Greenhouse Gas Coordination

Working Group 6

January 11, 2024

Housekeeping reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- These collaborative working groups are intended to stimulate open dialogue and engage different perspectives.
- Please keep comments professional and respectful.

Instructions for raising your hand to ask a question

- If you are connected to audio through your computer or used the “call me” option, select the raise hand icon  located on the bottom of your screen.
  Note: #2 only works if you dialed into the meeting.
  - Please remember to state your name and affiliation before making your comment.

- You may also send your question via chat to all panelists.

Notice to Participants

***Please be reminded**, Commissioners and advisors from state public utility commissions may be in attendance.*

Agenda

Time	Topic
1:00 – 1:05	Welcome & introductions
1:05 – 2:00	GHG attribution in EDAM and WEIM
2:00 – 3:30	Stakeholder-requested GHG metrics
3:30 – 3:55	Consolidated problem statements and prioritization
3:55 – 4:00	Next steps

Working group progress to date

GHG ATTRIBUTION IN EDAM AND WEIM

Background for today's discussion

- In previous working groups, the CAISO has heard feedback that stakeholders wish to understand more about the CAISO's GHG attribution mechanism
- CAISO believes that having this understanding will help in refining the problem statements from the working group and dismiss some misconceptions
- We hope that this discussion will be interactive, so please feel free to raise your hand at any time

