Resource Sufficiency Evaluation

Performance on July 9, 2021

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General Session

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The objective of the Bid Range Capacity Test is simply to assess whether there is sufficient bid-range capacity in the BAA to meet its capacity requirements
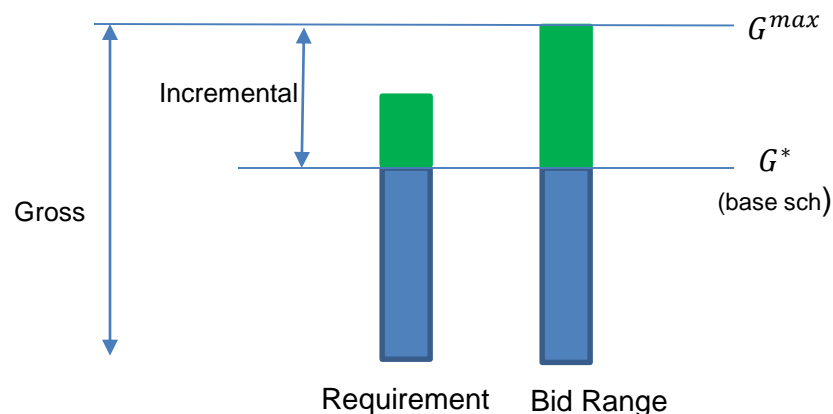
If

Bid range capacity > Capacity requirement

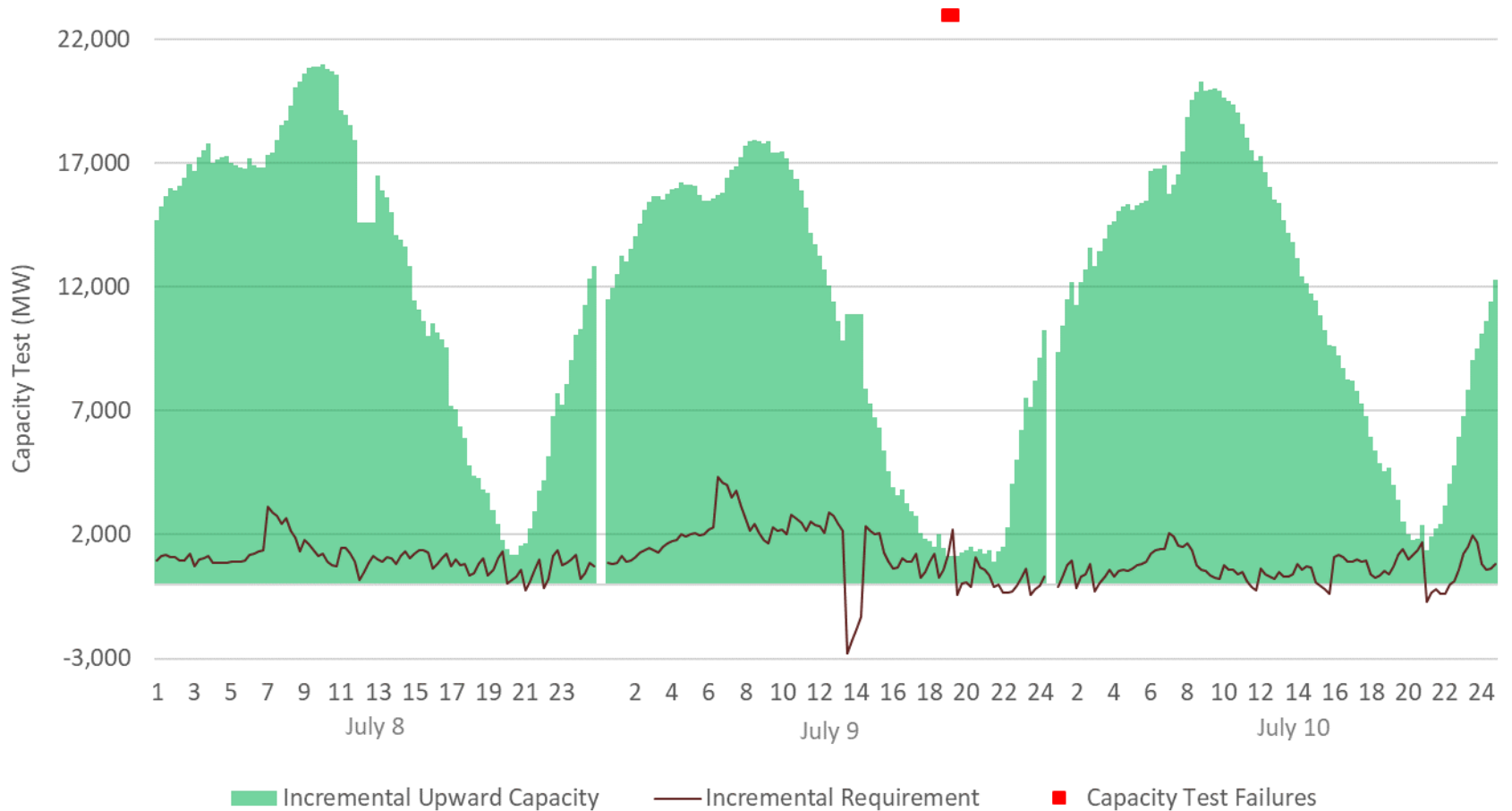(Generation Bid range + NSI bid range)   (Load + Uncertainty + Intertie deviation)

Then

BAA passes the test

Bid range is the summation
of the bid range of all resources

California ISO

Incremental capacity was sufficient most of the time to meet incremental requirements in the capacity test
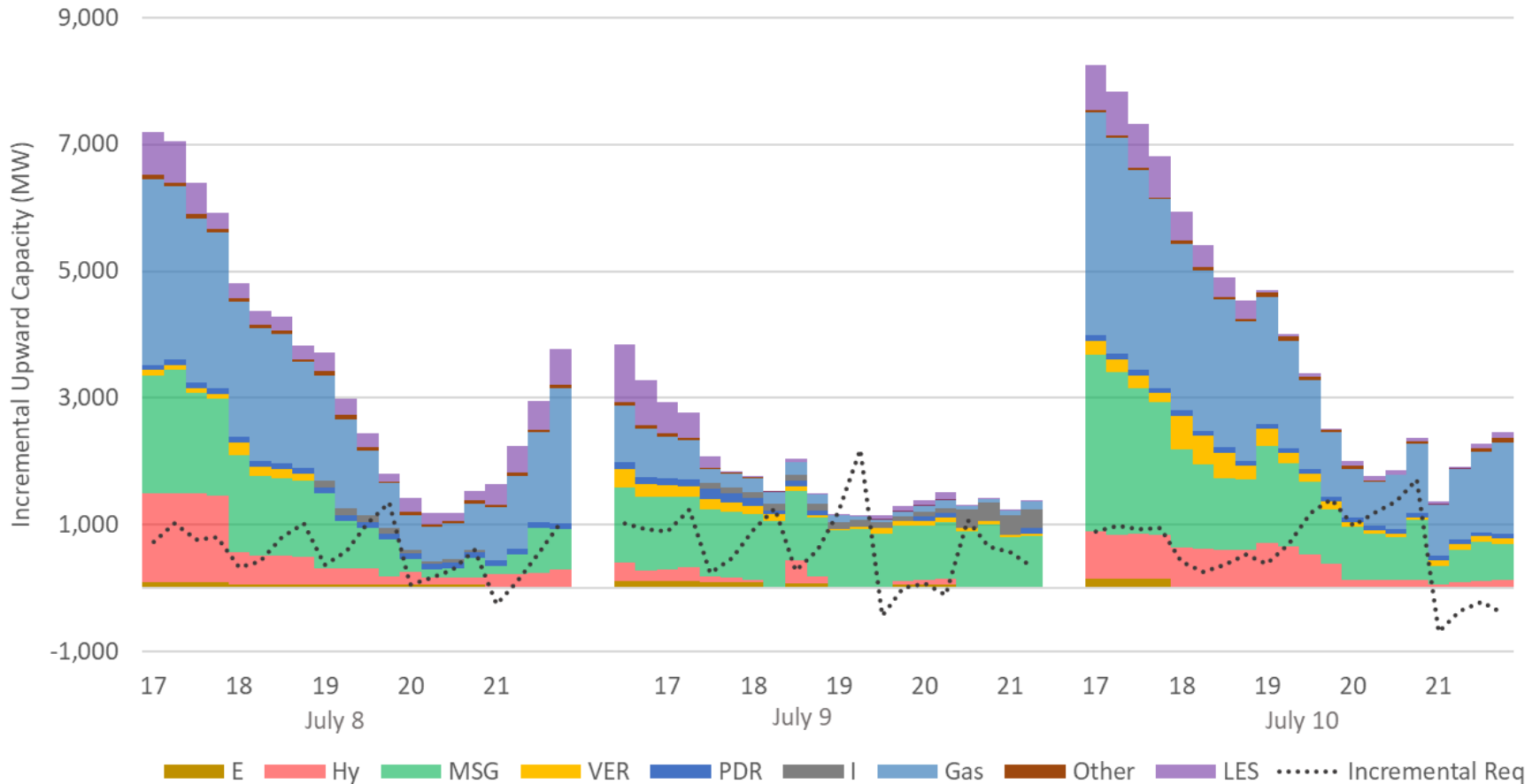

July 9, HE14 reflects failures of FMM which resulted in defaulting to placeholder values
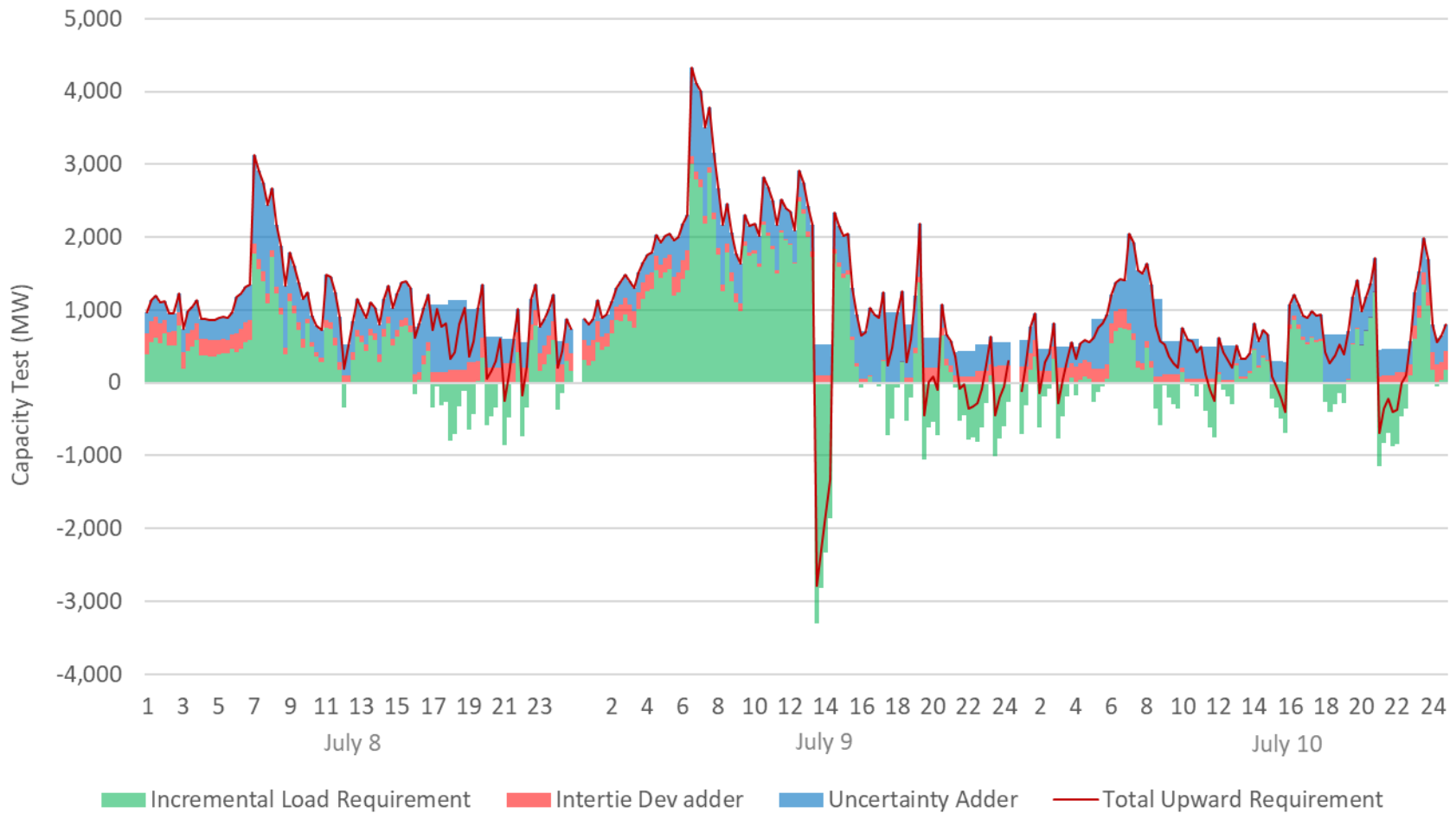
Resources with different technology supported incremental capacity different technology supply

