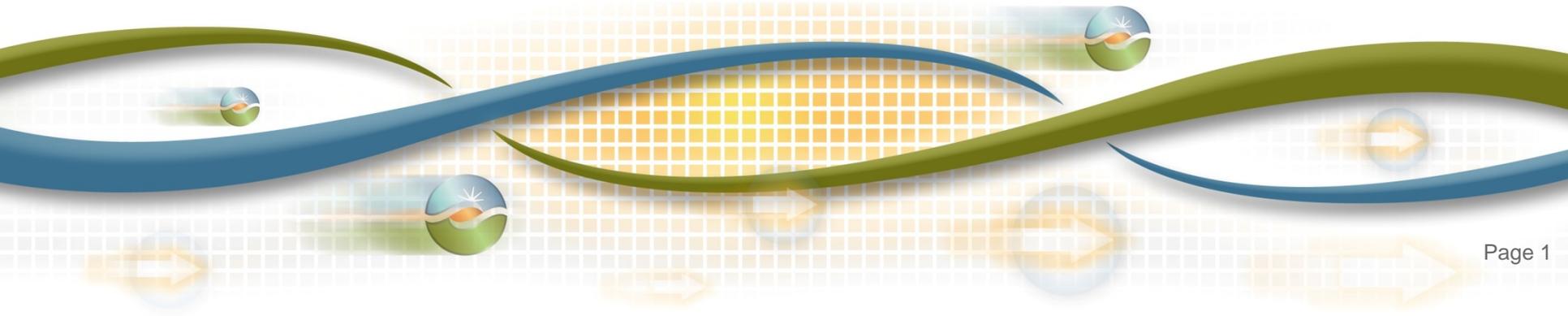


Energy Imbalance Market Options

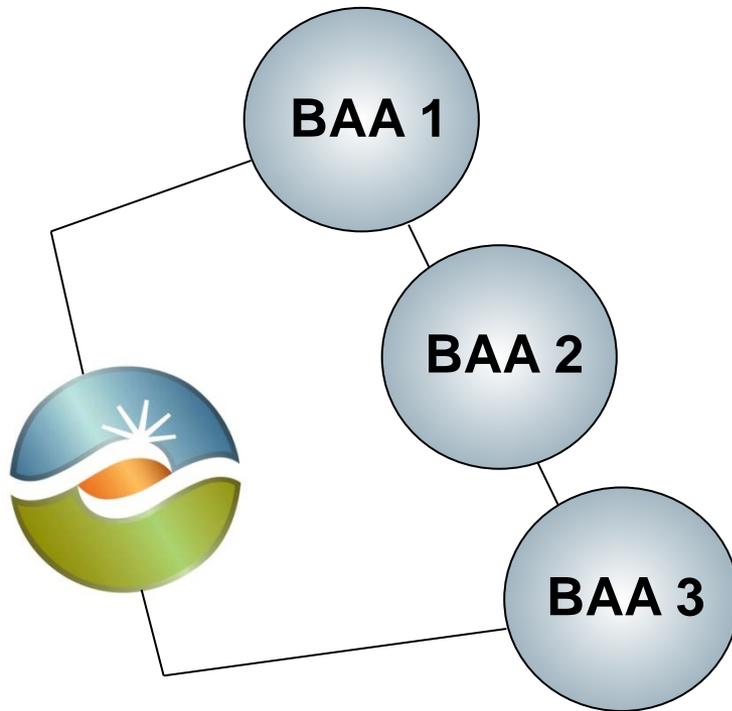
PUC-EIM Meeting, Tempe AZ
September 13, 2012



The Energy Imbalance Market provides financial benefit to the entire West

- Review of ISO-hosted approach
 - Overall approach – simple, scalable, and flexible
 - How it works
 - Cost estimate and cost example
- “Frequently Asked Questions”

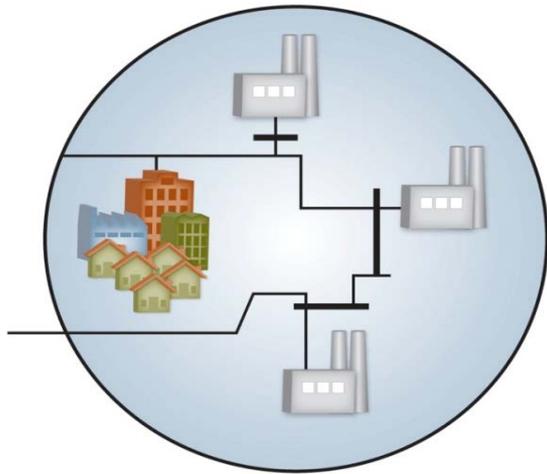
A simple, scalable approach promotes incremental participation



