Idaho Power IRP and Resource Sufficiency

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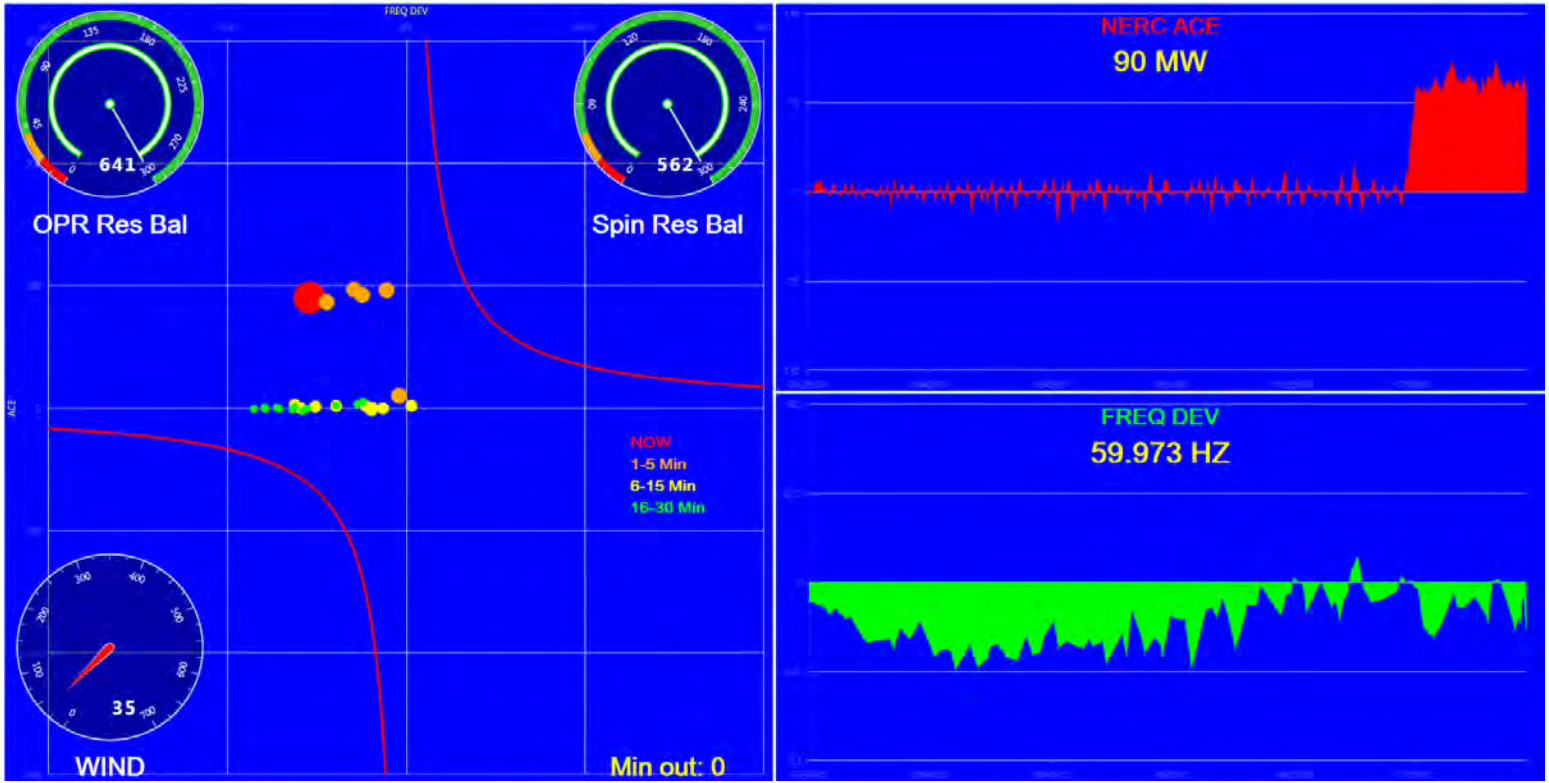
Acronyms for the Presentation

- ACE – Area Control Error (Over/Under Generation)
- BAA – Balancing Area Authority
- CAISO – California Independent System Operator
- CCH – Capacity Critical Hour(s)
- EIM – Energy Imbalance Market
- ISO – Independent System Operator
- RTPD – Real-Time Pre-Dispatch

