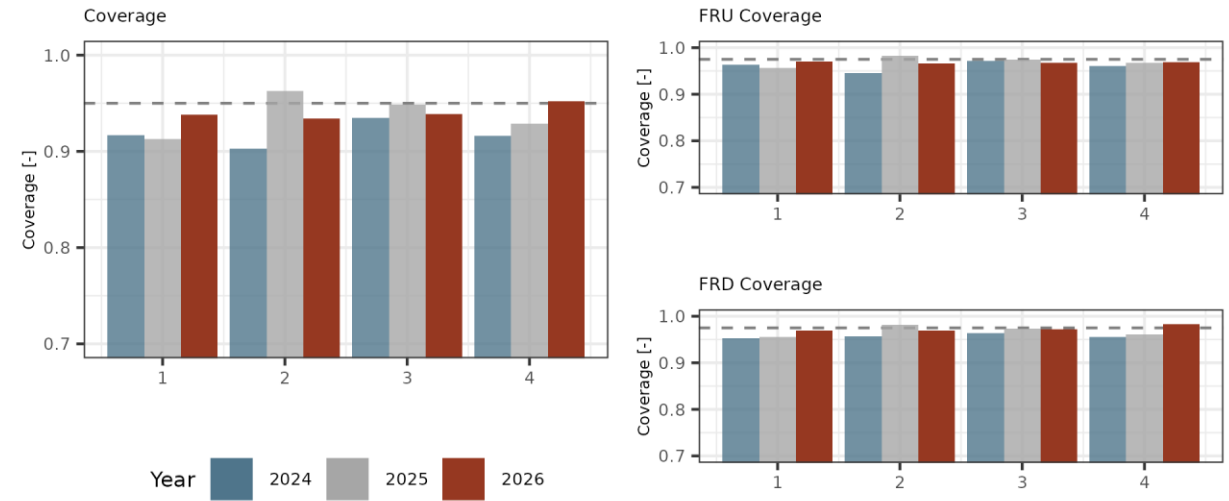
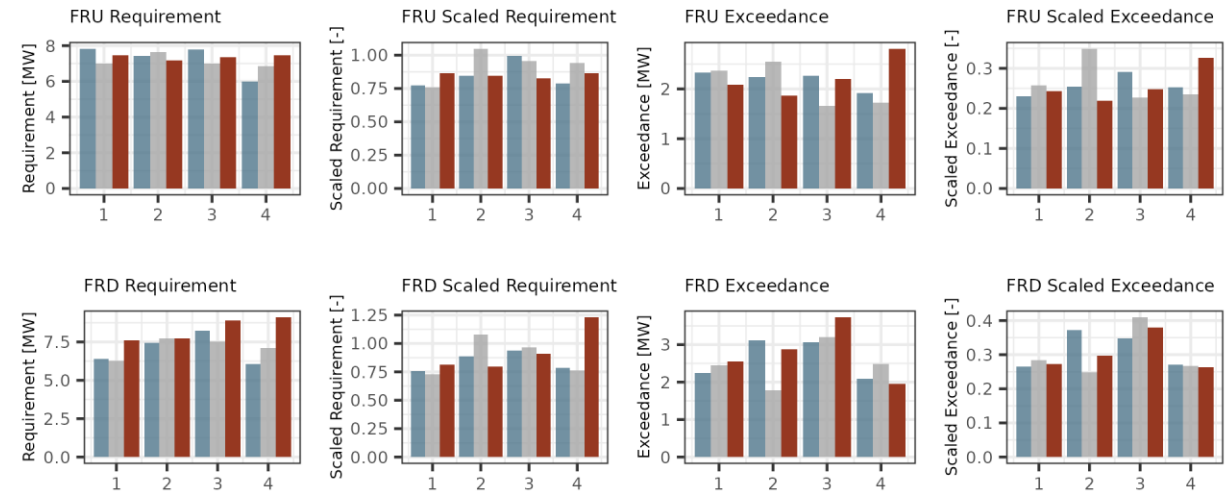
Data current to 2026-10-11. Quarter number on x-axis.

