

Training: Greenhouse Gas Enhancements Overview

September 29, 2026

Presenters:

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How to Engage During the Session



REMAIN MUTED

Keep yourself muted to minimize background noise.



ASKING QUESTIONS

Unmute to ask verbal questions or write in the chat pod.



RAISING HAND

Raise your hand using WebEx interactivity tools.

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Accessing the Presentation and Recording



TRAINING MATERIALS

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Course audience and focus

Primary audiences for this training course:

- Policy and regulatory staff
- Scheduling Coordinators/marketers responsible for GHG bidding
- Staff responsible for resource and market modeling
- Entities impacted by Washington GHG implementation and geographic boundary changes

Primary focus:

- Overview of Washington State GHG area activation
- GHG bidding enhancements for both states



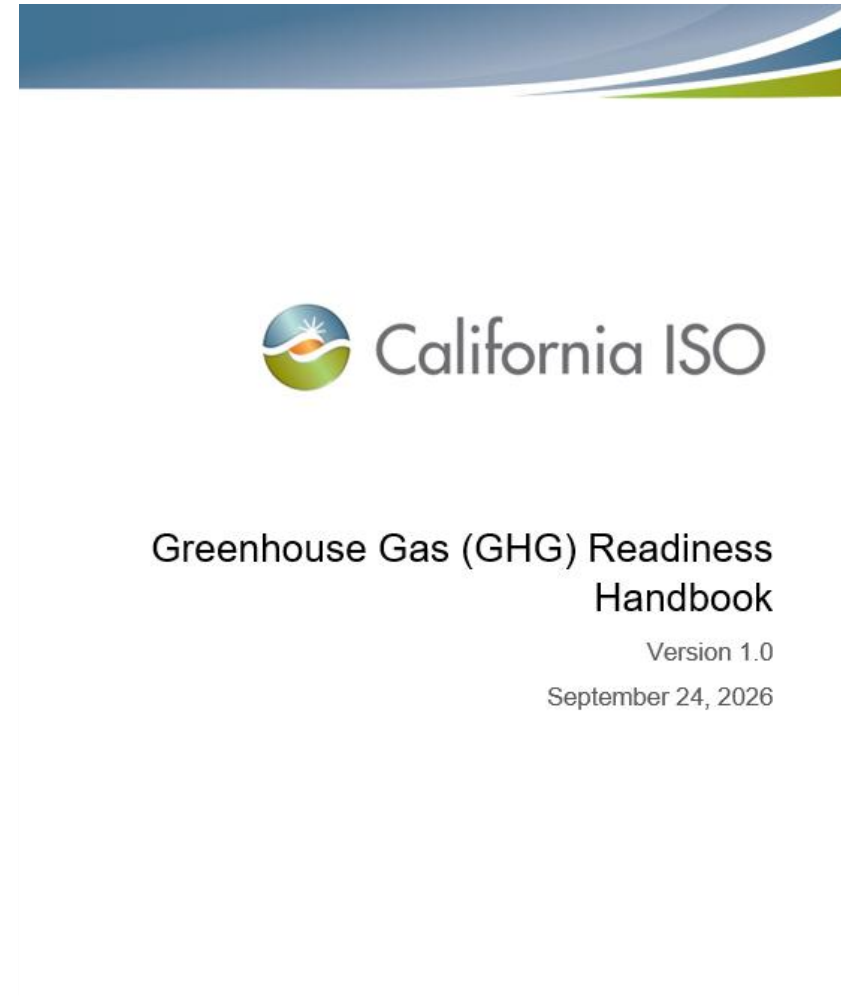
Enhancements planned for January 1, 2027

	Impacted entities	What to expect
WA GHG area definition	BAAs fully within the WA State boundary.	- Supply, load, and network branches in the State of Washington will be mapped to the WA GHG area. - Pricing nodes mapped to the WA GHG area will reflect a marginal cost of GHG in LMPs.
	Multi-state BAAs overlapping with WA State.	ISO will coordinate with multi-state BAs on GHG mapping.
GHG Bidding for multiple GHG areas	Market participating resources <u>not associated</u> with the WA or CA GHG areas.	- Resources can submit GHG bids for both WA and CA GHG areas separately. - The market will do GHG attribution for WA and CA GHG areas and print two separate GHG prices.
	CA GHG area resources.	Resources can submit GHG bids for the WA GHG area.

Primary Resource for this Session

GHG Readiness Handbook

Initial draft



About the GHG Readiness Handbook

1

One-stop reference for key GHG tariff, policy, and BPM materials.

2

Living resource updated as questions, feedback, and experience evolve.

3

Submit questions or feedback via CIDI or Contact Us.