- No critical mass required – each participant can enter EIM when ready
- Preserves participants' autonomy and current practices
 - Balancing authorities balance and provide their own ancillary services
 - Balancing authorities can trade bilaterally
 - Participants retain all physical scheduling rights
 - Flexible modes of participation are available

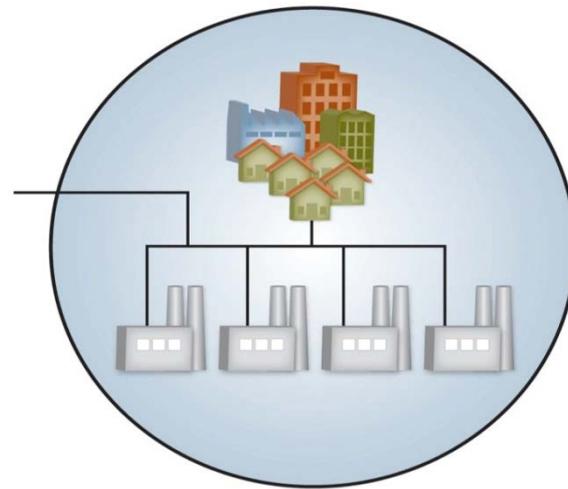
The ISO model provides for flexible modes of participation in the EIM

Transmission security constraint



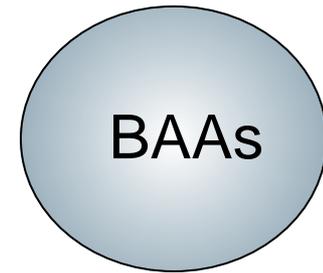
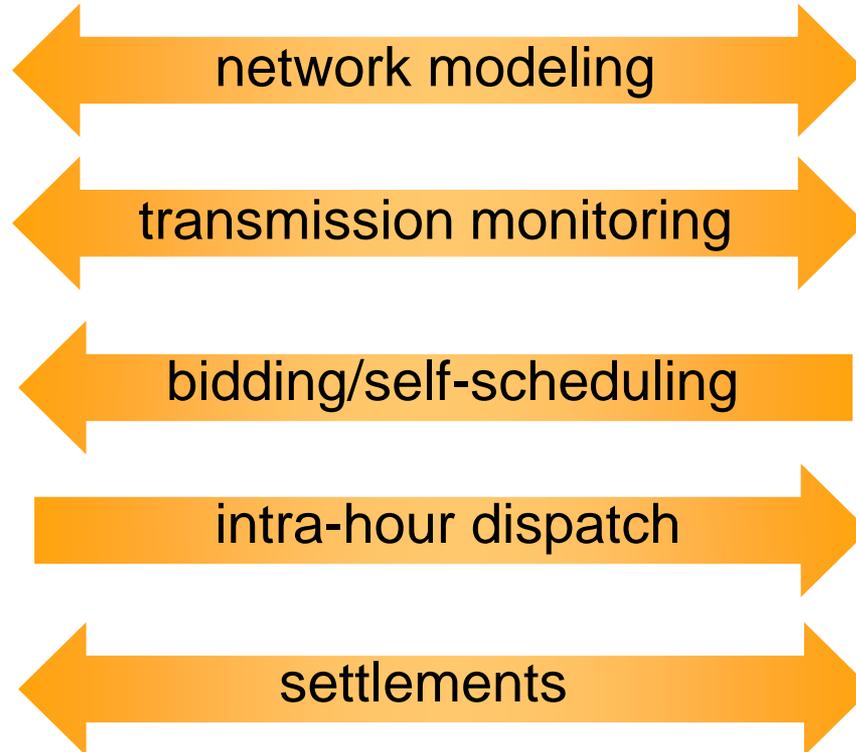
The EIM can perform security constrained economic dispatch within the member balancing authority

Hub approach



Or a balancing authority can participate in the EIM as net generation or load

How the EIM structure would operate



ISO design uses existing structure to provide gradual participation

- EIM participation can develop gradually
- EIM participants will have transmission rights to reach other participants
- Assumes 10% of participating areas' energy is in EIM, but this can vary
- ISO can leverage existing market and energy management systems
- Existing structure also satisfies regulatory requirements
 - Independent non-profit corporation
 - Credit policy and financial reporting
 - Market monitoring

A participant incurs a one-time cost to join and ongoing fees based on usage

One time

3¢ x

Total annual energy usage

Example: licensing fees, servers and set up

On-going

Usage rate

19¢ x

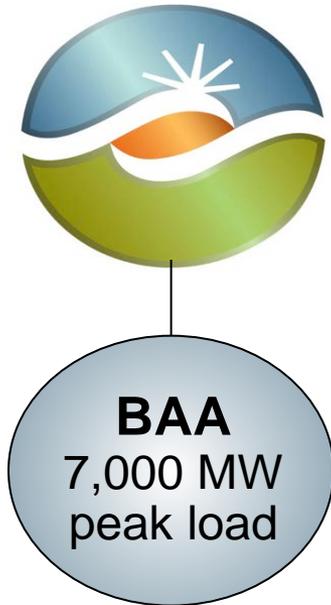
MWh of EIM energy

Example: staff and portions of ISO systems used to support EIM functionality

Ongoing 19¢ rate applies to level of usage, derived from existing Grid Management Charge