# TID



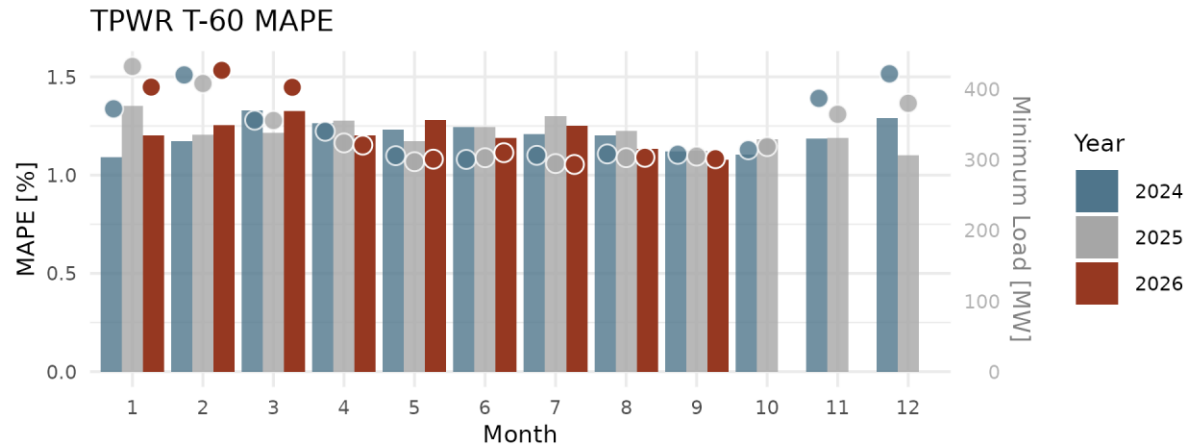
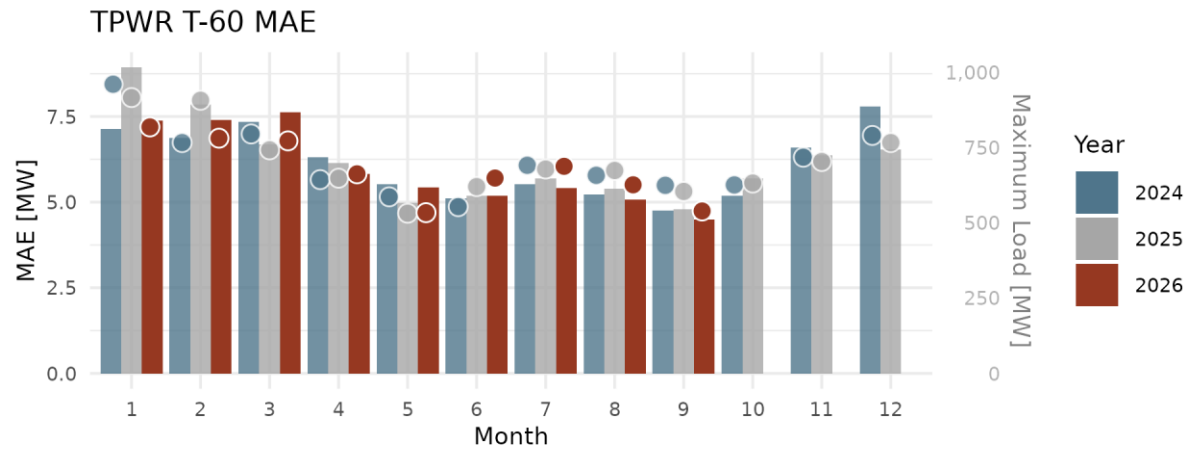
Bars use primary y-axis at left. Points use secondary y-axis at right.