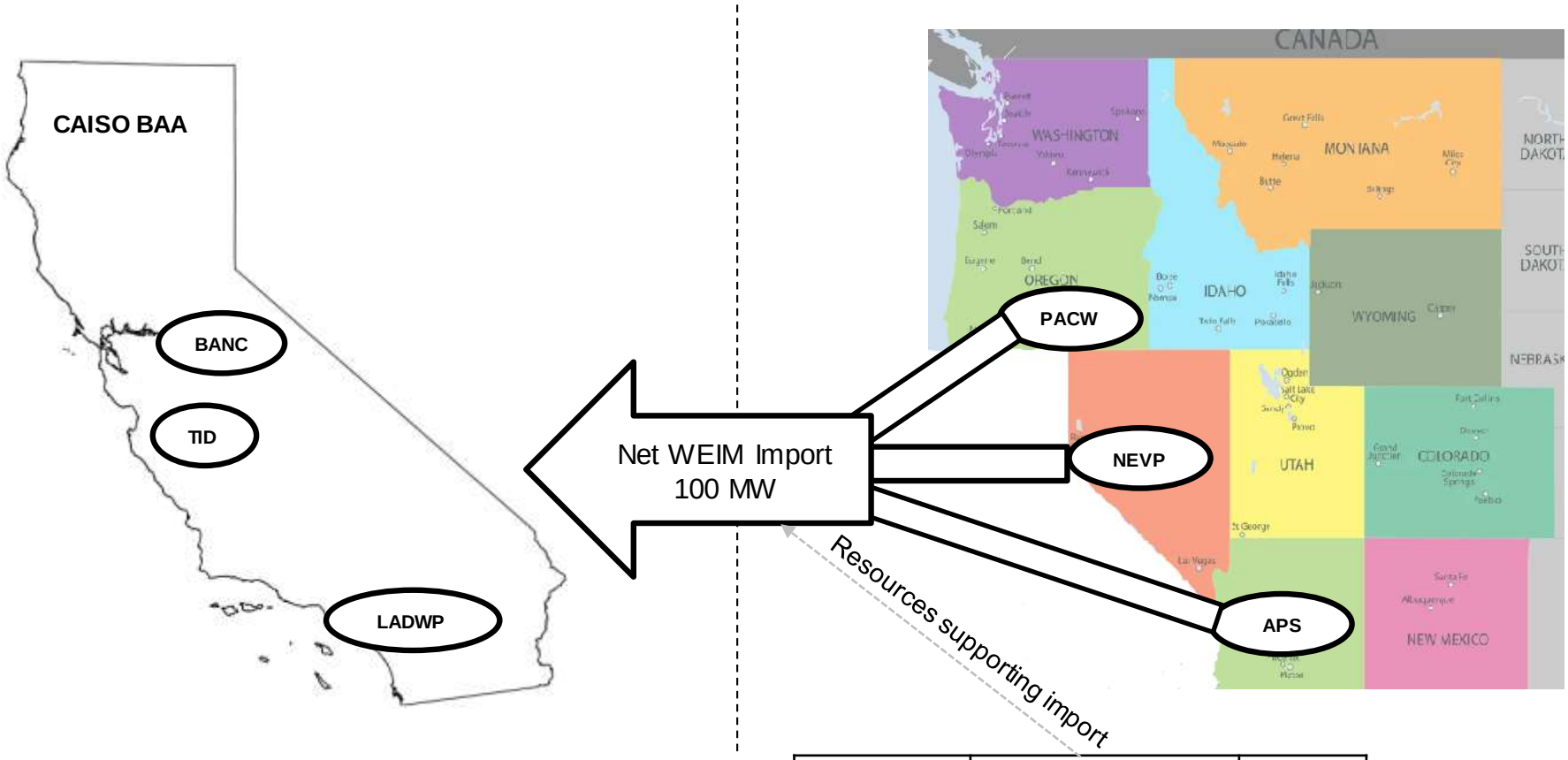
Objectives for today's discussion

- After today's discussion, stakeholders should be able to:
  - explain how the CAISO has implemented the current WEIM GHG attribution mechanism
  - define key terms such as GHG marginal cost and secondary dispatch
  - explain why resources may be dispatched below their base schedule
- With this updated understanding, the remaining conversation regarding GHG metrics and problem statements may be more productive

Part 1: Why does the CAISO have a GHG attribution mechanism?

- The need to implement a GHG attribution mechanism in the WEIM arises from CARB's cap-and-trade program and mandatory reporting regulations
- These programs regulate imports of electricity into the state of California, such as WEIM import transfers
- The GHG attribution mechanism identifies the:
  - total MW quantity of WEIM import transfers into California
  - which generating resources support those transfers

GHG attribution mechanism identifies the resources supporting the net WEIM transfer into California



Resource	GHG award	BAA
A	40 MW	PACW
B	20 MW	NEVP
C	40 MW	APS

If the underlying reason is so basic, why does the CAISO have all of the extra rules?

- The complexities arise from several other design constraints that CAISO's market is subject to:

  1) GHG attribution mechanism must integrate with CAISO least-cost dispatch principles

  2) Price impacts to load must be limited to within California

  3) Participation in the GHG attribution mechanism must be voluntary

The next few slides will discuss how CAISO's current GHG design addresses each of these three constraints

1) How does the GHG attribution mechanism integrate with CAISO least-cost dispatch principles?

- GHG bid prices are subject to a resource-specific cost-based bid cap:

GHG cost-based bid cap ($/MWh)

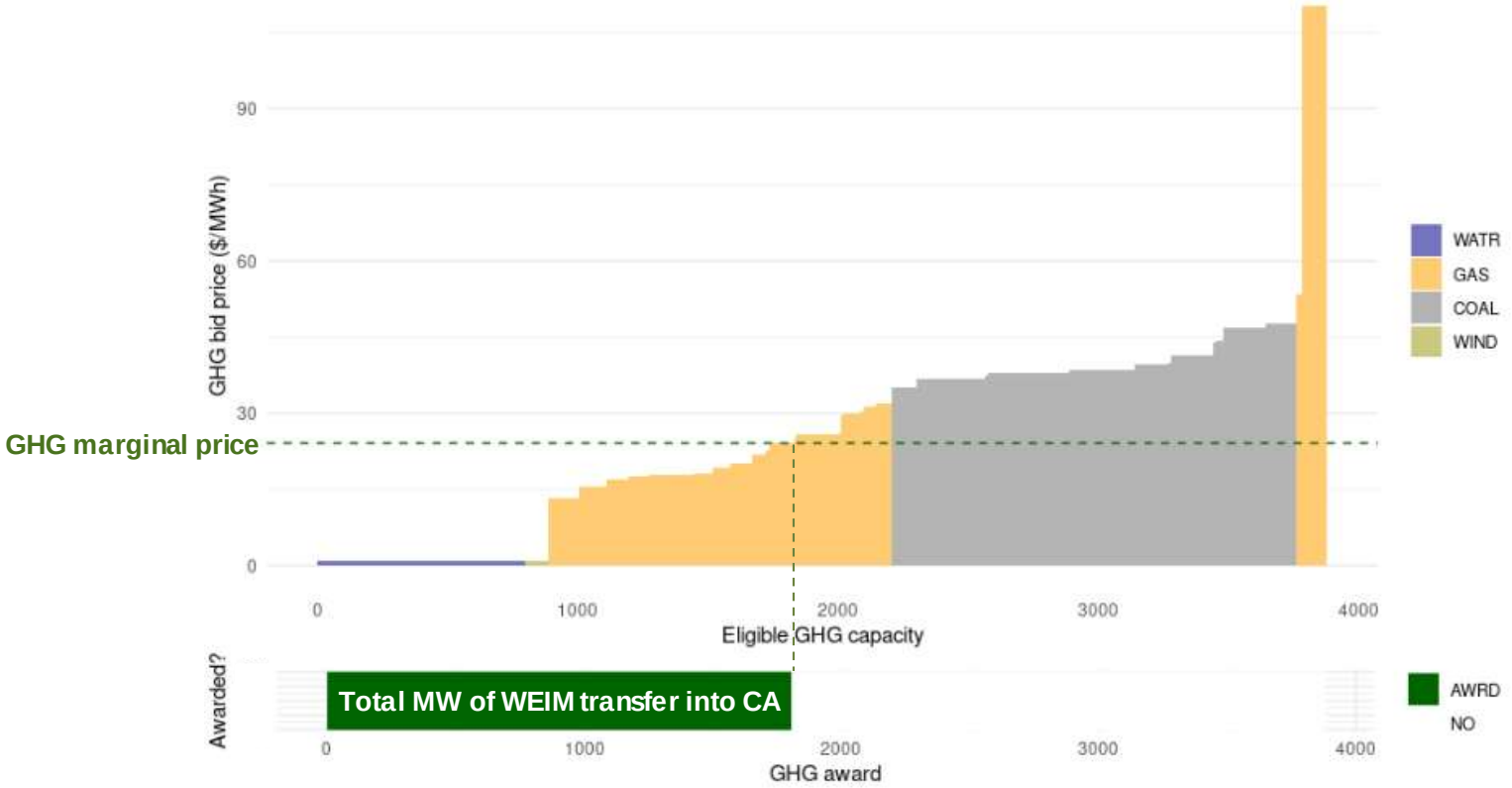
*110% * Heat rate * Resource's GHG emission rate * GHG allowance index price*

