



California ISO


GHG Coordination Working Group

September 13, 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	Presenter
9:00 – 9:05	Welcome & introductions	Isabella Nicosia
9:05 – 9:45	Overview of GHG accounting in EDAM and WEIM	Anja Gilbert
9:45 – 10:00	Review of principles	Isabella Nicosia
10:00 – 10:55	Problem statement building	Isabella Nicosia
10:55 – 11:00	Next steps	Isabella Nicosia

Welcome

The GHG Coordination Working Group has been formed to:

- Be responsive to stakeholder feedback to continue GHG design discussions through an ISO-hosted and stakeholder-driven process;
- Offer education on current GHG design; and
- Allow for discussion on analysis, new enhancements, or approaches for price-based and non-price based policies to be reflected in the market.

ISO Policy Initiative Stakeholder Process

PROPOSAL DEVELOPMENT

Issue paper and working groups

↳ Straw proposal

Draft final proposal

Draft business requirement specification

Draft tariff and business practice manual revisions

Final proposal

DECISION

ISO Board

WEIM Governing Body

Tariff filing

FERC

IMPLEMENTATION

Business practice manual

Training

Market simulation

Go Live



Stakeholder input

This represents the typical process, and often stages of the process run in parallel.

We are here

OVERVIEW OF GHG ACCOUNTING IN EDAM AND WEIM

GHG Accounting in the WEIM and EDAM

- Reflects state cap-and-trade/cap-and-invest programs.
- Allows generators that are subject to a GHG cost of compliance to reflect the cost in their bid:
 - Specified resources responsible for their specific emission rate
 - Unspecified resources responsible for GHG compliance based on default emission rate set by the state
 - Asset Controlling Supplier (ACS) responsible for GHG compliance based on their area's average emission rate
- CAISO optimizes transfers to a GHG area based on a voluntary GHG bid adder and the energy bid.

GHG Accounting Context

- CAISO dispatch is a least cost security constrained dispatch; it dispatches resources based on costs and constraints.
- GHG accounting does not determine what specific resource is serving what specific load; instead, it determines if a dispatched resource is serving a GHG Regulation Area.

Elements of GHG Accounting Design

Element	Purpose	Why it Matters
Geographic Boundary	Identifies regulated resources independently of BAA boundaries	<ul style="list-style-type: none"> - Supports accurate accounting - Ensures that the cost of GHG only applies to areas with a cost of carbon - Gives regulators flexibility to determine covered resources in their jurisdiction
Bid Adder	Allows resources to reflect their cost of state GHG compliance	<ul style="list-style-type: none"> - Ensures efficient dispatch by reflecting participant costs for separately priced jurisdictions
Counterfactual	Approximates how load outside a GHG area would be served without GHG transfers	<ul style="list-style-type: none"> - Identifies surplus demand for attribution - Helps identify and mitigate the potential for secondary dispatch
Attribution	Determines what resources are economic to serve GHG Regulation Area load	<ul style="list-style-type: none"> - Determines which resources receive a GHG award - Impacts state climate policy
Market Constraints	Constrains which resources can be attributed to serve load in a GHG Regulation Area	<ul style="list-style-type: none"> - Decreases secondary dispatch by limiting attribution - Can increase costs by limiting efficient attribution

Secondary Dispatch

Least cost dispatch with GHG accounting can result in low emitting resources serving a GHG Regulation Area, while not accounting for higher emitting resources serving demand in non-GHG Regulation Area.

- Secondary dispatch is a **'potential'** effect of attribution
- Limiting attribution limits the potential for secondary dispatch
- State regulation can determine how to account for the secondary dispatch and have done so in the past
- Least cost dispatch can also result in avoided curtailment of GHG Regulation Area low emitting resources by displacing higher emitting resources in the WEIM and EDAM

CAISO's design reduces the potential for secondary dispatch, but does not eliminate it. Key enhancements include:

1.) Optimized counterfactual; and 2.) GHG net export constraint.

