



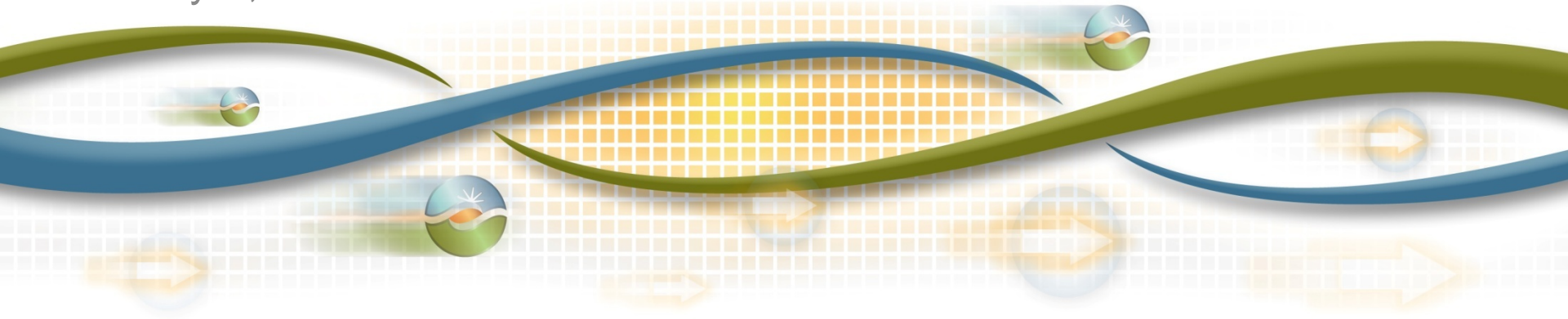
California ISO
Shaping a Renewed Future

Energy Imbalance Market Year 1 Enhancements Phase 2

Don Tretheway

Lead Market Design and Regulatory Policy Developer

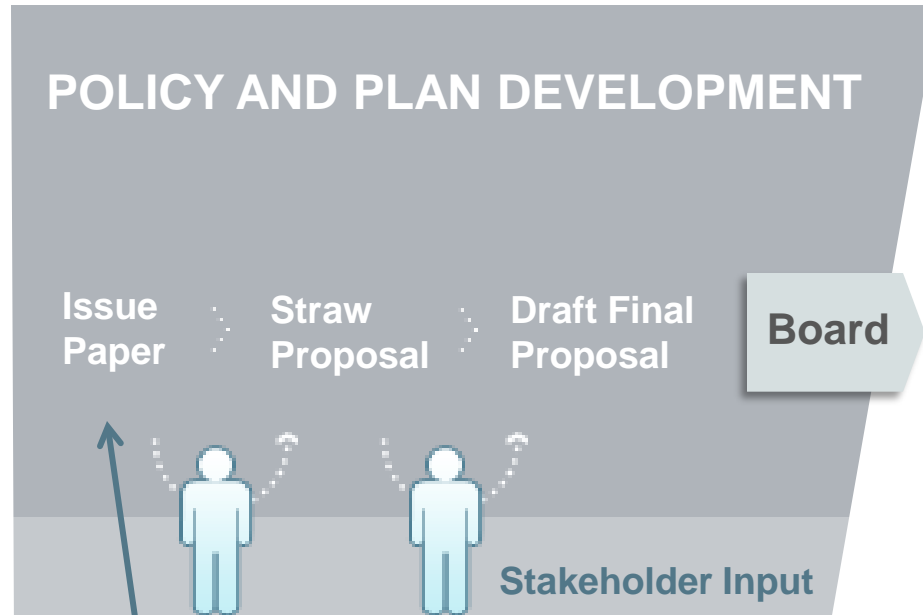
July 8, 2015



Agenda

| Time | Topic | Presenter |
|-------------|--------------------|------------------|
| 1:00 – 1:10 | Introduction | Kristina Osborne |
| 1:10 – 2:50 | Review Issue Paper | Don Tretheway |
| 2:50 – 3:00 | Next Steps | Kristina Osborne |

ISO Policy Initiative Stakeholder Process



We are here for Phase 2

Other EIM design activities outside of Year 1 enhancements

- “Available Capacity” proposal still pending at FERC
- Readiness requirements filed May 6 with FERC; 2015 readiness criteria posted June 30
- 6 month transition period – will file before August
- NVE structural competitiveness test prior to August

