EIM Resource Sufficiency Workshop
June 25 & 28 2021

Arizona Public Service

Bonneville Power Administration

Portland General Electric

Powerex

Agenda

1. Principles for RSE

2. Additional transparency, oversight and reporting
   a) Enhanced transparency and metrics are needed going forward
   b) Oversight and reporting to EIM Governing Body

3. Specific enhancements to improve accuracy of RSE
   a) Capacity should be capable of performing in real-time
   b) Imports should be identifiable
   c) Solar forecast error
   d) Consider Including Load Conformance in the RSE
   e) Demand Response
   f) Emergency actions

4. Failure consequences

Principles for RSE

1. Maintain reliability while discouraging leaning

2. Develop a Capacity Test that is accurate, effective, and equitably applied

3. Ensure the RSE is properly assessing each Balancing Authority's ability to meet its obligations on a stand-alone basis, net of its diversity benefit

4. Full transparency and on-going review

5. Designing a simple and effective failure consequence that upholds both reliability and equitable commercial outcomes

Enhanced transparency, reporting and oversight

Enhanced Transparency and Reporting

- Improved transparency and reporting is necessary to support confidence that the RSE is accurate, consistently applied and effective
  - help EIM participants interpret and understand test results
  - evaluate the accuracy and effectiveness of the RSE on an ongoing basis
  - identify issues (and prioritize enhancements) in a timely manner
  - provide performance metrics to assist EIM Governing Body in its oversight role

Layers of RSE Transparency

1. Additional data available to participants

2. Standardized metrics
   - Routine reviews and special issue reports
   - Recent trends presented at recurring meetings, such as MPPF, MSC and DMM quarterly meetings
   - Contribute to a greater understanding of RSE failures and contributing factors

3. Consistent reporting to the EIM GB to facilitate oversight

1. Additional Data Transparency

Example report to summarize Capacity Test for each BAA:

Available Capacity	HE1	HE 2	HE3	...	HE23	HE24
Gas						
Hydro						
Renewables						
Non-EIM Imports						
Nuclear & Other						
Demand Response						

BAA Obligations	HE1	HE2	HE3	...	HE23	HE24
Load Forecast						
Exports						
Uncertainty Requirement						
Less: Diversity Benefit						

PASS/FAIL AMOUNT (MW)						

2. Standardized Metrics

- **Performance metrics** to summarize RS results
  - e.g., pass/fail rates (similar reporting as today)
  - MW transfers during failure periods
  - Separate reporting for capacity and flexibility tests

- **Accuracy metrics** are also needed to evaluate whether RS is reflecting the true operating capabilities and obligations of each BAA
  - Comparison of actual real-time capacity vs. quantities included in RS test
  - Actual renewable output relative to forecasts used in RS Test
  - Actual load vs. load forecast used in the RS test, including role of load conformance
  - Overall evaluation of whether total RS requirements are accurate
    - *i.e.,* is the overall level of capacity/flexibility required by the RSE consistent with actual system conditions at a P95 confidence level?