WEIM and EDAM GHG Design

	WEIM Today	WEIM +EDAM Tomorrow*	WEIM only Tomorrow*
Geographic Modeling	No	Yes	Yes
Bid Adders	For California	For multiple GHG Areas (CA and WA)	For multiple GHG Areas (CA and WA)
Limits to attribution and secondary dispatch			
Counterfactual	Base Schedules	Optimized Reference Pass	Base Schedules
Bidding Constraints	Yes	Yes	Yes
Net Export Constraint	No	Yes	Yes

Geographic Boundaries

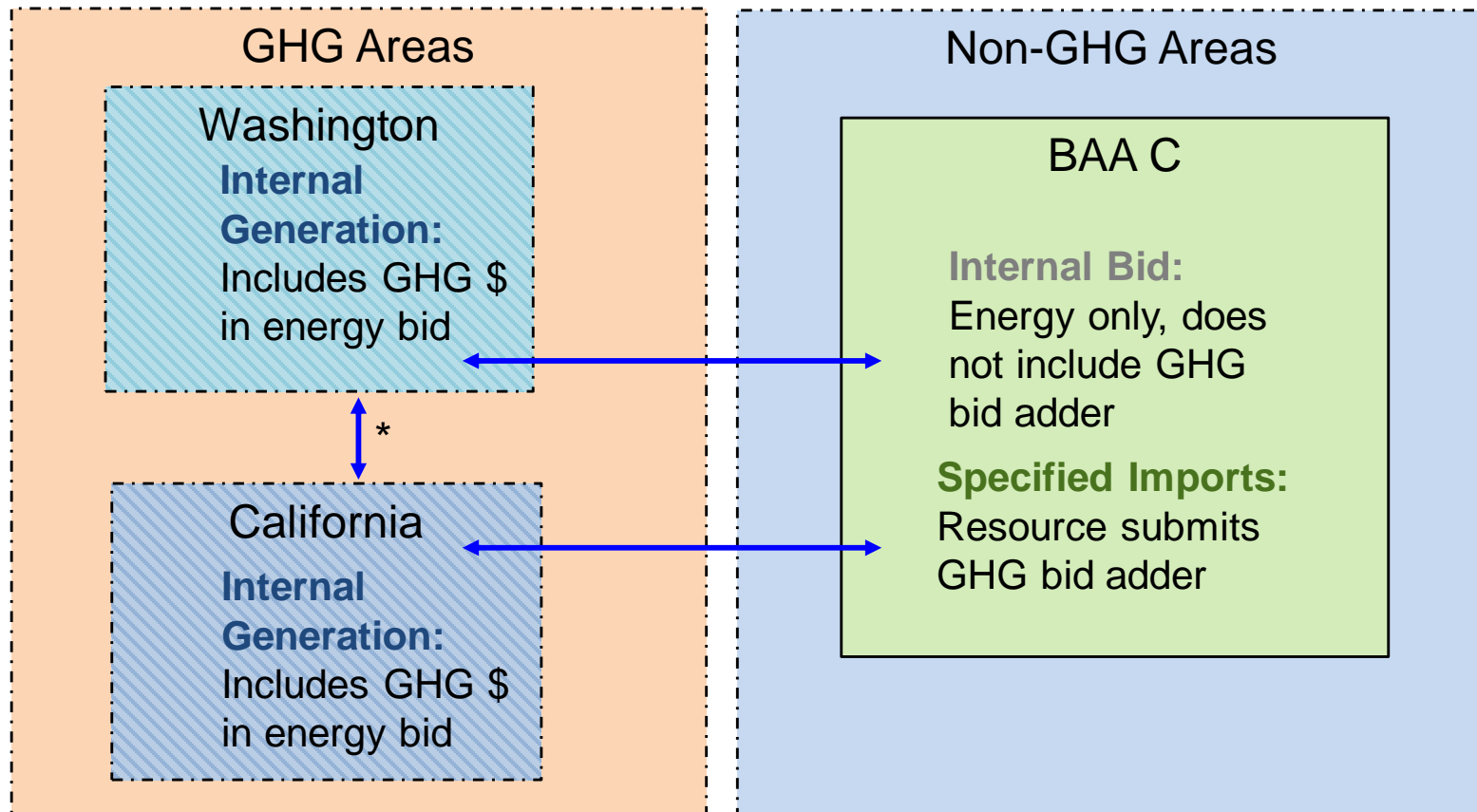
Reflects state policy as a “GHG Regulation Area”

Allows CAISO to reflect the costs associated with GHG pricing program compliance but not reflect these costs in the dispatch of resources not subject to these programs

CAISO will define the GHG regulation areas based on pricing nodes within state geographical boundaries (Washington and California) as opposed to balancing authority area boundaries

Resource Specific Overview with Multiple GHG Areas

Uses resource-specific GHG bid adders to optimize dispatch. Supports compliance and reporting by resources in non-GHG regulation areas if they receive an attribution.



