

**Comments of Powerex Corp. on
Regional Integration California Greenhouse Gas Compliance**

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to submit comments on CAISO’s August 29, 2016 Regional Integration California Greenhouse Gas Compliance Issue Paper (“Issue Paper”). The Issue Paper frames the challenges of implementing California’s greenhouse gas (“GHG”) regulations in the context of a potential future multi-state regional organized market. Of specific interest is the manner in which a regional organized market would include information regarding GHG emissions in the dispatch of out-of-state generating resources to serve load in California. Powerex is optimistic that an accurate, objective framework for GHG emissions can be developed that both supports California’s environmental objectives and achieves the efficiency benefits of a regional organized market.

I. Executive Summary

Powerex believes that a regional organized market may present a significant opportunity to advance California’s environmental objectives regarding GHG emissions associated with production of electricity to serve load in the state. Currently, the tracking and reporting of GHG emissions of out-of-state resources for imports of electricity into California relies, in part, on schedules and e-Tags submitted by market participants to establish the “link” between a source outside of California and a sink inside of California. In a regional organized market, however, the e-Tag scheduling framework will be entirely eliminated for energy flows within the expanded organized market footprint. Market participants will no longer establish a transaction-specific relationship, nor submit an e-Tag, between a specific resource that produces electricity and specific loads that consume it. Instead, the market operator will be required to make—through the administration of its tariff, business practices and power flow model—any determinations regarding which specific resources are dispatched to serve specific loads across the regional organized market footprint.

A regional organized market therefore offers an important opportunity to develop an improved, highly objective and uniformly applied approach for identifying the specific out-of-state GHG emissions associated with serving California load. In Powerex’s view, a well-designed GHG framework could significantly increase the effectiveness of the California Air Resources Board’s (“CARB”) programs in reducing emissions for energy procured from out-of-state resources.

The magnitude of the potential environmental benefits from a well-designed regional organized market is substantial, since these benefits will accrue from the operational decisions of all resources across a large geographic area and in all market timeframes. But the large scope and scale that drive these potential benefits also imply considerable risk if the regional market utilizes an approach that does not identify GHG emissions accurately or that is otherwise

inconsistent with CARB's regulations and objectives. For example, a regional organized market that is designed in a manner to simply "deem" the cleanest out-of-state resources in the footprint as serving load in California—even if those resources would have run anyway to serve out-of-state load—would severely undermine California's environmental policy of reducing emissions and promoting use of lower-emitting resources. Such an approach could give the *appearance* that all electricity imports into California were from zero- or low-GHG resources, when in fact the dispatch of out-of-state resources may entail significant GHG emissions. Effectively, the regional market's dispatch of out-of-state resources would not reflect CARB's efforts to encourage the use of lower-emitting out-of-state resources to serve California load, and the market outcomes would be no different than if CARB's GHG regulations did not exist at all.

Powerex understands that CARB's GHG regulations are intended to lead to (1) accurate tracking of out-of-state GHG emissions to serve California load; and (2) economic incentives to dispatch lower-emitting out-of-state resources to serve California load. Powerex believes that a regional organized market that is designed to support both of these outcomes is essential to achieving the efficiency benefits of centralized unit commitment and dispatch across an expanded geographic footprint while also fully supporting California's environmental goal of promoting the use of lower-emitting resources to serve California load.

Powerex recognizes the challenge of developing such a model, and believes the regional stakeholder process is well suited to examine the potential advantages and drawbacks of one or more approaches. In these comments, Powerex outlines a potential two-step process to identify the dispatch from specific out-of-state resources associated with imports that serve load in California. In addition to the formal stakeholder meetings already scheduled, additional technical discussions between CAISO and stakeholders may prove valuable for developing, testing and refining this approach and any others that carry the substantial potential to achieve the goals outlined above. Powerex believes it will be vital for CARB to participate in the stakeholder evaluation of potential designs, since ultimately CARB must be satisfied that the GHG framework is consistent with its GHG regulations and with its environmental policy objectives. If CAISO ultimately determines that this type of approach is not technically feasible or is otherwise impractical, alternative but less desirable approaches may need to be considered. For example, a simplified approach might apply more aggregated average GHG emission rates to the net energy flows into California.