- Usage estimated at 10% of total annual energy
 - Lower than ISO historical load deviations (3-5%) and import/export/gen deviations (15-20%)
- Rate will be charges to imbalance energy (non-ISO load deviations, gen deviations and RT dispatch)
- This approach designed to preserve cost causation consistent with current rates
- Ongoing rates may adjust as EIM design evolves

How these charges might apply to a specific BAA



$$25\text{M} \times 3\text{¢} = \$750,000$$

MWh annually one time
cost impact

$$2.5\text{M} \times 19\text{¢} = \$500,000$$

MWh annual usage ongoing fees
annually

Other GMC fees are less significant:

- \$1000/month per Scheduling Coordinator
- \$0.005 per bid segment (For a 6-segment bid curve, cost is
\$0.005 * 6 segments * 24 hours = 72 cents per resource per day)

In summary, the ISO is committed to working cooperatively with the rest of the West to improve reliability and efficiency, to benefit the entire region

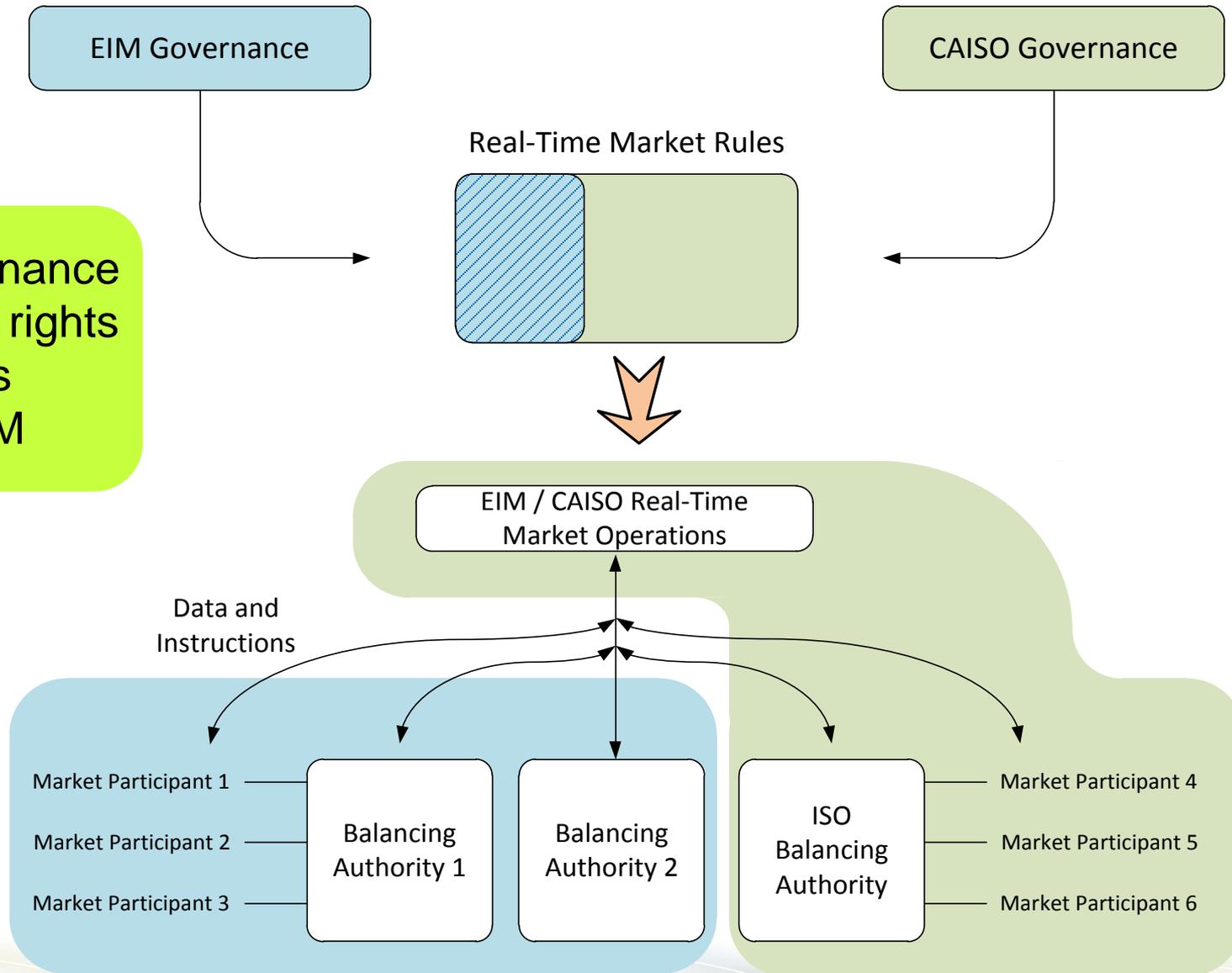
- Scalable participation preserves participants' autonomy
 - Membership – can start with a subset of WECC participants
 - Functionality – participants can elect additional functionality in the future
- Flexible
 - Hub approach, or modeling of internal transmission constraints
 - Participating BAs need not be adjacent to the ISO
- Proven market design enables ready implementation

