EDAM
EXTENDED DAY-AHEAD MARKET

EDAM Draft Final Proposal – Stakeholder Meeting

November 14, 2022

California ISO

AGENDA

Time	Topic
8:00 – 8:15	Welcome and opening remarks
8:15 – 8:25	WEIM Governance Review Committee update
8:25 – 12:00 **Break at 10:30 a.m.*	EDAM draft final proposal walk through • Resource participation model – transmission requirement • EDAM resource sufficiency evaluation • Transmission availability • Convergence bidding
12:00 – 1:00	Lunch break
1:00 – 2:50	EDAM draft final proposal walk through • External resource participation • Greenhouse gas accounting
2:50 – 3:00	Next steps and closing remarks

EDAM

Welcome & Opening Remarks

Mark Rothleder, SVP & COO

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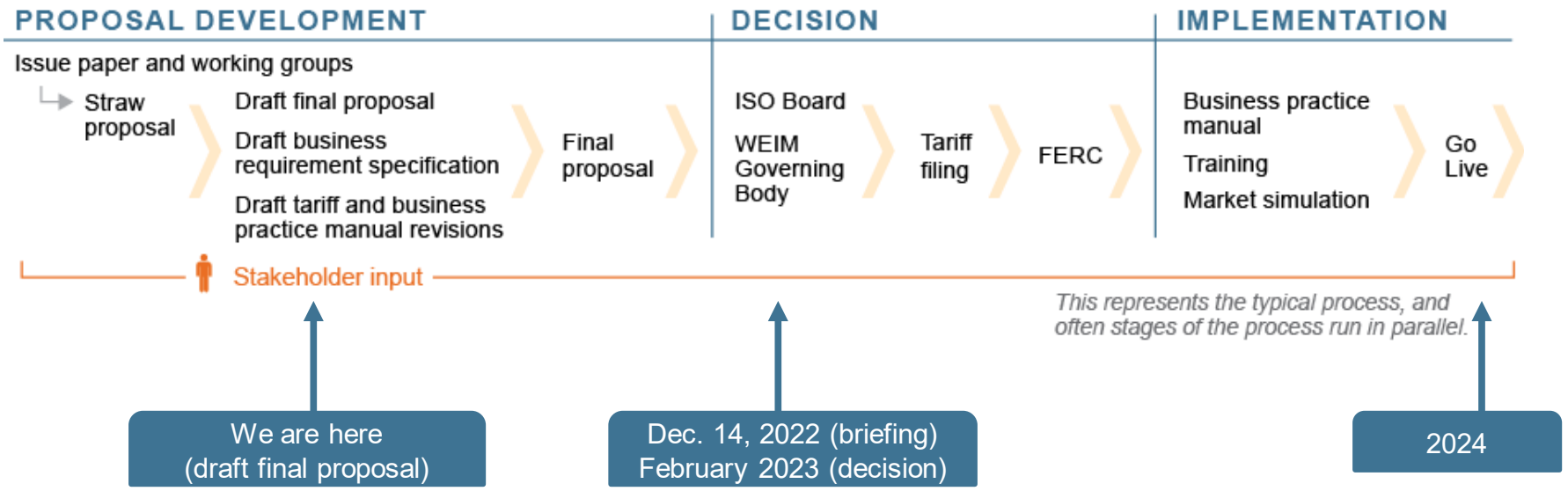
Policy Initiative Stakeholder Process



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Resource Participation Framework – Transmission Requirement

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Transmission Requirements for Generation

- Stakeholder comments suggested introduction of a requirement that generation in an EDAM BAA secure transmission from the transmission operator to participate in the market.
  - Supports administration of OATT in EDAM.
  - Avoids or limits cost shifts between transmission customers and load in paying the costs of the transmission system.

- The draft final proposal introduced the requirement that a resource bidding into the market:
  - Is a designated network resource under the terms of the EDAM entity OATT; or
  - Has reserved firm point to point (long-term or monthly duration) to the border of the EDAM BAA (or otherwise have legacy transmission rights).

Transmission Requirements for Generation

- Recognition that the proposed design may be overly restrictive in requiring long-term or monthly firm PTP transmission service.

- Intent is to ensure that generation in the EDAM entity balancing area continues to reserve transmission service and administration of sales under the OATT.
  - Avoids or limits cost shifts in paying for the transmission system.

- While the EDAM design does provide for recovery of historical transmission revenues, this should not replace the need to reserve transmission service under the OATT.

Proposed Adjustment in Design – Transmission Requirement

- Resources in an EDAM balancing area need to:
  - Be a designated network resource under terms of OATT; or
  - Reserve firm point to point transmission service (long term or short term), or otherwise hold a legacy transmission contract.
    - Not required to be to border of balancing area

- If transmission is not reserved, the resource can bid into the market and will be subject to a transmission charge from the transmission service provider based on the *daily firm point to point rate* under the OATT.
  - Ensures there is contribution to cost of transmission system.

- The charge is based upon the amount of the day-ahead market schedule for which transmission has not been reserved.

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Day Ahead Resource Sufficiency Evaluation (RSE)

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The EDAM RSE tests to ensure each participating BAA has supply to meet their next day obligations

- The on-demand application uses market optimization to test BAA resource supply (bids) against its obligations (forecast demand + uncertainty + AS) across the next operating day.
  - Same bids will be utilized in the RSE and IFM
  - Does not consider transmission network
- Ability to test resource sufficiency on an advisory basis leading up to the day-ahead market run.
- Optimization will minimize cost across the operating horizon for each BAA
  - Through pricing ensures optimal use of use limited or storage resources

Symmetric treatment of resources that are part of a BAA's resource adequacy or planning program

- Only count supply under forward contract
  - Including resources internal to a BAA as well as intertie transactions
- VER forecast will be utilized for the EDAM RSE and for the RUC
  - The IFM will use only use the supply bid into the market
- Demand response can participate under existing resource models or be utilized as load modifiers in the day ahead timeframe
  - Will come with load bidding rules to ensure EDAM transfers don't displace DR that is needed for a BAA's next day supply plan
- Delivered firm energy contracts (i.e., WSPP Schedule C) count in the RSE.
- Non-resource specific supply will have tagging requirements

Proposing to require non-resource specific supply contracts (WSPP-C) to identify a source BAA

- If the source BAA is within the EDAM footprint, the proposal assumes the sink BAA and/or 3rd party merchant will work with the source BAA to model as a bucket 1 transfer
  - Results in more accurate price formation by utilizing resources internal to the footprint and modeling expected flow patterns
  - If agreement to model as transfer can't be reached, the ability to model as a self-scheduled injection at BAA boundary remains

- If the source BAA is external to the EDAM footprint, supply will be modeled as a self-scheduled MW injection sourced at the sink BAA's boundary

The EDAM RSE will automatically attempt to cure insufficiencies; magnitude of surcharge will be based on severity of insufficiency

Tier 1 – De minimums failure within max of 10 MW or the forecast error of the BAA's IRU requirement

No Consequence

- Designed to ensure failure within a small margin does not result in asymmetric financial penalties

Tier 2 – Failed RSE shortage does not exceed 50% of IRU requirement

Consequence is surcharge x1.25 with ratcheting consequences for repeated failure

- While a BAA is not resource sufficient it can meet its P50 forecast plus a reasonable amount of uncertainty

Tier 3 – Failed RSE shortfall is greater then 50% of IRU requirement

Consequence is surcharge x2 with ratcheting consequences for repeated failure

- This represents a significant shortcoming in a BAA's day-ahead supply plan. During tight system conditions can impact the EDAM footprints ability to achieve a feasible solution or impact market results

The surcharge is intended to ensure that BAA's come into the EDAM in a resource sufficient position

- Provides a comparable option to address next day capacity as the existing bilateral markets
  - An "in-market" hourly penalty is difficult to right-size to a bilateral block purchase; exacerbated by potential marginal pricing application to all day-ahead awards
- Repeated failures will have a prospective 1% adder applied to the Tier 2 or 3 multiplier for each day over a rolling period
  - Intended to discourage and penalize systemic failure
  - % adder configurable and open to revision following monitoring of potential abuse

The proposed surcharge for an on-peak upward failure

$$Surchage = \alpha * [(\beta * \gamma) - \sum_{i=1}^{n} (\beta - \delta_i)]$$

$\alpha = failuer\ tier\ multiplier$
$\gamma = Max\ [Mid - C, PV]\ price\ for\ a\ block\ of\ energy$
$\beta = Maximum\ EDAM\ RSE\ shortfall$
δ = $MEC\ of\ insufficient\ BAA\ in\ non\text{-}failed\ intervals$

Hour	Shortfall (MW)	Mid-C Price ($/MWh)	PV Price ($/MWh)	BAA Weighted LMP ($)	Hourly surcharge/credit ($)
1	0	100	80	40	1.25[(10*100)-(10*40)]
2	0	100	80	50	1.25[(10*100)-(10*50)]
3	10 (Tier 2)	100	80	90	1.25[(10*100)]
4	0	100	80	70	1.25[(10*100)-(10*70)]
Administrative Surcharge =					$3000

- Separate hourly surcharge for off-peak failures.