# TID



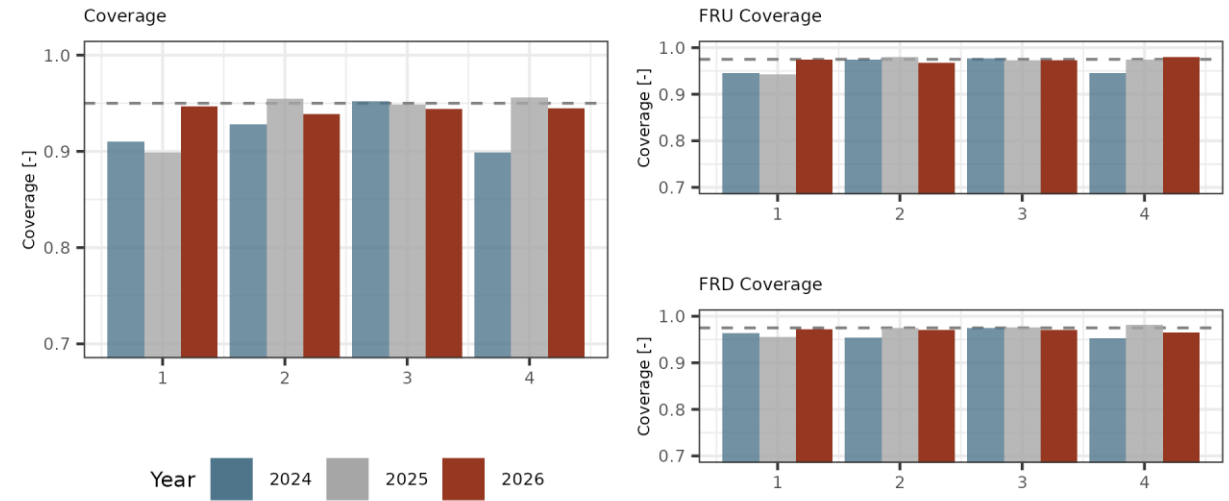
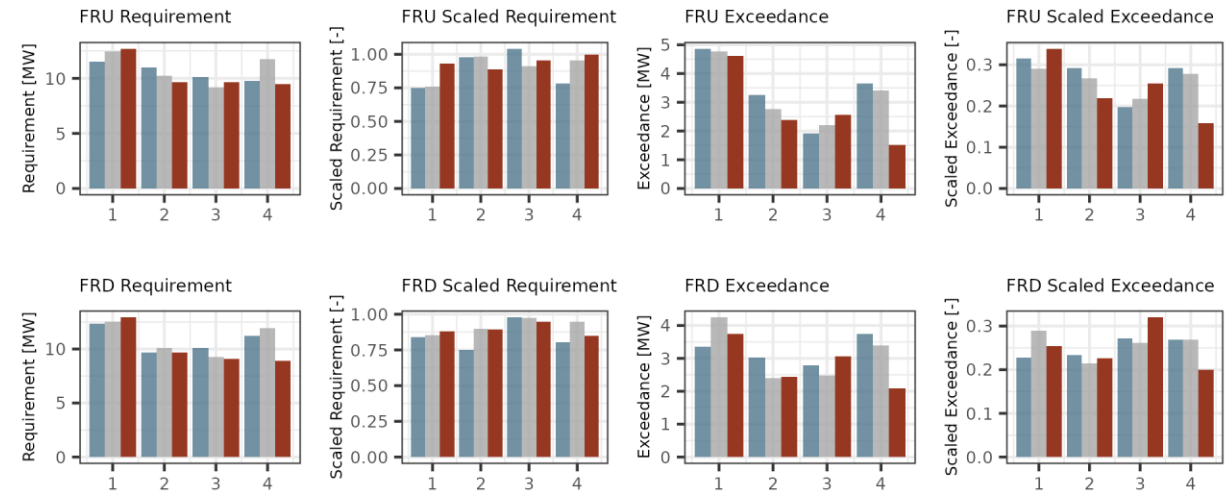
Data current to 2026-10-11. Quarter number on x-axis.

# TPWR



Bars use primary y-axis at left. Points use secondary y-axis at right.

