



Extended day-ahead market greenhouse gas (GHG) discussion

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ISO PUBLIC

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 as compared to the other proposals.
- We will continue to evaluate evolving the EDAM GHG design in the future.

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

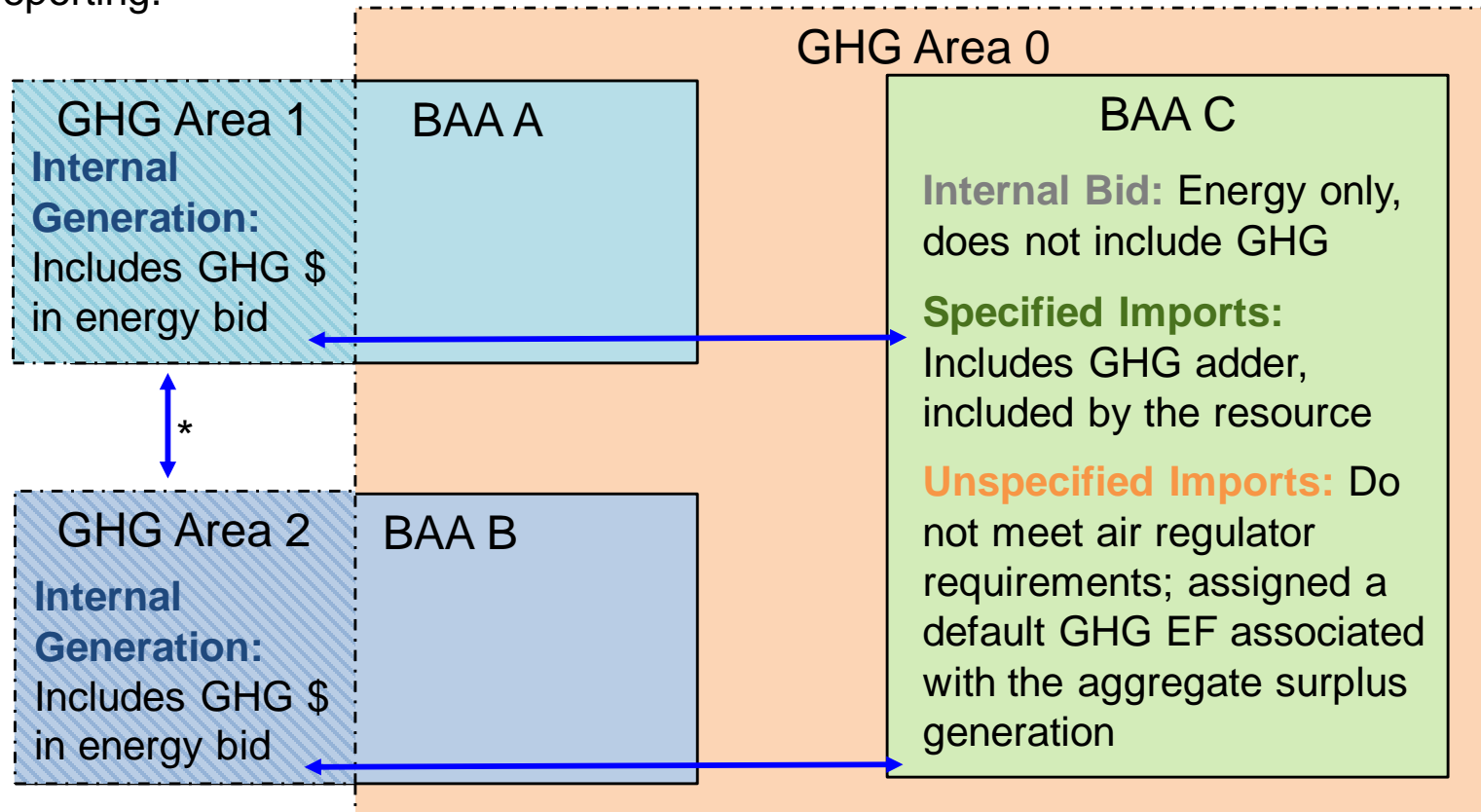
- I. Update the geographic boundary from the BAA to the GHG regulation area;
- II. Allow multiple GHG regulation areas for bidding and dispatch;
- III. Introduce a new counterfactual approach; and
- IV. Include new constraints to limit attribution.