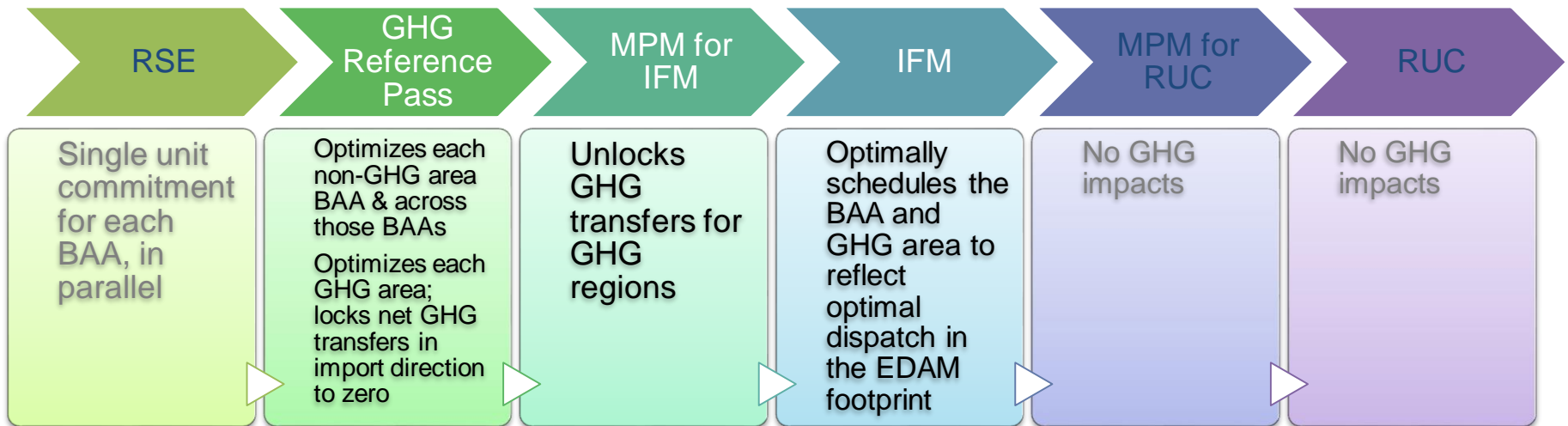
* **Between GHG regions:** unlinked (GHG bid adder); linked (energy bid includes GHG \$)

GHG Attribution

- Attribution is the least cost market selection of resources to serve a GHG Regulation Area. The resource is scheduled optimally to:
 - Serve demand outside a GHG Regulation Area using the resource energy bid; and
 - Serve demand inside a GHG Regulation Area using the resource GHG bid for that GHG Regulation Area
- Attribution is limited in a few ways:
 - At the resource level due to the energy bid (e.g., bidding constraints which include ramping constraints) and;
 - At the GHG Regulation Area as a result of the relative energy bid prices of resources in and out of a GHG Regulation Area as well as other constraints (e.g., transmission constraints)

Optimized Counterfactual

The GHG Reference Pass approximates how a balancing authority area will meet their own load with internal generation and BAA to BAA transfers.