Failure consequences include exclusion from the pool if the market cannot cure the insufficiency

- Depending on the magnitude of failure, the market may not have sufficient supply to cure an insufficiency.
- If the market cannot cure the insufficiency, the EDAM entity is deemed to have failed the RSE and will also be removed from the pool of entities evaluated jointly for the WEIM RSE.
- By being excluded from the pool, the EDAM entity is evaluated for the WEIM RSE on its own and foregoes diversity benefit of the day ahead uncertainty requirement.

EDAM BAAs passing the RSE will be evaluated together in a pool in the WEIM RSE

- To be eligible for pool participation a BAA requires schedules that can meet their day-ahead obligations
  - If the market is unable to cure a BAA the surcharge will still apply based on unresolved quantity, the BAA will be tested on a standalone basis in the WEIM
- Propose to not allocate full diversity benefit with go-live; additional imbalance reserves beyond 97.5 upwards confidence will be utilized for EDAM footprint
  - Configurable parameter that will evolve with the EDAM
- Participation in the pooled WEIM RSE creates incentives for EDAM BAA's to participate with, and submit e-tags on, physical supply
  - The diversity benefit is created by offsetting uncertainty requirements due to a larger, more diverse, geographic footprint

Introduction of a net EDAM export transfer constraint

- The constraint can limit the net export transfers from the EDAM balancing area and retains supply within balancing area to manage reliability conditions.
- This is an hourly constraint, applicable in the IFM, managing the net export transfers to EDAM areas.
- The constraint would be optional for an EDAM balancing area that may want to avail itself of a market mechanism to manage excess supply.
  - Enables offering supply into market for optimization, and market will respect constraint parameters when identifying export transfers.

Introduction of a net EDAM export transfer constraint

$$(RSE\ Eligible\ Supply + Non\ RSE\ Eligible\ Supply\ x\ Confidence\ Factor) - RSE\ Obligatoin - Additional\ Margin$$

- The constraint is based on total supply offered into the market and subtracting the RSE obligation of the EDAM balancing area.
  - The difference sets the upper limit of supply that could support export transfers.

- Confidence factor multiplier applies to “non RSE eligible supply” as an indicator of certainty of delivery.
  - This factor is variable and may vary by balancing area.

- Additional margin represents an additional amount of capacity the EDAM balancing area can further reduce the constraint limit, if necessary, to account for reliability risk and ability to replace reserves.

Introduction of a net EDAM export transfer constraint

- Each EDAM balancing area adopting the net export transfer constraint would need to describe its application under the tariff.

- This includes:
  - Formulation of confidence factor applicable to non-RSE eligible supply.
  - Factors or criteria for deriving the additional margin that further reduces the constraint limit.

- The constraint is designed such that in normal conditions the net export transfer constraint is larger, but in stressed system conditions – as RSE obligation is higher – the constraint may be smaller.

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Transmission Availability to EDAM

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Transmission Availability in EDAM Overview

Bucket 1 Transmission

- Firm, Condidiontal Firm PTP; NITS
- Supports delivery of supply across EDAM interfaces for RSE purposes
- Made available by Transmission Customer by 10:00 a.m. (day-ahead)
- Eligible for accrual of transfer revenue

Bucket 2 Transmission

- Firm, Conditional Firm PTP
- In excess of transmission needed to support RSE (excess transmission)
- Availability to market depends upon pathway chosen
- Eligible for accrual of transfer revenue

Bucket 3 Transmission

- Unsold Firm ATC
- Made available by Transmission Provider by 10:00 a.m. (day-ahead)
- Historical revenue recovery through EDAM
- Eligible for accrual of transfer revenue

Transmission Pathways – Exercise of Transmission Rights and Availability to the EDAM

- The EDAM will support exercise of OATT transmission rights held by transmission customers.

- Pathway 1 – exercise of existing transmission right through day-ahead market.
  - Submission of self scheduled, associate with transmission rights.
  - Accrued transfer revenue settled with EDAM entity.

- Pathway 2 – release transmission rights to EDAM by 9 a.m. day ahead.
  - Transmission supports EDAM transfers.
  - Accrued transfer revenue is settled with ISO directly.
  - ***Modified time of release to market from 6 a.m. to 9 a.m.

- Pathway 3 – unscheduled transmission by 10 a.m. is made available to the EDAM to optimize transfers.
  - Transmission customer can exercise their previously unscheduled transmission rights.
  - Market will re-dispatch to accommodate use of rights.
  - Accrued transfer revenue settled with EDAM entity.

Pathway 3 – Unscheduled Transmission in EDAM

- Stakeholders sought the ability to exercise their transmission rights after the day ahead market run without being exposed to re-dispatch costs and ability for the market to accommodate that use.

- Pathway 3 allows transmission customers to exercise previously unscheduled transmission rights after the day-ahead market run.
  - Consistent with abilities under OATT today.
  - Submission of a self-schedule associated with transmission rights.

Pathway 3 – Unscheduled Transmission in EDAM

- The market will seek to re-dispatch generation across the footprint to accommodate exercise of those previously unscheduled rights.
  - Market cannot discern or attribute re-dispatch or costs caused solely by exercise of transmission rights.

- The EDAM transmission provider will hold the transmission customer exercising rights harmless, along with other NITS and PTP customers, from the costs of re-dispatch.
  - Pooling of EDAM transfer and congestion revenues to offset costs.
  - Surplus or shortfalls would be allocated under the terms of the EDAM entity OATT.

Pathway 3 – Unscheduled Transmission in EDAM

- The market will re-dispatch to accommodate a later use of previously unscheduled transmission rights.
  - Re-dispatch generally goes a step beyond the OATT.
- If market cannot feasibly accommodate the later exercise of transmission rights through re-dispatch, market will not disturb schedule of entities that self scheduled or exercised their transmission rights in day-ahead market.
- Consistent with OATT expectations that a later exercise of transmission rights may not always be able to be accommodated.
  - For example, derates of transmission may preclude accommodation of schedule changes.

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Convergence Bidding

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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.
  - One year optional transition period

- Transition period recognizes that EDAM entities may need to gain experience participating in the day-ahead market prior to enabling convergence bidding to protect from unintended financial impacts.

- Will monitor impact of transition period convergence bidding across BAAs (as compared to footprint-wide).

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External Resource Participation

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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

Design Evolution - External Resource Participation in EDAM

- Proposal continues to extend the current WEIM framework to external resource participation into the EDAM.
  - Evaluate enabling broader external resource participation structure as EDAM evolves and entities gain experience.

- 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.
  - As is done in WEIM today.

Inclusion of off-system designated network resource

- Off-system designated network resources, meeting requirements, can economically bid at the EDAM entity interties where the designated load is located.

- Requirements:
  - Network resource is designated to serve load in EDAM entity BAA under terms of the OATT.
  - Resource is located in WEIM balancing area and is modeled in market as a specific resource.
  - Designation under terms of OATT provides for transmission deliverability across various systems.
  - Can be economically bid only at the intertie of the EDAM balancing area where the load served by the designated resource is located.

