



California ISO

Greenhouse Gas: Accounting and Reporting Issue Paper

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Prepared by: Anja Gilbert

California Independent System Operator

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Executive Summary

In August of 2023, the Greenhouse Gas (GHG) coordination working group began work to evolve the current Extended Day Ahead Market (EDAM) and Western Energy Imbalance Market (WEIM) GHG design. The working group reached consensus that a solution for states that have climate policies not based on a price of carbon is ready to move forward from the working group phase to policy development. The approach suggested by stakeholders is to account for the energy and emissions for which an entity is responsible termed as the “Accounting and Reporting” approach. This approach does not affect market dispatch, rather it is an after-the-fact report of generation an entity owns and contracts for that ultimately was dispatched. It also includes market purchases. Such a report can provide greater transparency into the emissions associated with the dispatch of an entity’s portfolio, and facilitate the calculation of a residual market emissions rate associated with unspecified sources to serve load.

This Issue Paper outlines the background of the topic and the stakeholder-proposed solution. It discusses the report attributes and stakeholder feedback to date. The paper also highlights the tradeoffs of each of the report design options, along with potential variations. This initiative will incorporate stakeholder input to inform subsequent development of a Straw Proposal to outline the report.

Background

In the EDAM and WEIM policy processes, stakeholders focused on developing a market model that could accommodate the price-based GHG emissions policies of multiple states, namely California and Washington, which have GHG emissions trading systems. These programs put a cap on economy-wide GHG emissions that grows more stringent over time and establish a price on carbon emissions by requiring emitters to acquire compliance instruments. Covered entities with GHG emissions must retire a number of allowances equal to their emissions in order to comply with the program. Compliance with these programs apply to sources of electricity used to serve customers in Washington and California.

The ISO market’s GHG accounting design allows resources to reflect their compliance costs in their offers, enabling the market to account for them when dispatching the lowest-cost resources.¹ These policies effectively increase the marginal cost of electricity from fossil-fueled resources, if that electricity is subject to the GHG emissions regulation of Washington or California. An objective of the market design in the WEIM, and now in the EDAM, is to account for GHG costs associated with transfers to serve demand consistent with state policy. However, there are climate policies in place and developing

¹ The CAISO GHG design’s bid adder approach allows resources in Washington or California to reflect GHG in their bids. It also allows resources outside California and Washington to determine whether they want to opt-in to serve a state with a carbon-pricing program. Thus, the market includes the cost of compliance when optimizing to serve load in a GHG pricing region but removes that bid component when a resource located in a non-carbon-pricing region serves load outside of Washington or California.

that do not price carbon emissions and thus do not fit neatly into the existing CAISO GHG accounting framework.

Rather than setting a price on carbon, some states in the West simply require that load serving entities rely on resources that meet lower emission targets over time. Separately, utilities may have their own targets for emission reductions to complement these state policies. However, market participants do not currently have a way to reflect this limitation in the ISO's market. Additionally, market participants do not have a more granular method than applying an unspecified source emission rate to transfers to understand what constitutes the emissions intensity of the electricity serving their load.

Climate policies not based on a price of carbon vary across states. Oregon and New Mexico have approached their climate policies without developing a GHG price. For example, Oregon's largest investor-owned utilities, Portland General Electric (PGE) and PacifiCorp (PAC), must achieve an 80 percent GHG reduction from an established baseline by 2030, 90 percent reduction by 2035, and 100 percent reduction by 2040. Emissions accounting reflects the emissions associated with the underlying generating resources, meaning that the emissions profile of the energy received from the market contributes to a utility's overall emissions and its ability to demonstrate compliance. New Mexico requires certain qualifying utilities, like Public Service Company of New Mexico (PNM), not to emit more than 400 lb CO₂e/MWh by 2023 and not more than 200 lb CO₂e/MWh by 2032.² Regulated utilities in Oregon and New Mexico are required to demonstrate continual progress towards meeting their goals.

Some states have both price-based and non-price based approaches. Washington has a price-based Cap-and-Invest program through the Climate Commitment Act (CCA), and yet the joint Washington agencies (Ecology, Commerce, and the Utilities and Transportation Commission) have highlighted the importance of the market handling both priced and non-price GHG programs within a state simultaneously as important.³ Washington state agencies expressed interest in the Accounting and Reporting approach in light of their Clean Energy Transformation Act (CETA), which requires utilities to meet a 100 percent clean energy procurement target.

The GHG coordination working group first approached questions related to non-price based climate policy with a near-term effort to provide more granular data on the average emissions intensity in a given market interval. Today many state regulations assume that unspecified transfers from the market are at an unspecified emissions rate.⁴ Recognizing some WEIM and future EDAM entities want more granular information to fulfill different types of obligations, the ISO is now producing an average

² Section 10. D. of New Mexico Energy Transition Act (SB0489).

³ Comments from Washington State Agencies. August 30, 2023. Available at:

<https://stakeholdercenter.aiso.com/Comments/AllComments/d9e6e3b4-4768-4a9d-82e1-f6ec03549601#org-8754bfac-4b53-421a-b517-ddf2abe6a066>

⁴ For example, California assumes 0.428 metric tons CO₂e/MWh whereas Washington assumes 0.437 metric tons CO₂e/MW. The difference relates to transmission losses.

emissions rate (AER) report.⁵ This report shows the hourly AER covering the entire WEIM footprint and the emissions intensity of WEIM transfers into California.

