

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Carbon Pricing in Organized Wholesale)
Electricity Markets)
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Docket No. AD20-14-000

**Prepared Statement of Mark Rothleder
on behalf of the California Independent System Operator Corporation**

My name is Mark Rothleder. I serve as Vice President, Market Policy and Performance at the California Independent System Operator Corporation (CAISO). Thank you for the opportunity to participate in this discussion.

The CAISO operates wholesale electricity markets for the benefit of approximately 80 percent of electric demand in California and small portion of electric demand in the state of Nevada. We also serve as the market operator for the western Energy Imbalance Market (EIM), which provides real-time market services to participating balancing authorities throughout the Western Interconnection.

My remarks address operational and market design issues associated with integrating carbon pricing in organized wholesale electricity markets. In particular, I discuss how recognizing the cost of carbon in our market optimization can affect the price of energy and ancillary services. I also discuss some observations based on our experience with optimizing the EIM across balancing authority areas in which some resources face compliance with a carbon emission program and some do not. Finally, I discuss considerations for optimizing resources across a region with different state programs seeking to reduce carbon emissions.

I. Recognizing the cost of carbon cost in the market optimization may impact both the price of energy and ancillary services

The Commission has accepted rules within the CAISO's market to accommodate California's greenhouse gas (GHG) emission reduction program that affect wholesale sales of electricity. Since 2013, when California first established a compliance obligation for GHG emissions, the CAISO market has allowed scheduling coordinators to include the emissions costs of GHG allowances associated with any energy produced in or serving California as part of their energy bids. This ability exists for bids from both internal resources and imports. For imports into California, GHG compliance costs depend on whether the import reflects a specific resource or only system power. If the import does not reflect a specified source then the importer's GHG compliance obligation reflects either a default emission rate or a rate representing the assets under the control of the supplier. In addition, the Commission has accepted CAISO market rules to incorporate the emissions costs of GHG allowances into the calculation of generating units' variable costs, providing generators a reasonable opportunity to recover their variable energy costs when they are committed by the CAISO or subject to bid mitigation rules.¹

With these market rule changes, the CAISO's system marginal energy price generally reflects GHG compliance costs of the marginal unit or units clearing the CAISO's day-ahead and real-time energy markets. The co-optimization of energy and ancillary services can also result in the cost of carbon affecting ancillary services prices. Ancillary service awards do not involve carbon emissions unless a resource with such

¹ *California Independent System Operator Corp.*, 141 FERC ¶ 61,237 (2012); Letter Order dated February 26, 2013 in Docket ER13-219-001.

an award is dispatched for energy. However, within the CAISO, ancillary service pricing may include the opportunity cost of not providing energy, which reflects the cost of compliance with California's GHG program.

In connection with the EIM, the Commission has accepted market rules to allow scheduling coordinators for EIM participating resources located in balancing authority areas outside of California to recover their costs of compliance with California's GHG program that arise from real-time transfers of electricity to serve California demand.² When these EIM participating resource scheduling coordinators serve demand within the CAISO or another EIM Entity located within California (e.g., the Sacramento Municipal Utility District) they must comply with California's GHG program. The CAISO's market rules allow scheduling coordinators for EIM participating resources to submit bid adders on a voluntary basis to make their output available to serve demand in California. These bid adders consist of a MW quantity and a price that reflects the EIM participating resource's costs to comply with California's GHG program.

Based on least cost dispatch, EIM bid adders allow the CAISO to attribute which EIM participating resources support real-time transfers to serve demand in California and compensate EIM participating resource scheduling coordinators for their costs of compliance under California's GHG program. As a result, EIM participating resources attributed as serving California demand receive a payment that reflects the GHG

² See generally *California Independent System Operator Corp.*, 147 FERC ¶ 61,231 (2014); see also CAISO tariff at section 29.32. The submission of bid adders by EIM participating Resource Scheduling Coordinators is voluntary and serves as a signal to the market optimization that a resource's output is available to serve demand within the CAISO or other EIM balancing authority areas located within California. EIM participating Resource Scheduling Coordinators may also elect not to submit a bid adder and instead only serve EIM demand in EIM Entity balancing authority areas located outside of California.

compliance costs of the marginal EIM participating resource serving California demand. These costs are allocated to California demand.