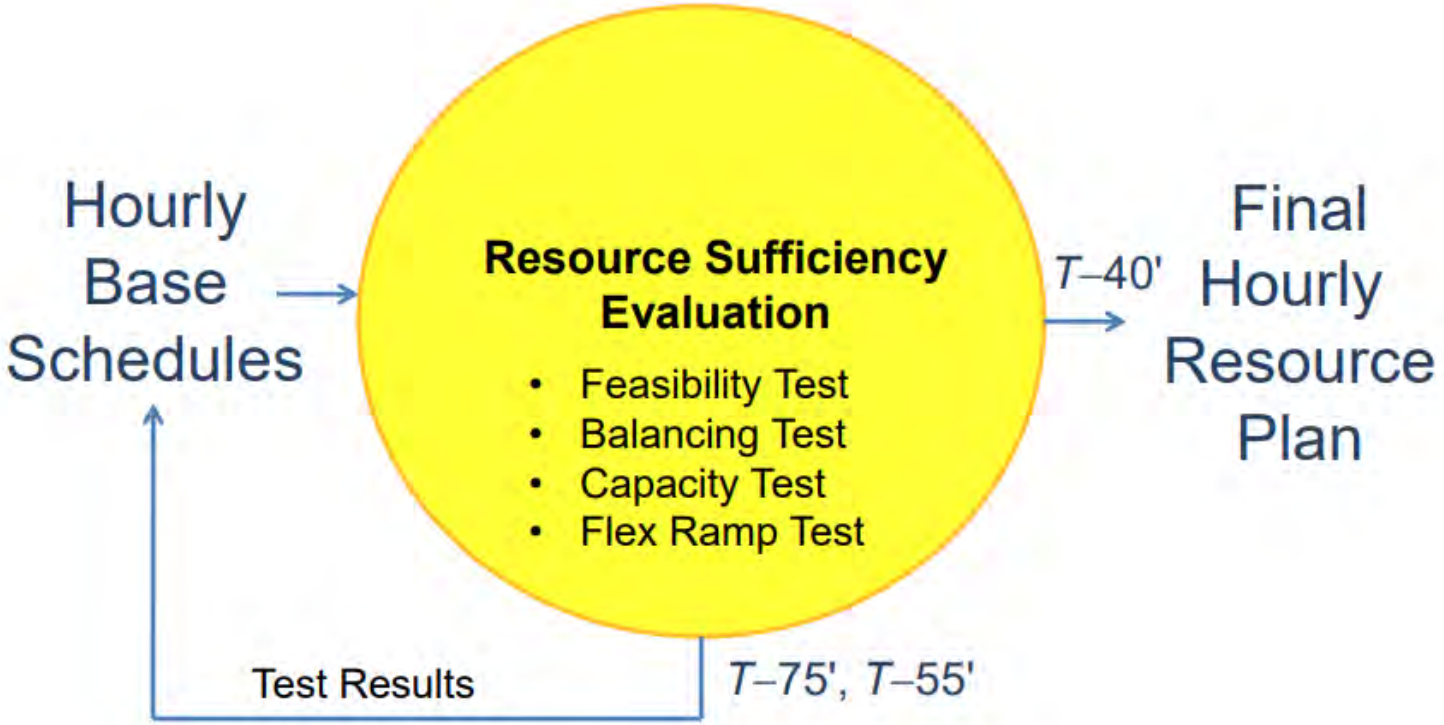
Agenda

- Resource Adequacy vs. Resource Sufficiency
- Resource Sufficiency Pre-EIM
- Resource Sufficiency in the EIM
- Challenges

Balancing Authority ACE Limits



Energy Imbalance Overview



Feasibility Test

CAISO performs a Day-Ahead and Base Schedule power flow feasibility test the day before the Operating Day.

- If the Day-Ahead Market or the Base Schedules submitted for the Real-Time Market result in no transmission violations in the EIM Entity Balancing Authority Area, then the feasibility test passes.
- Transmission constraint violations result in a failed feasibility test.

Balancing Test

BAA base schedules (for EIM generating and intertie resources) are compared to the ISO's demand forecast to determine the BA imbalance.

If the BAA imbalance is within 1% = PASS

If the BAA Imbalance is greater than 1%

Then the EIM Balancing Authority will be subject to over-scheduling or under-scheduling penalties if its actual load is 5% more or less than its load Base Schedule for that hour.

Capacity Test

Prior to each hour, the ISO administers a capacity test if an EIM Balancing Authority uses the ISO forecast and does not balance that forecast exactly with submitted Base Schedules.

