

**Comments of Powerex Corp. on
EIM Greenhouse Gas Enhancements
Second Revised Draft Final Proposal**

Submitted by	Company	Date Submitted
Mike Benn 604.891.6074	Powerex Corp.	March 1, 2018

I. Introduction

Powerex appreciates the opportunity to submit comments on CAISO’s February 16, 2018 EIM Greenhouse Gas (“GHG”) Enhancements Second Revised Draft Final Proposal (“Proposal”). The Proposal consists of two principal features:

1. A limitation on the GHG bid quantity that can be offered by a participating resource; and
2. The application of a “residual rate” to the GHG bid price.

The Proposal marks a significant change from the prior proposal issued in this proceeding in June 2017, which focused on a “two-pass” solution to identify external resources serving CAISO load by comparison to a counterfactual solution with no EIM transfers into the CAISO balancing authority area (“BAA”).¹ Consequently, previous stakeholder discussion and comments have not focused on the specific proposal that CAISO now seeks to pursue. While Powerex is supportive of exploring new potential approaches, the abbreviated time available for this round of comments appears insufficient to permit stakeholders sufficient opportunity to understand and provide detailed feedback on this proposal. For this reason, Powerex provides these initial comments, but requests that CAISO accept supplemental comments beyond the March 1 deadline.

As explained more fully below:

- Powerex fully supports limiting the GHG bid quantity that can be attributed to each external resource to the economic “headroom” above the base schedule quantity. This limitation reduces the opportunity for the output of external resources that has already been committed to serve load outside of the CAISO BAA to be inaccurately deemed by the EIM algorithm as serving load within the CAISO BAA.
- While Powerex expects that the GHG bid quantity limitation will improve the accuracy of GHG attribution in the EIM, there will remain opportunities for material misattribution of resources serving CAISO load. Powerex believes that this issue should be addressed and that the use of the GHG bid price to address residual misattribution may be workable in the EIM. However, Powerex strongly disagrees with the specific details of

¹ See Cal. Indep. Sys. Operator Corp., EIM Greenhouse Gas Enhancement Revised Draft Final Proposal (June 23, 2017), available at: <http://www.caiso.com/Documents/RevisedDraftFinalProposal-EnergyImbalanceMarketGreenhouseGasEnhancements.pdf>.

the approach described in the Proposal, which would inaccurately place the burden of the residual inaccuracy in the EIM algorithm's GHG attribution disproportionately on external non-emitting resources. Specifically, the proposed approach would apply the residual inaccuracy exclusively to external non-emitting resources, failing to assign any of the residual inaccuracy to gas or coal generation. This reflects that it is expected that the Proposal's residual rate GHG bid "floor" will be above the resource-specific emission rate of \$0 for non-emitting resources but almost certainly below the resource-specific emission rate for gas and coal generation. In effect, the GHG bid "floor" would act as a GHG bid "addier," exclusively applied to non-emitting resources. This would occur even though there are clearly many hours when coal and gas resources increase their output, and gas generation is the marginal deemed resource. As a result, the Proposal would continue to permit higher-emitting coal and gas resources to increase their output to serve California load, but with lower-emitting gas resources inaccurately being deemed delivered, and the residual emissions associated with this activity applied as an adder to non-emitting resources. This is inaccurate, inequitable, will distort market dispatches and prices, and—perhaps most importantly—will discourage EIM participation by the very resources most able to help reduce the GHG emissions associated with serving California load.

- Powerex believes a more effective way of addressing residual emissions is to apply an "addier" to the GHG bid of each participating resource, including both non-emitting and emitting resources (as opposed to setting a "floor" price that has the practical effect of applying an addier to non-emitting resources only).
- Powerex believes the addier should be weighted by a multiplier, further discussed herein, to reflect the extent to which a resource's GHG attribution in each interval may be inaccurate (*i.e.*, reflecting an inaccurate re-allocation of its base scheduled output to serve California load, as opposed to a correct allocation associated with increasing its physical output in the EIM).
- Powerex objects to the inclusion of the concept of "California supply" in the revised approach. This concept originated in the context of the two-pass solution, to avoid outcomes where external renewable resources developed to serve California loads might systematically be treated as serving non-California loads. With the decision to not pursue the two-pass approach, that concern no longer exists. Using "California supply" to exempt certain external resources from the residual pricing addier would result in discriminatory treatment of those resources in the EIM dispatch and settlement, and provides those resources with preferential access to transmission made available to the EIM by other entities. As proposed, "California supply" is simply a penalty on external suppliers that do not enter into contracts with California LSEs. Powerex believes this aspect of the Proposal must be eliminated.