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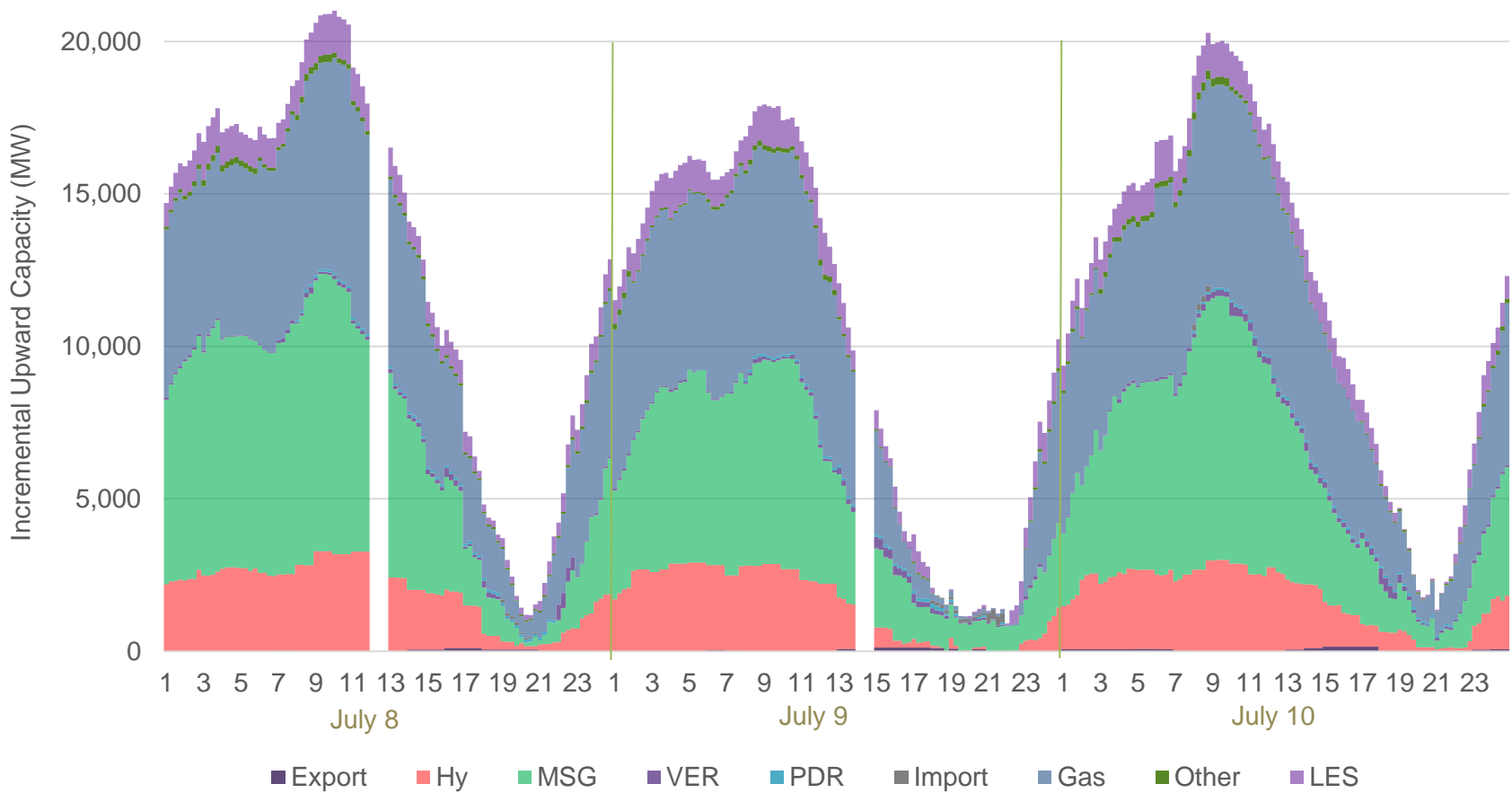
Based on the test, the incremental capacity available in the test on critical peak hours was mainly from multi stage generator (MSG) units

Incremental requirements consist of incremental load, intertie deviation and uncertainty adders

The gross capacity approach eases the overall view of the system capacity while holding the same test outcomes

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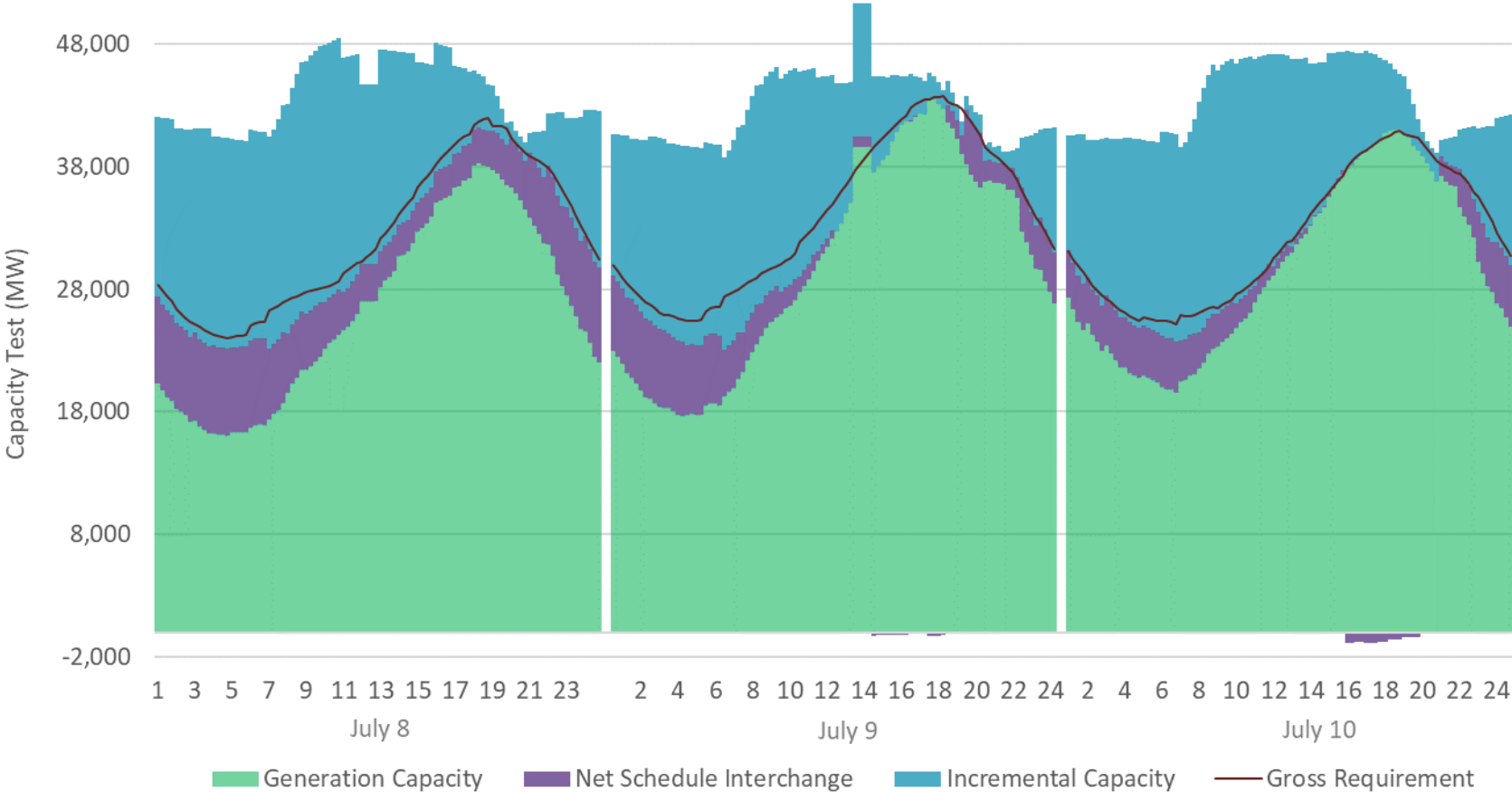
How do we reconcile the capacity between the test and the "actual" capacity available?

- Was the capacity test properly projecting the capacity eventually available in real time?

- "Actual" capacity is an elusive target
  - How quickly should it be readily available?
  - How to measure it?

- Timing is important. The gap between running the test and the utilization of it in real-time will naturally lead to some divergence

- The original principle of the capacity test is simply an assessment of "capacity". The flex test complements it.

ISO's approximation of "actual" capacity relies on what is made available to the last run of the market

- Using the bid-range available in the real-time dispatch is a crude approximation subject to further tuning

- It accounts only for the capacity already online and available for energy

- It does not consider capacity accessible by starting or transitioning units

- For non-peaking conditions it will simply reflect the condition of partial loading of units even when more capacity is actually available

- For peaking conditions the exercise is to see trends of divergence between the test and actual conditions

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Import capacity came in lower in real-time than the capacity seen in the test due to intertie deviations, and curtailments on Malin and NOB interties

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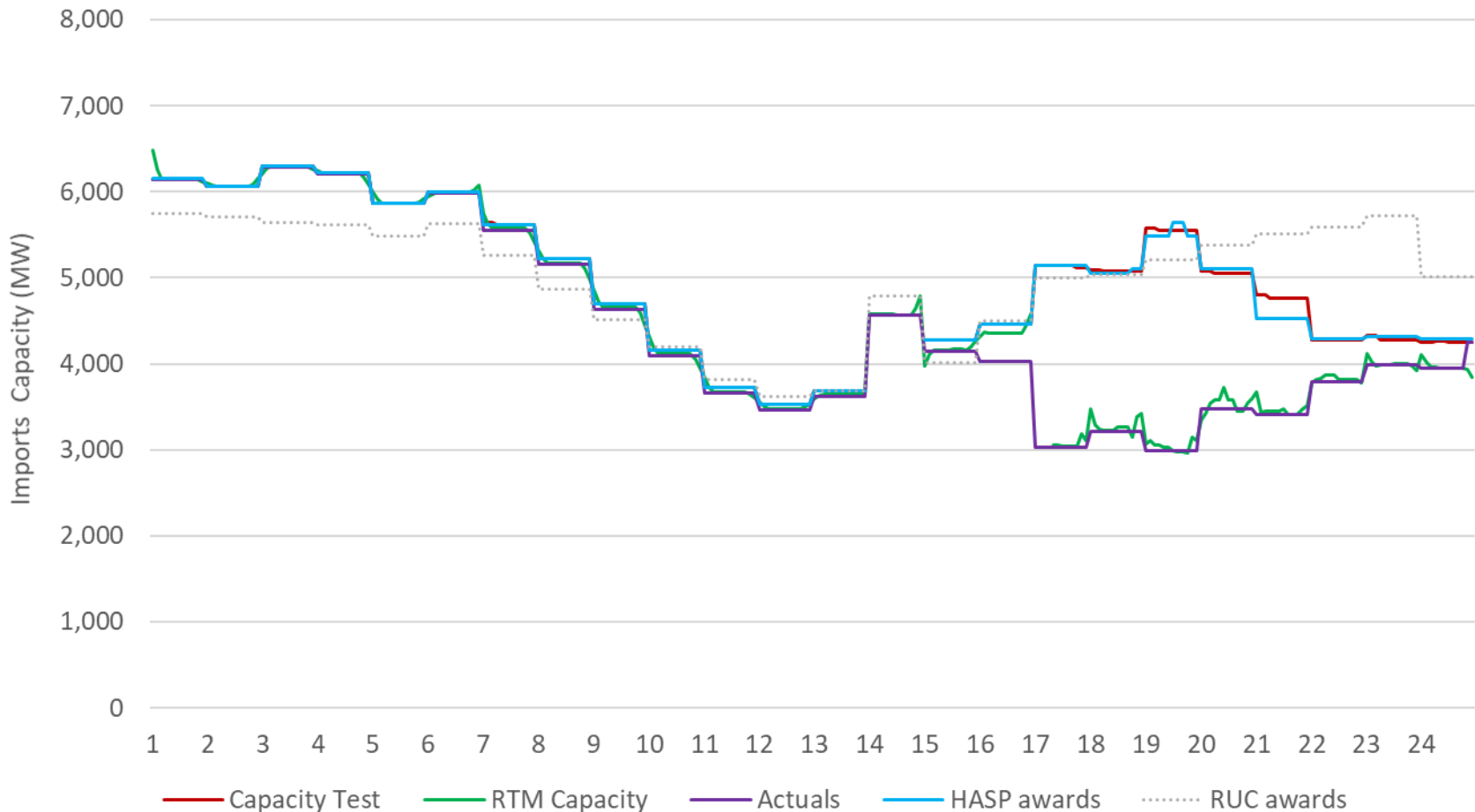
On July 9, Malin and NOB interties were derated due to fire impacts. Some markets overscheduled on these interties due to current parameters to set scheduling priorities