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Greenhouse Gas (GHG) Accounting

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The resource specific GHG approach of the WEIM will extend to EDAM

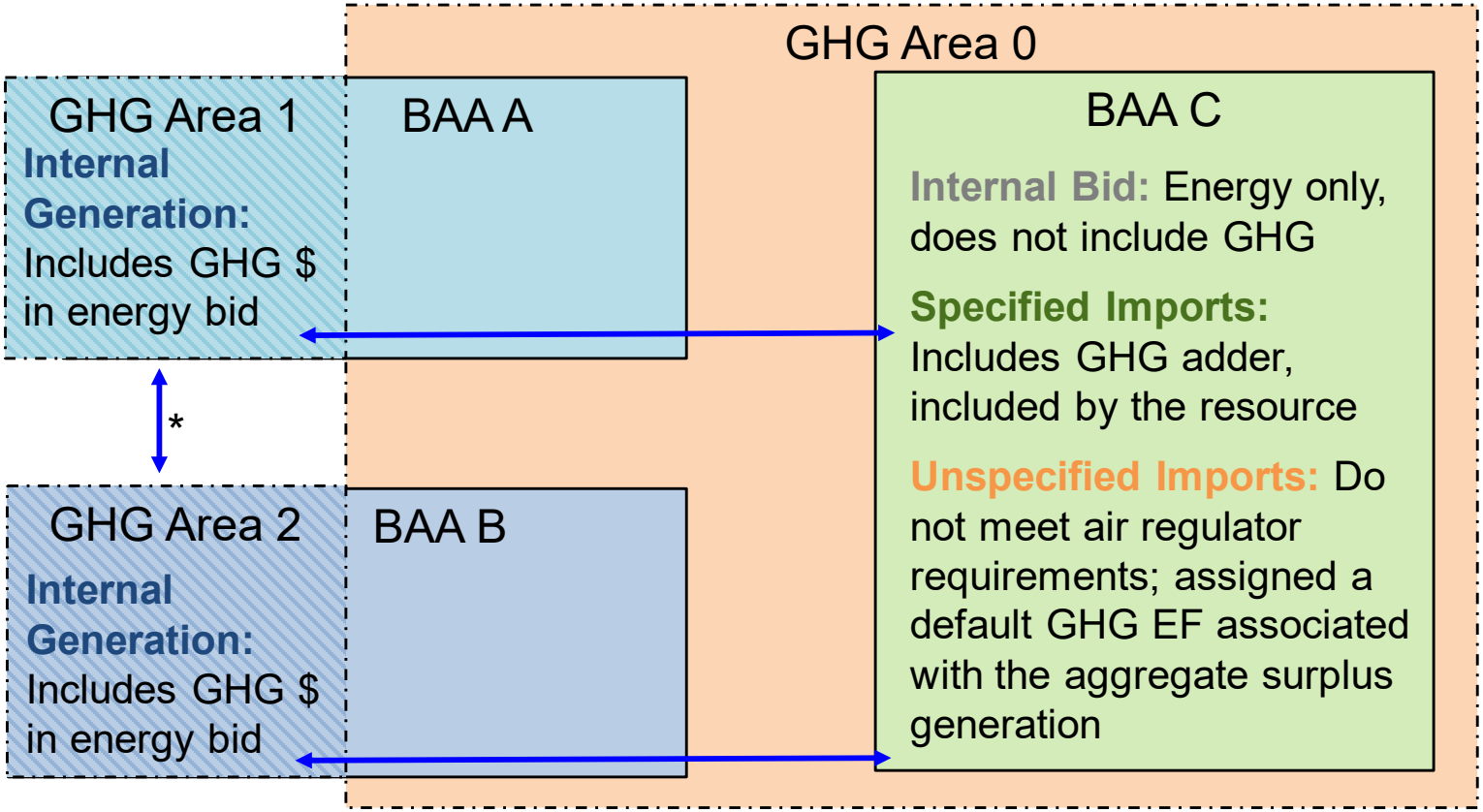
Summary of Resource Specific Design Changes, as Compared to the WEIM Design

I. Updates the geographic boundary from the BAA to the GHG regulation area, to reflect state-level policies;
II. Allows for multiple GHG regulation areas for bidding an dispatch;
III. c; and
IV. Introduces a new optimal counterfactual approach.

We will evaluate the EDAM GHG design after the first year of implementation to assess what enhancements or evolution is needed based on performance or regulatory updates.

Resource specific overview with multiple GHG areas

Uses resource-specific bid adders to optimize dispatch. Scheduling coordinators for resources in non-GHG regulation areas attributed to serve demand in a GHG regulation area would remain responsible for compliance and reporting.



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

GHG constraints

The enhancements proposed include constraints which can limit secondary dispatch by limiting GHG attribution.

1. **GHG attribution constraint**: Attribution limited to the lower of:
   - The GHG bid capacity
   - The positive difference between the Upper Economic Limit (highest capacity on the energy bid) and the GHG reference pass
   - The optimal energy schedule

2. Hourly net export constraint: The aggregate GHG attribution in a BAA outside the GHG area will be limited to the higher of:

   – Either capability or the optimal net export BAA transfer (zero if a net import), or
   – The aggregate RA capacity procured from resources in the BAA

Counterfactual: EDAM market passes

1. **RSE pass:** Single unit commitment for each BAA, in parallel

2. **GHG reference pass**:
   - Optimizes for the entire market footprint at the BAA level and across BAAs
   - Limits net GHG transfers in import direction to a GHG region but does not prevent an export

3. **MPM for the IFM**:
   - Unlocks GHG transfers between BAAs and GHG regulation areas
   - Applies GHG constraints

4. **IFM:**
   - Optimally schedules each BAA and GHG regulation area to reflect optimal dispatch in the EDAM footprint, considering constraints

5. **MPM pass for RUC**

6. **RUC**

Modifications from Revised Straw Proposal

1. Clarifies the geographic modeling for multi-state BAAs.

2. Indicates the ISO will reflect GHG regulation area reference levels.

3. Provides more detail on GHG attribution and secondary dispatch in the WEIM today and the process to reduce the potential for secondary dispatch in EDAM.

4. Updates the net export constraint to account for RA and provides analysis on GHG bid sufficiency.

5. Outlines the interaction between the EDAM and the WEIM for GHG accounting.

1. Multi-state BAA geographic modeling

- Stakeholders raised unique circumstances with multi-state BAAs that require a different geographic modeling approach and coordination with state air regulators.

- Proposal clarifies that where there are cases of special state provisions in which either generation or load is not associated with the state for GHG accounting purposes, the market can model these unique circumstances.
  - The ISO will continue to coordinate with EDAM entities and state air regulators.

2. GHG reference levels

- The proposal clarifies that for resources located within a GHG regulation area, the ISO will also include reference level updates based on prevailing allowance prices as is done today for GHG pricing regions.

- This applies to:
  - Commitment costs used to cap bids for start-up and minimum-load.
  - The variable cost option default energy bid used for local market power mitigation.

3. Attribution and secondary dispatch

- Stakeholders requested additional information on attribution and secondary dispatch. The proposal clarifies:

1. All attribution is based on voluntary GHG bid adders
2. Attribution is based on energy + GHG bids
   - The optimization selects/attributes resources based on energy bid + GHG bid lowest to highest until the total MW of GHG transfers is fully allocated.
   - The shadow price of this GHG transfer allocation constraint is the marginal GHG price.
3. Attribution can occur either above or below a resource's counterfactual
4. Attributing resources may result in secondary dispatch
5. Incremental dispatch should not be conflated with secondary dispatch

4. Treatment of RA capacity

Proposal clarifies the treatment of RA resources:

Viewed as internal to the GHG area; not attributed	Viewed as external to the GHG area; can be attributed
Pseudo-tied resources will be viewed as internal to the GHG regulation area if they are pseudo-tied at the BAA and GHG pseudo-tied at the GHG regulation area.	RA resources from EDAM BAAs must be shown as bucket 1 energy transfers into the ISO BAA for RSE. They will have a zero GHG reference so that RA capacity can be fully attributed; their attribution will not be constrained by net export transfer constraints.
Dynamically scheduled resources from non-EDAM BAAs shown as system resources or tie-generators at an ISO scheduling point are viewed as internal to the GHG regulation area.	Dynamically scheduled resources from non-EDAM BAAs shown as system resources or tie-generators at an EDAM BAA intertie can be viewed as external to the GHG regulation area if the EDAM BAA is not inside the GHG regulation area.

