



# EDAM

## EXTENDED DAY-AHEAD MARKET

### EDAM Revised Straw Proposal – Stakeholder Meeting

September 7, 2022



California ISO

# Reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO permission.
- If you need technical assistance during the meeting, please send a chat to the event producer.

Thank you for joining us, and we look forward to an engaging discussion.

# DAY 1 AGENDA

Time	Topic
1:00 - 1:15	Welcome and overview
1:15 - 1:30	WEIM Governance Review Committee update
1:30 - 3:00	Western Resource Adequacy Program and the EDAM coordination
3:00 - 3:15	Break
3:15 - 5:00	Continuation of EDAM revised straw proposal walk through
5:00 - 6:30	Networking reception

# DAY 2 AGENDA

Time	Topic
8:00 - 9:00	Continental breakfast
9:00 - 12:00 <i>*Break at 10:30</i>	Continuation of EDAM revised straw proposal walk through
12:00 – 1:00	Lunch
1:00 - 4:50 <i>*Break at 2:30</i>	Continuation of EDAM revised straw proposal walk through
4:50 - 5:00	Next steps and closing remarks

# EDAM

## Welcome & Opening Remarks

Mark Rothleder, *Senior Vice President and Chief Operating Officer*



California ISO

# WESTERN ENERGY IMBALANCE MARKET (WEIM)

## WEIM Governance Review Committee Update

Extended Day-Ahead Market Revised Straw Proposal  
September 7, 2022



# Governance review timeline

July

- July 15 – published straw proposal
- July 20 – GRC public meeting

Aug-Sept

- August 15 – straw proposal comments due
- August 29 – GRC public meeting to discuss stakeholder comments
- September – GRC work to refine proposal

We are here

Oct-Dec

- Late October – issue revised proposal
- December – issue final proposal
- December – bring to WEIM GB and BOG for decision with EDAM market design proposal

# GRC is working to develop a revised proposal based on stakeholder comments and feedback

- *Delegation of Authority – type, scope, decisional classification, dispute resolution*
- *Stakeholder Engagement – working groups, RIF roundtable, RIF CA & PIO sector liaisons*
- *WEIM Governing Body – size, qualifications, compensation*
- *When governance changes should take effect*
- *ISO Board of Governors Bylaws*



# WEIM Governance Review Committee - members

Michele Beck	Utah Office of Consumer Services
Tony Braun	Braun Blaising & Wynne, PC
Suzanne Cooper	Bonneville Power Administration
Eric Eisenman	Pacific Gas and Electric Company
Angelina Galiteva*	California ISO Board of Governors
Therese Hampton	Consultant representing public power
Jeff Nelson	Southern California Edison
Amanda Ormond	Ormond Group LLC
John Prescott*	WEIM Governing Body
Pam Sporborg	Portland General Electric
Commissioner Letha Tawney	Body of State Regulators
Rob Taylor	Salt River Project
Rebecca Wagner	Independent consultant
Cameron Yourkowski	EDP Renewables

\* *non-voting member*

# EDAM

## Western Resource Adequacy Program (WRAP) and the EDAM Coordination

Sarah Edmonds, *President & CEO, Western Power Pool*

Mark Rothleder, *SVP & COO, California ISO*

Mike Wilding, *VP, Energy Supply Management, PacifiCorp*



California ISO

# EDAM

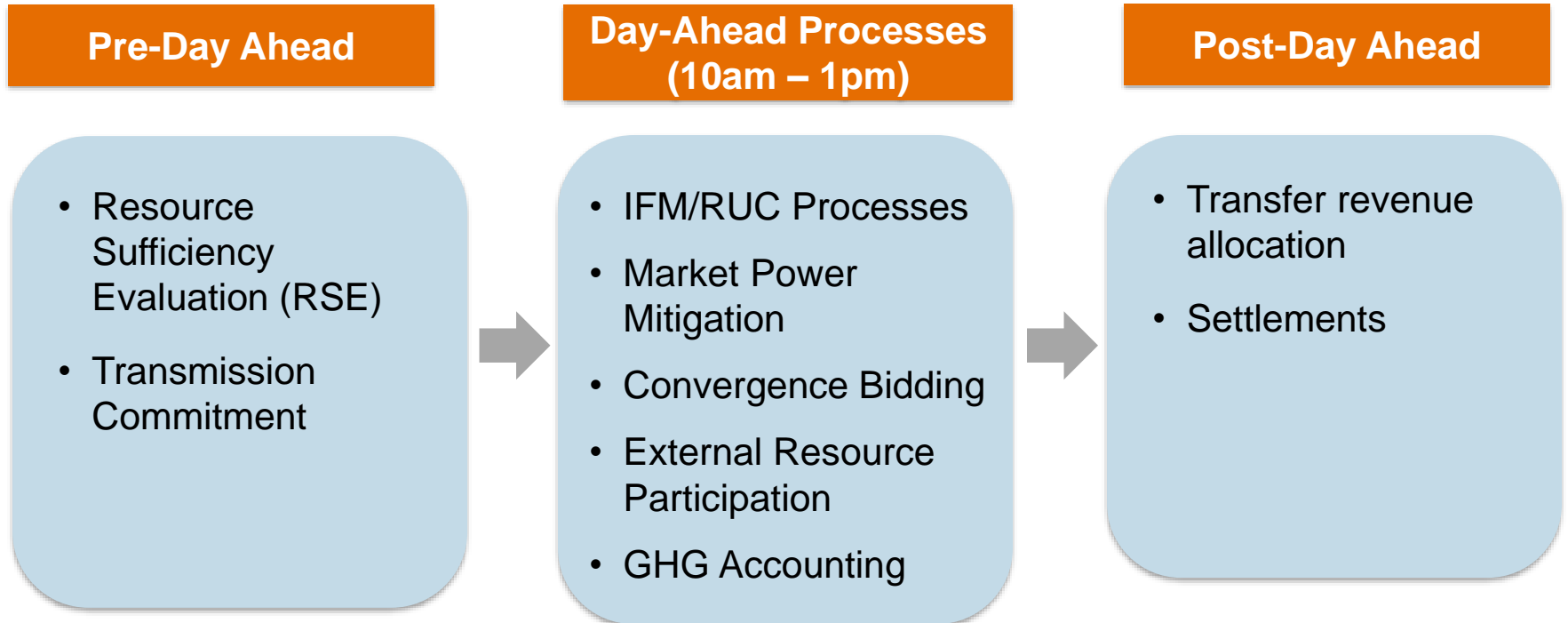
## EDAM Straw Proposal Walkthrough – Processes and Activities

Milos Bosanac, *Regional Markets Sector Manager, Market  
and Infrastructure Policy*



California ISO

# EDAM design components – an overview



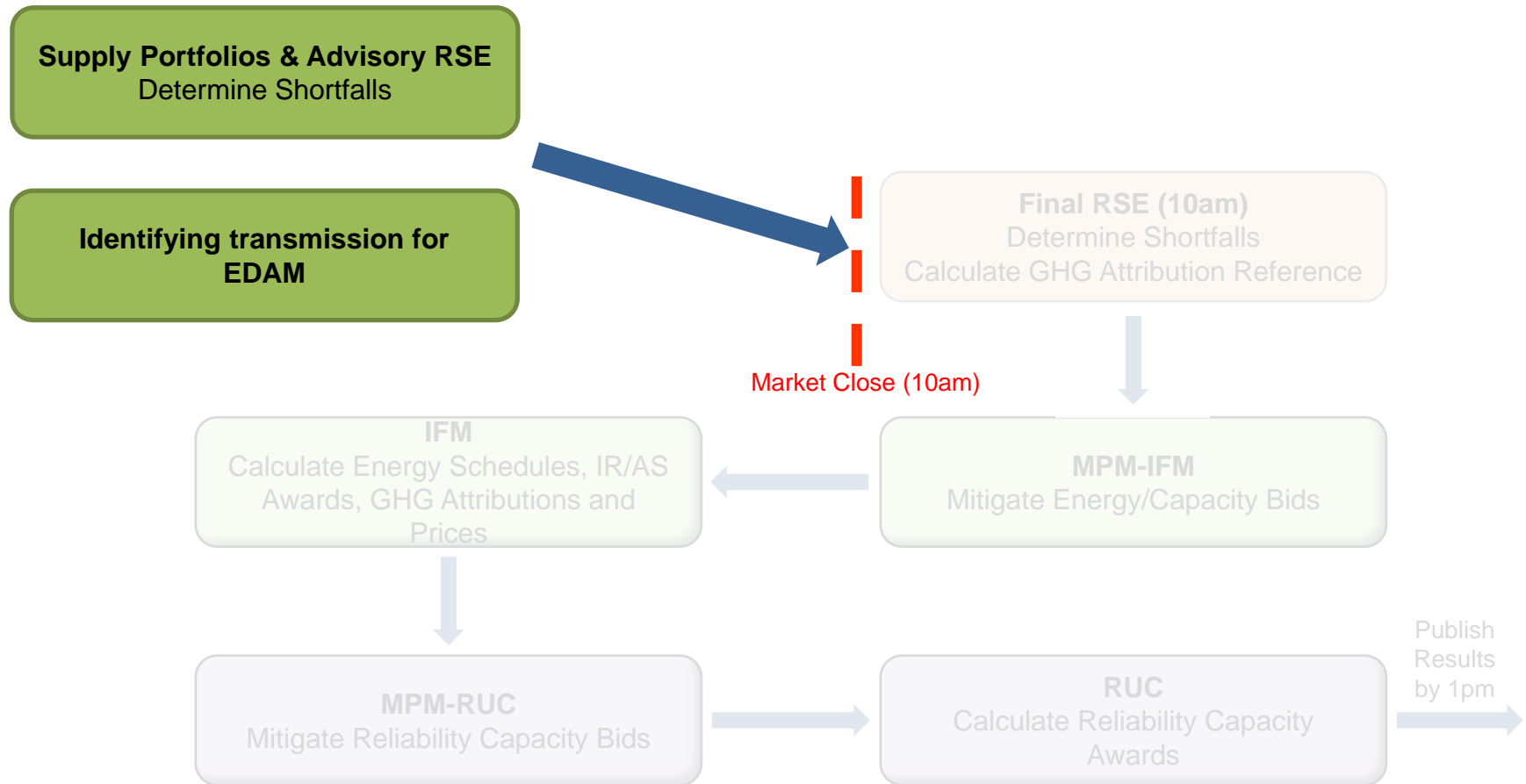
# EDAM

## *Pre-Day Ahead Market Activities*



California ISO

# Pre-Day Ahead Market Close Processes



# EDAM

## *Pre-Day Ahead Market Activities: Transmission Availability to EDAM*

*Partha Malvadkar, Principal, RA, Infrastructure, and Grid  
Enhancements, Market and Infrastructure Policy*



California ISO

# EDAM Transmission Framework

## Bucket 1 Transmission

- Firm or Conditional Firm transmission rights
- Supports delivery of supply across EDAM interfaces for RSE purposes
- Made available by Transmission Customer by 9 a.m. (day-ahead)
- Receives transfer revenue

## Bucket 2 Transmission

- Firm or Conditional Firm transmission rights
- In excess of transmission needed to support RSE
- Made available by Transmission Customer by 10 a.m. (day-ahead)
- Receives transfer revenue

## Bucket 3 Transmission

- Unsold Firm ATC
- Made available by Transmission Provider by 10 a.m. (day-ahead)
- Cost recovery through historical TRR recovery in EDAM
- Receives transfer revenue



# Transmission Rights Respected in EDAM

- The EDAM will support exercise of OATT transmission rights in the day ahead market held by transmission customers.
  - To the extent transmission rights are not exercised, those would be made available to the market (but could be exercised in real-time).
  - These could also be released to the market ahead of the day ahead market (pathway 2 discussed later).
- Legacy transmission contracts (pre-OATT) can continue to be exercised under the terms of the agreement.
  - Coordination between transmission provider and contract holder.
  - Depending on terms of agreement, these could potentially be made available to the market.

# Bucket 2 – Customers' Transmission Rights

- Transmission customer use of transmission rights:
  - *Pathway 1* – can utilize transmission rights by 10am, day ahead.
    - Receive day ahead transfer revenue through EDAM entity.
  - *Pathway 2* – can release the transmission rights to EDAM by 6am.
    - Receive transfer revenue from ISO directly.
    - Can continue to self schedule or economically bid in real-time (but not associated with use of transmission rights)
    - Limited to long term rights
  - *Pathway 3* – unscheduled transmission (by 10am) is made available to EDAM.
    - Can exercise previously unscheduled rights between day ahead and real time.
    - Accommodate exercise of rights if feasible (i.e., derates, market infeasibility).
    - Day ahead transfer revenue (associated with unscheduled transmission) settled with EDAM entity who may net out uplifts associated with exercise of rights.
- Legacy transmission contracts (pre-OATT) can continue to be exercised under the terms of the agreement.
  - Pathway 2 may be available based on terms of agreement.
  - Pathway 3 may not be applicable and unscheduled rights would not be in market.

## Bucket 3 - Transmission Cost Recovery without Hurdles in Optimization

- Bucket 3 transmission will be available to the EDAM hurdle free.
  - Eliminating the hurdle rate will increase market efficiency and the overall benefits.
  - Foregone revenues with bucket 3 transmission, including short term firm ATC, would be eligible for cost recovery within the calculation.
- Bucket 3 transmission would also receive transfer revenue associated with the transmission made available.

# Transmission Cost Recovery

EDAM Straw Proposal allows for the recovery of an EDAM recoverable TRR that consists of:

1. Revenues associated with the short-term firm and non-firm point-to-point products for OATT Customers
  - Foregone reduction in wheeling access charge (WAC) revenues in the ISO
2. Revenues on approved new transmission builds that increase transfer capability between EDAM BAAs
3. Revenues for wheeling-through volumes for EDAM BAAs that exceed the total imports/exports from the EDAM entity BAA.