Reduction of capacity on Malin and NOB intertie due to derates in real-time was not seen in the capacity test. Overscheduling of interties contributed to the access capacity
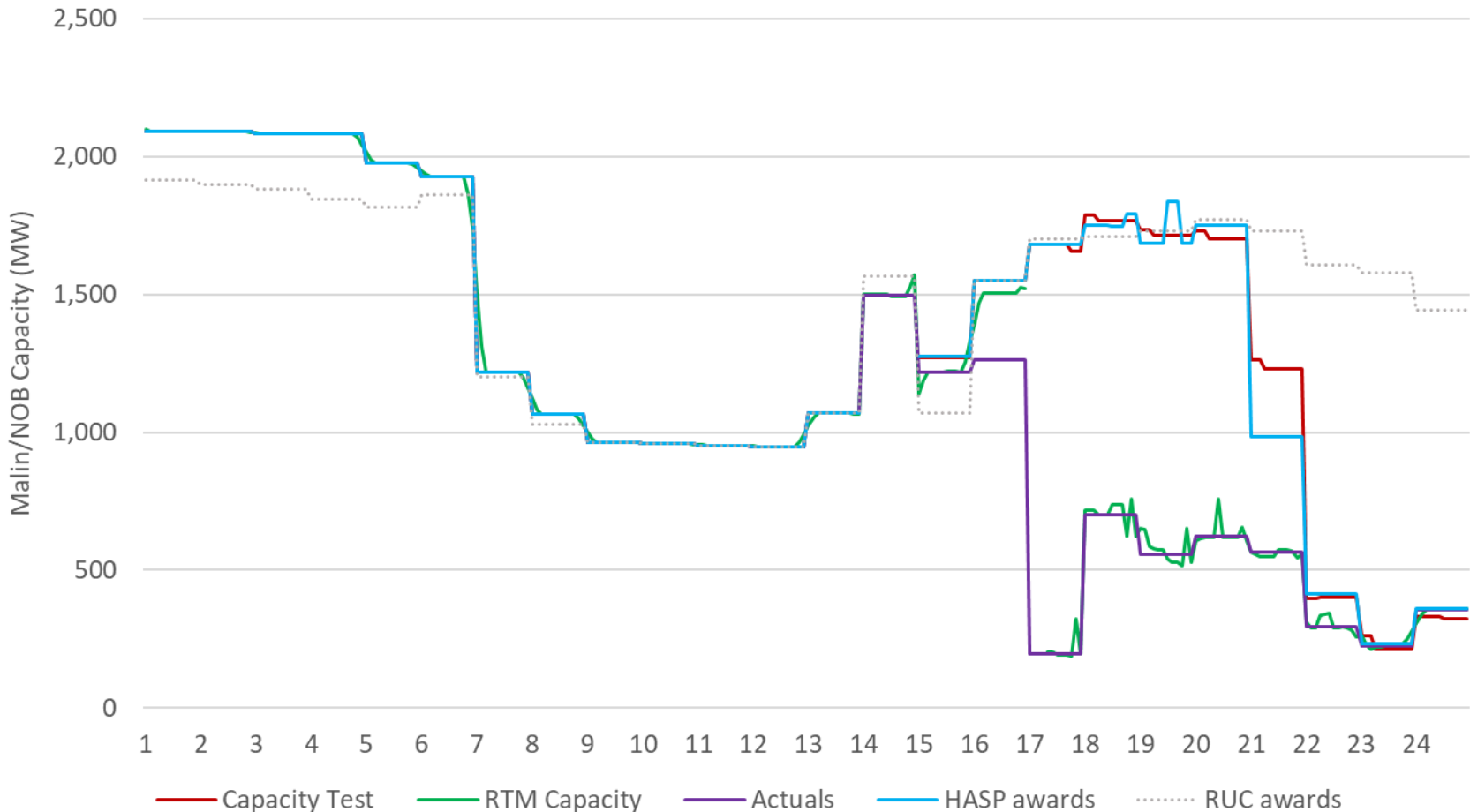
Solar production performed well with no significant variability during peak hours

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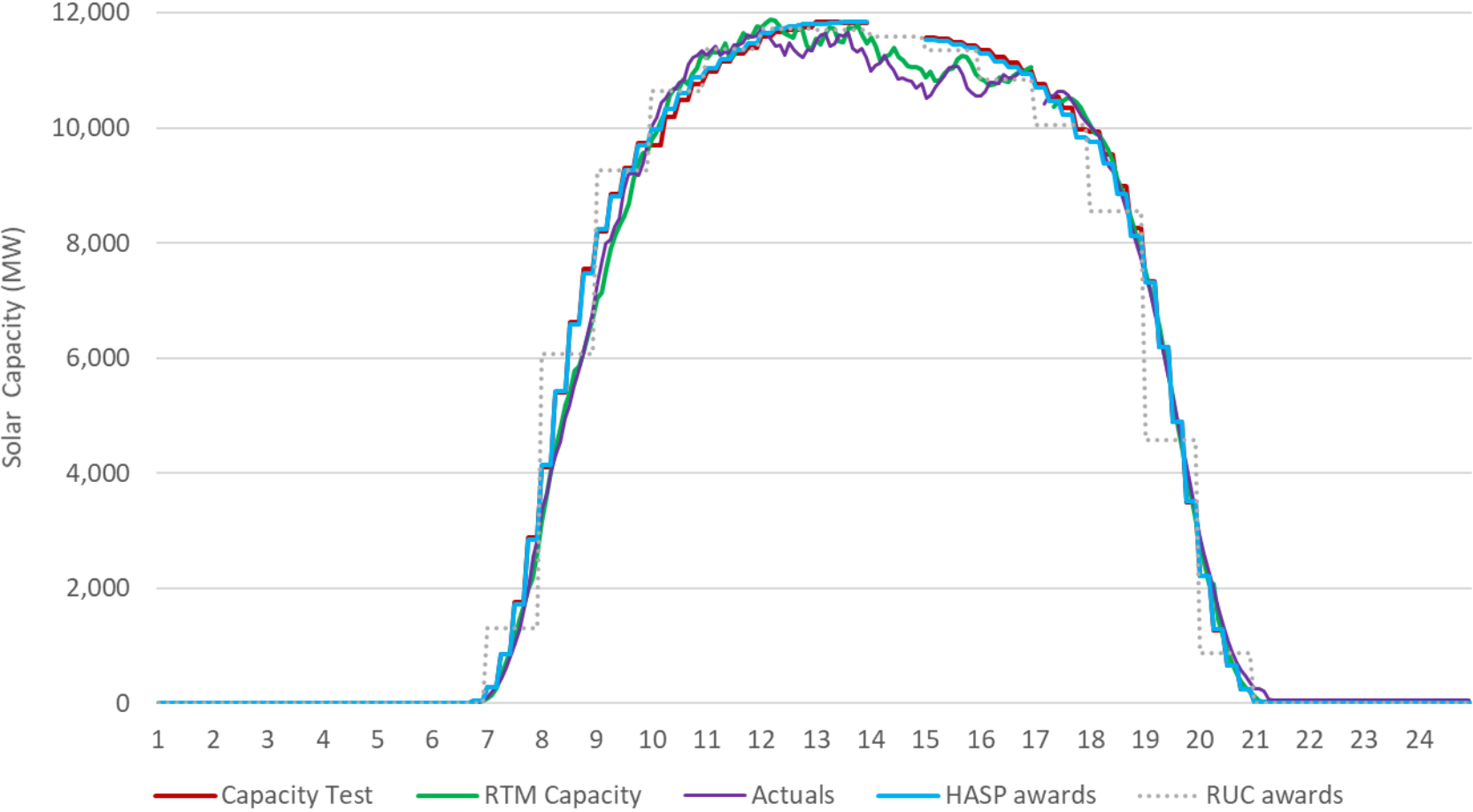
Wind capacity in real time tracked closely the projected capacity available in the capacity test
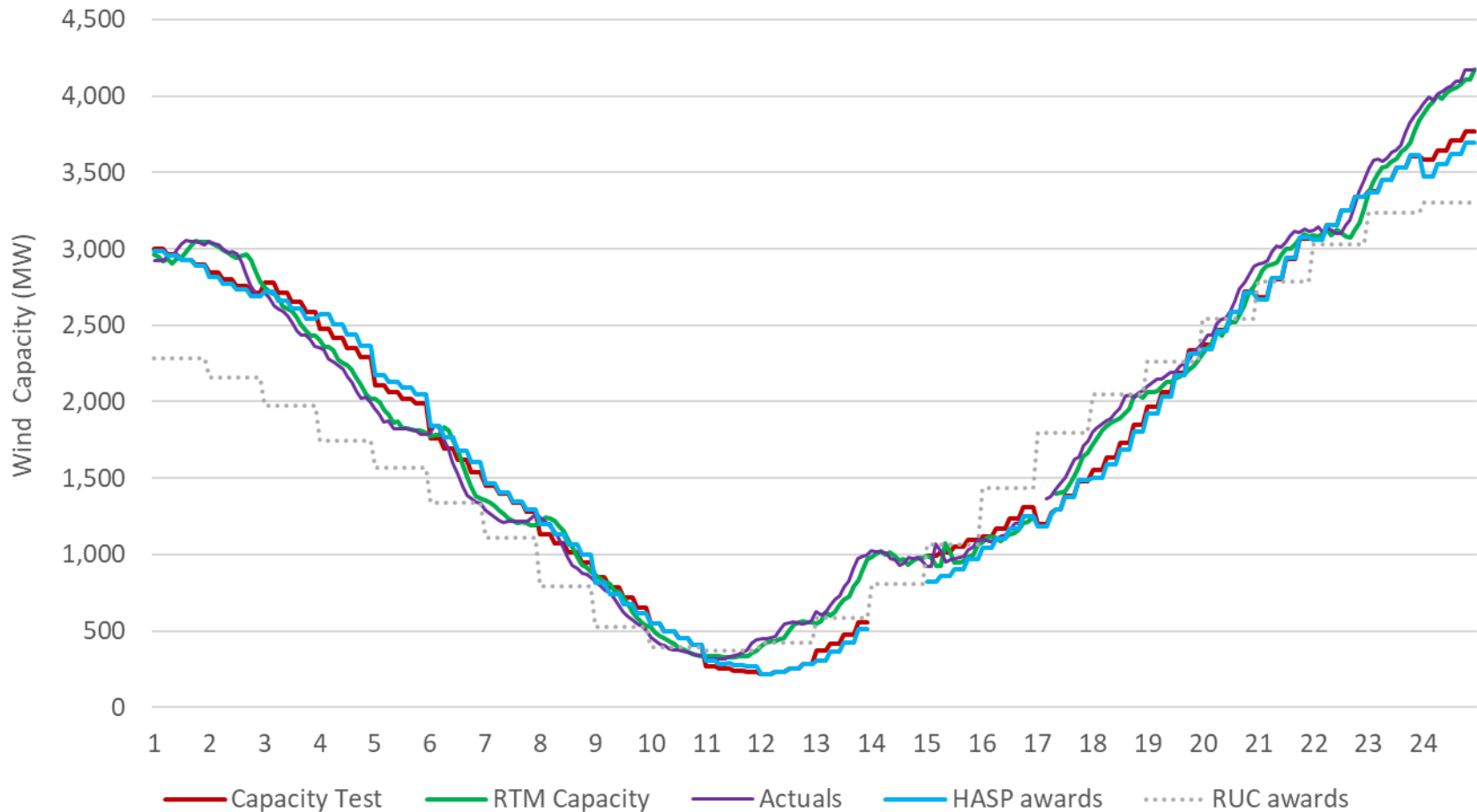
Capacity from RDR resources deployed in real-time market was not accounted for in the capacity test
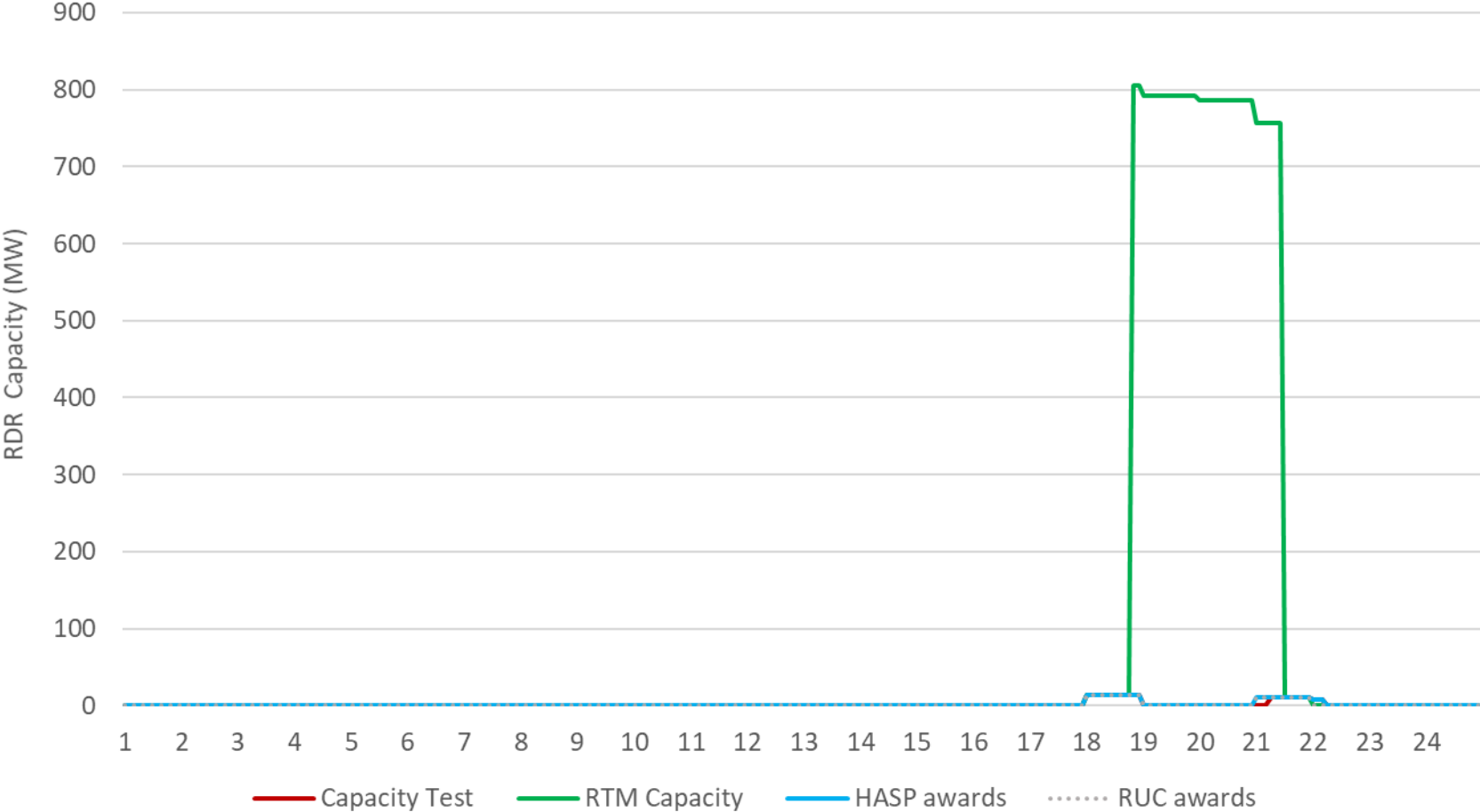
Functionality to include RDR in the capacity test was deployed until August 4