2. Standardized Metrics

- ***Presentation can enhance meaning***: graphic on the left is a more insightful metric – it focuses on pertinent intervals, adds surrounding days and bolsters context
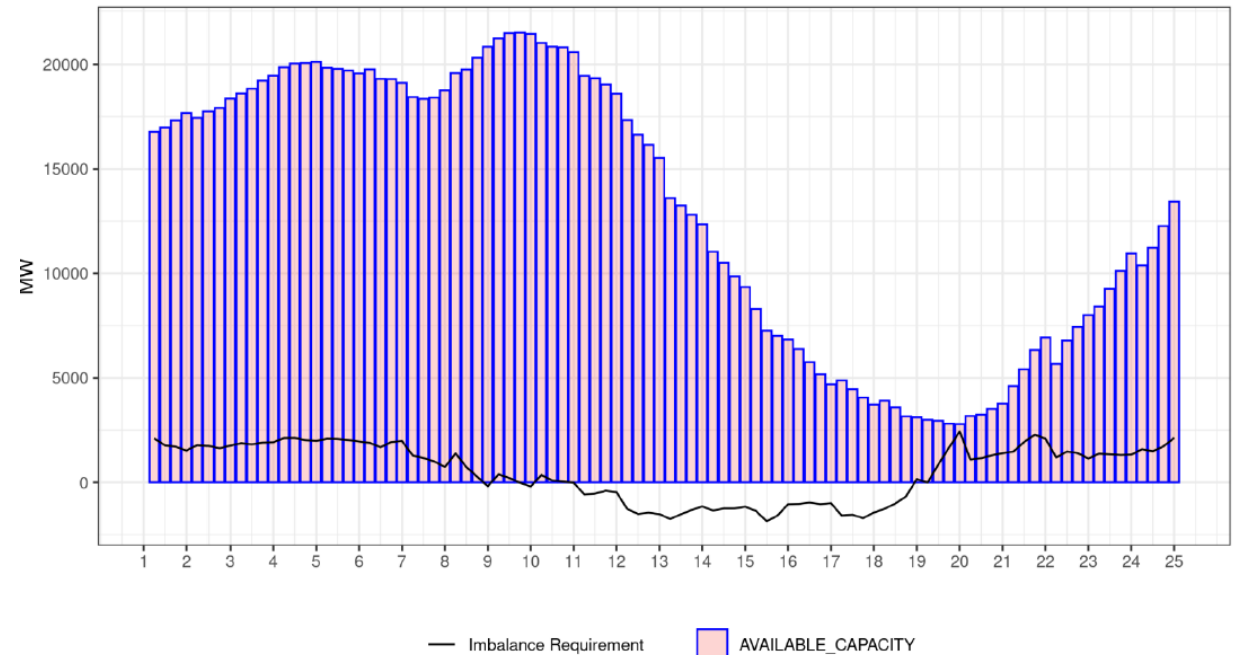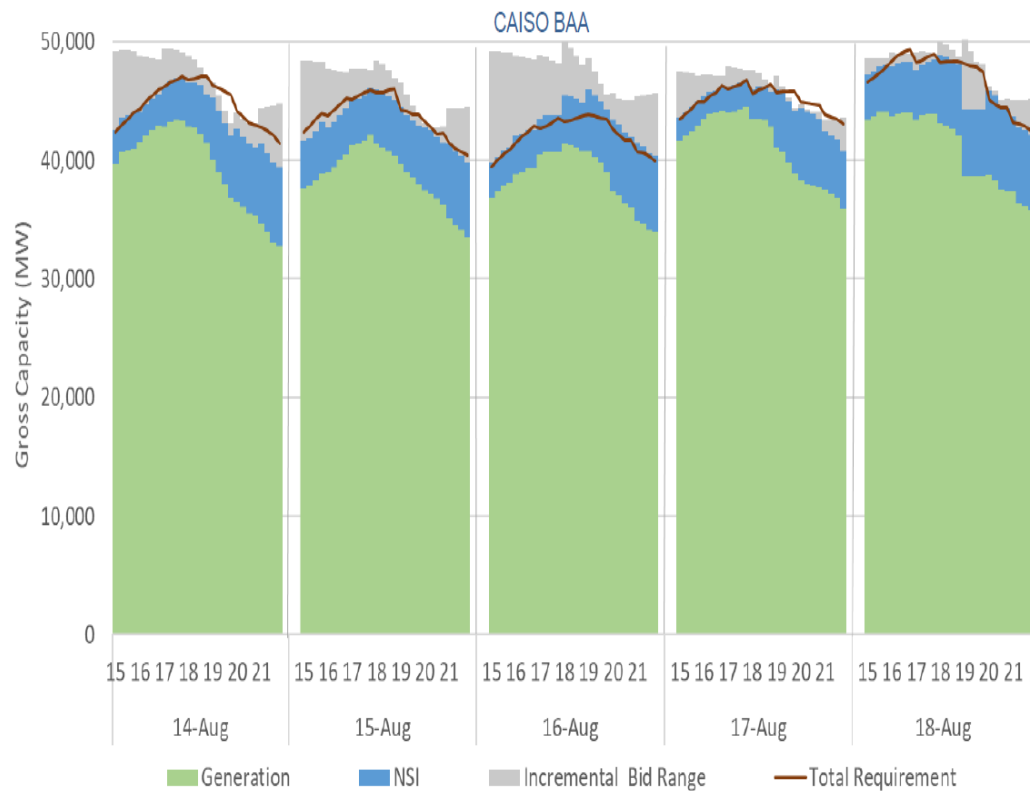
2. Standardized Metrics

	Bid Range Capacity Test																										**Flexible Capacity Sufficiency Test**																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
APS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BPA	0	0	0	0	0	8	10	7	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BANC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAISO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	10	12	16	12	4	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	10	12	16	12	4	0	0	0	0
Idaho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NVE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PWX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SRP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TPWR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The <u>two</u> orange circles show the two tests yielding different results for the number of intervals failed which warrants further exploration.