Learning Objectives

- Describe how the GHG market model attributes energy from eligible resources to serve GHG-area load.
- Explain the role of GHG bids, resource eligibility, and market optimization in the attribution process.
- Recognize the revenue opportunities and compliance responsibilities associated with offering GHG capacity.
- Identify the Master File and bid requirements needed to support GHG capacity attribution and participation in GHG markets.

GHG Market Model Fundamentals

Section Focus

- Handbook sections 1.0 through 1.4

Purpose of the GHG Market Model

- Provides a market-based framework to attribute energy, emissions, and compliance costs when resources serve load in GHG-regulated areas.
 - Facilitates resource-specific GHG accounting.
 - Recovers compliance costs.
 - Assigns GHG costs to responsible GHG area load.

California and Washington GHG Regulation Areas



- The CA GHG regulation area defines the jurisdictional boundary of the California Air and Resource Board (CARB) administered cap-and-trade program.
- The WA GHG regulation area defines the jurisdictional boundary of the Washington Department of Ecology (ECY) administered cap-and-trade program.

What defines a GHG area?



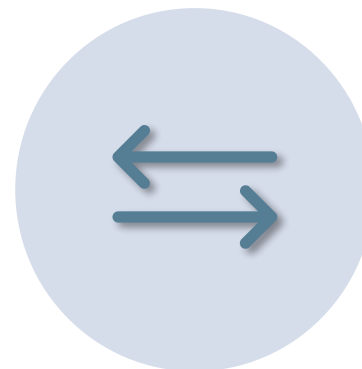
Pricing
Nodes



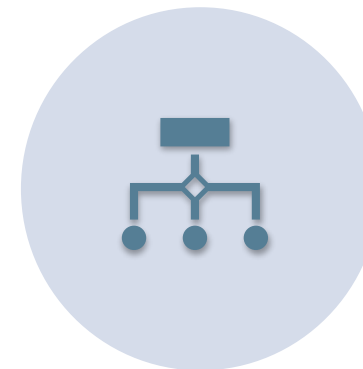
Supply
Resources



Demand
Resources



Intertie
Scheduling
Points



Network
Branches

GHG import allocation constraint

- The market enforces a **GHG import allocation constraint**.
- If the **optimal net GHG transfer (T)** is an import, the import is optimally allocated to resources outside the GHG area that submitted GHG bid adders.

$$T_{g,t} \equiv \sum_{i \in \text{GHG}_g} (EN_{i,t} + I_{i,t} - E_{i,t} - L_{i,t}) - \text{Loss}_{g,t}, \forall g \wedge t = 1, 2, \dots, T$$

- The shadow price of this constraint is the **marginal cost of GHG**.

Marginal Cost of GHG (MC-GHG)

- Determines GHG awards: MC-GHG is the shadow price of the GHG import allocation constraint.
- Reflects the marginal cost difference:
 - Positive when serving load in the GHG area has a higher marginal cost.
 - \$0 when the least-cost solution is the same for GHG and non-GHG areas.
- Supports GHG award settlement: For attributed capacity, resources are settled at the BAA MEC + MC-GHG.
- Distinct from the GHG allowance price: MC-GHG is determined through market optimization and may reflect more than compliance costs.
- $\text{GHG award} \leq \text{Energy award}$: A resource cannot receive a GHG award greater than its energy award.

GHG attribution and MC-GHG results

CMRI

 **California ISO** | Customer Market Results Interface

Day-Ahead | Real-Time | Post-Market | **Default Bids** | Convergence Bidding | Forecast | Reference | LSE | External Entities | Phase 1

Start Date: 09/18/2026 | Entity: [ALL] | Resource:
End Date: 09/18/2026 | Market: [ALL] |
State: [ALL] |
Apply **Reset**

Greenhouse Gas Bid Cap

Trade Date	SC ID	Resource	Market	State	Greenhouse Gas Bid Cap[\$/MWH]
09/18/2026			Day-Ahead	CA	113.61
09/18/2026			Day-Ahead	CA	42.06
09/18/2026			Day-Ahead	CA	28.36
09/18/2026			Day-Ahead	CA	28.36
09/18/2026			Day-Ahead	CA	126.84
09/18/2026			Day-Ahead	CA	121.12
09/18/2026			Day-Ahead	CA	59.19
09/18/2026			Day-Ahead	CA	20.92
09/18/2026			Day-Ahead	CA	20.92

OASIS

 **California ISO** | OASIS

OASIS | ATLAS REFERENCE | REPORT DEFINITION | **PRICES** | TRANSMISSION | SYSTEM DEMAND | ENERGY | ANCILLARY SERVICES

Welcome to the California ISO Open Access Gateway (OASIS) site. On OASIS you will find real-time information about the California ISO transmission system and its Market, such as system demand, market status, market prices and market results.

