



California ISO

Extended day-ahead market workshop

February 11-12, 2020

Agenda: Day 1 Resource Sufficiency Evaluation

Time	Topic	Presenter
9:00 – 9:10	Welcome	Kristina Osborne
9:10 – 10:00	CAISO Resource Sufficiency Principles	Don Tretheway George Angelidis James Lynn Greg Cook Brad Cooper
10:00 – 12:00	EIM Entities Resource Sufficiency Discussion	Mark Symonds Jeff Spires John Olson Justin Thompson Teyent Gossa
12:00 – 1:00	Lunch	
1:00 – 2:00	EIM Entities Resource Sufficiency Discussion	Same as above
2:00 – 3:00	CAISO Resource Sufficiency Discussion	Same as above
3:00 – 3:30	CAISO Transmission Design	Chris Devon
3:30 – 4:00	OATT Transmission Design	Sarah Edmonds

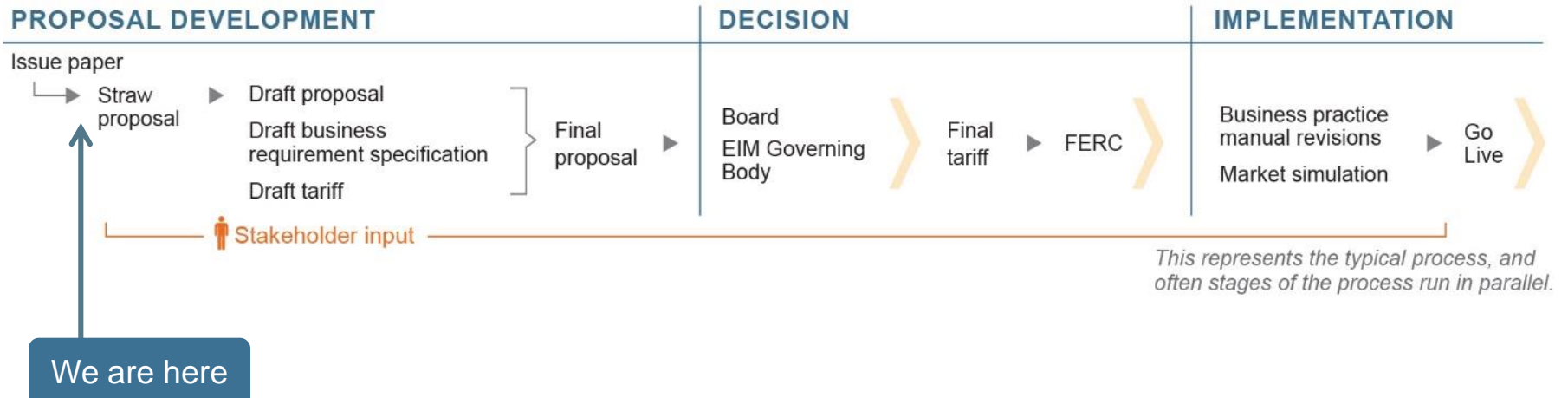
Agenda: Day 2 Transmission and Congestion Revenue

Time	Topic	Presenter
9:00 – 9:10	Welcome	Kristina Osborne
9:10 – 10:00	CAISO Transmission Principles	Don Tretheway George Angelidis James Lynn Greg Cook Brad Cooper
10:00 – 12:00	EIM Entity Transmission Discussion	Sarah Edmonds David Rubin Kevin Smith Kathy Anderson Russ Mantifel
12:00 – 1:00	Lunch	
1:00 – 1:45	CAISO Transmission Discussion	Same as above
1:45 – 2:30	CAISO Congestion Revenue Principles	Same as above
2:30 – 3:15	EIM Entity Congestion Revenue Discussion	Jeff Spires
3:15 – 3:50	CAISO Congestion Revenue Discussion	Same as above
3:50 – 4:00	Next Steps	Kristina Osborne

After completing a topic we plan to summarize discussion among stakeholders

- Areas of alignment
- Areas needing additional clarity
- Areas requiring additional discussion

ISO Policy Initiative Stakeholder Process



Bundle topics for workshops and reach solid straw proposal before moving to next bundle

- Bundle 1 – Resource Sufficiency Evaluation, Transmission Provision, Congestion Revenue
- Bundle 2 – Accounting for GHG costs, ancillary services, FNM Phase 2, EDAM administrative fee
- Bundle 3 – Price formation, convergence bidding, external resource participation, market power mitigation, other issues