The California ISO proposal recognizes the need for a governance solution.

- Enable participants to govern the EIM
- Acknowledge that EIM rules will evolve over time with consideration of the costs and feasibility
- Allow participants to enter and exit the EIM on terms that are clear and agreed-upon
- Recognize FERC jurisdiction over EIM while avoiding direct FERC regulation of EIM participants

EIM is governed by EIM participants.

Separate governance and contractual rights for rule changes affecting the EIM



Frequently Asked Questions

Is there a minimum level of participation? Do the per-transaction costs change when participation changes?

- A “handful” of entities is enough to start the EIM
 - Contiguous transmission path is needed
- There is no minimum transaction level
- The ISO has based its costs on the existing GMC structure
 - Not immediately affected by transaction levels
 - May adjust as EIM design evolves
- Revenue from EIM will offset the next year’s rates
 - Reduces the revenue requirement for the Market Services and System Operations GMC categories

What internal costs can participants expect?

- Communications or other IT investments
 - An entity already participating in the ISO market would already have the necessary interfaces
 - May have new costs to communicate resource output (but may already be in place for WECC RC)
 - Since a BAA enables participation in EIM, it may be possible to leverage its existing ICCP data pool
- Depending on an entity's system and existing participation, its internal system installation estimated in \$3,000 to \$100,000 range with monthly system costs in the \$500 range

Interaction between EIM and non-EIM transmission owners

- The EIM operator will enforce limits to manage flows within capacity that is available for use by the EIM
- Transmission rates have not been fully explored in EIM discussions and need further consideration
- Concepts for market-to-market coordination may facilitate interactions with non-EIM participants
- In real-time, balancing authority areas energy management system must be aware of real-time changes to net scheduled interchange similar to dynamic transfers

How does EIM affect schedule curtailments?

- EIM does not manage curtailment priorities
- EIM starts with balanced supply and demand schedules from BAAs, determined before real-time using existing procedures
- EIM treats all participants equally, using available bids to maintain system balance and manage congestion
- If EIM exhausts its bids, it would notify the BAs and transmission providers, who would take further action
- BAAs would restore their energy balance
- If the issue is congestion, the transmission provider could call on BAA the Enhanced Curtailment Calculator (ECC) to curtail schedules using ECC's procedures

How does EIM relate to reserve-sharing groups?

- BAAs manage reserve schedules – not EIM
- Deployment of reserves would settle as bilateral transactions
 - No change required to existing reserve management practices
- A reserve sharing group may include members that do not participate in EIM. When bilateral schedules for reserve sharing cross the EIM boundary, the net scheduled interchange for the EIM area has a corresponding adjustment

How are physical resource limitations treated?

- The ISO's market optimization manages a variety of physical constraints using look-ahead dispatch for future intervals. For example:
 - Ramp rates
 - Start-up times, minimum on- and off-times
 - Energy limitations
- Flexible ramping feature ensures market feasibility
- The ISO market optimization supports complex non-linear price curves and price curves with gaps
 - Example: multi-stage generator modeling
- Real-time outages and derates are automatically transferred from outage tracking to market systems

Does the EIM operator take on any reliability obligations?

- The EIM market operator should
 - provide dispatches that respect the transmission constraint of the grid,
 - respect resource constraints, and
 - follow any other NERC standards that apply to market operators
- The market operator is not a BAA or TOP
 - BAAs and TOPs remain responsible for their own performance standards.

How do losses affect unit dispatch and settlement?

- The ISO's market optimization uses AC network analysis to include marginal losses in LMPs, and dispatches supply to meet physical demand plus losses
 - In some contractual arrangements, the ISO settles external losses through defined adjustments
- Existing contracts on interties into the ISO market use a variety of settlement arrangements
 - In some contractual arrangements, the ISO settles external losses through defined adjustments
- The ISO could accommodate losses in EIM's dispatch and LMPs, settle losses through defined adjustments, or to leave the responsibility for losses up to other BAAs.