The use of bid adders informs the CAISO's market optimization to ensure an efficient dispatch and ensures the market result provides suppliers that voluntarily offer to serve California demand with information necessary to secure allowances or offsets to comply with California's GHG regulations. Finally, the bid adders allow the CAISO to dispatch EIM participating resources to serve EIM demand outside of the CAISO without reflecting the costs of California's GHG gas program in locational marginal prices for resources serving that demand.

II. The CAISO's experience reflects the need to balance the objectives of least cost dispatch with accurate emissions accounting

Over the last several years, the CAISO has refined its market rules in consultation with stakeholders, policymakers and regulators across the West.³ These refinements arise from several observations involving our market optimization to implement least cost dispatch and efforts to track emissions associated electric demand within a GHG compliance area such as California. First, the market optimization cannot determine what specific resource is serving what specific electric demand on the system, rather it determines if a resource is serving demand generally within a GHG compliance area. Second, the use of least cost dispatch across a GHG compliance area and areas without GHG compliance can result in attributing lower emitting

³ *California Independent System Operator Corp.*, 153 FERC ¶ 61,087 (2015); *California Independent System Operator Corp.* 165 FERC ¶ 61,050 (2018). See also Informational Report of the CAISO filed in Docket ER18-2341 on Implementation of EIM Bid Adder Rules dated December 27, 2019: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15432533>

resources to serve demand in the GHG compliance region, while not accounting for secondary dispatch of other, higher-emitting resources to serve demand in the non-GHG compliance areas. In addition, least cost dispatch can result in avoided curtailment of renewables within one balancing authority area by displacing emitting resources to serve demand in another balancing authority area. However, under California GHG regulations, there is no mechanism to obtain a credit for these emission offsets. Nonetheless, it is worth emphasizing that the least cost dispatch objective of the market optimization also advances the objective of reducing carbon emissions across the region.

These observations have helped identify that carbon pricing in wholesale electricity markets creates a tension between the objectives of market efficiency and accurate tracking of GHG emissions. The intersection of these objectives requires a balance, especially in regions with wholesale electricity markets where states have implemented different carbon emission reduction or clean energy programs or in states that do not have such programs. In short, the tension between these two objectives involves securing the least cost dispatch among resources participating in a wholesale electricity market while allowing states to track resource emissions that occur based on electricity usage within their borders.

III. Carbon pricing rules in wholesale electricity markets need to harmonize the economic optimization of resources across a region with different state programs seeking to reduce carbon emissions

In the West, various discussions are underway regarding how to evolve carbon pricing in wholesale electricity markets. For example, the CAISO has initiated a

stakeholder process to explore extending its day ahead market to EIM participants.⁴ An element of that discussion will necessarily include how to evolve EIM market rules to account for greenhouse gas costs across participating entities in the day-ahead timeframe.

Under an extended day-ahead market, there will likely be multiple state approaches to reducing carbon emissions. Any accounting approach will need to treat comparable resources similarly. Unlike the EIM, a day-ahead market will not start with balanced base schedules from which the market optimization can distinguish between incremental dispatches to serve demand in an area with GHG compliance rules and in an area without GHG compliance rules. Accordingly, a new paradigm for identifying which resources are serving demand in these areas will be necessary. In addition, state programs based solely on renewable energy credits may pose challenges for utilizing resources across a broader region. Any new paradigm will also need to ensure any emissions accounting approach treats comparable resources similarly.

Given these challenges, the design of carbon pricing in the CAISO's market optimization will need to consider how resources reflect the cost of compliance in their economic bids, whether that cost reflects an allowance to emit carbon or the payment of a carbon tax. The point of regulation, *i.e.* whether suppliers or end users are responsible for the cost of GHG compliance, will also be a factor in any market design. Finally, the interplay between market optimization and renewable energy credits is important. If these are de-coupled, the market can optimize the resource considering its

⁴ More information on the CAISO's stakeholder process to extend its day-ahead market platform is available on the CAISO's website: <http://www.caiso.com/StakeholderProcesses/Extended-day-ahead-market>

GHG emission factor without having to attribute the supply to electric demand within a GHG compliance area. If they are coupled, this approach will limit ability to optimize supply to meet electrical demand across the broader region.

The CAISO believes resolving these issues is critical to developing a regional approach to address carbon pricing in wholesale electricity markets effectively and efficiently. They will inform carbon reduction discussions that are occurring throughout the West as well as CAISO stakeholder processes to evolve carbon pricing in the electricity markets it administers.