Energy Prices
Shadow Prices
Ancillary Services Prices
Index Prices
Market Power Mitigation

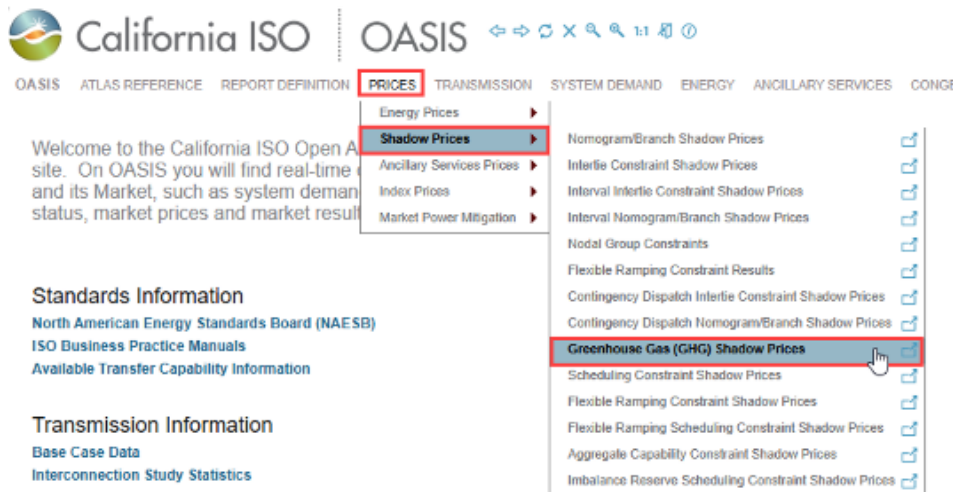
Information System (OASIS)
California ISO transmission system
Fuel Prices
Greenhouse Gas Allowance Index Prices

Greenhouse Gas Allowance Index Prices

Trade Date	State	GHG Index Price
09/14/2026	CA	32.63
09/14/2026	WA	43.27

Finding the MC-GHG in market results

- Before May 1, 2026 enhancements, the MC-GHG was visible as part of WEIM entity Locational Marginal Prices (LMPs) on OASIS and in CMRI.
- Today, the MC-GHG is posted separately on OASIS and in CMRI.



California ISO OASIS

OASIS ATLAS REFERENCE REPORT DEFINITION **PRICES** TRANSMISSION SYSTEM DEMAND ENERGY ANCILLARY SERVICES CONGESTION

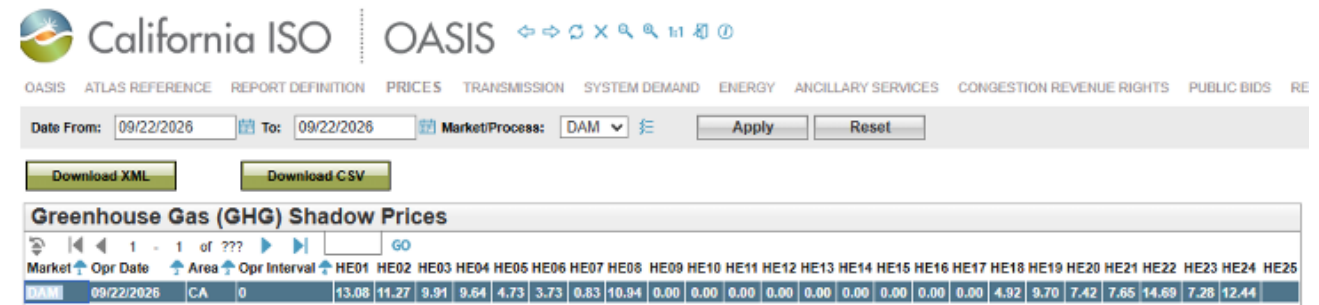
Welcome to the California ISO Open Access Resource (OASIS) site. On OASIS you will find real-time and its Market, such as system demand status, market prices and market results.

Standards Information
North American Energy Standards Board (NAESB)
ISO Business Practice Manuals
Available Transfer Capability Information

Transmission Information
Base Case Data
Interconnection Study Statistics

Energy Prices
Shadow Prices
Ancillary Services Prices
Index Prices
Market Power Mitigation

Nomogram/Branch Shadow Prices
Interlie Constraint Shadow Prices
Interval Interlie Constraint Shadow Prices
Interval Nomogram/Branch Shadow Prices
Nodal Group Constraints
Flexible Ramping Constraint Results
Contingency Dispatch Interlie Constraint Shadow Prices
Contingency Dispatch Nomogram/Branch Shadow Prices
Greenhouse Gas (GHG) Shadow Prices
Scheduling Constraint Shadow Prices
Flexible Ramping Constraint Shadow Prices
Flexible Ramping Scheduling Constraint Shadow Prices
Aggregate Capability Constraint Shadow Prices
Imbalance Reserve Scheduling Constraint Shadow Prices