Powerex believes that the aspects of the Proposal related to applying a residual rate to GHG bids would greatly benefit from additional stakeholder engagement and discussion. As pointed out by CAISO, there are also important interdependencies between the residual rate design to be implemented by CAISO, and changes to CARB's GHG cap-and-trade program. Both of

these factors indicate that additional time may be necessary and beneficial prior to finalizing the residual rate aspects of the Proposal.

However, Powerex believes the Proposal's limitation on GHG offer quantities can be finalized and implemented without further delay, and can begin to yield immediate improvements to the accuracy of the EIM algorithm's GHG attribution. ***Powerex therefore recommends that CAISO “de-link” the implementation of these two elements of the Proposal, pursuing immediate implementation of the GHG bid quantity limitation, with finalization and implementation of the GHG pricing enhancements to follow.***

II. Overview Of The Challenge

The accurate and appropriate application of California's GHG program to the Western EIM has proven to be challenging. These challenges largely arise from the need to include GHG costs in the dispatch, pricing and settlement of energy that serves California load in the EIM, while simultaneously not including GHG costs in the dispatch, pricing and settlement of energy that serves load outside of California. These needs must be met in the context of a multi-state organized market, where there generally is no clear, identifiable link between the specific resources that are dispatched to serve specific loads both within, and outside of, California.

Unfortunately, the Western EIM has failed to meet the latter of these two objectives since its inception in 2014, resulting in significant unintended consequences. As illustrated in prior comments by Powerex, and supported by presentations from both CAISO and Brattle Group on this topic, external coal and gas resources are regularly dispatched to serve California load in the EIM, with lower and non-emitting resources inaccurately deemed to be the sources of supply. This occurs even in circumstances where the resources “deemed delivered” to serve California load have not increased their output in the EIM at all. This has had numerous unintended and undesirable consequences, including increasing GHG emissions, understating the volume of GHG allowances that should appropriately be retired, causing “leakage” (as out-of-state, higher-emitting resources systematically displace in-state, lower-emitting resources), lowering real-time market prices and muting the critically important price signals intended from California's GHG program.

Before addressing the details of CAISO's specific proposals, Powerex believes it is important to identify the characteristics of an “ideal” solution to these challenges. Powerex believes this will assist with the evaluation of the CAISO's specific proposals, as well as modifications to these approaches. Ideally, application of California's GHG program to the Western EIM would:

- Not include GHG costs in the dispatch, pricing and settlement of external resource output that is dispatched in the EIM to serve load outside of California (**achieved today**)
- Enable all external resources that are “deemed delivered” to recover their GHG costs through payments received from CAISO at the GHG shadow price (**achieved today**)
- Result in the correct volume of GHG allowances surrendered to CARB (**currently not achieved**)

- Include the specific GHG costs of GHG-emitting external resources that increase their output in the EIM to serve California load in EIM dispatch decisions (**currently not achieved**)
- Include the specific GHG costs of GHG-emitting external resources that increase their output in the EIM to serve California load in real-time market prices in California, and in the GHG shadow price (**currently not achieved**)
- Increase the settlement price charged to California load by the full GHG costs of marginal GHG-emitting external resources that increase their output to serve California load (**currently not achieved**)
- Create accurate prices signals, and economic benefits, for lower and non-emitting resources that are dispatched in the EIM to serve California load (**currently not achieved**)

Although Powerex believes each of these objectives may not be fully achievable in each interval, at least in the near-term, it does believe that improvements are possible to ensure that each of these objectives is either met in each interval or met “on average” over time.

Finally, Powerex believes that it is important to recognize that improved application of California’s GHG program to the EIM may adversely impact some market participants participating in the CAISO’s real-time markets, relative to the status quo. Specifically, improved application can be expected to significantly reduce the opportunities to sell the output of external GHG-emitting gas and coal resources to California load through EIM Transfers, while also reducing the revenues received when these GHG-emitting resources are deployed to serve California load. At the same time, improved application can be expected to increase market prices in California (as well as the average GHG shadow price) which will raise the costs of serving California load. However, it is critical to recognize that such outcomes are appropriately viewed as necessary consequences of the proper application of California’s GHG program to the Western EIM and, hence, are not valid reasons to oppose enhancements that bring the EIM closer to achieving these objectives.