Phase 2 items informed by one year of operational experience or need for additional discussion

- EIM transmission charge
- Additional sub-allocation of real-time congestion offset (RTCO) – flow entitlements
- 15-Minute bidding on intertie scheduling points
- Congestion settlement on EIM transfer limits
- Dynamic market power mitigation
- Compensation for third parties making capacity available to support EIM transfers
- Long term changes to GHG design

Data

Discussion

Defer

Principles to consider appropriateness of transmission cost recovery (1 of 2)

1. There should be no pancaking for transmission service,
2. Each transmission owner should meet its transmission revenue requirement,
3. Resource owners should not have to estimate or attempt to incorporate where their production is going, as part of their supply bids,

Principles to consider appropriateness of transmission cost recovery (2 of 2)

4. The implementation cost of a transmission access charge approach should be consistent with the magnitude of the total transmission costs expected to be incurred through EIM operations and recovered in EIM-related rates, and
5. The transmission charge should be consistent regardless of whether the EIM participating resource is operated by an EIM entity. In other words, transmission cost recovery should not be affected by whether or not a load is the native load of the business entity that also is the transmission provider.

Analysis to inform transmission charge discussion

- Compare transmission usage between forward markets and real-time market considering net impact of EIM transfers
- Compare the volume of forward scheduling over time

Previous discussion of alternative transmission proposals

1. No charge for as-available transmission
2. EIM transmission access charge
3. Transfer charge as a minimum shadow price
4. Transmission access charge applicable to load and wheeling

Additional sub-allocation of RTCO (Flow Entitlements)

- Base schedules of one EIM entity can cause flows on another EIM entity's BAA
- Currently, the EIM assumes each EIM BAA is responsible for resolving congestion on its own system
- RTCO is calculated for each BAA
- Flow entitlements would allocate base schedule flows above entitlement to the other EIM entity's BAA RTCO

Additional sub-allocation of RTCO (Flow Entitlements)

- Agreement between two EIM BAAs on base schedule flows allowed on each other's BAA
 - Based upon historical flows? Need uniform methodology
- If EIM #1 base schedule flows exceed flow entitlement, cost of re-dispatch accrued in EIM #2 RTCO is allocated to EIM #1 RTCO
- Need to evaluate the incremental benefit of added RTCO complexity by including flow entitlements

Proposed analysis for assessing flow entitlements between PacifiCorp east (PACE) and ISO

1. Determine the real-time congestion offset amount by ISO constraint for each operating hour.
2. For all resources in PACE, calculate the theoretical impact on the ISO constraint by multiplying the quantity of the resource's imbalance energy by its shift factor relative to the constraint by the shadow price of the constraint.
3. Calculate the actual impact to ISO real-time congestion offset as the minimum of the amounts determined in steps 1 and 2.

Analysis would be performed for all BAAs in EIM footprint

How does the ISO calculate intertie scheduling limits used in the market optimization?