Cadence proposed for workshop and straw proposal development

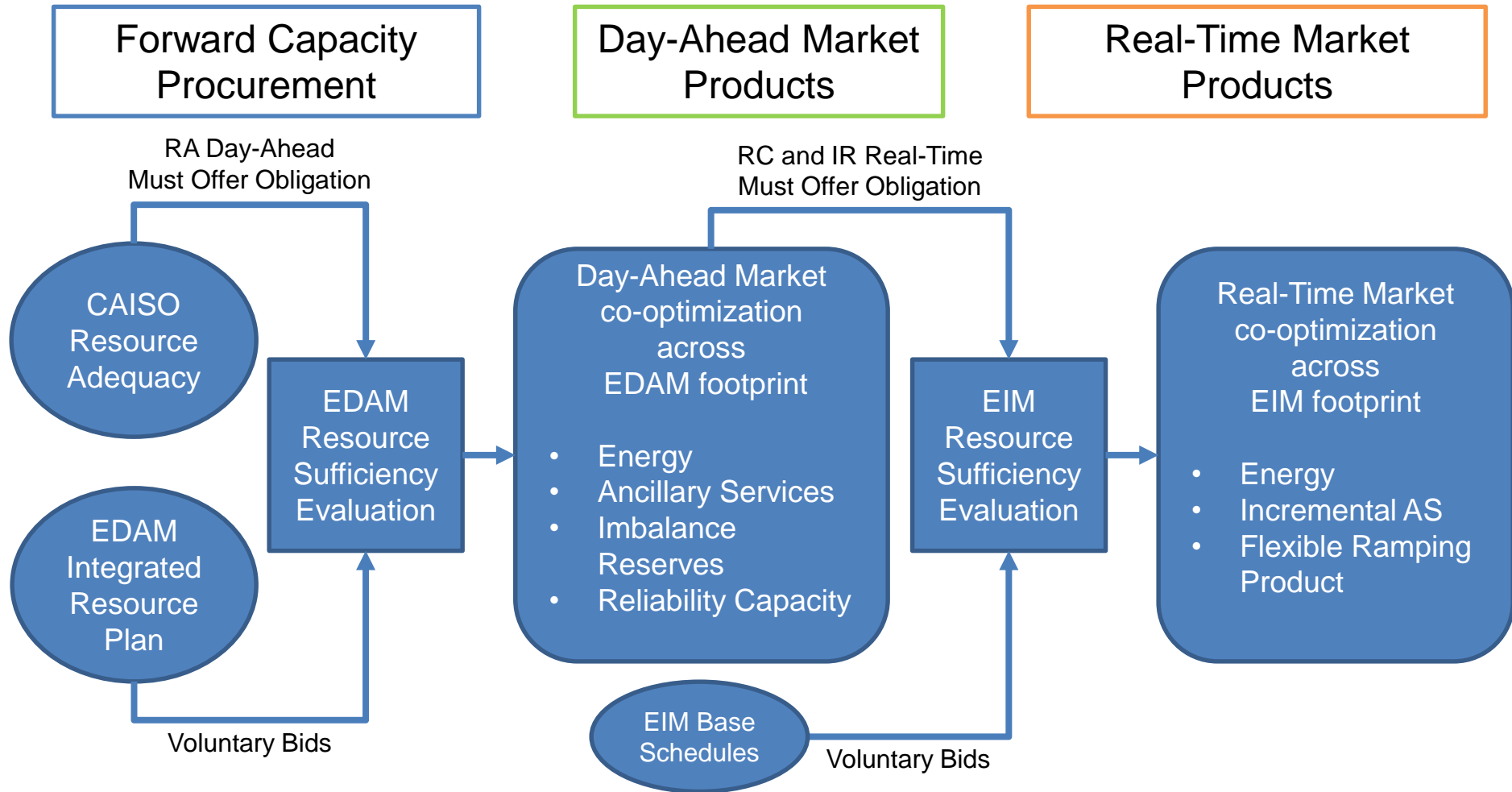
- Week 1 – Post workshop presentations
- Week 2 – Workshop
- Week 4 – Workshop comments due
- Week 8 – Straw proposal posted
- Week 9 – Stakeholder meeting
- Week 15 – Stakeholder comments
- Week 17 – Communicate if moving to next bundle or revised straw proposal

RESOURCE SUFFICIENCY EVALUATION PRINCIPLES

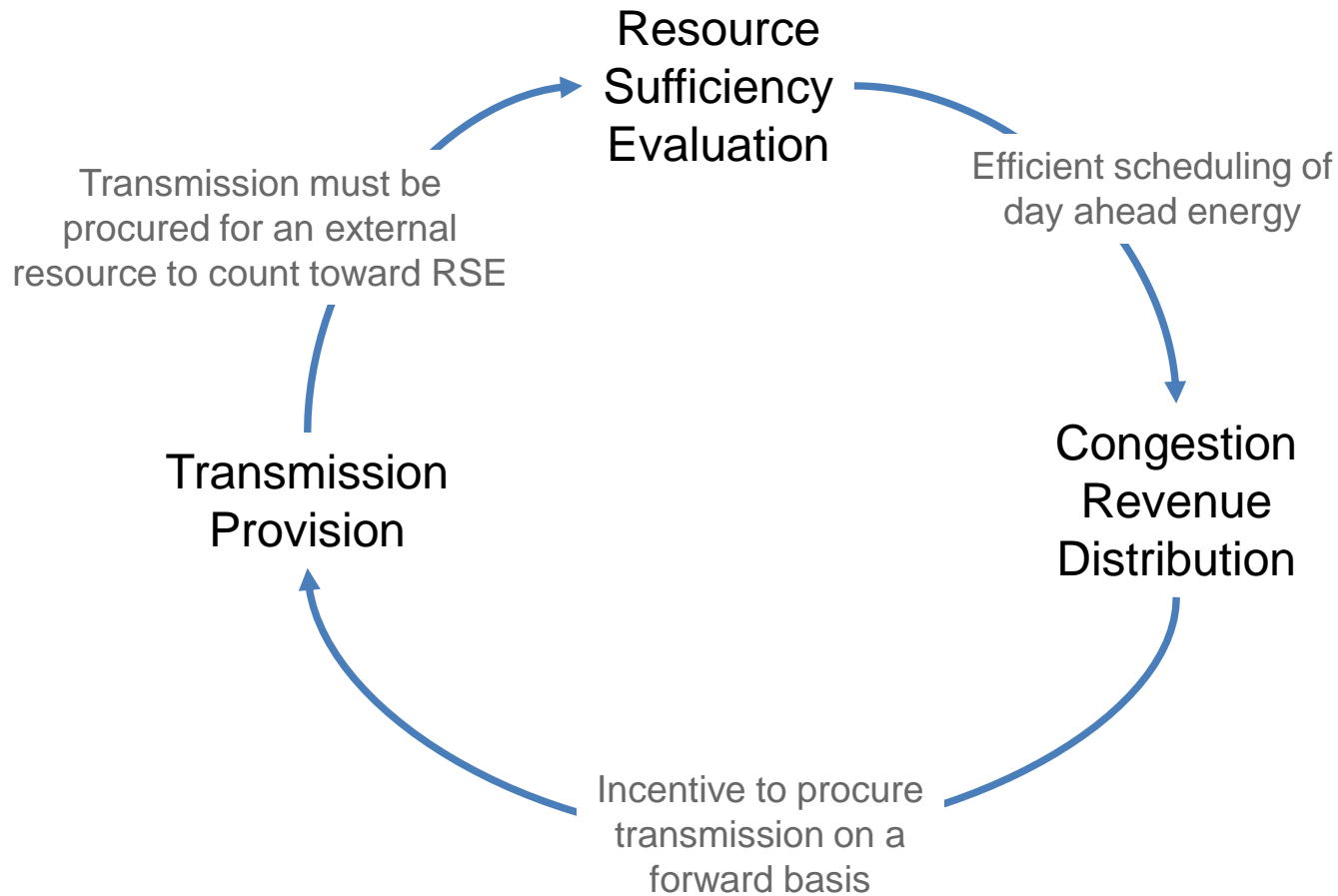
Extending the day-ahead market to EIM entities provides regional benefits

