Price Formation Enhancements discussion

James Friedrich
Lead Policy Developer, Market Policy Development

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Purpose of this Discussion

• CAISO has been organizing stakeholder working groups to explore concepts, principles, and problem statements related to this initiative

• Since we are in the exploratory stage with stakeholders, there are no concrete proposals to present to the MSC

• The staff presentation aims to introduce broad themes of scarcity pricing to the MSC that have been discussed in the working group
Price Formation: A Brief Overview

• **Price formation** is the process through which prices are determined in electricity markets.

• Price formation is crucial for efficient market operations because it:
  – Maximizes market surplus
  – Incentivizes participants to adhere to commitment and dispatch instructions
  – Promotes system reliability
  – Enhances transparency about costs to serve load
Price Formation Enhancements Initiative Topics

**Scarcity pricing**: establishing prices when there is insufficient supply to meet energy and reserve requirements

- **BAA-level market power mitigation**: assessing competitiveness of EDAM/WEIM transfer constraints

- **Fast-start pricing**: incorporating fast-start generators and their commitment costs into market prices

- **Extended FRP**: increasing look-ahead horizon of flexible ramping product

- **Storage + multi-interval optimization**: improving market dispatch and pricing outcomes of storage resources under multi-interval optimization
Scarcity Pricing: Preview of Topics for MSC Discussion

• **Topic 1:** What conditions should trigger the application of scarcity pricing?

• **Topic 2:** When scarcity pricing is triggered, what is the appropriate price signal?

• **Topic 3:** How should non-market demand response and strategic reserve resources be accounted for in price formation?
Topic 1: What conditions should trigger the application of scarcity pricing?

- Under normal system conditions, prices are set by the intersection of supply and demand
  - Under competitive conditions, market prices represent the marginal cost of production

- Under scarcity conditions, there is insufficient supply to meet demand for energy and reserves
  - How should prices be set during periods of supply scarcity?
Scarcity prices are effectuated in different ways

- Reserve shortage pricing (operating reserve demand curves)
- Power balance constraint violations
- Specific events such as load shedding or activation of demand response
- FERC Order 831 conditions
What conditions should trigger the application of scarcity pricing?

- Reserve shortage pricing effectuates energy scarcity pricing through opportunity costs

- CAISO’s reserve (ancillary service) shortage pricing may not be fully effective for several reasons:
  - CAISO market only ancillary service (AS) shortage pricing during an actual shortage
  - CAISO market only procures incremental AS in the real-time market
  - CAISO market only procures incremental AS in FMM and not RTD
  - Western Energy Imbalance Market does not procure AS outside of CAISO
Reserve shortage pricing in ISO/RTO markets


*Note: the CAISO curve would be approximately doubled in height during FERC Order 831 conditions*
Reserve shortage pricing in ISO/RTO markets

Rightward steps are in excess of NERC required minimum reserves

*Note: the CAISO curve would be approximately doubled in height during FERC Order 831 conditions

September 2022 there were 0 ancillary service scarcity events
When scarcity pricing is triggered, what is the appropriate price signal?

• During periods when supply is insufficient to meet demand, prices should rise to reflect the value of electricity

• Some stakeholders suggest the CAISO price signals are not high enough and should incorporate a Value of Lost Load methodology

• Other stakeholders suggest the current price signals are just fine and CAISO should address scarcity issues with resource adequacy and not through market pricing
How should non-market demand response and strategic reserve resources be accounted for in price formation?

- Activation of these resources should **complement** the markets objectives

- Some stakeholders suggest CAISO should activate energy price floors when emergency resources are activated