

Powerex

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Price Formation

Supply. Flexibility. Commitment.

The EIM Entities Recognize The Importance Of Price Formation

- “In addition to governance, there are several critical market design topics - including resource sufficiency, transmission access and compensation, *price formation*, and greenhouse gas program application - that have the potential to greatly impact not only the *magnitude of total regional benefits* that may be achieved, *but also the distribution* of those benefits between and among participating EIM Entities and the CAISO”
- “...the core design elements of EDAM must be *considered carefully and not simply extended* from the EIM or from the CAISO’s existing day-ahead market design”
- “Key market design choices *must effectively balance a variety of potentially competing interests and priorities*, ultimately providing an opportunity for participation in a well-functioning competitive market”
- “CAISO, the EIM Entities, and stakeholders must carefully evaluate *a variety of options and industry best practices* related to price formation”

The EIM Entities Are In The Early Stages Of Evaluating Price Formation Issues and Potential Approaches

- The EIM Entities have not yet had the opportunity to explore, in detail, each of the price formation topics that are relevant to a regional day-ahead organized market
- The EIM Entities look forward to stakeholder discussions on each applicable price formation topic, including an examination of FERC policy, as well as approaches applied in western bilateral markets, CAISO, and other ISO/RTOs
- ***The following slides represent Powerex's perspective on price formation,*** informed by its experience participating in:
 - CAISO
 - AESO
 - SPP
 - MISO
 - PJM
 - ISO-NE
 - NYISO

What Is Fast Start Pricing And Why Is It Important?

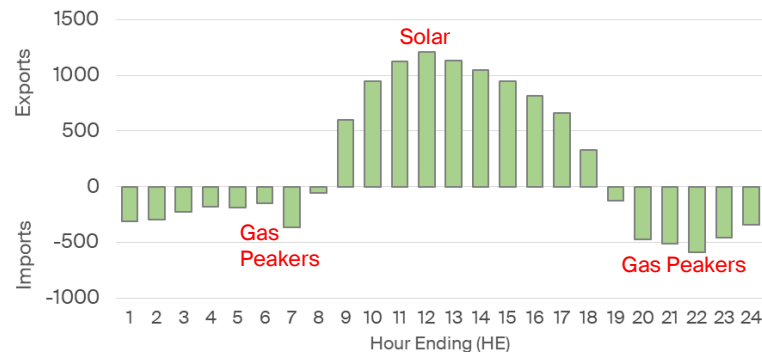
“...incorporating commitment costs of fast-start resources in prices more accurately represents the marginal cost of serving load.”

FERC Order Instituting Paper Hearing re: NYISO (2017), Docket No. EL18-33

Are gas peaker operating costs generally included in market clearing prices?

Market	Current	Enhancements
MISO	Yes	
SPP	No	December 2019 Compliance Filing
PJM	No	August 2019 Compliance Filing
ISO-NE	Yes	
NYISO	No	December 2019 Compliance Filing
ERCOT	Yes	
Western Bilateral	Yes	
CAISO	No	

2019 Average EIM Transfers in FMM (CAISO BAA)



Data source: CAISO OASIS

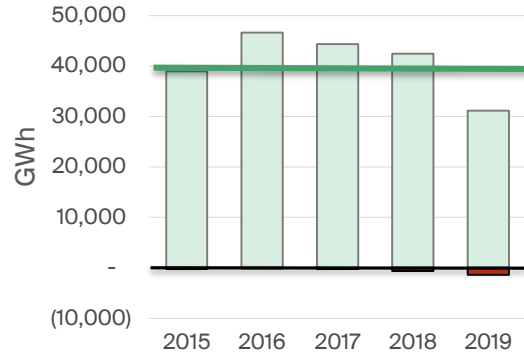
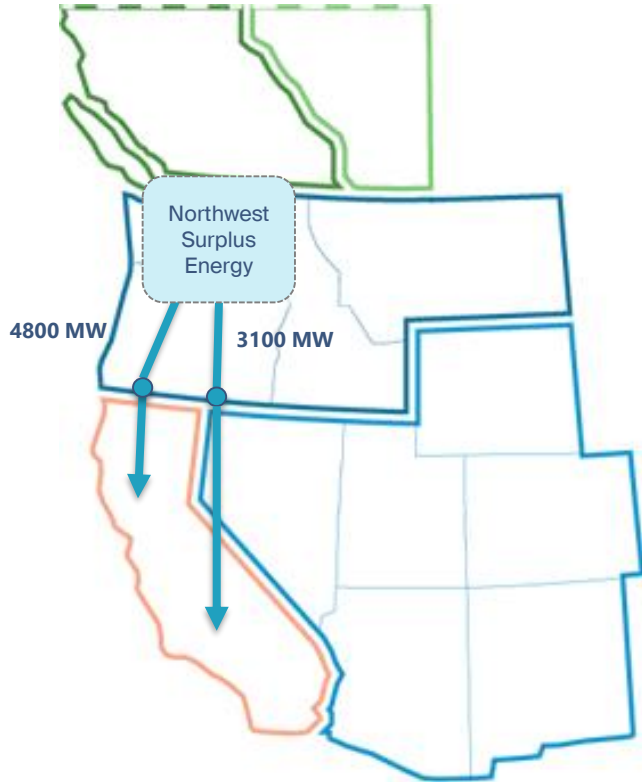
Why is it important?