GHG Accounting Constraints to Limit Attribution

Measures to limit attribution could also limit transfers to serve demand in a GHG Regulation Area

- Bid constraint (used in WEIM, updated to reflect Reference Pass in EDAM)
 - Takes the **lower of** the GHG bid capacity, the difference between the upper economic limit (UEL) and the Base Schedule/GHG Reference Pass, or the optimal dispatch
- Net transfer constraint (New for EDAM and the WEIM)
 - Limits GHG attribution to resources in a BAA in the non-GHG area to the higher of the optimal net transfer or the aggregate available “committed” capacity in that BAA
 - Market does not enforce the constraint when a BAA that overlaps with a GHG Regulation Area fails the resource sufficiency evaluation

GHG Net Transfer Constraint Example

Scenario	Description	Total Attribution to BAA 1 Resources with GHG Bid Adders
Net Importer	BAA 1* is a net importer for the hour	None
Net Exporter	BBA 1's net transfer limit is 100 MW	Up to 100 MW
Accounting for Committed Capacity	BAA 1 has a 100 MW resource, of which 20 MW is committed capacity to BAA 2**	20 MW may receive full attribution. Remaining 80 MW may received an attribution so long as the BAA 1 is not a net importer and so long as this does not exceed net transfer limit

* BAA 1 is in a non-GHG Regulation Area

** BAA 2 is in a GHG Regulation Area

Putting it All Together

	NV gas resource (100 MW) bidding to serve WA
Geographic Boundary	Washington State
Bid Adder	<p>Energy bid = 100 MW @ \$30/MWh GHG Bid = 40 MW @ \$6/MWh</p> <p>The NV resource includes the WA cost of GHG compliance in a GHG bid to WA at \$6/MWh for a natural gas unit with a UEL of 100 MW and an emissions factor of 0.42 MTCO₂/MWh</p>
Counterfactual	The counterfactual identifies 40 MW of surplus capacity
Attribution	<p>The resource had an energy award and was thus able to be attributed at least cost based on its GHG bid.</p> <p>The resource is attributed 40 MW.</p>
Market Constraints	N/A
GHG Payment to EDAM Participating Resource SC	<p>Payment = 40 MW X \$6/MWh = \$240 Or \$240/12 = \$20 for RTD</p> <p><i>*Assumes the resource also sets the GHG marginal price</i></p>
Reported Emissions	40 MW/12 = 3.33 MWh @ 0.42 MT CO ₂ /MWh for RTD

REVIEW OF PRINCIPLES AND INITIAL FEEDBACK

GHG Coordination working group principles

These principles reflect standard principles of market design, and should be kept in mind when moving through the working group process.

Note: Not every topic will align with all principles listed. The principles are a resource to facilitate assessment of prioritization and potential trade-offs associated with problem statements.

1. Efficiency
2. Simplicity
3. Transparency
4. Feasibility
5. Non-discrimination
6. Jurisdictional roles and responsibilities

Efficiency

- Optimizing dispatch to minimize cost - **REVISED**

Simplicity

Stakeholders suggest eliminating the simplicity principle, and folding it into the feasibility principle; complexity should be considered as an element of feasibility

- Design should be broadly applicable, scalable, and accommodate many participants
- Design should use existing systems and instruments for tracking generation and emissions when possible - **NEW**

Transparency

- Sufficient information exists in order to:
 - Make sufficient bidding and procurement decisions
 - Maintain market compliance with state GHG regulations and programs - **NEW**
 - Accurately perform GHG accounting and reporting - **NEW**
 - Distinguish between available resources and resources that have been scheduled and accounted for – **NEW**
- Market prices, **design, and performance** are transparent and known to participants – **REVISED**
- Costs to market participants beyond the GHG price required for importing electricity into states with price-based programs are transparent and known to participants - **NEW**

Non-discrimination

One stakeholder suggests renaming this principle to “competitive participation of resources inside and outside a GHG zone”

- No inappropriate or unacceptable GHG **or cost** impact on a non-GHG regulation area or resource – **REVISED**
- No penalty under a GHG pricing requirement through unreasonable uplift charges or any dispatch decision that unreasonably increases costs to customers in states with price-based programs - **NEW**
- Participants within GHG and non-GHG areas should have equal access to residual supply – **NEW**
- Non-prohibitive; states selling output of GHG pricing to those without GHG costs should not be hindered - **NEW**

Jurisdictional roles and responsibilities

One stakeholder suggests renaming this principle to “congruency with state policy”

- Market design should **support or** align with state greenhouse gas regulation policies, to the extent practicable – **REVISED**
- Coordination with state regulators and stakeholders to identify design and reporting needs required to support state policies and programs - **NEW**