# Transmission Recovery Component 1: Calculating the EDAM Recoverable TRR

- For EDAM entities operating under the OATT, the EDAM recoverable TRR is the historical transmission revenue requirement for short-term firm point to point and non-firm point to point transmission.
  - Associated with sales to third parties (non-merchant).
- For the ISO, the EDAM recoverable TRR is the total historical WAC revenues associated with third parties.
- Two key questions regarding calculation of the EDAM recoverable TRR:
  - (a) across what time period is the gross at risk TRR derived?
    - Three years historical data
  - (b) how often is the gross at risk TRR value updated?
    - Updated after 2 years

	Total TRR	Non-Firm TRR (3 <sup>rd</sup> party)	Short-term Firm TRR (3 <sup>rd</sup> parties)	EDAM Recoverable TRR (for EDAM)	Ratio (EDAM recoverable TRR / Total TRR)
EDAM Entity (OATT)	\$100 Million	\$3 million	\$4 million	\$7 million	7%

## Bound to Gross TRR

- Seek feedback of a bound to the gross TRR recoverable through the EDAM based upon the EDAM transfer flows.
  - Goal: a bound would avoid shifting of costs to the EDAM disproportionately compared to the use of the EDAM entity system to support EDAM transfers.
- Limit the EDAM recoverable TRR by comparing EDAM transfer exports (energy transferred) out of the EDAM BAA and total exports (energy exported to EDAM and non-EDAM BAAs).

---

$$TRR \text{ Bound} = \frac{EDAM \text{ Transfer Use (MWh)}}{Total \text{ Exports (MWh)}} \times EDAM \text{ Recoverable TRR}$$

---

# Netting Transmission Sales

- The total revenues recoverable through the EDAM consist of the difference between the EDAM recoverable TRR, which is based on historical values and the actual transmission revenues collected through transmission sales of the products eligible for recovery.
- Formula below illustrates further the example of the TRR shortfall recoverable through the EDAM.

$$\text{TRR Shortfall} = \text{EDAM Recoverable TRR (historical)} - \text{Actual transmission revenues}$$

## Component 2: Percentage of New Transmission Build Revenue Requirement

- New transmission builds raise the potential of foregone transmission revenues associated with non-firm and short-term firm transmission sales.
- Recovery through the EDAM is limited to the ratio of the non-firm and short-term firm point to point revenue requirement to the total transmission revenue requirement.
- If the upgrade adds \$50 million to the total TRR, and the historical percentage of sales was 7%, then the amount recoverable through the EDAM is 7% of that amount, a total of \$3.5 million.

	Total TRR	Non-Firm TRR (3 <sup>rd</sup> party)	Short-term Firm TRR (3 <sup>rd</sup> parties)	EDAM Recoverable TRR (for EDAM)	Ratio (EDAM recoverable TRR / Total TRR)
EDAM Entity (OATT)	\$100 Million	\$3 million	\$4 million	\$7 million	7%



## Component 3: Recovery of Transmission Costs Associated With Significant EDAM Wheeling Through

- The proposal is that in those limited periods where this net difference occurs, the EDAM entity be compensated for the excess transmission use supporting net wheels through its system.
- The wheels through the EDAM entity system created benefits for other EDAM BAAs but not for that entity.
- The volume of net wheels through the EDAM entity transmission system, net of EDAM transfer imports/exports, would be compensated at the EDAM entity's filed and approved non-firm hourly point to point transmission rate.

# Transmission Cost Assignment

- Two Options to apply the uplift rate:
  1. to gross load across the footprint or
  2. to demand plus supply across the footprint.
- In allocating this uplift charge, the proposal is not to allocate an EDAM entity its own TRR revenue shortfall so its metered demand does not have to pay for its TRR cost recovery.

# CAISO BA Transmission in EDAM – RSE

Entities relying on resources wheeled through or export from the ISO to meet the EDAM RSE would have the following pathways:

1. Wheeling through the ISO system – entities would demonstrate establishment of a wheeling through priority across the ISO system and bring Bucket 1 transmission to the EDAM across the interface (consistent with RSE requirements).
2. Exports from the ISO system – entities would demonstrate establishment of high priority export status to export non-resource adequacy supply
  - The WAC charges would be assessed for the period that the high priority export is being shown for the RSE.

## CAISO BA Transmission – Other Buckets

- Bucket 2 transmission on the ISO system is primarily associated with legacy contracts
  - could be made available to the market based upon the terms of the agreement
- Bucket 3 consists of the remaining transmission on the ISO system, which is unreserved and unsold
  - TRR recovery proposal allows for the recovery of the shortfall associated with historical WAC revenues

# EDAM

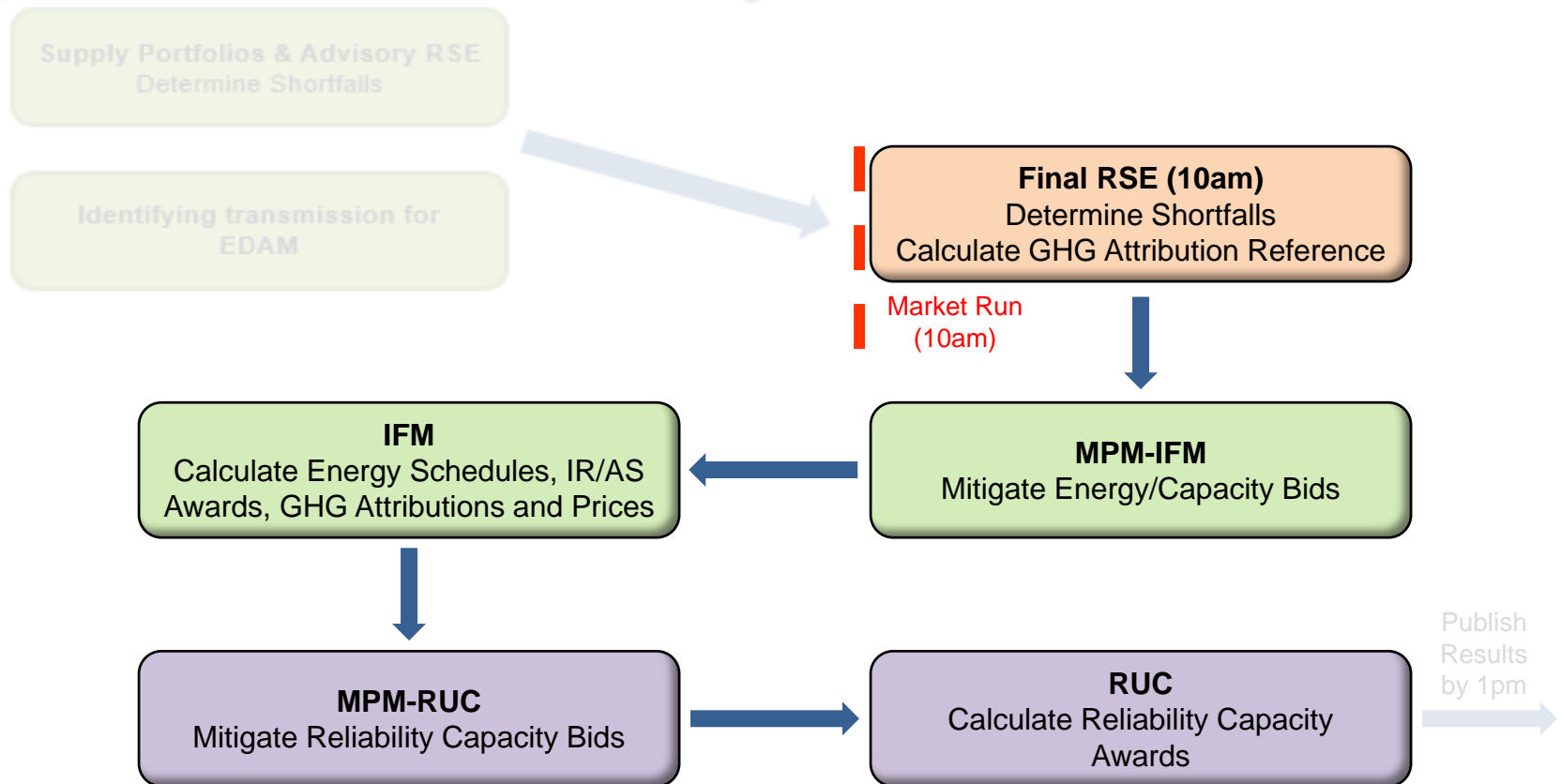
## *Day Ahead Market Processes*

*Milos Bosanac, Regional Markets Sector Manager, Market and Infrastructure Policy*



California ISO

# Day Ahead Market Activities (10am - 1pm)



# EDAM

## *Day Ahead Market Processes: Integrated Forward Market (IFM) and Residual Unit Commitment (RUC)*

*James Friedrich, Lead Policy Developer, Market and  
Infrastructure Policy*



California ISO

# IFM Role and Function

- The IFM balances supply and demand, produces hourly unit commitment and energy schedules, procures ancillary services, and will procure imbalance reserves.
  - Note: ancillary services will not be co-optimized with energy across the footprint.
- WEIM has no demand bids; in EDAM, entities can self-schedule or economically bid demand into the day-ahead market
  - If bid-in demand clears less than the BAAs load forecast, RUC will secure “reliability capacity up” to the forecast.



# Imbalance Reserves

- An imbalance reserve product will procure 15-minute ramping capability to cover forecast uncertainty and provide intra-hour ramp capability.
  - Topic further discussed in DAME initiative.
- Imbalance reserves enhance benefits of EDAM:
  - Diversity benefit reduces each BAAs individual uncertainty requirements.
  - Builds confidence that solution coordinates capacity to address unrealized uncertainty.
  - Allows more optimal scheduling of energy and transfers by accounting for uncertainty/ramping needs.
  - Allows BAAs to meet uncertainty needs from resources across the EDAM footprint.
  - Establishes a consistent metric and treatment of uncertainty for the EDAM RSE.
  - Provides revenue opportunities for EDAM BAAs with flexible resources.

## RUC Role and Function

- RUC process procures incremental and decremental capacity (reliability capacity up/down) based on the amount of physical energy that clears the IFM in relation to the BAA load forecast.
- Based on how load and virtual bids clear the IFM, absent RUC awards there may be a shortfall in meeting the forecasted demand with physical resources.
- Suppliers submit reliability capacity up/down bids and the RUC produces hourly reliability capacity awards, transfers, and prices.

# RUC Proposals

- Continue to propose that RUC remains an integral component of the EDAM.
- Continue to proposal also that all resources must submit reliability capacity bids at the same quantity as their energy bid plus ancillary service self-provision. This ensures all resources shown in the EDAM RSE are fully available for use in RUC.
  - The requirement to bid in RUC only extends to capacity shown in the RSE (and by extension to IFM) and not to all resources in the EDAM BAA.

# EDAM

## *Day Ahead Market Processes: Market Power Mitigation (MPM)*

*Gabe Murtaugh, Storage Sector Manager, Market and  
Infrastructure Policy*



California ISO

## The ISO will apply the same approach used in WEIM for MPM to the EDAM

- The ISO uses market power mitigation to help guard against the potential exercise of market power mitigation.
- The ISO applies a 3-pivotal supplier methodology to determine if supply could potentially exercise market power in the WEIM market.
- If a 3-pivotal supplier test fails, the ISO will insert default energy bids for storage resources that offer relief to the binding constraint.

# The ISO is exploring changes to market power mitigation in price formation enhancements

- The ISO may think about improvements to grouping balancing authority areas while performing the three pivotal supplier test
  - Multiple areas that impact the same constraint should be considered together
  - This could reduce the instances that market power mitigation is triggered
- May apply market power mitigation to resources outside of the balancing area where a constraint is binding
  - Today market power mitigation does not do this

## Day 1 Wrap-up

- Thank you for attending day 1 of the EDAM revised straw proposal stakeholder meeting.
- Day 2 of the meeting begins tomorrow at 9 a.m. Pacific Time. Meeting and participation details are available on the [ISO calendar](#).



# EDAM

## EXTENDED DAY-AHEAD MARKET

### EDAM Revised Straw Proposal – Stakeholder Meeting – Day 2

September 8, 2022



California ISO



# Reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO permission.
- If you need technical assistance during the meeting, please send a chat to the event producer.

Thank you for joining us, and we look forward to an engaging discussion.

# DAY 2 AGENDA

Time	Topic
8:00 - 9:00	Continental breakfast
9:00 - 12:00 <i>*Break at 10:30</i>	Continuation of EDAM revised straw proposal walk through
12:00 – 1:00	Lunch
1:00 - 4:50 <i>*Break at 2:30</i>	Continuation of EDAM revised straw proposal walk through
4:50 - 5:00	Next steps and closing remarks

# EDAM

## *Day Ahead Market Processes: Convergence Bidding*

*James Friedrich, Lead Policy Developer, Market and  
Infrastructure Policy*



California ISO

# Convergence bidding

- Convergence bids are purely financial bids that do not represent physical supply and demand.
- Convergence bids can only be submitted in the day ahead market.
  - Virtual supply (demand) is paid (charged) the day-ahead locational energy price and charged (paid) the 15-minute locational energy price.
- Convergence bidding is intended to minimize systemic differences between day-ahead and real-time prices.
  - Has several market benefits, notably market power protection.

# Convergence bidding transition period

- Proposing a transition period to convergence bidding in the EDAM footprint.
  - EDAM Year 1: transitional year, no convergence bidding in non-CAISO BAAs.
  - EDAM Year 2 and beyond:
    - An EDAM entity will have the option to enable convergence bidding right away or choose a 1-year transition period.
  - Convergence bidding would continue in the CAISO BAA
- Propose to monitor impact of optional convergence bidding across BAAs (as compared to footprint-wide).