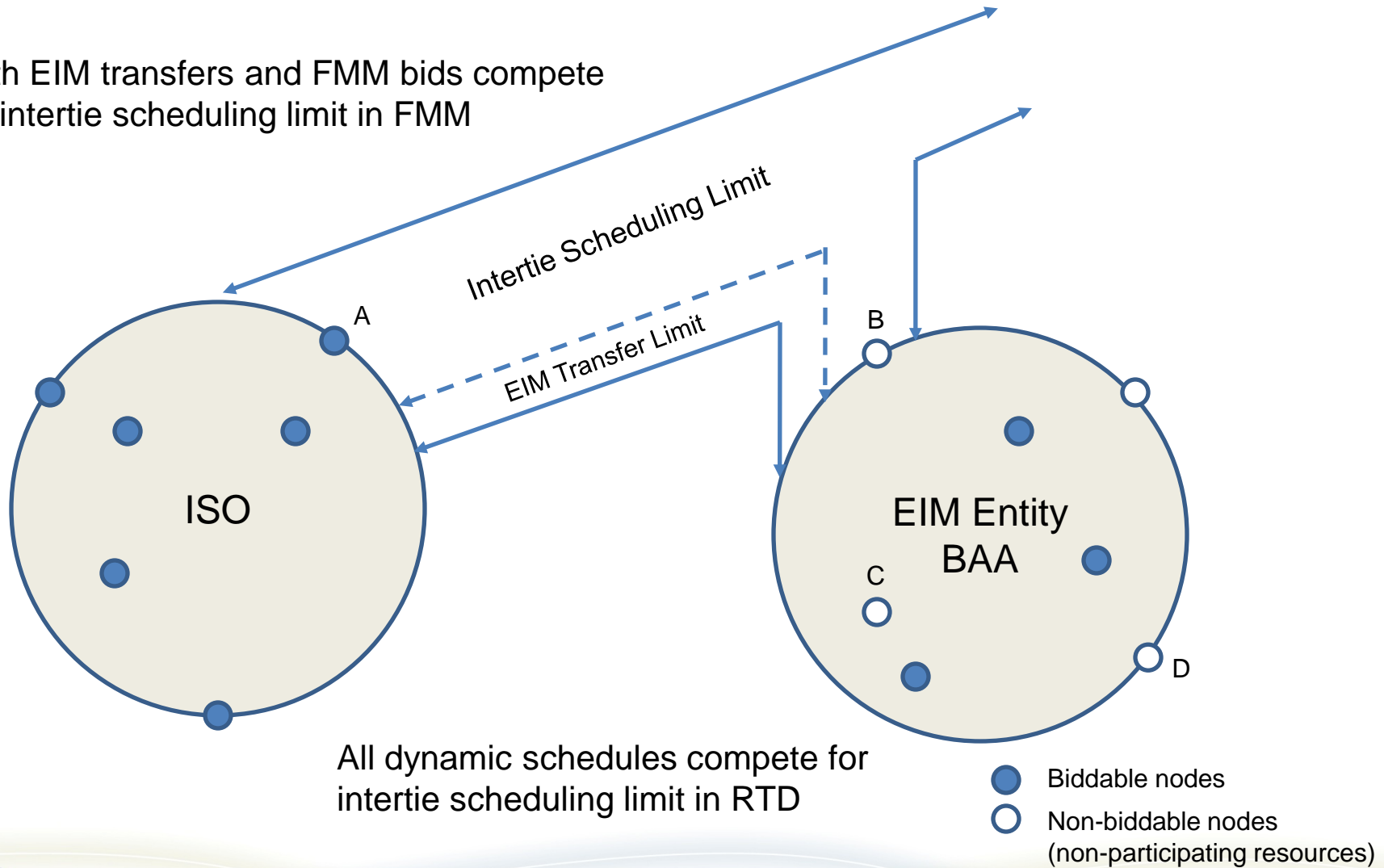
- See Appendix L of ISO Tariff
 - This methodology applies for any EIM external intertie
 - This methodology applies for any EIM internal intertie
- Intertie scheduling limit may be different than EIM transfer limit

Market optimization enforces intertie scheduling limit constraints in the import and export direction (1 of 3)

- **EIM External Interties (assume FMM economic bidding)**
 - Counterflows are allowed
 - Hourly energy schedules, FMM awards, dynamic transfer awards must be below scheduling limit in HASP, FMM, and RTD
- **EIM Internal Interties**
 - Counterflows are allowed
 - Hourly energy schedules, FMM EIM transfers, RTD EIM transfers must be below scheduling limit
- **Shared EIM External Interties and EIM Internal Interties**
 - Counterflows are allowed
 - Hourly energy schedules, FMM award, FMM EIM transfers, dynamic transfer awards, RTD EIM transfers must be below scheduling limit

Every transaction competes equally for intertie transmission capacity (2 of 2)

Both EIM transfers and FMM bids compete for intertie scheduling limit in FMM



Economic bidding at EIM external interties, market also observes the transmission profile of the tag

- In FMM, awards are limited by the minimum transmission profile tagged on any path outside the EIM footprint
- Tag must be created by T-40, prior to the start of the FMM for first 15-minute interval of the operating hour
- Energy schedules must be within the intertie scheduling limit
- Market operator updates the energy profile with FMM award

Propose to not allow real-time economic bidding at EIM internal interties

- Base schedules, including ISO day-ahead schedules deemed delivered
- If sourced within the EIM footprint, then bid in real-time market at the resource
- If source outside the EIM footprint, then bid at the EIM external intertie based upon the source/sink non-EIM BAA
 - Phase 2 full network model (FNM) is implemented on EIM external interties for EIM entities
 - Currently, only Phase 1 FNM is implemented on ISO interties with non-EIM BAAs (EIM external intertie)

