



California ISO

GHG Coordination Working Group

November 27, 2023

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	
9:00 – 9:05	Welcome & introductions	Isabella Nicosia (CAISO)
9:05 – 10:00	Current and potential GHG metrics published by CAISO	Kevin Head (CAISO)
10:00 – 11:30 • 10:00 – 10:30 • 10:30 – 11:30	Discussion on reporting requirements • Oregon GHG reporting requirements • Complexities of a multi-jurisdictional utility	Elizabeth Elbel (ODEQ) Zepure Shahumyan (PacifiCorp)
11:30 – 12:30	Lunch break	
12:30 – 2:45	Consolidated problem statements	Isabella Nicosia (CAISO) Sylvie Spewak (CAISO)
2:45 – 3:00	Working group schedule & next steps	Isabella Nicosia (CAISO)

Working group progress to date



- Principles **[Done – open for continuous review and feedback]**
- Problem statements **[In progress]**
- Assessment **[In progress]**
- Resolution **[Not started]**



California ISO

Current and Potential GHG Metrics Published by CAISO

Market Design & Analysis

Kevin Head

November 27, 2023

Background for today's meeting

- Stakeholders have asked the CAISO to provide various metrics regarding:
 - GHG emissions associated with CAISO markets and,
 - Performance of the GHG market design
- The CAISO already publishes some of these metrics and plans to report additional metrics
- Today's presentation will cover:
 - The current metrics posted
 - Potential metrics that may be published in the future as a result of the GHG working groups

Current GHG metrics published by CAISO

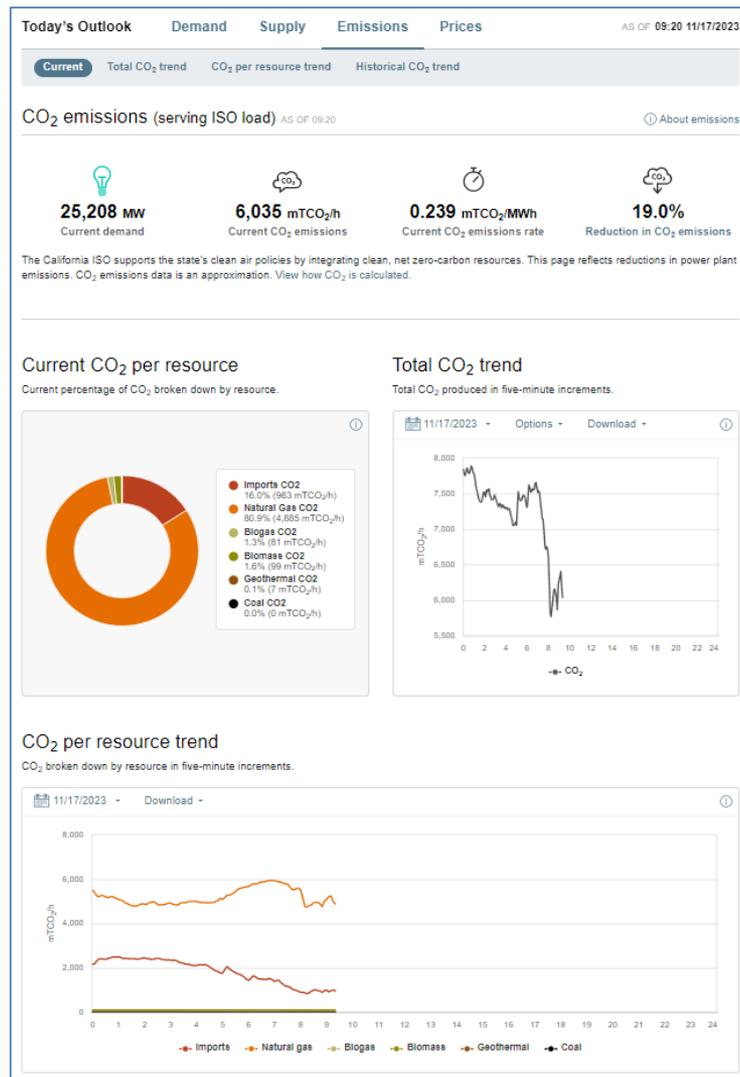
1) Public

- a) CAISO Daily Outlook
- b) GHG Emission Tracking Report
- c) GHG Attributions by Fuel Type