# Convergence bidding transition period

- A transition period permits EDAM entities to gain experience in the market before enabling convergence bidding.
- Modeling and other implementation issues could create arbitrage opportunities.
- Lack of familiarity with convergence bidding could lead to unintended financial impacts.
- For EDAM BAAs without convergence bidding, the RSE will consider variable energy resources (e.g., wind and solar) (VERs) at their energy bids and not at their energy forecast.
  - Entities without convergence bidding cannot rely on virtual supply to make up the shortfall in VER energy bids compared to their forecasted output.

# EDAM

## External Resource Participation

Milos Bosanac, *Regional Markets Sector Manager, Market and Infrastructure Policy*



California ISO

# External Resource Participation

- External resource participation refers to the ability of supply located outside of the EDAM footprint to participate in the day ahead market.
- In WEIM today, the following external resources can participate in the real-time market at the WEIM interties:
  - Pseudo tied – economically bid or self scheduled
  - Dynamically scheduled – economically bid or self scheduled
  - Otherwise contracted resources – self scheduled



# External Resource Participation in EDAM

- Propose to extend the current WEIM framework to external resource participation into the EDAM.
  - Evaluate enabling broader external resource participation structure as EDAM evolves.
- Mitigates WEIM entity reliability concerns of economic bidding of non-source specific supply at its interties.
  - Displacement of internal generation, and risk of non-performance
  - Creation of operational uncertainty
- Full external resource participation (intertie bidding) would continue to be enabled at the ISO interties with non-EDAM BAAs.

The logo for EDAM, consisting of the letters 'E', 'D', 'A', and 'M' in a bold, sans-serif font. The letters are white with a slight gradient and are set against a dark blue background. The background of the entire slide features a faint, light blue grid with various data points and numbers, suggesting a financial or technical context.

## Confidence in Market Transfers

George Angelidis, *Executive Principal, Power Systems and Market Technology*

Milos Bosanac, *Regional Markets Sector Manager, Market and Infrastructure Policy*

# Confidence in Market Transfers

- Establishing confidence in market transfers is a critical design component of the overall EDAM design.
- EDAM entities make generation and transmission available to the market for optimized commitment to reliably and dependably serve load.
- Each EDAM BAA continues to maintain their role and function of managing reliability in the BAA.
  - Continue to manage various operational tools and maintain operational coordination.

# EDAM Design Elements Building Confidence in Transfers

- *Robust day-ahead resource sufficiency evaluation*
  - Diverse supply pool offered in the market helps respond to changes in conditions in footprint.
  - Failure consequences incentivize supply sufficiency through forward procurement.
- *Market optimization through IFM and RUC*
  - Schedules and transfers emerging out of market are feasible.
  - Market will schedule transfers out of EDAM BAA only if load and uncertainty can be feasibly met.

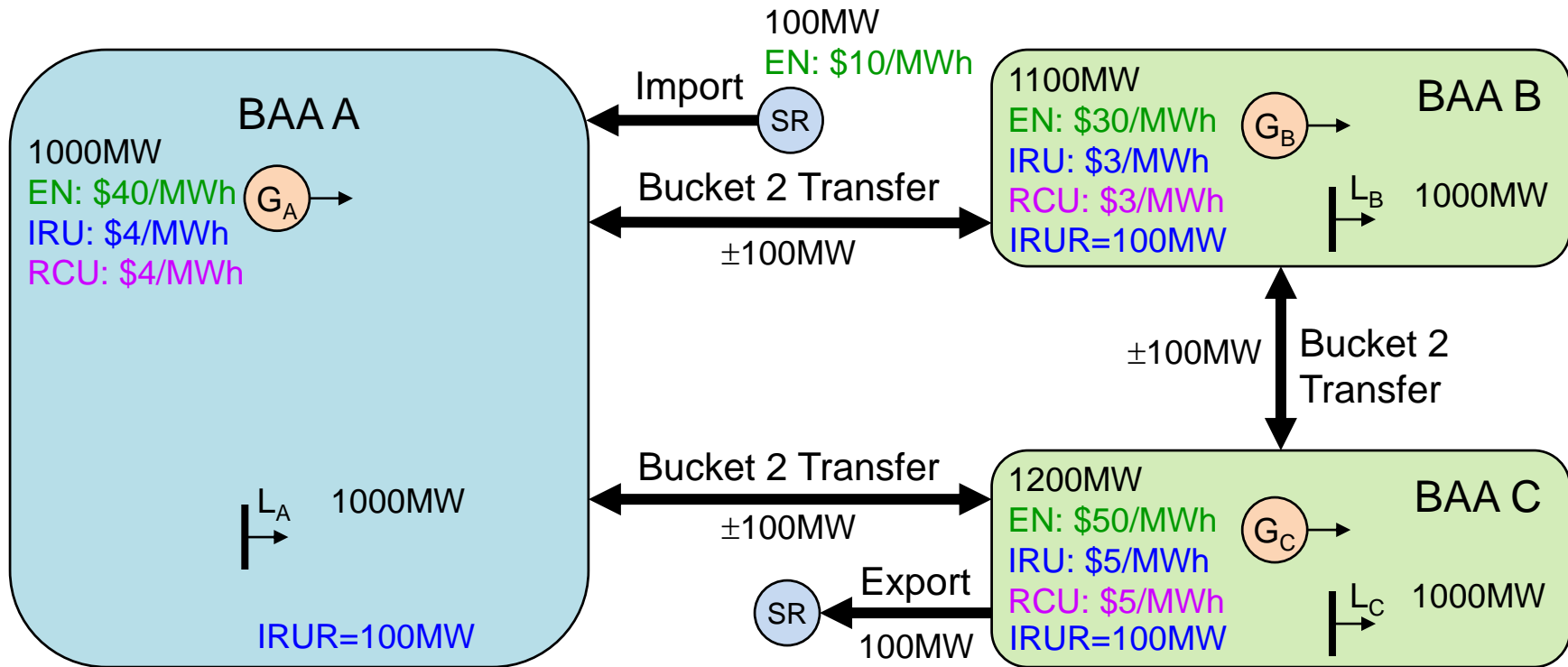
# EDAM Design Elements Building Confidence in Transfers

- *Transmission availability in EDAM*
  - Transmission capability supporting EDAM transfers remains available in WEIM.
  - This enables transfers and counterflows when uncertainty actually materializes.
- *Imbalance reserves*
  - IFM efficiency procures imbalance reserves to cover uncertainty that may materialize in real-time.
  - This capacity is available for optimal dispatch in real-time to respond to changing conditions, uncertainty that materializes.
- *Constraint preventing propagation of BAA shortfalls*
  - The constraint will not allow simultaneously the relaxation of the power balance constraint and a net energy export transfer above what can be exported on bucket 1 energy transfers.
  - Similar constraints for imbalance reserves and reliability capacity.
  - No net export above bucket 1 if the power balance constraint is relaxed.

# Effectuating Confidence in Transfers – Operational Timeframe

- Market design features will be able to effectively respond to changes in conditions to avoid or limit emergency conditions in a BAA.
- In limited instances, edge cases, where the market has exhausted its tool-set but a reliability condition persists, each BAA will rely on its operational tools for reliability.
  - Excess supply not in market
  - Emergency assistance, reserve sharing
  - Curtailment of lower priority transactions
  - Emergency backup supply, demand response

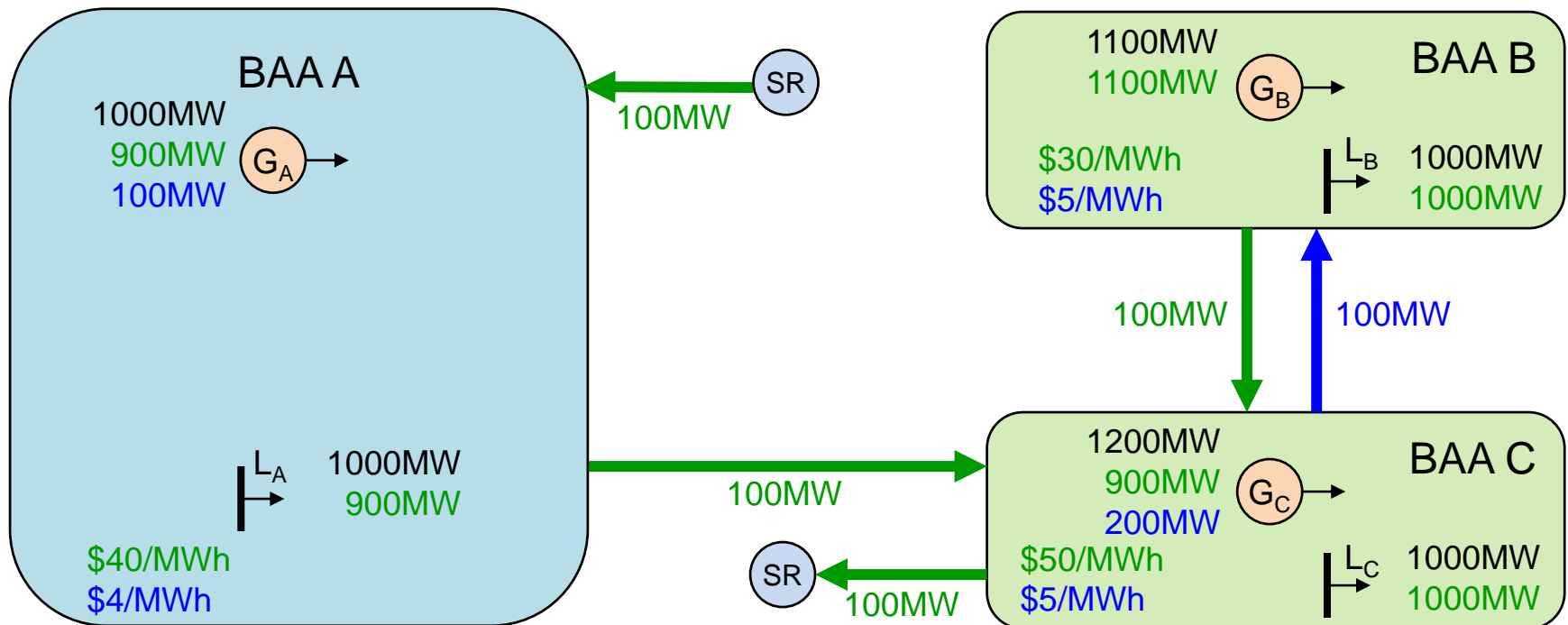
# EDAM Transfer Example Setup (removing virtual supply from the RSP example)