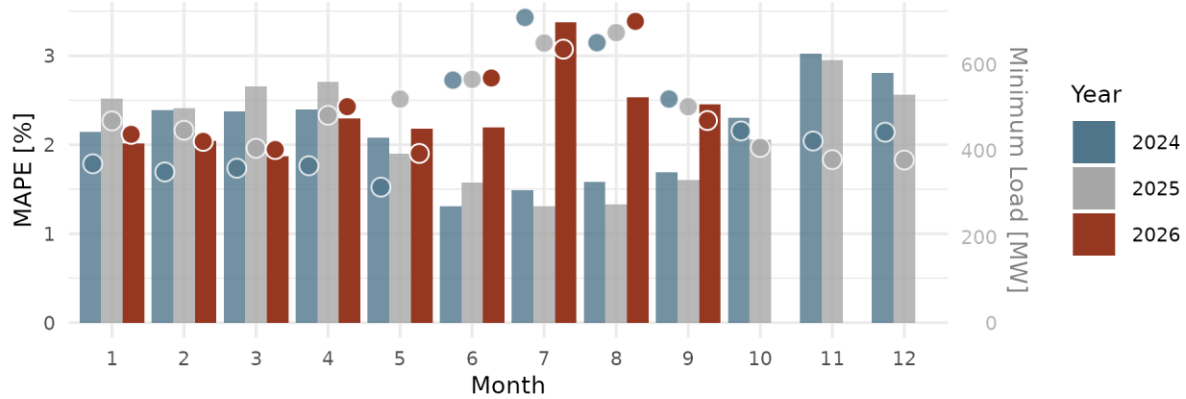
# TPWR



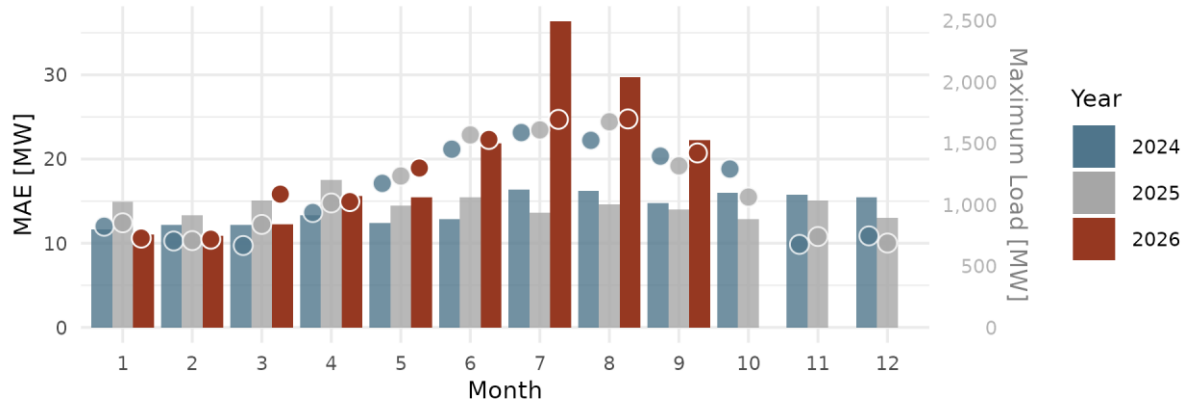
Data current to 2026-10-11. Quarter number on x-axis.