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PDR capacity tracked relatively close between the test and real-time market

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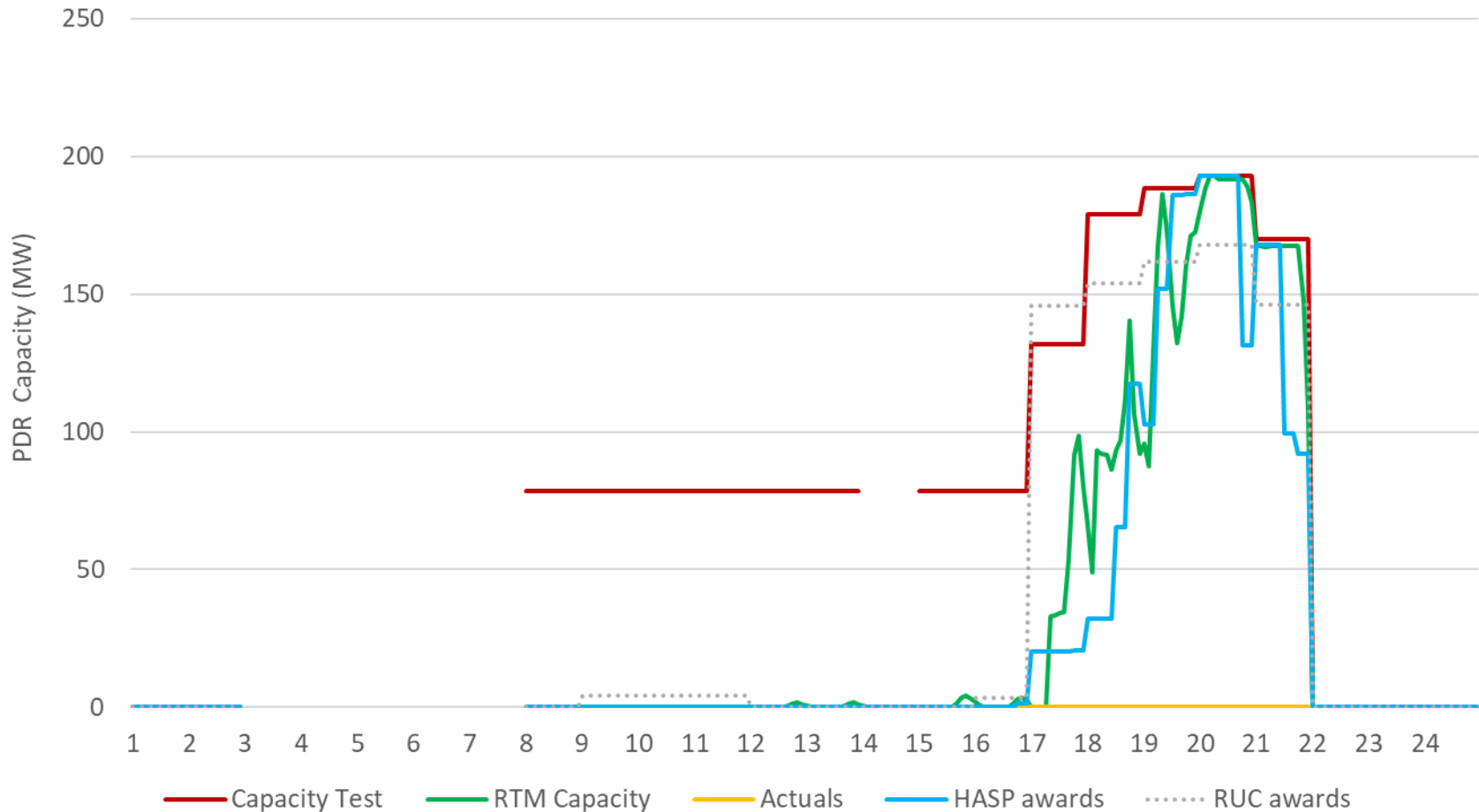
Hydro production performed well in real-time and was at or above the capacity projected in the capacity test
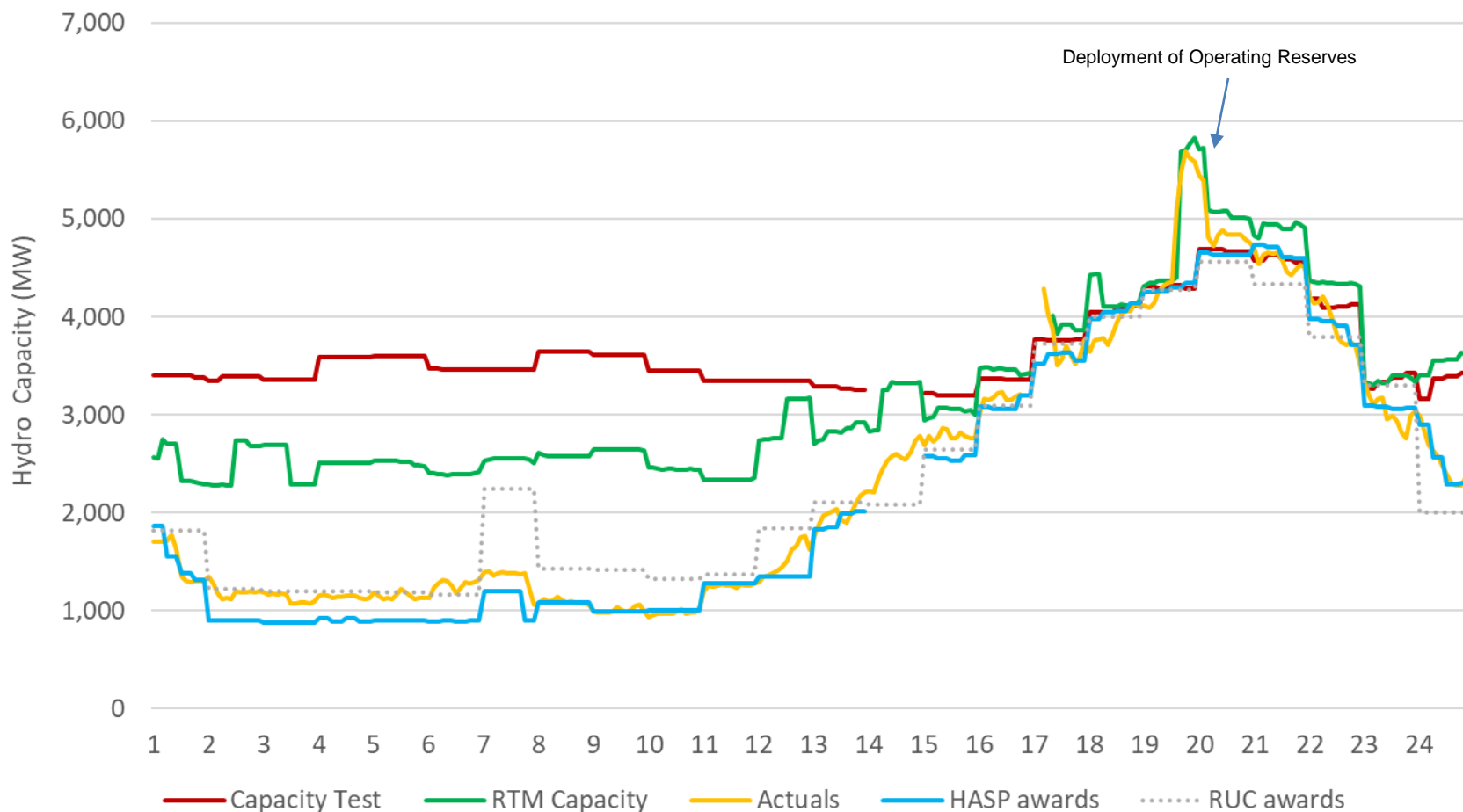
Capacity from Storage resources in the real-time was at or above the capacity projected in the capacity test for peak hours