# EDAM Transfer Example

## IFM Solution ( $L_A$ under-schedules by 100MW)

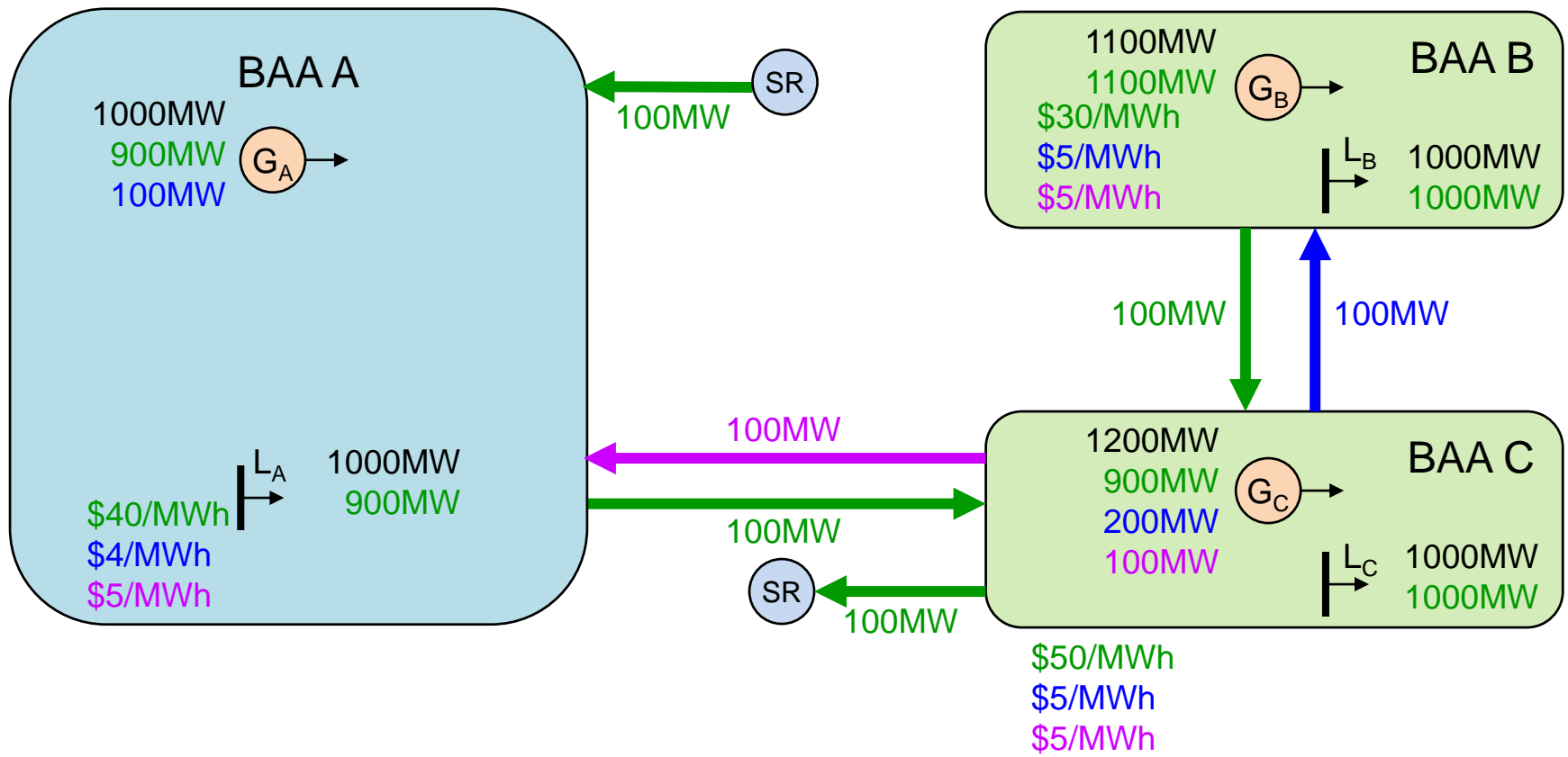
\*  $L_A$  self-schedules only 900mw





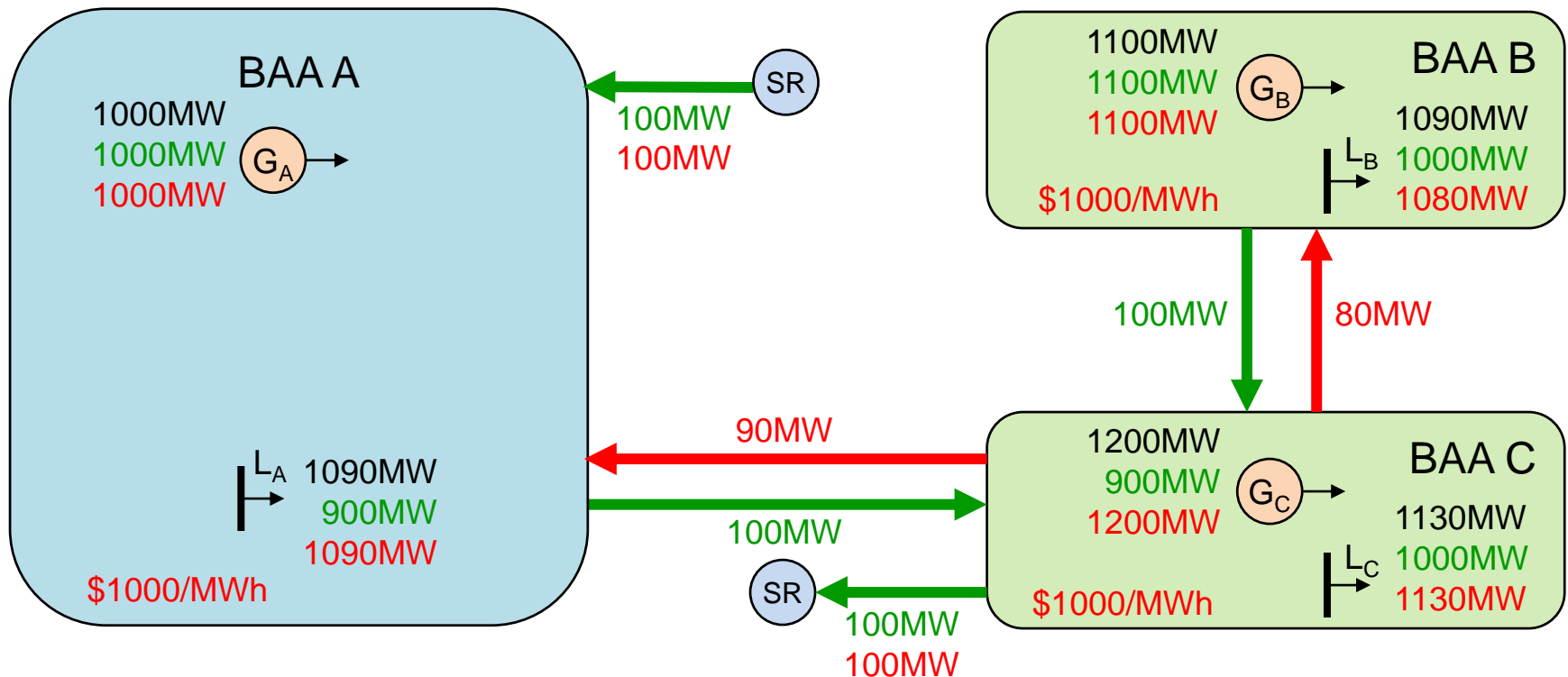
# EDAM Transfer Example

## RUC Solution



# WEIM Edge Case Solution: uncertainty materialized beyond EDAM requirements and footprint is short

\* Day-ahead transfers are fixed



# Observations on the WEIM Edge Case Example

- The EDAM optimal solution may result in energy transfer exports countered by imbalance reserve and/or reliability capacity transfer imports
  - This optimal outcome is not necessarily due to the presence of virtual schedules
- The transfer capacity for energy counter flow and imbalance reserve and reliability capacity awards are available in WEIM for optimal dispatch
  - In edge cases where uncertainty materializes beyond EDAM requirements, there may not be available capacity to counter flow on DA energy transfers
- Any ABC in BAA C will not be deployed and the PBC in BAA C will not be relaxed while it has a net dynamic transfer export
  - The net base transfer for BAA C is -200MW (DA net energy transfer)
- Although the DA transfer export has equal priority with load in BAA B, it should not be cut pro rata because that would be ineffective due to a chain reduction of the dynamic transfer import from BAA C

# Redesign the Power Balance Relaxation Constraints for EDAM BAAs in the WEIM

- All day-ahead transfers are firm in the WEIM
  - Day-ahead energy transfers are protected with a high relaxation penalty, like base transfers
  - PBC may be relaxed to avoid DA energy transfer cut
- Day-ahead capacity transfers are also firm commitments
  - PBC should also be relaxed if needed to schedule dynamic energy transfers on DA capacity transfers
- Day-ahead capacity transfers offset the net base transfer in the PBC relaxation constraints in the WEIM

# Power Balance Relaxation Constraints in the WEIM

$$\sum_{i \in BAA_j} G_i - D_j - T_j + s_j^{(+)} - s_j^{(-)} = 0$$

$$\left( s_j^{(+)} + \sum_{i \in BAA_j} ABC_i^{(+)} \right) (T_j - \bar{T}_j^{(+)}) \leq 0$$

$$\left( s_j^{(-)} + \sum_{i \in BAA_j} ABC_i^{(-)} \right) (T_j - \bar{T}_j^{(-)}) \geq 0$$

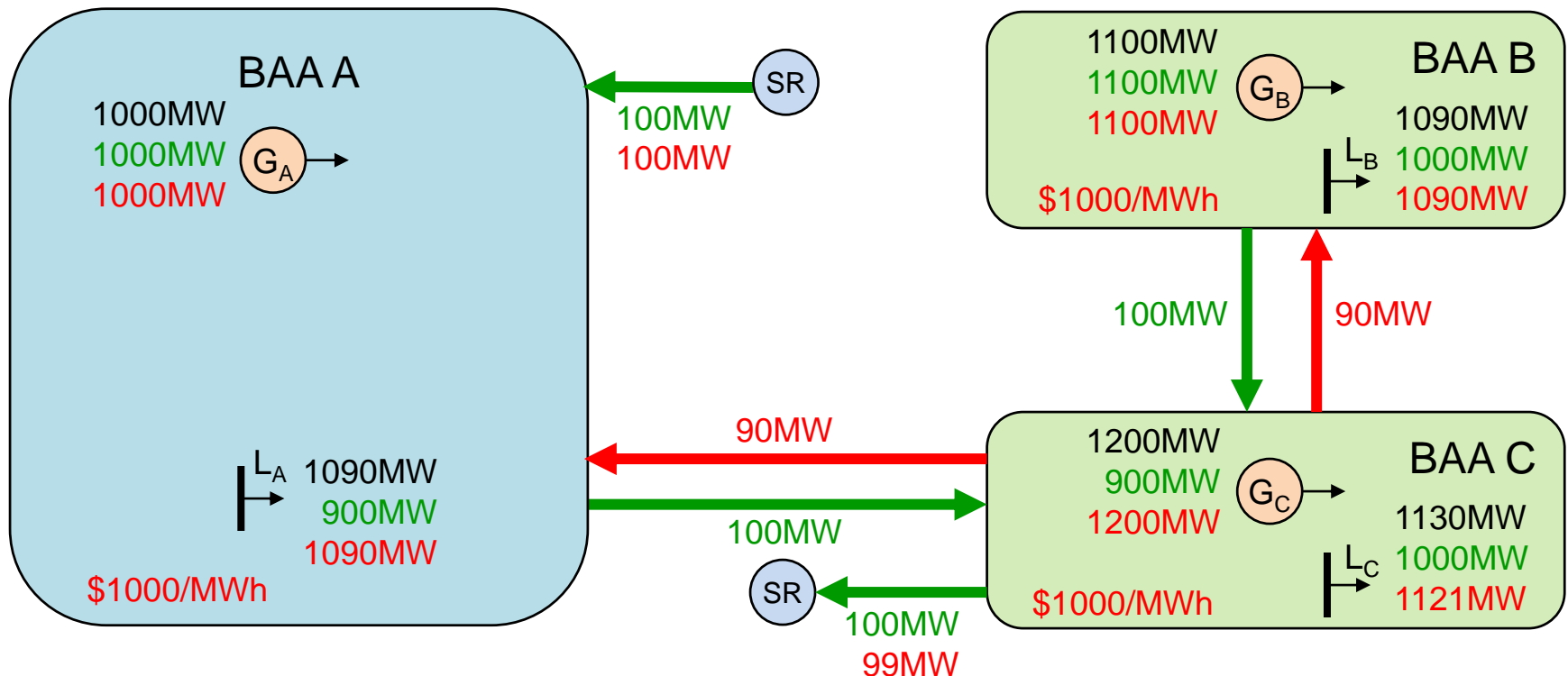
$$\bar{T}_j^{(+)} = T_j^{(EN)} + T_j^{(IRU)} + T_j^{(RCU)}$$

$$\bar{T}_j^{(-)} = T_j^{(EN)} - T_j^{(IRD)} - T_j^{(RCD)}$$

$i$	node index
$j$	<i>BAA index</i>
$G$	<i>supply</i>
$D$	<i>demand</i>
$T$	<i>algebraic net transfer</i>
$\bar{T}$	<i>base net transfer</i>
$s_j^{(+)}$	<i>supply shortfall</i>
$s_j^{(-)}$	<i>supply surplus</i>
$ABC_i^{(+)}$	<i>available balancing capacity up</i>
$ABC_i^{(-)}$	<i>available balancing capacity down</i>

# WEIM Edge Case Solution: uncertainty materialized beyond EDAM requirements and footprint is short

\* Net base transfer in BAA C is increased to 0MW



# Effectuating Confidence – Equal Priority of Transfers and Load

- The proposal is that, in edge case scenarios, day-ahead market transfers be afforded equal priority to load.
  - Subject to operational discretion and coordination consistent with good utility practice.
- The EDAM entity effectuates equal priority through pro-rata, proportionate, curtailment of transfers and load shed in emergency, edge case, conditions.
- Operators have discretion in effectuating the priority through continued coordination with the EDAM BAA where the transfer sinks.
  - To the extent curtailment of transfer to sinking BAA would not cause reliability issues, have discretion to curtail transfer prior to load.

# Priority of Transfers to EDAM BAAs Outside of the WEIM RSE Pool

- Day-Ahead transfers to an EDAM BAA outside of the WEIM RSE pool could be afforded a lower priority in the operational timeframe.
  - Subject to operator discretion and good utility practice.
- When does the lower priority apply?
  - Failing the EDAM RSE and no ability to cure through market (infeasibility)
  - Failing to tag imports in day ahead (or subsequently curing)
- In edge case conditions, an EDAM entity could curtail day-ahead transfers sinking in an EDAM BAA that fails the day ahead RSE ahead of load.
- If load shed is at risk, the operator can at its discretion curtail day-ahead transfers ahead of load through coordination with the sink BAA.



The background features a dark blue overlay with a grid of light blue dots and faint, semi-transparent data charts. The charts include bar graphs with various values and line graphs with multiple data series. Some visible numbers include -16.75, -6.08, 26.93, 13.13, 1.00, 0.09, 10.96, 10.09, 2.788, 0.44, 0.03, 13.04, 14.32, 3.540, 1.051, 3.759, 1.8, 0.2, 0.02, 13.04, 14.32, -4.9, 1.94, 1.01, 0, -34.0, -55.7, 16.04, 5.4, 5.84, 1.520, 45.12, 0.77, 2.39, 3.48, 1.74, 1.214, 8.49, 2.69, 0.51, 0.55, 27.72, 36.17, 81,029, 7,284, 17,288,600, 13,224, 2,913,100, 40,573, 16,273,100, 247,000, 38,265,200, 183,197, 3,888,600, and 81,029.

# EDAM

## GHG Accounting

*Anja Gilbert, Lead Policy Developer, Market and Infrastructure Policy*

# GHG Accounting Approach at the Start of EDAM

- The proposal adopts the resource specific approach to GHG accounting at the start of EDAM.
- Stakeholders are familiar with the design as an extension of the WEIM, it is the most defined option, it requires the least amount of implementation changes, and it will require fewer regulatory changes compared to the other proposals.
- We will continue to evaluate alternate approaches for evolving the EDAM GHG accounting design in the future.