- Key principles:
 - Each balancing authority retains reliability responsibilities
 - States maintain control over integrated resource planning
 - Resource adequacy procurement decisions remain with local regulatory authority
 - Transmission planning and investment decisions remain with each balancing authority and local regulatory authority
 - Voluntary market, like EIM
- Key benefits:
 - Allows EIM participants to further reduce costs and gain market efficiencies
 - Day-ahead unit commitment and scheduling across a larger footprint provides diversity benefits and helps with renewable integration

Overview of RA, DAME, EDAM and EIM relationship with CAISO market runs



CAISO vision on how bundle 1 topics work together



CAISO proposed principles for EDAM resource sufficiency evaluation

1. Ensure all BAAs can **individually** meet their capacity, flexibility and transmission needs with equivalent quality of resources to share in diversity benefit
2. **Incent** making transmission and bid range available for optimal and efficient scheduling
3. Enable **forward trading** of capacity and flexibility while accurately accounting for resources
4. Apply transparent tests **equally** across EDAM and EIM footprint
5. Ensure feasible day-ahead schedules while each **BAA** remains responsible for its reliability and resource adequacy

RESOURCE SUFFICIENCY EVALUATION DESIGN DISCUSSION

Load and VER forecast in the proposed day-ahead market

- Load is economically bid or self-scheduled into day-ahead market unlike real-time market
- VER and load forecast come from an independent provider
- Under day-ahead market enhancements straw proposal,
 - Difference between cleared bid in load and forecast is reliability capacity up or down which has a real-time must offer obligation
 - VERs upper economic limit set to forecast
 - Uncertainty in net load forecast is covered by imbalance reserves which have a real-time must offer obligation

EDAM BAA has sufficient self-schedules and bids to independently meet its ...

- Bid-in demand
- Bid-in supply with ramp capability to meet 24 hour net demand variation
- 100% forecasted ancillary services
- Reliability capacity up/down (P50 load forecast)
- Imbalance reserve up/down (P95 net load) less diversity benefit

What does failing the day-ahead resource sufficiency evaluation mean?

- The BAA is short?
- For a given hour the BAA wants to wait until after day-ahead market to bilaterally contract for supply?
 - Still subject to the EIM resource sufficiency evaluation
- Other?

Need to answer in order to determine consequence of failure

Requirement transparency and advisory information

- Bids can be submitted 7 days prior to market closes
- Update independent load and VER forecast regularly
 - Every day, multiple time per day, etc
- Optimization ensures supply resource is deliverable considering internal congestion and dynamic ramp
- Is an offline optimization tool that mimics the market to check if BAA can pass resource sufficiency evaluation under range of load and VER scenarios being requested?

Self-schedules and economic bids that should count towards resource sufficiency evaluation (RSE)

- Supply to meet demand and upward flexibility
 - All internal generation
 - Trade bid range for capacity or flexibility from another EDAM BAA
 - RSE import schedule (not bids) from non-EDAM BAA
 - CAISO resource adequacy imports (modeled via FNM Phase 2)
- Increased demand and downward flexibility
 - Internal resource providing bid range to another EDAM BAA
 - Trade bid range for capacity or flexibility to another EDAM BAA
 - RSE export schedule (not bids) to non-EDAM BAA
 - CAISO resource adequacy exports (modeled via FNM Phase 2)

Economic bids that should not count towards resource sufficiency evaluation

- Virtual supply
- Virtual demand
- CAISO non-RA imports
- CAISO non-RA exports

Should apply similar rules in EIM for imports/exports

Trading capacity and flexibility between EDAM BAAs

- Trading bid range should change each BAAs obligation in resource sufficiency evaluation
 - Increases capacity requirement of source BAA and reduces capacity requirement of sink BAA
 - Increases imbalance reserve requirement (up or down) of source BAA and reduces requirement of sink BAA
- When discussing bid range is it at the resource level or the BAA level?