Feasibility

- Operationally feasible; the market can solve within prescribed timelines
- Feasible implementation
- Feasible timelines; must consider short and long-term prioritizations - **REVISED**
- Feasibility should be evaluated through coordination between the ISO and the DMM on the workability of proposed solutions, including modeling and example scenarios where applicable - **NEW**

Additional principles to consider

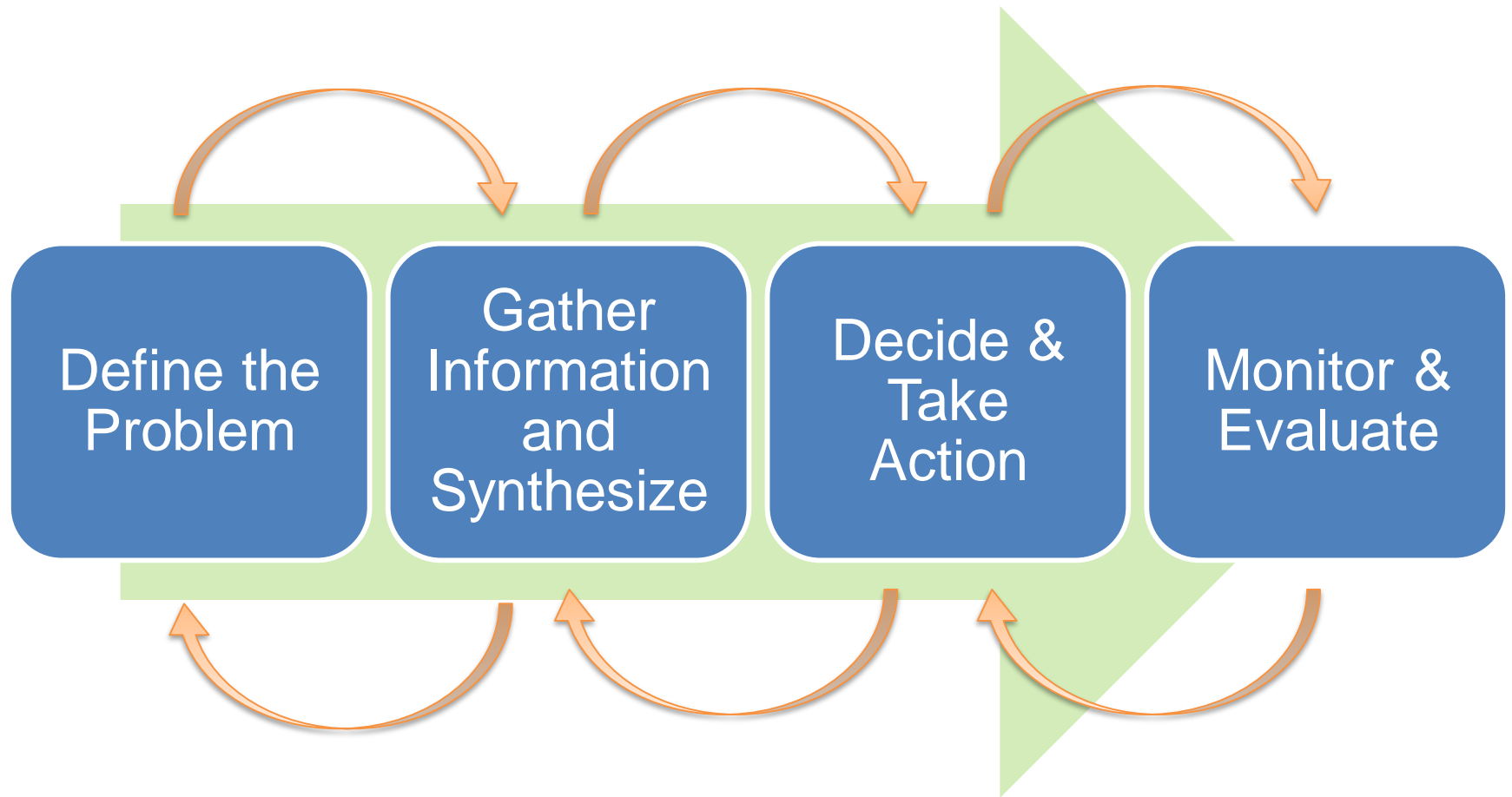
- Accuracy
- Environmental justice
- Minimizing leakage
- Durability