There must be sufficient EIM Participating Resource capacity bid range in the EIM through incremental or decremental energy bids above or below the Base Schedules to meet the imbalance, positive or negative.

Capacity Test

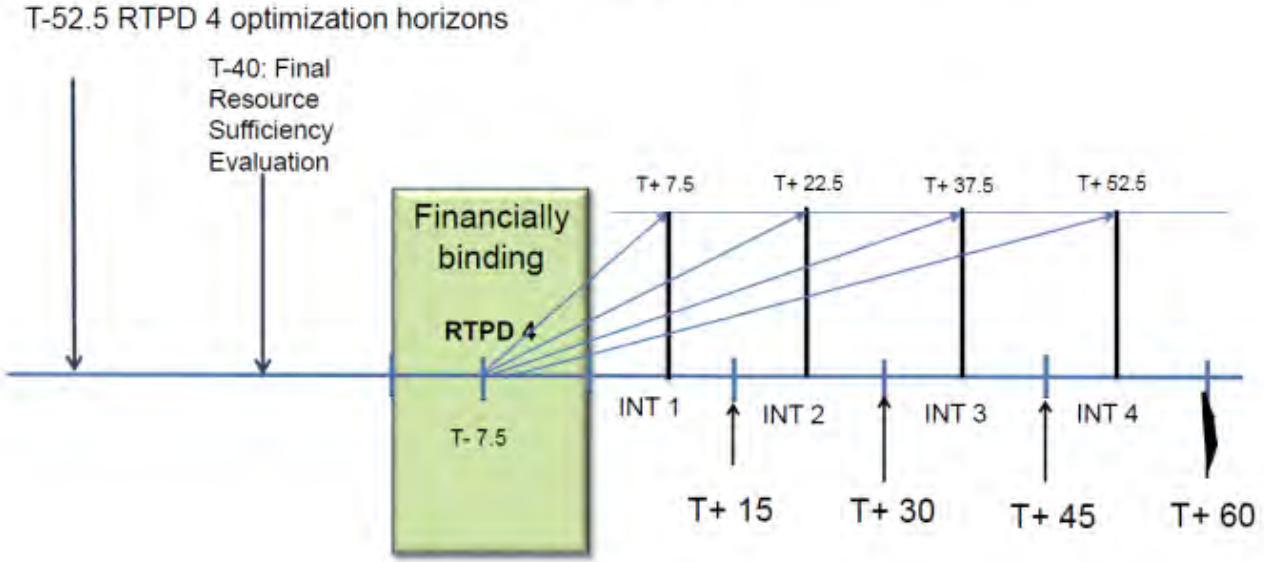
Sufficient Capacity = Pass

If the EIM Balancing Authority fails the capacity test, it will automatically fail the flexible ramp sufficiency test. The capacity test is also applicable to the CAISO BAA.

Insufficient capacity also results in the EIM transfers being limited to the value from the last 15-minute interval of the previous hour’s dispatch.

Flexible Ramping Sufficiency Test

Cumulative test for meeting flexible ramping requirements for each 15' interval of the hour



Flex Ramp Sufficiency Test – Requirement Has Six Components

- Net Demand Uncertainty – Stays the Same for all Tests
- Forecasted Change in Demand
- Diversity Benefit Factor
- Net Import Capability
- Net Export Capability
- Flexible Ramp Credit

  - Increase requirement
  - Increase or decrease requirement
  - Reduce requirement

Flex Ramp Sufficiency Test – Requirement Has Six Components

$$\begin{aligned} &Flex\ Ramp\ Up\ Requirement\ (T) = \Delta Demand(T) \\ &+\max[(Flex\ Up\ Uncertainty - Net\ Import\ Capability), \\ &((Diversity\ Benefit\ Factor * Flex\ Up\ Uncertainty) \\ &- Flex\ Ramp\ Up\ Credit)] \end{aligned}$$

$$\begin{aligned} &Flex\ Ramp\ Down\ Requirement\ (T) = \Delta Demand(T) \\ &+\max[(Flex\ Dn\ Uncertainty - Net\ Export\ Capability), \\ &((Diversity\ Benefit\ Factor * Flex\ Dn\ Uncertainty) \\ &- Flex\ Ramp\ Dn\ Credit)] \end{aligned}$$