# WALC

WALC T-60 MAPE



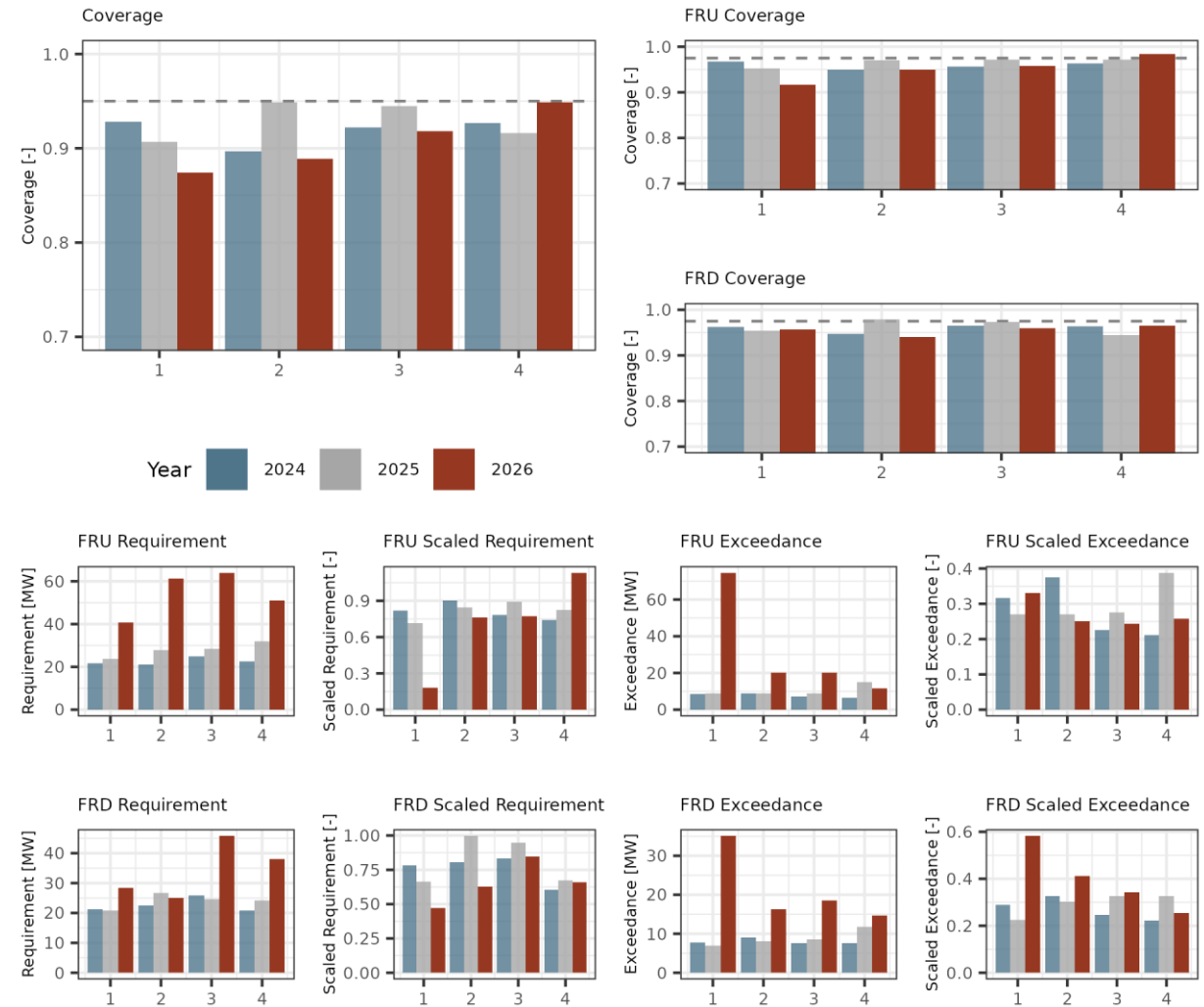
WALC T-60 MAE



Bars use primary y-axis at left. Points use secondary y-axis at right.

STF has communicated with WALC on data quality issues, which impacted forecast quality but have now been addressed. We are monitoring.