PROBLEM STATEMENT BUILDING

How a problem is defined influences how it is solved

- There may be many ways to define a problem when there is
 - More than one relevant policy
 - More than one principle trade-off
 - More than one impacted market outcome or function
- Stakeholders will have different perspectives and experiences that can illustrate potential root causes of a problem
- Working groups are a collaborative process to build problem statements

Problem statement development is an iterative process



How to build a Problem Statement

What's a problem statement? An issue or challenge related to CAISO market policy or processes that impacts market outcomes.

- Problem statements help identify the root cause of issues and facilitate assessment

What makes a good problem statement?

- Identify a root cause in terms of existing market design policy or processes
 - If the root cause is not known:
 - Explore how current ISO market policy and processes reflect principles and support market objectives
 - Determine how these policies and processes may not meet their intended goals
- Determine possible trade-offs associated with principles
- Illustrate how problems create a measurable impact on market outcomes

Problem Statement Terms and Definitions

- **Market functions:** Functions or outcomes of a regional centralized electricity market that reflect the role of the CAISO as an independent system operator. These might include:
 - Reliability
 - Minimize costs facing consumers
 - Operational cost recovery
- **Principles:** Describe *how* market design policy achieves a market outcome. These might include:
 - Efficiency
 - Transparency
 - Feasibility

Problem Statement Terms and Definitions

- **Policy or process:** Describe an existing CAISO market policy or process that supports market outcomes. These might include:
 - Attribution
 - Reporting
 - Bid Adders
- **Root cause:** Describes the failure of an existing policy to help achieve market outcomes. These might include:
 - Lack of data or process
 - Unknown until EDAM is implemented

Example: Incomplete problem statement

Stakeholder comment: GHG attribution should be limited to capacity above the base schedule

Identified problem: Not limiting the GHG attribution to above a resource's base schedule will increase costs to California consumers.

- Policy or process: this statement identifies *GHG attribution for price-based GHG regulations*.
- Principle: this statement does not reflect principles; how does limiting attribution below the base schedule achieve a market outcome? Do trade-offs exist here?
- Market outcome: this statement identifies *cost to California consumers*; what other market outcomes may be impacted by limiting attribution below the base schedule?

Draft problem statement 1.) Attribution

The market lacks transparency into the attribution process which results in stakeholder feedback that the market is inequitable and inefficient.

- Potential root cause or sub-issue: Least cost dispatch does not produce real time insight into attribution and instead relies on after the fact reporting by the ISO.

Draft problem statement 2.) Reporting

The ISO's market does not provide the complete reporting metrics desired by all market participants. This undermines the transparency and accuracy desired by market participants.

- Potential root cause or sub-issue: The ISO does not have a current understanding of all of the data required or desired by participants, the rationale for providing that data, the frequency of providing that data, or the granularity of data desired by market participants.

Draft problem statement 3.) Reflecting non-price based policies

There is not a market mechanism to reflect state climate policies that are not based on the cost of carbon. Participating in the ISO's market could undermine efforts to decarbonize as the unspecified emissions rate used by states fails to reflect the accuracy of generation and consumption at a local level.

- Potential root cause or sub-issue: Typical units of measure for market intake are \$/MW, \$/MWh, or MW. Additional discussion would be required to address new units of measure into the market.

Draft problem statement 4.) Balancing minimizing leakage and costs

It is unclear if the ISO's market has correctly balanced minimizing leakage and costs.

- Potential root causes or sub-issues:
 - Additional constraints to limit attribution to limit leakage could increase costs to GHG Regulation Areas.
 - Reducing the constraints on attribution could both lower costs but increase leakage outside of a GHG Regulation Area.
 - Without bids and a live EDAM market, the ISO will not be able to measure either costs to market participants or secondary dispatch.

Next steps

- Next working group on October 19
- Comments due by end of day September 27
 - Submit using the template provided on the working group webpage
- Submit requests to present to ISOStakeholderAffairs@caiso.com
- Relevant information: <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Greenhouse-gas-coordination-working-group>