California ISO OASIS

OASIS ATLAS REFERENCE REPORT DEFINITION PRICES TRANSMISSION SYSTEM DEMAND ENERGY ANCILLARY SERVICES CONGESTION REVENUE RIGHTS PUBLIC BIDS RE

Date From: 09/22/2026 To: 09/22/2026 Market/Process: DAM Apply Reset

Download XML Download CSV

Greenhouse Gas (GHG) Shadow Prices

1 - 1 of ??? GO

Market	Opr Date	Area	Opr Interval	HE01	HE02	HE03	HE04	HE05	HE06	HE07	HE08	HE09	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24	HE25
DAM	09/22/2026	CA	0	13.08	11.27	9.91	9.64	4.73	3.73	0.83	10.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	9.70	7.42	7.65	14.69	7.28	12.44	

Locational Marginal Price (LMP) decomposition

GHG area	Nodes	Yesterday (pre-EDAM go-live) in the GHG area	Today in the GHG area
Load pays	LMP_{GHG}	SMEC = 60 <i>GHG revenue is transferred to attributed resources</i>	$MEC_{GHG} + MC-GHG = 60$ <i>GHG revenue is transferred to attributed resources</i>
Resources are paid	LMP_{GHG}	SMEC = 60	$MEC_{GHG} + MC-GHG = 60$

Non-GHG Area		Yesterday (pre-EDAM go-live) in the non-GHG area	Today in the non-GHG area
Load pays	LMP_N	$SMEC - MC-GHG = 60-15 = 45$	$MEC_N = 45$
Resources are paid	LMP_N	$SMEC - MC-GHG = 60-15 = 45$	$MEC_N = 45$
Attributed resources are paid	LMP_{N-GHG}	$SMEC - MC-GHG + MC-GHG = 60$	$MEC_N + MC-GHG = 60$

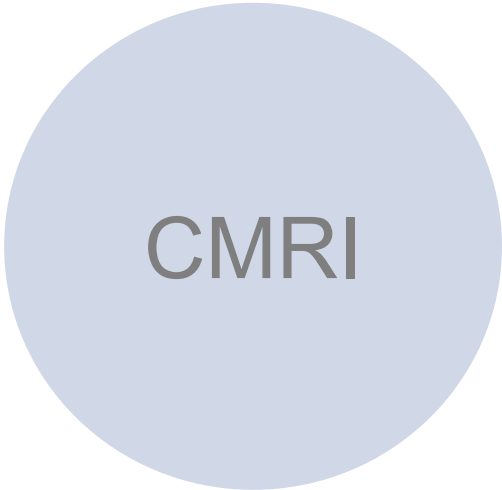
Resource Association

- **GHG-regulated resources:**
 - Output counted as energy (EN) in the GHG area.
 - Pricing nodes include the marginal cost of GHG.
- **Non-GHG area resources:**
 - Energy offered with a GHG bid adder can be considered for GHG attribution.
 - Attributed resources are awarded the marginal cost of GHG.

Load in the GHG area

- Prices at Load Aggregation Points (LAPs) in the GHG area include the marginal cost of GHG.
- Load in the GHG area is charged the marginal cost of GHG, generating GHG revenue.
- GHG revenue covers GHG awards to resources outside the GHG area that are allocated to the GHG area through the attribution process.

Applications that provide data

A light blue circle containing the text "CMRI" in a bold, sans-serif font.

CMRI

- GHG awards/export allocations
- GHG component of market results

A light blue circle containing the text "OASIS" in a bold, sans-serif font.

OASIS

- GHG shadow prices/MC-GHG
- GHG allowance price information

Key takeaway



The market identifies the energy needed to serve GHG-area load and determines how much of that energy can be attributed to eligible resources outside the GHG area.