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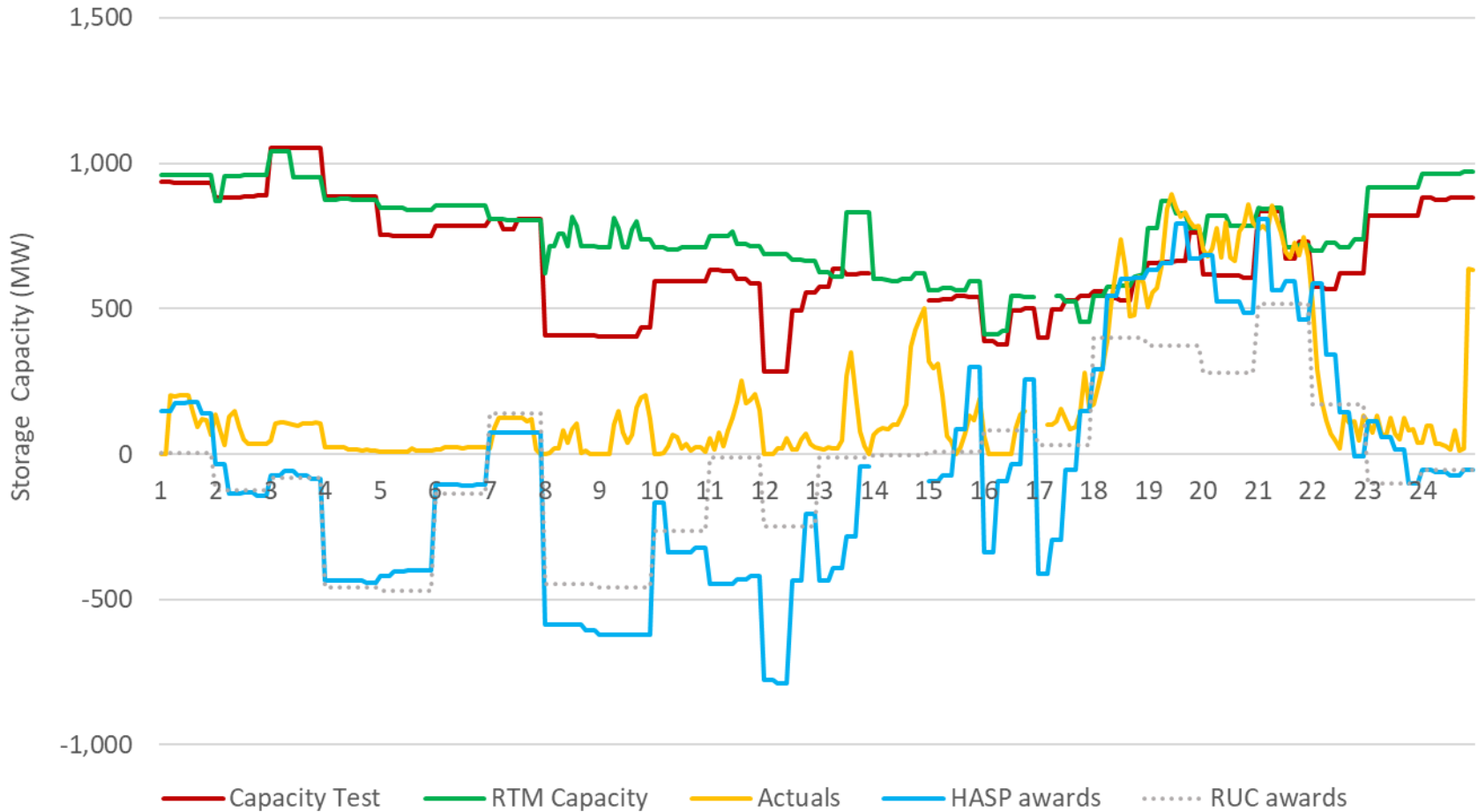
MSG capacity in real time was below the capacity projected and used in the capacity test in peaks hours

- Unit on outage and could not comeback. Similar outcome to summer 2020

- Market could not transition unit up because it reached its max daily # of transitions

- Market could not access higher configuration due to telemetry oscillating between configurations

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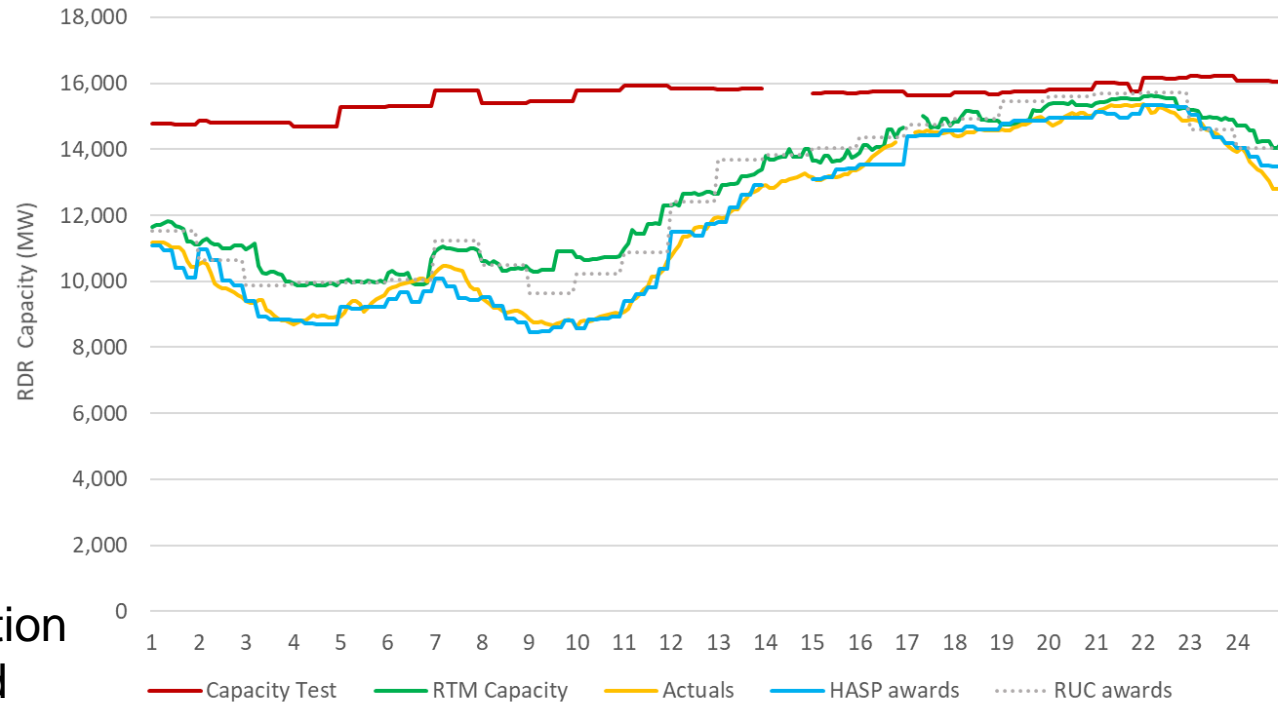
Load conformance and EIM transfers

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Load conformance was used to position resources in the pre-dispatch markets and to true up imbalances in real-time dispatch
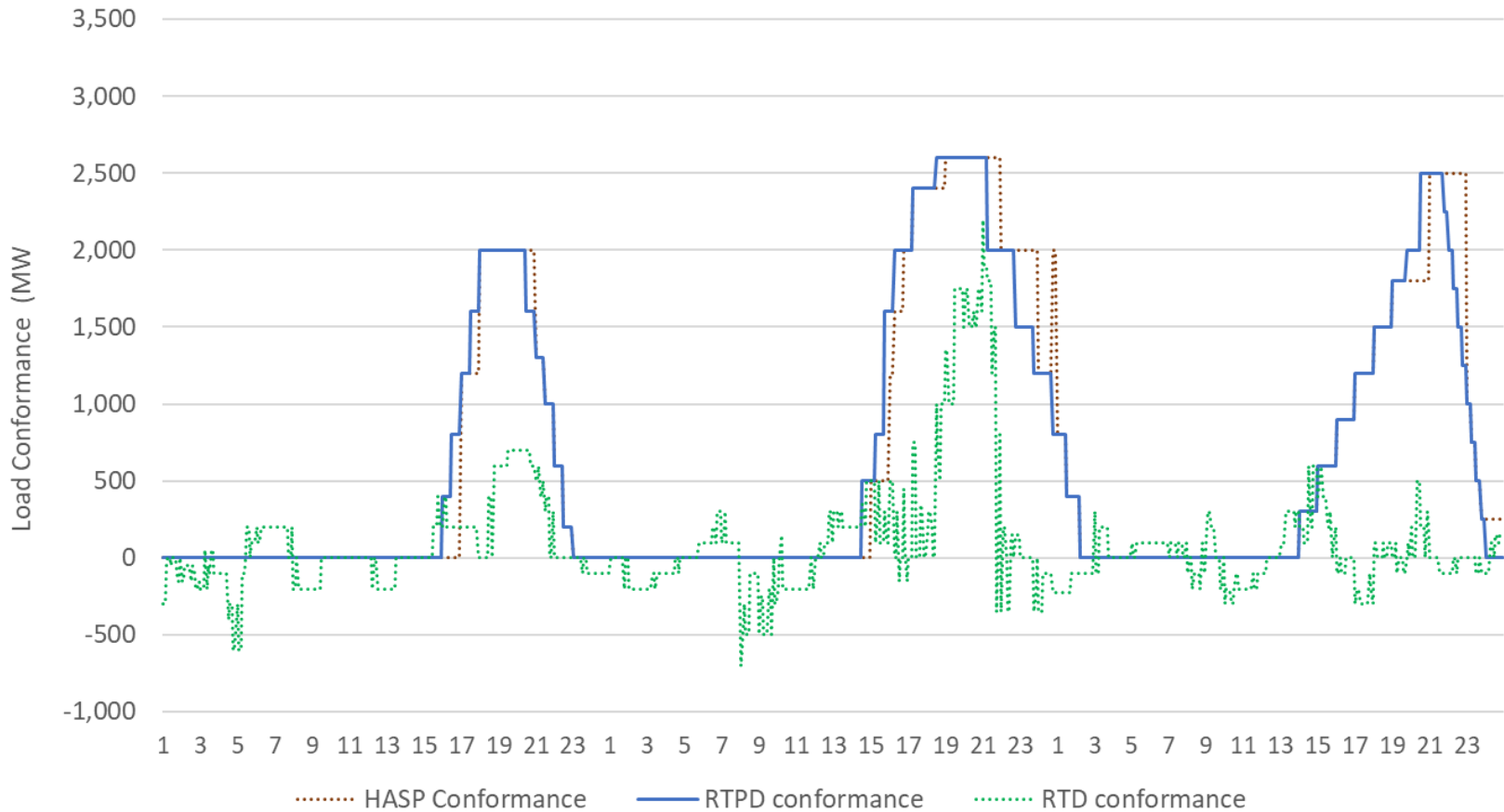
How load conformance is used

- HASP/FMM conformance is for flexibility and position resources
- RTD is to true up for imbalances
- As conditions change over time and across markets, load conformances may lead to other changes
- Typically RTD conformance will be lower than HASP/FMM
  - It means RTD is buying back the flexibility made up with HASP/FMM conformance
  - HASP/FMM transfers are from financial pre-dispatches; they do not realize operationally
  - RTD transfers are the only ones operationally meaningful

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Is the HASP/FMM conformance driving the EIM import transfers?