- This cost-based cap was implemented in response to a 2014 FERC Order
  - Previous rules limited GHG bid price to $1,000/MWh

1) How does the GHG attribution mechanism integrate with CAISO least-cost dispatch principles? (cont.)

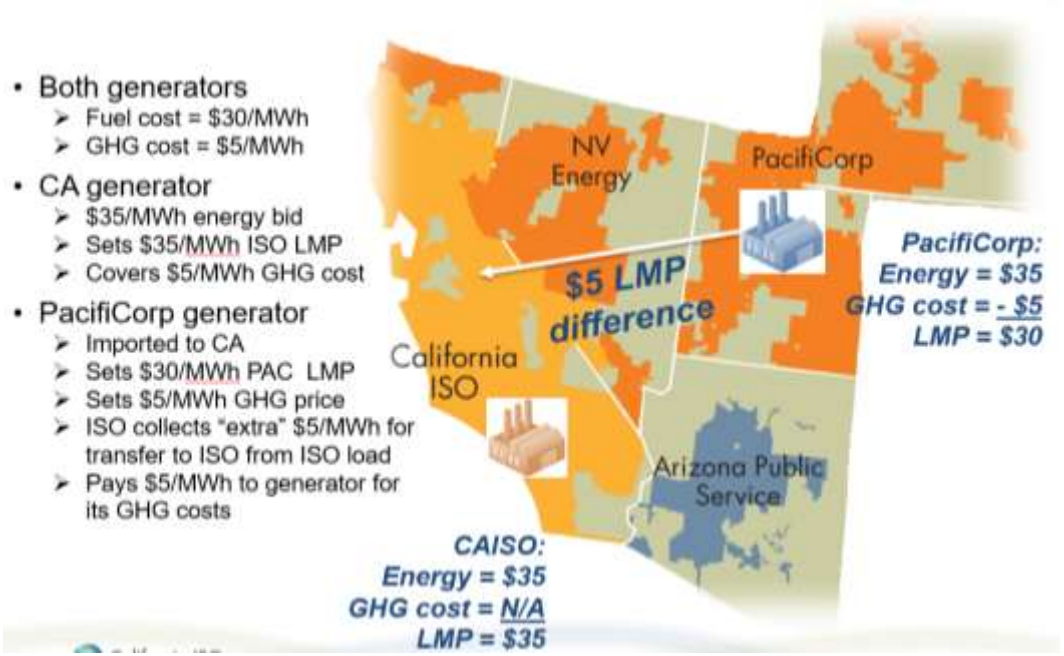
- GHG bids are awarded based on the GHG bid price

GHG supply curve: August 28, 2023, 21:40-21:45



2) How does the GHG attribution mechanism limit price impacts to load to within California?

- GHG marginal cost is only paid by load within California



3) How does the GHG attribution mechanism ensure that participation is voluntary?

- The submission of GHG bids is entirely voluntary
- In other words, only those market participants that wish for their resource's output to be deemed to serve load in California need to submit GHG bids

Part 1 recap: how does CAISO's GHG attribution mechanism address design constraints?

1) GHG attribution mechanism must integrate with CAISO least-cost dispatch principles
   - GHG bid prices are subject to a cost-based cap
   - GHG bids are awarded based on GHG bid price
2) Price impacts to load must be limited to within California
   - GHG marginal cost is only paid by load within California
3) Participation in the GHG attribution mechanism must be voluntary
   - Submission of GHG bids is entirely voluntary

Part 2: Definitions

- The remainder to the presentation will describe CAISO's definitions of the following terms:
    1) GHG Marginal Cost
    2) Eligible GHG Capacity
    3) Potential Secondary Dispatch

1) What is the GHG marginal cost?