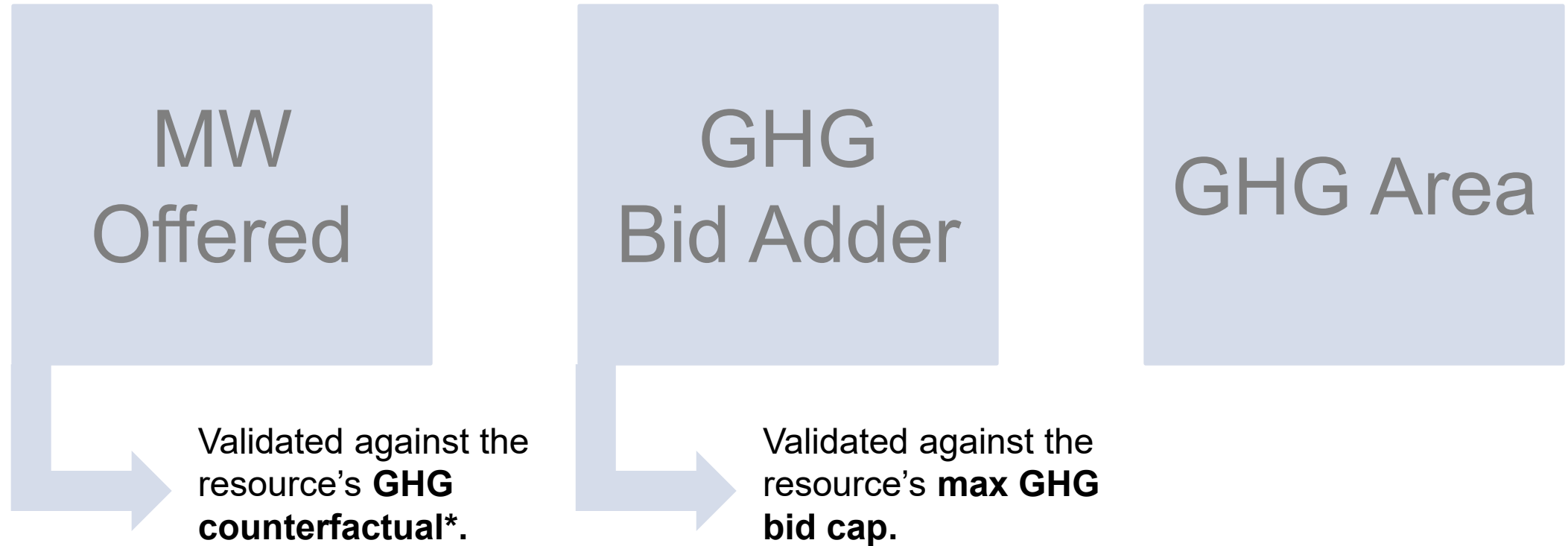
GHG Eligibility



Section Focus

- Handbook sections 1.3

GHG bid eligibility



**to be covered in more depth in future course*

Maximum GHG bid cap

The max GHG bid cap is calculated and published by 8:50am Pacific before the Day-Ahead Market.

- Purpose
 - Helps ensure GHG bids reflect reasonable compliance costs.
 - Calculated daily by resource and GHG regulation area.
- How the Cap Is Determined
 - Variable Cost: Heat rate + emissions rate + daily GHG allowance price.
 - Negotiated: Negotiated emissions rate or static \$/MWh value.
- Important
 - Emissions rate is maintained in Master File.
 - Blank emissions rate = \$0/MWh maximum GHG bid cap.
 - CA and WA GHG allowance price indices are posted daily on OASIS.

Key takeaway



Submitting a GHG bid makes eligible capacity available for attribution, but actual attribution depends on market optimization, capacity eligibility, and the applicable GHG-area constraint.

Offering GHG Capacity

Section Focus

- Handbook Section 3

Handbook Readiness checklist

-  1. Confirm GHG area/resource association.
-  2. Review contractual and regulatory considerations.
-  3. Review/update emissions information.
-  4. Determine whether committed capacity applies.
-  5. Prepare systems and processes for GHG bidding.
-  6. Understand post-market reporting and compliance responsibilities.

Key takeaway



Offering GHG capacity creates an opportunity for additional market revenue, but attribution also carries the applicable state's compliance and reporting obligations.