4. Net export constraint limiting transfers

- Stakeholders raised concerns that the net export constraint could limit transfers resulting in reliability or pricing impacts.

- The proposal clarifies:
  - The RSE should ensure a BAA is sufficient. However, if a BAA fails the RSE, constraint will be turned off for that hour.
  - The net export constraint will not limit GHG attribution in a BAA outside the GHG area to the higher of:
    - Capability or the optimal net export BAA transfer, or
    - The aggregate RA capacity from resources in the BAA
  - If we apply the EDAM net export constraint (absent RA exceptions) to a WEIM data set, the constraint binds relatively infrequently,
    - Approximately 1% intervals in tight summer months

5. GHG accounting impacts - EDAM to WEIM

- Stakeholders requested feedback on WEIM impacts
- Proposal clarifies three changes to the WEIM GHG design
  1. The counterfactual for EDAM (GHG reference pass) will roll over into real time schedules for WEIM entities. WEIM entities that do not join EDAM will still use base schedules as their counterfactual.

  2. The net export constraint will also apply in the WEIM, for all BAAs.

  3. In both EDAM and WEIM the system marginal energy cost (SMEC) component for GHG will be positive.
     - The GHG component will be a positive payment for EDAM participating resources. Thus, the CAISO will change the SMEC in the WEIM (from being negative to positive).
     - This update is to support multiple GHG areas and does not change settlement outcomes.

Currently Proposed Greenhouse Gas Attribution Limits

- The GHG attribution to a resource outside GHG regulation areas with a GHG bid is limited in the IFM to the lower of the following:
  - The GHG bid capacity
  - The energy schedule
    - The energy schedule and the GHG attribution are co-optimized in the market pass
  - The positive difference between the Upper Economic Limit (highest capacity on the energy bid) and the GHG reference obtained from the GHG reference pass
    - This limit is static (fixed) in the IFM
    - It reduces secondary dispatch but it allows GHG attribution overlap with GHG reference

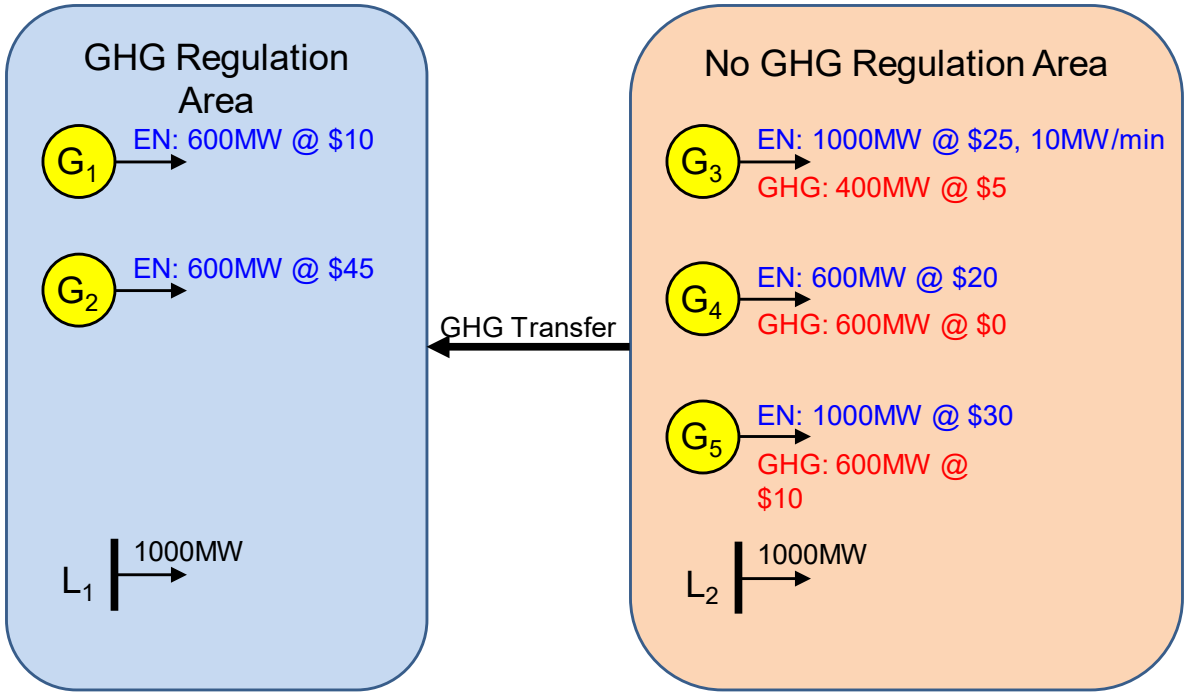
Alternative Proposal for Greenhouse Gas Attribution Limits

- The GHG attribution to a resource outside GHG regulation areas with a GHG bid is limited in the IFM to the lower of the following:
  - The GHG bid capacity
  - The energy schedule
    - The energy schedule and the GHG attribution are co-optimized in the market pass
  - The positive difference between the energy schedule and the GHG reference obtained from the GHG reference pass
    - This limit is dynamic (variable) in the market pass
    - It is a nonlinear constraint that requires a binary variable to linearize
    - It reduces secondary dispatch by attributing only above the GHG reference

Two Examples

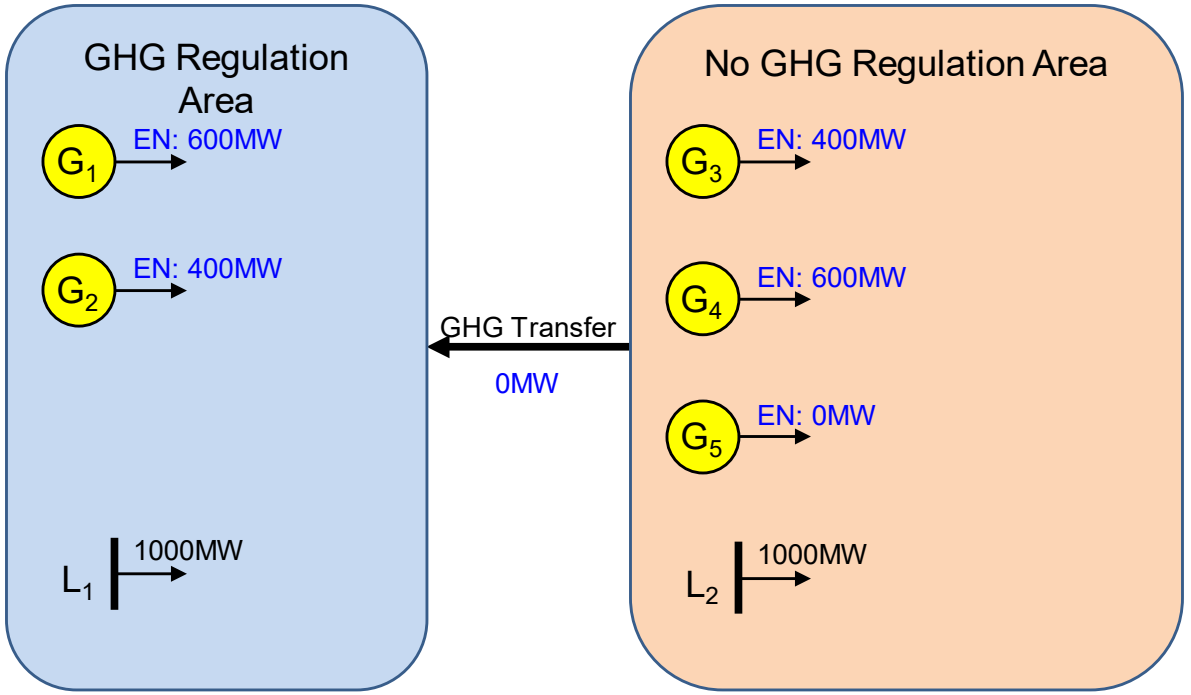
- Example 1
  - Compares the efficiency of optimal schedules enforcing a static versus a dynamic resource GHG attribution limit
  - Shows that the dynamic constraint results in a higher-cost solution (ignoring atmospheric emission cost outside the GHG regulation area) and it may limit the net GHG transfer import into a GHG regulation area
- Example 2
  - Shows that the dynamic constraint may result in marginal prices that do not support the optimal schedule, i.e., a payment shortfall
  - This payment shortfall is not caused by binding inter-temporal constraints

