
EXECUTIVE SUMMARY

**Greenhouse Gas Accounting Systems in Wholesale
Regional Electricity Markets:**
Considerations for the Western Interconnection

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Executive Summary

Regional markets, in principle, have great potential to create renewable energy cost savings and efficiencies while decarbonizing electricity, so a regional greenhouse gas accounting system is crucial for realizing the benefits of a regional wholesale electricity market. Our aim in [“Greenhouse Gas Accounting Systems in Wholesale Regional Electricity Markets: Considerations for the Western Interconnection”](#) is to offer best practices and recommendations for a future greenhouse gas accounting system for a regional wholesale electricity market in the West.

Without a regional (multi-state) accounting system, states cannot consistently track utility compliance due to energy transfers that are impacted by clean energy mandates or renewable energy requirements and result in displaced or avoided greenhouse gas emissions. Inadequate tracking in electricity markets can also result in unfair price advantages for certain types of generation resources, poor planning of optimal siting of renewable resources, and resource dispatch that does not reflect state public policies or mandates, leading to higher costs to deliver clean energy.

Wholesale regional electricity markets match generation resources to meet demand in the most cost-effective manner possible by dispatching the least-cost resources first. A multi-state centralized electricity market (i.e., Regional Transmission Organization or RTO) offers significant benefits in terms of economies of size and scale. Regional markets also are a key pathway to a decarbonized electric grid.

As Western states explore regional market expansion efforts to meet electricity demand, they must comply with individual states’ regulations related to clean energy and greenhouse gases. Interstate transfers of energy, therefore, require a robust and consistent system to account for greenhouse gases as electricity flows and serves load. Currently, Western states lack a coherent and multi-state regional greenhouse gas accounting framework. We offer best practices and recommendations centered around all-generation attribute-based accounting for greenhouse gases. This method of accounting tracks emission attributes, or the characteristics of a specific amount of power and its resultant greenhouse gases profile, as denoted by information on a generation certificate.

Existing Methods of Greenhouse Gas Accounting

The two primary methods of accounting for greenhouse gas emissions in the electricity sector are production-based and consumption-based accounting, which differ primarily based on their point of regulation. Production-based accounting measures greenhouse gas emissions at the point of generation. Using measurements taken at the generator, this approach accounts for greenhouse gas emissions before the energy is dispatched into the electrical grid. In contrast, consumption-based accounting tracks electricity through the grid to its point of consumption and assigns the associated greenhouse gas emissions to the end user. Consumption-based accounting uses a variety of tracking instruments to follow electricity on its journey from generation through the electric grid until its final delivery to a load-serving entity. Attribute-based accounting is a type of consumption-based accounting that records generation attributes and assigns them to a specific amount of load through pairing with an all-generation certificate as authentication issued by the market operator for a specific amount of generated power.

Best Practices for Greenhouse Gas Accounting

We advocate for an attribute-based accounting system with a focus on delivering functionality and consistency over any potential regional electric market construct. Any greenhouse gas accounting system should incorporate these best practices:

- ✓ ***A single, centralized accounting methodology across a regional wholesale electric market.*** Implementing a single accounting methodology across a market avoids the double counting of emission attributes, cumbersome and confusing information reporting systems, and market fragmentation. To achieve a uniform accounting methodology, a market operator should clearly outline guidelines for greenhouse gas attribution and the necessary data inputs required from market participants.
- ✓ ***Compatibility with an array of state policies.*** In states with differing greenhouse gas compliance systems or procedures from the regional electric market(s) that utilities participate in, a compliance process must be developed to align with consumption-based accounting guidelines and to process and utilize data from the central greenhouse gas accounting system.
- ✓ ***Guidelines for unspecified power and associated Renewable Energy Certificate attribution.*** A market operator should provide consistent guidelines for attributing emissions to unspecified power, which is power that cannot be matched to a specific generator or generating resource and as such has no environmental attributes, including an emissions rate. Additionally, no unspecified power should be able to have renewable attributes assigned without a corresponding REC. This helps prevent the double counting of renewable attributes.
- ✓ ***Alignment with federal environmental requirements.*** Electrical generating units with current mandatory reporting requirements should continue this federal reporting, including to the Greenhouse Gas Reporting Program and the Clean Air Markets Program. A regional market greenhouse gas accounting system must not interfere with existing federal reporting requirements and should use data from these federal reporting systems when applicable.
- ✓ ***Compatibility with state policies and goals.*** Western states have varied renewable energy and greenhouse gas policies in place. These policies, including Clean Energy Standards, emission reduction goals, and Renewable Portfolio Standards, often require assigning power attributes from market transactions to each load-serving entity and aggregated on the state level. Some state policies call for assigning electricity transacted via a market to a load-serving entity for reporting and compliance. To accomplish this, each entity should have a single account within a market's greenhouse gas accounting system. The system operator could assign resources into this account and proportionally divide resources into subaccounts for each state where the load-serving entity serves load for multi-state load-serving entities. Barring the contractual purchase of energy intended for end use in a single state an entity serves, certificates for generation resources would stay in the given state subaccount reporting systems. In such cases, transfer between subaccounts could occur. This same proportional practice, except in cases such as the contractual delivery of energy and REC purchases, could be used for system power in a wholesale market.
- ✓ ***Alignment with state-based carbon pricing requirements.*** Any greenhouse gas accounting system in a market with varied state requirements on carbon pricing should abide by proportional assignment of system mix resources, to avoid resource shuffling when system resources are dispatched. As another option, entities subject to carbon pricing could make

