Energy Imbalance Market Collaborative Workshop #1

Puget Sound Energy

Power Cost Only Rate Case, Docket UE-200980

June 15, 2021

Proposed collaborative roadmap has 4 workshops

1. Objective & principles	• Settlement agreement • EIM[1] overview • Objective of collaborative workshops • Principles for treatment of EIM impact in power costs
2. Current model & CAISO estimates	• PSE's approach to modeling power costs and its evolution • CAISO's[2] EIM benefits calculation • PSE's validation of CAISO's calculation • Hydro-adjusted CAISO calculation
3. Sub-hourly model	• Proposed approach to including net impact of EIM participation in current power cost models
4. Conclusion	• Discussion of approach to including net impact of EIM participation in rate year power cost projections • Discuss final work product of collaborative

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[1]Energy Imbalance Market
[2]California Independent System Operator

Agenda for today

Settlement Agreement | EIM overview | Objectives | Principles

- Review settlement agreement
- Provide overview of EIM
- Discuss objective of collaborative workshops
- Define principles for quantifying and accounting for the net impact of EIM participation in PSE's rate year power cost forecasts
- Review proposed roadmap & agenda for workshop #2

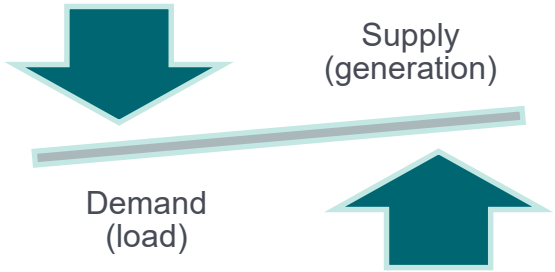
2020 PCORC settlement includes EIM collaborative workshop

Settlement Agreement | EIM overview | Objectives | Principles

The Settling Parties agree to participate in a collaborative workshop on the estimation and treatment of EIM costs and benefits for rate making purposes.[1]

[1]Docket UE-200980 Settlement Stipulation and Agreement, page 6

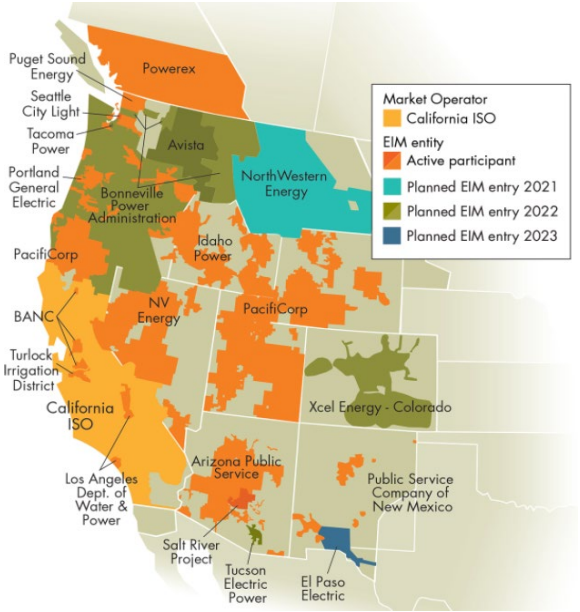
PSE must constantly balance resources and load



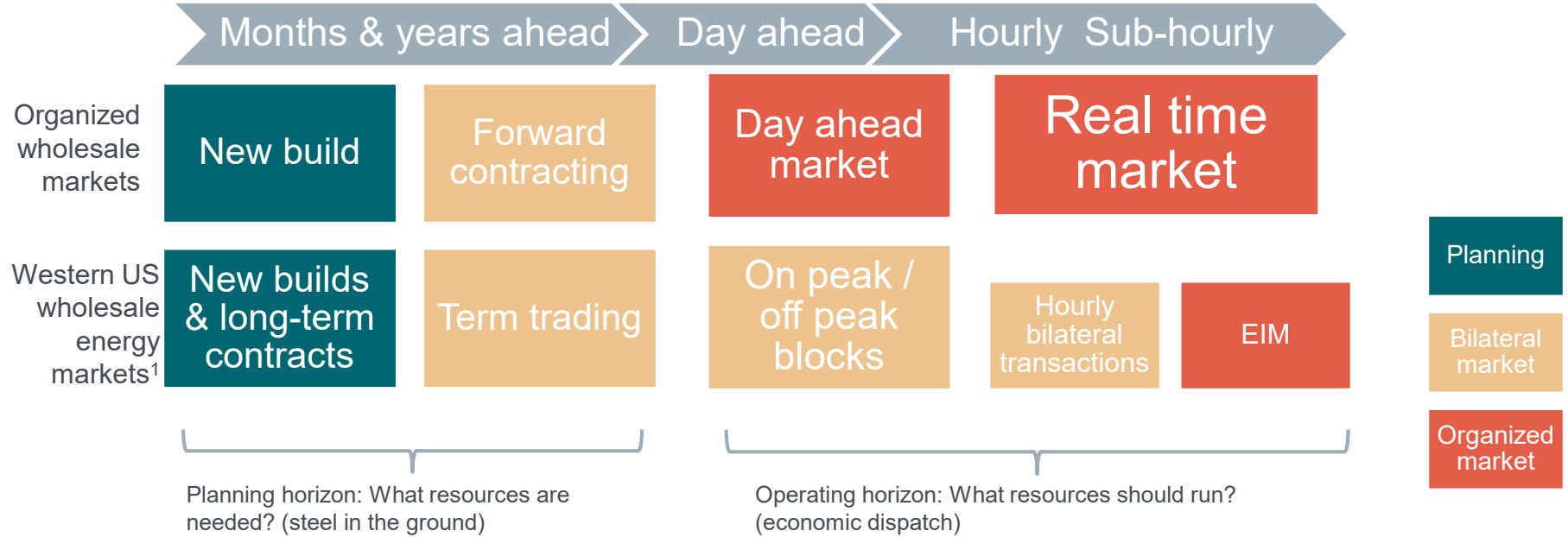
- Energy purchases and sales are made bilaterally in the term, day-ahead and hour-ahead markets
- PSE holds operating reserves and contingency reserves (available generation capacity) going into each hour
- Prior to EIM participation, PSE used only its own generating resources to balance generation and load within the hour