Propose to require EIM entity allow FMM bidding after six months to one year of operational experience

- More accurate real-time bidding at actual resource or boundary of EIM footprint
- Allows effective transition period for EIM entity
 - Otherwise \$1000 or -\$150 intertie bids could be last economic in FMM
 - Should timing align with transition period?
- Increase market liquidity by allow more FMM bids

Real-time congestion offset is calculated for each BAA in the EIM footprint

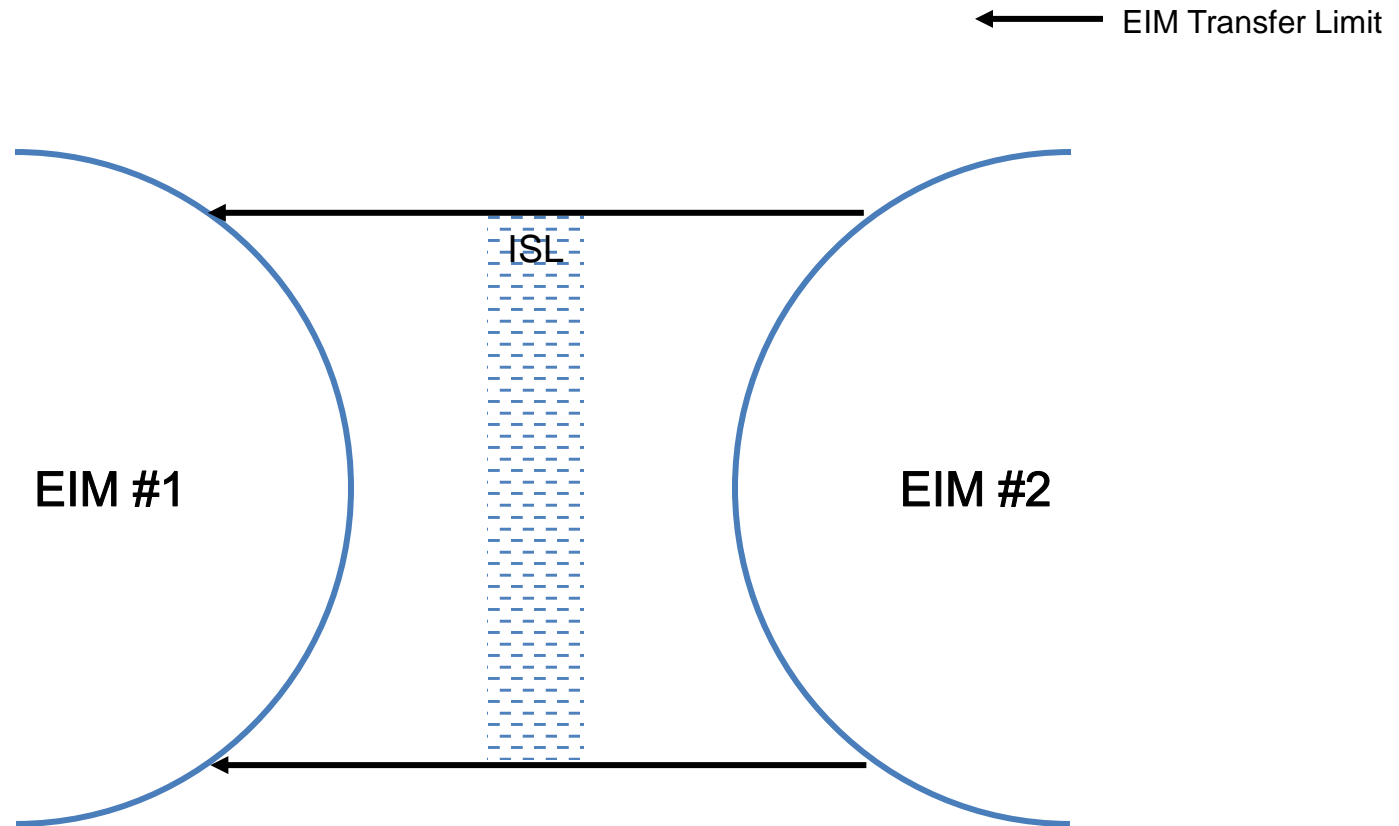
- To calculate a resource's impact on a constraint
 - Shift factor of resource is the impact on constraint
 - Shadow price of the constraint represents the change in congestion costs
 - Delta between meter and base schedule is the change in flow
 - The product of the shift factor, shadow price and change in flow is the RTCO by constraint
- Each BAA bears its own cost of infeasible schedules entering the EIM