At the same time, Powerex strongly cautions against a regional market design that simply applies the existing EIM approach, in which GHG responsibility is algorithmically assigned to the out-of-state resources that submit the lowest GHG adders. Such an approach serves primarily to minimize the *reporting* of GHG emissions, and systematically understates the GHG emissions of the out-of-state resources that increase output when EIM imports serve California load. This approach—which has been described as "efficient resource shuffling" by a prominent industry academic¹—may well achieve the least-cost technical compliance with CARB's current regulations, but it does not achieve the policy objective of encouraging the dispatch of lower-emitting out-of-state resources to serve California load. Indeed, as applied to the relatively

¹ Hogan, W. W. (2013). CAISO Energy Imbalance Market Straw Proposal: Comments (pp. 1–4). Available at http://www.hks.harvard.edu/fs/whogan/Hogan_CAISO_EIM_Notes_062613.pdf

limited volume of California load served by imports in the EIM, the algorithmic model has already raised substantial concerns over “leakage.” GHG emissions in a regional organized market must be treated as more than just an accounting problem that is solved by allocating the lowest-emitting out-of-state resources to serving California load, while allocating higher-emitting resources to out-of-state load.

Extending this same approach to the much larger volume of transactions that would occur in a multi-state organized energy market would render CARB’s GHG regulations largely inconsequential and, in Powerex’s view, would create unnecessary tension between regionalization efforts and California’s environmental goals. Powerex therefore strongly supports the pursuit of a more accurate and robust approach.

II. A Regional Organized Market will Require a New Approach to Accurately Identify the “Source” of an Import Serving California Load

California has implemented a ground-breaking set of policies and programs to substantially reduce the state’s GHG emissions. In pursuing this objective within the state’s electricity sector, it must be recognized that a significant portion of the state’s electrical load is served by energy imported from outside of California, and therefore produced by generating resources whose emissions are not directly regulated under CARB’s comprehensive in-state regulations. This might not pose a challenge if all generating resources in the west were subject to similar GHG programs in their own states, as the cost of imports into California would already reflect the cost of GHG emissions. In the absence of a region-wide GHG framework for generators, however, CARB has developed GHG regulations for two distinct activities: (1) the production of electricity by generators located within the state of California; and (2) the import of electricity (necessarily produced by resources located outside of the state) to serve load in California.

Under CARB’s GHG regulations, GHG emissions must be reported for all imports of electricity that serve load in California. Use of a resource-specific GHG emission rate is permitted for entities delivering power from physical generation that they own, control, or for which they are the exclusive marketer. Resource-specific reporting is also permitted for contracts calling for delivery from a specific generating resource.² A default rate for “unspecified source” imports is available when the import does not satisfy the criteria for reporting using a resource-specific or “specified source” emission rate.

The determination of which specific out-of-state resources support imports serving load in California may not always be straightforward, however. Under the scheduling framework that exists throughout the WECC outside of the CAISO, parties to an interchange transaction can decide which generation resources are associated with energy deliveries to a particular sink or load. Depending on the circumstances, there may be multiple different ways to schedule generation resources to loads, potentially resulting in different GHG emission rates for transactions that serve load in California as opposed to transactions that serve load outside of California.

² Specific resources may be individual generating units or the system of resources of an “asset controlling supplier.”

A regional organized market will necessarily eliminate the scheduling of interchange transactions within the expanded regional market footprint. What are currently inter-BAA transfers of energy will simply become internal flows within the single expanded BAA, with no e-Tag representing the link between a particular resource and any particular load. The scheduling and e-Tagging process will be replaced by a new framework, incorporated into the regional organized market design, which performs this function.

In Powerex's view, the expansion of CAISO's organized market offers an important opportunity to improve the tracking of GHG emissions associated with imports serving load in California. A properly designed GHG framework that meets CARB's objectives and is uniformly applied to all resources dispatched in the regional market footprint could significantly increase the effectiveness of CARB's regulations and advance California's environmental policy goals.

III. Potential Approaches for GHG Compliance in a Regional Organized Market

Powerex believes that a regional organized market can include a framework that accurately identifies the out-of-state resources supporting energy imports serving load in California. A proposal that appears to achieve this result is outlined below; its performance and feasibility could be further explored through CAISO technical stakeholder discussions. To the extent such an approach is technically infeasible or otherwise not pursued, a simplified, though less efficient, alternative is also presented.