Simple correlation for a subset of hours may erroneously assume causation
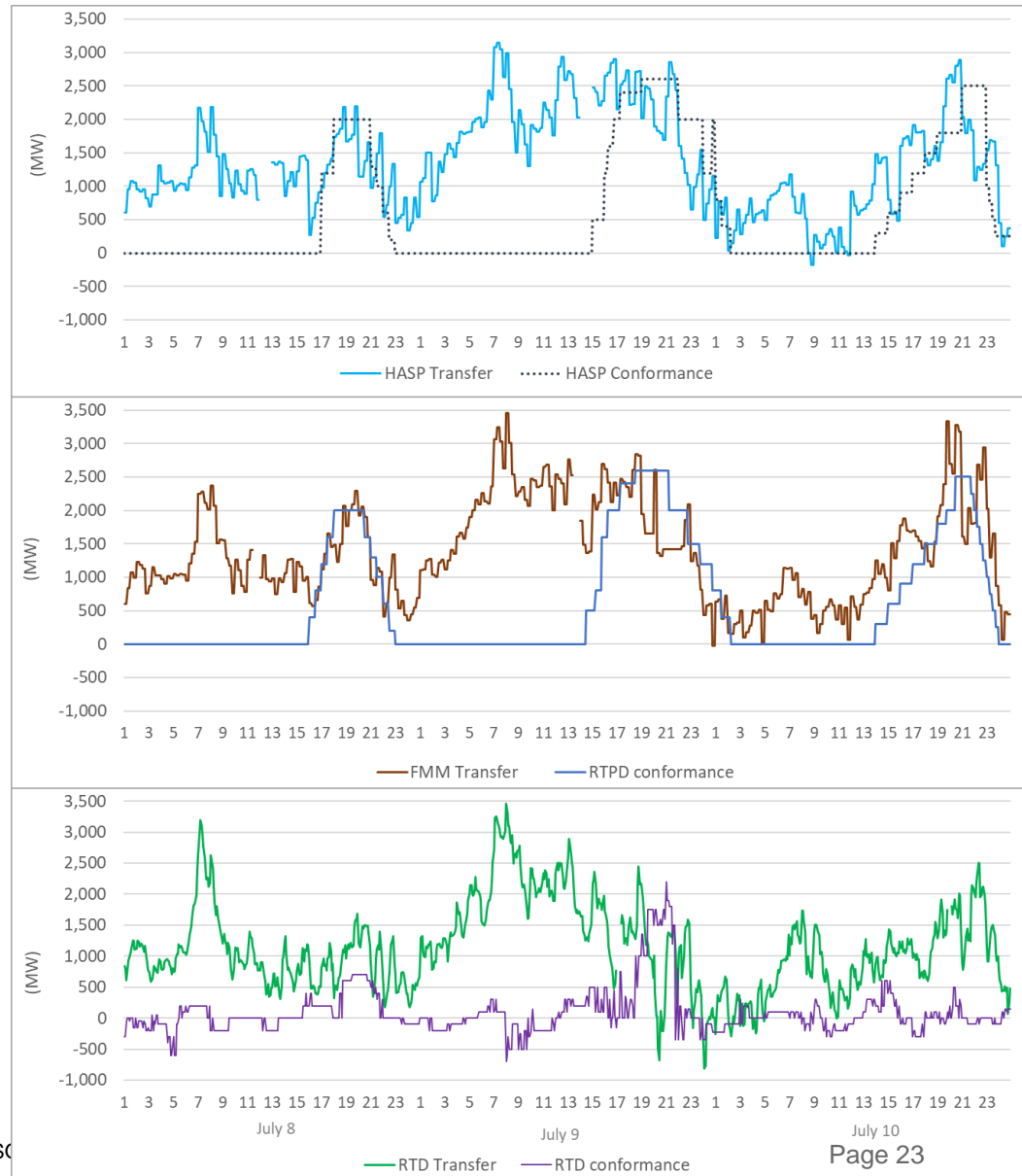
EIM transfers in each market are determined based on multiple factors, with conformance being only one of these

Factors driving EIM transfers:

- Load/supply movements across the whole footprint
- Load conformance
- Economics
- Congestion
- Scheduling priorities
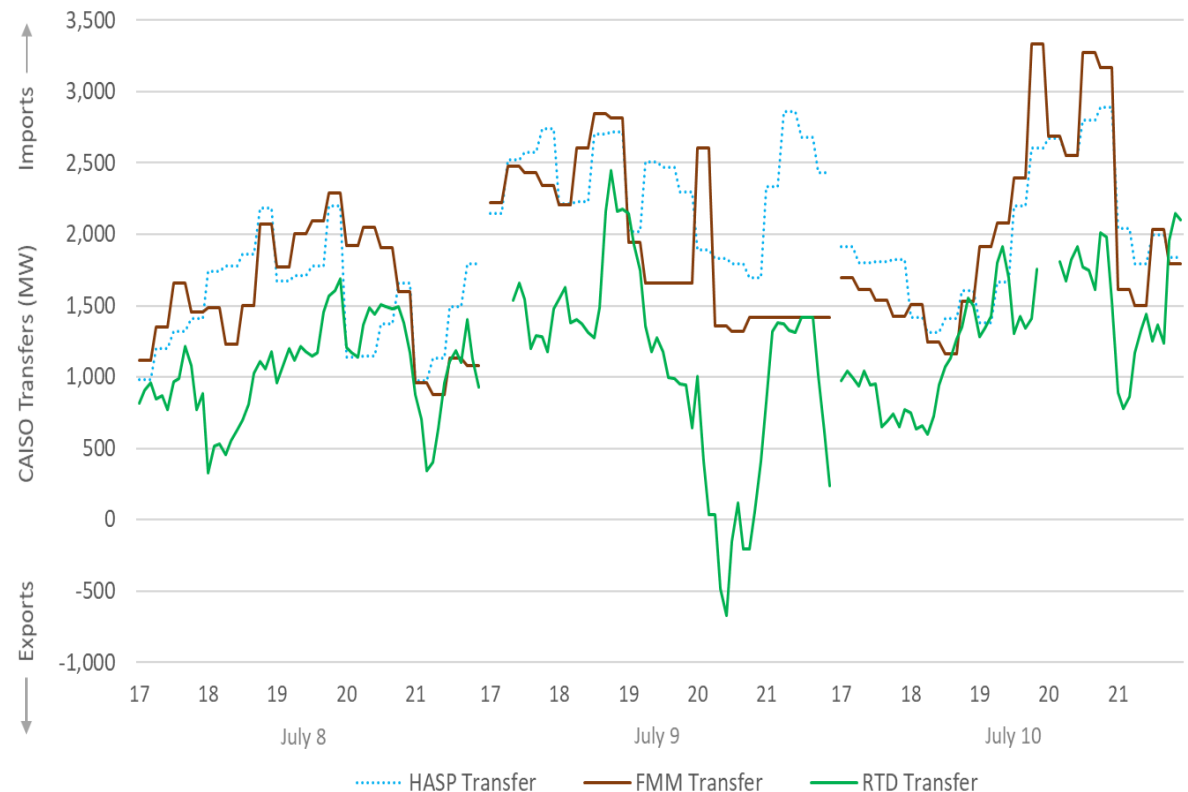
Not all HASP/FMM transfers were driven by conformance, they are financial and they were largely bought back in RTD

EIM transfer level during test failure irrelevant due to actual system conditions

2,200MW Buyback of EIM transfer in RTD

CAISO transfer locked due to Test failure

1,600 MW Buyback of EIM transfer in RTD

Declining EIM transfer into CAISO due to tigh supply accross the west in spite of high transfers cleared in FMM

2,000MW buyback of CAISO transfer in RTD to support Nevada and Portland

July 9

········· HASP Transfer ────── FMM Transfer ────── RTD Transfer

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2,600 MW of additional load bias in HASP resulted in 13% additional transfers in HE19, and in a reduction of transfers in HE20*

Transfers actually reduce with conformance

Legend:
- Additional Import
- Additional internal Gen
- Export reductions
- Additional transfers
- Additional infeasibility
- .... Additional load Requirements

Y-axis: Additional Supply (MW)

X-axis groups: 19 (1, 2, 3, 4), 20 (1, 2, 3, 4)
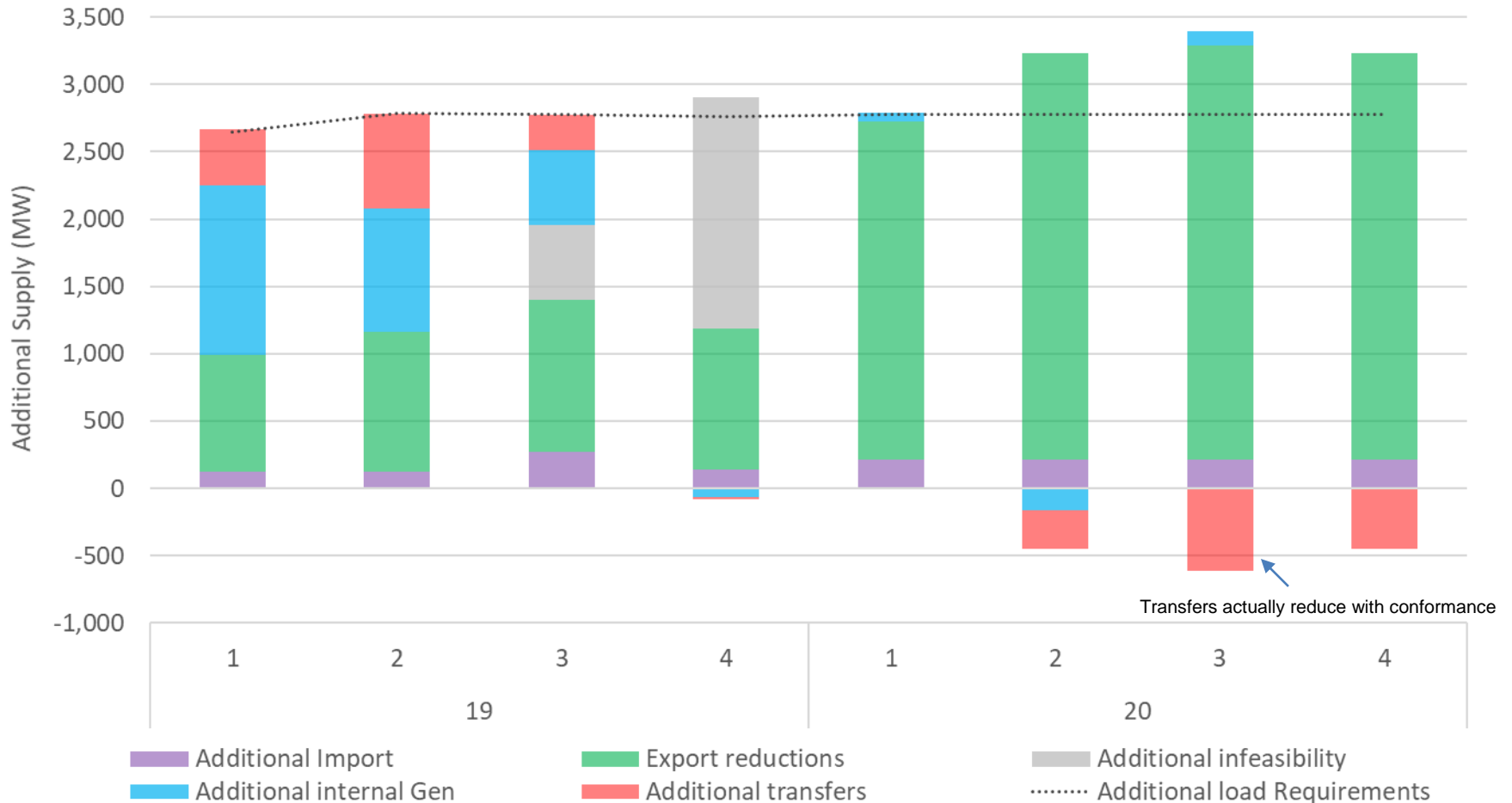
* Based on counterfactual study without load conformance

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ISO Public

Page 26

If there were no overscheduling of interties on July 9, the load bias would had actually resulted in more export reductions and also in less, not more, EIM import transfers*

EIM transfers actually reduce

Legend:
- Additional Import (purple)
- Additional internal Gen (blue)
- Export reductions (green)
- Additional transfers (red)
- Additional infeasibility (gray)
- Additional load Requirements (dotted line)