	BAA#1	BAA#2
BAA Imbalance Reserve Up Requirement (MW)	1000	150
BAA#1 Procures IRU Resource A		40
BAA#1 Procures IRU Resource B		50
BAA#1 Procures IRU Resource C		80
		170
BAA Imbalance Reserve Up Obligation (MW)	830	320

Contracting for resource sufficiency for capacity and flexibility between EDAM BAAs

- All bid range trades should pay transmission rates from source BAA to sink BAA boundary
 - Load in sink BAA has already paid for transmission from boundary
- Trades can occur up to T-75 of the operating hour

Export transmission must be available to capture the imbalance reserve down diversity benefit

- If insufficient RSE EDAM transfers out to capture diversity benefit, then should make additional transmission available in bucket 1
- CAISO anticipates it will need to make bucket 1 export capability available to capture the diversity benefit
- Only transmission in excess of the RSE should have a bucket 3 usage fee

Day-ahead energy and capacity schedules between EDAM BAAs should have same priority as meeting internal load

- In CAISO, if an export is linked to a non-RA resource it has a higher scheduling priority than a spot export not supported by non-RA resource
- An EDAM transfer out of the CAISO should have the same higher schedule priority as above
- What mechanism do OATT BAAs use to protect EDAM transfers into real-time?

EDAM BAAs should be held to the same real-time standards as EIM BAAs but benefit from EDAM schedules

- EIM BAA Only
 - **Feasibility:** Advises if unresolved congestion in base schedule
 - **Balance:** Determines if subject over/under scheduling penalties
 - **Capacity:** Sufficient economic bids to meet 15-minute load forecast. Freeze transfers for failure.
 - **Flexibility:** Sufficient ramping capability to meet 15-minute load forecast + flexible ramping product. Freeze transfers for failure.
- EDAM BAA:
 - **Feasibility:** N/A because day-ahead schedules resolved congestion
 - **Balance:** N/A because day-ahead schedules are balanced
 - **Capacity:** Same as above
 - **Flexibility:** Same as above

Summary of discussion among stakeholders

- Areas of alignment
- Areas needing additional clarity
- Areas requiring additional discussion

CAISO TRANSMISSION COST RECOVERY

TAC Enhancements Initiative overview and proposed modifications

- CAISO completed a SH initiative that reviewed the HV-Transmission Access Charge structure holistically
- Two major elements were reviewed:
 - Billing determinants
 - Existing TAC structure is billed on volumetric basis (MWh's)
 - Point of measurement
 - Use is currently measured at end use customer meters
- CAISO determined existing point of measurement is appropriate and has proposed changes to the billing determinant to incorporate a peak demand charge component (MWs)

TAC Enhancements modification impacts

- Addition of Coincident Peak Demand Charge component:
 - Aligns transmission system planning and cost causation with rate design, and better reflects customer usage and beneficiaries' pay cost allocation principle
- Impacts to wheeling access charge:
 - Current volumetric MWh wheeling charge will be reduced – component of overall revenue requirement that will be recovered through the new demand charge component will not be included in the HV-wheeling access charge rates
- Peak demand charge TRR component will be determined through annual system load factor calculation:
 - Between 45-55% system load factors have been observed over the previous 5 years of historic data that was reviewed
 - Resulting HV-WAC rates will be ~45-55% of current HV-WAC rates (\$12.4522/MWh currently, change will provide a reduction in HV-WAC to ~\$5.60-\$6.85/MWh)

TRANSMISSION PROVISION PRINCIPLES

CAISO proposed principles for EDAM transmission design

1. **Maximize** transmission system usage while respecting long term scheduling rights and other contractual arrangements
2. Support **efficient** transmission **investment** while maintaining local control over transmission planning and investment decision
3. Incent transmission availability while maintaining **voluntary** participation
4. **Maximize efficient** scheduling of energy and reserves
5. **Complementary** to bilateral trading and provide additional **transparency** to improve forward resource planning

TRANSMISSION PROVISION DESIGN DISCUSSION

Transmission to pass RSE is not a marginal cost to consider when efficiently scheduling energy

- Transmission should be considered a sunk cost
- Transmission investment decisions are generally made to serve demand (load and long-term exports/wheels)
- Transmission costs are normally allocated to demand under the regulatory authority that approved transmission investment
- Transmission is typically built to meet peak demand, not average usage
- Short term exports/wheels can offset costs when transmission not used to serve native peak demand
 - This transmission can have marginal cost included in energy

Bucket 3 usage charge should incentivize forward contracting with the most efficient resources

- Forward contracted external resources used for resource sufficiency evaluation pay pancaked transmission
- If transmission procured in monthly timeframe, then eligible for receiving the congestion rents
- Day-ahead market may determine it is more economic to schedule different external resources and pay incremental usage charge for transmission
- If those different external resources were forward contracted in the future, would pay pancaked transmission and receive congestion rents