1. Accurate price signals for supply availability
2. Equitable, non-discriminatory compensation (including for imports)

What Is Scarcity Pricing And Why Is It Important?

- Several ISOs/RTOs, as well as FERC have recognized the need for prices to rise as the market **gets close** to running out of supply to serve firm demand:
 - *“shortage pricing ... will help ensure that **prices rise sufficiently and appropriately** to allow supply to meet demand during an operating reserve shortage, and thus will **more accurately reflect the value a resource provides.**”* FERC Order No. 825 at P 163 (2016)
- There are numerous opportunities for CAISO to implement improved scarcity pricing
 - Would better encourage voluntary supply participation, resource availability, demand response
- A new high-priority stakeholder process focused on “system market power mitigation” is underway
 - Would *lower* prices when California is importing, particularly during tight conditions
 - Important to consider relationship and timing of improved scarcity pricing and any new market power mitigation measures

What Is The Economic Magnitude Of Price Formation Issues?

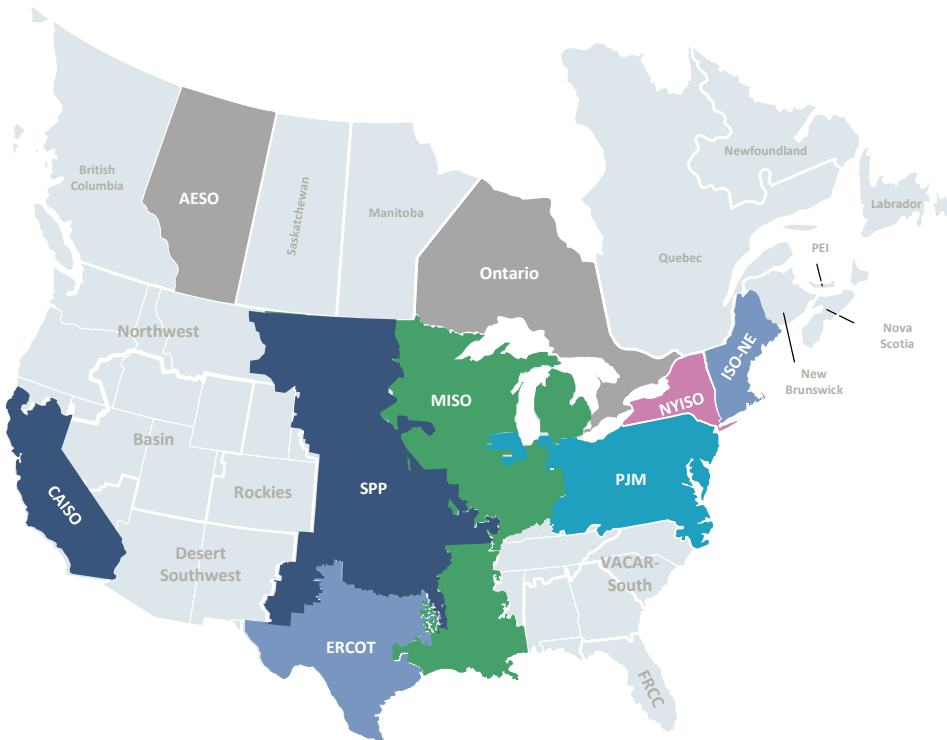


*~40 Million MWh of Northwest surplus energy delivered to California annually**

*Data Source: BPA, PGE, PSEI OASIS

Price Formation Impact (\$/MWh)	Resulting Annual Value Transfer Between Regions (\$)
\$1	\$40 Million
\$2	\$80 Million
\$5	\$200 Million
\$10	\$400 Million
\$15	\$600 Million

How Can The West Make Informed Price Formation Decisions?



Organized Market	Number Of States	Internal Market Monitor	External Market Monitor
MISO	15	No	Potomac Economics
SPP	14	Yes	None
PJM	13	No	Monitoring Analytics (Former Internal MM)
ISO-NE	6	Yes	Potomac Economics
NYISO	1	No	Potomac Economics
ERCOT	1	No	Potomac Economics
CAISO	1*	Yes	None

* CAISO also operates the multi-state Western Energy Imbalance Market

Diverse, knowledgeable, perspectives are critical to achieving price formation approaches consistent with industry best practices



Thank You

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