EDAM
EXTENDED DAY-AHEAD MARKET

Technical Workshop: Settlements

October 11, 2022

California ISO

Reminders

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- 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.

Agenda

Time	Topic
9:00 - 9:10	Welcome and introduction
9:10 - 12:00 *Break at 10:30 a.m.*	Day-Ahead Market Outputs: Settlements • Day-Ahead Market Settlement
12:00 - 1:00	Lunch
1:00 - 3:50 *Break at 2:00 p.m.*	Day-Ahead Market Outputs: Settlements • WEIM/Real-Time Market Settlement
3:50 - 4:00	Next steps

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Day Ahead Market Outputs: Settlements

James Lynn, *Principal, Market Settlement Design*

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EDAM Settlements Design Overview

- Resource Sufficiency Evaluation (RSE) – Settlement Components
- Day Ahead Award Settlement
- Imbalance Reserve Settlement
- Reliability Capacity Settlement
- Bid Cost Recovery (BCR)
- WEIM/RTM Settlement
- Transmission Revenue Recovery (TRR)
- High-Level End to End Settlement Example

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Day Ahead Market Settlement

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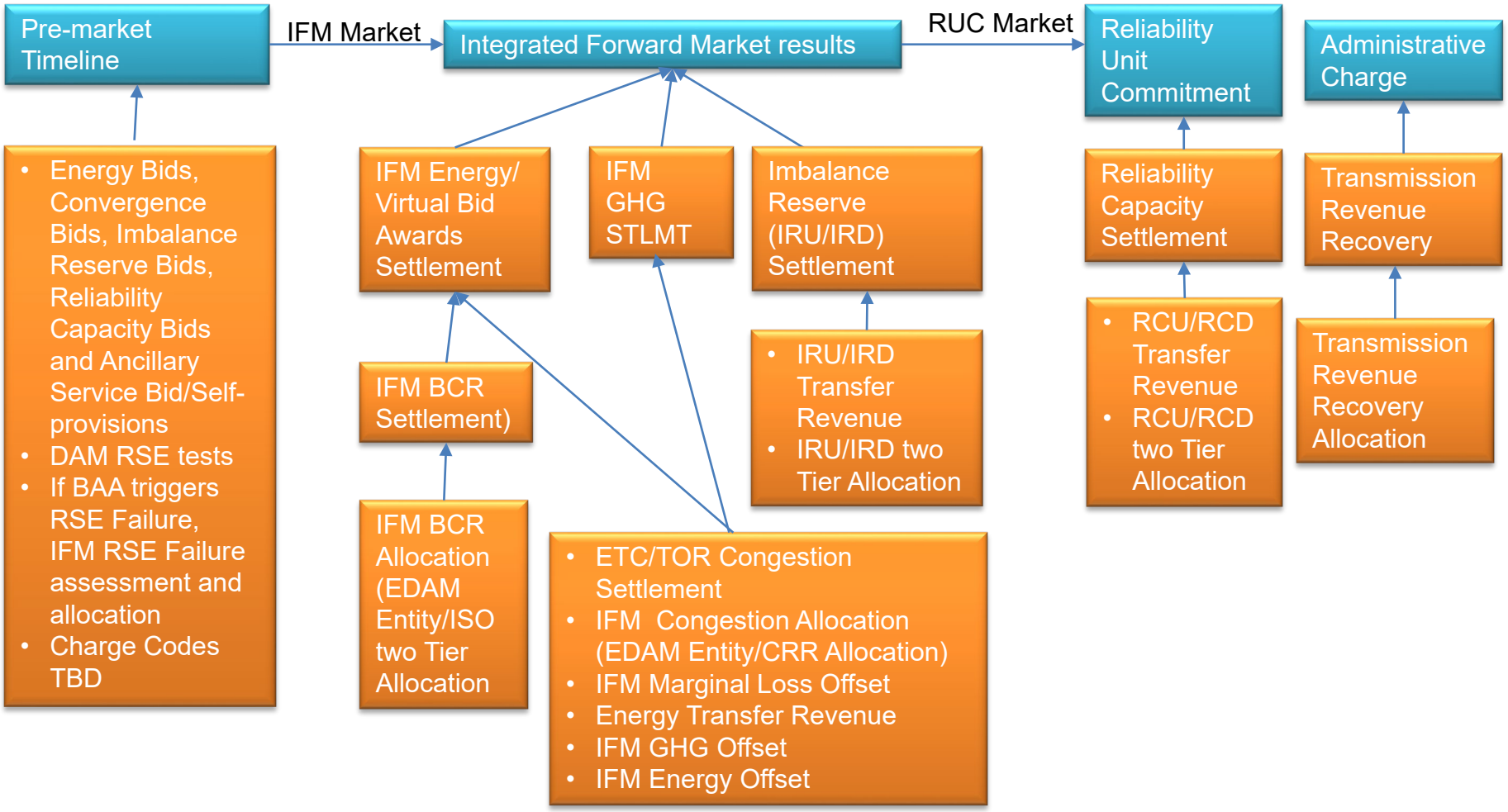
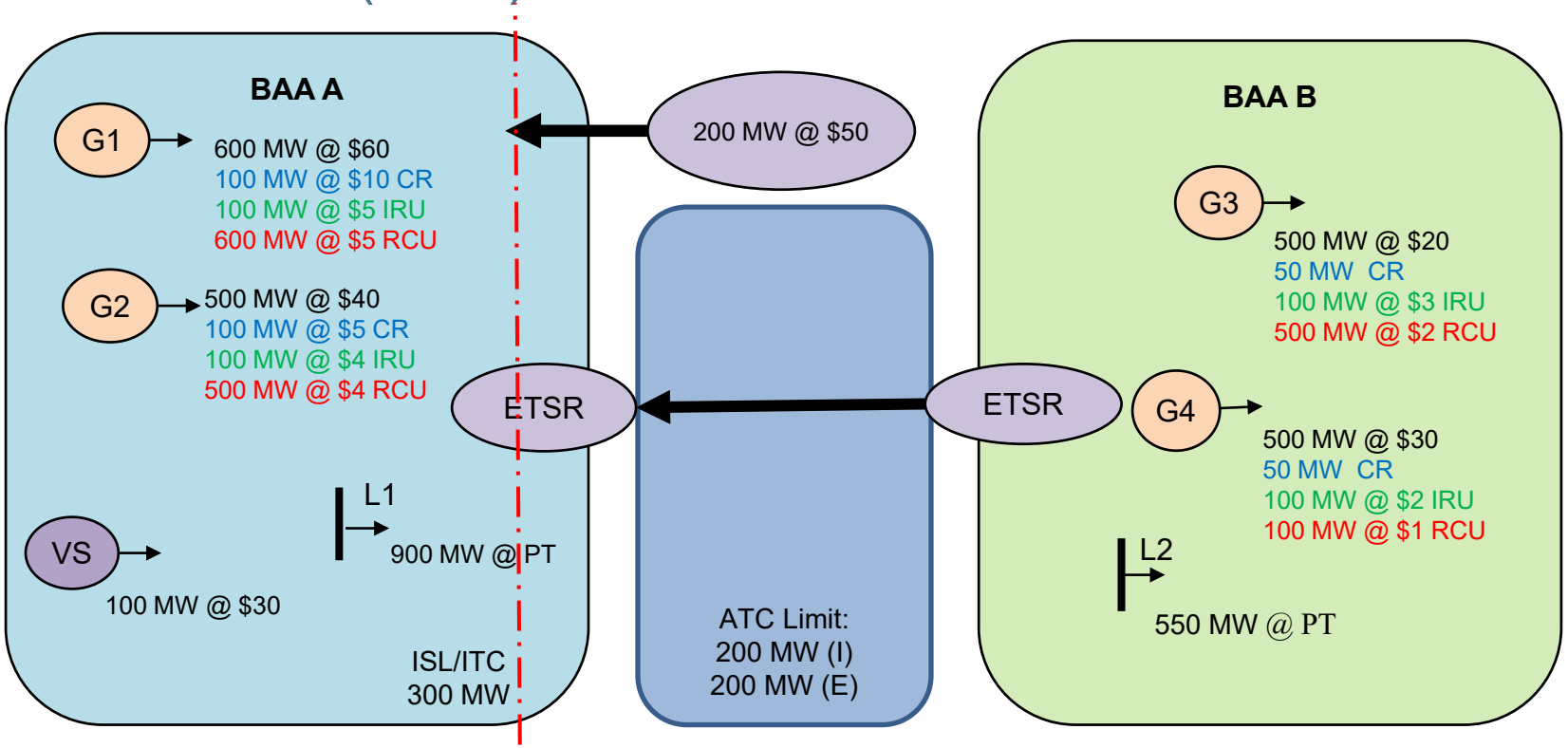