In the GHG coordination working group discussions, stakeholders proposed both in-market and out-of-market solutions for states that have climate policies not based on a price of carbon. An in-market solution would alter the market optimization to reflect these non-market policies and therefore change which resources are dispatched to serve load in the state. An out-of-market solution would instead rely on market results and contract information to support emissions tracking.

The Regulatory Assistance Project (RAP) presented two in-market solutions.⁶ First, the “Emission Constrained Dispatch” approach, would extend the current market GHG accounting framework, which attributes transfers to resources based on bids. The Emission Constrained Dispatch approach would require a scheduling coordinator to submit a GHG cost in a resource’s offer and would create both marginal energy costs and GHG marginal costs. An open question with this approach was to which entity to allocate market revenues arising from the marginal GHG cost (*e.g.*, should these costs be given back to load or directly to a state entity regulating GHG emissions?). RAP also proposed the “Import Constrained Dispatch” approach, which would constrain dispatch to not exceed a maximum emission target. This approach is a constraint on import emissions. It looks at internal and external resources to meet an emissions threshold. It does not allow for the attribution of resources to support transfers to serve load in a state unless the resources are under contract to serve that load. This approach would only produce a marginal energy cost. The marginal GHG cost is not explicitly calculated but the approach does result in a difference in the marginal energy cost between the state with this constraint and the marginal energy cost outside of this state. Both approaches envisioned cost and reliability off-ramps, based on regulator input on what level of reliability or costs were appropriate.

The Western Power Trading Forum (WPTF) proposed an after-the-fact reporting approach. This Accounting and Reporting methodology would account for the energy consumption for which a load-serving entity or state was responsible. The GHG coordination working group will assess both approaches on different timelines.⁷ This Issue Paper focuses on the Accounting and Reporting approach.

⁵ CAISO. Average Emissions Rate Reports. Available at: <https://www.caiso.com/library/average-emissions-rate-reports>

⁶ RAP Presentation. March 14, 2024. Available at: <https://stakeholdercenter.caiso.com/InitiativeDocuments/Presentation-GHGCoordination-Mar14-2024.pdf>

⁷ An in-market approach has been requested by Oregon by 2030. As a result, a policy initiative will not be needed at this time. In the interim, the ISO and stakeholders may begin to assess the potential pricing impacts of such an approach.

Current challenges faced by entities with non-priced based climate policies

Leading up to the development of the problem statement, stakeholders discussed the challenges for entities facing a non-price based climate policy. Some of these challenges arise in states with climate policies not based on price; others encompass utility-specific climate goals. Challenges arise with relying on unspecified transfers to meet emission reduction targets, the absence of a market mechanism to ensure supply does not exceed an emissions threshold, and relying solely on system energy to meet residual supply needs.

Unspecified transfers may make it difficult for some LSEs to show progress towards state climate goals which may result in self-scheduling

During the working group, stakeholders shared that participating in the ISO's market could undermine efforts to demonstrate their progress towards state climate goals. There are three drivers for this issue. First, for states and entities that do not have a price on carbon, there is not a way for the market optimization to incorporate their climate goal. Second, the unspecified source emissions rate assigned to energy imbalance purchases from the market under state rules may not accurately reflect the emissions profile of generation that serves that entity's load in all intervals. In the future, some stakeholder expressed concern that uncontracted low-emitting resources may receive attributions through the market optimization to serve load in areas with GHG pricing, thereby leaving higher emitting resources to support unspecified imports to a non-priced GHG area. This may cause state regulators to insist on a higher unspecified source emission rate. Third, entities in states with GHG prices cannot limit the MWh of unspecified sources transfers that are economic to serve their area, outside of forward contracting. This concern may cause affected entities to reduce economic bidding from market resources and instead self-schedule generation to ensure market dispatch in order to support compliance with the emissions targets. Reduced incentives to economically bid generation into the market could reduce the benefits of participating in EDAM or WEIM.

There is not a market mechanism to ensure that a state or LSE is only served by generation that does not exceed their emission threshold

The market uses a least cost security constrained economic dispatch; it dispatches resources based on costs and constraints. Today there is neither a cost nor a constraint to reflect in the market for either states with climate policies not based on a price of carbon or for utilities to meet their own goals. Moreover, market participation occurs through Scheduling Coordinators that submit bids for supply resources and load depending on the resources and load serving entities they represent. The market settles transactions with scheduling coordinators for metered supply resources and load and but does not map specific resources to specific loads based on their bids. As a result, the market today cannot guarantee that a state or LSE is only served by generation that does not exceed their established emission threshold on either a resource or aggregate basis.

The ISO's system looks at system energy

In a bilateral market, energy and associated attributes are bought and sold by counterparties and can be tracked. A key challenge with emissions tracking and a centralized electricity market is that some overlay is necessary to match supply and demand. The EDAM and WEIM GHG design does not determine what specific resource is serving what specific load. Instead, it determines only if a dispatched resource receives an attribution to serve a GHG Regulation Area through the use of bids. Pairing market results with contracts can be one way to link the financial and legal arrangements associated with market dispatch.