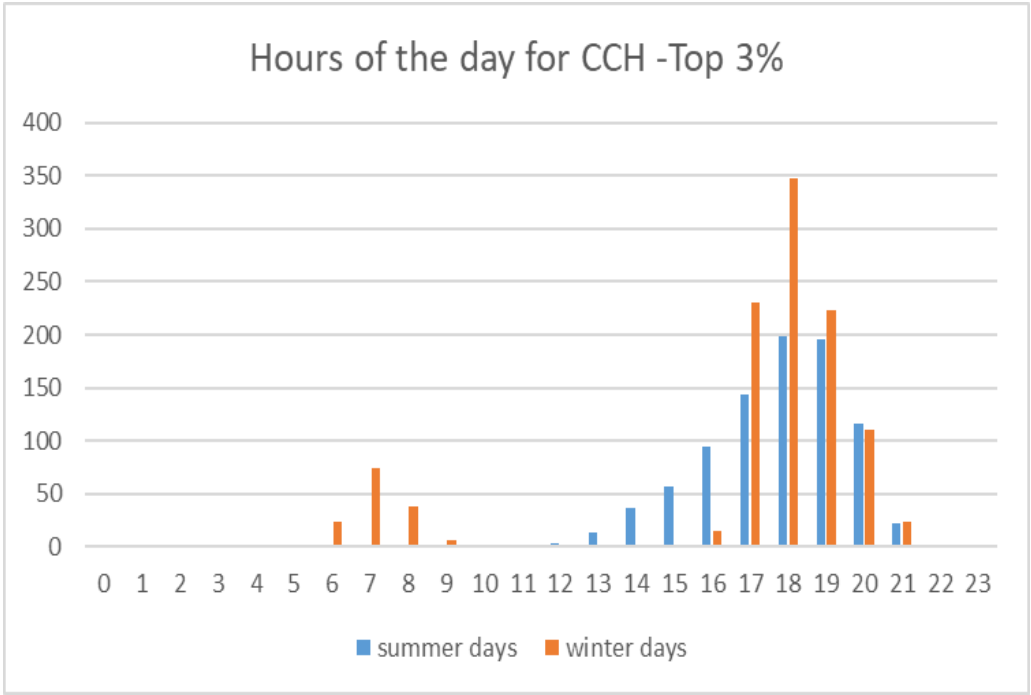
Increase requirement

Either increase or reduce requirements

Reduce requirement

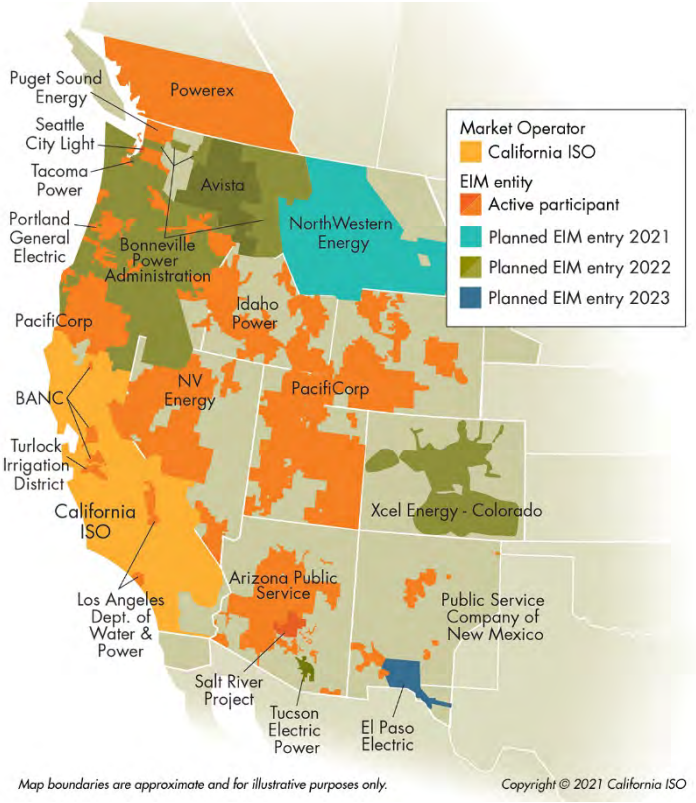
Capacity Critical Hours (CCH)

- Distribution of Hours of Day
  - Summer –
    - Hour 18 – 23%
    - Hour 19 – 22%
    - Hour 17 – 16%
- Winter
  - Hour 18 – 32%
  - Hour 17 – 21%
  - Hour 19 – 20%



Challenges

- Flexible Capacity
- Transmission



Questions?