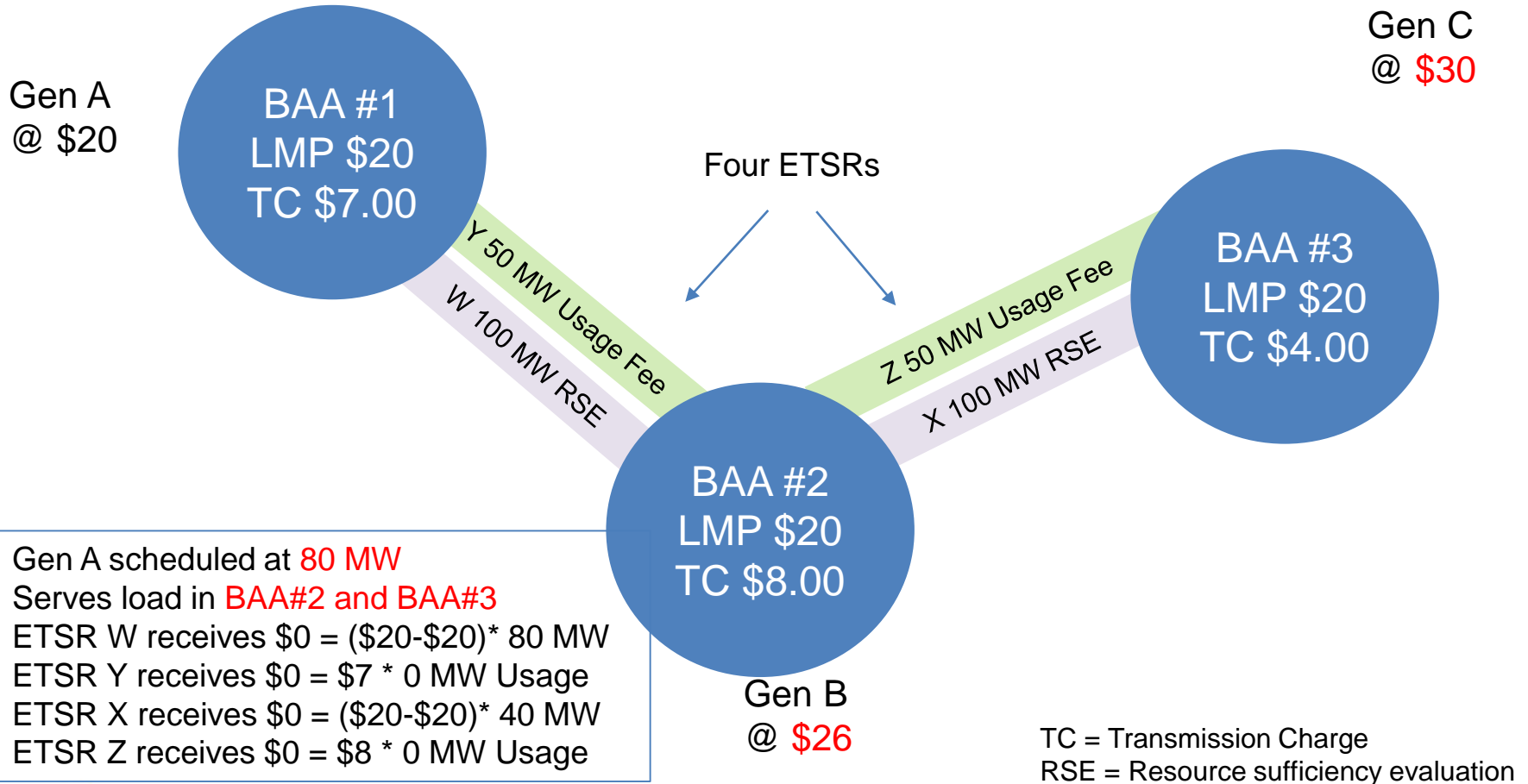
Bucket 3 transmission can also be used to compensate for incremental use above 1 and 2

- Consistent incentive for forward contracting between day-ahead market and real-time market
- Market may determine it is more economic to schedule a different external resource and incur transmission charge
 - If bucket 3 transmission cost not in the market, may be lower cost to schedule a higher cost generator and not pay transmission
- Charging different transmission rate forward market, day-ahead market and real-time market can lead to leaning on transmission by not forward contracting with the lowest cost resources, internal or external, to serve BAA load

Are net wheeling charges needed?

- Is it needed across all transmission buckets or just certain ones?
- Is the cost included in the market optimization or not?
- Is it a common wheeling charge across BAAs?

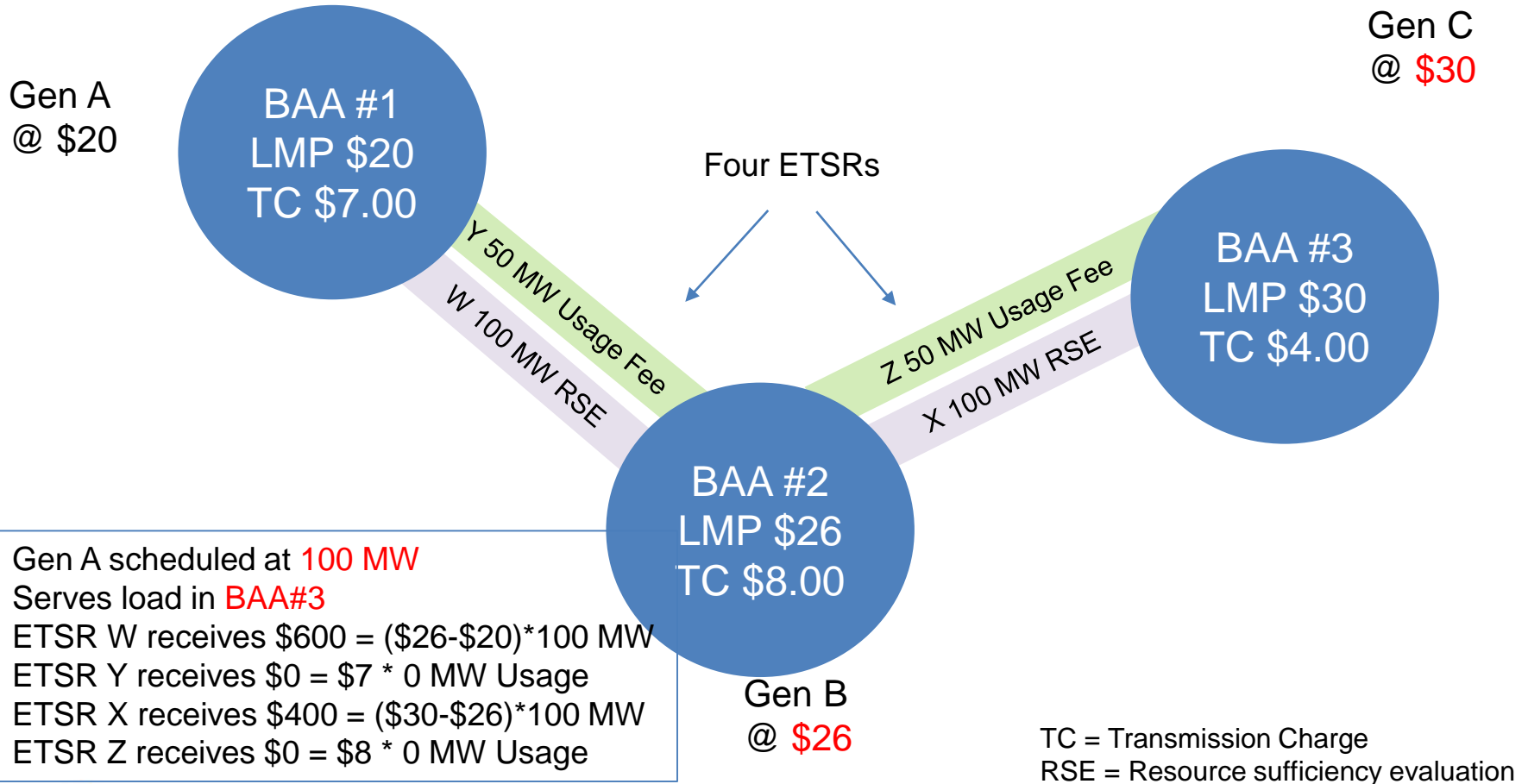
Transmission made available above what is needed to pass the RSE can be compensated when transfer is economic (1 of 4)