The <u>two</u> yellow circles show the Capacity and Flex tests working in tandem with the same results.

3. Oversight to EIM Governing Body

- RS is foundational to EIM and additional oversight is necessary to ensure the RSE is functioning as intended

- The EIM Governing Body must have access to sufficient data, analysis and perspectives

- Should include consistent reporting to the EIM GB each calendar quarter:
  - Routine review of RSE performance (pass/fails, transfer quantities,etc.)
  - Review of RS accuracy metrics
  - Review any issues/recommendations raised by DMM, GBME, and/or stakeholders

Specific Enhancements to Improve Accuracy of RSE

Capacity Should Be Capable of Performing in RT

Figure 3 - August 14, 2020 Overestimation
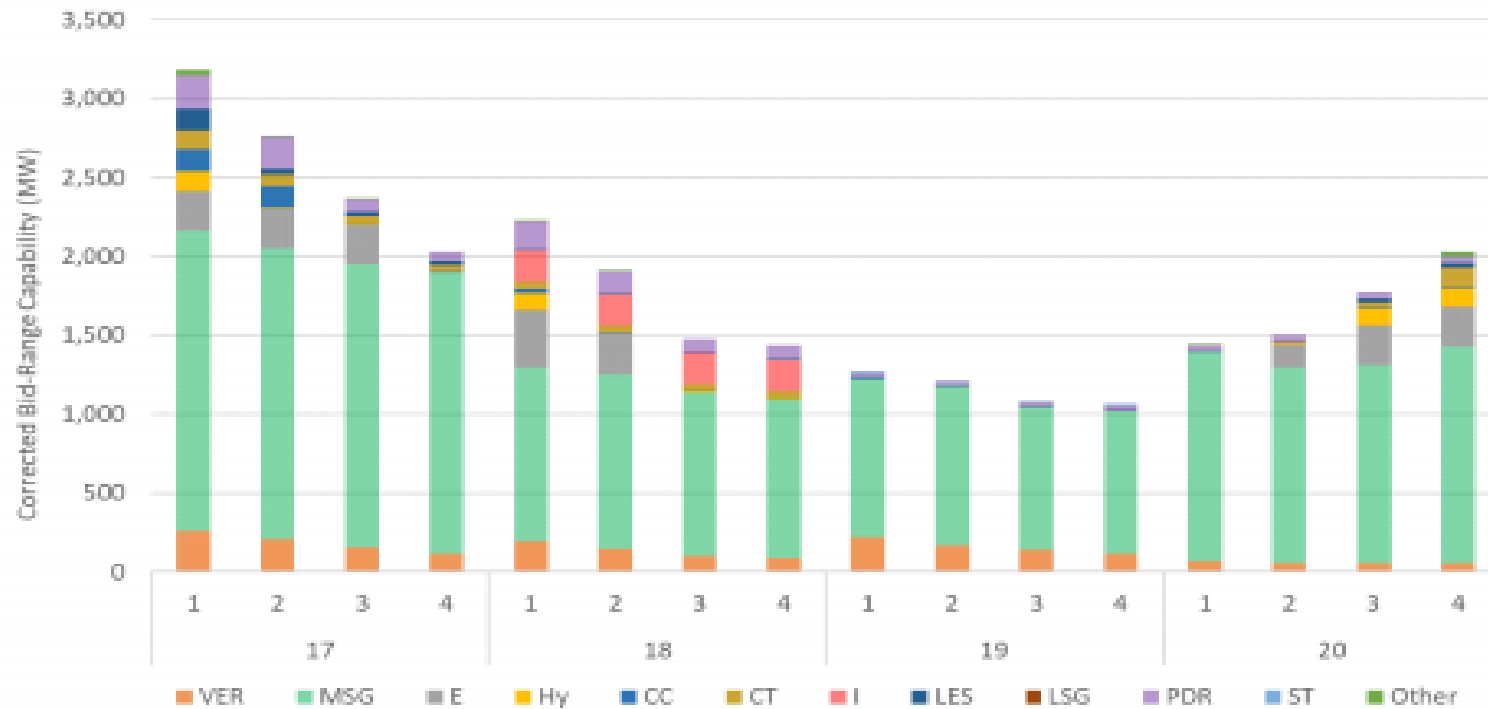
Source: CAISO Issue Paper, page 12