2) Non-public

- a) WEIM GHG attributions through the Customer Market Results Interface (CMRI)

CAISO Daily Outlook



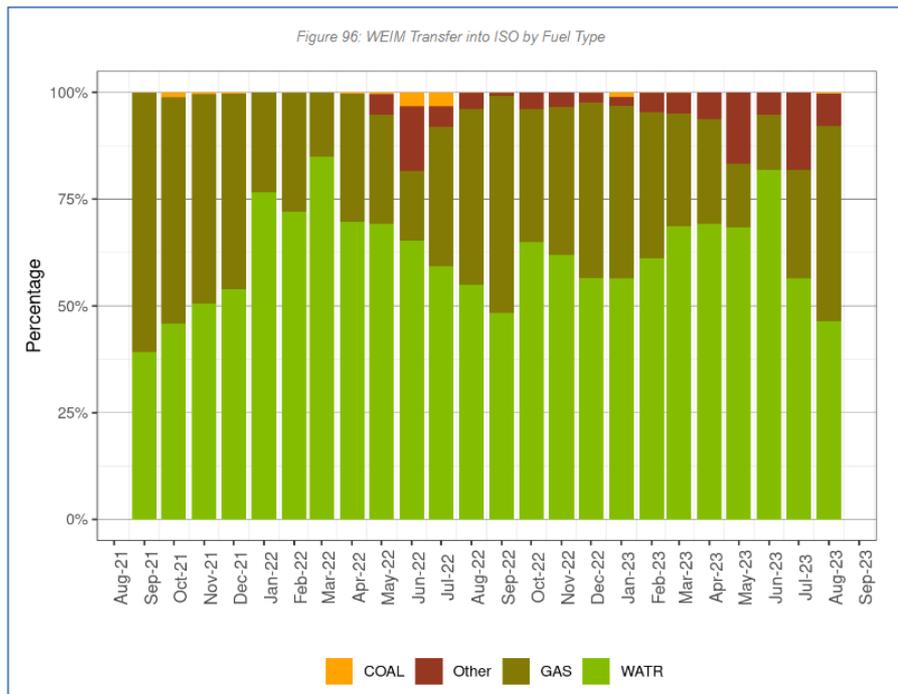
- Reports the emissions associated with the energy serving load in the CAISO BAA, using metered energy
- Assumptions:
 - Uses pre-defined emissions rates by fuel type (i.e. not resource-specific as registered in Master File)
 - Assigns emissions to imports based on unspecified rate of 0.428 MTCO₂e/MWh
- Link:
<https://www.caiso.com/TodaysOutlook/Pages/emissions.html>

GHG Emission Tracking Report



- Reports the emissions associated with the energy serving load in the CAISO BAA using 5-minute market awards
- Assumptions:
 - Uses resource-specific emissions rates as registered in Master File, where possible
 - Assigns emissions to imports based on unspecified rate of 0.428 MTCO2e/MWh
- Link: <https://www.aiso.com/market/Pages/ReportsBulletins/Default.aspx>

GHG Attributions by Fuel Type



- Reports only the percentage of MWh transfers of GHG attributions into California BAAs, grouped by fuel type
- Link (Market Performance Reports > Monthly market performance reports > Sect. 8): <https://www.caiso.com/market/Pages/ReportsBulletins/Default.aspx>

WEIM GHG attributions (CMRI)

The screenshot displays the California ISO Customer Market Results Interface. The top navigation bar includes links for Day-Ahead, Real-Time, Post-Market, Default Bids, Convergence Bidding, Forecast, Reference, LSE, Energy Imbalance Market, Phase Shifter, Gas Burn, and Reliability Coordination. The main interface shows search filters for Trade Date (11/17/2023), Entity, Resource (All Item(s)), Binding (ALL), Product (CA Export Allocation), Schedule Type (ALL), and Hour (1). Below the filters is a table titled "Fifteen-Minute Market (FMM) Schedules". The table has columns for Trade Date, SC ID, Resource, Configuration Effective, Intertie Product, Schedule Type, Binding, Hour Ending, and four GHG attribution intervals: Interval IE:15 [MW], Interval IE:30 [MW], Interval IE:45 [MW], and Interval IE:00 [MW]. A red box highlights the data for the CA Export Allocation resource on 11/17/2023.