Congestion on EIM transfer limits included in real-time congestion offset

- For EIM internal interties, the congestion is split 50/50 in to each BAA's real-time congestion offset
- Should there be different treatment for ...
 1. Transmission for EIM transfer to intertie scheduling point
 2. Transmission for EIM transfer across intertie scheduling point

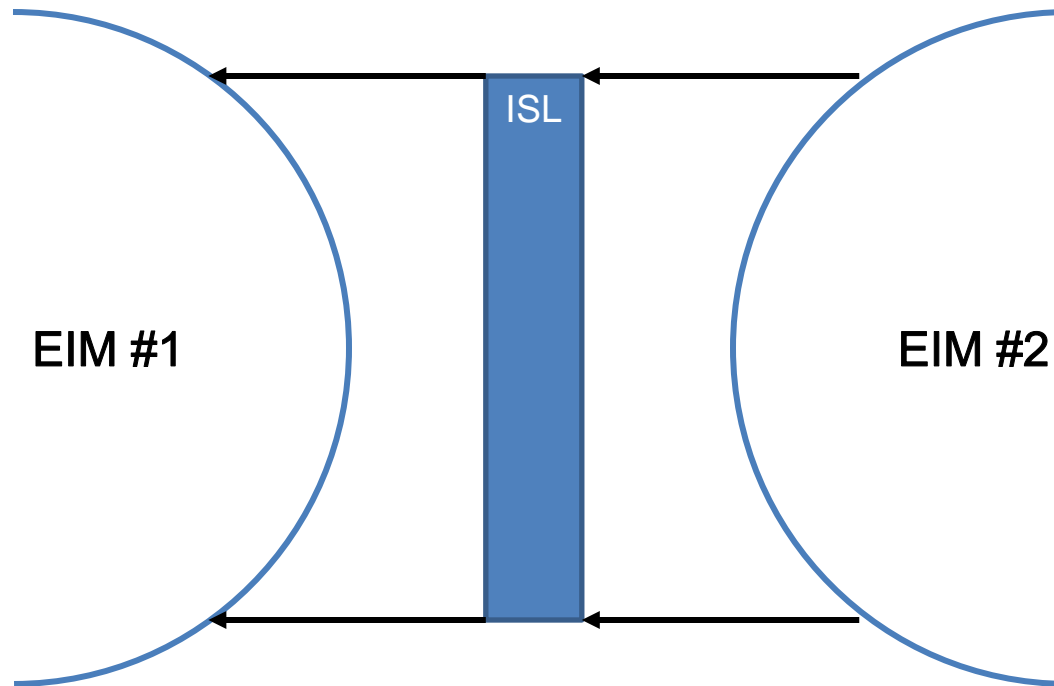
In which BAA is the constraint located?

Scenario 1 – EIM transfer limit = intertie scheduling limit, rights across intertie



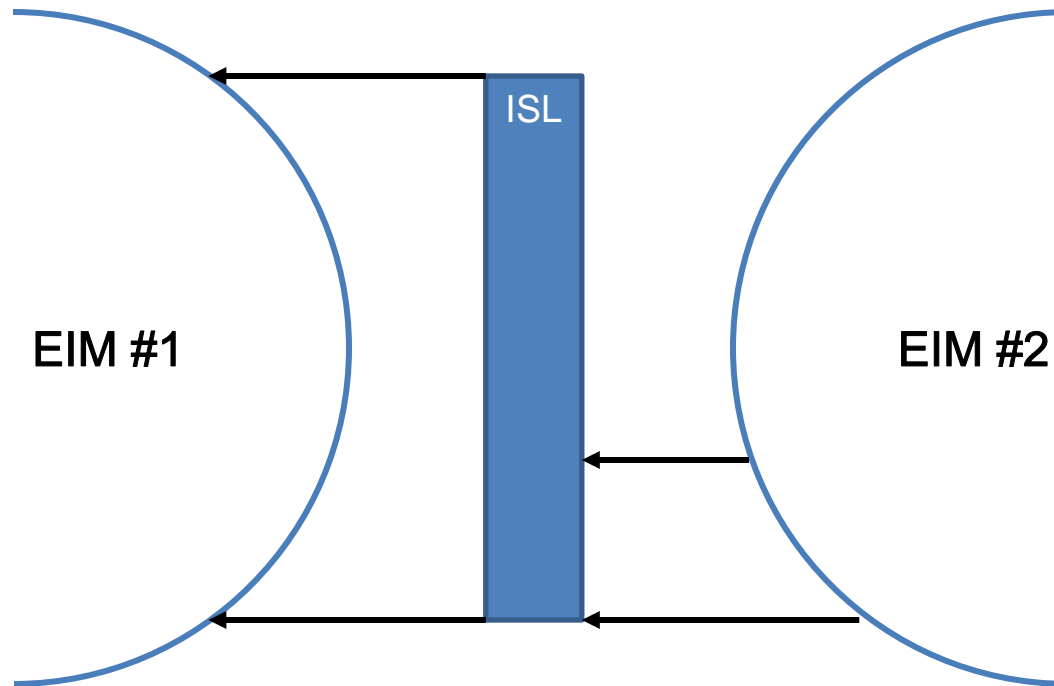
Congestion on EIM transfer limit shared between EIM #1 and EIM #2 RTCO