- CAISO's analysis of August 14th 2020 illustrates the potential for over-stated capacity to be included in BRCT

- Magnitude of over-stated capacity on August 14th was larger than other days based on a long-start resource attempting to return from outage

- Illustrates the need to more accurately measure whether the resource is realistically available in real-time

Capacity Should Be Capable of Performing in RT

- Principle: BRCT should measure whether each entity has sufficient available capacity in real-time to meet its load <u>without</u> relying on EIM Transfers

- General rule: capacity should reflect the maximum <u>achievable</u> output within the real-time market horizon (i.e., approximately 2 hours)

  - excluding supply that is not truly available in real-time is necessary to accurately evaluate each BAA's ability to meet its own obligations without leaning on the EIM

  - will result in a more consistent application between EIM Entities and the CAISO BAA (as EIM Entities are expected to provide feasible base schedules each hour)

  - consistent with efficient market dispatch in real-time

Capacity Should Be Capable of Performing in RT

Attribute	Online and Offline		Online Only		
	Fast Start	**Short-Start**	**Medium Start**	**Long-Start**	**Extremely Long-Start**
Start Up Time	less than or equal to 10 minutes	less than 2 hours	between 2 & 5 hours	between 5 & 18 hours	greater than 18 hours
Cycle Time		less than or equal to 270 mins	less than or equal to 270 mins		
Real-Time Applications					
RTUC	**Commit/ Advisory**	**Commit/ Advisory**	No Commit	No Commit	No Commit
STUC	Commit/ Advisory	Commit/ Advisory	Commit	No Commit	No Commit

Capacity Should Be Capable of Performing in RT

Resource	Included in BRCT?	Quantity
Online resources	Yes	Maximum achievable output within RT horizon (i.e., within approx. 2 hours)
Offline resources that can be committed by RTUC	Yes	Maximum achievable output within RT horizon (i.e., within approx. 2 hours)
Offline resources with start-time beyond RTUC	No	Not included
Offline resources returning from outages	Yes	Potentially included, but limited to realistic output within next 60 minutes
MSG Resources	Yes	Limited to configurations that can be achieved within RTUC horizon (i.e., within approx. 2 hours)
Exceptional Dispatch	Yes	Limited to fixed ED quantity

# Imports Should Be Identifiable

- EIM Entities only include imports with an identified source

- CAISO BAA includes all cleared HASP import schedules at T-40
  - Can include speculative bids that are not supported by real supply

- Delivery failures associated with speculative supply bids are not random: risk is elevated during tight supply conditions