Trade Date	SC ID	Resource	Configuration Effective	Intertie Product	Schedule Type	Binding	Hour Ending	Interval IE:15 [MW]	Interval IE:30 [MW]	Interval IE:45 [MW]	Interval IE:00 [MW]
11/17/2023		CA Export Allocation	Cleared	Yes	1	0.00	11.12	12.62	30.00		
11/17/2023		CA Export Allocation	Market	Yes	1	0.00	11.12	12.62	0.00	0.00	
11/17/2023		CA Export Allocation	Self	Yes	1	0.00	11.12	12.62	0.00	0.00	
11/17/2023		CA Export Allocation	Cleared	Yes	1	0.00	11.12	12.62	0.00	0.00	

- Reports the resource-specific GHG attributions for the 15-minute and 5-minute market
- Results are only available to the WEIM Participating Resource Scheduling Coordinator
- 5-minute market results form the basis of what is reported the CARB for compliance with their programs related to the WEIM

Potential GHG metrics to report

- CAISO is also considering publishing other metrics in the future to increase transparency and assist market participants with compliance and reporting requirements
- The GHG working group effort will help inform which metrics to report, how frequently, etc.
- One such metric is an average emissions rate (AER)
 - The CAISO would like to discuss how such a metric could be calculated in future GHG working groups
 - The CAISO will publish an example of this data on the CAISO website after this working group meeting

Issues to consider when developing an AER metric

- In future working groups, the CAISO would like to receive feedback on some considerations when calculating such a measure:
 - 1) Which resources the AER would reflect
 - 2) Whether the AER would measure all schedules or only those schedules relative to the WEIM base schedule
 - 3) How bilateral transactions between BAs would be treated
 - 4) How missing data would be treated
- The AER would not replace or supplant the marginal unspecified factor emissions rate used by other state reporting/compliance programs unless approved by the appropriate regulatory bodies

1) Which resources the AER would reflect

- AER is a simple calculation:

$$\text{Average Emissions Rate} = \frac{\text{GHG Emissions (MTCO}_2\text{e)}}{\text{Energy Output (MWh)}}$$

- CAISO wants to highlight some categories of resources for potential inclusion:
 - Supply resources (*i.e.* traditional generators)
 - Demand response resources
 - Energy storage resources
 - Resources that were attributed to serve California (or, post-EDAM, Washington)

2) Whether the AER would measure all schedules or only those schedules relative to the WEIM base schedule

- WEIM utilizes a concept called “base schedules” which can be thought of as the generation/bilateral contracts that is intended to serve a WEIM BAA’s native load
- The energy schedules that result from the WEIM optimization can be viewed as incremental (above) or decremental (below) to the base schedule

	Incremental	Decremental
Base schedule	40MW	40MW
WEIM optimization result	50MW	25MW
<hr/>		
Incremental schedule/ (Decremental) schedule	10MW	(15MW)

2) Whether the AER would measure all schedules or only those schedules relative to the WEIM base schedule (cont.)

- CAISO wants to share some considerations which might be helpful in determining the best approach

All resource schedules	Relative to base schedule
<p>Pro:</p> <ul style="list-style-type: none">• Easier to understand• More in line with physical principles (i.e., all generation feeds a single pool)• More in line with capturing the emissions on the system at a given time	<p>Pro:</p> <ul style="list-style-type: none">• More in line with market principles (i.e., captures just those schedules that are marginal relative to a baseline)
<p>Con:</p> <ul style="list-style-type: none">• Might not capture the principles of a market	<p>Con:</p> <ul style="list-style-type: none">• Base schedules might not be a perfectly objective baseline• Results in some unusual situations with negative emission rates

3) How bilateral transactions between BAs would be treated

- CAISO's markets, including WEIM, allow for energy imports and exports to be transacted bilaterally, rather than through the market
- Such transactions might not be traceable back to a specific resource making their emissions rate ambiguous
- The CAISO is soliciting feedback on:
 - Whether or not to factor these transactions into the AER calculation and,
 - If they should be included, how to account for the emissions for unspecified imports into the system

4) How missing data would be treated

- CAISO does not have emissions rates or heat rates for every resource in the WEIM
- CAISO would likely fill in missing emissions rates and heat rates in order to have an exhaustive accounting of all emissions and energy schedules
- This could be done with:
 - Existing data from similar resources using data from CAISO Master File
 - Other publically-available data sources