III. Powerex Supports The Proposal’s Limitation on GHG Bid Quantity

The Proposal would introduce a limitation on the GHG bid quantity (in MW) that an EIM participating resource may submit. Currently, participants may submit any GHG bid quantity they choose between 0 MW and the upper economic limit of the resource’s offer range. The Proposal would limit the GHG bid quantity to not exceed a resource’s available “headroom” above its base schedule. That is, the GHG bid quantity could not exceed the difference between the resource’s upper economic limit and its base schedule.²

Powerex strongly supports this limitation, as it directly addresses the primary mechanism through which the EIM algorithm inaccurately attributes GHG emissions to serve California load. More specifically, Powerex believes that misattribution of GHG emissions occurs primarily when an EIM participating resource is “deemed” to serve California load from output that was already

² Proposal at 5.

accounted for in the resource's base schedule (*i.e.*, it has already been designated to serve load outside the EIM).

For instance, a 100 MW non-emitting hydro resource located in the Northwest may submit a base schedule for its full 100 MW of capacity. That is, even prior to the EIM market run, that resource was scheduled to produce 100 MW, and this output was part of the resource plan that was balanced with forecasted load and non-EIM interchange transactions for that EIM entity. Stated differently, the entire output of the non-emitting hydro resource was already scheduled, and represented through the EIM's base schedules, to serve load *outside of the EIM*. But under the current EIM algorithm, the full 100 MW could be "deemed" to serve load in California through the EIM. Obviously, the same 100 MW of output cannot serve load both within California through the EIM, as well as load outside of California outside the EIM. As a practical matter, this means that, all else being equal, some *other* resource must be dispatched in the EIM to provide the additional output to serve load in California. This scenario—in which EIM transfers to serve California load require the dispatch of one resource, but the EIM algorithm attributes the import to a different resource—is what is often referred to by CAISO as "secondary dispatch." By attributing the import serving California load to the "wrong" resource, the EIM algorithm reaches an inaccurate conclusion regarding the GHG emissions associated with serving California load. It is this misattribution that results in the multitude of distortions described above.

The Proposal would eliminate the opportunity for "secondary dispatch" in this example. The resource's GHG bid quantity would be capped at the difference between its upper economic limit (*i.e.*, 100 MW in this example) and the resource's output in its base schedule (*i.e.*, also 100 MW in this case), resulting in a GHG bid quantity of 0 MW for the resource in this example.

At the other end of the range, the base scheduled output for this same 100 MW non-emitting resource might be 0 MW. In that case, the Proposal would permit the GHG bid quantity for the resource to be up to 100 MW, which is equal to the difference between the upper economic limit of 100 MW and the base scheduled output of 0 MW. This scenario illustrates a case where the resource simply cannot contribute to secondary dispatch, since every MW of GHG attributed to it must reflect incremental output dispatched in the EIM.³

In Powerex's view, the Proposal works appropriately in these two examples: output from resources that are fully base scheduled prior to EIM operations will not be eligible to be deemed delivered to California, while continuing to permit output from resources that have not been base scheduled to be attributed to serving California load in the EIM.

Powerex notes that, while the Proposal's approach is simple to implement and appears to substantially reduce opportunities for "secondary dispatch," it is not a perfect solution. Given the extensive and prolonged process that has preceded the Proposal—during which more accurate solutions were pursued but ultimately found to be unworkable—this should not be seen

³ The EIM algorithm currently limits the GHG quantity that can be attributed to a resource to no greater than its actual production.

as a flaw, but rather merely a limitation. ***Powerex therefore strongly supports implementation of the GHG bid quantity limitation as soon as possible.***

As discussed in the next section, opportunities for “secondary dispatch” will continue to exist, and must also be addressed as part of CAISO’s GHG enhancements. The precise manner in which this should be accomplished is less clear and more complex. Moreover, a final design will require coordination with, and approval from, CARB, who will likely need to modify its regulations. Powerex sees no reason to delay the significant improvements that can be achieved through the GHG bid quantity limitation by unnecessarily linking implementation of that limitation to other enhancements, however. The effectiveness of the GHG bid quantity limitation is not contingent upon implementation of other aspects of the Proposal, and hence Powerex recommends that CAISO pursue its implementation on an expedited and independent timetable.