- Only imports supported by an identified resource should be included by CAISO BAA (e.g., using e-Tags or other form of reliable verification)
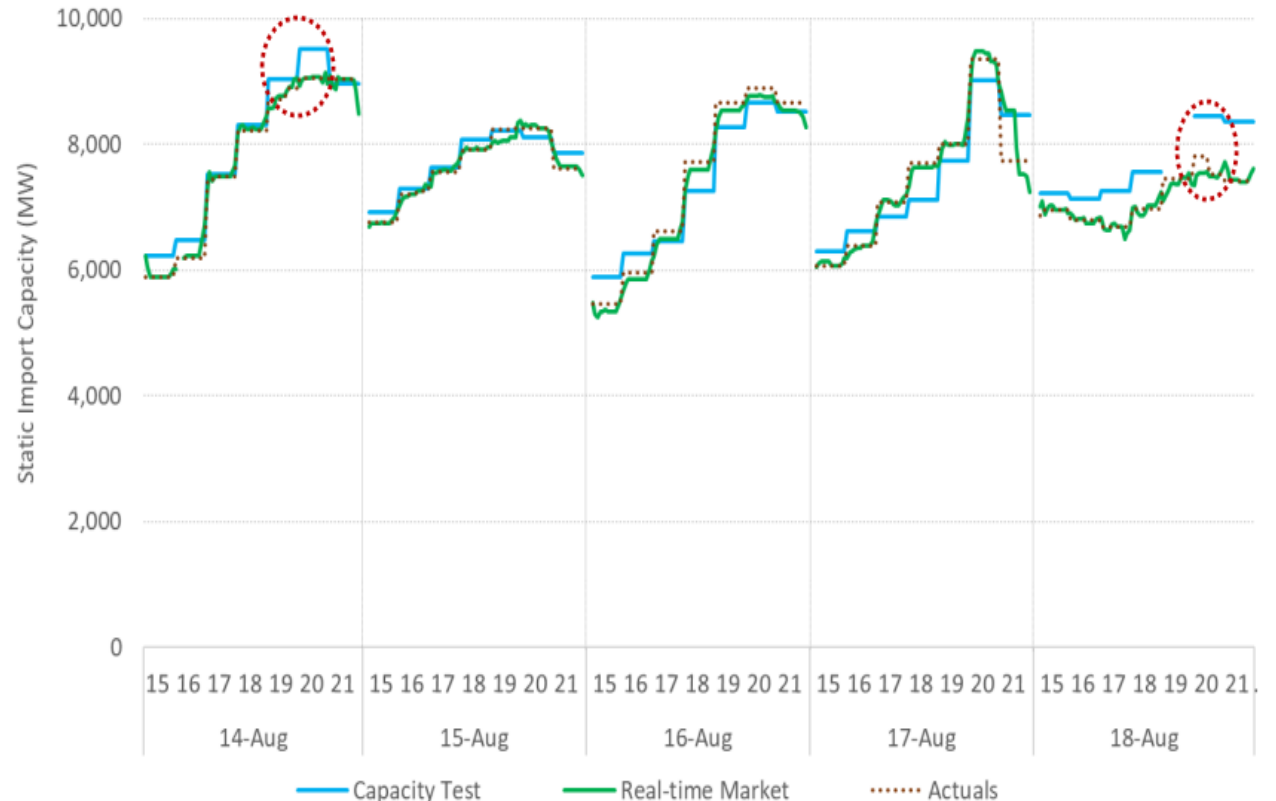
Partial deliveries from imports cleared in HASP resulted in some deltas between the capacity test and the real-time capacity

Solar forecast error

- CAISO previously identified over-stated solar during peak hours of August 2020 heat event
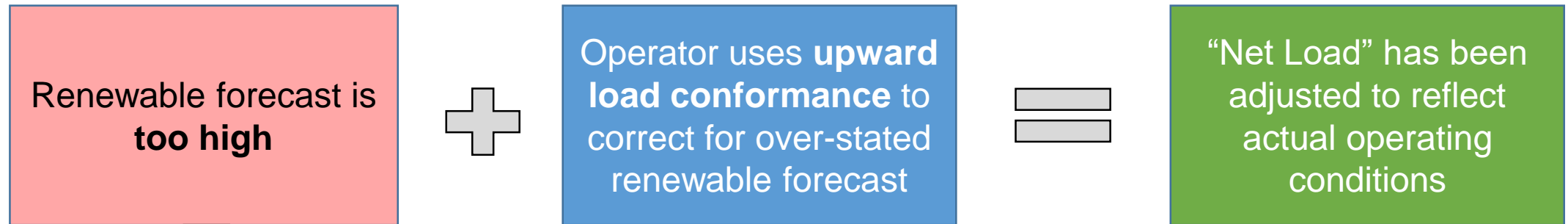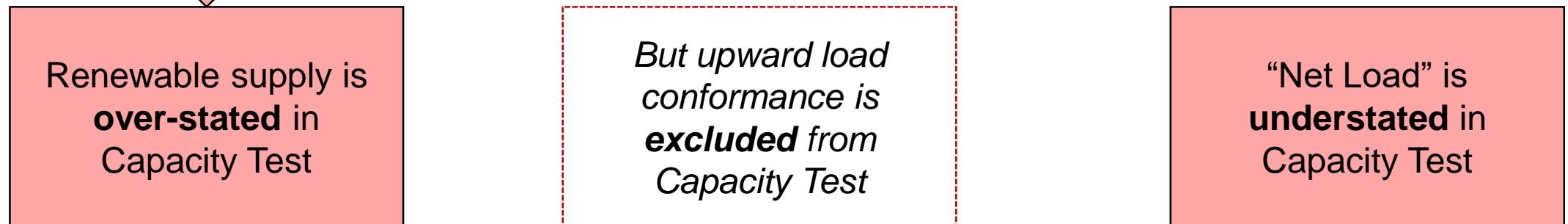- Similar results in June 2021: solar output appears to be systemically over-stated