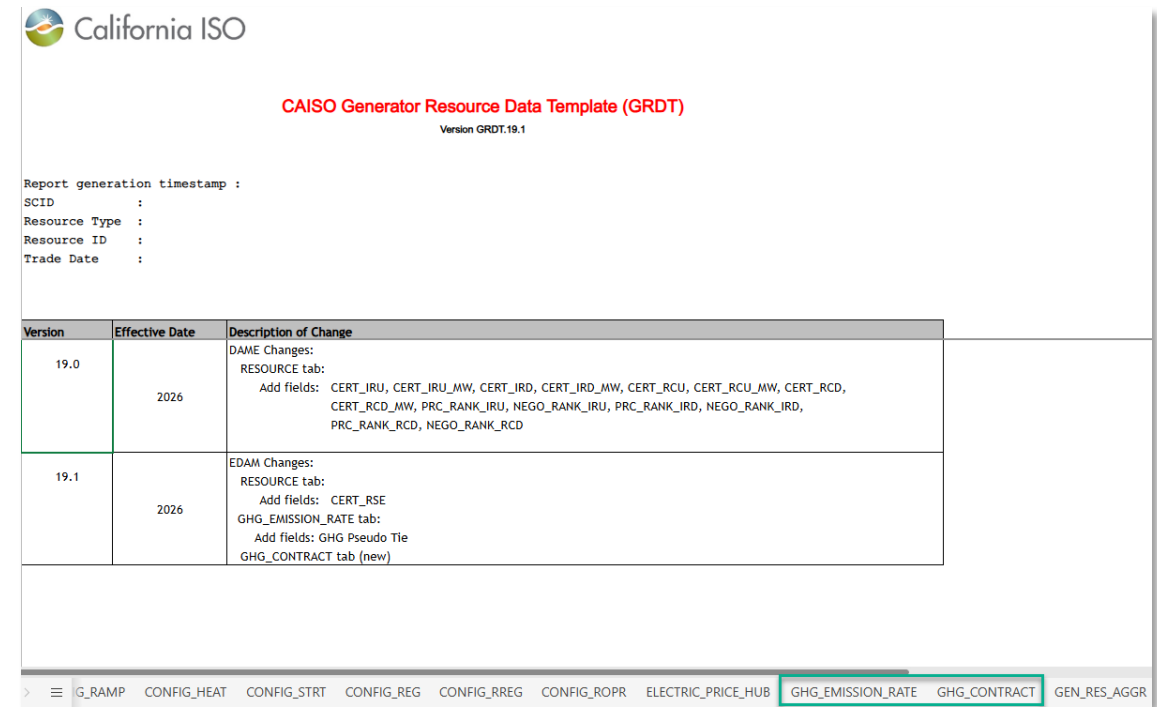
Master File & GHG Registration Overview

Section Focus

- Handbook Section 4

Generator Resource Data Template (GRDT)

- GHG_Emissions_Rate tab
 - Separate CA and WA information
 - GHG emissions rate
 - Compliance obligation
 - GHG pseudo-tie consideration
- GHG_Contract tab
 - Registering committed capacity*
 - Pmax validation
 - Availability of contract information in SIBR



Version	Effective Date	Description of Change
19.0	2026	DAME Changes: RESOURCE tab: Add fields: CERT_IRU, CERT_IRU_MW, CERT_IRD, CERT_IRD_MW, CERT_RCU, CERT_RCU_MW, CERT_RCD, CERT_RCD_MW, PRC_RANK_IRU, NEGOT_RANK_IRU, PRC_RANK_IRD, NEGOT_RANK_IRD, PRC_RANK_RCD, NEGOT_RANK_RCD
19.1	2026	EDAM Changes: RESOURCE tab: Add fields: CERT_RSE GHG_EMISSION_RATE tab: Add fields: GHG Pseudo Tie GHG_Contract tab (new)

> ≡ G_RAMP CONFIG_HEAT CONFIG_STRT CONFIG_REG CONFIG_RREG CONFIG_ROPR ELECTRIC_PRICE_HUB **GHG_EMISSION_RATE** **GHG_Contract** GEN_RES_AGR

**to be covered in more depth in future course*

How registered emissions rates affect market calculations

GHG area association	Reference levels (DEBs, Commitment Costs)	Max GHG bid cap (CA)	Max GHG bid cap (WA)
Non-GHG area resource	N/A	CA emissions rate	WA emissions rate
California (CA)	CA emissions rate	N/A	WA emissions rate
Washington (WA)	WA emissions rate	CA emissions rate	N/A

- GHG regulation area resources are eligible for a GHG cost adder in reference levels.
 - Variable cost, negotiated Default Energy Bids (DEBs).
 - Proxy start-up, min load calculations.
- Max GHG bid cap can be variable cost or negotiated.

CIDI process for negotiated rates

- **Select a negotiated rate:** Daily GHG index-based emissions rate or static \$/MWh value.
- **Request an ACS rate:** Use the negotiated process to establish an Asset Controlling Supplier (ACS) rate.
- **Submit a request:** Open a CIDI ticket using “Negotiated Rate Application” and application type “Other”.

Key takeaway



Accurate Master File data establishes the resource-specific information the market needs to verify GHG bids and determine eligible capacity.

Submitting GHG Bids



Section Focus

- Handbook Section 5

GHG as an hourly bid component

A GHG bid must be accompanied by an energy offer. The energy offer can be economically bid or self-scheduled.

Three required elements:

- **GHG capacity (MW)** - signals the capacity from this resource the SC is willing to offer for attribution to the GHG area.
- **GHG bid adder (\$/MWh)** - carries the GHG compliance obligation.
- **GHG area (CA or WA)** - designates the GHG bid as an offer to either the CA or WA GHG area.

Bid Submissions

Scheduling Infrastructure & Business Rules (SIBR)

Submit bids and copy them forward, ensuring you supply the GHG area.