# Scalability and Adaptability

The GHG design will continue to evolve

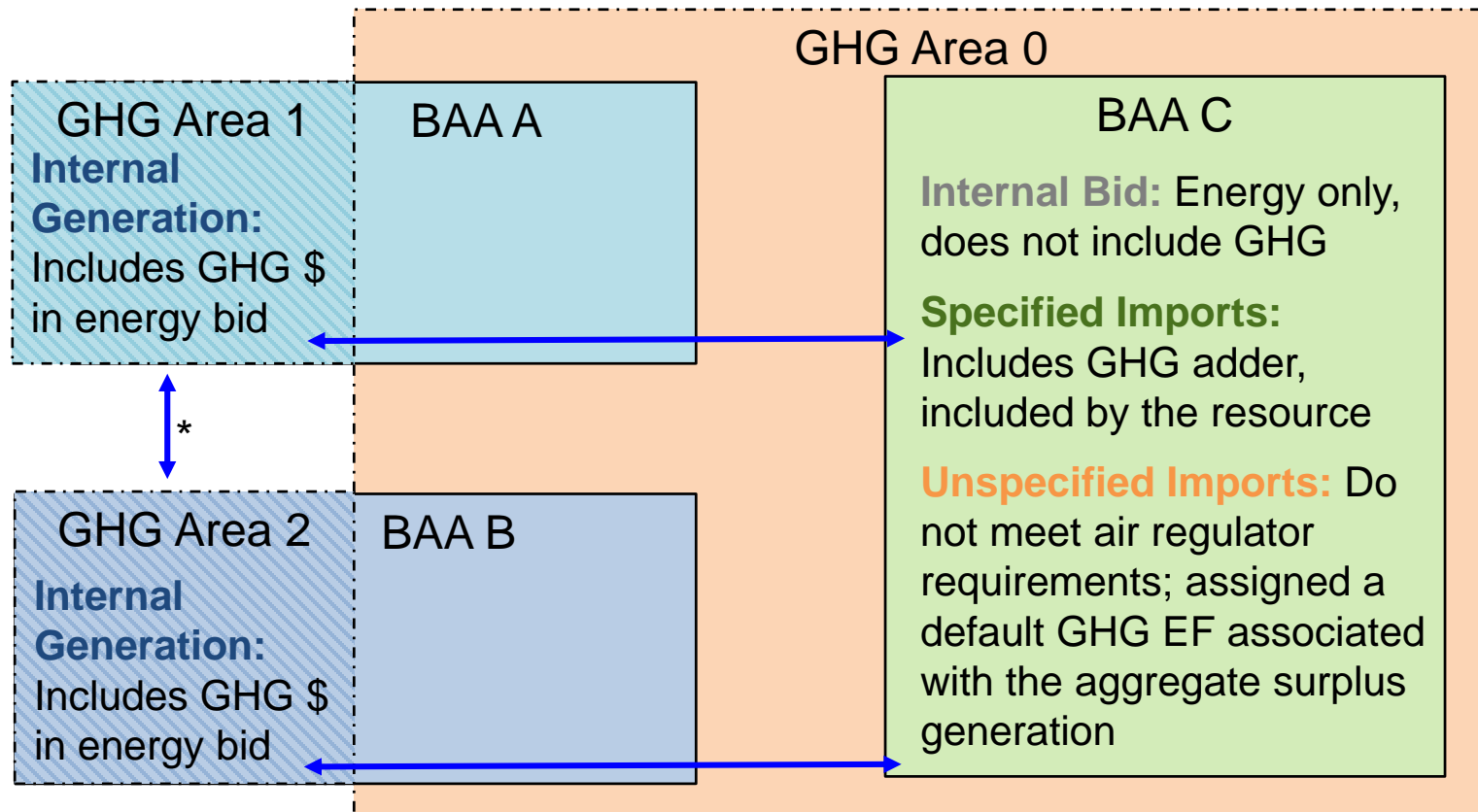
- The resource-specific model implementation is foundational and allows for evolution to the zonal or LADWP approach, should state regulators move in that direction.
- The resource-specific model is also flexible enough to include additional constraints to reflect state climate goals that are not based on price.
  - These constraints could exclude resources with “x” emissions factor or certain resource types.
  - This would only apply to the resource specific and LADWP approaches.

## Common Elements of All of the Proposals:

- 1. Geographic Boundaries:** The CAISO will define the GHG regulation areas based on state geographical boundaries as opposed to BAA boundaries. This will allow CAISO to reflect the costs associated with GHG pricing program compliance, but not reflect these costs in the dispatch of resources not subject to these programs
- 2. Treatment of resources in the RSE:** Any self-schedules or bids from pseudo-tied resources that were offered from a non-GHG regulation area would be included in the RSE for a GHG regulation area

# Resource Specific

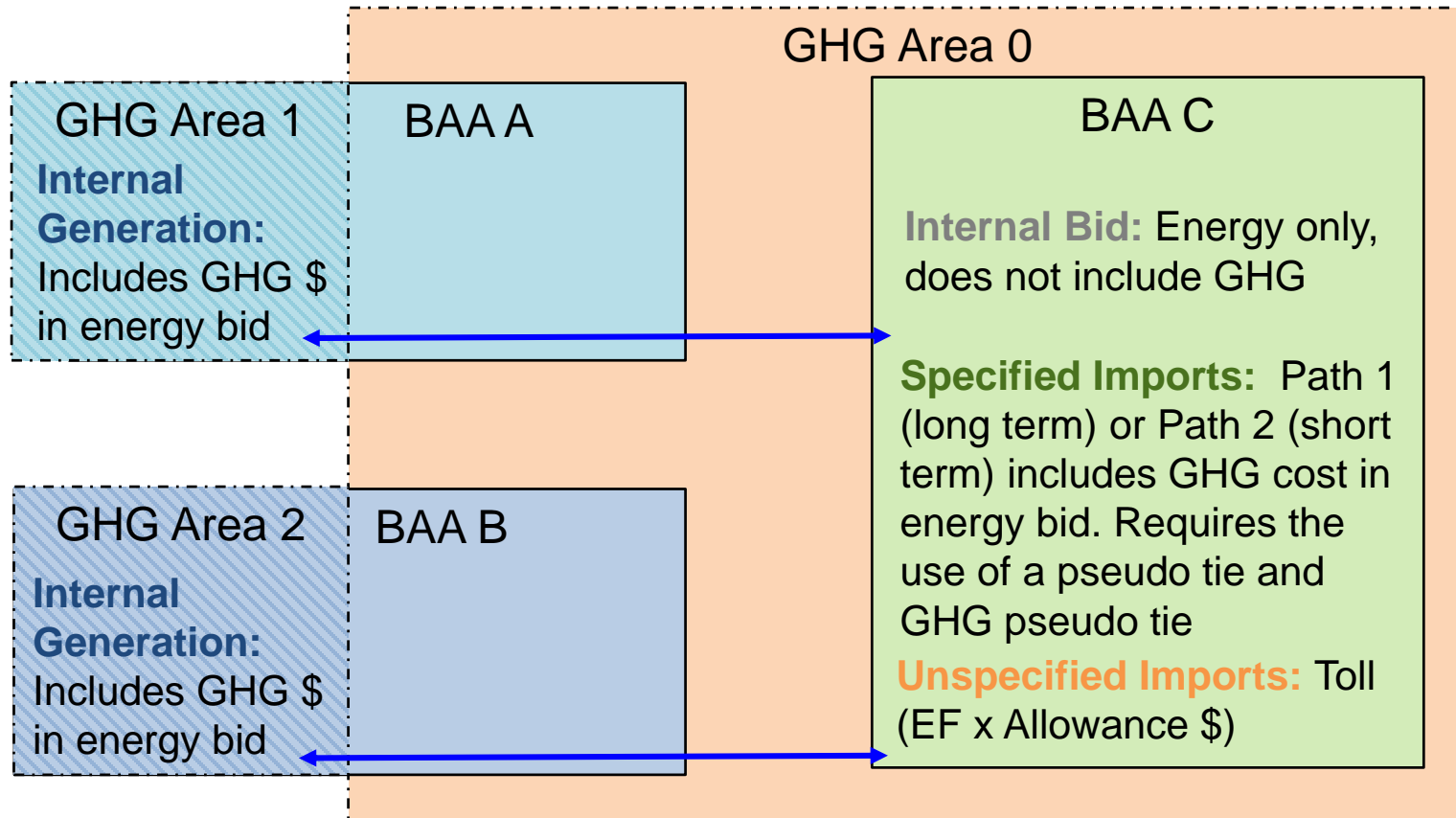
An extension of the WEIM design that uses resources specific GHG bid adders to optimize GHG dispatch. Requires compliance and reporting by non-GHG regulation areas if their resources are attributed.



\* **Between GHG regions:** unlinked (GHG bid adder); linked (energy bid includes GHG \$)

# Zonal

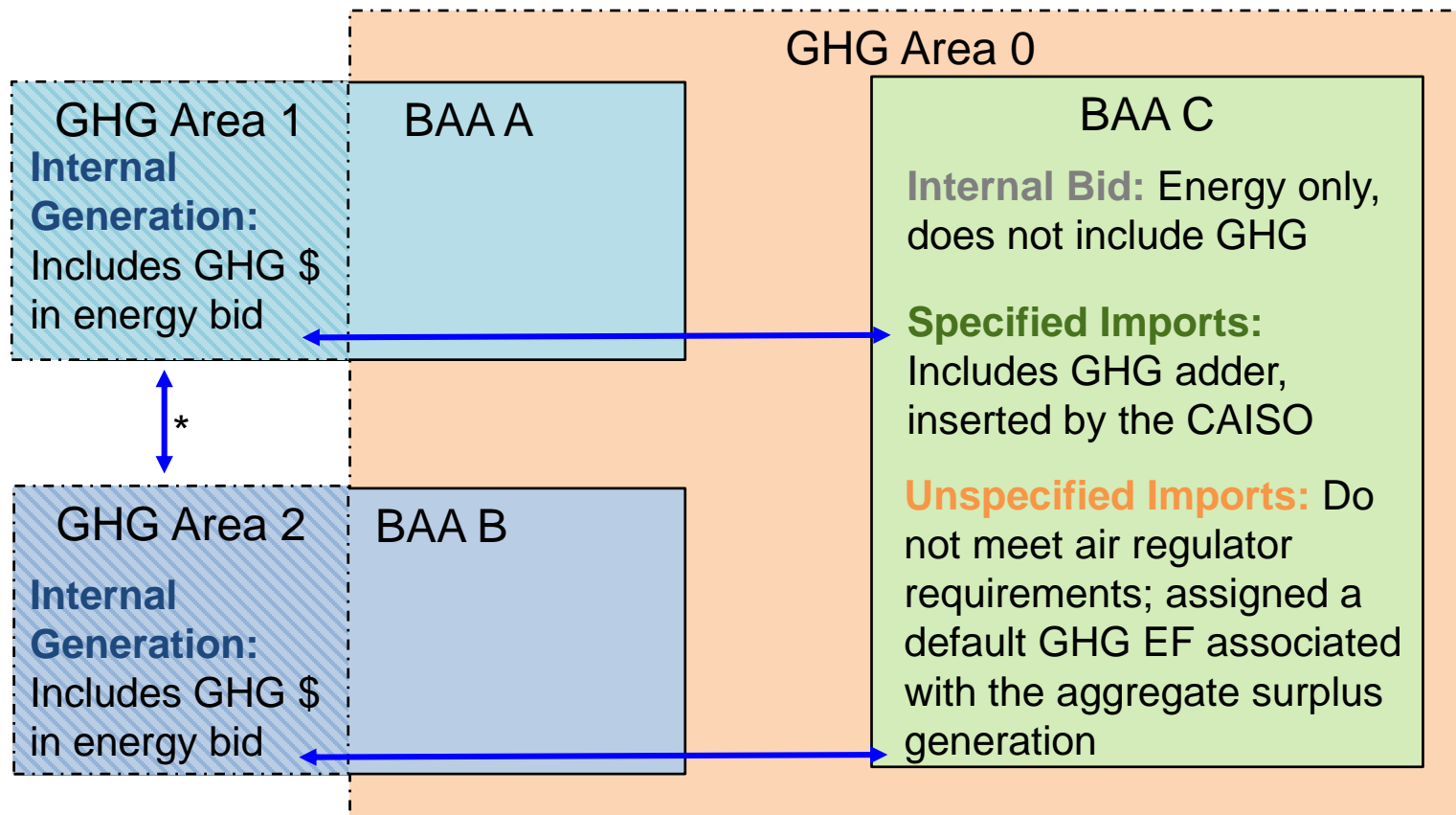
The design offers a source specific pathway, otherwise a toll applies to transfers. Compliance and reporting would be handled by the CAISO.



- **Between GHG regions:** unlinked (specified P1 or P2 or unspecified import toll);  
linked (opportunity for transfers to occur without a hurdle rate)

# LADWP

An extension of the resource specific design with three key changes: (1) CAISO would insert bids for non-GHG area resources; (2) imports would use load based accounting by GHG area LSEs; and (3) it eliminates compliance and reporting by non-GHG area resources.