IV. Powerex Believes The Proposal’s Residual GHG Pricing Design Is Flawed And Problematic, But A Workable And More Efficient Design Is Available

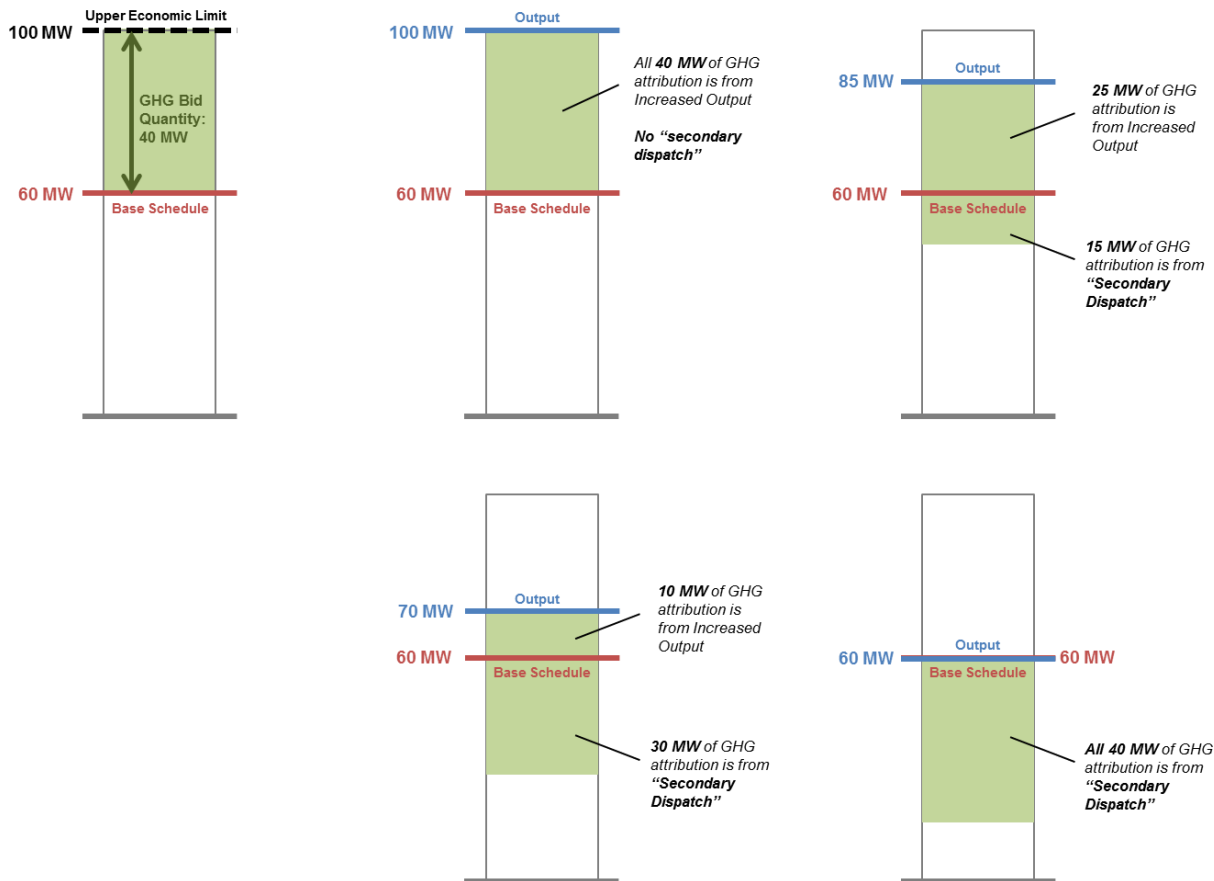
A. Opportunities for “secondary dispatch” will remain, and must also be addressed

The implementation of the GHG bid quantity limitation, discussed above, will significantly reduce opportunities for “secondary dispatch,” but it will not eliminate them. These remaining opportunities are evident when considering a resource with base scheduled output that is neither zero nor at its upper economic limit, but at some value in between these bookends.