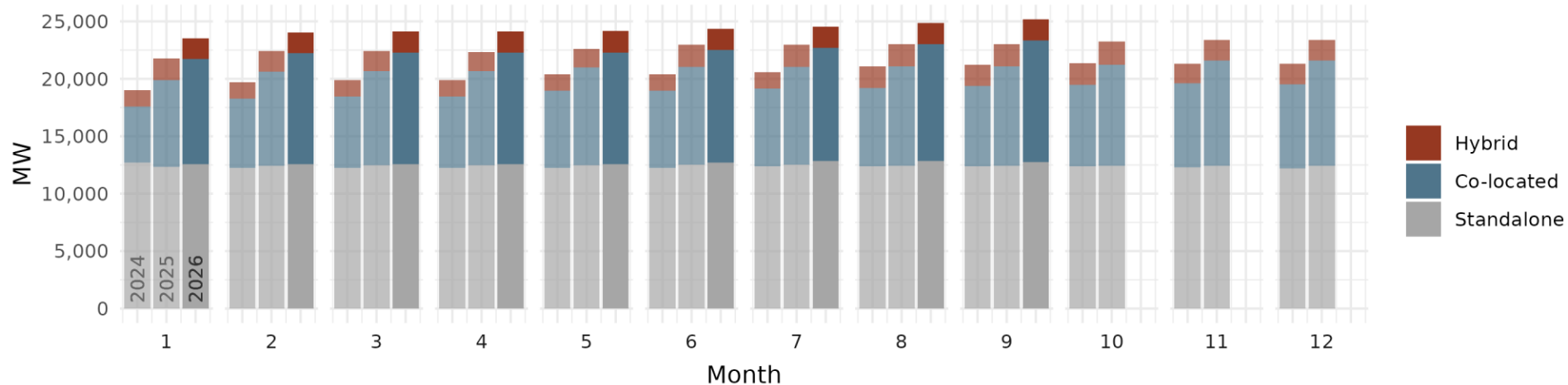
## WALC



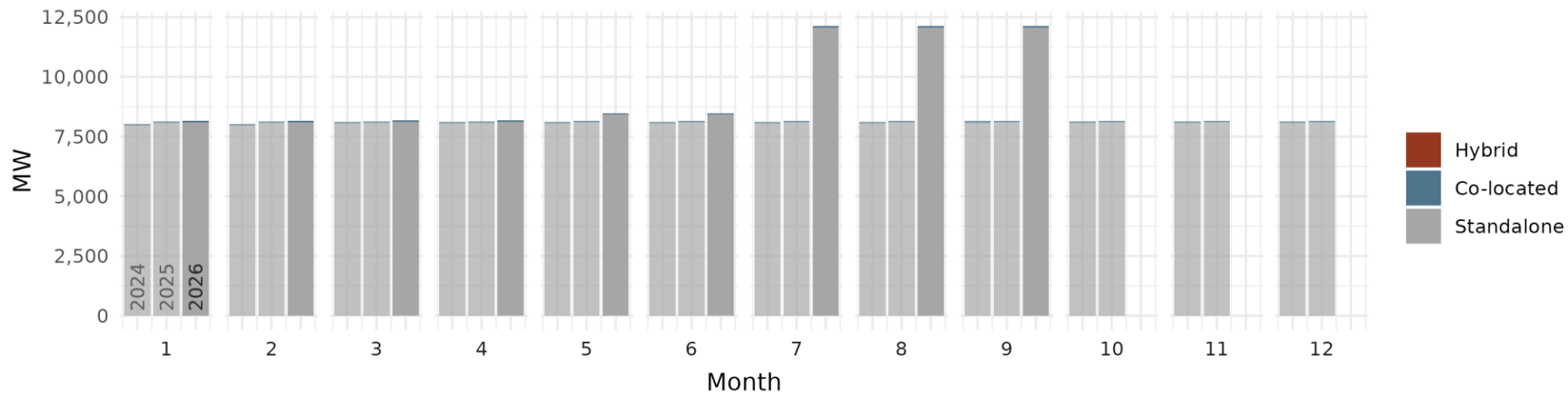
Data current to 2026-10-11. Quarter number on x-axis.