Stakeholder Drafted Problem Statement

In light of the challenges described above the working group developed the following problem statement:

The market lacks a mechanism that enables Load-Serving Entities and energy users to accurately account for energy and associated emissions used to serve load under regulatory and voluntary GHG reduction and clean energy goals. Sub-issues include:

- a. There is not a market mechanism in states with a declining cap on emissions for utilities to ensure load is served by generation and wholesale market transfers that meet those emission reduction targets.*
- b. There is currently not a way to optimize a portfolio of resources at the EDAM Entity/ WEIM Entity/BAA/LSE level annually from a pre-market, in-market, or post-market perspective over the course of the year to adhere to state emission targets.*
- b. There is not a market mechanism in states with a declining cap on emissions to reflect both the declining cap and a price on carbon in the market for states that have both requirements.*

Stakeholder Suggested Solution: Accounting and Reporting Approach

During the working group phase, WPTF introduced the out-of-market Accounting and Reporting approach as a way for entities (LSEs and market participating energy users) to account for their emissions over time. WPTF's proposal sums an entity's energy and emissions for each five-minute interval based on what the market dispatched net what capacity receives an attribution to serve load in a state with GHG pricing.⁸ If the entity's portfolio of resources generates more than its load for a given interval, it receives a credit reflecting the energy for which it was long in an interval at their LSE-specific emission rate. If the entity's portfolio of generation resources produces less than its load for an interval, it adds in the energy for which it is short at the market residual emissions rate. The proposal also allows LSEs in GHG pricing regions to share excess energy LSE-specific emissions rate for that interval for those entities that were long on energy in that interval. The ISO summarizes this approach in the mathematical formula below.

Figure 1: Summary of the WPTF Accounting and Reporting approach

+	Dispatched Owned Resources Dispatched Contracts for Purchase
	Total, owned/contracted
-	Attributed owned/contracted
	Total, owned/contracted net attribution
<i>If Total > load</i>	
-	<i>Energy @ LSE emissions rate</i>
<i>If Total < load</i>	
	<i>Energy @ residual emissions rate</i>
+	<i>(considerations for null power)</i>
	FINAL TOTAL

WPTF included four components of their design: pre-dispatch accounting, accounting rules, database rules, and reporting and publication rules:

Pre-Dispatch Accounting

Pre-dispatch accounting encompasses the rules to record committed energy. This includes mapping all owned and contracted resources to an entity. This step requires validation between the seller and buyer to ensure accuracy of who should be associated with what energy. If there is a disagreement between buyers and sellers then some means is necessary to resolve that disagreement. The ISO anticipates any

⁸ Energy attributed by the market is removed because it serves an area that prices GHG emissions.

verification of these contracts would occur after-the-fact by a state regulator. Other rules determined by state regulators would include determining the emissions factors of resources within the market footprint.

Accounting Rules

Accounting rules include both assigning energy to the market participant (*i.e.*, the LSE or market participating energy user) and assigning attributed MWh. Assigning energy to market participants includes assigning the energy and emissions for their owned and contracted resources to each entity's account. Any energy and the associated emission attributed to a GHG regulation area from a resource owned by an entity outside of a GHG regulation would be deducted from their account. The philosophy of this deduction is that the attributed MWh are intended to serve a GHG pricing region. If the energy assigned to an entity is less than their load, the energy is added to the entity's account at the market residual rate. However, if what the market dispatches is less than the entity's load, the excess energy is subtracted from their account at the LSE's system average emissions rate for that market interval.

Database Rules

The database rules envision different ways of subdividing data. There are both market participant accounts and market area accounts. It assumes all LSEs within a market footprint would have an account in a database. This would also be available optionally for energy users that are market participants. The market area accounts would track the energy and emissions associated with the GHG regulation areas, non-GHG area, residual market supply, and the market footprint as a whole. The GHG regulation area would include all the energy and emissions for resources within, committed to, or attributed to that area. The non-GHG area would include the energy and emissions for resources within the area as well as committed to market participants in an outside GHG regulation area. The residual market supply account would record the dispatched energy from unowned and uncontracted energy as well as contributions of excess system energy by LSEs. The emissions associated with this energy would go towards developing the residual emissions rate. Lastly, there would be an account for the market footprint as a whole to total the energy and associated emission in order to create an average emissions rate. Additional rules may be necessary for how to treat lost or missing data.

Reporting and Publication

Reporting would be for LSEs, energy users, and regulators upon request. The ISO would provide reports to regulators upon the request of LSEs subject to those regulations. The ISO would also regularly publish metrics for market transparency, including:

- Energy, emissions, and average emission rate for within region generation for each market subdivision
- Energy, emissions, and average emission rate of energy attributed to GHG Areas
- Energy, emissions, and average emission rate of energy attributed in aggregate to LSEs and Energy Users
- Average emission rate of residual market supply

Objectives of the Accounting and Reporting Approach

Stakeholders developed and discussed the following possible objectives for the Accounting and Reporting Approach.

Standardized tracking over time

A key objective of the Accounting and Reporting approach is to standardize emissions tracking to allow an entity, such as a market participant, to track progress towards its climate goals over time. This means associating the market dispatch with the entity's owned and contracted resources based on the market footprint the entity operates in. It also enables, to the extent practicable, attribution and assignment of energy from specific resources and associated emissions to states and/or individual market participants (*e.g.*, BAAs, SCs, LSEs).

Accurately assign energy and associated emissions

The accuracy objective is to ensure the methodology only assigns energy and associated emissions to one entity and prevents any under or over counting of emissions.