* Based on counterfactual analysis

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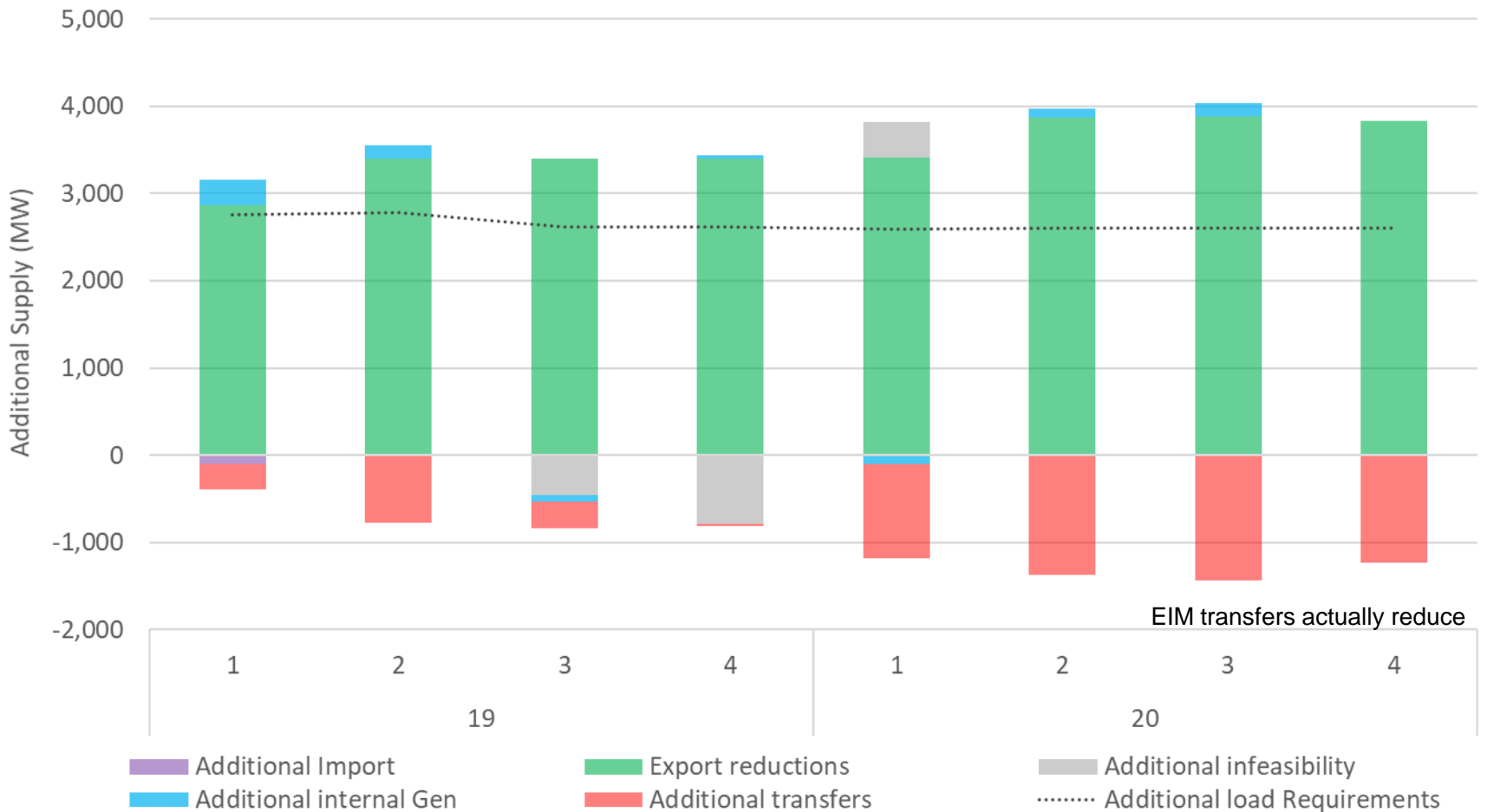
What are the implications of FMM conformance in the real-time market?*
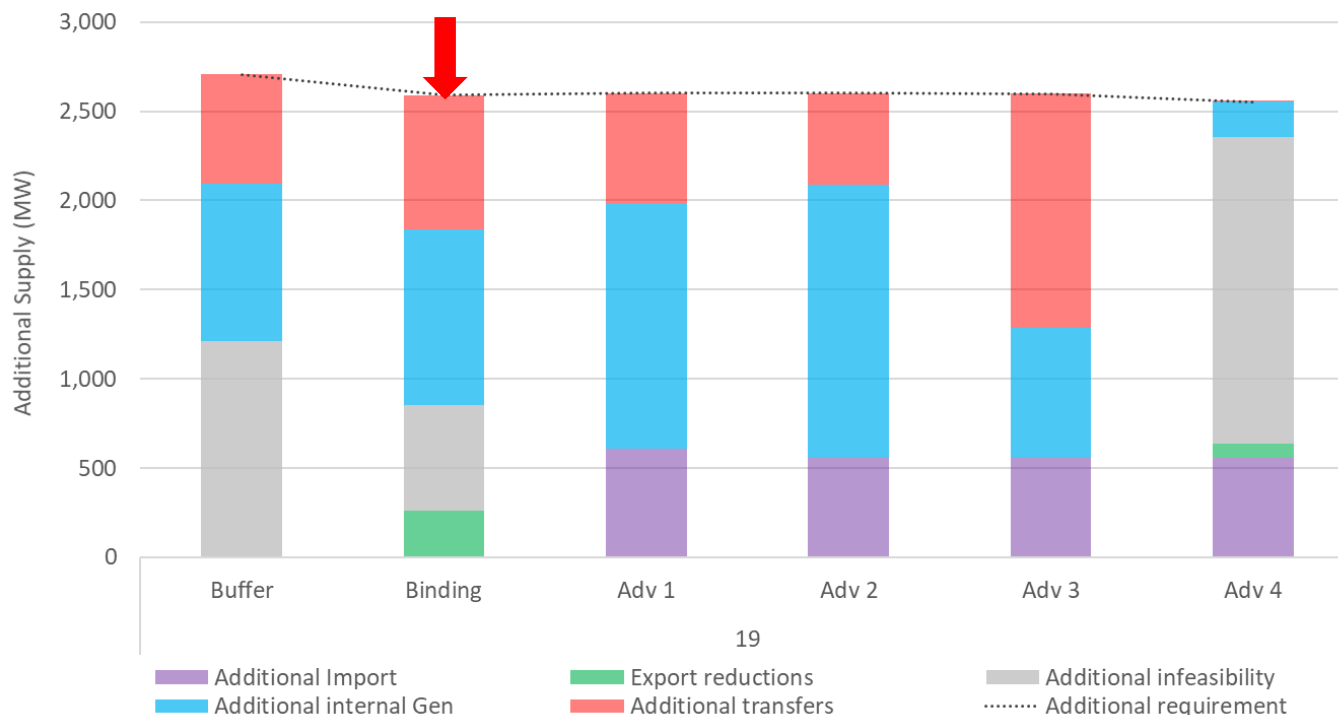
A 2,600 MW load conformance in FMM results in
- a power balance infeasibility of 590MW (22%)
- 260MW (10%) of export reductions
- an increase of 750MW (29%) of EIM import transfers
- the rest (38%) is balanced out with generation increases of CAISO's internal resources and losses adjustments
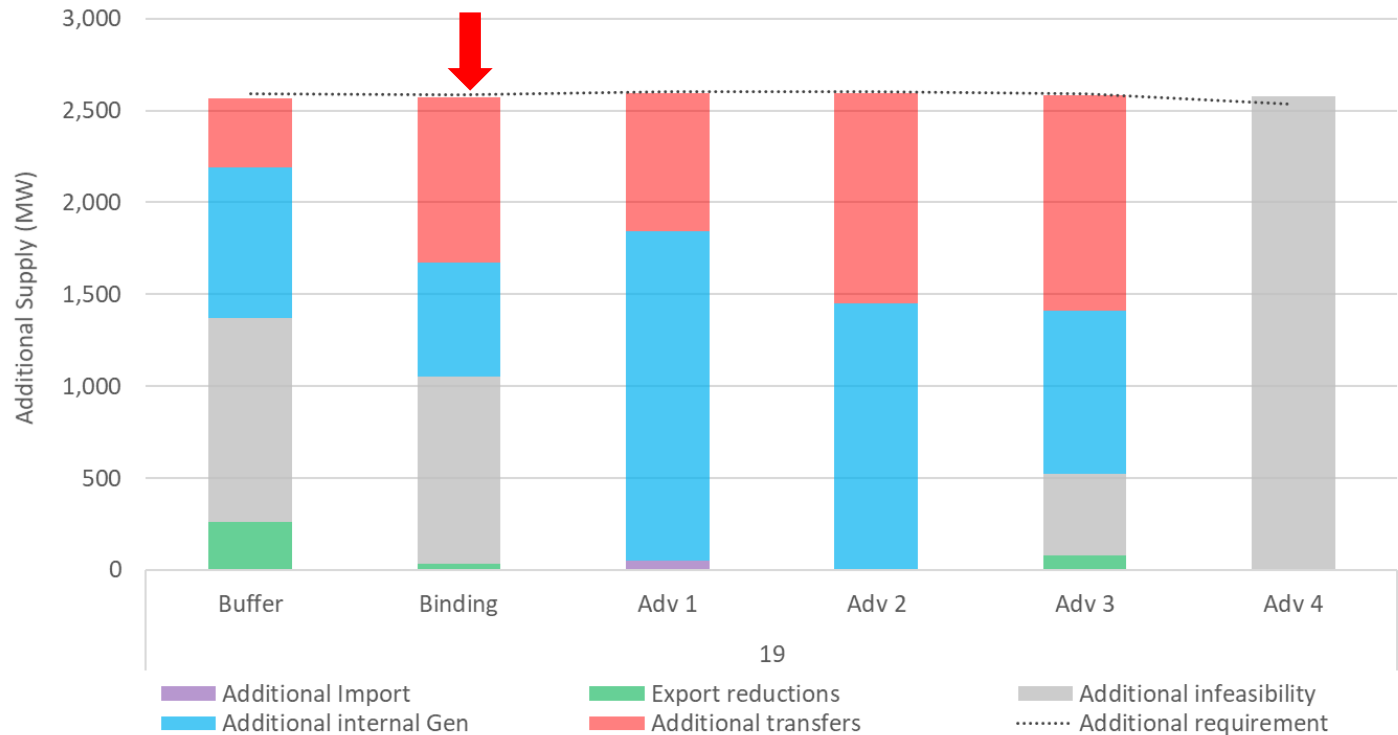
* Counterfactual study based on original solution with intertie overscheduling