\* **Between GHG regions:** unlinked (GHG bid adder); linked (energy bid includes GHG \$)

# Leakage and Secondary Dispatch

	Leakage or Secondary Dispatch	Quantification
Resource Specific	Yes, secondary dispatch can arise as a result of higher emitting resources backfilling lower emitting resources serving GHG regulation area load.	<p>Secondary dispatch can be estimated as the sum of GHG attributions below the GHG reference.</p> <p>Secondary dispatch emission cost can be addressed by state air regulators.</p>
Zonal	Leakage can occur if the toll is set too low.	The approach does not include a GHG counterfactual or means of quantifying leakage.
LADWP	Yes, secondary dispatch can arise as a result of higher emitting resources backfilling lower emitting resources serving GHG regulation area load.	<p>Secondary dispatch can be estimated as the sum of GHG attributions below the GHG reference.</p> <p>The approach plans to account for secondary dispatch through a total emissions calculation to be worked out with state air regulators.</p>

*For all proposals, air regulators may choose to address this emissions leakage with regulatory tools. In WEIM this is addressed by CARB through the Outstanding Emissions Calculation*



## Resource Specific Approach: GHG Attribution and Secondary Dispatch

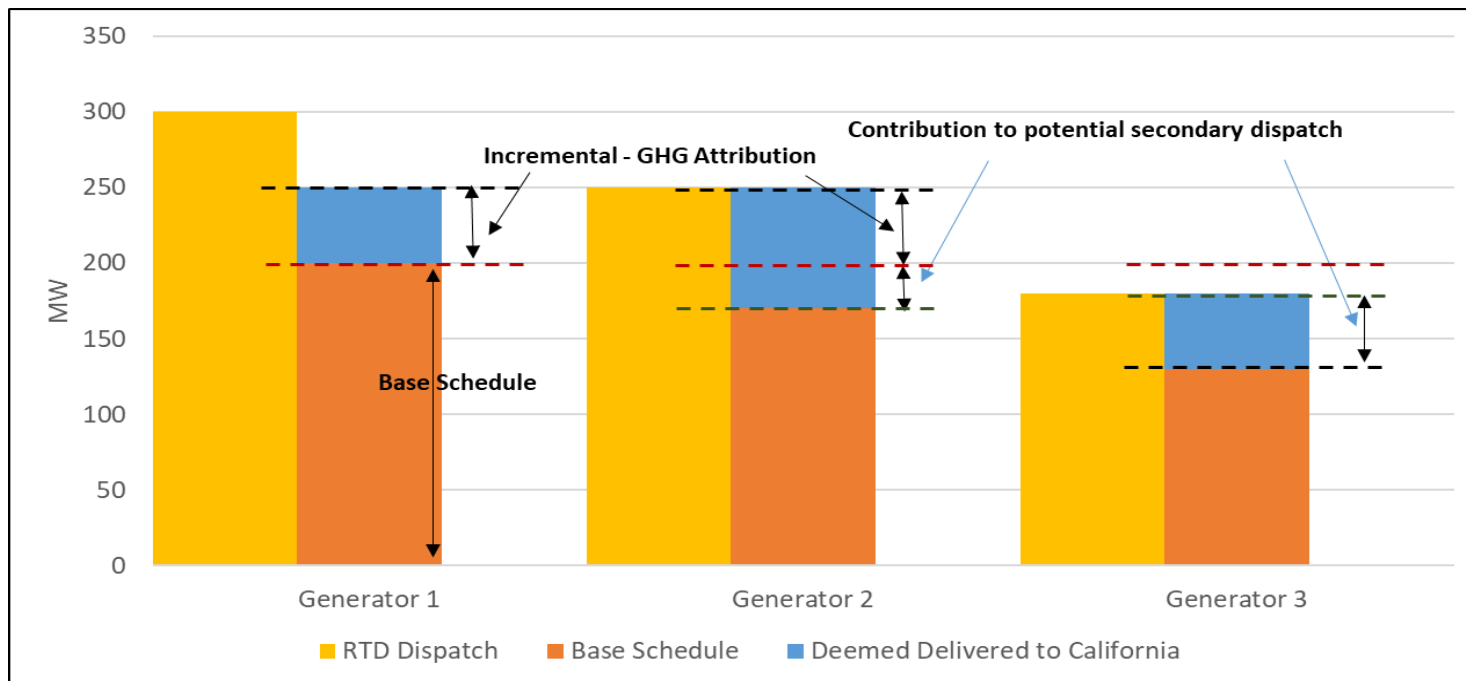
The optimization takes the total imports for a GHG regulation area and then attributes resources (based on their composite energy and GHG bid) lowest to highest. The marginal resource sets GHG price.

This process results in the market attributing transfers to lower emitting resources which may result in higher-emitting (*i.e.* more expensive) resources backfilling this attribution to serve load in other BAAs (secondary dispatch).

Calculating secondary dispatch allows states to quantify and take responsibility for their atmospheric impact if they choose to do so.

# Resource Specific Approach: WEIM Attribution Example

Gen in EIM Area	Type	Base Schedule (MW)	RTD Dispatch (MW)	GHG Attribution – Deemed Delivered to California (MW)	Contribution to potential Secondary Dispatch (MW)
Gen 1	Hydro	200	300	50	0
Gen 2	Gas	200	250	80	30
Gen 3	Hydro	200	180	50	50



## Resource Specific Approach: GHG Reference Pass

- The counterfactual to determine secondary dispatch would be based on a market run before the actual market run (“GHG reference pass”)
  - This will be identical to the IFM, but without GHG bids.
  - This will approximate how the BAAs outside GHG regulation areas will meet their own load with their internal generation.
  - It will also optimally schedule transfers between BAAs outside GHG regulation areas thus reflect how supply resources can optimally serve demand in the EDAM footprint without net imports into GHG regulation areas and the associated GHG regulation cost. The net GHG transfers are limited in the import direction to GHG regulation areas.
- The GHG Reference Pass for a GHG regulation area would include any self-schedules/bids from pseudo-tied resources from a non-GHG regulation area

## Resource Specific Approach: GHG Constraints to Limit Secondary Dispatch

- **Scheduling constraint:** This constraint will limit resource-specific attributions to the difference between a resource's upper economic limit and the GHG Reference Pass
- **Net export constraint:** This constraint will not allow GHG attribution to GHG regulation areas:
  - Above BAA transfer limits (set by transmission made available in EDAM)
  - If the BAA is a net importer

# Resource Specific Approach: Reporting to support states and market participants

## State reported data:

- Today CAISO reports total and EIM-entity level MWh GHG attributions to CARB. Through OATI, CARB collects total MWh of tagged imports (outside the WEIM) which is used to quality assure imports reported to CARB under the Mandatory Reporting Regulation (MRR)
- The CAISO is willing to provide total WEIM and EDAM transfers to states with GHG pricing programs

## Market participant reported data:

- Currently, WEIM market participants receive
  - Settlement statements which include GHG attribution
  - GHG attributions through CMRI
- In EDAM, the CAISO will provide settlement statements which include GHG attribution DA and RT (deviation from DA)

# EDAM

## *Day Ahead Market Outputs*



California ISO

The logo for EDAM, consisting of the letters 'E', 'D', 'A', and 'M' in a bold, sans-serif font. The letters are white with a slight gradient and are set against a dark blue background. The background of the entire slide features a faint, light blue grid and various data points, including numbers like -16.75, -6.08, 26.93, 10.96, 10.09, 13.13, 13.13, 1.00, 0.09, 10.96, 10.09, 2.788, 0.44, 0.03, 13.04, 14.32, -4.9, 3.540, 1.091, 1.94, 1.01, 0, -34.0, -55.7, 1.520, 45.12, 0.77, 2.34, 0.09, 3.48, 1.74, 81.029, 7.284, 17,288,600, 13,224, 2,913,100, 40,573, 16,273,100, 247,000, 38,265,200, 183,197, 3,888,600, and 81,029.

# *Day Ahead Market Outputs: Transfer Revenue and Congestion Revenue Allocation*

*James Lynn, Principal, Market Settlement Design*



California ISO

# WEIM Transfer and Congestion Revenue Allocation

- In the WEIM, transfer and congestion revenue is not differentiated explicitly, it is all termed congestion revenue.
  - Congestion revenue accrues when either internal or transfer constraints bind.
  - Reflects both energy and congestion price differences.
- Congestion revenue in WEIM is allocated as follows:
  - Transfer constraint:
    - 50:50 allocation between WEIM BAAs
    - 100:0 allocation between WEIM BAA and CISO BAA
  - Internal congestion: allocation 100% to the BAA
  - ITC congestion revenue: allocation 100% to BAA where it is binding



# Terminology

- Transfer revenue:
  - price difference between the marginal energy component of the LMP between BAAs
  - net transfer scheduling limit reached for an EDAM BAA at interfaces with other EDAM BAAs.
- Congestion revenue:
  - price differences in the marginal congestion component of LMP
  - triggered when internal system congestion materializes or intertie constraints (ITC) binding
- Intertie transmission constraint (ITC):
  - Internal transmission system limitation or constraint on particular paths or flowgates based on intertie schedules.
  - For example, a constraint that may bind on the internal transmission system based on import volumes exceeding specific limits.
  - ITC-like constraints are respected on various WEIM entity systems today.

# Transfer Revenue Allocation (1 of 2)

- Transfer Types:
  - *Energy transfer revenue*: Price differences between the Marginal Energy Cost (MEC) component of the LMP across EDAM BAAs
    - BAA MEC is the shadow price of the power balance constraint of that BAA
  - *Imbalance Reserve Transfer Revenue*: Price differences between the imbalance reserve capacity up price/imbalance reserve capacity down price (IRUP/IRDP) across BAAs
    - BAA IRUP/IRDP is the shadow price of the IRU/IRD procurement constraint of that BAA, respectively
  - *Reliability Capacity Transfer Revenue*: Price differences between the Reliability Capacity Up Price/Reliability Capacity Down Price (RCUP/RCDP) across BAAs
    - BAA RCUP/RCDP is the shadow price of the RCU/RCD procurement constraint of that BAA, respectively

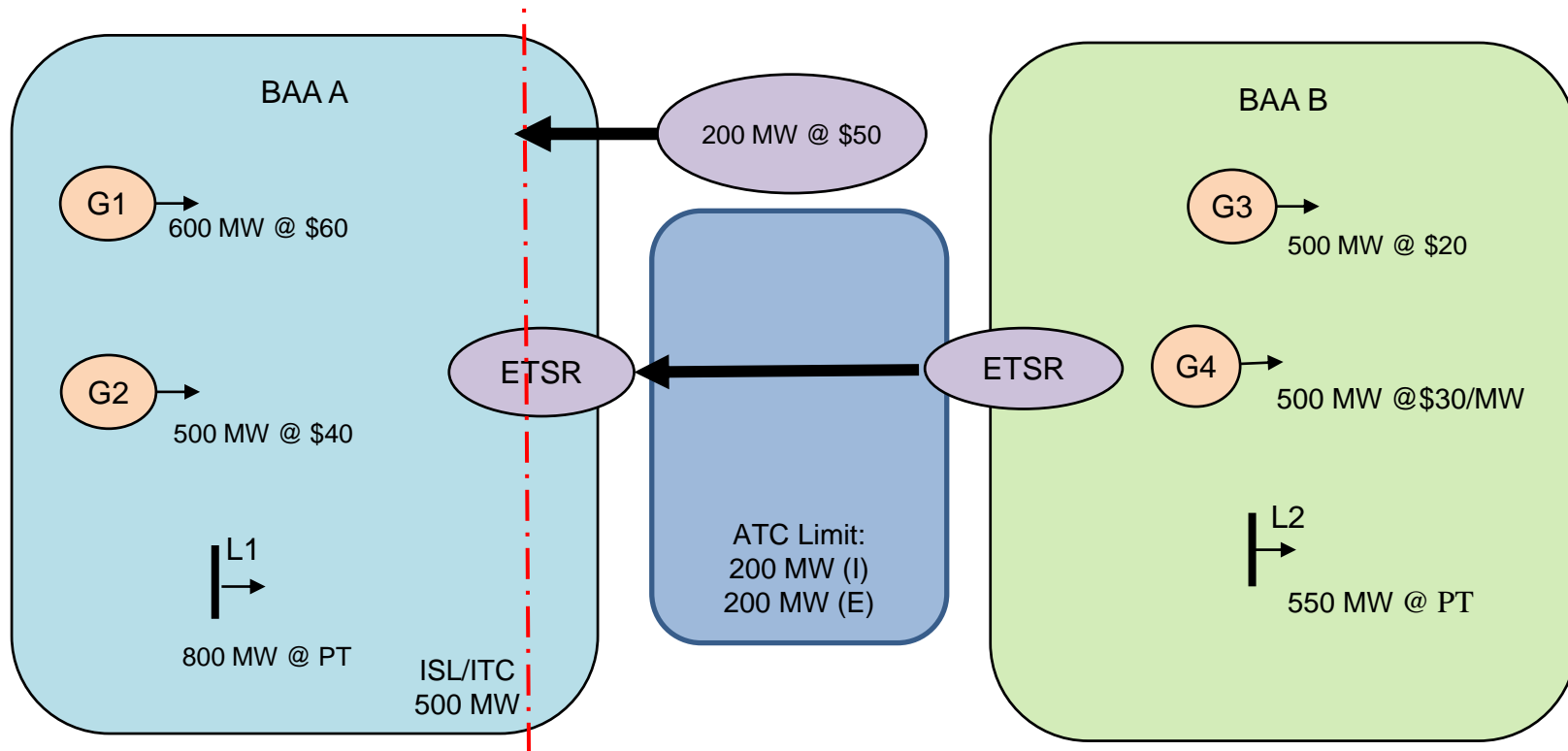
# Transfer Revenue Allocation (2 of 2)

- Transfer Revenue Collection
  - The differences between import transfers settlement and export transfer settlement when transfer constraint binds
    - Energy transfers, Imbalance Reserve transfers, Reliability Capacity transfers
- Transfer Revenue Allocation (in proportional to transmission):
  - BAAs associated with transfer location share in distribution, 50:50
    - EDAM BAAs will allocated per OATT
    - CAISO BAA will allocated to Metered Demand
  - Transmission Customer who releases transmission right to market (pathway 2) will receive 100 percent of Transfer Revenue associated with their transmission rights