contractual purchases instead of later adding a price adjustment for the greenhouse gas content of the energy dispatched to them to minimize their compliance costs and lessen market disruption. For this to be possible, a robust all-generation tracking system detailing the attributes of dispatched power to each load-serving entity must be in place. Trading within the market database also must be possible for these transactions to occur. However, if carbon pricing legislation stipulated that the electricity needed to be physically delivered to the state and the purchase of contractual power is not sufficient, then sub-markets or a multiple pass optimization system could be needed to ensure physical electricity delivery.

- ✓ ***“One-stop” greenhouse gas verification system design.*** Data used for policy compliance and accounting must have validity and verifiability for state policy compliance. Greenhouse gas data collection through an all-generation tracking system administered by a market operator can be paired with emissions information reported to the U.S. Environmental Protection Agency or a state environmental agency. These emission rates, which are verified regularly, can be used on all-generation certificates. A market administrator can also choose to carry out third-party verification for emission rates. This process of pairing previously verified data with generation reported to the market operator for dispatch purposes creates an accurate measure of the greenhouse gas emissions in a system.
- ✓ ***Information flow and real-time tracking.*** Various tools can be used to track greenhouse gas data. Among these are e-tags, which represent purchased transmission paths that cross Balancing Area Authority borders. E-tags can help track the contractual delivery of a resource by tracing its purchased physical transmission path. E-tags are a useful tool for policy compliance in states with more stringent deliverability requirements. Another facet of periodic reporting on market performance and environmental attributes is the need for a public-facing information source displaying the amount of energy dispatched and the environmental attributes associated with that energy fuel mix. This data should include geographic area, fuel type, and other details.
- ✓ ***Emission rates for unspecified power.*** Unspecified power presents a challenge for greenhouse gas accounting due to its lack of environmental attributes. This results in inconsistent to weak policy compliance due to the uncertainty over the emissions profile of unspecified power. However, assigning of an emissions rate to this power is complex and depends on communicating relevant information to establish an accurate residual rate for system power. To remedy this issue, unspecified power should utilize a residual rate. A residual rate employs the use of a subtractive process to assign attributes to power. That is, residual rates focus primarily on which attributes cannot be assigned to the power due to having already been claimed by another party. To apply a residual rate to unspecified system power, system power generation certificates should be assigned to the power and deposited in the accounts of purchasers or users of the power. For unspecified power purchased from another market, the best available information should be used to assign an emissions rate. For imports from a market with an all-generation tracking system in place, the greenhouse gas accounting system administrator should attempt to acquire information on the system mix.

Recommendations for Greenhouse Gas Accounting in Various Regional Market Scenarios

Status Quo:

A greenhouse gas accounting system in the current regional market system in the West must consider the 38 balancing authorities transacting energy bilaterally, as well as the real-time markets operated by the California Independent System Operator (CAISO) and Southwest Power Pool (SPP). We recommend:

- *Creating a tracking system for energy imbalance markets that monitors and attributes resources dispatched through the energy imbalance market.*
- *Creating a residual thermal rate to assign to unspecified power.*
- *Creating an all-generation certificate tracking system of the resources dispatched in an energy imbalance market.*
- *Requiring RECs to be paired with all-generation certificates for the claim of renewable attributes.*
- *Allowing for joint regulation on the requirements surrounding energy procured via energy imbalance markets.*

Energy Imbalance and Day-Ahead Market:

We expect to see the continued development of a fully expanded energy imbalance market in the West and day-ahead market services for energy imbalance market member utilities. Such a framework would maximize the use of existing transmission. We recommend:

- *Following energy imbalance markets procedures as detailed in the status quo scenario and creating a certificate tracking system for energy procured through a day-ahead market.*
- *Creating a residual thermal rate to assign to unspecified power.*
- *Creating a database for energy imbalance and day-ahead market all-generation certificate tracking.*
- *Excluding unspecified power from claims for renewable attributes and requiring RECs for renewable attributes.*
- *Including air and utility regulators in market design efforts for a day-ahead market to ensure representation of state greenhouse gas policy.*

Single RTO or Multiple RTOs:

The development of a single Western RTO or multiple RTOs for states outside California would facilitate expanded trading of wholesale electricity resources without required compliance with California laws for electricity markets. CAISO or any other credible market operator could take on contractual obligations to build an RTO or multiple RTOs and manage operations. We recommend:

- *Performing all-generation tracking and deposit certificates into utility subaccounts.*
- *Using a residual rate for unspecified power and obtaining the best available information for assigning attributes to imports.*
- *Registering certificates in utility accounts for power generated by independent system operators and using e-tags or contracts for imported energy.*
- *Keeping RECs and their associated renewable all-generation certificates paired whenever possible.*
- *Ensuring state regulators have input on market design by forming a committee that includes air and utility regulators.*

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