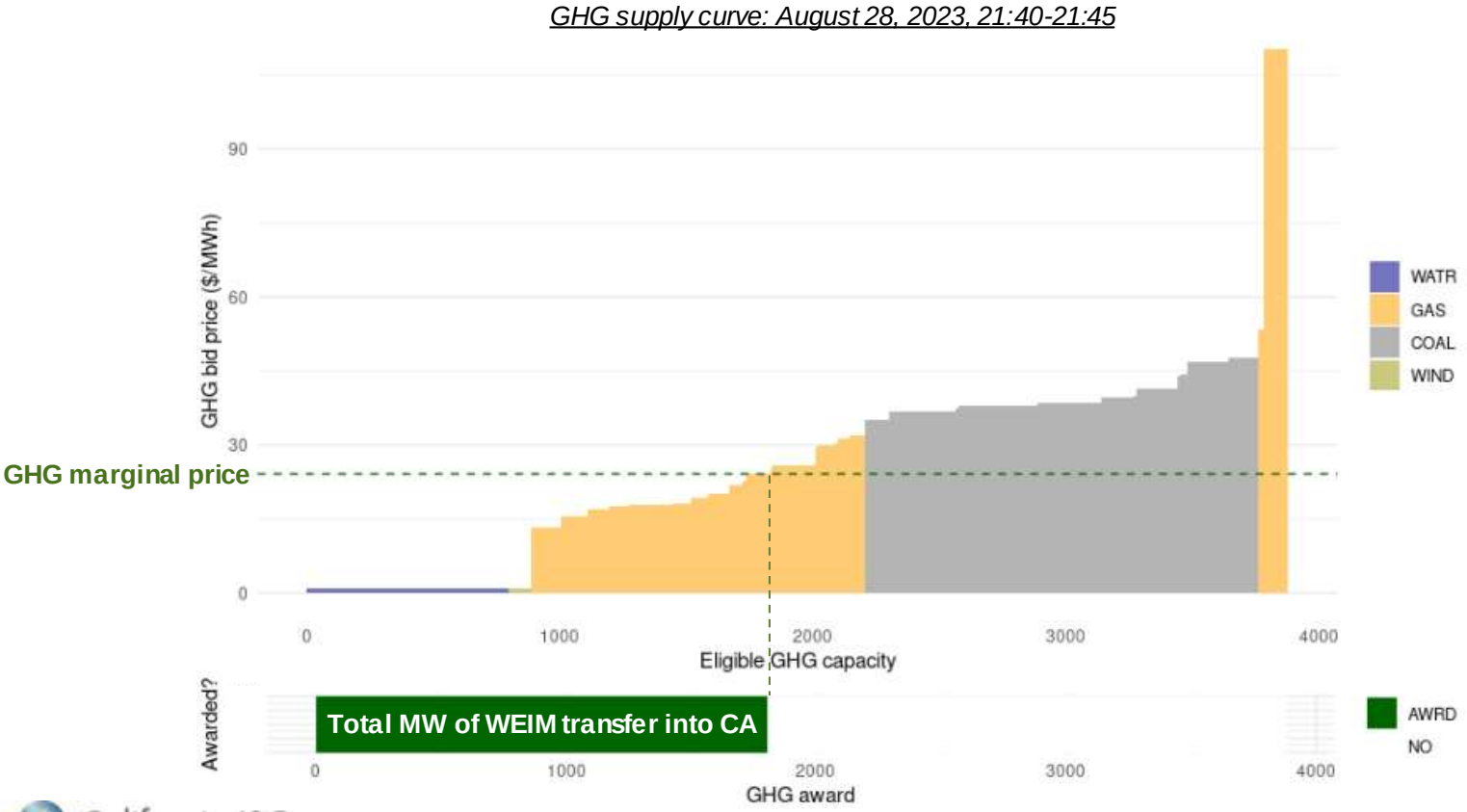
- In optimization terminology, the GHG marginal cost is:

  "the shadow price of the net imbalance energy export allocation constraint"

- A more intuitive explanation is that is the change in the total cost paid by load if the WEIM transfer into California were to change by 1 MWh
- Remember: the WEIM transfer into California is allocated according to the relative GHG bid prices…

1) What is the GHG marginal cost? (cont.)