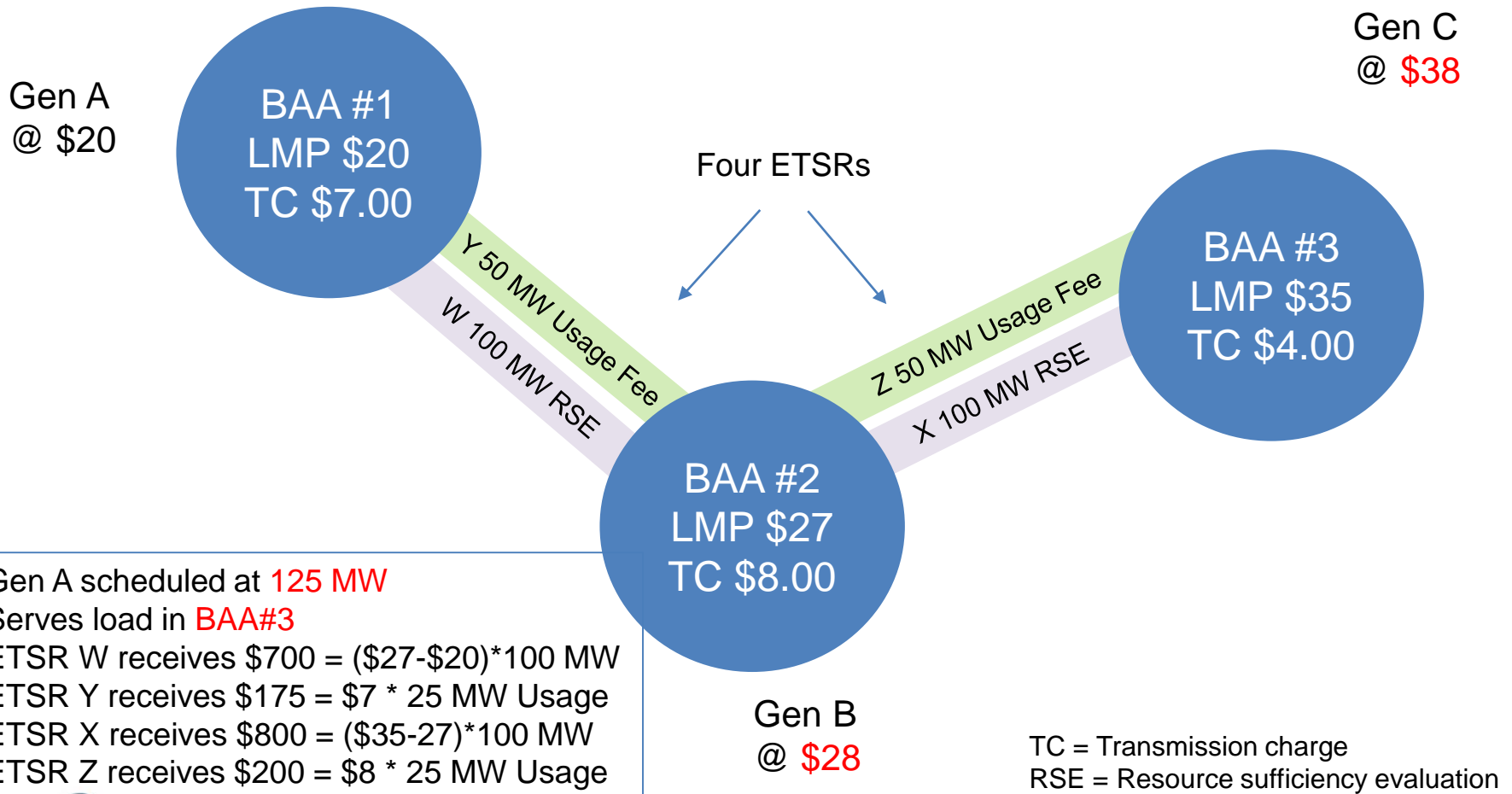
Gen A scheduled at **80 MW**
 Serves load in **BAA#2 and BAA#3**
 ETSR W receives \$0 = (\$20-\$20)* 80 MW
 ETSR Y receives \$0 = \$7 * 0 MW Usage
 ETSR X receives \$0 = (\$20-\$20)* 40 MW
 ETSR Z receives \$0 = \$8 * 0 MW Usage

TC = Transmission Charge
 RSE = Resource sufficiency evaluation

Transmission made available above what is needed to pass the RSE can be compensated when transfer is economic (2 of 4)