Example 1: Setup



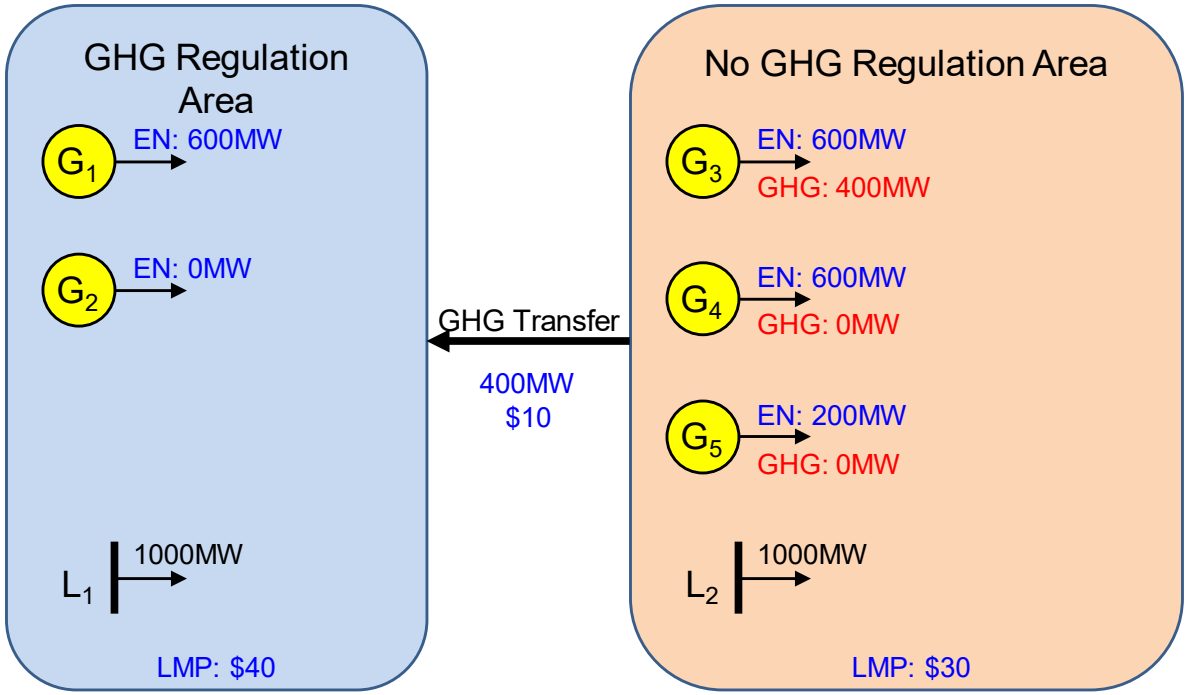
- Notation
  - EN: Energy bid/schedule
  - GHG: GHG bid/schedule

Example 1: GHG Reference Pass



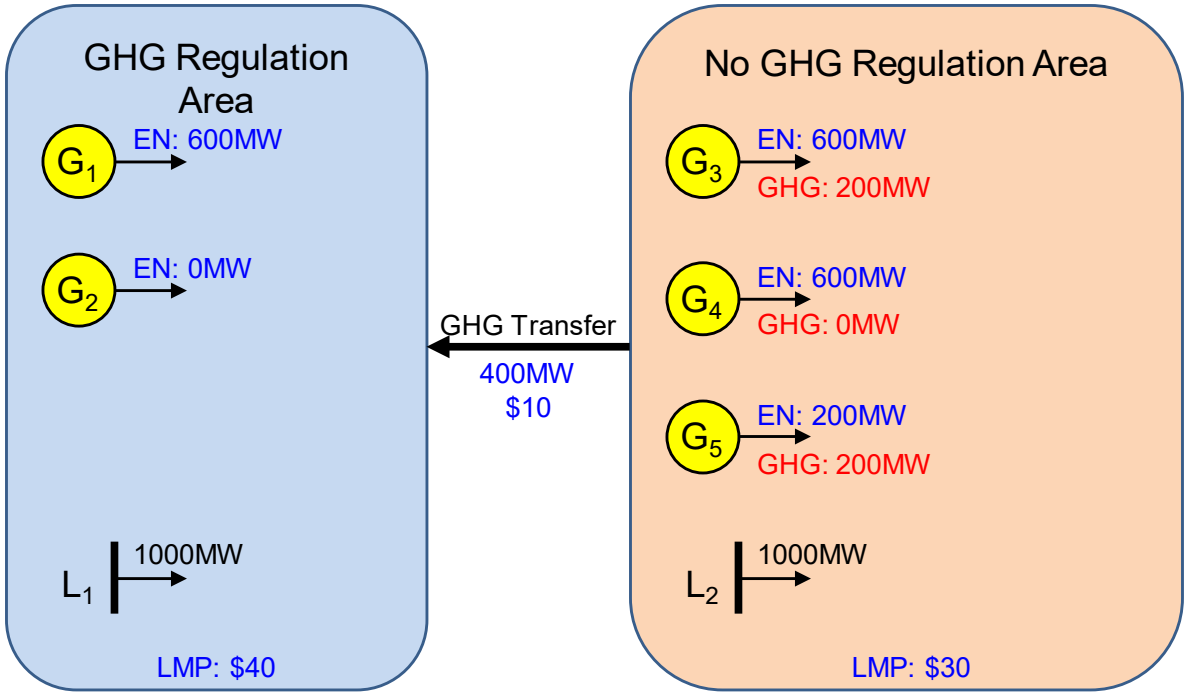
- GHG reference
  - G_3: 400MW
  - G_4: 600MW
  - G_5: 0MW

Example 1: IFM Pass with Static GHG Attribution Limit



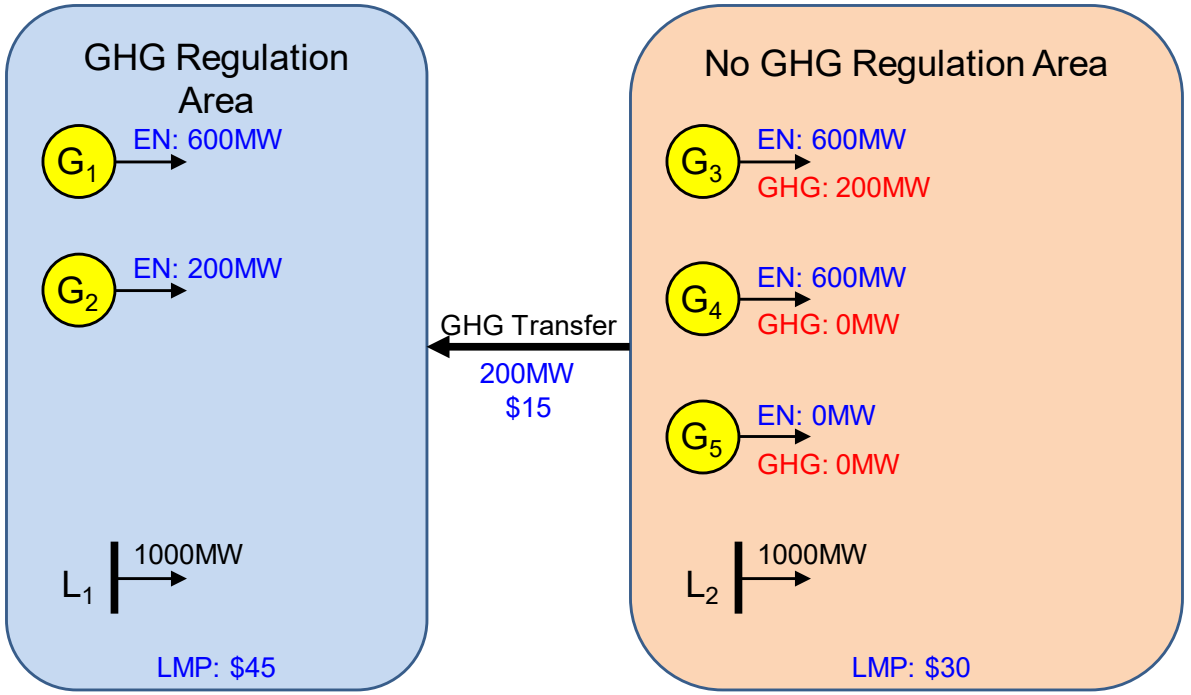
- G_3 cost
  - Energy:
    - 200MW × $25/MW = $5,000
  - GHG cost:
    - 400 × $5 = $2,000
  - Total: $7,000
- G_5 cost
  - Energy:
    - 200MW × $30/MW = $6,000
- G_2 savings
  - Energy:
    - −400MW × $45 = $(18,000)
- Net savings
  - $(5,000)