- … thus the GHG marginal cost is set by the marginal GHG bid price, based on the total MW of the WEIM transfer into California

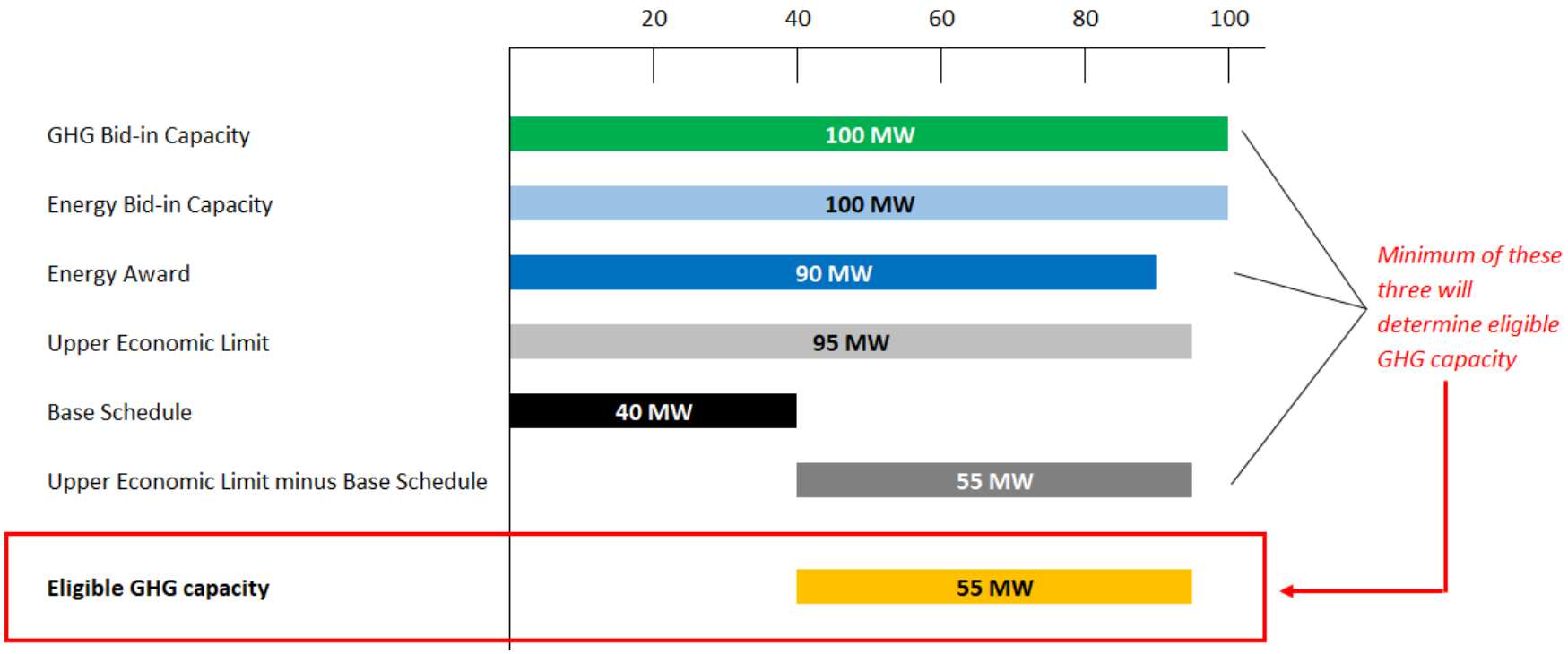


What is NOT the GHG marginal cost?

- CAISO's GHG marginal cost is not a reflection of the GHG cost associated with the "marginal" resource for energy (i.e. the resource that sets the SMEC)
  - The system marginal energy cost (SMEC) is the clearing price for energy, not considering any impacts of congestion or losses
  - In any market interval, there is a resource or a set of resources that set the SMEC
- In theory, the GHG costs associated with the marginal resource(s) could be identified or estimated

The GHG costs of the marginal resource(s) would be a different metric than the CAISO's GHG marginal cost which is associated only with the WEIM transfer

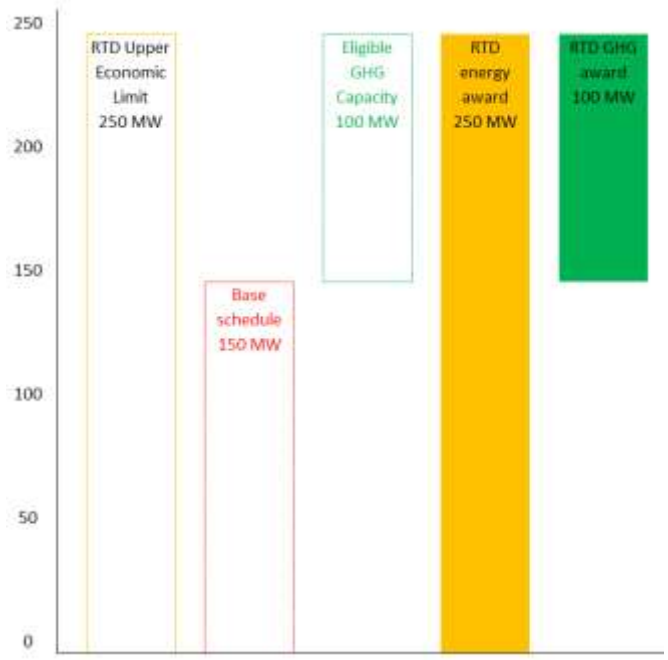
2) How does is eligible GHG capacity determined in the market clearing process?