A. GHG Recognition Based on Incremental Out-of-State Dispatch to Serve California Load

The key challenge in properly applying resource-specific GHG treatment is identifying the incremental out-of-state GHG emissions that occur only for the purpose of serving California load. This determination cannot be made by looking only at the final dispatch of resources, since this final dispatch reflects the optimal dispatch that jointly serves load in the entire regional market footprint, both within and outside of California. To properly identify the out-of-state GHG emissions associated with serving California load, the final dispatch of out-of-state resources must be compared to the dispatch of those resources that would have occurred if they were used only to serve load in the market region outside of California. This permits the tracking of the additional output (and GHG emissions) from out-of-state resources specifically due to serving California load. Powerex believes such an approach, while technically complex in some regards, can yield the maximum economic benefits from efficient dispatch as well as the maximum environmental benefits from ensuring the dispatch properly considers GHG emissions.

1. Overview of two-pass approach

Powerex suggests that CAISO, CARB and stakeholders consider a two-pass approach to identify the dispatch of out-of-state resources used to serve California load.

- In Pass 1 ("counterfactual baseline") out-of-state resources are dispatched only to serve load outside of California.

- In Pass 2 (the binding market run) all resources in the market footprint may be dispatched to serve load anywhere in the market footprint.

Pass 1 would use the same security-constrained economic dispatch model used for the binding market run, with one important difference. Namely, in Pass 1, load in the market footprint would be split into two sub-regions: a “California zone” and a “non-California zone.” Load in the “California zone” would be required to be met only through the dispatch of “California resources.” This would be achieved by adding a constraint to Pass 1 that the volume of “California resources” dispatched must be at least equal to the “California zone” load.

To ensure that Pass 1 does not artificially restrict the resources available to serve California load (or lead to infeasible outcomes), “California resources” would include generation resources physically located within the state as well as any physical resources outside of California that are already committed to serve California load under a Resource Adequacy contract with a California load-serving entity.³ GHG emission costs would be included for all “California resources,” either implicitly (in the bid price of in-state generation), or explicitly as a GHG adder for “California resources” physically located outside the state. Conversely, GHG emission costs would be excluded from the Pass 1 optimization for all resources that are not “California resources.”

The results of Pass 1 therefore establish a “counterfactual baseline” scenario representing the level of output (and GHG emissions) for out-of-state resources that would occur if these resources were only used to serve load *outside* of California.

In the binding market run, the “California zone” and “non-California zone” are eliminated, and the associated constraint is removed. If an out-of-state resource is dispatched above its output level in the “counterfactual baseline” scenario, it would generally indicate that the additional output is the result of serving load in California. Therefore, the GHG adder would apply to this additional out-of-state output. This ensures that the market dispatch includes the GHG-related costs of out-of-state resources when using that resource to serve California load. An out-of-state resource would also incur a CARB reporting and compliance obligation for the additional output above the baseline counterfactual output, as this additional output would represent an import serving California load.⁴

The same principles could be applied to imports offered at scheduling points at the boundary of the regional market footprint. Such imports would generally not be included as “California resources.”⁵ Hence, in the counterfactual baseline scenario (Pass 1), imports would only be used to serve load in the “non-California zone.” In the binding market run (Pass 2) import quantities that are dispatched in excess of the counterfactual baseline quantity would generally

³ If a feasible solution cannot be found even after including the above categories of out-of-state resources, this should raise questions about whether the Resource Adequacy requirements actually ensure that California load can be met with a high degree of confidence.

⁴ To the extent an out-of-state resource with an RA contract is dispatched in the baseline scenario, this dispatch would also incur a CARB reporting and compliance obligation. This is because out-of-state RA capacity is treated as a “California resource” in the baseline pass.

⁵ An import could be a “California resource” if it was associated with a physical resource located outside the regional market footprint that was under a Resource Adequacy contract with a California load-serving entity.

indicate that the import served load in California, and hence would incur a CARB reporting and compliance obligation.⁶

2. Key benefits of the proposed two-pass approach

The major benefit of this approach is that it offers an objective framework for identifying the resource-specific, out-of-state GHG emissions associated with serving California load. This approach would replace the current framework for scheduling energy transfers within the organized market footprint, eliminating the scheduling decisions required under that approach. As a result, the effectiveness of CARB's GHG regulations could be significantly improved as a result of a regional organized market.