# APPENDIX – CAISO VER METRICS

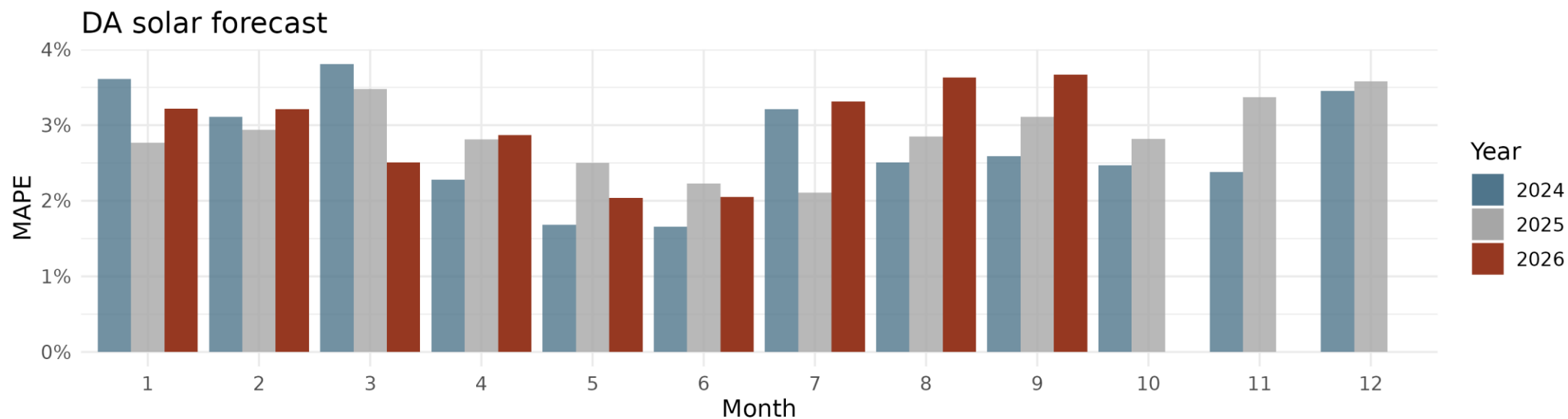
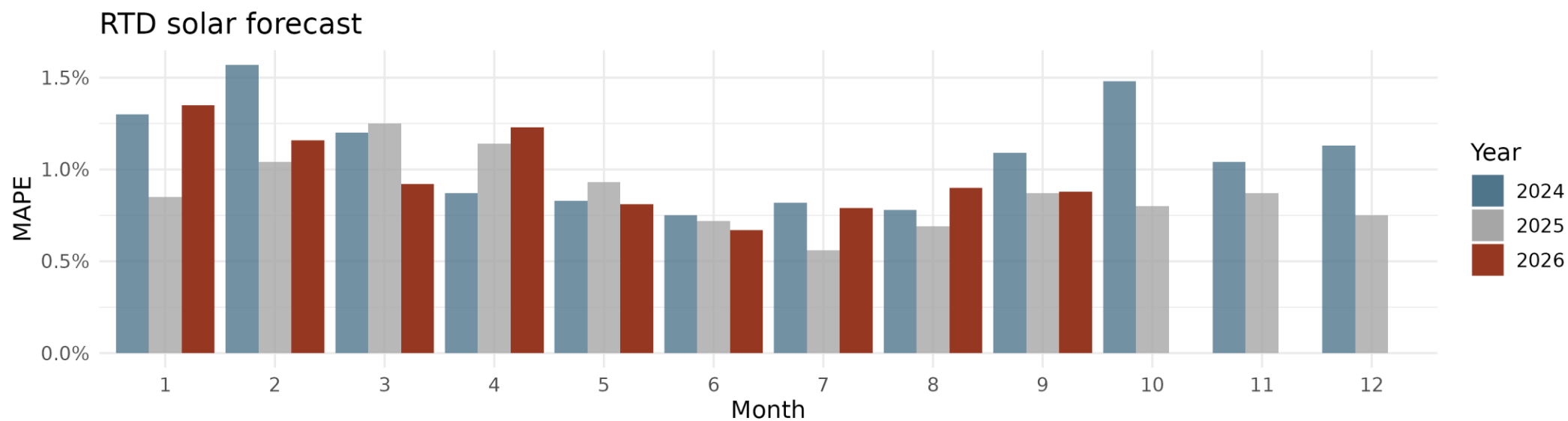
### CAISO solar capacity