How CAISO calculated the example AER metric published on the CAISO website

- 1) Which resources the AER would reflect:
 - Supply resources - **Included**
 - Demand response resources - **Excluded**
 - Energy storage resources - **Included**
 - Resources that were attributed to serve California (or, post-EDAM, Washington) - **Included**
- 2) Whether the AER would measure all schedules or only those schedules relative to the WEIM base schedule
 - **All schedules were included**
- 3) How bilateral transactions between BAs would be treated – **Bilateral transactions were included**
- 4) How missing data would be treated – **CAISO filled in missing data by using weighted averages from existing data**

Oregon Department of Environmental Quality

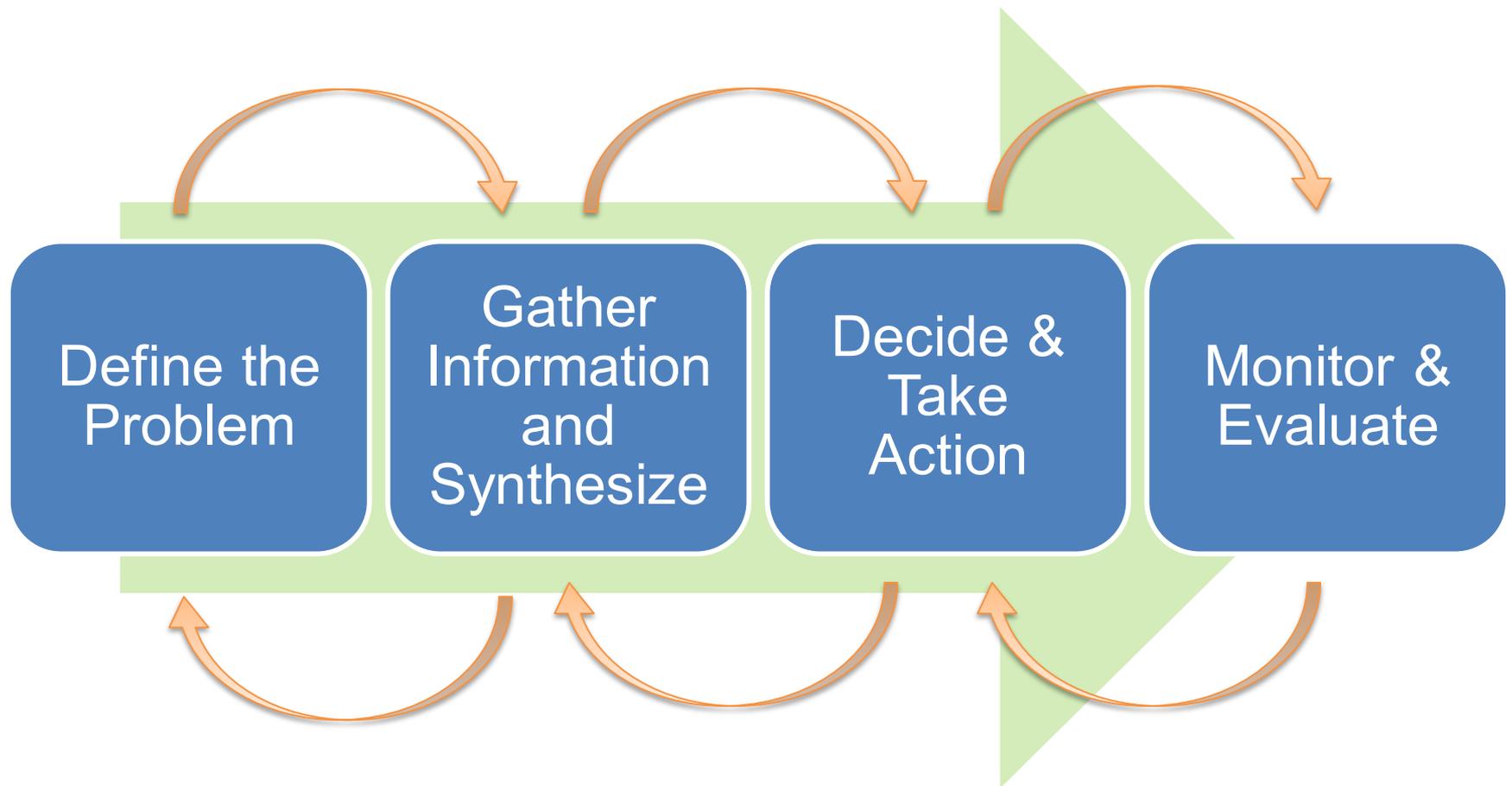
OREGON GHG REPORTING REQUIREMENTS

PacifiCorp

COMPLEXITIES OF A MULTI- JURISDICTIONAL UTILITY

CONSOLIDATED PROBLEM STATEMENTS

Problem statement development is an iterative process



ISO Market Definitions

The ISO would like to offer the following definitions of certain key phrases/terms to simplify the process of defining problem statements. The ISO recognizes that there may be some disagreements in the precise definitions. Understanding that, the ISO believes that the definition of the problem statements is considerably simplified when the problem statements can leverage consistent definitions.

ISO Market Definitions

- Secondary dispatch: the MW quantity below a resource's baseline that receives a GHG award
- Baseline: The MW quantity of a resource that would likely have been dispatched regardless of the opportunity to serve demand in a GHG area.
 - The baseline is used as a counterfactual to determine the MW quantity of a resource that can be attributed to a GHG area.

ISO Market Definitions

- The baseline in the WEIM today is a resource's self submitted base schedule
- In EDAM:
 - The baseline for WEIM only resources will continue to be a resource's self submitted base schedule
 - The baseline for EDAM resources in the IFM will be an optimized counterfactual

AREAS OF FURTHER EXPLORATION

Market Operations and GHG Design

Stakeholders are seeking greater understanding of the current EDAM and WEIM GHG design in order to inform and refine future problem statements. Specific topics stakeholders would like to understand include:

1. How does the EDAM and WEIM baseline/counterfactual work?
2. How is attribution determined?
3. Is attribution determined by the optimization or does it occur after the fact?
4. What energy does the WEIM and EDAM consider to be eligible to be attributed to serve demand in a GHG regulation area?
5. How much secondary dispatch is occurring both in the WEIM and EDAM?
6. What is the associated cost of secondary dispatch?