An important feature of this approach is that it would use the same full network model and optimization algorithms for both the counterfactual baseline and binding market run, with the exception of the additional constraint discussed above. This would ensure that the identification of out-of-state resources that serve California load accurately reflects actual resource dispatch, as limited by the pertinent transmission and other network constraints. In other words, the GHG reporting would be consistent with the actual physical performance of out-of-state resources and with the grid's actual ability to deliver the output of those resources to serve California load.

This approach would also accommodate out-of-state resources that wish to avoid incurring any CARB reporting and compliance obligation. Each out-of-state resource will be able to elect how much, if any, of its capacity can be dispatched to serve California load. For resources that do not agree to serve California load at all, their dispatch in the binding market run will generally be limited to the output in the baseline run. Resources could also limit the quantity of output that serves California load, which would generally limit the amount by which the dispatch in the binding run can exceed the dispatch in the counterfactual baseline scenario. This design follows the opt-out functionality required by FERC in the current EIM design. It should also allay any concerns that participation in a regional organized market would impose CARB's authority outside of California.

3. Scalability to multiple state GHG programs

The Issue Paper identified the potential development of GHG programs in other states as an issue to be considered in a regional market design. Powerex believes a two-pass solution can accommodate multiple state-level GHG programs, in two key ways. First, the sub-regions used in the counterfactual baseline scenario can be re-defined over time. The general concept is to group states with functionally similar GHG programs. For example, to the extent multiple states reciprocally recognize their GHG programs as functionally similar, and agree to exempt imports from each other from GHG regulations that would otherwise apply, then these states could be merged into a single sub-region in the baseline scenario. The constraint in the baseline scenario would then require that total generation in the new sub-region (including external Resource Adequacy resources relied upon to serve load in the new sub-region) must be greater

⁶ This approach would apply even to scheduling points located in California, since the location of the scheduling point does not establish whether the energy serves load in California, or whether the energy is transmitted across the CAISO grid to serve load outside of California.

than or equal to load in the new sub-region. GHG adders would be similarly applied to the incremental dispatches of resources located outside the new sub-region above the baseline scenario.

Second, the GHG adder will continue to offer a way for resources to reflect their additional GHG compliance costs depending on the state to which their output is being delivered. The GHG adder should be able to reflect agreements between states that provide a reduction to the CARB GHG compliance obligation in recognition of GHG regulations within the resource's "home" state. For example, if another state adopted a carbon tax framework for electricity production within its state, and California agreed to recognize these costs when the output from these resources was delivered to California, the GHG adder for these resources could be reduced to reflect the carbon tax incurred by the resource. It will be up to CARB and the respective agencies in other jurisdictions to develop such a framework, but once in place, Powerex believes it would be feasible for resources to reflect these provisions in their California-specific GHG adders.

4. Next steps

Powerex believes the above approach would accurately and objectively identify the change in out-of-state dispatch—and in out-of-state GHG emissions—that occurs specifically to meet California load. It also avoids jurisdictional concerns, as out-of-state resources could opt to be dispatched only to serve non-California load, and hence avoid CARB reporting and compliance requirements. In Powerex's view, these substantial potential benefits warrant further exploration of this proposal.

Powerex recognizes, however, that significant effort will be necessary to fully explore the feasibility and performance of this type of approach. The conceptual description above will need to be translated into formal mathematical constraints, and multiple alternative specifications may exist. Each of these potential formulations will need to be tested, not only against simple illustrative scenarios, but against real-world test cases that include interactions with transmission constraints, ramping constraints, and other factors.

Powerex believes that a full assessment of potential solutions may best be pursued through CAISO technical stakeholder discussions. These discussions would also provide an important opportunity for stakeholders to understand the GHG framework being developed and alert CAISO to ramifications that may need to be addressed. Finally, Powerex believes it will be critical for CARB to participate in these discussions, since ultimately CARB must be satisfied that the GHG framework is consistent with its GHG regulations and with its environmental policy objectives.