Scenario 2 – EIM transfer limit = intertie scheduling limit, rights to intertie



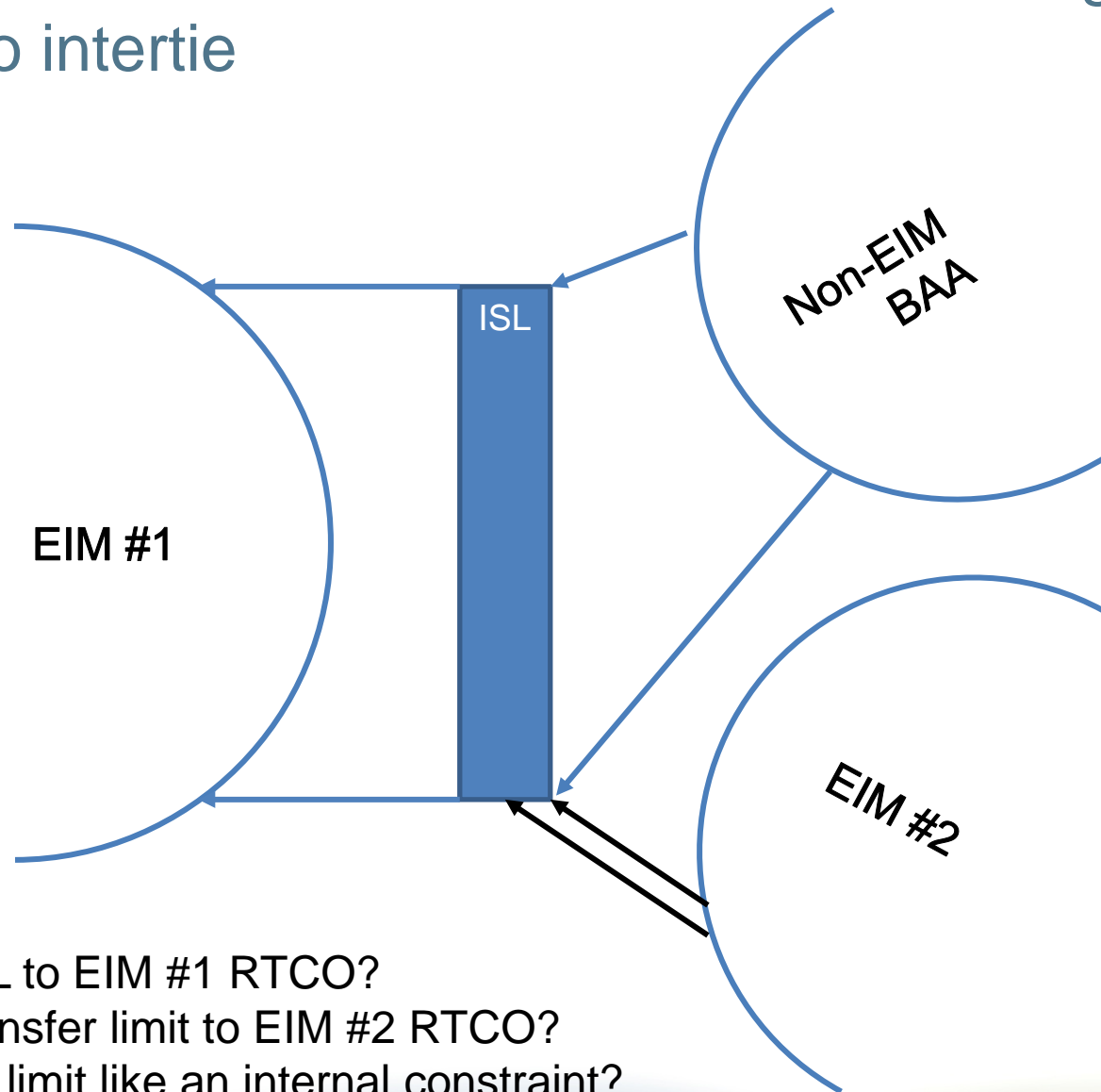
Should RTCO treatment be different from Scenario 1?