Example 1: IFM Pass with Dynamic GHG Attribution Limit



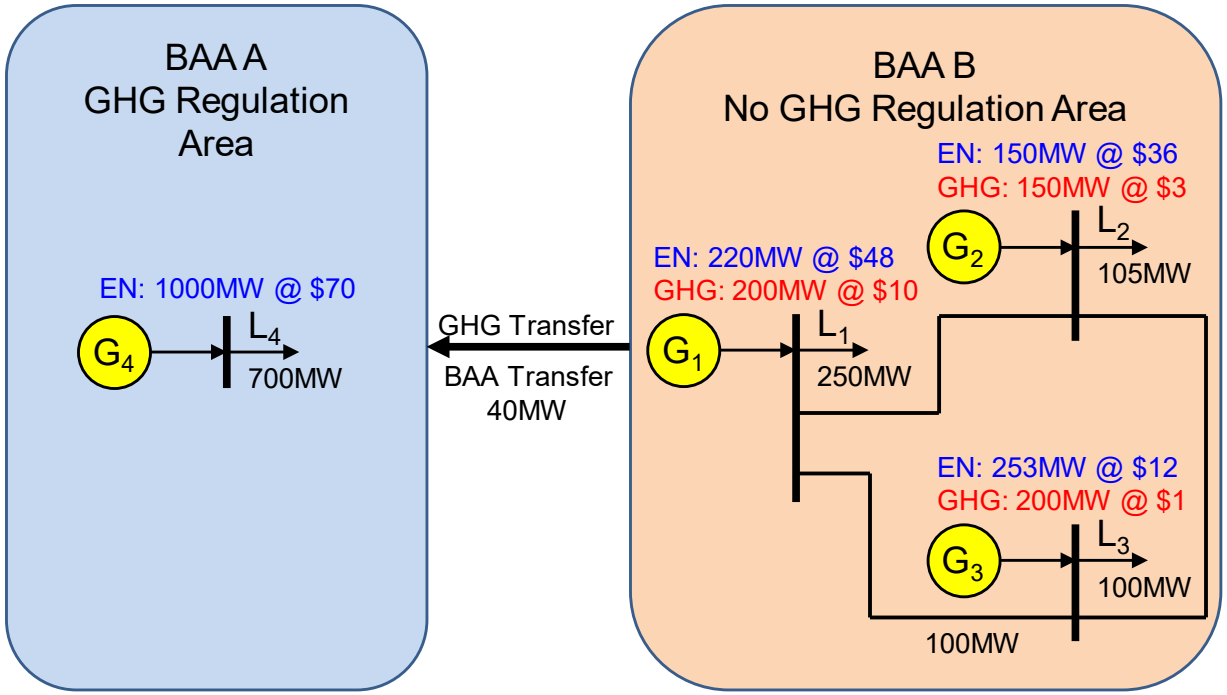
- G_3 cost
  - Energy:
    - 200MW × $25/MW = $5,000
  - GHG cost:
    - 200 × $5 = $1,000
  - Total: $6,000
- G_5 cost
  - Energy:
    - 200MW × $30 = $6,000
  - GHG cost:
    - 200 × $10 = $2,000
  - Total: $8,000
- G_2 savings
  - Energy:
    - −400MW × $45 = $(18,000)
- Net savings
  - $(4,000)

Example 1: Change GHG Bid for G_5 to >$15/MW



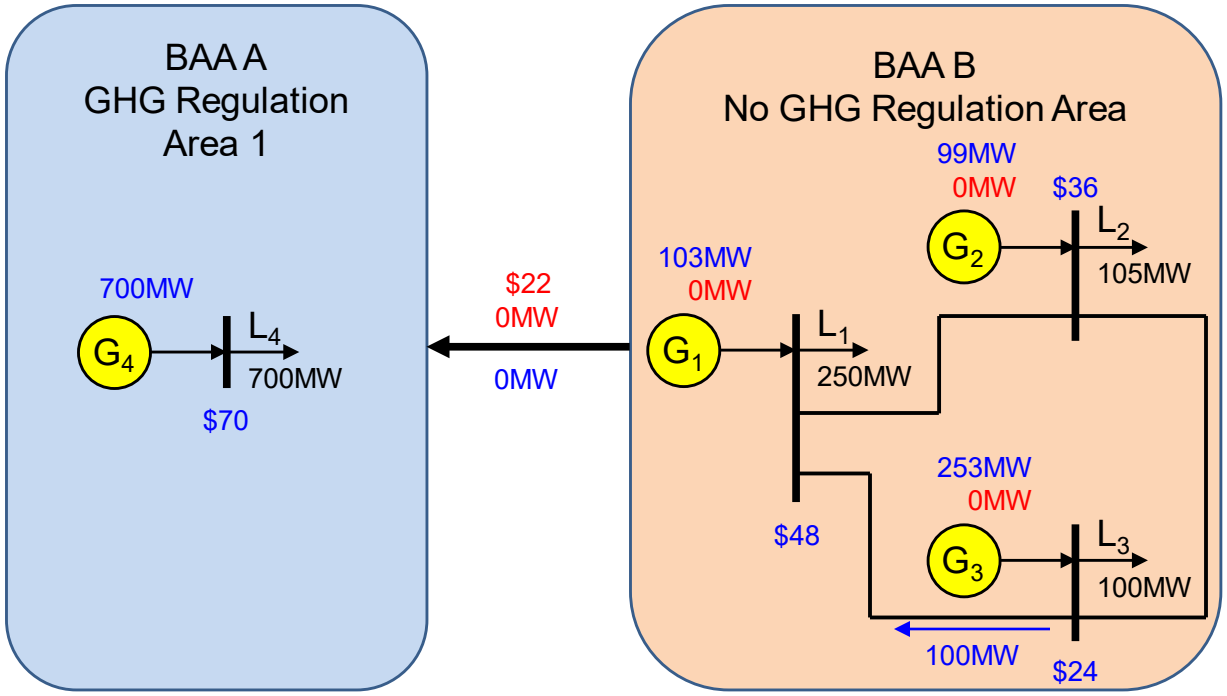
- G_3 cost
  - Energy:
    - 200MW × $25/MW = $5,000
  - GHG cost:
    - 200 × $5 = $1,000
  - Total: $6,000
- G_2 savings
  - Energy:
    - −200MW × $45 = $(9,000)
- Net savings
  - $(3,000)