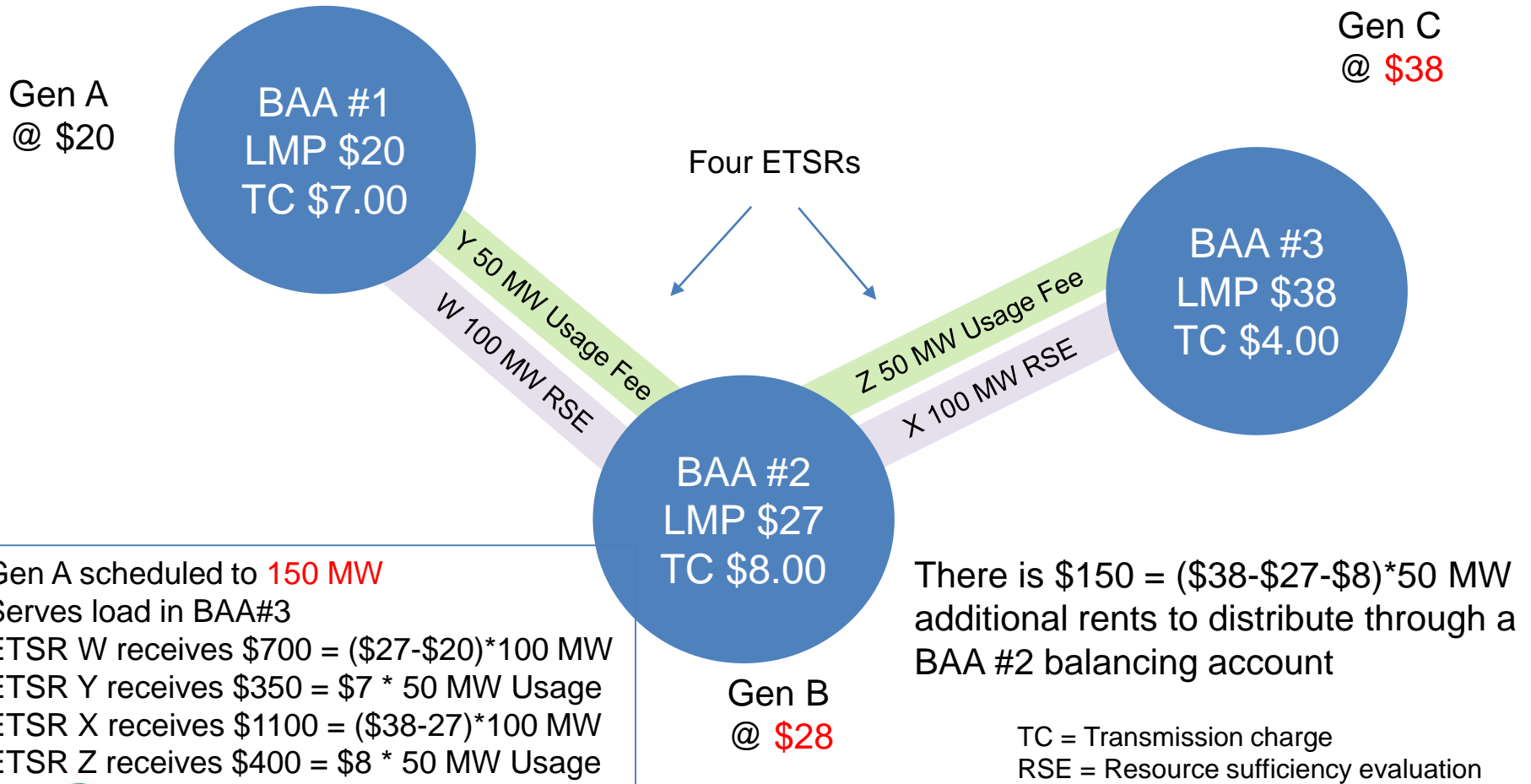
Transmission made available above what is needed to pass the RSE can be compensated when transfer is economic (3 of 4)



Gen A scheduled at **125 MW**
Serves load in **BAA#3**
ETSR W receives \$700 = $(\$27 - \$20) * 100$ MW
ETSR Y receives \$175 = $\$7 * 25$ MW Usage
ETSR X receives \$800 = $(\$35 - \$27) * 100$ MW
ETSR Z receives \$200 = $\$8 * 25$ MW Usage

TC = Transmission charge
RSE = Resource sufficiency evaluation

Transmission made available above what is needed to pass the RSE can be compensated when transfer is economic (4 of 4)



CAISO existing design to recognize long term contractual rights: What are TORs and ETC?

- TOR – a transmission owner that has not turned over operational control of their transmission, but the transmission is in the CAISO BAA
- ETC – a contract for transmission service that existing as of 3/31/1998 that encumbers transmission that has been turned over to CAISO operational control.