More precisely account for transfers to a non-GHG regulation area

This objective seeks to have a more precise method to assign an emissions factor to transfers. For regions without GHG-pricing, the emissions rate of transfers is based on the state policies. For example, although Oregon is not a GHG region, it also assumes transfers occur at an unspecified resource rate.

In light of stakeholder requests, the ISO has also published an average emissions factor, which calculates on a five minute basis the emissions intensity of all resources operating in the market.⁹

Accommodates different approaches for accounting for clean energy accounting

The report seeks to be modular enough to allow entities to tailor the market data they receive in alignment with state requirements or corporate goals.

No imposition on non-GHG regions

A key objective of overall GHG market design is not to unduly impact non-GHG regions with the policies of a GHG region (priced or non-priced). Proponents of the report cited concerns that an in-market approach to constrain the emissions intensity of dispatch to regions that have a GHG policy not based on price could impact market dispatch. Any policy to price carbon or constrain dispatch does change merit order. However, a benefit cited by proponents of the Accounting and Reporting approach is that as it is out-of-market. The approach does not impact merit order or costs. Additionally it does not impose requirements on states or entities without GHG reduction goals.

⁹ CAISO. Average Emissions Rate Reports. Available at: <https://www.caiso.com/library/average-emissions-rate-reports>

Report Structure - Options for Consideration

WPTF recommends that the Accounting and Reporting approach be developed for an LSE and market participating energy user. The report WPTF recommends includes the following elements:

- **Total dispatch of owned generation:** Reflects the MWh from resources that are owned by the entity that are dispatched on a five minute basis.
- **Total dispatch of contracted generation:** Reflects the MWh from contracted resources that are dispatched on a five minute basis.
- **Total load:** Reflects if the market dispatched owned and contracted generation above or below the LSE/energy user's load.
- **LSE emissions rate:** Credits back the energy and emissions at an LSE-specific emissions rate for applicable five-minute intervals.
- **Market residual rate:** Adds the energy and emissions using a market residual rate for applicable five-minute market intervals.

There are various options for who would receive such a report, including, for example, an EDAM or WEIM entity (Balancing Authority Area, or BAA level), LSE, or Scheduling Coordinator (SC). The sections below discuss options for the report attributes and the accompanying tradeoffs among these options, as discussed by stakeholders in the working group.

Entity

This section addresses each of the options of “who” is the audience for the report. This question is challenging because there is not always a one-to-one relationship of entities that directly interact with the ISO and entities that have GHG compliance obligations.

BAA level:

If the ISO were to develop and publish this report for each EDAM or WEIM entity, it would be at a BAA level. For EDAM and WEIM entities, the ISO has access to data on transactions, transfers, and load. The ISO would need to develop new systems to capture contract data and data on unowned and uncontracted power producers in that BAA. If the report is developed at a BAA level it would include MWhs from resources in a BAA that were dispatched, transfers to and from that BAA, and load data (depending on the EDAM or WEIM entity), to understand if the MWhs from the BAA's owned and contracted resources that were dispatched by the market were greater or less than their load in any five-minute interval.

If the BAA dispatched more than their load consumed, the report methodology would credit back the MWh and associated emissions at the EDAM/WEIM entity level rate. If the BAA dispatched less than their load, the report methodology would add in energy and emission at the market residual rate. As WEIM entities only participate in the 15 minute and 5 minute market, WEIM entities would need to develop their own emissions accounting for their WEIM base schedules for a full accounting of their WEIM emissions.

The ISO has access to which resources are registered in the Master File by the SC and in which BAA these resources operate. However, unless registered in the Master File or separately communicated, the ISO will not have access to any contractual information. New systems would be needed depending on the nature of contracts that need to be reflected in the report and how short term these contracts are.

A BAA level report would allow BAAs to show progress towards meeting climate goals. However, it is typically the LSE not the BAA that has state level climate requirements. As a result, no stakeholder has supported only having a report developed at the BAA level.

LSE level:

An LSE-level report would allow LSEs to demonstrate progress towards meeting state or corporate emissions reduction climate goals. As most state requirements are at the LSE-level, this level of reporting aligns with the entity responsible for meeting state compliance obligations. A key challenge for the ISO is access to LSE-specific data.

If this report is developed at a LSE level it would total the MWhs and associated emissions from resources in a LSE's portfolio, meaning owned and contracted resources. This total would subtract out any emissions attributed. This total would be compared with the LSE's load on a five minute basis. If the LSE's portfolio of resources dispatched, net attribution, was more than their load, the report methodology would credit back the MWh and associated emissions at the LSE emissions rate. If the LSE's portfolio of resources dispatched, net attribution, was less than their load, the report methodology would add in the MWh and associated emissions at a market residual rate.

As discussed above, EDAM and WEIM both operate at the BAA level. Load is settled at the BAA level.¹⁰ Information obtained and settled with generators is at the SC level. There is not currently an explicit or direct association of generation or load to LSEs today. Accordingly, new IT systems would be needed to collect information to associate owned and contracted generation with specific LSEs and to capture if there are any imports or exports. Additionally, either an intake tool or a new IT system would be needed to incorporate load data. An LSE's load data is critical to understand if on a five-minute interval if the load was greater or lower than what load consumed to determine if the LSE should be credited back at the LSE-specific emission rate or if they were a net consumer from the market and the energy and associated emissions should be added to their report.