I. Geographic Boundaries

- BAA boundaries do not necessarily align with state geographic areas
- In EDAM, the CAISO will define the GHG regulation areas based on state geographical boundaries as opposed to BAA boundaries
- This will allow the CAISO to reflect the costs associated with GHG pricing programs in the dispatch of resources to serve demand in a GHG regulation area

II. Resource Specific Overview with Multiple GHG Areas

An extension of the WEIM design that 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 \$)

II. Without linkage between WA and CA there will be a double cost of regulation

While this will result in market inefficiency, this is an area that state air regulators have stated they will address.

(Their solution may follow the approach used by Quebec with RGGI.)*

	CA offering to WA	WA offering to CA	Non-GHG area offering to CA
Energy Bid of a Natural Gas Unit	\$50 *Includes GHG cost of compliance in CA	\$50 *Includes GHG cost of compliance in WA	\$25
GHG Bid	\$25	\$30	\$30
Total Bid	\$75	\$80	\$55

Reference: [Quebec's Cap-and-Trade System Regulation](#) Calculation methods for the allocation of emission units without charge, subsection 7 and equation 6-11.

III. Counterfactual: GHG Reference Pass

The counterfactual run optimally assesses what incremental supply resources may have to support an EDAM transfer into a GHG regulation area.



Optimal EDAM solution
IFM

- Optimally schedules the **BAA** and **GHG regulation area** to reflect optimal dispatch (including constraints) in the EDAM footprint

GHG Reference Pass
(Counterfactual)

- Approximates how a BAA will meet their own load with internal generation and BAA to BAA transfers
- Does not include GHG bid / any GHG attributions, and therefore there will not be any GHG transfers in the import direction

III. 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. Will limit net GHG transfers in import direction to aggregate RA capacity in non-GHG area but does not prevent an export
3. **MPM for the IFM:** Will unlock GHG transfers between BAAs and GHG regulation areas and apply the net export constraint
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**

III. Counterfactual: Treatment of RA

1. RA resources that are treated as external to the GHG regulation area will have a zero GHG counterfactual/schedule which means they can be fully attributed to a GHG regulation area:
 - Dynamic schedules from resources in EDAM BAAs will need to be converted to bucket 1 energy transfers. The CAISO will expect the GHG bid to match their RA capacity.
2. RA resources treated as internal to the GHG regulation area will not be attributed, as they are viewed as internal to the GHG regulation area
 - Pseudo-ties are considered in the GHG area
 - Dynamic schedules from resources in non-EDAM BAAs are modeled as TGs at a CISO Scheduling Point

III. Counterfactual: The EDAM Counterfactual Approach Differs From the WEIM Approach

- In the WEIM the counterfactual is the base schedule, which is self-submitted by each participating resource in the WEIM BAA
- In EDAM the counterfactual will be an optimal solution produced by GHG reference pass with a limited GHG net import transfer
 - A scheduling coordinator that bids a high energy bid for a resource in the non-GHG area to avoid a GHG reference schedule to maximize its GHG attribution risks pricing the resource out of the IFM

IV. GHG Constraints to Limit Attribution

The proposal reduces secondary dispatch, but it does not eliminate it. Measures are in place to reduce secondary dispatch by limiting GHG attribution, which may indirectly result in a higher marginal GHG price

1. The GHG attribution constraint: GHG attribution will be 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 obtained from the GHG reference pass
- The optimal energy schedule