7. What tradeoffs occur between limiting secondary dispatch and the GHG costs in the WEIM and EDAM?
8. Is there sufficient transparency in the total marginal GHG cost?
9. Does the GHG cost in the market reflect actual cost of GHG to end use customers?

PROBLEM STATEMENTS

Market Operations and GHG Design

Problem Statement 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.

Market Operations and GHG Design

Problem Statement 2:

The current GHG design does not limit attribution to only capacity above the baseline which results in the potential for secondary dispatch.

Market Operations and GHG Design

Problem Statement 3:

Attribution is not scaleable because it creates the potential for secondary dispatch. This secondary dispatch could increase with market expansion.

State Coordination

Problem Statement 4:

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:

- Using both total WEIM transfer data and cost based accounting
- Using both total WEIM attribution and systems to allocate generation and associated emissions to retail load (i.e., RECs)
- Between unlinked jurisdictions if one area uses generation based accounting and another area uses load based accounting

Emissions Accounting and Reporting

Problem Statement 5:

The ISO does not provide all metrics desired by market participants. This includes:

- Demonstration of the impact of the market on decarbonization and renewable curtailment.
- 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.

Beyond Price-based GHG Policy

Problem Statement 6:

There is not a market mechanism for utilities, operating in states with a declining cap on emissions, to ensure load is served by generation and wholesale market transfers that meet those emission reduction targets.

Beyond Price-based GHG Policy

Problem Statement 7:

There is not a market mechanism for a utility in a state with a declining cap on emissions 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.

Beyond Price-based GHG Policy

Problem Statement 8:

There is not a market mechanism for states with both a price on carbon and a declining cap on emissions to reflect both requirements in the market.

Working group schedule

Date	Topic(s)
December 21, 2023	Discussion on attribution and counterfactual
January 18, 2024	Emissions tracking and accounting Beyond price-based policy
February 22, 2024	
March 14, 2024	
April 17, 2024	
May 29, 2024	
June 26, 2024	

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 December 11th.
 - Submit using the template provided on the working group webpage
- Survey
- Next working group on December 21st.
- Submit requests to present to ISOStakeholderAffairs@caiso.com
- Relevant information: <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Greenhouse-gas-coordination-working-group>