¹⁰ In some cases, the ISO receives settlement quality load data from LSEs via the Scheduling Coordinator representative who aggregates the several LSE information into a single market resource. In these cases, while the ISO has access to the aggregate Load resource data, the individual LSE specific load data is not discernable and the ISO does not interact directly with the LSEs.

Stakeholders largely would like to see the report developed at the LSE level. In comments received in response to the ISO's November 12, 2024 working group meeting on the non-price based approach, Bonneville Power Administration (BPA), the Center for Resource Solutions (CRS), PacifiCorp (PAC), Portland General Electric (PGE), WPTF, and the Arizona Utilities [The Salt River Project Agricultural Improvement and Power District (SRP), Arizona Public Service (APS) and Tucson Electric Power (TEP)] all supported the report at the LSE level. WPTF also requested a discussion of the order in which the LSE was contributing to the residual mix. San Diego Gas and Electric (SDG&E) requested a cost estimate of the report at the LSE level. The working group will continue to discuss these additional questions.

SC level:

WPTF suggested that the Accounting and Reporting approach could also be developed for an energy user that is a "market participant." In general, a market participant in the ISO's market is an SC. Many different entities are required to use an SC with regard to interactions with the ISO. For the most part, only SCs are authorized to transact business directly with the ISO. The primary need for an SC is to facilitate participation in the ISO Markets.¹¹

The ISO does not have requirements around how a BAA or LSE chooses to represent their participating resources in the market through a single or various SCs. The ISO provides market entities with the flexibility to choose how they would like their resources and load to be bid into the market. For example, one SC may represent the participating load from many different LSEs. Therefore, an SC-level approach would require an entity to associate all resources to an SC-affiliate group to produce this report.

While there may not be a one-to-one relationship between SC and LSE, the SC is the most granular unit of measure the ISO collects on market participation today. Rules and processes currently exist to verify information provided by SCs and resolve issues such as duplication. The ISO observes that grouping together SC resources could accomplish the same goals as the LSE level report and mitigate some of the technical, and potentially costly, challenges associated with the LSE-level report. For example, SCs report contractual obligations to the ISO for the purposes of resource adequacy, greenhouse gas attribution, etc. However, SCs do not provide the ISO with settlement quality load data at an LSE level. LSEs may use an SC to bid participating load into the market but the ISO does not use load-bids as actual load data for settlement purposes.

If this report is developed at an SC-level it would total the MWhs and associated emissions from resources in a grouping of SCs, an SC affiliate group. This SC-affiliate group could group SC resources owned and contracted by a single LSE. This would add owned and contracted, net attribution. This total would be compared with the SC-affiliate group's load on a five minute basis. If the SC affiliate group's portfolio of resources dispatched, net attribution, was more than their load, the report methodology would credit back the MWh and associated emissions at the SC-affiliate group's emissions rate. If the SC affiliate group's portfolio of resources dispatched, net attribution, was less than their load, the report

¹¹ See California ISO Tariff Section 4.5 Responsibilities of a Scheduling Coordinator

methodology would add in the MWh and associated emissions at a market residual rate. The market residual rate would be comprised of all unowned and uncontracted resources.

In comments received in response to the November 12, 2024 working group meeting, no stakeholder opined if SC resource mapping could equate with an LSE level report. The ISO seeks feedback from entities if associating all SC generation and load resources to an SC-affiliate group could equate to an LSE report and thus satisfy the need to have this report developed at the LSE level.

Owned and Contracted Supply

Capturing what the market dispatches that the entity owns or has contracted for first requires alignment on the entity the report is developed for (*e.g.*, LSE or SC-affiliate group). Today the ISO's Master File captures what resources should be associated with an SC; this could represent owned and contracted resources. For any approach described above, the ISO requires additional information on what information and at what granularity information should be captured to assess if existing systems can be adapted or if new systems are necessary.

It is currently unclear to the ISO at what granularity contracts should be captured to support reporting. There is also an open question on the extent to which capturing short term contracts would impact an entity's report. To include these contracts would allow them to be included in the LSEs portfolio, and if applicable, credited back at the LSE emissions rate. To not include these short-term contracts would mean the energy and emissions associated with these short term contracts would be in the market residual rate.

Some stakeholders, such as BPA and the Arizona Utilities, have communicated capturing short term contracts would be necessary. WPTF observed in their comments that the materiality of capturing short term contracts will depend on the entity in question. Other stakeholders, such as PGP, requested more information on what types of contracts these represent. The working group will further discuss these contracts to assess if capturing these contracts make a material difference in an entity's emissions report and therefore if new IT systems need to be developed.

Load Data

Collecting load data is a critical element of the report. The WPTF methodology compares dispatch to load to determine if the entity should subtract out excess energy and associated emissions at the LSE rate or add the energy and emission that they consumed from the market at a residual rate.

Today, the ISO has limited access to LSE-level settlement load meter data. For WEIM balancing areas, the ISO receives settlement quality load meter data aggregated at a BAA level.¹² If the ISO publishes generation data on a five minute basis, the LSE could compare this value to their own metered load to determine if it needs to make any adjustments based on the residual rate.

If stakeholders want the ISO to calculate if an LSE is long or short relative to their load in a given interval, the ISO will need discrete LSE's load information. To obtain this information will require either a template or other intake system. The specifics of any new obligation on an entity to report this information and any changes to the ISO's ability to aggregate or share new data, including potential tariff changes, will need to be vetted further.