### CAISO wind capacity



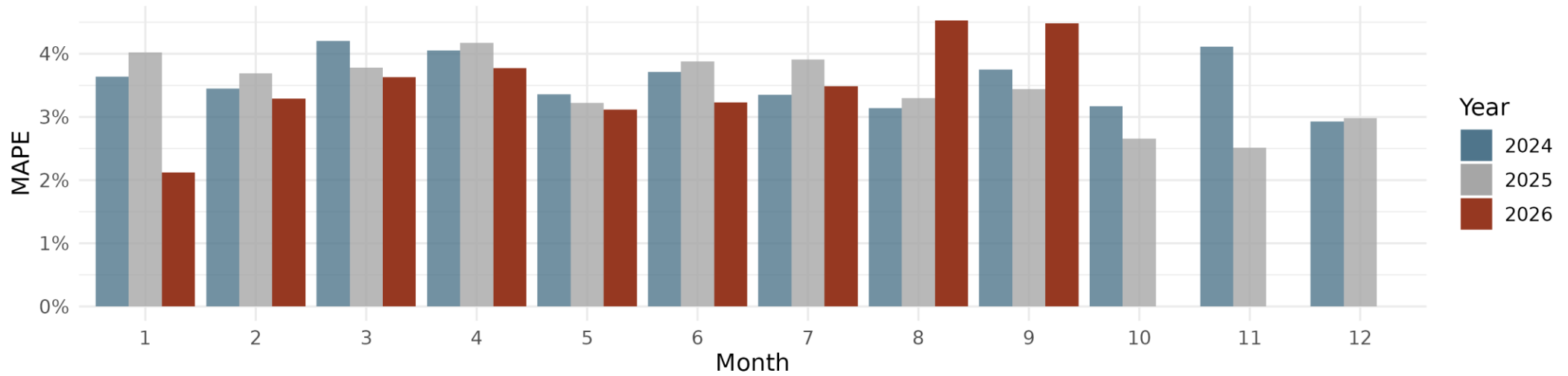
Note, plots reflect capacity at start of month.  
Wind plot reflects SunZia capacity in CAISO footprint.



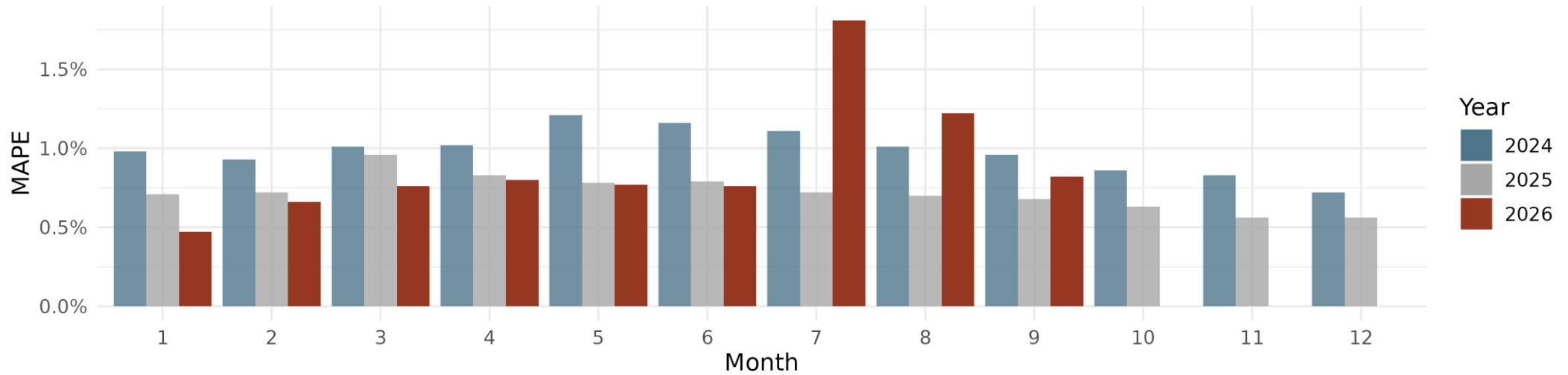
\* MAPE =  $\text{abs}(\text{Forecast} - \text{Actual}) / \text{Actual}$

\*\* MAPE only calculated for intervals where Forecast > 0

DA wind forecast



RTD wind forecast



\* MAPE =  $\text{abs}(\text{Forecast} - \text{Actual}) / \text{Actual}$

\*\* MAPE only calculated for intervals where Forecast > 0