HA forecast vs **RTD dispatch**
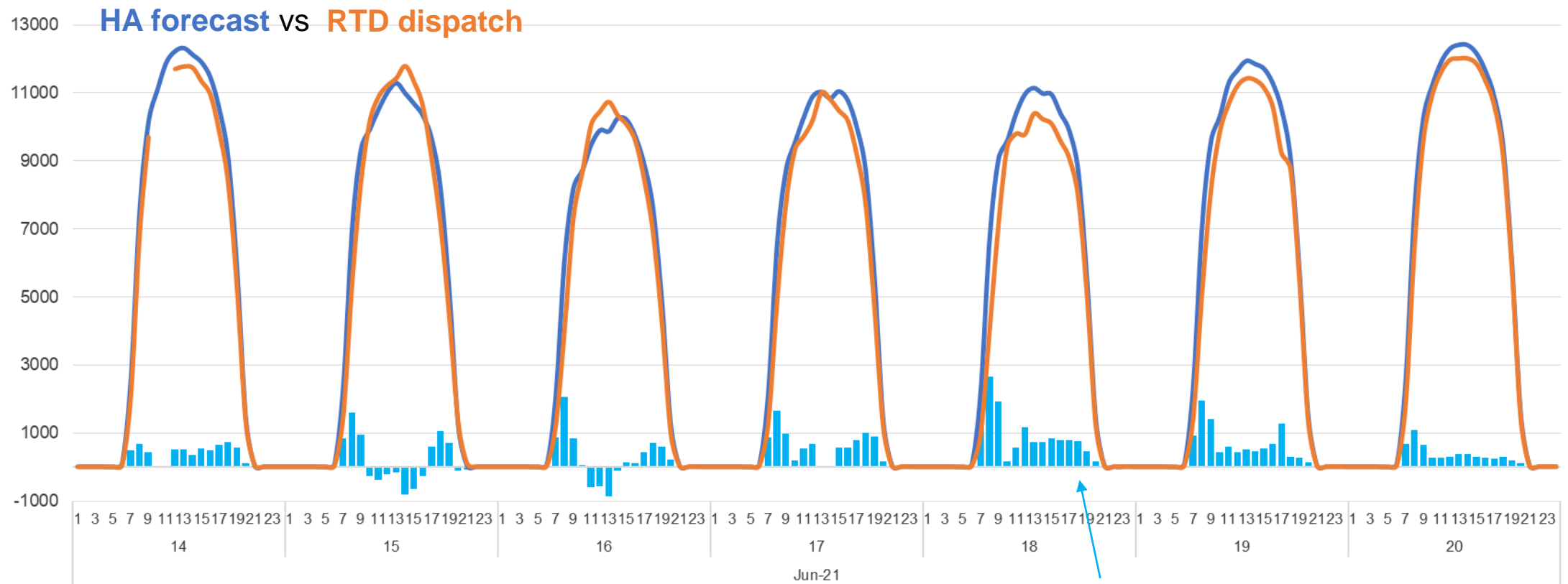
Forecast error

Source: CAISO OASIS

Consider Including Load Conformance in the RSE

Market Operations

| Renewable forecast is **too high** | ➕ | Operator uses **upward load conformance** to correct for over-stated renewable forecast | ＝ | "Net Load" has been adjusted to reflect actual operating conditions |

RSE

| Renewable supply is **over-stated** in Capacity Test | *But upward load conformance is **excluded** from Capacity Test* | "Net Load" is **understated** in Capacity Test |

Consider Including Load Conformance in the RSE

- Load conformance is a manual adjustment used to correct for over/under-forecasted load, renewable output, and to address net load ramps

- Currently, BRCT load forecast does not include the impact of load conformance and can result in a systemic understatement of the forecast used for EIM dispatch

- Consider including the quantity of load conformance applied to the FMM in the BRCT

- FMM conformance plays a direct role in the dispatch of EIM resources, including determining EIM Transfers between BAAs

Load conformance in CAISO BAA occurs systemically in the upward direction during peak hours:

Figure 1.46 Average hourly imbalance conformance adjustment (Q1 2020 – Q1 2021)
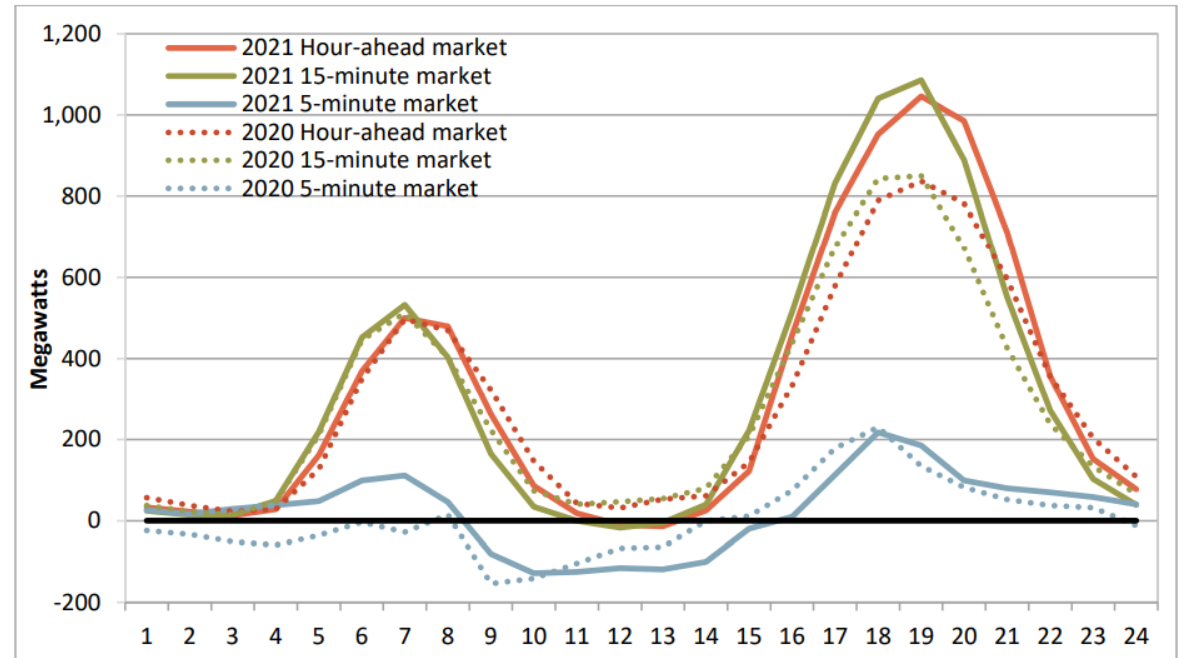
Source: DMM Q1 2021 Report on Market Issues and Performance

Entities should be able to accurately reflect demand response in EIM RSE

- Like CAISO, many other EIM Entities have demand response programs

- Often not modeled directly in EIM market systems and cannot be counted toward sufficiency requirements - this requires that EIM Entities procure capacity to cover their DR resources that are not counted in the RSE

  - 5% ALFS threshold is too high and prevents DR from being counted in load forecast

  - ISO's current telemetry rules make it difficult to register a DR resource as a PR or NPR

- This situation means that preferred, available capacity across the EIM footprint is unable to be utilized or appropriately valued

  - This contributes to the capacity shortage issues facing the region during peak demand times and extreme events

- EIM Entities and CAISO should work together to ensure DR can be accurately scheduled through EIM (RSE, base scheduling, load forecasts, market dispatches)

Emergency Actions

- Emergency capacity (including emergency demand response) should be included in a BAA's RSE if:
  - it has been deployed/base scheduled for energy; or
  - it has been initialized and available for market dispatch
  - i.e., similar criteria for including any other resource in the BRCT

- The RSE is intended to measure each BAA's ability to meet its obligations
  - Arming firm load for curtailment is an indicator that the BAA is not resource sufficient

Failure Consequences and Opportunity for EIM Energy Assistance

Failure Consequences

- Purpose is to ensure BAs that fail the RSE are not enabled to lean on the EIM

- Can be achieved through physical consequences

- Consequences should be graduated to avoid operational and reliability challenges

Physical Failure Consequences

- What is leaning on the EIM?
  - An entity relying on the EIM to meet its obligations less the diversity benefit *in place of* procuring sufficient resources to meet those needs ahead of the EIM

- Consider gradually decreasing deficiency transfer limit for capacity failures to diversity credit over a period of time

Opportunity for EIM Energy Assistance

- Consider an option for the BA that fails RSE to receive energy assistance from the EIM at a financial cost (entity could choose to "opt in" for assistance)

- Energy assistance is achieved through EIM transfers into a BAA in excess of the deficiency transfer limit

- Financial cost to receive energy assistance should be sufficiently high to incent entities to resolve capacity shortfalls in advance