If stakeholders want the ISO to calculate a residual market rate based on when individual LSEs are long or short relative to their load, the ISO will need load information from each LSE. Stakeholders will need to determine best practices to ensure consistency and accuracy because the ISO does not currently have rules or validation measures for this type of information. For example, the ISO does not require LSEs to meter their load and further understands that not all LSEs currently have the infrastructure to meter their load. However, the ISO does require that SCs managing metered load values have a functional software interface to validate, estimate and edit metered values they manage.

Stakeholders agree that participation in the Accounting and Reporting approach should be voluntary and promote consistency, but this poses a challenge with regard to developing consistent reporting rules for load data. PGP requested further clarification and discussion around how to treat entities who are not participating in the reporting and accounting approach. Most stakeholders that commented on consistency on load data—BPA, PGP, WTPF, and the Arizona Utilities—believe load data should be based on actual metered load data. PAC suggested an approach be developed for both forecasts and actuals on an annual basis.

LSE Rate and Market Residual Rate

The proposed WPTF design suggests that if an entity's portfolio of resources is dispatched more than their load, then they get credit back for the energy and associated emission at the LSE rate. However, if an entity's portfolio is dispatched less than their load then they add in the energy and associated emissions at the market residual rate. WPTF also proposed that within a GHG Regulation Area, the states that have a price on carbon, there is an adjustment to allow LSEs to share any excess. Two key questions need to be resolved prior drafting the report and developing these emission rates.

¹² Day ahead market participation may provide additional visibility into LSE-level data to the extent the LSE represents its load in the market, distinct from the rest of the BAA.

1. **What data is the ISO publishing?** The ISO could either produce the report total or just the residual rate. The report total would be the sum of what was dispatched, net attribution, and trued up with if the entity was long or short with the market. A residual market rate could take different forms, ranging from all unowned and uncontracted resources to an average of net exporting BAAs emissions. If the ISO only produces a residual market rate the entity can use the information they have from market results, and their own load level information to develop the report themselves.
2. **Which entity is the report developed for?** As discussed above, the data inputs and availability are based on who the report is developed for (e.g., LSE vs. SC). If the ISO produces the report it will need information on the load of the LSE or SC. If the CAISO only produces the residual rate, LSEs will be able to utilize their own generation and load data to understand when they should credit back at their LSE rate and what their LSE emission rate is.

Future stakeholder conversations will need to resolve the questions above to finalize the discussion of how a LSE rate and market residual rate are developed.

The sections below highlight the LSE rate and residual rate. However, prior to calculating either, there could also be an intra GHG zone pricing adjustment. This could re-allocate energy and emissions ahead of assessing if there should be any crediting at the LSE specific emission rate or adding in at the market residual rate.

1. Intra GHG Pricing Zone: Accounting for MWh and GHG emissions for LSEs in GHG Pricing Areas

WPTF proposed that within a GHG Regulation Area, defined as states with GHG pricing policies, LSEs could share excess energy and associated greenhouse gas emissions. This would allow energy in a LSE that was long to be assigned to those that were short. This recognizes that resources in a GHG pricing area face GHG costs. They also suggested that surplus clean energy that is attributed to a GHG pricing area should be assigned on a pro-rata basis to LSEs in the GHG area.

Both in their September 19, 2024 presentation¹³ and in comments,¹⁴ PGE relayed their desire to be included in the GHG intra-pricing zone. They view Oregon's HB 2021 to be at least as stringent as the cap-and-trade programs in place in California and Washington. PGE believes this approach will enable them to fully account for the value of their clean portfolio buildout which could result in considerable excess generation during various hourly intervals. In their comments in response to the presentation, PGP and WTPF raised concerns that this approach would create parity in accounting and reporting that

¹³ PGE Greenhouse Gas Coordination. September 19, 2024. Available at: <https://stakeholdercenter.caiso.com/InitiativeDocuments/Presentation-PGE-Greenhouse-Gas-Coordination-Sep19-2024.pdf>

¹⁴ PGE Comments. December 5, 2024. Available at: <https://stakeholdercenter.caiso.com/Comments/AllComments/3ca261e4-20d4-42b2-980e-05ef2b2f53c6#org-6ac9553d-7b91-46c9-b5eb-70180f334edf>

does not exist within market dispatch or price formation¹⁵ and without reflecting a willingness to pay or contract in the same way as states with a price on carbon.¹⁶ The Arizona utilities opposed the concept of a residual climate region on the basis that any mechanism that treats participants differently and preferentially could create cost shifts and artificial market distortions.¹⁷

However, in follow up comments, stakeholders suggested an alternative approach could be a voluntary LSE climate region. In their November 26, 2024¹⁸ comments, WPTF and BPA suggested that rather than including non-price based LSEs in the intra-GHG pricing zone that LSEs could elect to participate in such arrangements on a voluntary basis. In those cases excess energy would be contributed to the market residual supply only when the voluntary climate region as a whole is a net exporter. This will require further discussions as it will impact the residual market rate.