Application Programming Interface (API)

Visit the Developer Portal to review v5 API Specification and XML Schema Definition XSD & share with applicable parties to complete updates.

Submitting bids for multiple GHG areas

- A GHG regulated resource is eligible to submit a GHG bid for the GHG area it is not associated with.
 - Energy offer is expected to include GHG compliance for their native jurisdiction.
 - GHG bid adder for the separate GHG area should also include compliance.
- Non-GHG area resources are eligible to submit GHG bids for both CA and WA simultaneously.
 - A resource can offer up to its full capacity for both GHG areas, and the Market will optimally allocate the capacity depending on market conditions.

Example: bidding for multiple GHG areas

	Energy		CA GHG bid		WA GHG bid	
	UEL	Energy offer	MWh	Bid adder	MWh	Bid adder
CA GHG area resource	100	\$0/MWh	N/A	N/A	20	\$0/MWh
WA GHG area resource	100	\$35/MWh	100	\$10/MWh	N/A	N/A
Non-GHG area Resource 1	100	<i>self-schedule</i>	-	-	50	\$0/MWh
Non-GHG area Resource 2	100	\$35/MWh	100	\$5/MWh	100	\$0/MWh

What are other GHG bid considerations?

These topics
will be
discussed in
future sessions

Scheduling at GHG ties

Committed-capacity bidding

Key takeaway



The enhanced bid structure allows eligible resources to specify both the capacity and compliance-cost adder they are willing to offer separately to the California or Washington GHG area.



Summary, Participant Actions & Q&A

Section Focus

- What's next?

What next?

- Participants should begin by:
 - Determining whether their BAA, load, resources, or interties are affected by CA or WA GHG-area modeling.
 - Confirming resource GHG-area associations.
 - Reviewing required geographic/modeling information.
 - Reviewing Master File GHG data.
 - Identifying resources expected to offer GHG capacity.
 - Reviewing SIBR/API changes with bidding and technical teams.
 - Understanding reporting and compliance responsibilities associated with GHG attribution.
 - Monitoring updates to the GHG Readiness Handbook and related ISO readiness communications.

Participate in the Greenhouse Gas Coordination initiative

 California ISO

Stakeholder center

Policy initiatives

Recurring processes

Commenting tool

[Home](#) > [Policy Initiatives](#) > Greenhouse gas coordination

INITIATIVE:
Greenhouse gas coordination

Started: Jul 14, 2023

Leads
Sylvie Spewak
Anja Gilbert

The Greenhouse Gas (GHG) Coordination working group stakeholder process focuses on developing durable electricity market solutions for climate policies across the West.

The working group structure aims to give stakeholders a more active role in forming problem statements, identifying potential areas for analysis and supporting data, and scoping necessary market rule changes. Working group discussions will help inform the scope of a formal stakeholder initiative.

 Relevant notices

 Contact us

Status

Proposal Development	Decision	Implementation	Completed/Closed
Oct 15, 2025 Final proposal posted			

Activities

	 Accounting and Reporting Final Proposal - Greenhouse Gas Coordination Working Group - Oct 15, 2025 10/15/2025	
Web meeting 7/21/2025 01:00 pm – 04:00 pm PT Details	 Video - Greenhouse Gas Coordination Working Group - Jul 21, 2025 07/24/2025  Greenhouse Gas Coordination Accounting and Reporting Draft Final Proposal 07/18/2025  Greenhouse Gas Coordination Accounting and Reporting Approach Public Report - Draft Jul 21, 2025 07/18/2025  Presentation - Greenhouse Gas Coordination Working Group - Jul 21, 2025 07/18/2025	 View comments

Fall 2026 – EDAM Enhancements 2026 Manage Multiple GHG areas

Project Information	Details
Scope Item	Manage Multiple GHG areas
Description	All Core BRQs in this section related to Multiple GHG Areas have been moved out of the EDAM BRS and into this BRS for the EDAM Enhancements 2026. Development will be required for these BRQs. • Define GHG regulation area and network branch association in SGEM • NA loss shall be calculated for each GHG area • Define CLAP for load in each GHG Regulation Area and load outside of all GHG Regulation Areas for both EDAM and WEIM BAA • GHG Bid submission and validation for GHG areas • Calculate base load for WEIM BAA CLAPs using ELAP LDF data in RTBS • Include BAA PBC slack in GHG area import allocation, using LDF for split BAAs • Calculate/Publish ELAP LDFs for WEIM BAAs at LAP level in RTBS. • Consume and publish all EDAM BAA LDFs to EDAM Entities
Impacted Systems	BAAOP
BRS	Version 1.1 – planned 10/8/2026 Version 1.0 – 08/17/26 Version 0.6 – 6/30/2026
Tech Spec	TBD
External Training	GHG Overview – GHG Readiness Handbook 09/29/2026 Late-October (TBD)
Market Simulation	November 2026
Production	December 2026
BPM	TBD
Release Notes	December 2026

Key takeaway



The September training is the starting point for readiness. Participants should use the handbook, BPMs, market reports, technical specifications, and subsequent ISO outreach to complete implementation activities.