Pre-market Timeline
IFM Market
Integrated Forward Market results
RUC Market
Reliability Unit Commitment
Administrative Charge
• Energy Bids, Convergence Bids, Imbalance Reserve Bids, Reliability Capacity Bids and Ancillary Service Bid/Self-provisions
• DAM RSE tests
• If BAA triggers RSE Failure, IFM RSE Failure assessment and allocation
• Charge Codes TBD
IFM Energy/ Virtual Bid Awards Settlement
IFM GHG STLMT
Imbalance Reserve (IRU/IRD) Settlement
IFM BCR Settlement)
IFM BCR Allocation (EDAM Entity/ISO two Tier Allocation
• IRU/IRD Transfer Revenue
• IRU/IRD two Tier Allocation
• ETC/TOR Congestion Settlement
• IFM Congestion Allocation (EDAM Entity/CRR Allocation)
• IFM Marginal Loss Offset
• Energy Transfer Revenue
• IFM GHG Offset
• IFM Energy Offset
Reliability Capacity Settlement
Transmission Revenue Recovery
• RCU/RCD Transfer Revenue
• RCU/RCD two Tier Allocation
Transmission Revenue Recovery Allocation

Integrated Forward Market (IFM)/Residual Unit Commitment (RUC) Bid Data



- Load Forecast – Balancing Authority Area (BAA) A: 1000 MW, BAA B: 600 MW
- Transfer Available Transmission Capacity limit is 200 MWs
- Intertie Scheduling Limit/Intertie Transmission Limit is 300 MWs
- Imbalance Reserve Requirements – BAA A: 100 MWs; BAA B: 100 MWs
- Contingency Reserve Requirement - BAA A: 100 MWs; BAA B: 100 MWs

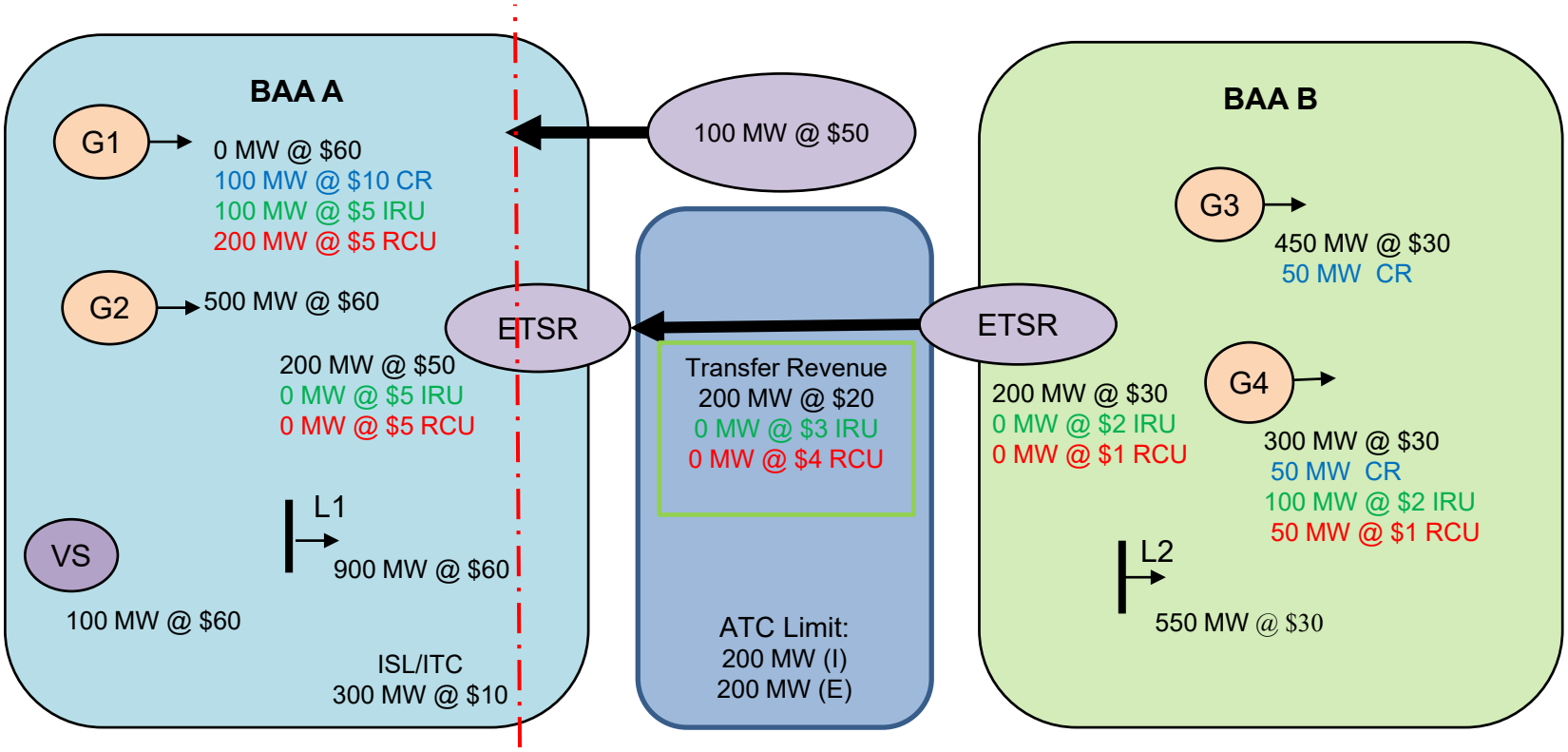
RSE – Failure Consequence EDAM Settlement

- EDAM RSE failure settlement proposed in revised straw proposal
  - BAA that fail the resource sufficiency test will be assessed an administrative surcharge based upon a 16-hour block product priced at the higher of the prices at bilateral hubs (PV, Mid-C) based on the maximum hourly deficiency.
    - Provisions for adjusting the surcharge.
  - RSE administrative surcharges of EDAM BAA are assessed to the EDAM entity.
    - Each EDAM entity has the ability to determine how to sub-allocate surcharges
  - RSE administrative surcharges of ISO BAA would be allocated through a two-tier allocation:
    - Tier 1: Allocate directly to deficient load-serving entity (LSE)
    - Tier 2: Remaining costs allocated pro-rata to measured demand
- Distribution of RSE administrative surcharges
  - Distributed to BAA who have not failed the RSE test in pro-ration to net export transfers
    - Further distribute the surcharge within in the net export BAAs to metered demand