Scenario 3 – EIM transfer limit < intertie scheduling limit, rights to intertie



Why would EIM #2 have a transfer limit lower than ISL?
Should ISL go to EIM #1 RTCO, transfer limit to EIM #2 RTCO?

Scenario 4 – EIM transfer limit < intertie scheduling limit, rights to intertie



Congestion for ISL to EIM #1 RTCO?

Congestion for transfer limit to EIM #2 RTCO?

Is EIM #2 transfer limit like an internal constraint?

Scenario 4 exists with the current PacifiCorp implementation

- Currently congestion on EIM transfer is split 50/50
 - Existing rule for EIM internal intertie
- If ISL congestion, 100% to ISO RTCO
- Assume ISL MCC = \$1.00, EIM transfer MCC = \$10.00
 - Under current methodology for each MW EIM transfer,
 - ISO RTCO = \$6.00 ($\$1.00 + \$10.00/2$)
 - PAC RTCO = \$5.00 ($\$10.00/2$)
 - If EIM transfer limit considered internal to PAC,
 - ISO RTCO = \$1.00
 - PAC RTCO = \$10.00

ISO proposes to determine which BAA constraint is located as follows:

- EIM external intertie
 - 100% to the EIM BAA with which the intertie scheduling point is interconnected
- EIM internal intertie where intertie scheduling limit = total EIM transfer limit
 - 50% to each EIM BAA on each side of the EIM internal intertie
- EIM internal intertie where intertie scheduling limit > total EIM transfer limit
 - 100% of congestion revenue due to EIM transfer limit to the EIM entity tagging the EIM transfer
 - 100% of congestion revenue due to intertie scheduling limit to the EIM BAA managing the intertie scheduling point

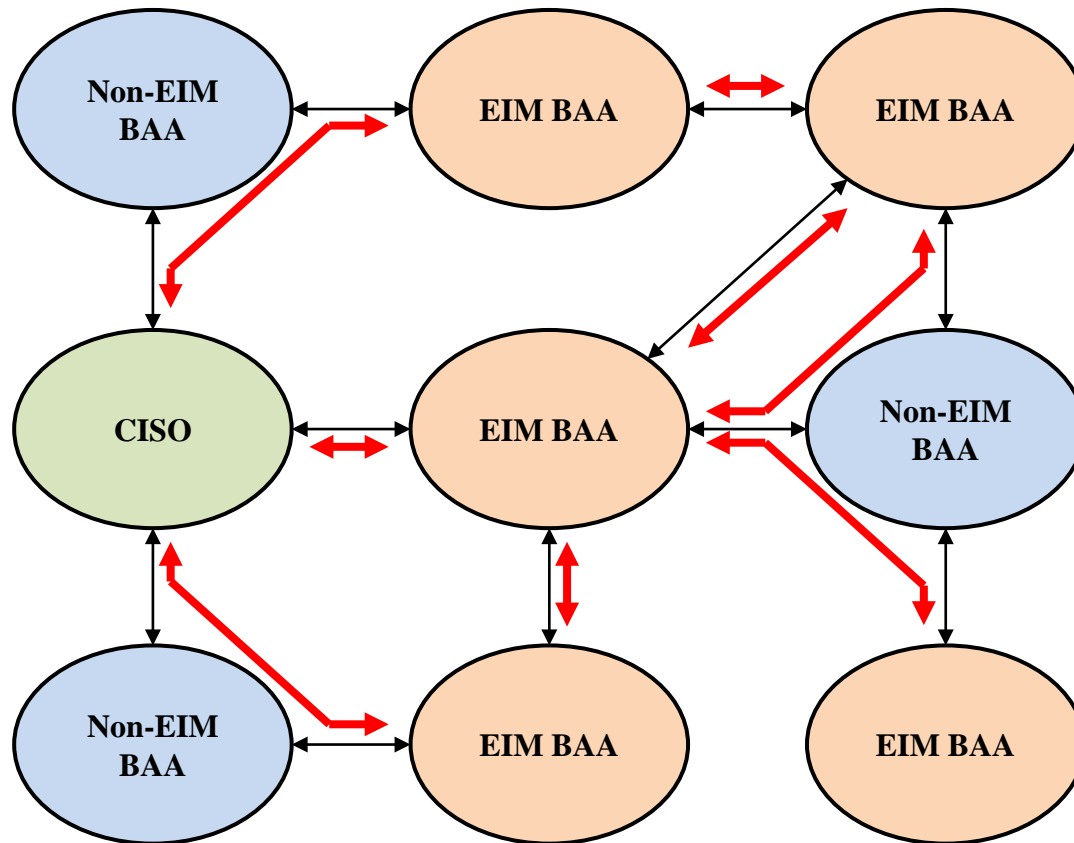
Market power mitigation of EIM transfer constraints into EIM BAAs