# Congestion Revenue Allocation

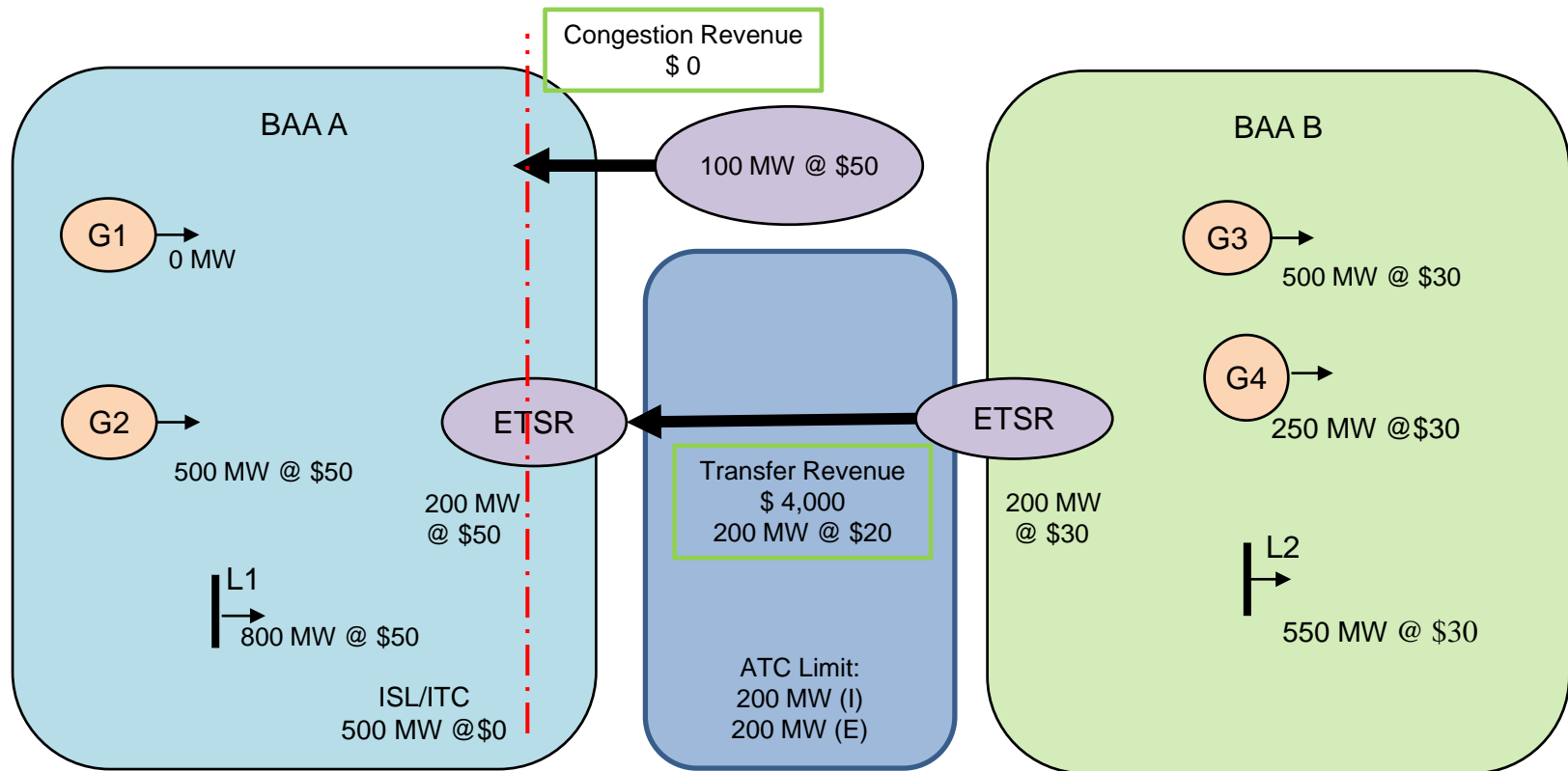
- Marginal cost of congestion (MCC) reflects the shadow price of a binding internal transmission constraint or scheduling limits.
- Collected from
  - MCC price differences across nodes within a BAA
  - MCC price difference between boundary intertie scheduling points (ITC/ISL) and internal nodes within BAA
- Allocated to the BAA in which the transmission constraint is modeled
  - For EDAM BAAs it will be allocated per OATT
  - For CAISO BAA it will be allocated to CRRs and Measured Demand

# IFM Bid Data – Transfer Scheduling Limit binding



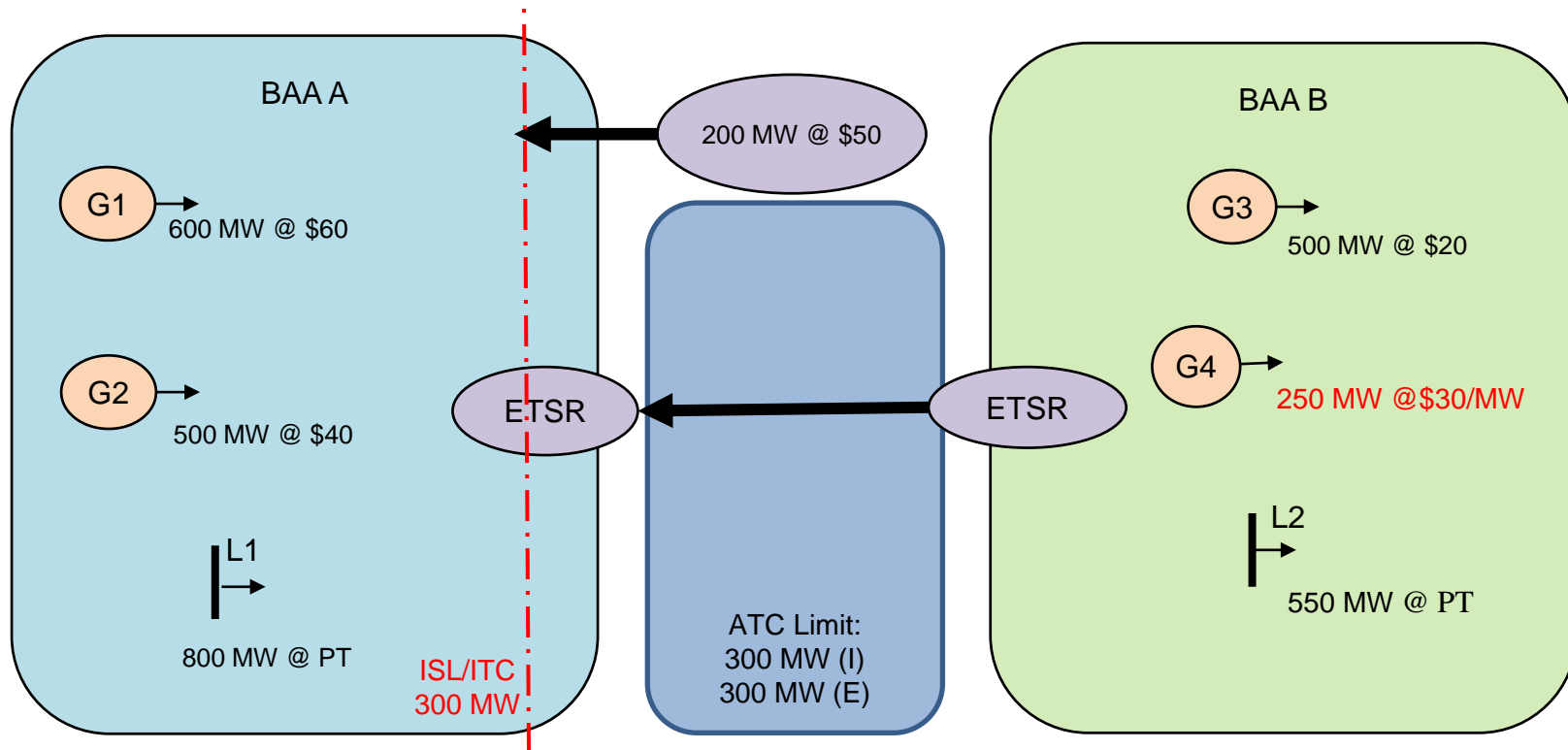
- Transfer Available Transmission Capacity limit is 200 MWs
- Intertie Scheduling Limit/Intertie Transmission Limit is 500 MWs

# Transfer Revenue vs Congestion Revenue – Transfer Binding



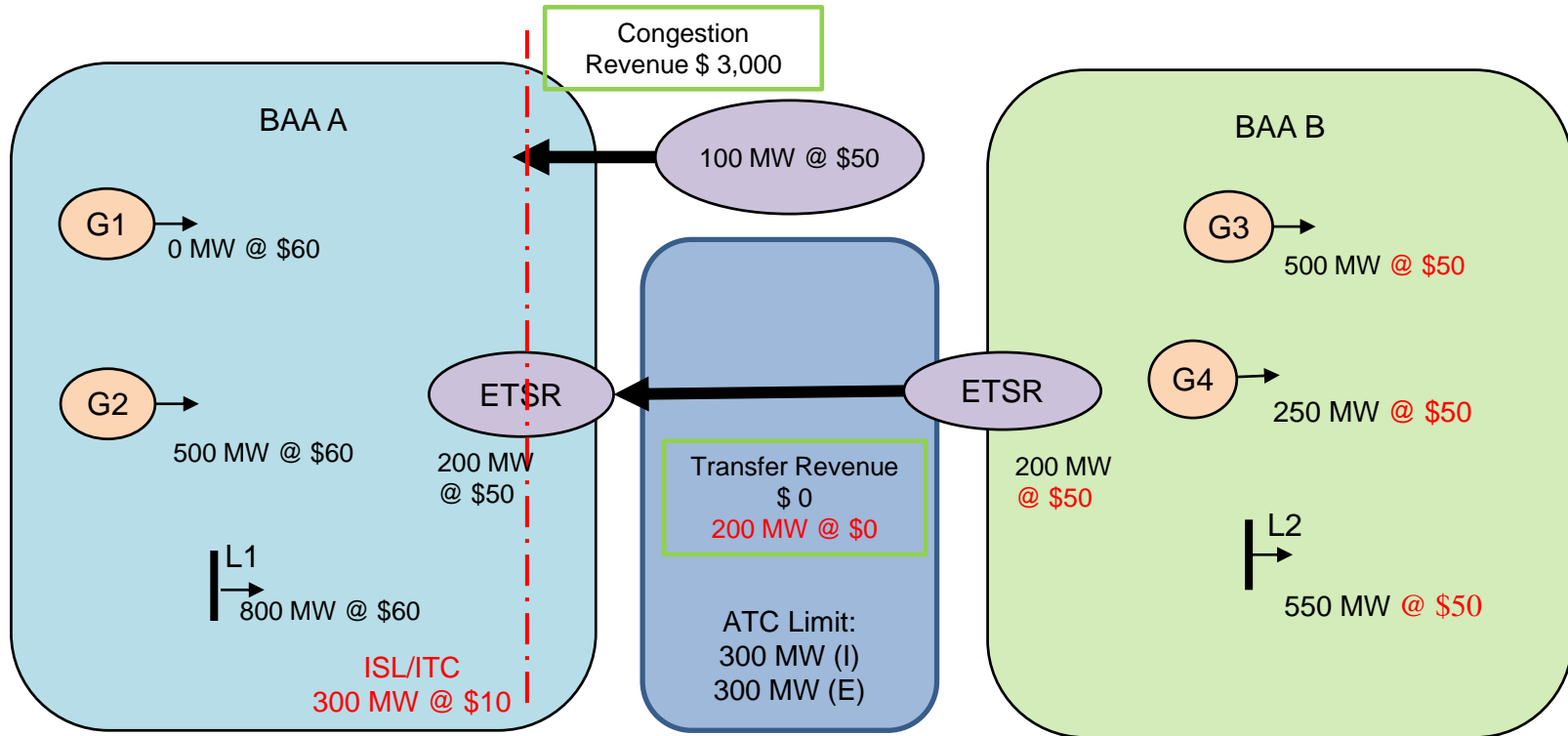
- Transfer Revenue is shared 50:50 between BAA A and BAA B at \$2,000 each
- Congestion Revenue is \$0 allocated to BAA A. ITC not binding

# IFM Bid Data - Intertie Constraint (ITC) Binding



- Transfer Available Transmission Capacity limit is 300 MWs
- Intertie Scheduling Limit/Intertie Transmission Limit is 300 MWs