Example RSE result

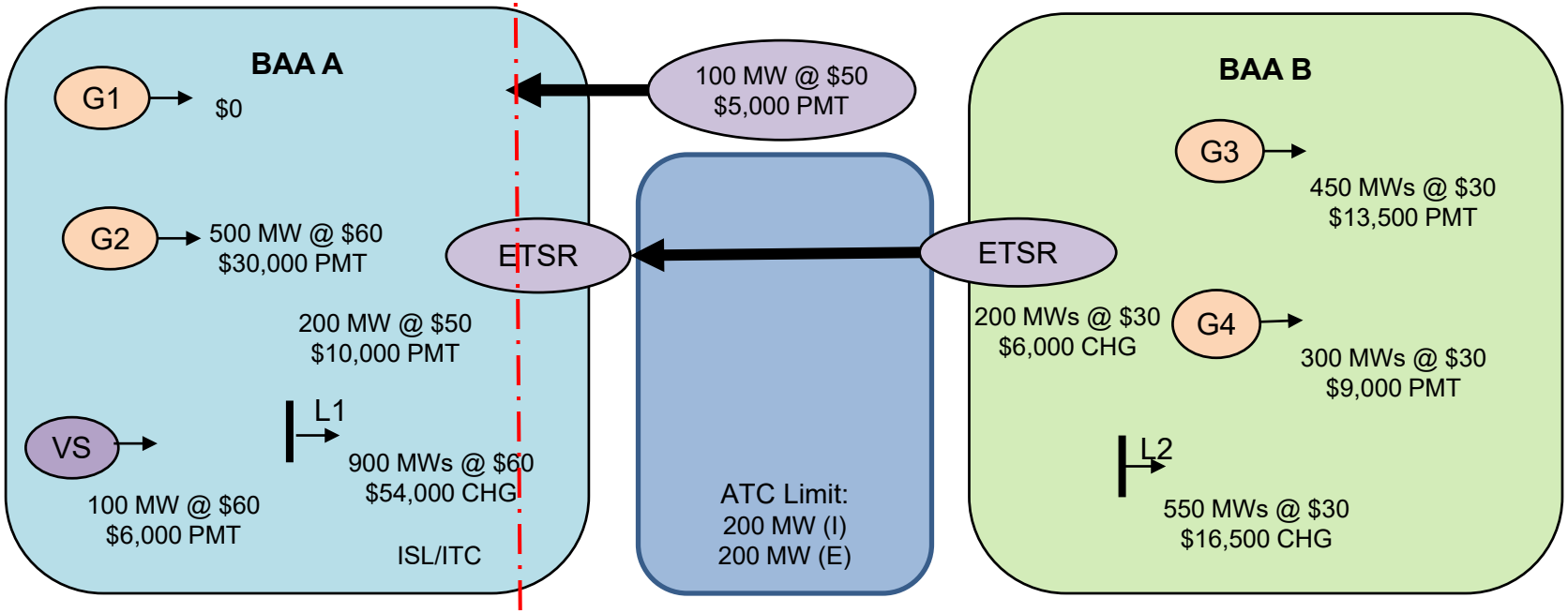
- Settlement Example IFM RSE Test Results
  - BAA A
    - Energy
      - L1: 1000MW; ETSR1: 100MW; G2: 500MW; SR: 200MW; G1: 200MW
    - Capacity
      - G1: 100MW CR; G1: 100MW IRU
    - Pass - BAA A is not assessed RSE administrative charge
  - BAA B
    - Energy
      - L2: 700MW; ETSR2: 100MW; G3: 450MW; G4: 350MW
    - Capacity
      - G3: 50MW CR; G4: 50MW CR; G4: 100MW IRU
    - Pass - BAA B is not assessed RSE administrative charge

Day Ahead Market Results



Day Ahead Energy Settlement

- IFM (including convergence bids) Energy Schedules: Settle at IFM locational marginal price (LMP)
  - Transfer Energy schedules settle within each BAAs at IFM Transfer LMP
    - BAA marginal energy cost (MEC) (power balance constraint (PBC) shadow price), plus intertie transmission constraint (ITC)/intertie scheduling limit (ISL) shadow price, plus MGC (marginal greenhouse gas (GHG) cost)
- IFM GHG attributions: settle at IFM MGC



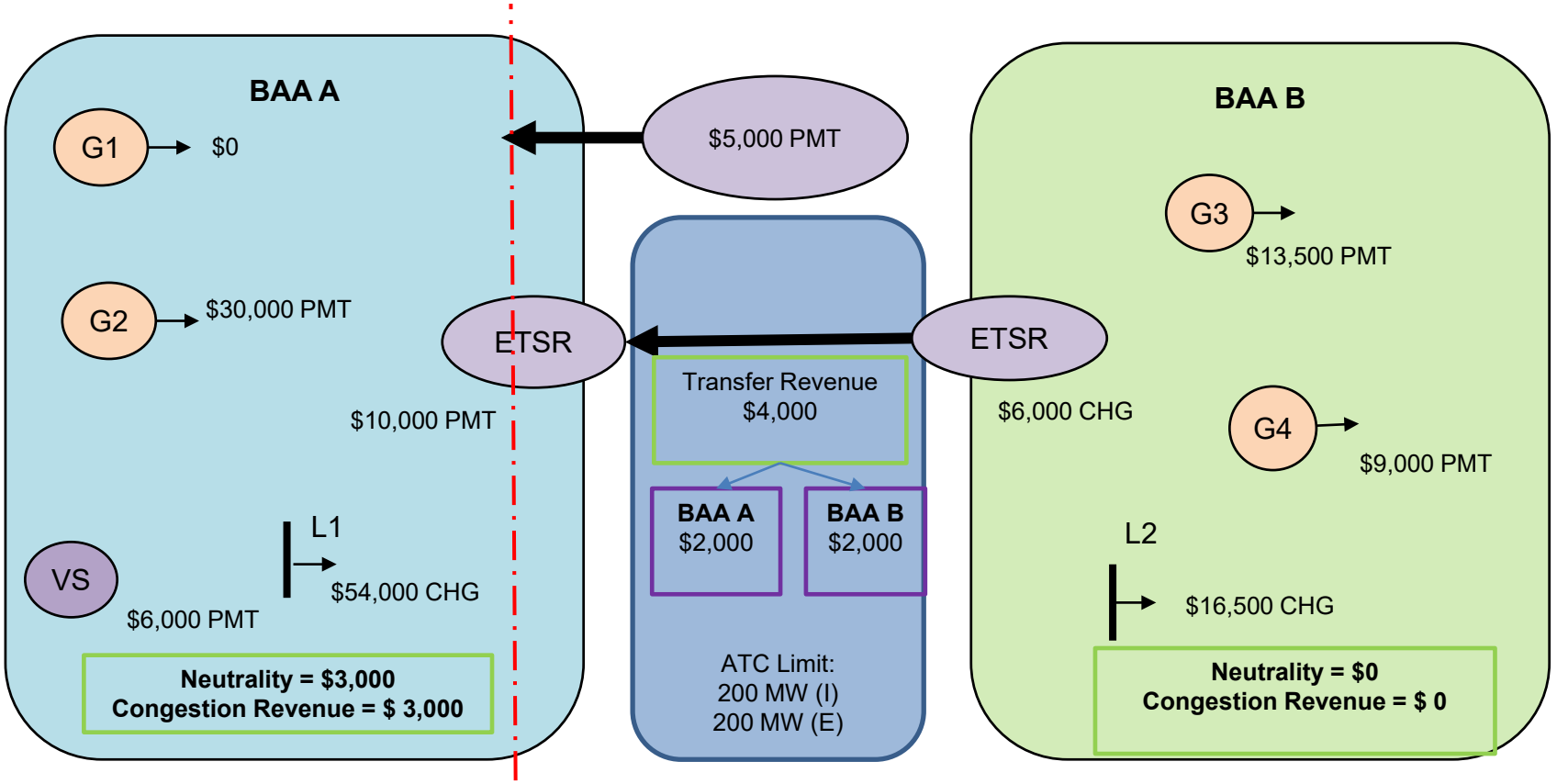
Day Ahead Energy Neutrality Settlement (1 of 2)