- Currently the ISO performs a structural competitive assessment for each joining EIM to determine if constraint should be mitigated
- As we discussed earlier, an EIM transfer constraint is similar to an internal constraint to the BAA
- Also, EIM transfer can be frozen if resource sufficiency evaluation
- Recommend subjecting the EIM transfer in constraint to LMPM in all cases

Compensation for third parties making capacity available to support incremental EIM transfers

- Utilize the changes to EIM transfer from Phase 1
- EIM transfer cost = compensation to third party
- Need mechanism to settle with third party
 - Direct with Market Operator
 - Indirect with EIM entity scheduling coordinator

EIM Transfer Constraints



Energy Transfer Schedule Definition

- Portion of the EIM transfer distributed to an intertie (or between tags on the same intertie) with another BAA in the EIM area for accounting and tagging
- Constrained by energy transfer limits
 - Limits reflect transmission rights released for EIM
 - Limits may be 15 min static (RTUC) and 5 min dynamic (RTD), or only 5 min dynamic (RTUC/RTD)
 - If using contractual rights, provided by EIM entity
 - If using ATC, calculated with priorities developed with EIM entity
- Constrained by scheduling limits (ISL/ITC) on interties with ISO or non-EIM BAAs

Energy transfer system resources

- Used to anchor the energy transfer schedules
- Used to identify energy transfer schedule tags
- Defined at the default generation aggregation point (DGAP) of an EIM BAA or non-EIM BAA
- Registered in pairs across interties:
 - In BAA₁ for export from BAA₁ to BAA₂ on intertie T
 - In BAA₂ for export from BAA₂ to BAA₁ on intertie T
- No imbalance energy settlement for transfers
 - The settlement is with resources in the EIM BAA

Transfer cost allows implementation of priority order of which tags to schedule EIM transfers

- Direct paths will have higher priority over indirect paths
- Paths that 5-minute scheduling is allowed on will have different priority over paths that only 15-minute scheduling is allowed on
- This cost can also be used to reflect the cost of using third party transmission for incremental transfer capability

Provide tariff authority to allow outage reporting to Peak RC by ISO for EIM entity

- EIM entities use ISO outage management system (OMS) to provide ISO with approved outages
- EIM entity has the option to use OMS for its customers to enter outage date
- By allowing the ISO to forward data to Peak Reliability Coordinator, eliminates the need for a redundant application for the EIM entity

Next steps

| Item | Date |
|---|--------------------|
| Stakeholder Conference Call | July 8, 2015 |
| Stakeholder Comments Due | July 22, 2015 |
| Post Analysis & Revised Straw Proposal* | August 5, 2015 |
| Stakeholder Meeting (Bellevue, WA) | August 12, 2015 |
| Stakeholder Comments Due | August 26, 2015 |
| Post Draft Final Proposal* | September 17, 2015 |
| Stakeholder Conference Call | September 24, 2015 |
| Stakeholder Comments Due | October 1, 2015 |
| One Year of Operational Data Available | November 1, 2015 |
| Board of Governors Decision* | November 5-6, 2015 |

Please submit written comments to EIM@caiso.com by July 22