The ISO views a combined approach of the voluntary intra-GHG area LSE adjustment and climate region residual rate as represented using the formulation below. In this formulation, LSEs that decide to be in a similar climate area could share any excess of MWh ahead of the report assessing if they were long or short as compared to their load. Then, if the LSE's portfolio, including this intra-GHG LSE adjustment, was dispatched less than their load, they would have the opportunity to use a climate region residual rate for the MWh of shortfall up to the MWh of excess from the other climate regions. A methodology would need to be determined on how to allocate the associated MWh and emissions across LSEs from the climate region. Once the MWh are allocated from the climate regions that are long to those that are short, the climate regions that have a remaining MWh shortfall relative to their load would use the non-climate region's emissions factor for any remaining MWh of shortfall.

¹⁵ PGP Comments. October 10, 2024. Available at: <https://stakeholdercenter.caiso.com/Comments/AllComments/9ae09a8a-aa4e-4b24-9418-6c14ba34222b#org-d3cd8a97-5fc1-44c4-a5bd-b08f179eb899>

¹⁶ WPTF Comments. October 10, 2024. Available at: <https://stakeholdercenter.caiso.com/Comments/AllComments/9ae09a8a-aa4e-4b24-9418-6c14ba34222b#org-5bf5d5c7-6dea-460d-a1b7-8b9fc53d52f2>

¹⁷ Arizona Utilities comments. December 6, 2024. Available at: <https://stakeholdercenter.caiso.com/Comments/AllComments/3ca261e4-20d4-42b2-980e-05ef2b2f53c6>

¹⁸ WPTF and BPA Comments. November 26 and 27, 2024. Available at: <https://stakeholdercenter.caiso.com/Comments/AllComments/3ca261e4-20d4-42b2-980e-05ef2b2f53c6#org-e03f9f8c-d300-4b24-aca2-71e72011827c>

Figure 2: Voluntary Climate Area Adaptation of the WPTF Accounting and Reporting approach

	Dispatched Owned Resources
+	Dispatched Contracts for Purchase
<hr/>	
	Total, owned/contracted
	Attributed owned/contracted
-	
<hr/>	
	Total, owned/contracted net attribution
	Total for owned/contracted – attributed
	Voluntary intra-GHG area LSE adjustment
+/-	
<hr/>	
	Total, net attribution & intra-GHG LSE adjustment
<i>If Total > load</i>	
-	<i>Energy @ LSE emissions rate</i>
<i>If Total < load</i>	
	<i>1.) Add in energy @ climate region residual emissions rate</i>
	<i>2.) If remaining MW shortfall, add in energy @ non-climate region residual emissions rate</i>
	<i>(considerations for null power)</i>
+	
<hr/>	
	FINAL TOTAL

2. LSE Rate:

If the ISO produces a LSE emissions rate it could be based on an average of the emissions of all of the resources dispatched in a given interval. If the ISO only produces a residual market rate, then the LSE can determine their own LSE-specific emissions rate based on information they have on the emissions of their dispatched owned and contracted resources.

3. Residual Rate:

A residual rate typically is used in energy and GHG accounting to describe the unallocated or unclaimed electricity generation and associated emissions in a certain area over a certain period of time. In WPTF's proposal it represents the unowned and uncontracted MW and the associated emissions. This assumes that all other MW and the associated emissions have been "claimed" by entities as either owned or contracted, or that the ISO has associated owned and contracted resources.

The development of a more accurate residual rate has been the impetus behind support for the Accounting and Reporting approach. Stakeholders have described the value of a residual emissions rate as: developing a more accurate unspecified emissions rate to assign to market transfers, reducing

double-counting by removing claimed capacity (renewable certificates, contracts, owned capacity), and enabling the entity to show progress toward climate goals. The ISO could develop this at the LSE, SC, or as described below at the BAA level.

The residual rate could have different designs. One option is to base the residual rate on all resources that are not owned and not contracted in a given market interval, as proposed by WPTF. A second option is an interim approach that could be the average of all resources in a given footprint (e.g., LSE, SC, or BAA). Alternative BAA level residuals are described below. The ISO seeks feedback on what approach is preferred in the short-term and long-term.

Data Granularity

The report data could entail publishing data for WEIM or EDAM transfers. Data produced for EDAM and the WEIM would be 5 minute data for all transfers. WEIM only entities would need to develop an emission accounting for their WEIM base schedules for a full account of their WEIM emissions. Data could be aggregated at a quarterly or annual basis.

Alternatives for Consideration

In addition to the options above, the working group discussed the approaches below as either interim or alternative approaches. Feedback received in comments indicates any BAA level residual rate is helpful, but not a replacement for an LSE-level report. Stakeholders did not find value in the Locational Emissions Rate data approach.

I. Interim Approach: BAA Level Residual Rate

An interim approach ahead of developing a LSE or SC level Accounting and Reporting approach is to develop a residual rate at a BAA level. This effort may provide a better approximation of the emissions intensity of BAA level transfers.

A draft methodology for this approach would entail totaling all energy and emissions for all net exporting BAAs on a five-minute basis. All net exporting BAA emissions would be averaged on a five-minute basis to create a residual rate. There would be one residual emissions rate per five-minute interval.¹⁹

¹⁹ See slide 18 from the CAISO's November 12, 2024 presentation for an example. Available at: <https://stakeholdercenter.caiso.com/InitiativeDocuments/Presentation-Greenhouse-Gas-Coordination-Working-Group-Nov-12-2024.pdf>

Only two entities support the BAA level report as an interim approach. Both PAC and PGE would like the BAA Level report developed in the near term, but do not see it as a replacement for the LSE-level approach. PGP observed that a BAA level residual rate makes it challenging for LSEs to confirm null power, and would also result in LSEs needing to do an additional calculations. Null power is often synonymous with non-emitting power that is used for RECs. PGP's challenges highlight the challenges between what can be verified with contracts at the LSE level versus BAA level. Again, the CAISO does not take claim on any REC with market dispatch or attribution, but recognizes stakeholder's need in this reporting process to assign ownership of a resource with the correct entity to prevent over or under counting of emissions.