- ISO BAA energy neutrality by component of LMP (Offsets)
  - IFM Marginal Loss Offset:
    - Sum of BAA day ahead energy schedule/virtual award and marginal cost of losses (MCL) of LMP
    - Allocated to EDAM Entity/CAISO measured demand
  - IFM Marginal Congestion Offset:
    - Sum of BAA day ahead energy schedule/virtual award and marginal congestion component (MCC) of LMP
      - EDAM BAA costs allocated to EDAM Entity
      - CAISO BAA costs used to fund Congestion Revenue Rights otherwise allocated to measured demand
  - IFM Marginal Greenhouse Gas Offset
    - Sum of GHG/Non-GHG region day ahead energy schedule/virtual award and MGC of LMP net of GHG attribution payments
    - Allocated to GHG region/non-GHG region metered demand

Day Ahead Energy Neutrality Settlement (2 of 2)

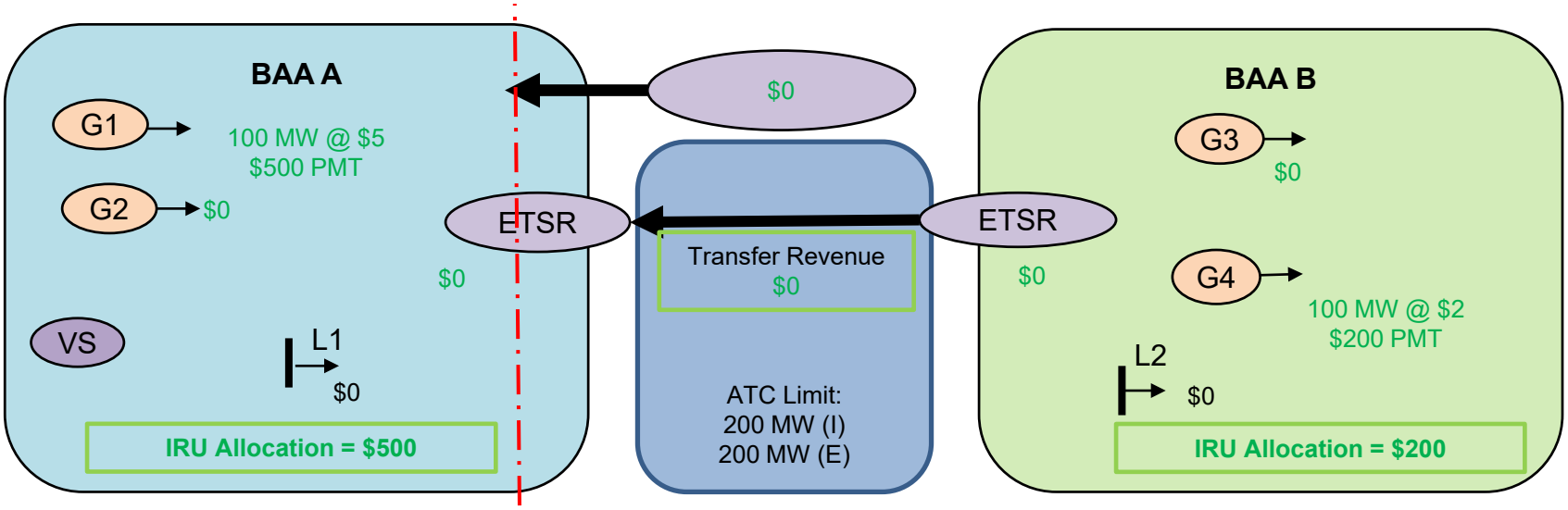
- ISO BAA energy neutrality settlement by component of LMP (Offsets)
  - IFM Marginal Energy Offset:
    - Sum of BAA day ahead energy schedule/virtual award and LMP less the IFM Marginal Loss Offset, IFM Marginal Congestion Offset, and IFM Marginal Greenhouse Gas Offset
    - Allocated to EDAM Entity/CAISO measured demand
  - IFM Energy Transfer Revenue
    - The product of Transfer Energy awards and the LMP difference between Export and Import BAA Transfer price
    - Distributed to each BAA at ratio of 50:50 based on transmission at interfaces between BAAs made available to EDAM
      - If Transfer Revenue from Transmission customer released transfer transmission allocated to transmission customer (Pathway 2)
      - EDAM BAA Transfer Revenue allocated to EDAM Entity for sub-allocation to Transmission customer and metered load per open access transmission tariff (OATT)
      - CAISO BAA Transfer Revenue allocated to metered demand

Example: Day Ahead Energy Neutrality settlement



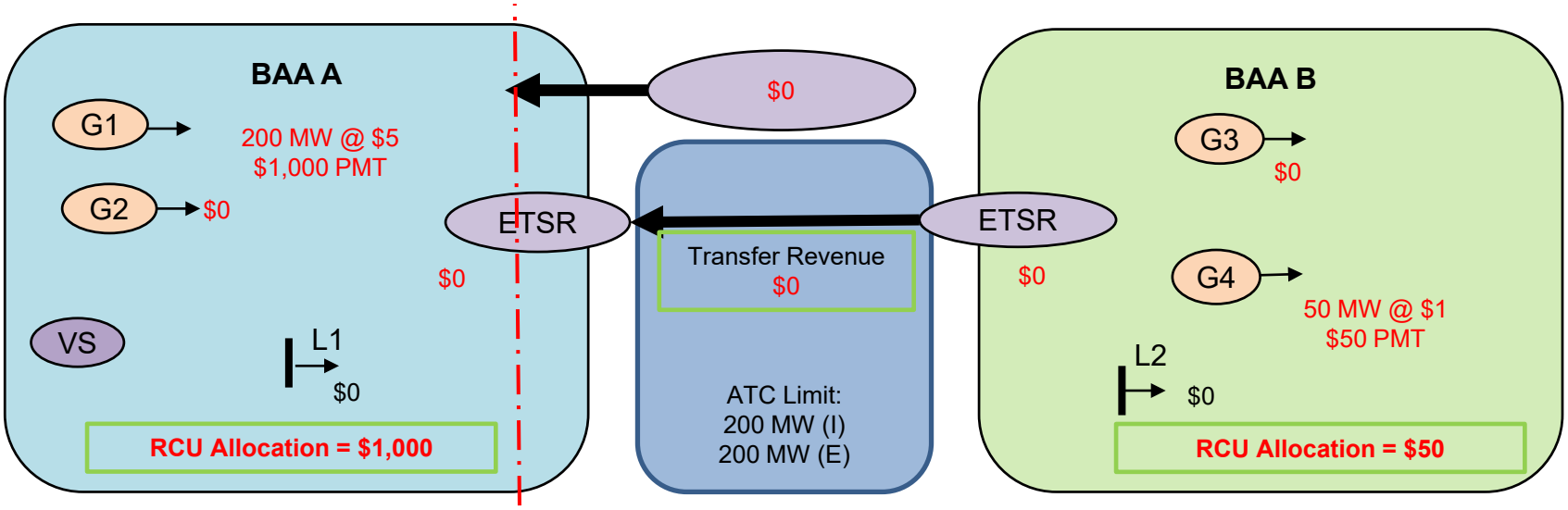
Imbalance Reserve Settlement

- Settlement:
  - Imbalance reserve up (IRU) award/imbalance reserve down (IRD) award will be settled at the locational imbalance reserve marginal price (IRUP/IRDP)
- Allocation:
  - BAA IRU/IRD costs allocated to BAA resource based upon two-tier allocation methodology described in the Day-Ahead Market Enhancements (DAME) initiative
- IRU/IRD Transfer Revenue shared 50:50 between BAA A and BAA B