Example 2: Setup



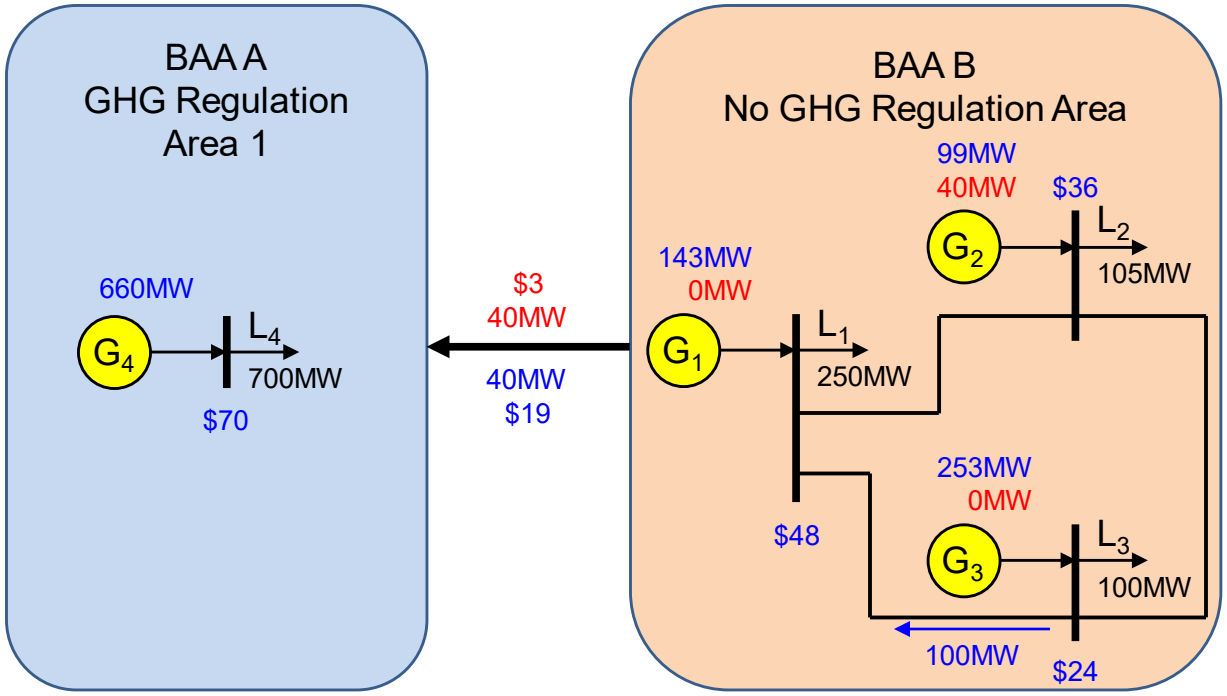
- Notation
  - EN: Energy bid/schedule
  - GHG: GHG bid/schedule

Example 2: GHG Reference Pass



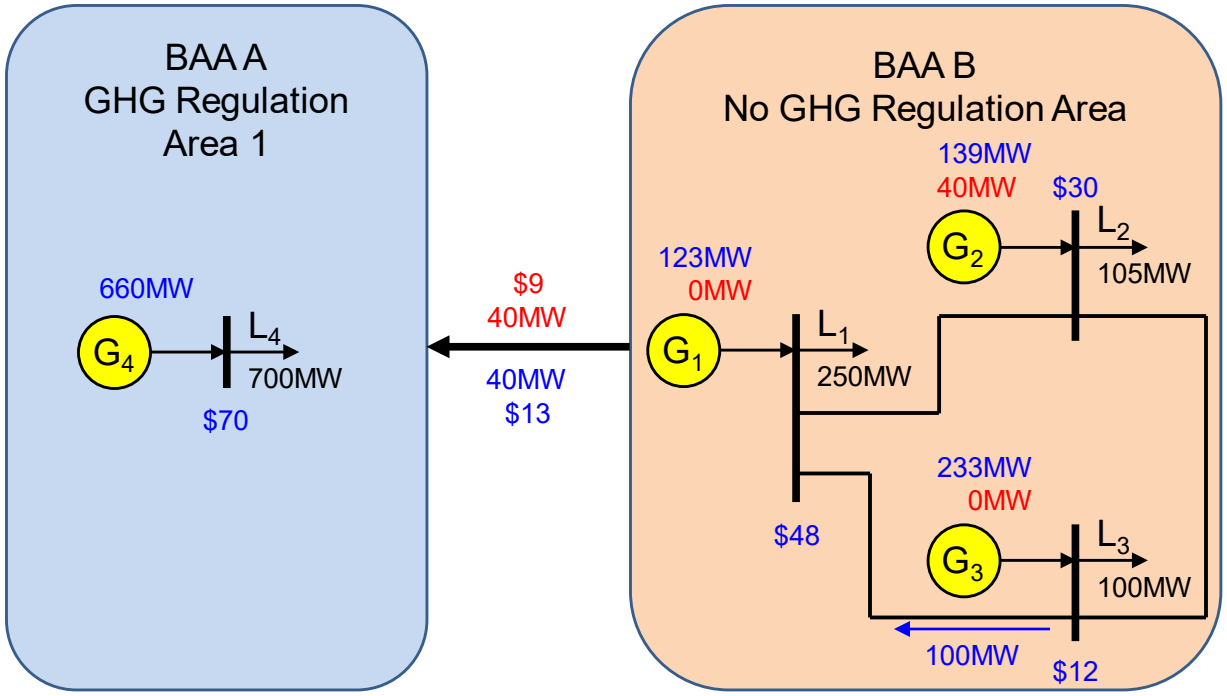
- GHG attributions at 0MW
- Transfer at 0MW
- Power Flow 3→1 at 100MW
- GHG reference
  - G1: 103MW
  - G2: 99MW
  - G3: 253MW

Example 2: IFM Pass with Static GHG Attribution Limit



- GHG attributions
  - G2: 40MW
- Transfer at 40MW
- Power flow 3→1 at 100MW
- Energy schedule
  - G1: 143MW
  - G2: 99MW
  - G3: 253MW
  - G4: 660MW
- Marginal GHG cost: $3
- Transfer Limit cost: $19

Example 2: IFM Pass with Dynamic GHG Attribution Limit



- GHG attributions
  - G2: 40MW
- Transfer at 40MW
- Power flow 3→1 at 100MW
- Energy schedule
  - G1: 123MW
  - G2: 139MW
  - G3: 233MW
  - G4: 660MW
- Marginal GHG cost: $9
- Transfer Limit cost: $13
- Payment shortfall
  - G2: $594

Why the Marginal Prices Do not Support the Optimal Schedule?

- The dynamic GHG attribution constraint destroys the convexity of the problem
  - The supply energy bid is monotonically increasing imposing convexity
    - An energy bid segment is at a higher cost and its scheduled after the previous energy segment is fully scheduled
  - The static GHG attribution constraint reflects the GHG attribution benefit to all energy bid segments maintain convexity
  - The dynamic GHG attribution constraint reflects the GHG attribution benefit only on energy segments above the GHG reference
    - The GHG attribution benefit may reduce the net cost of the energy segment below the cost of a previous energy bid segment destroying convexity

EDAM

Next Steps & Milestones

California ISO

EDAM milestones

Date	Milestone
Q4 2022	
October 31, 2022	Publication of draft final proposal
November 7, 2022	Publication of draft tariff framework
November 14, 2022	Stakeholder meeting (in-person and virtual)
November 22, 2022	Comments due on draft final proposal
December 7, 2022	Publication of final proposal
December 14, 2022	Joint ISO Board of Governors and WEIM Governing Body meeting (**briefing**)
February 2023	Joint ISO Board of Governors and WEIM Governing Body meeting (**decision**)
Q1 2023	Draft tariff publication and stakeholder process
Q2 2023	FERC filing
Q4 2023	Implementation
2024	EDAM go-live coordinated with interested entities

Next Steps

- Please submit comments on the draft final proposal using the commenting tool linked on the initiative webpage.
  - Comments are due by end of day November 22nd.