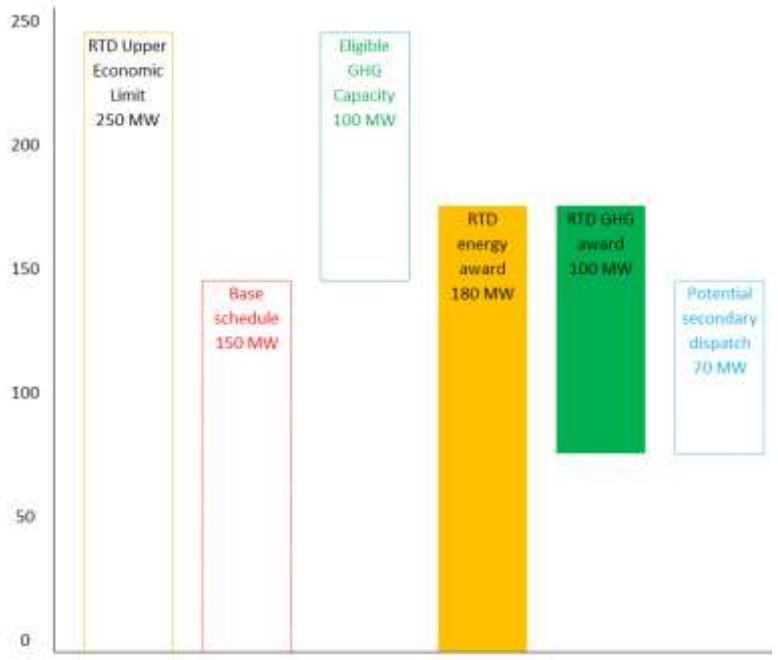
Eligible GHG capacity = *max(0, min(GHG Bid-in Capacity, Upper Economic Limit - Base Schedule, Energy Award))*

How does the CAISO identify potential secondary dispatch?

No secondary dispatch



Potential for secondary dispatch



Potential secondary dispatch is when the range of the GHG award dips into the resource's submitted base schedule

Potential secondary dispatch = *max(0, Base Schedule – [Energy Award - GHG Award])*

Why would a WEIM resource be dispatched below its submitted base schedule?

- WEIM resources are dispatched below their submitted base schedule for a variety of reasons. For example:

  1) Economic displacement

  Another resource is relatively less expensive (i.e. lower energy bid price), so the WEIM optimization dispatches the other resource upwards and the current resource downwards

  2) Decreases in load forecast

  When the actual load (technically, the market clears against forecasted load) needs of the WEIM area is lower than the estimated load used to develop base schedules, less output is required from the resource