Reliability Capacity Settlement

- Settlement:
  - Reliability capacity up (RCU) award/ reliability capacity down (RCD) award will be settled at the locational reliability capacity marginal price (RCUP/RCDP)
- Allocation:
  - BAA RCU/RCD costs allocated to BAA resource based upon two-tier allocation methodology described in DAME initiative
- RCU/RCD Transfer Revenue shared 50:50 between BAA A and BAA B



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
    - IFM Revenue include Energy Settlement, Ancillary Service Settlement, and Imbalance Reserve Settlement
    - IFM Costs include Start-Up Costs, Minimum Load Costs, Transition Costs, Energy Bid Cost, Ancillary Service Bid Cost, and Imbalance Reserve Bid Cost
  - IFM BCR Adjustment
    - IFM BCR adjustment = Total IFM BCR Amount * (Net transfer out / sum of (Net transfer out + IFM Load schedule + IFM Export Schedule)
    - IFM BCR Adjustment distribution = IFM BCR Adjustment * BAA Net IFM Transfer In / Total of BAA IFM Transfer In
  - Total BAA IFM BCR shall be allocated to EDAM Entity for allocation per OATT or via the CAISO two-tiered allocation methodology

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WEIM/Real-Time Market (RTM) Settlement

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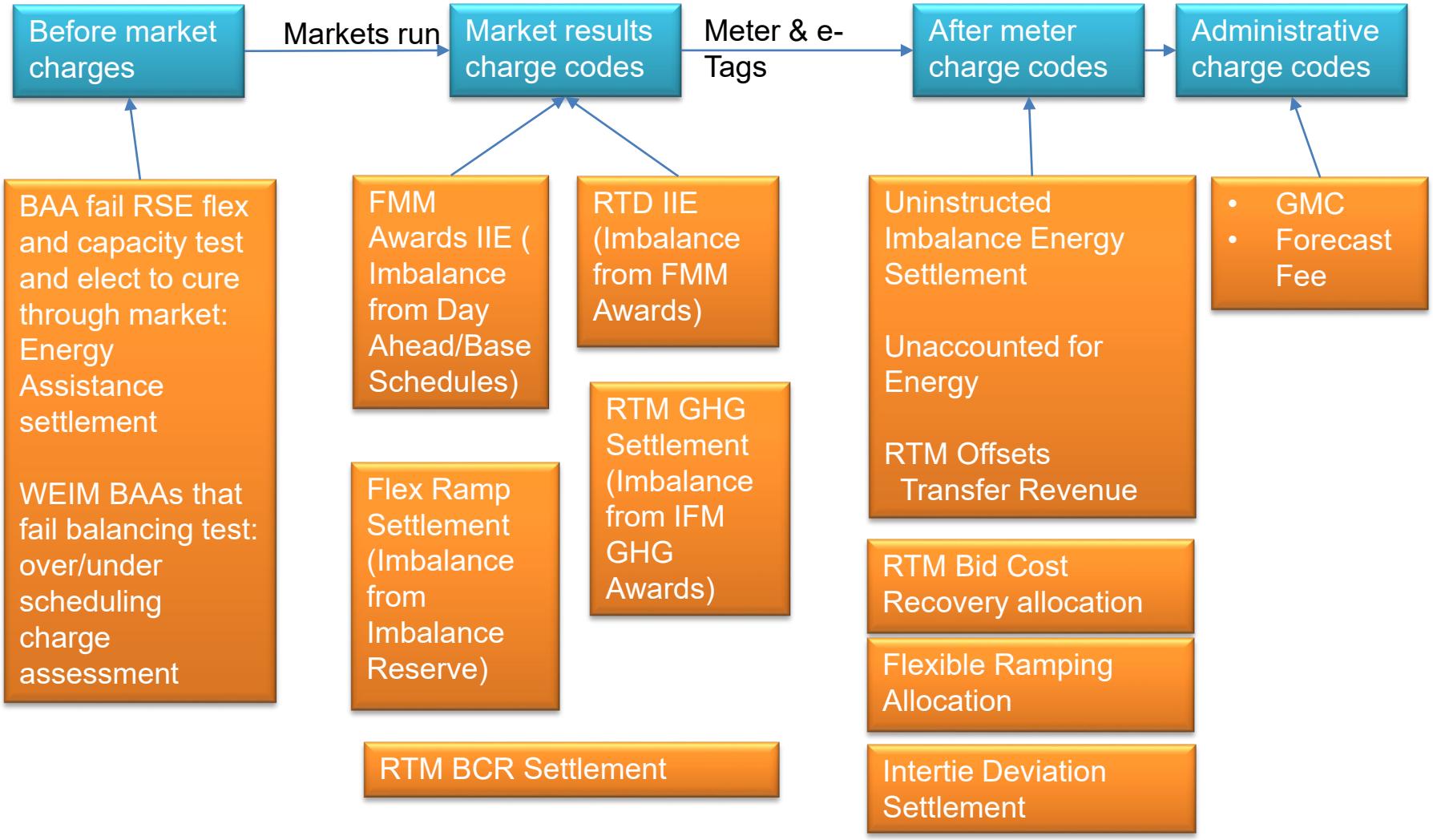
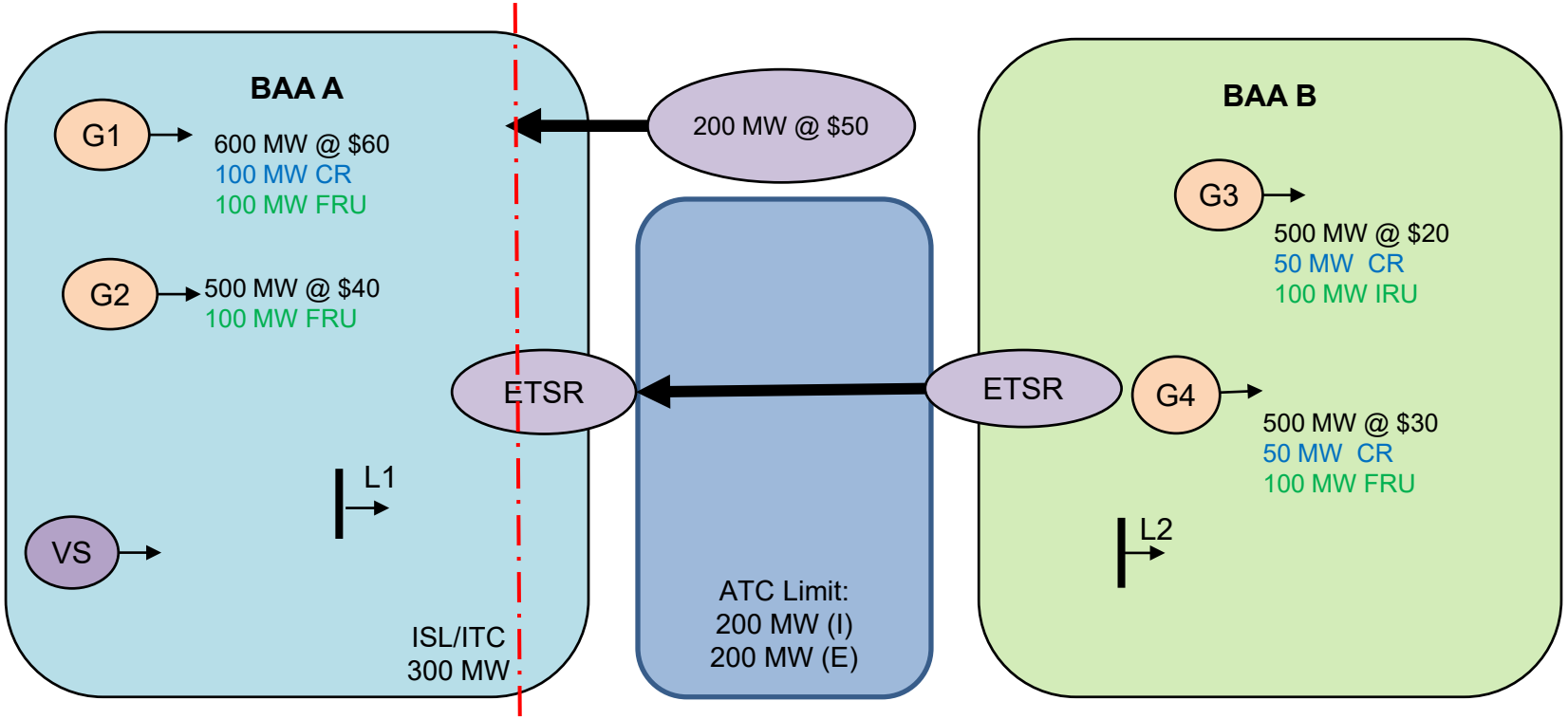