Consider the same 100 MW non-emitting hydro resource used in the preceding examples. If the base scheduled output is 60 MW, the resource will be able to submit a GHG bid quantity of up to 40 MW (*i.e.*, the difference between the upper economic limit of 100 MW and the base scheduled output of 60 MW). If the EIM dispatches the resource fully up to 100 MW, then the full amount of the GHG bid quantity may, indeed, reflect the additional output of the resource (above its base scheduled amount) resulting from its participation in the EIM. That is, “secondary dispatch” is not a concern if the resource’s incremental dispatch in the EIM is equal to (or greater than) the amount deemed to serve California load in the EIM.

If the EIM dispatches this resource only up to, say, 85 MW, then the additional output above its base scheduled amount would only be 25 MW. But the resource could *still* be deemed to serve up to 40 MW of California load, even under the Proposal’s GHG bid quantity limitations. In this case, as much as 15 MW of the 40 MW deemed to serve California load in the EIM would be output that was included in the resource’s base schedule. That is, up to 15 MW of the GHG attribution to this resource represents “secondary dispatch” for which the actual GHG emissions will not have been accurately identified by the EIM algorithm.

The figure below depicts these scenarios, and extends them to different levels of output following EIM operations. All cases assume a 100 MW non-emitting resource with a 60 MW base schedule, but with different levels of production as dispatched in the EIM.



As illustrated above, the amount of GHG attribution that represents “secondary dispatch” as opposed to an increase in output from the resource depends on the dispatch of the resource under the EIM optimization. The results of that optimization, of course, cannot be known prior to the CAISO actually running the EIM. In other words, there is no way to know in advance whether GHG attributed to a resource that has base scheduled a portion of its potential output will represent additional production in the EIM, “secondary dispatch,” or a combination of the two.⁴

At this time, the magnitude of residual potential for “secondary dispatch” and its impact on GHG attribution accuracy in the EIM is not known. And even if data analysis were available, it would reflect the current EIM rules rather than the proposed enhancements. Powerex does believe, however, that this “secondary dispatch” will likely be substantial, as many resources are often base scheduled between 0 MW and their maximum output. It is thus appropriate and necessary to develop a framework to measure GHG emissions in the EIM that are not accurately attributed as a result of residual “secondary dispatch,” and to account for those emissions in the EIM. This is necessary in order to:

⁴ Conceptually, it may be appropriate for the EIM optimization to constrain GHG attribution as a function of incremental dispatch above a resource’s base schedule. It is unclear whether this would introduce computational challenges, however, and any changes to the EIM optimization algorithm (as opposed to enhancements that only affect inputs) would inevitably take longer to implement. For these reasons, Powerex supports initially focusing on efforts to improve GHG attribution accuracy without changing the EIM optimization itself. Powerex recommends, however, considering more fundamental enhancements at a future date.

1. ensure that the appropriate quantity of GHG allowances are retired for external resources serving California load through the EIM;
2. reduce “leakage” that could otherwise occur if the GHG emissions to serve California load with external resources are understated; and
3. improve the accuracy of dispatch and pricing decisions in the EIM, at least on average over time.

B. The Proposal’s “Residual Rate” Design Is Flawed and Problematic

The second part of the Proposal would affect the GHG bid price that market participants submit, an implicit recognition that the Proposal’s limit on GHG bid quantity will not, on its own, be sufficient to address concerns related to “secondary dispatch.” More specifically, the Proposal would define a “floor” on the GHG bid price that can be submitted for each resource, which would be based on an estimated GHG emission rate for secondary emissions. The Proposal also envisions that scheduling coordinators for resources that are deemed to serve California load will be required to surrender GHG allowances based on the “secondary emission rate.”

Powerex sees merit in the concept of incorporating an estimate of GHG emissions associated with “secondary dispatch” in the GHG bid price of participating resources, but disagrees with the Proposal’s “floor” approach. In particular, the “floor” price would, in practice, apply exclusively to non-emitting resources, since the resource-specific GHG emissions rates of natural gas and coal generation would generally be above the proposed secondary emission floor rate.⁵ The result is likely to be that GHG emissions associated with “secondary dispatch”:

- would only be reflected in the GHG shadow price when the marginal deemed resource is a non-emitting resource; and
- would result in additional GHG allowances being required only from non-emitting resources.