Q&A With Subject Matter Experts



Reference Links



[GHG Readiness Handbook](#)

[California ISO Tariff](#)

[Business Requirements Specification v1.7 Redline – Extended Day-Ahead Market](#)

[Business Practice Manuals \(BPMs\)](#)

- [BPM for Extended Day-Ahead Market](#), Section 23: Greenhouse Gas (GHG) Accounting (applicable for both EDAM and WEIM-only entities)
- [BPM for Western Energy Imbalance Market](#) Section 11.3.3 Accounting for Greenhouse Gas Regulation
- [BPM for Market Instruments](#) View GHG Readiness Handbook for applicable sections
- [BPM for the Full Network Model](#)
- [BPM for Settlements and Billing](#)

Evergreen training: Greenhouse Gas Coordination - GHG Price Formation

[Chapter 1](#)

[Chapter 2](#)

[Chapter 3](#)

[Chapter 4](#)

[Extended Day-Ahead Market Initiatives Page](#)

[Extended Day-Ahead Market Technical Description](#) document

[Greenhouse Gas \(GHG\) Bidding and Pricing Updates for EDAM](#) Readiness Note

[EDAM Greenhouse Gas Regulation Obligations](#) computer-based training

[EDAM FAQ Guide](#)

REGISTRATION IS OPEN

2026 STAKEHOLDER SYMPOSIUM

Welcome reception - Oct. 5

at Kimpton Sawyer Hotel, Sacramento, CA

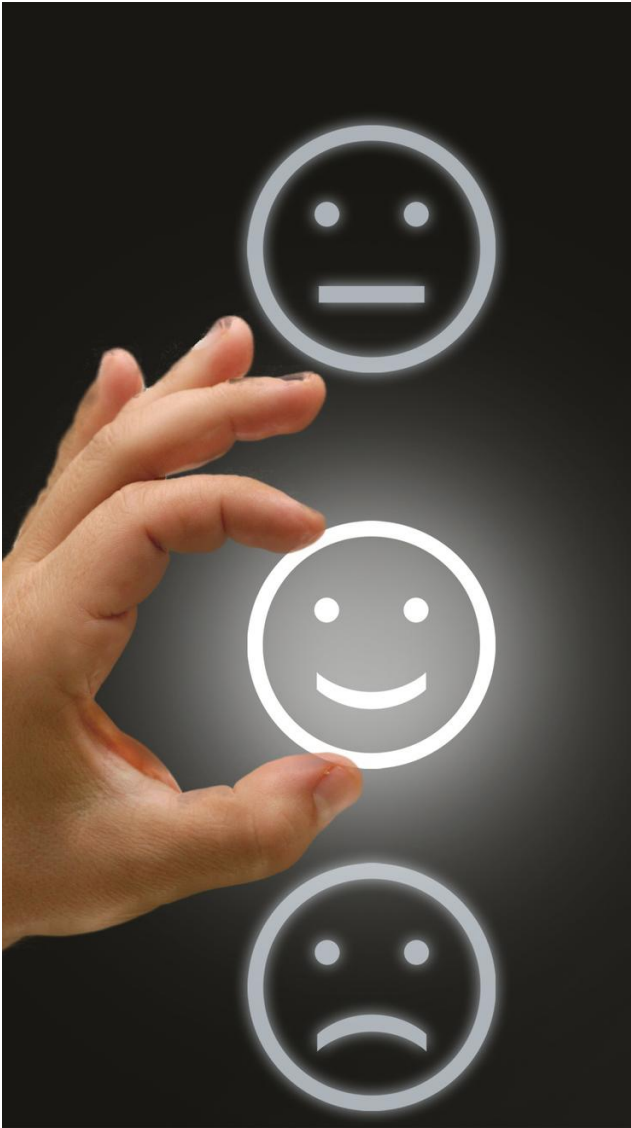
Symposium program - Oct. 6

SAFE Credit Union Convention Center
Sacramento, CA

Visit: <https://www.caiso.com/meetings-events/events/stakeholder-symposium>

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Thank you for your participation!



For clarification on anything presented in this training, send an email to:
CustomerReadiness@caiso.com.

For other questions or stakeholder specific questions or concerns use one of these methods:

- Submit a [CIDI ticket](#).
- Contact your Scheduling Coordinator.
- Use the “[Contact us](#)” page on caiso.com to submit questions.