Energy Imbalance Market: A Conceptual Overview
Outline of Presentation

• Issues and Current Practices in the West
  – Variability and Balancing
  – Unused transmission capacity

• Overview of how an EIM works

• Where are we now and where do we go?
  – PUC EIM Group work
  – Next Steps
Issues & Practices in the West

Variability on the Grid
Balancing Authorities
Unused Transmission Capacity
Issues & Practices in the West
Variability and Balancing on the Grid

- Changes and increases in variability require us to change the way we operate the grid
- Have 37+ BAs* and no mechanism to share and address balancing across the interconnection
Issues & Practices in the West

Unused Transmission Capacity

What are the possibilities in utilizing transmission capacity that would otherwise not be used?
What is an EIM and How Does it Work?

High-Level Overview

Myths and misconceptions
What is an EIM?

Definition

An Energy Imbalance Market is a tool that dispatches lowest cost resources to address energy imbalances, while maintaining reliability.

*(Security-Constrained Economic Dispatch)*
What is an EIM?

Breaking it down

Today:
Each BA must balance loads and resources \textit{within its borders}.

- Limited pool of balancing resources
- Inflexibility
- High levels of reserves
- Economic inefficiencies
- Increased costs to integrate wind/solar

In an EIM:
The market dispatches resources across BAs to balance energy.

- Diversity of balancing resources
- Increased flexibility
- Decreased levels of reserves
- More economically efficient
- Decreased integration costs
How does an EIM work?

Dispatching balancing energy

EIM

Looks at the grid to locate imbalances and opportunities to reduce costs

Participants dispatch resources and send information to EIM for settlement

Analyzes information on available resources and prices to determine most economic resources to dispatch

SCED Algorithm determines which available resources to dispatch and sends orders to participants

Accesses information on transmission to identify congestion and adjust prices
How does the EIM work?

Participant actions

Prior to Operating Horizon
- Participants choose whether to offer units into the EIM.
- Submit schedules and resource information

Offer unit:
- Submit with offer price

Do not offer:
- Self-schedule unit

EIM identifies energy imbalances. SCED algorithm determines the dispatch and issues orders.

Operating Horizon
- Participants receive dispatch orders.

Offered units receive SCED-calculated dispatch

Others receive dispatch orders matching their schedule

After Operating Horizon
- Tool calculates settlement according to Locational Imbalance Price (LIP)
What does an EIM do?
Reducing Variability across BAs

Through the EIM, variability in aggregated across participating BAs, which effectively reduces the overall variability across the footprint.

At the same time, the pool of resources available to manage variability expands, increasing flexibility.
What does an EIM do?

Optimization of Generation Dispatch

• In addition to providing a balancing solution for integrating variable generation, the EIM is an optimization tool

• Even if no imbalance on the grid, the EIM would redispatch resources available to it to maximize the economic
What does an EIM do?

Reliability

• Indirect benefits:
  – Better situational awareness
  – Sub-hourly dispatch to follow imbalance
  – More flexibility
  – Improved communication

• Direct benefits:
  – Would an EIM prevent SOL violations/near violations?
  – What effect would/could the EIM have had in recent outage events?
What does an EIM do?

Use of transmission capacity

• The EIM must use capacity that would not otherwise be used

[Diagram showing unused capacity, actual flow, maximum physical capacity, and EIM flow]
What is an EIM?
Myths and Misconceptions

The EIM is
• A market for balancing energy
• Centralized unit dispatch for balancing energy
• Voluntary*

The EIM is NOT
• An RTO (with planning, day-ahead markets, etc.)
• Centralized Unit Commitment
• Capacity market
• A replacement for current bilateral contractual business structure