EIM is a sub-hourly wholesale energy market

- EIM is a sub-hourly wholesale energy market that enables purchases and sales in 15-minute and 5-minute increments
- CAISO is the EIM market operator
- There are currently 14 market participants across the western United States and Canada



The EIM is one type of organized market



1 Excluding CAISO

The bilateral market is limited

- Bilateral transactions limit resource optimization
  - Transactions are between individual counterparties rather than a larger load and resource base
  - Transactions are limited to block hours for day ahead (peak and off peak) and hourly for real time

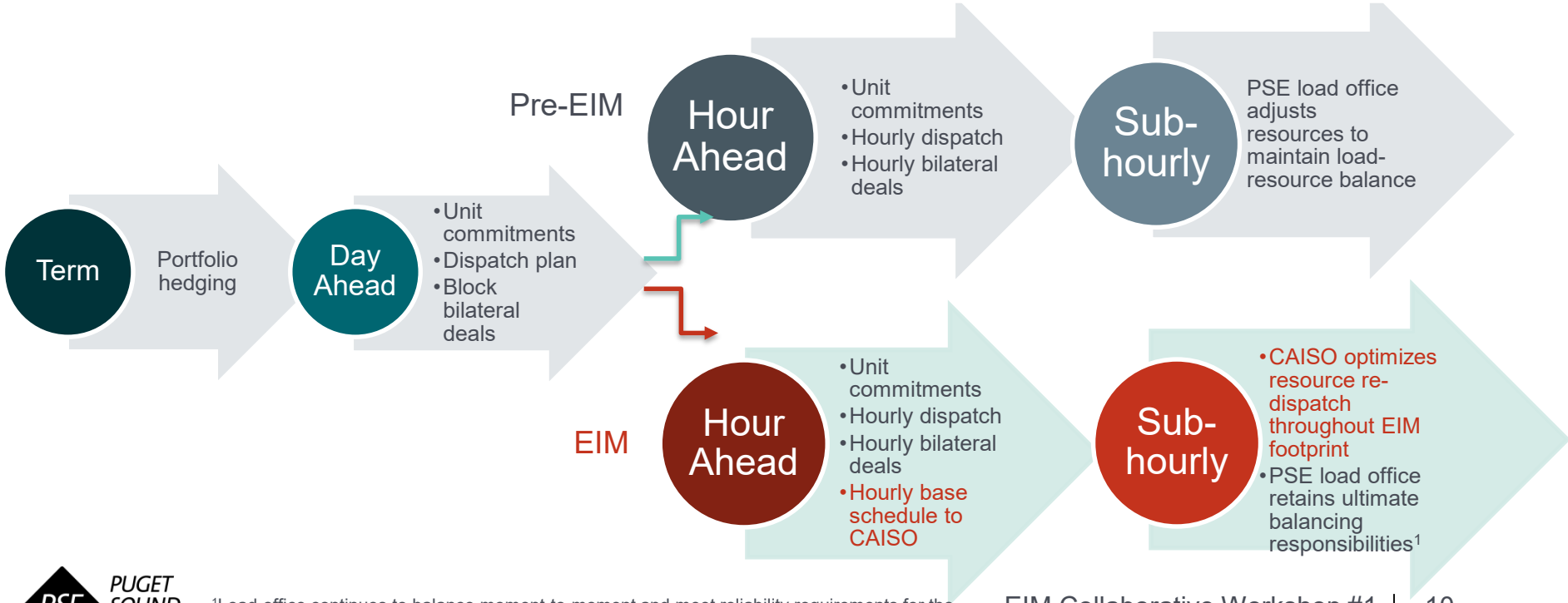
- EIM allows PSE to purchase from or sell to other market participants to maintain its load/resource balance and optimize available resources every 15 and 5 minutes within the hour