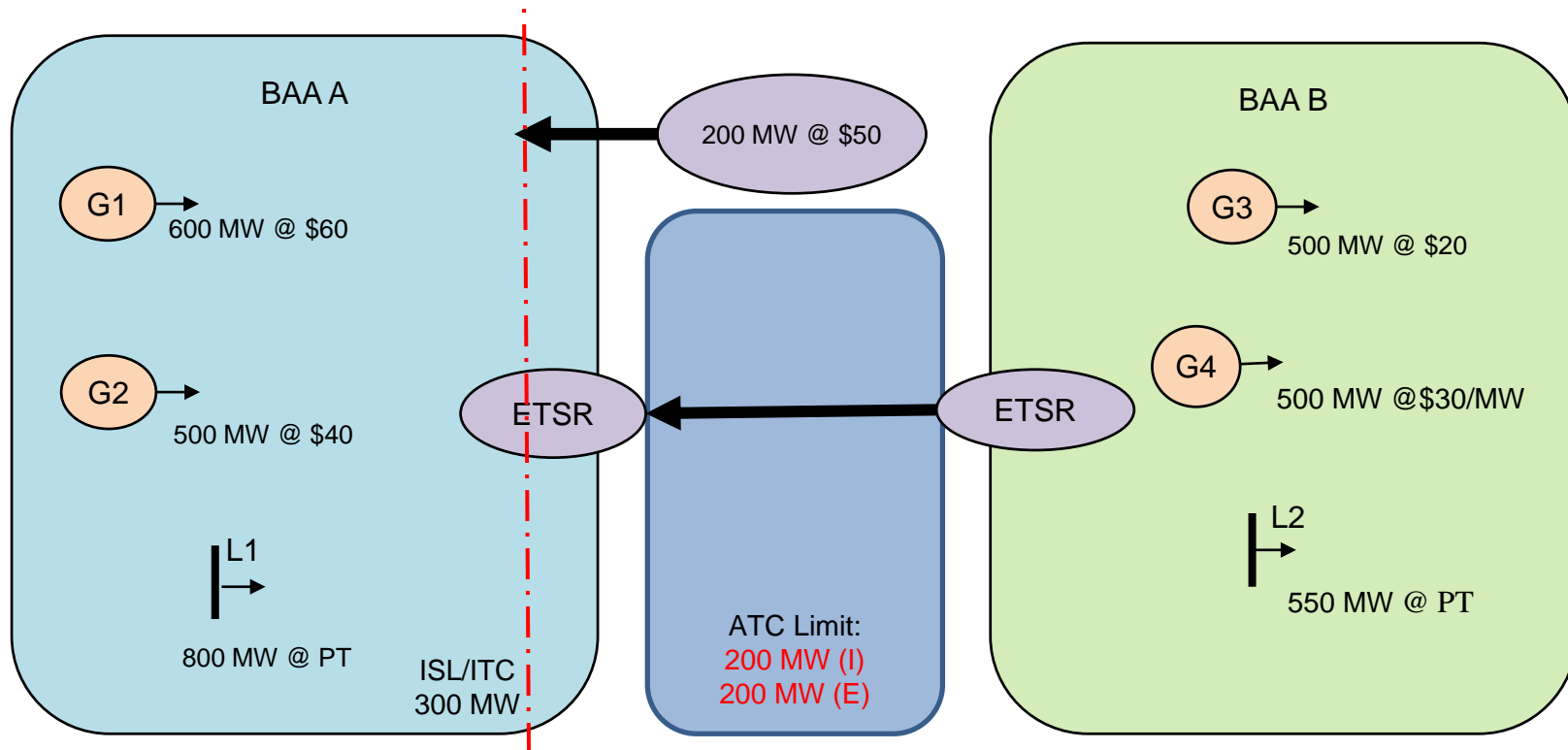
# Transfer Revenue vs Congestion Revenue - ITC Binding



- Transfer Revenue is shared 50:50 between BAA A and BAA B at \$0 each
- Congestion Revenue is \$3,000 allocated to BAA A

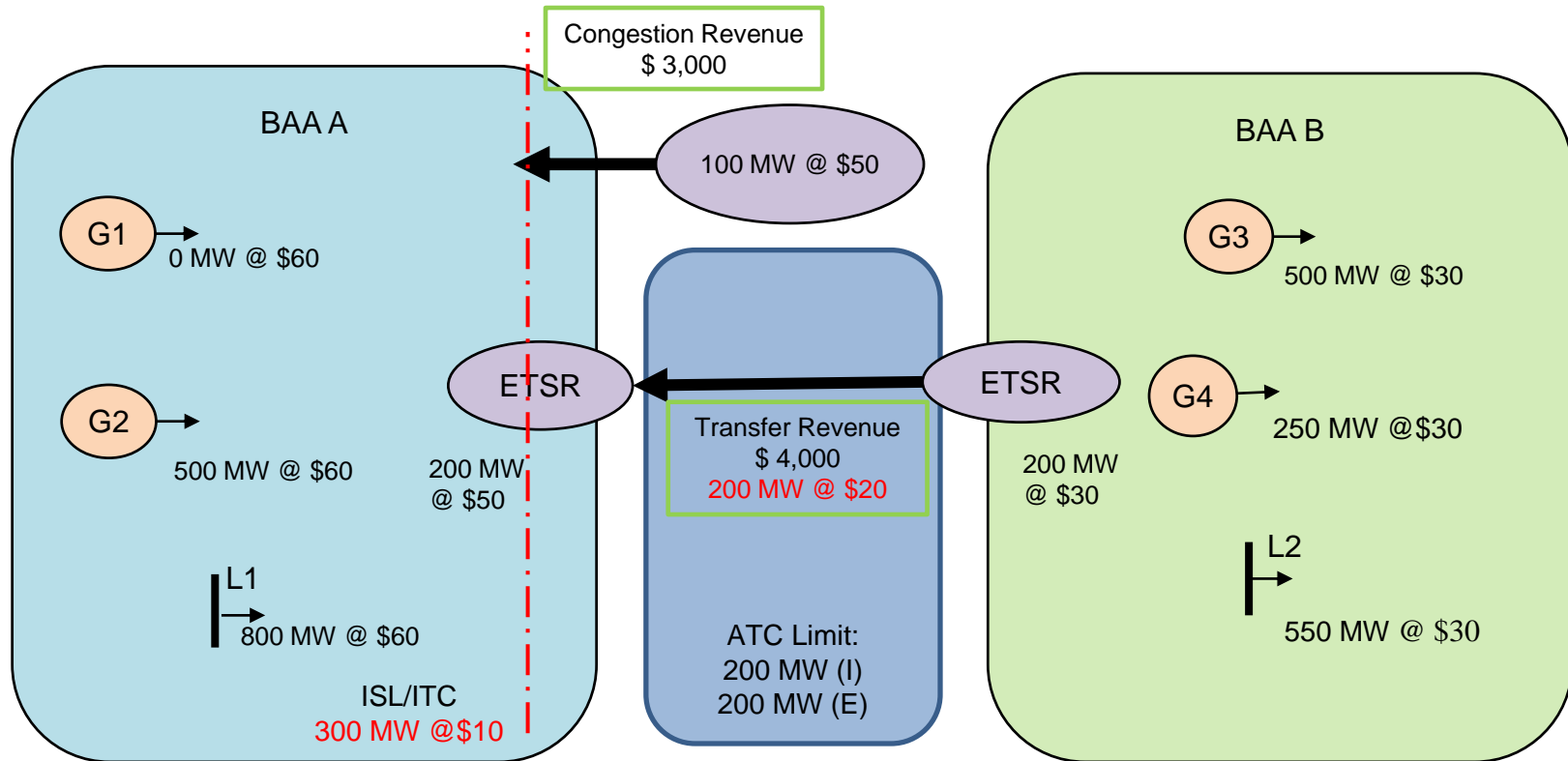


# IFM Bid Data - Both Binding



- Transfer Available Transmission Capacity limit is 200 MWs
- Intertie Scheduling Limit/Intertie Transmission Limit is 300 MWs

# Transfer Revenue vs Congestion Revenue – Both Binding



- Transfer Revenue is shared 50:50 between BAA A and BAA B at \$2,000 each
- Congestion Revenue is \$3,000 allocated to BAA A

# Transfer Revenue and Congestion Revenue

- Informed by stakeholder comments and workshop discussions
- Recognizes the shared value that results when two EDAM entities bring transmission to the transfer location
- Equally sharing the mutual benefit of the transfer is a fair and equitable solution.
- Recognizes that internal congestion revenues associated with the internal constraints should flow to the BAA where the constraint is modeled.

# EDAM

## *Day Ahead Market Outputs: Settlements*

*James Lynn, Principal, Market Settlement Design*

# Settlement Overview

- Resource Sufficiency Settlement
- Day Ahead Award Settlement
- Reliability Capacity Settlement
- Bid Cost Recovery
- WEIM/RTM Settlement
- Transmission Revenue Recovery

# Resource Sufficiency Evaluation Settlement

- IFM RSE failure settlement
  - BAA that fail the resource sufficiency test will be charged  $\max(\text{PV}, \text{MID-C}) * 16 * \text{max hourly deficiency}$
  - Allocated pro-rata to net EDAM exporting BAAs
- RTM RSE failure settlement
  - WEIM RSEE Phase 2 Initiative looks to create assistance energy product to cure deficiencies in WEIM.
    - Collects from WEIM BAAs that cure using assistance energy
    - Allocated the assistance energy revenue to WEIM BAAs that provide the assistance energy

# Extended Day Ahead Settlement

- IFM (including Virtual) Energy Schedules: Settle at IFM LMP
  - Transfer Energy schedules: settle between BAAs at IFM Transfer LMP
    - BAA MEC (PBC shadow price), plus ITC/ISL shadow price, plus MGC (marginal GHG cost)
- IFM GHG attributions: settle at IFM MGC
- ISO BAA energy neutrality settlement by component of LMP (Offsets)
  - BAA MEC and MCL Neutrality will be allocated to EDAM Entity/CAISO measured demand
  - MGC neutrality between GHG and non-GHG region allocated to metered demand
  - BAA MCG neutrality allocated as Congestion Revenue
- Ancillary Services: settle at ASMP
- Imbalance Reserve Awards: Settle at IRUP/IRDP
  - Transfer IRU/IRD schedules: settle between BAAs at IFM Transfer IRUP/IRDP
  - Allocated to EDAM Entity/CAISO DAME two tier allocation methodology

# Reliability Capacity Settlement

- Reliability Capacity Up (RCU) award reliability capacity down (RCD) award will be settled at the locational marginal RCUP/RCDP
  - RCU/RCD transfers will be settled as an import and export between the two EDAM BAAs at the ETSR marginal RCU/RCD price
- Allocation:
  - Allocated to EDAM Entity/CAISO two tier allocation methodology described in DAME initiative



# Bid Cost Recovery Settlement

- **IFM BCR:**
  - Supply resource whose daily IFM Revenue does not cover the daily IFM Costs shall be eligible to receive IFM BCR for the shortfall
  - Total BAA IFM BCR shall be allocated to EDAM Entity for allocation per OATT or via the CAISO two-tiered allocation methodology
- **RUC/RTM BCR**
  - BCR eligible resources will receive uplift for daily RTM/RUC net shortfall
  - RUC BCR portion of RUC/RTM uplift will be allocated to EDAM Entity or via the CAISO two-tiered allocation methodology
  - RTM BCR portion of RUC/RTM uplift will be allocated to EDAM Entity or via the CAISO current allocation methodology

# WEIM/RTM Settlement (1 of 2)

- **Convergence Bid**
  - IFM Virtual Supply/Demand has a reversal settlement at the FMM LMP
- **Imbalance Energy Settlement in EDAM BAA**
  - Reference point for calculating Imbalance Energy is the resource Day-Ahead Schedule and not the Base Schedule (no base schedules in EDAM BAAs)
  - Intertie resources are subject to HASP Reversal provisions
  - RTM GHG settlement is a deviation settlement from IFM GHG attribution settlement
  - Transfers will have a financially binding imbalance settlement from day-ahead transfer transfer at the ETSR LMP
  - RTM transfer revenue will be calculated and distributed as described in Transfer Revenue section

# WEIM/RTM Settlement (2 of 2)

- **Flexible Ramp Settlement**
  - RTM forecasted movement is an imbalance settlement from DAM accounting for day-ahead schedule forecasted movement
  - RTM Uncertainty settlement is an imbalance settlement of the 5-minute ramp-capable portion of the day-ahead Imbalance Reserve award
- **Intertie Deviation settlement will apply to intertie schedules**
  - Charge applied to intertie resources that receive an award in HASP and deviate from schedule for non-reliability reasons

# Transfer Revenue Recovery Settlement

- BAA's TRR recovery amount collection
  - From EDAM footprint metered load less the recovering EDAM BAA's metered load.
  - From EDAM footprint gross metered load plus gross supply less the recovering EDAM BAA's gross metered load plus gross supply.
- Distribute BAA TRR recovered amount to the EDAM entity of EDAM BAA or ISO's participating transmission owners.

The logo for EDAM, consisting of the letters 'E', 'D', 'A', and 'M' in a bold, sans-serif font. The letters are white with a slight blue gradient and are set against a dark blue background.

# EDAM Fees Framework

April Gordon, *Director, Financial Planning and Procurement*

# Implementation Agreement and Fee

- Implementation agreement will establish the implementation date for entity's participation in the day-ahead market
- Implementation at cost of service
  - Implementations costs will be tracked separately from other implementations
  - Projected average implementation cost is \$1.2M
  - Upfront deposit is \$300K; additional \$300K deposits as necessary
- Implementation activities include project management, administrative management, full network modeling of resources, system integration and functional testing, metering and settlements, and operations readiness and training.

# EDAM Administrative Fees Framework

- Fees will consist of the existing market services charge and a new EDAM system operations charge
  - Market services charge represents fees for the real-time market and the day-ahead market services that EDAM offers, and applies to awarded MWh of energy and MW of capacity.
  - EDAM systems operations charge will represent the fees for real-time dispatch services that EDAM offers, and it applies to metered flows in MWh of supply and demand.
- All customers receiving market services will benefit from a lower market services charge once EDAM is operationally effective because the charge will be calculated using the incremental day-ahead MWh volumes from EDAM participants.

# EDAM

## Next Steps



California ISO



# EDAM Tariff Framework – September 15

- WEIM tariff development started with a framework
  - guide to applicable CAISO tariff provisions
- EDAM tariff framework draft published in September will reflect the revised straw proposal in an outline format
  - facilitate understanding of the relationship between the market design and anticipated tariff provisions
- EDAM tariff framework published in November will reflect the draft final proposal and include market design details
  - establish the scope of applicable market rules
- EDAM draft tariff language will follow the final proposal and consideration by the WEIM GB/Board

## Next steps

- Please submit comments on the revised straw proposal using the commenting tool linked on the initiative webpage.
  - Comments are due by end of day September 26.
- EDAM Settlements Workshops: Tentatively scheduled for October 5 and 6, 2022
- Visit the initiative webpage for more information: [California ISO - Extended day-ahead market \(caiso.com\)](https://www.caiso.com/California-ISO-Extended-day-ahead-market)
- If you have any questions, please contact [ISOStakeholderAffairs@caiso.com](mailto:ISOStakeholderAffairs@caiso.com)

# EDAM

## Closing remarks

Mark Rothleder, *Senior Vice President and Chief Operating Officer*

Thank you for your participation. That concludes the Extended Day-Ahead Market stakeholder meeting.