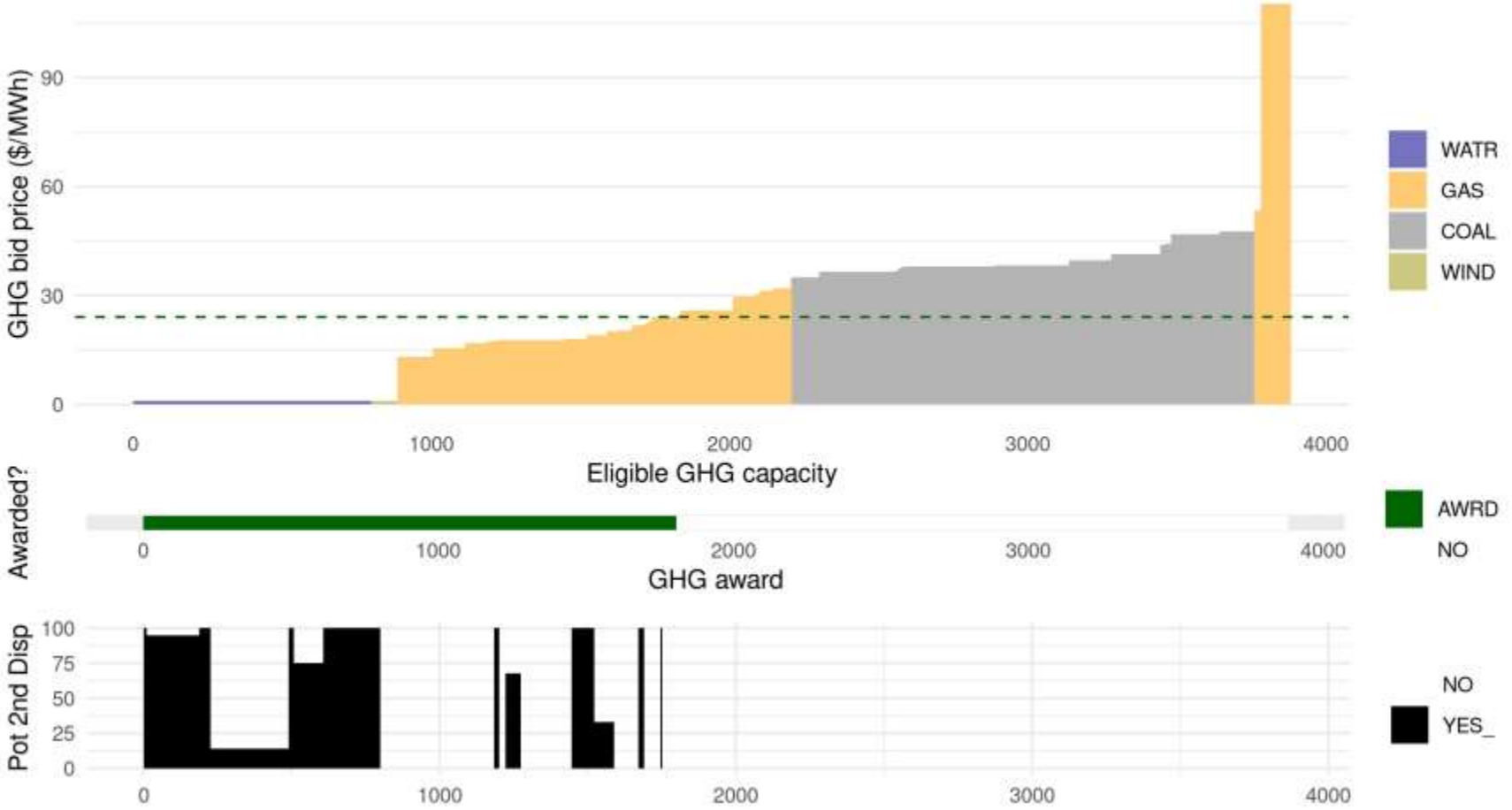
  3) Other resource is "backfilling"

  Another resource is relatively more expensive (i.e. a higher energy-only bid price) but has a lower "total bid" price (i.e. energy bid price plus GHG bid price), that resource may be dispatched upwards but the current resource receives a GHG attribution

- While reason 3 may be considered to be leakage due to potential secondary dispatch, reasons 1 and 2 are not

GHG bids awarded below a resource's base schedule may result in potential secondary dispatch

GHG supply curve: August 28, 2023, 21:40-21:45



STAKEHOLDER-REQUESTED GHG METRICS

General feedback

- Working group participants are supportive of average emissions rate (AER) metric
  - Seeking more discussion on various permutations

Requested metrics in Dec 2023 working group comments

- GHG attributions by fuel type broken down into attributions from generators registered/not registered in WREGIS
- Attributed generation by zone
- Permutations of the average emissions rate
- Marginal emissions rate
- Residual emissions rate
- Total emissions by jurisdiction
- Enhancements to Today's Outlook emissions data
- Enhancements to ISO Emissions Tracking Report

Requested metrics in Dec 2023 working group comments

- Net import into the GHG regulation zone for electricity deemed delivered to serve load in the GHG zone
- For attributed resources, the total MWH of GHG attribution above and below the counterfactual
- Total MWH and GHG emissions of emitting resources outside of GHG zones dispatched above the counterfactual and not deemed for delivery into a GHG zone
- The GHG revenue distributed to zero-emitting resources within GHG and non-GHG zones
- The dollar amount that would be paid to emitting resources if paid highest as-bid GHG for resources wrongly deemed beneath the base schedule
- A graph comparing the marginal GHG emission rate for deemed delivered imports (below the WEIM base schedule) to CA and WA for each market interval to the default GHG emission factor for unspecified electricity (0.428 metric tons CO2e/MWh)

CONSOLIDATED PROBLEM STATEMENTS & PRIORITIZATION

General feedback

- Stakeholders are seeking further understanding of how problem statements were consolidated
- Distinguish problem statements that address current market operations from those that relate to future operations under EDAM
- Defer consideration of problem statements that relate to future operations under EDAM
- For consolidated problem statements that identify concerns under current market operations, identify data available to analyze the scope of the problem and potential solutions under current market operations
- Problem statement sponsors

General feedback

- Problem statement additions:
  - problem statement that focuses on utilities that have a declining emissions target/zero emissions neutral target in a price-based area
  - problem statement that reflects how corporate goals work alongside an absolute reduction target
  - The current price formation does not provide full transparency into the total marginal GHG cost, leading to inaccurate price signals and reduced price transparency.