EIM enables more optimal sub-hourly energy supply

- CAISO uses a market wide economic dispatch model and participant-submitted data to find the lowest-cost energy to serve real-time demand

- Diversity of load and resources across the wide geographic area provides for
  - Integration of variable resources
  - More efficient balancing of supply and demand inside the hour

Sub-hourly operations are different with the EIM



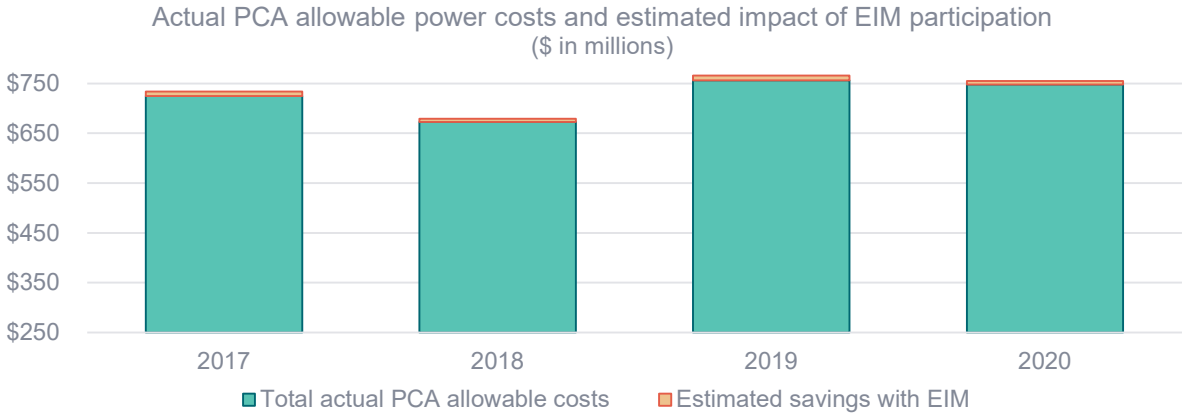
[1]Load office continues to balance moment-to-moment and meet reliability requirements for the entire Balancing Authority Area.

PSE must continue to meet hourly requirements

- PSE continues to purchase and sell in the term, day-ahead and hour-ahead markets
  - These bilateral transactions, combined with the planned dispatch of PSE resources, equal forecasted PSE load going into each hour. This hourly load/resource balance becomes PSE's EIM base schedule.
- PSE begins each hour with resources sufficient to serve forecasted load
- PSE must hold sufficient flexible ramping capability and reserved capacity
  - Requirements ensure entities are able to meet load and reliability obligations without leaning on other participants
  - When an entity fails sufficiency tests, its EIM transactions in successive intervals are limited and the entity may face financial penalties

CAISO-estimated EIM benefits indicate up to 1% reduction to PSE's actual variable power costs

- PSE's actual PCA[1] power costs were approximately 1% lower than they might have been in 2017 through 2020 without EIM participation[2]



- PCA sharing bands determined how much of this benefit was assigned to customers

1 Power Cost Adjustment mechanism
2 CAISO benefits estimates include O&M savings, which are not included in PCA power costs. Estimated EIM power cost reductions shown here are therefore likely higher than actual savings.

Collaborative objective and final work product

Proposed objective

- Agree on a method to quantify and account for the net impact of EIM participation in PSE's rate year power cost forecasts

Proposed final work product

- A filing with the Commission of a narrative summary that:
  - Outlines the content discussed in the collaborative
  - Describes the agreed-upon treatment of EIM in PSE's rate year power cost forecasts
- Filing will be in PSE's PCORC Docket UE-200980, similar to that filed by PSE in Dockets UE-190529 and UG-190530 related to wind generation

Proposed principles for treatment of EIM in PSE's rate year power cost forecasts

1. The net impact of EIM participation should be reflected in customer rates
2. The approach to incorporating EIM should be consistent with established ratemaking principles as applied to PSE[1]
3. Time and effort should be commensurate with the scale of costs and benefits

Current principles applied to PSE include:

Power cost projections should accurately represent rate year power costs

- Rate year power costs should be set as closely as possible to costs that are reasonably expected to be actually incurred during the period when rates are in effect, consistent with prior Commission guidance[2]

Normal conditions

- Load, hydro, wind

Fundamentals-based power price forecast

- Aurora-generated, assuming 3-month average forward gas prices

Rate year power costs are established on a forward-looking basis

- Starting when rates take effect

[1] The assumptions and approach to power cost modeling can evolve over time

[2] *See* WUTC v. Puget Sound Energy, Dockets UE-111048 & UG-111049, Order 08 (May 7, 2012) at n.303

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Draft agenda for workshop #2

- Current power cost model
- CAISO EIM benefits
- PSE's validation of CAISO EIM benefits
- Hydro-adjusted EIM benefits