Before market charges
Markets run
Market results charge codes
Meter & e-Tags
After meter charge codes
Administrative charge codes
BAA fail RSE flex and capacity test and elect to cure through market: Energy Assistance settlement
WEIM BAAs that fail balancing test: over/under scheduling charge assessment
FMM Awards IIE (Imbalance from Day Ahead/Base Schedules)
RTD IIE (Imbalance from FMM Awards)
RTM GHG Settlement (Imbalance from IFM GHG Awards)
Flex Ramp Settlement (Imbalance from Imbalance Reserve)
RTM BCR Settlement
Uninstructed Imbalance Energy Settlement
Unaccounted for Energy
RTM Offsets Transfer Revenue
RTM Bid Cost Recovery allocation
Flexible Ramping Allocation
Intertie Deviation Settlement
GMC
Forecast Fee

RTM/WEIM Bid Data – Settlement example



- Load Forecast - BAA A: 1050 MW, BAA B: 600 MW
- Transfer Available Transmission Capacity limit is 200 MWs
- Intertie Scheduling Limit/Intertie Transmission Limit is 300 MWs
- Flexible Ramp Requirement: BAA A 50 MW and BAA B 100 MWs
- Contingency Reserve Requirement is unchanged from Day Ahead

WEIM RSE Failure Consequence Settlement

- RTM RSE flexible ramp and capacity test failure settlement (Energy Assistance)
    - If BAA opts in for assistance energy then
        - Collects from BAAs that cure using functionality as sum of fifteen-minute market (FMM) instructed imbalance energy (IIE), real-time dispatch (RTD) IIE, uninstructed imbalance energy (UIE), and unaccounted for energy (UFE) at the relevant energy assistant price (embedded in MCC)
    - Allocated the assistance energy revenue to WEIM BAAs that provide the assistance energy
        - Sub-allocated to generation that provide incremental RTM supply

- RTM RSE balancing test failure settlement
    - Assessment of over/under-scheduling penalty to failing WEIM BAAs
    - Over/under-scheduling payment to passing WEIM BAAs
        - EDAM BAAs are not considered in this penalty

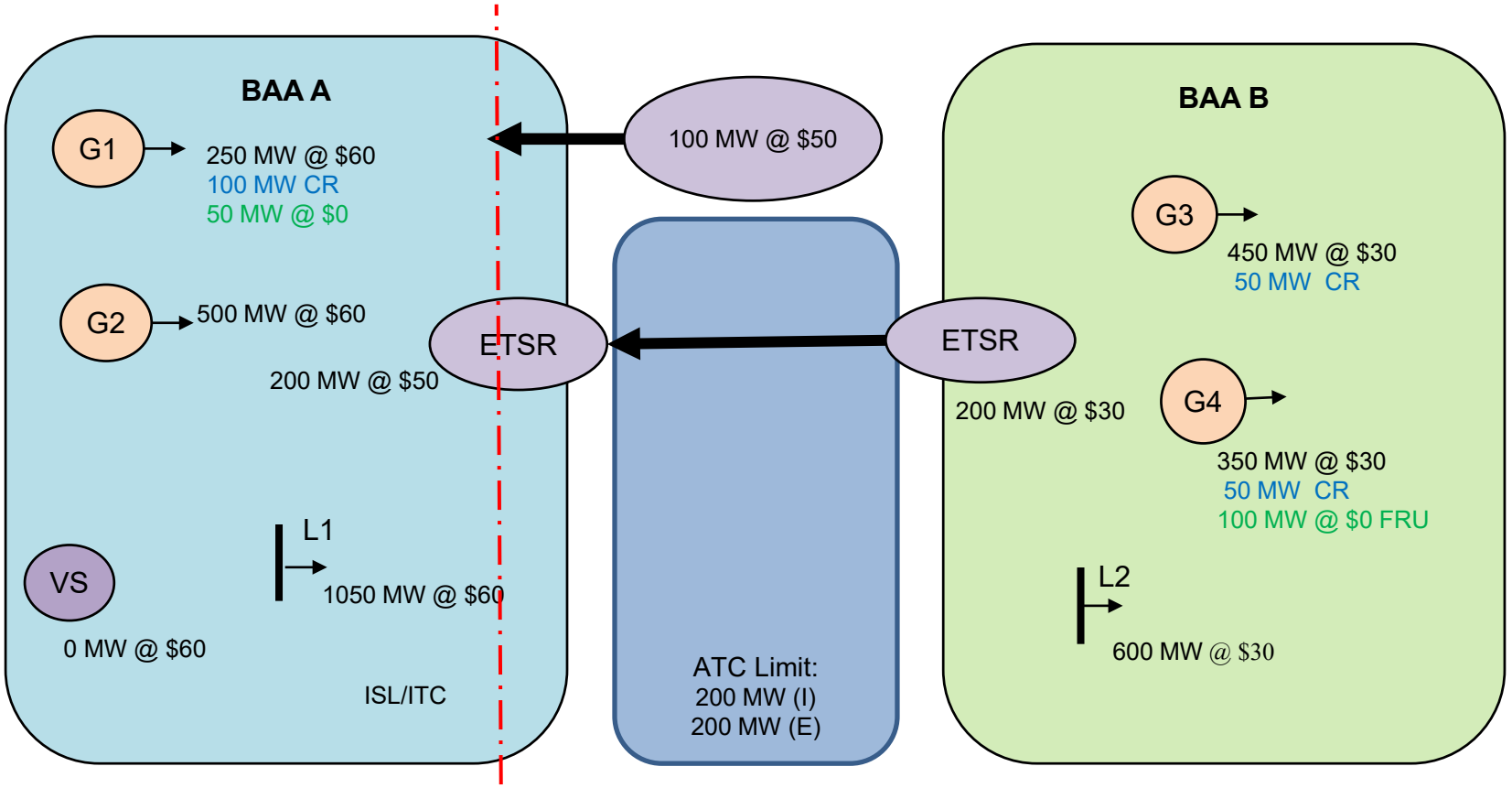
RTM Settlement example – WEIM RSE results

- BAA A and BAA B both opted in for Energy Assistance
  - Energy assistance not needed for either BAAs