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

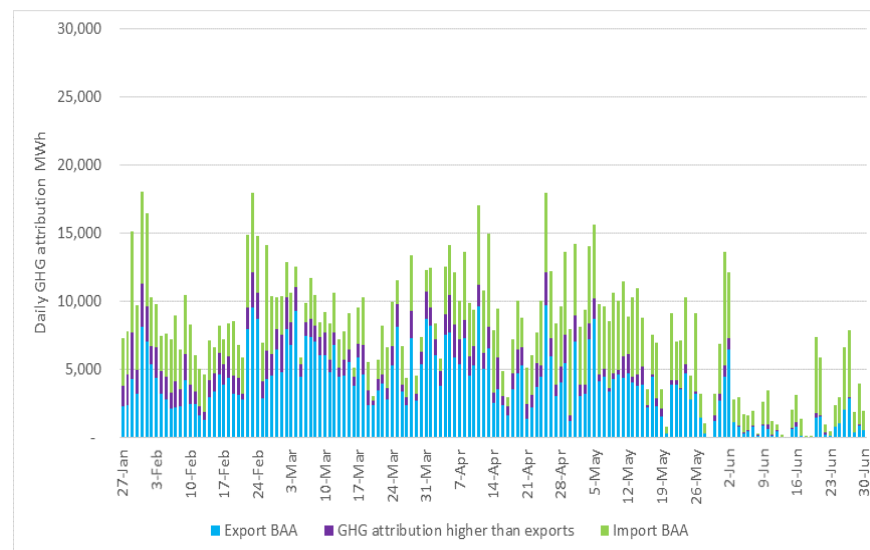
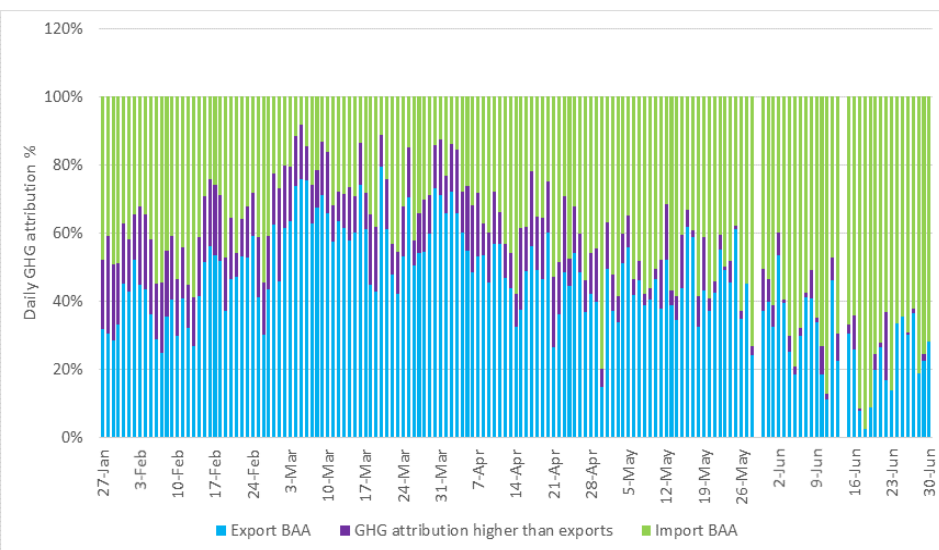
- The optimal net export BAA transfer (zero if a net import), or
- The aggregate RA capacity procured from resources in the BAA

Impact of applying the EDAM net export constraints to WEIM data from 1/27/22 - 6/30/22

Sources of GHG Attribution from a BAA	WEIM Today	EDAM
Exporting below transfer limits	Included	Included
Exporting above transfer limits	Included	Excluded
Importing	Included	Excluded

EDAM Secondary Dispatch Constraints Applied to WEIM Percentage

EDAM Secondary Dispatch Constraints Applied to WEIM Volume



The constraint from a BAA does limit transfers to a GHG regulation area which could have dispatch and pricing impacts.

Additional Constraints Proposed by Stakeholders

- Numerous parties have requested to include a nonlinear dynamic constraint to limit the resource GHG attribution to the incremental energy schedule above the GHG reference so as to reduce secondary dispatch
- The binary variables required to linearize the constraint impose a performance challenge that must be carefully evaluated and assessed
- The constraint removes the convexity of the problem leading to solutions with inappropriate unit commitment, production cost, and marginal prices
 - Working with examples, the CAISO found that resources outside the GHG area can be uneconomically scheduled above the GHG reference to receive a GHG attribution, resulting in payment inadequacy (payment below bid cost)

Q&A