- Visit the initiative webpage for more information: California ISO - Extended day-ahead market (caiso.com)

- If you have any questions, please contact ISOStakeholderAffairs@caiso.com

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

EDAM

APPENDIX

California ISO

GHG bid sufficiency

- Stakeholders raised concerns that there may not be sufficient GHG bids with the net export constraints.
- Analysis shows that constraint does bind, but relatively infrequently, ~1% intervals in tight summer months

	Number of RTPD Intervals		
Month	Yes	No	Total
July 2022	1	2,972	2,973
August 2022	25	2,940	2,965
September 2022	27	2,850	2,877

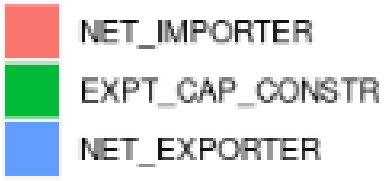
- In cases where GHG bids are insufficient, internal generation to the GHG regulation area would be dispatched.

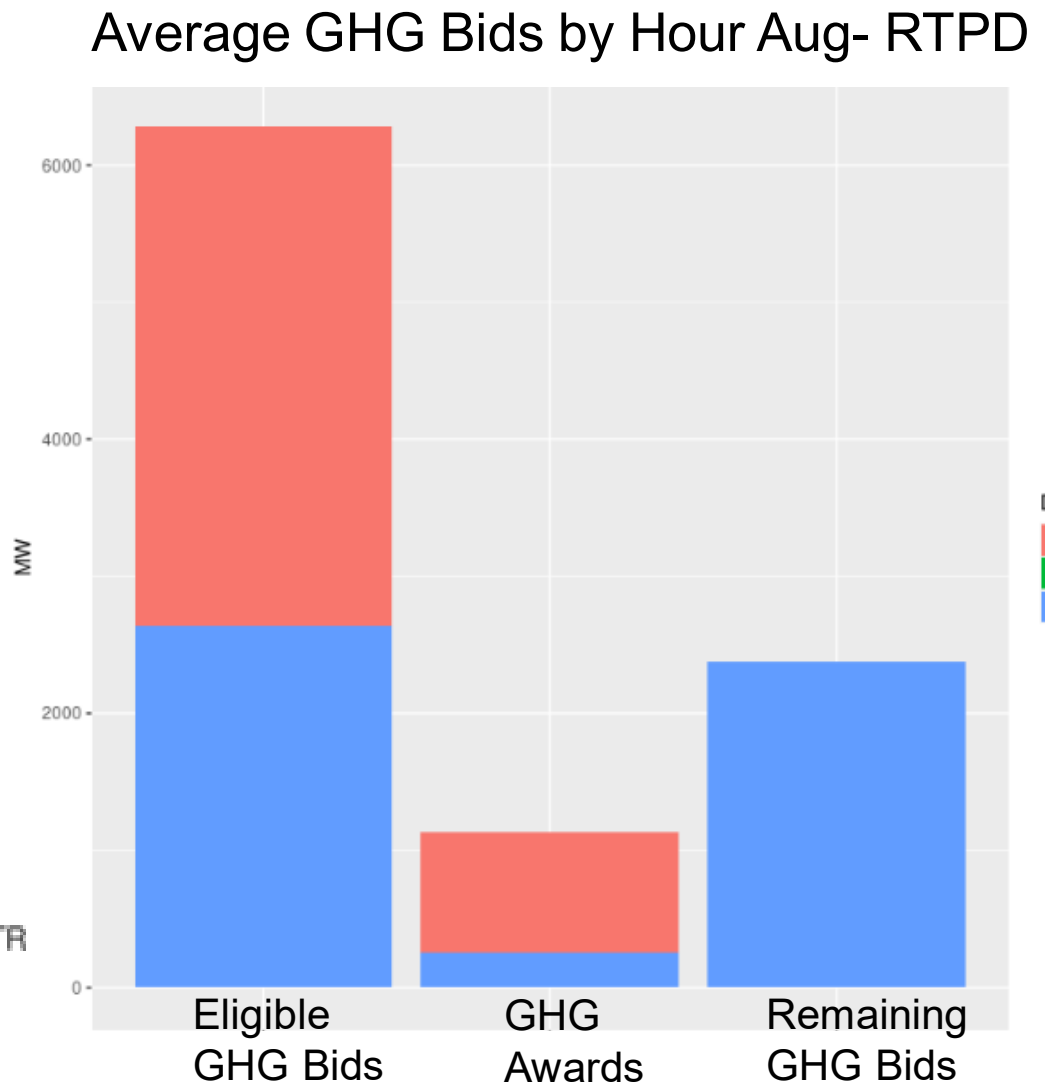
GHG net export constraint analysis

- Purpose: Estimate, using WEIM data, the extent to which the net export constraints proposed would affect the availability of GHG bids in EDAM
- Constraints analyzed:
  - GHG MW only awarded to net exporters
  - GHG MW not awarded above BAA's net export capability
  - GHG MW not awarded above BAA's optimal WEIM transfer
- Constraints not analyzed:
  - Exception for RA capacity
- Uncertainties:
  - How many entities will join EDAM
  - How bidding behavior will change in EDAM
  - EDAM uses optimal GHG market result (not base schedule)

GHG bids considered and impact of constraints

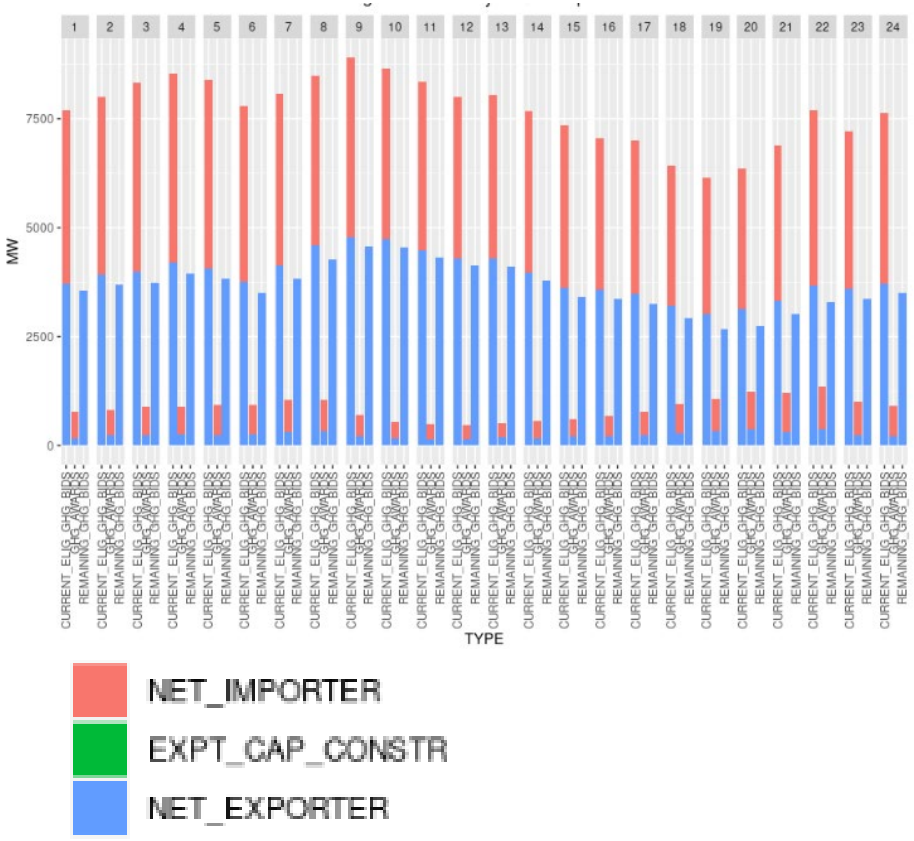
- "Currently Eligible GHG Bids" includes GHG bids that are eligible for attribution in WEIM today (i.e. eligible GHG bids after UEL minus Base Schedule constraint imposed)
- Does NOT include limitation of GHG awards by RTPD optimal energy schedule





Average GHG bid sufficiency in September 2022

Average GHG Bids by Hour
September RTPD



Remaining GHG Bids Net of
GHG Awarded to Imports
September - RTPD