II. Alternative Interim Approach: BAA Level with Climate Region Residual Rate

An alternative interim approach is for there to be a residual rate for both a climate region and for the broader non-climate region. This effort could allow states that have common policies that require emission reductions and therefore investments in procurement and contracting of low-emitting resources to share the energy and emissions of any excess ahead of using the non-climate region emission factor. Regulators or stakeholders would determine which BAAs are in a climate region. A draft methodology for this approach would entail totaling all energy and emissions for climate region net exporting BAAs on a five-minute basis. This would create the climate region residual rate. Any net importing BAAs that states determine are in a climate region could use this rate for the associated MWh shortfall as compared to their load. If the shortfall was greater than the MWh of net export by climate region BAAs they would then use the residual rate of the non-climate region BAAs.²⁰

III. Replacement Approach: Locational Emissions Data

Early stakeholder feedback suggested that some form of a locational emissions rate would be valuable. Stakeholder problem statements for GHG metrics have identified locational emission data as important to support contracting, development and citing decisions, 24/7 matching, and load shifting. Stakeholders have also raised this approach as a means for greater transparency into the emissions at different locations on the grid. And some stakeholders have requested nodal data in order to help identify a marginal emissions rate.

²⁰ See slide 19 from the CAISO's November 12, 2024 presentation for an example. Available at: <https://stakeholdercenter.caiso.com/InitiativeDocuments/Presentation-Greenhouse-Gas-Coordination-Working-Group-Nov-12-2024.pdf>

As an alternative to developing the Accounting and Reporting approach the ISO could explore producing locational emissions data. There are various approaches this effort could take including:

- **Marginal Emissions Rate, gen-node:** This would include the ISO publishing a marginal emission rate at each gen-node on a five-minute basis.²¹
- **Average Emissions Rate, gen-node:** This would include the ISO publishing an average emissions rate at each generation-node on a five-minute basis.
- **Average Emissions Rate, System:** As described in the Background section of this Issue Paper, the ISO today produces an average emissions rate covering the entire WEIM footprint as well as the emissions intensity of WEIM transfers into California.²²

In comments submitted at the end of November, stakeholder reactions to a Locational Emissions Rate ranged from indicating that the data was not useful to that it could be interesting. No stakeholder found it as sufficient to supplant the need for the Accounting and Reporting approach.

Implementation Timing

Implementation timing evaluation is subject to the features of the final design. As discussed in the working group, developing the approach at the LSE level with contracts that are updated daily may be a few years after EDAM go-live. An approach that uses SC-mapping may be able to be implemented more quickly after EDAM-go live. However, the interim BAA level climate region residual rate could be implemented with EDAM go-live.

In comments received, it appears there is limited use of this report at this time. In response to a question on if stakeholders planned to use the report, only PAC and PGE affirmed they would. SDG&E commented they were evaluating its usefulness. A handful of entities, BPA, PGP and CRS, commented there could be some use cases for the Accounting and Reporting approach. For example, PGP commented they have some members that could use it, if it could be used to validate RECs. CRS notes that the Accounting and Reporting approach “will only be useful in a voluntary market and other programs that rely on RECs if it’s coordinated with the REC system.” While the ISO’s market does not create a claim on a REC, stakeholders should help guide the reporting requirements to meet their reporting requirements.

²¹ As there are instances of multiple resources setting the marginal rate, this may be an average of the marginal resources at a gen-node.

²² CAISO. Average Emission Rate Reports. Available at: <https://www.caiso.com/library/average-emissions-rate-reports>

Reader's Guide

Recognizing the number of options within the report, the ISO developed the following two questions to shape the report's path forward. These questions will be discussed in the January 21, 2025 workshop and included in the subsequent comment template.

What data should the ISO publish for stakeholders?

The ISO could either produce the report total or just the residual rate. The report total would be the sum of what was dispatched, net attribution, and trued up with if the entity was long or short with the market. This would result in one report total for each entity requesting a report. This report would only be made available to the requesting party.

A residual market rate could take different forms, ranging from all unowned and uncontracted resources to an average of net exporting BAAs emissions. If the ISO only produces a residual market rate the entity can use the information they have from market results, and their own load level information to develop the report themselves. There may be one or multiple market residual rates. If the residual rate represents all unowned and uncontracted resources in a market interval there would be one residual rate per market interval. On the other end of the spectrum of design, if there is a climate region residual rate at a BAA level and a non-climate region residual rate, the ISO could accomplish this by producing an average of each of the BAAs that is net exporting in a given interval and it would be up to various entities to decide which BAAs are in or out of the climate region.

Which entity is the report developed for?

The data inputs and availability are based on who the report is developed for (e.g., LSE vs. SC). The ISO is interested in feedback on if resource mapping at the SC-level can equate to a LSE-level report.

Next Steps

The ISO plans to discuss this Issue Paper at the January 21, 2025 GHG Coordination Working Group meeting. Please submit comments on this paper and the working group meeting discussion by Tuesday, February 11, 2025.