Problem statement consolidation

#	Problem statement	Former PS	Prioritization
1	The optimization does not take the explicit cost of secondary dispatch into account, and therefore may not balance optimized attribution with constraints to limit secondary dispatch.	PS 3	3
2	The current GHG design does not limit attribution to only capacity above the baseline which results in the potential for secondary dispatch.	PS 1	4
3	Attribution is not scale-able because it creates the potential for secondary dispatch. This secondary dispatch could increase with market expansion.	PS 2	6
4	The current price formation does not provide full transparency into the total marginal GHG cost, leading to inaccurate price signals and reduced price transparency.	PS 4	N/A; Re-added

Note: Prioritization determined by 11/27 Slido Poll results and written comments submitted on 12/11.

Problem statement consolidation

#	Problem statement	Former PS	Prioritization
5	When there are multiple unlinked GHG regulation areas or different reporting requirements by different states, market participation may result in double counting, undercounting, or inconsistent counting of emissions. Variations of this issue include: a. Using both total WEIM transfer data and cost based accounting b. Using both total WEIM transfer data and cost based accounting c. Between unlinked jurisdictions if one area uses generation based accounting and another area uses load based accounting	PS 5 PS 6	2

Note: Prioritization determined by 11/27 Slido Poll results and written comments submitted on 12/11.

Problem statement consolidation

#	Problem statement	Former PS	Prioritization
6	The ISO does not provide all metrics desired by market participants. This includes: a. Demonstration of the impact of the market on decarbonization and renewable curtailment. b. Information is lacking to LSEs in jurisdictions with non-priced emissions reduction policies to fulfill reporting obligations with state policy such as market imports to serve load. This could undermine efforts to decarbonize as the unspecified emissions rate used by states with an absolute reduction program fails to reflect the accuracy of generation and consumption at a local level. c. Costs of GHG to end-use customers	PS 8 PS 9 PS 10 PS 11 PS 12 PS 13	1

Note: Prioritization based on 11/27 Slido Poll results and written comments submitted on 12/11.

Problem statement consolidation

#	Problem statement	Former PS	Prioritization
7	There is not a market mechanism in states with a declining cap on emissions for: a. Utilities to ensure load is served by generation and wholesale market transfers that meet those emission reduction targets b. Utilities to offer generation to the market on a portfolio basis (regardless of point of consumption) that meets the state's emissions target over a given time period c. Reflecting both the declining cap and a price on carbon in the market for states that have both requirements	PS 7 PS 14 PS 15 Verbal feedback	5

Note: Prioritization determined by 11/27 Slido Poll results and written comments submitted on 12/11.

Topic prioritization

1. Emissions Tracking and Accounting
2. ISO Market Operations & GHG Design
3. State Coordination
4. Beyond Price-based GHG policy

Note: Prioritization based on 11/27 Slido Poll results and written comments submitted on 12/11.

NEXT STEPS

Working group schedule

Date	Topic(s)
February 22, 2024	GHG Counterfactual Beyond GHG Pricing Policies
March 14, 2024	Stakeholder determined
April 17, 2024	Stakeholder determined
May 29, 2024	Stakeholder determined
June 26, 2024	Stakeholder determined

Note: Working group topics will be informed by problem statement readiness, stakeholder feedback, staff bandwidth, and stakeholder presentation timing.

Next steps

- Comments due by end of day January 25th.
  - Submit using the template provided on the working group webpage

- Next working group on February 22nd.

- Submit requests to present to ISOStakeholderAffairs@caiso.com

- Relevant information: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Greenhouse-gas-coordination-working-group

NEWS RELEASE: FERC accepts ISO tariff changes for a Western day-ahead electricity market

- New rules adopted for the Day-Ahead Market Enhancements (DAME) and the Extended Day-Ahead Market (EDAM).
- Stakeholders were deeply engaged in designing the market rules through a collaborative working group process, which included regional utilities, independent energy providers, state regulators, public interest organizations, and a variety of entities representing various interests and points of view throughout the Western Interconnection.
- Learn more about EDAM through this link.
- Find out What They're Saying, News Release

- *Energy Matters* blog provides timely insights into ISO grid and market operations as well as other industry-related news

http://www.caiso.com/about/Pages/Blog/default.aspx.

December 18, 2023
Leadership, Western EIM

WEIM Governing Body has two positions to fill in 2024

By Nicole Hughes

In 2024, the Western Energy Imbalance Market (WEIM) Nominating Committee will reconvene and lead the stakeholder effort to recommend candidates to fill two positions on the WEIM Governing Body that are set to expire at the end of June. This time around, there is the added consideration of candidates' qualifications to meet the additional ...

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Leadership

California ISO 2023 Year in Review

Last year, following extensive engagement with our partners and stakeholders, the California ISO published its 2022-2026 Strategic .

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