- BAA A
  - Requirements
    - L1: 1050MW; CR: 100MW; FRU: 50MW;
  - Capacity
    - G1: 500MW; G2: 600MW; ETSR: 200MW; SR: 100MW
  - Pass

- BAA B
  - Requirements
    - L2: 600MW; CR: 100MW; FRU: 100MW; ETSR: 200MW
  - Capacity
    - G3: 500MW; G4: 500MW;
  - Pass

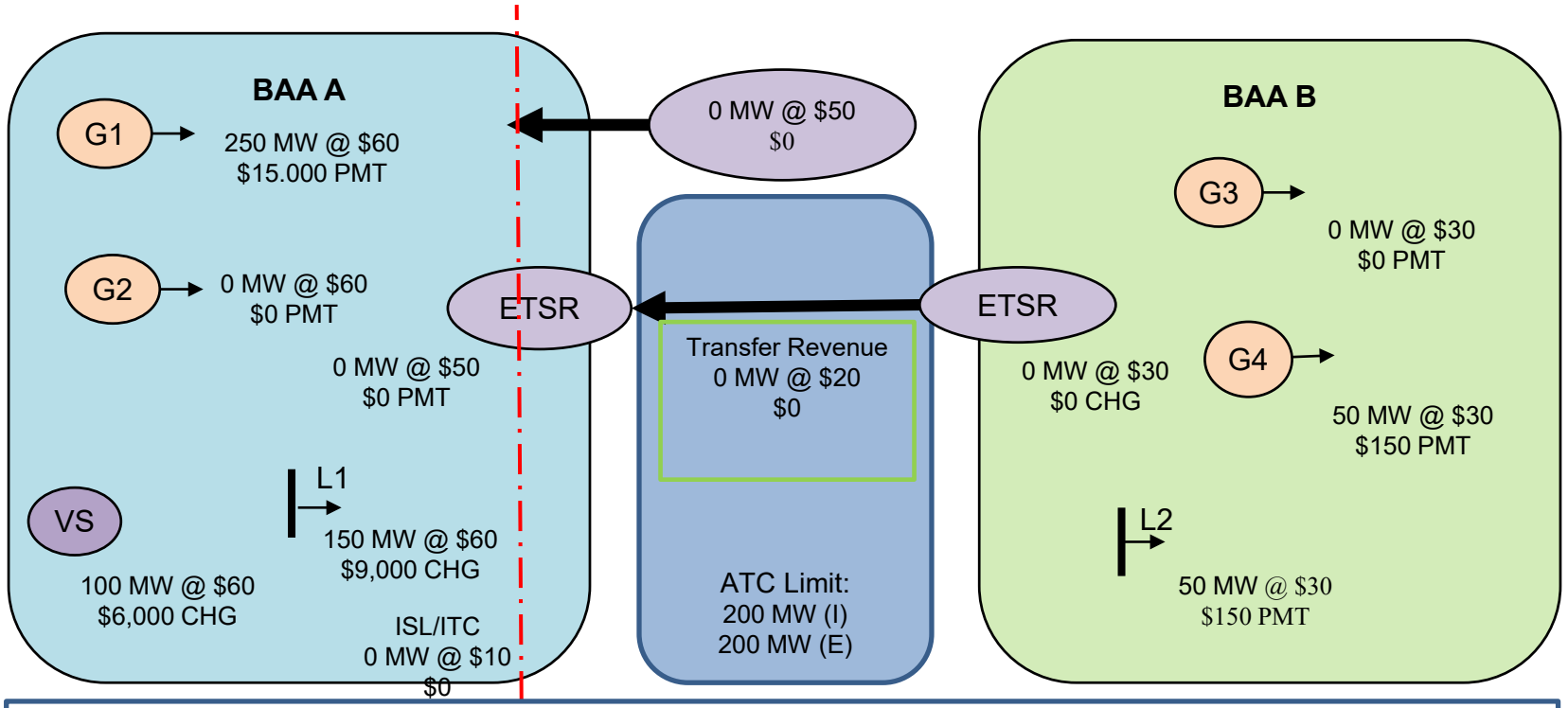
RTM/WEIM Market Results



Imbalance Energy Settlement (1 of 2)

- Convergence Bid
  - IFM Virtual Supply/Demand has a reversal settlement at the FMM LMP
- Imbalance Energy Settlement in EDAM BAA
  - Day Ahead Schedule is reference point for calculating FMM Instructed Imbalance Energy
  - Day Ahead Schedule is reference point for calculating Load Uninstructed Imbalance Energy
  - Intertie resources are subject to Hour Ahead Scheduling Process (HASP) Reversal provisions which settles as adjustment to FMM instructed imbalance energy
  - RTM GHG settlement is a deviation settlement from IFM GHG attribution settlement
  - Transfers will have a financially binding imbalance settlement from day-ahead transfer at the Energy Transfer System Resource (ETSR) LMP

Imbalance Energy Settlement



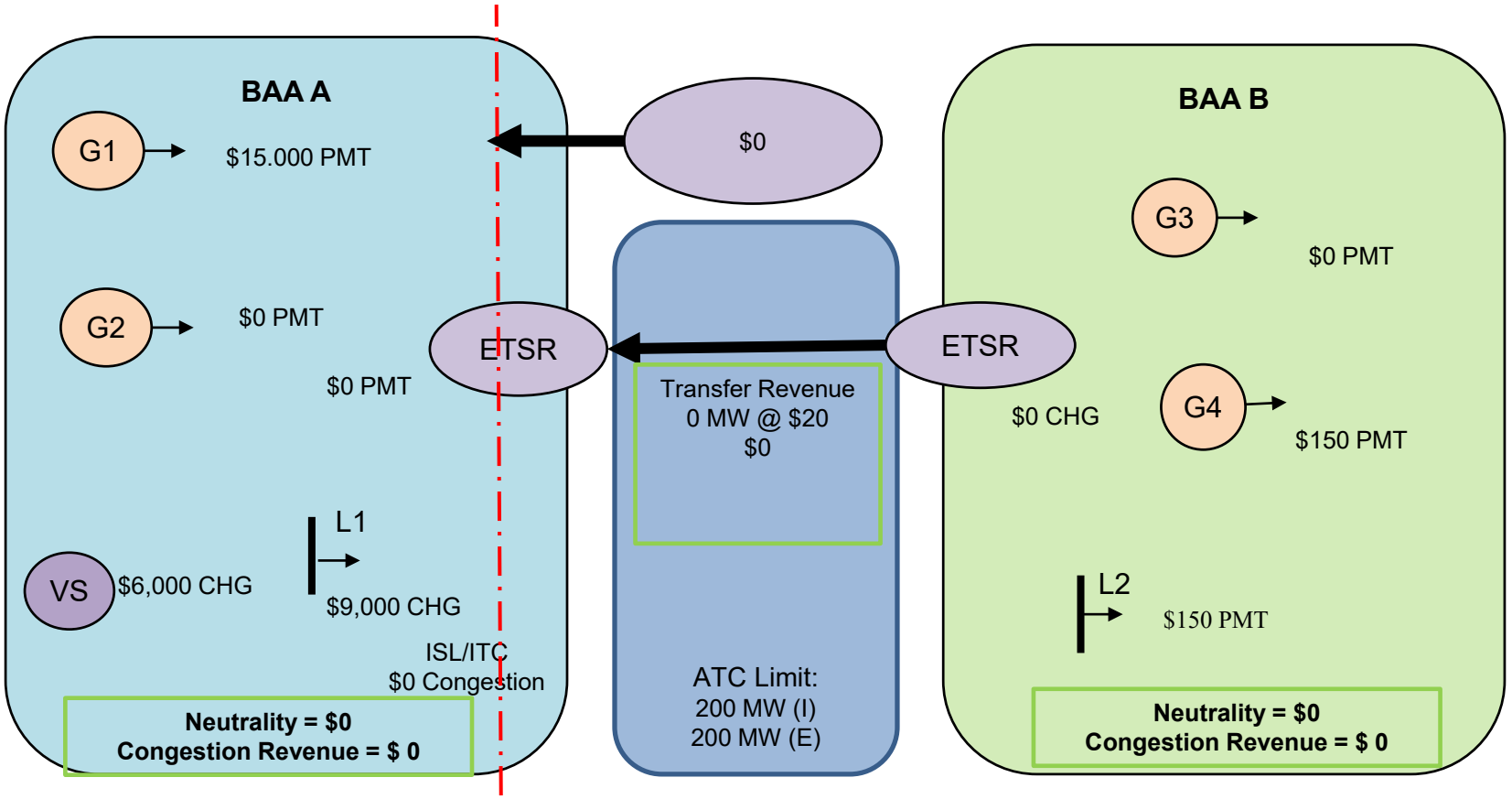
Assumption:

- Generation imbalance is settling as Instructed Imbalance Energy
- Load is settling as Uninstructed Imbalance Energy
- Virtual Bid reversal settlement is at RTM LMP

Imbalance Energy Settlement (2 of 2)

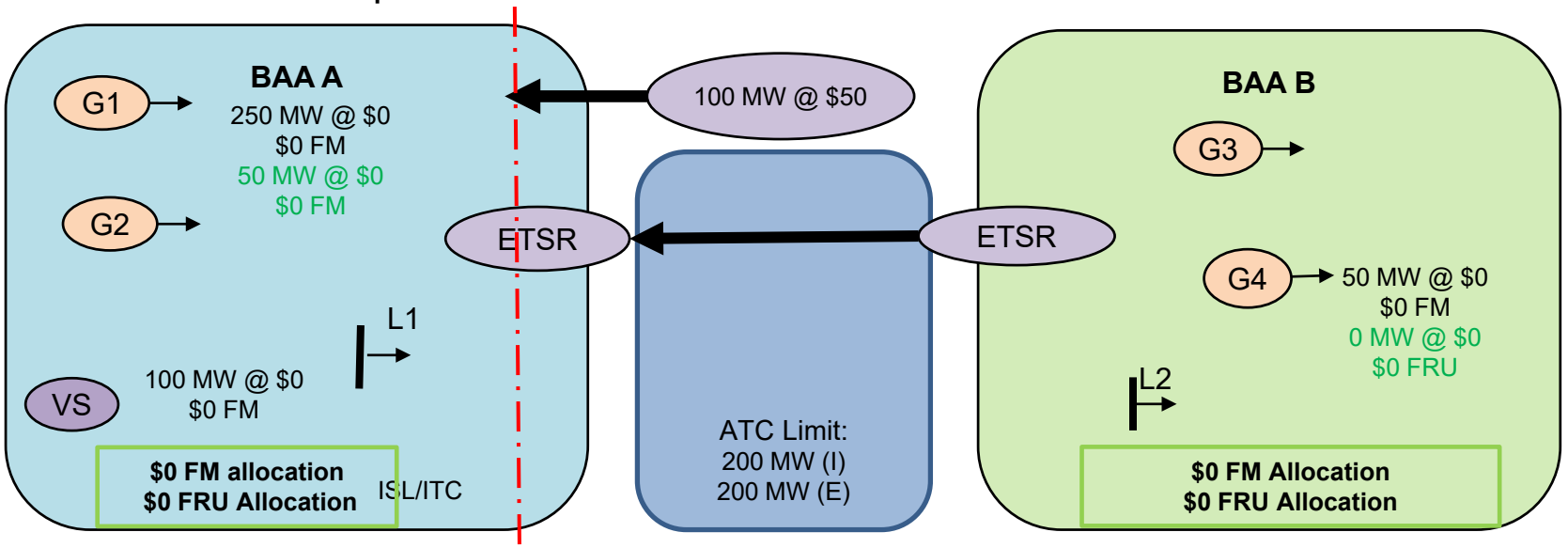
- Real Time Offset settlement
  - Real Time Marginal Loss Offset is unchanged
  - Real Time Congestion Offset: modified to account for assistance energy, if applicable (RSEE 2)
    - Energy assistance cost will be collected through marginal Cost of Congestion component of LMP of BAA that failed
    - Energy assistance cost will be allocated to BAA that RTM Net Imbalance Transfer is in export direction
  - Real Time GHG Offset: new settlement to account for GHG neutrality between GHG region and Non-GHG region including GHG transfer financial settlement between regions
  - Real Time Imbalance Energy Offset: modified to account for new RTM GHG Offset and binding FMM and RTD transfer settlement
- RTM energy transfer revenue will be calculated as imbalance settlement from day ahead transfer qty.

RTM Imbalance Offset Settlement



Flexible Ramp Settlement

- Flexible Ramp Settlement (Flexible Ramp Deliverability Initiative)
  - 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
  - Fall 2022 implementation



Assumption: G1 and G4 have 5-minute ramp capability of 20 MWs/minute

Intertie Deviation Settlement

- Intertie Deviation Settlement penalty is designed to ensure that intertie schedules award in Hour Ahead Scheduling Process (HASP) are delivered in RTM

- Intertie Deviation settlement will apply to intertie schedules
  - Charge applied to intertie resources that receive an HASP award and deviate from HASP schedule for non-reliability reasons
    - Will calculate for each BAA
  - Allocated to BAA measured demand

RUC/RTM Bid Cost Recovery (BCR) Settlement

- RUC/RTM BCR
  - BCR eligible resources will receive uplift for daily RTM/RUC net shortfall
    - RUC Revenue include Reliability Capacity Up Revenue and Reliability Capacity Down Revenue
    - RUC Cost include Reliability Capacity Up Bid Cost and Reliability Capacity Down Bid Cost
    - RTM Revenue include instructed imbalance energy settlement, ancillary service settlement, flexible ramp uncertainty, and GHG attribution settlement
    - RTM Costs include Start-Up Costs, Minimum Load Costs, Transition Costs, instructed imbalance energy bid cost, and ancillary service bid cost
  - RUC/RTM BCR sequential netting
    - RUC surpluses are netted against RTM Shortfall
    - RTM surpluses are netted against RUC Shortfall

Bid Cost Recovery Settlement

- RUC BCR Allocation
  - Applying RUC transfer adjustment to RUC BCR portion of RUC/RTM uplift
    - RUC BCR adjustment = Total IFM BCR Amount * (Reliability Capacity Net transfer out / sum of (Reliability Capacity Net transfer out + measured demand)
    - RUC BCR Adjustment distribution = RUC BCR Adjustment * BAA Reliability Capacity Net Reliability Capacity Transfer In / Total of BAA Reliability Capacity Transfer In
  - Allocate adjusted BAA RUC BCR amount as part of BAA RCU two-tiered allocation methodology (DAME initiative)

- RTM Allocation
  - RTM BCR portion of RUC/RTM uplift will be allocated to EDAM Entity or via the CAISO current allocation methodology (same as today)

Transmission Revenue Requirement (TRR) Recovery Settlement

- The revised proposal identifies a framework for providing TRR recovery associated with certain potential foregone revenues.

- 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.

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Next Steps

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Upcoming Dates

- October 21, 2022
  - EDAM design presentation to the Market Surveillance Committee (MSC).
- October 28, 2022
  - Publication of draft final proposal targeted for the end of October.
- Early November
  - Publication of an updated draft tariff framework, based on the draft final proposal.
- Dates for stakeholder meeting will be identified in conjunction with posting of the next proposal.