B. Alternative: Apply Hurdle Rates Based on Average GHG Emissions

If CAISO determines that the above proposal is not technically feasible, or would not perform as expected, then alternative approaches should be considered. Powerex has not, at this time, identified any other approach that accurately applies a resource-specific GHG emission rate for dispatch that serves California load. Instead, hurdle rates based on the average GHG emission rates of non-California resources could be applied to net imports of energy into California. For

instance, imports from PacifiCorp's generation resources to serve California load would incur a hurdle rate based on the average GHG emission rate of PacifiCorp's available resources. This hurdle rate would be reflected in the difference in locational marginal price between the current CAISO sub-region and the PacifiCorp sub-region. This price difference will result in the market operator collecting sufficient surplus revenues to cover the cost of the CARB compliance obligation for the imports.⁷

The same hurdle rate would apply regardless of which individual PacifiCorp resource is actually dispatched, and hence this approach would not fully distinguish between PacifiCorp resources with different GHG emission rates. This would understate actual PacifiCorp GHG emissions in some cases, and overstate them in others. However, there should be no systematic errors in either the dispatch or the GHG reporting under this approach. Consequently, such an approach would limit the potential for "leakage," which arises if the GHG emissions of out-of-state resources are systematically understated or ignored.

A different hurdle rate could be calculated for each market entity (e.g., for PacifiCorp's generation, for individual IPPs in the PacifiCorp service territory, and for future participants that join as the regional footprint expands). The key challenge will be to ensure that the determination of how much of the imports serving load in California came from which entity provides a reasonable approximation of GHG emissions associated with serving California load. One relatively simple approach would be to allocate imports into California *pro rata* to all non-California generation (excluding entities that opt out of serving California load). This approach avoids the potential problems of "secondary dispatch" discussed in the EIM context, while not requiring the more complex two-pass counterfactual baseline approach discussed above.

C. The Current EIM Algorithm Should Not be Extended to the Regional Market

Powerex strongly opposes designing a regional organized market that uses the algorithmic approach currently applied in the EIM. The initial EIM algorithm has had the unintended effect of treating GHG emissions as primarily an accounting exercise, through a least-cost objective function that minimizes the application of CARB's regulations to emitting resources. Under the current EIM algorithmic approach, the determination of which resources are "deemed delivered" to California currently is divorced from the incremental dispatch of those resources, as well as from the ability of the output of those resources to actually be delivered to California. In short, the current EIM approach is predicated on preferentially "deeming" low-emitting resources to serve California load.

While the existing EIM approach has raised concerns, its practical consequences are ultimately limited by the relative volume of California imports that occur in that market. The environmental consequences of a similar approach would be far higher in a regional organized market, which would involve much greater quantities of imports into California and the entire output of all resources located in the footprint. Under such an approach, every zero-emitting or low-emitting

⁷ The question of which particular entity would be required to report and comply with CARB's GHG regulations does not alter this approach, as long as the entity assigned the liability is also the entity that receives the revenues collected from applying the hurdle rate.

resource in the footprint could be “deemed” to serve CAISO load, and indeed the total capacity of clean resources may even exceed imports serving load in California. This would give the appearance that all imports serving load in California are GHG-free, even if the actual dispatch of out-of-state resources entails significant increases in GHG emissions. Just as important, the artificial “glut” of clean out-of-state resources would eliminate any of the intended economic incentives to encourage development and use of clean resources to serve California load. Powerex believes that pursuing a regional market design in this manner would effectively dismantle CARB’s GHG regulations for imports serving load in California, and would put regional market expansion in conflict with California’s environmental policy goals.

IV. Conclusion

The development of a regional organized market, and its potential economic benefits, must not be achieved in a manner that compromises the integrity of California’s Cap and Trade program, including the accurate tracking and reporting of GHG emissions. To the contrary, Powerex believes that the development of a regional organized market in the west actually presents an important opportunity to improve how GHG emissions are currently tracked for imports that serve load in California. A regional market would replace the existing scheduling and e-Tagging process within the market footprint. By developing an accurate, objective and non-discretionary framework to identify the out-of-state GHG emissions specifically associated with serving California load, a regional organized market can fully support California’s environmental policy objectives.

Powerex has outlined an approach that uses the regional market’s security-constrained economic dispatch to establish a baseline level of dispatch for out-of-state resources serving only non-California load. In the subsequent binding market run, out-of-state resources can elect to increase their output above the baseline level in order to serve California load. Out-of-state resource dispatch in excess of the baseline level is accurately identified as supporting an import serving load in California, and incurs a CARB reporting and compliance obligation.

Implementing such a solution as part of a regional organized market would represent a significant improvement in the effectiveness of CARB’s programs in reducing emissions associated with California’s electricity sector. The significant potential benefits of this approach appear to warrant further examination of the technical feasibility and performance of the solution outlined above. Powerex looks forward to opportunities to continue to explore this issue with CAISO, CARB and other stakeholders.