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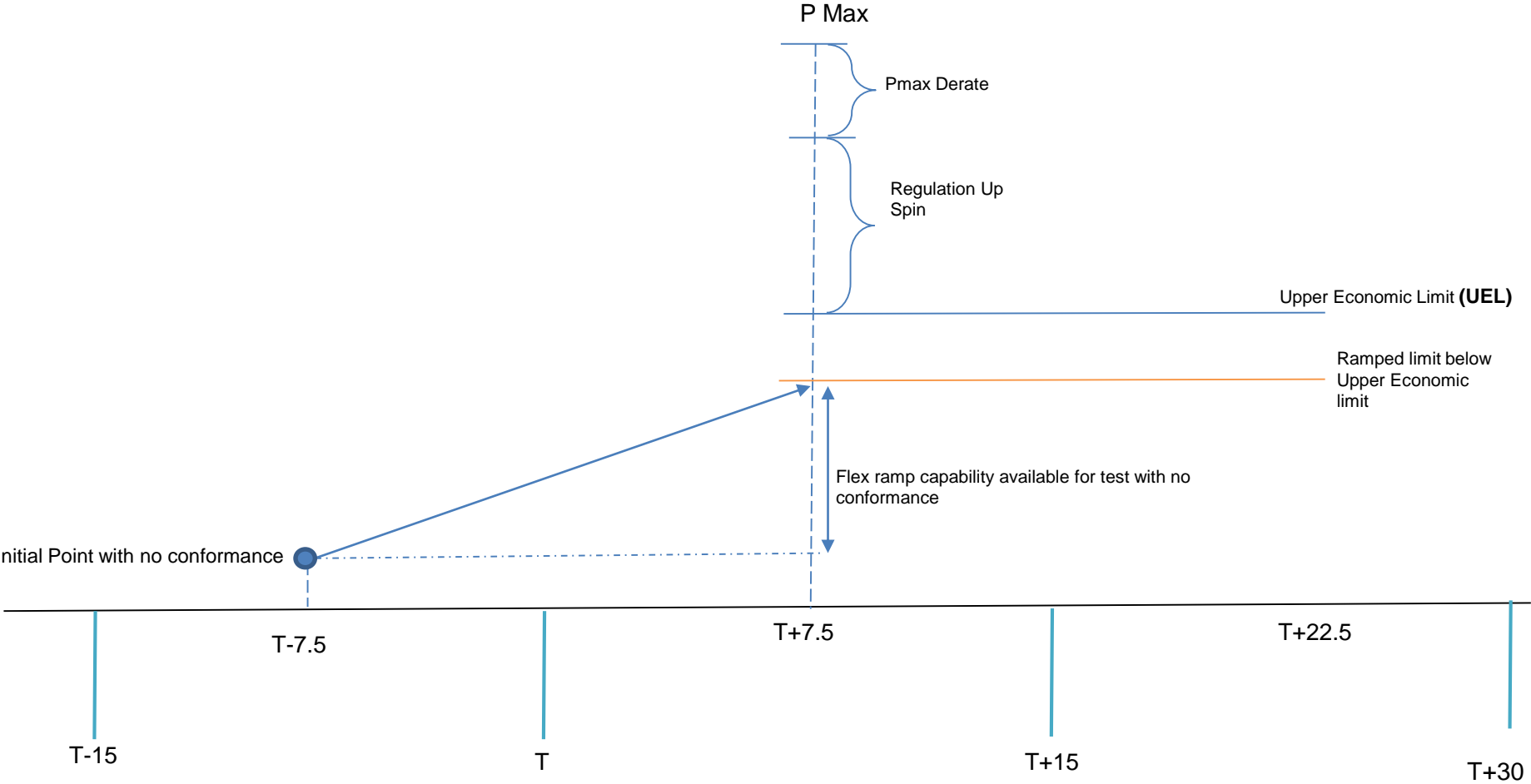# What are the implications of FMM bias in the real-time market?*

A 2,600 MW load conformance in FMM results in
- a power balance infeasibility of 1000MW (39%)
- 260MW of export reductions (1%)
- an increase of 899MW (34%) of EIM import transfers
- the rest (26%) is balanced out with generation movements of CAISO's internal resources and losses adjustments

* Issue of intertie overscheduling addressed

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What are the implications of FMM bias in the real-time market?

- Load conformance in any market does not impact the capacity test since bid range is based on capacity made available only
- If it drives the level of transfers at which the transfers will be locked when the EIM entity fails the test
- Positive load conformance in FMM will generally
  - move internal resources up (not down)
  - the starting point to calculate the resources' flexible capability made available in the test will be higher,
  - with a higher starting point, there will be less (not more) flexible capability assessed in the test
  - the flexible ramp test will fail more (not less) frequently

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Illustration of implications of load conformance on flexible capability available in the test

P Max

Pmax Derate

Regulation Up
Spin

Upper Economic Limit **(UEL)**

Ramped limit below
Upper Economic
limit

Flex ramp capability available for test with no
conformance

Initial Point with no conformance

T-7.5

T+7.5

T+22.5

T-15

T

T+15

T+30

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Load conformance can actually reduce the flexible capability available in the test, leading to sooner/more failures

P Max

Pmax Derate

Regulation Up
Spin

Unlimited ramp projection

Lost flex ramp capability due to conformance

Upper Economic Limit **(UEL)**

Flex ramp capability with conformance

Ramped limit below
Upper Economic
limit

Initial Point with conformance

Flex ramp capability available for test with no
conformance

FMM schedule increase due to
conformance

Initial Point with no conformance

T-7.5
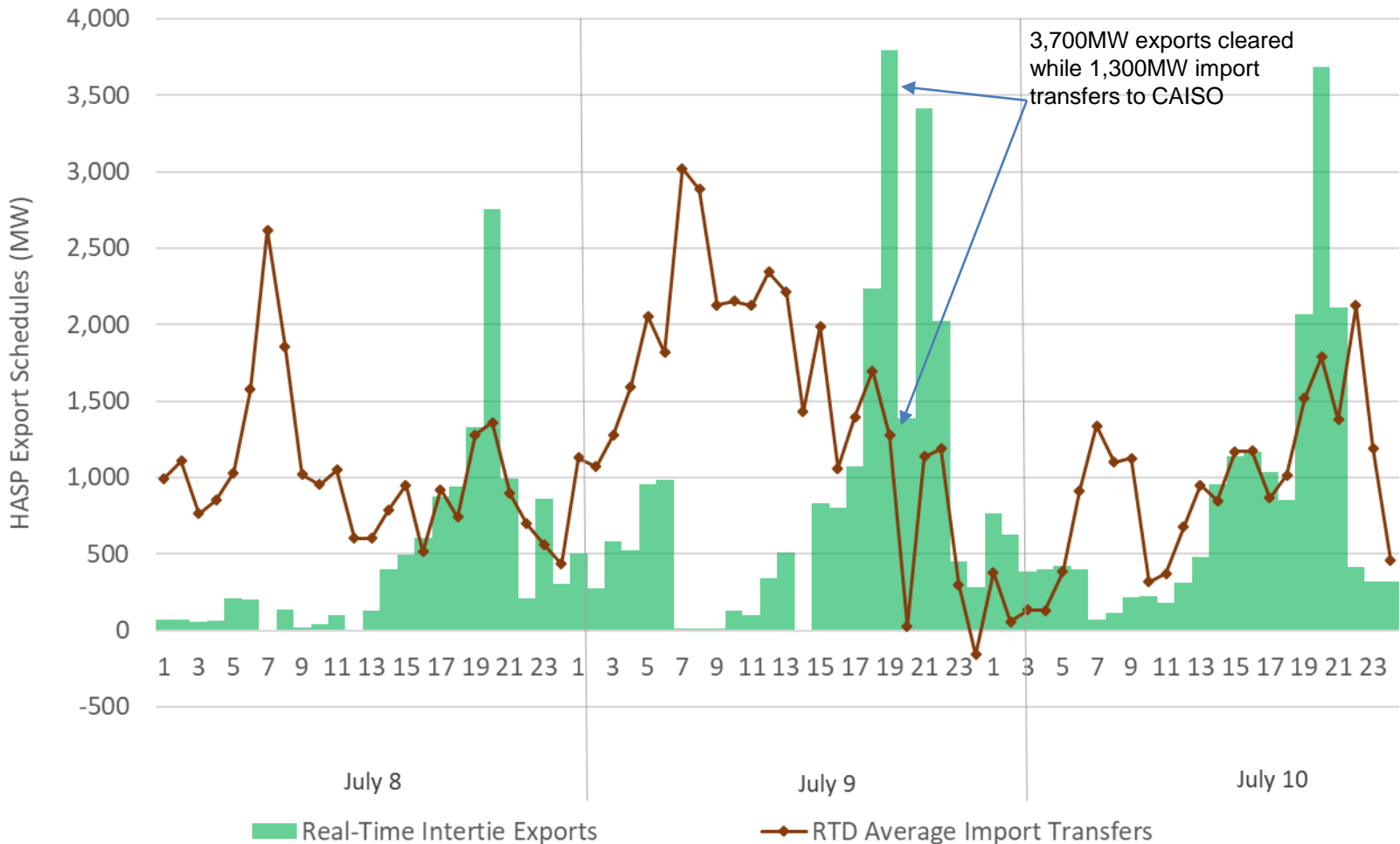
T+7.5

T+22.5

T-15

T

T+15

T+30

Exports on July 9 were significant with ISO market clearing a meaningful volume of real-time exports (self schedules and economic)
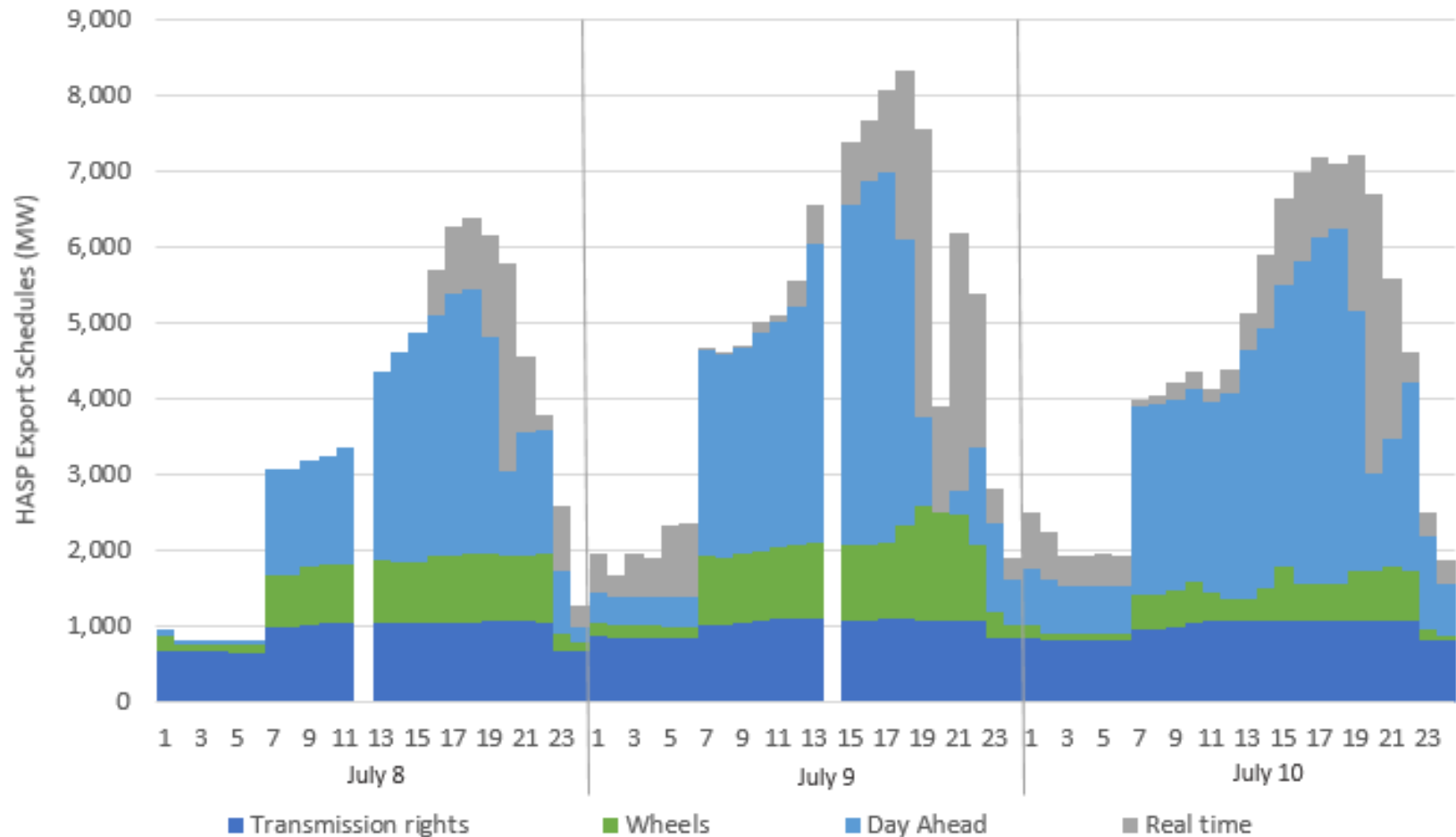
Exports cleared in real time were generally higher than EIM Import transfers coming into ISO during critical peak hours

3,700MW exports cleared while 1,300MW import transfers to CAISO

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Closing remarks

- Capacity test accounted for import supply that was not available in real-time. ISO has started an initiative to address intertie overscheduling

- Capacity from MSG units accounted in the test was not available in real-time due to outage and temporal constraints

- HASP/Load conformance played no role in the volume of operational EIM transfers into ISO

- FMM conformance is already partially factored in the flexible ramp test due to incremental dispatches of internal resources

- Real-time exports cleared in real time were generally above the level of import EIM transfers during peak hours