How to manage transmission rights from bilateral trades without limiting physical transmission in day-ahead and real-time market

Current design TORs and ETCs in the day-ahead market

- Submit self-schedules of energy between source and sink location
 - Self-schedule type of “ETC or TOR” with relevant contract reference number
- Day Ahead Schedule are settled at relevant IFM LMP
- SIBR shall validate that day ahead balanced TOR/ETC quantities
- Receives a congestion credit for balanced TOR/ETC quantities up to their rights
 - “the perfect hedge”

Current design TORs and ETCs in the real-time market

- Submit real time self-schedules of energy self-schedule type “ETC or TOR”
- FMM IIE shall reflect any incremental or decremental energy from Day Ahead Market and paid or charge at relevant FMM LMP
- RTD IIE shall reflect any incremental or decremental energy from FMM Schedule and paid or charge at relevant RTD LMP
- Receives a congestion credit of the post-day ahead market balanced TOR/ETC quantities
 - “the perfect hedge”

Current design of TORs and ETC cost causation allocation

- ISO shall calculate a final balanced TOR/ETC quantities based upon submitted meter data and deemed delivered interchange schedules
- Dependent upon the cost causation principles, the final balanced TOR/ETC quantities may be excluded for allocation
 - Examples:
 - Real Time Imbalance Energy Offset
 - Real Time Market Bid Cost Recovery Allocation

Potential regional transmission charge for spot (non-RSE) imports and exports with BAAs not in EDAM footprint

- Is an EDAM footprint transmission charge needed for spot (non-RSE) exports?
 - Transactions at the boundary may have wheeled through other BAAs in EDAM, not just the outer BAA
- Is an EDAM footprint transmission charge needed for spot (non-RSE) imports?
- Address in bundle 3 when we discuss external resource participation

Summary of discussion among stakeholders

- Areas of alignment
- Areas need additional clarity
- Areas requiring additional discussion

CONGESTION REVENUE PRINCIPLES

CAISO proposed principles for congestion revenue distribution

1. Allocate **revenues** to those long term exports and internal **transmission customers** who are paying for the long term investment in transmission
2. Distribute revenues **equitably** to support flexibility of meeting transmission customer needs with EDAM **transmission buckets**
3. Incent long term **forward procurement** of transmission for resource sufficiency evaluation
4. **Respect** long term traditional bilateral scheduling **rights**
5. Provide **accurate accounting** of congestion revenues between BAAs in the EDAM

CONGESTION REVENUE DESIGN DISCUSSION

Paradigm for congestion rents moves from BAA level to transmission customer

- **EIM: Real-Time Congestion Offset**
 - Cost allocation to demand
 - Neutrality cost when unresolved congestion in base schedules
 - Split revenues between BAAs when congestion rents occur from optimal dispatch
- **EDAM: Congestion Revenue Distribution**
 - Over-collection by the day-ahead market
 - Revenues should be distributed to transmission customer based upon their forward contracted generation
 - Provides hedge against day-ahead congestion

EDAM and EIM transfers between BAAs should be settled as import to sink and export from source

- Congestion rents from generator to export point should be provided to transmission customer who forward contracting with external generation to where its load is served
- Congestion rents from import to load aggregation point should be provided to same transmission customer forward contracting with external generation
- Even through two BAAs, the transmission customer is hedged against congestion from its generator to its load
- Can different congestion revenue distribution rules in BAAs negatively impact forward contracting?

CAISO CRR Allocation – Out of Balancing Authority Area Load Serving Entities (OBAALSE)

- OBAALSEs can participate in the allocation process. Similar approach could be used between EDAM BAAs.
- Subject to slightly different rules from internal LSEs
 - Source locations are always contract verified
 - CRR Sink locations are at the scheduling point where load leaves the CAISO BAA
 - Eligible quantities are determined based on historical usage and load meter data
 - OBAALSE must pre-pay Wheeling Access Charges up to the eligible amounts being requested
 - The load for which the CRRs are being requested must be subject to CAISO congestion, i.e. OBAALSE does not hold ETCs or TORs

CAISO CRR allocation process for CRR Year One is an approach for initial distribution to transmission customers

- Source and Sink verification will be performed
- Annual eligibility will be based on historical load at the appropriate sink location
 - If sink locations are new then process to convert historical load will need to be done
- Monthly eligibility is based on Resource Adequacy forecast load data
 - RA or some similar comparison will need to be decided on
- Verify ETC/TOR contract paths
 - Identifying contract paths if rights are network service-like rights can be complex
- Limitation on eligible quantity in the long-term allocation for CRR Year One

In subsequent years, priority nomination process and load migration process re-align CRR allocation

Timeline/eligibility needs to be aligned between CAISO CRR and EDAM congestion revenue distribution

- Exports supporting RSE that are procured in the annual/monthly timeframe should receive congestion revenue
- Export supporting RSE that are procured daily/hourly should not receive congestion revenue
 - Is the transmission charge lower because doesn't receive congestion revenue?
- Spot (non-RSE exports) should never receive congestion revenue

Approaches to distribute congestion revenues

- CAISO Congestion Revenue Rights Allocation
 - Annual/monthly process
 - Transmission customers nominate source sink pairs
 - Simultaneous feasibility test
- Transmission sales to customers
 - Point to point similar to source sink pairs
 - How would source sink pair be determined for network service?
 - Is there a simultaneous feasibility test?
 - If transmission oversold, could use CRR 1B approach
- Allocation and sale of congestion hedging instruments up to each BAA/transmission provider

Each BAA should have its own congestion revenue balancing account

- Similar to the real-time congestion offset in EIM the balancing account is allocated to BAA demand
- Can isolate revenues and charges that are BAA driven
 - Perfect hedge for TORs/ETCs
 - Decision/impact of CRR auction can be isolated to each BAA
 - CRR 1B change minimizes revenue insufficiency if a BAA over allocates rights to congestion revenue
- Allows easier entry/exits of a BAA because remapping of congestion hedges easier

Summary of discussion among stakeholders

- Areas of alignment
- Areas need additional clarity
- Areas requiring additional discussion

NEXT STEPS

Next steps

Date:	Activity:
February 11-12, 2020	Workshop #1 – Topics: Transmission provisions, resource sufficiency evaluation, congestion rents
February 26, 2020	Comments due – workshop #1 presentations and discussion
March 25, 2020	Post straw proposal – workshop #1 topics only
April 2, 2020	Stakeholder meeting – straw proposal #1
May 14, 2020	Comments due – straw proposal #1

Submit comments to initiativecomments@caiso.com.