This is problematic for several reasons. Perhaps this is most evident by considering the circumstances when the marginal deemed resource is a natural gas-fired resource, but the resources that increase production in the EIM are external coal resources. Under the Proposal, the GHG price would continue to reflect only the resource-specific rate of the (inaccurately) deemed natural gas-fired resource, and the emissions from “secondary dispatch” of the coal resources would be ignored. In other words, the Proposal’s “floor” approach would do nothing to address instances in which imports to California result in the dispatch of external coal resources, but these imports are nevertheless deemed by the EIM algorithm to be sourced from natural gas-fired external resources. Prior analyses by the CAISO and by The Brattle Group, as well as data presented by Powerex, confirm that EIM transfers to serve California load have, in

⁵ Proposal at 6-7 (explaining that the secondary emission rate, while ultimately defined by CARB, is expected by CAISO to be no higher than the rate for unspecified source imports (*i.e.*, 0.428 mTCO₂/MWh)). By comparison, 2016 data from the U.S. Energy Information Administration indicates that California natural gas generators produce 0.460 mTCO₂/MWh, and Utah coal-fired generators produce 0.942 mTCO₂/MWh. See <https://www.eia.gov/electricity/state/> for state-level information; total output and emissions by fuel source can be found in the source data tables for each state.

fact, led to increased production—and GHG emissions—from external coal resources, even though California load has almost never been deemed to be served by external coal resources. The Proposal’s “floor” approach would be entirely ineffective in addressing this issue.

The Proposal creates numerous problems in terms of efficiency, equity, and incentives to participate in the EIM.

1. **“Leakage” would not be addressed** during intervals that the GHG shadow price is set by natural gas-fired resources, to which the price “floor” design would rarely, if ever, apply. Since the GHG shadow price in these intervals is *not* set by non-emitting resources,⁶ this means that the Proposal will be minimally effective in reducing “leakage” in these circumstances, and in-state resources will continue to be inefficiently displaced by excess imports from GHG-emitting external resources in the EIM.
2. **The cost of “secondary dispatch” will fall almost entirely on external non-emitting resources.** In most intervals with EIM transfers serving California load, the GHG shadow price is set by emitting resources (while both non-emitting and emitting resources are deemed delivered to serve California load). Thus the net effect of the price “floor” will likely be to increase the cost of GHG compliance obligations for all non-emitting resources deemed delivered (by increasing the GHG allowance obligations for these resources), but without increasing their GHG revenues (since in the majority of intervals the GHG shadow price is set by emitting resources as the marginal resource, which will be unaffected by the “floor”). Thus the cost of “secondary dispatch” in the EIM—and specifically the cost of procuring and surrendering the GHG allowances to account for that “secondary dispatch”—will fall almost entirely on external non-emitting resources.

External natural gas-fired resources and external coal-fired resources will continue to benefit from increased sales opportunities in the EIM—including to serve California load, but with lower-emitting resources inaccurately deemed delivered—while incurring no increase in their GHG allowance costs. And California loads served in the EIM will also largely avoid bearing the cost of GHG emissions, as prices in the EIM will continue to be suppressed, despite a CARB program developed for the specific purpose of reflecting GHG costs in the price of electricity used to serve California load.

3. **The Proposal’s carve-out for “California supply” compounds the patently inequitable allocation of the cost of “secondary emissions.”** “California supply” would ensure that external non-emitting resources under contract to California LSEs would be shielded from bearing any of the cost of “secondary emissions.” Powerex’s objection to the “California supply” proposal is discussed more fully in Section 5, below.
4. **Non-emitting resources will be discouraged from participating in the EIM.** As a result of the Proposal’s attempt to allocate the bulk of the costs of “secondary emissions”

⁶ 2017 data on the RTD GHG shadow prices during intervals with net EIM transfers into the CAISO BAA show that the shadow price was non-zero in most such intervals, and the majority of the volume of such transfers occurred when the GHG shadow price was less than $-\$5/\text{MWh}$.

to external non-emitting resources, implementing the Proposal can be expected to discourage participation in the EIM by non-emitting resources. This is a perverse incentive, since these are the precise resources whose EIM participation can actually help *reduce* the GHG emissions associated with serving California load.

These problems make the Proposal's GHG bid price "floor" design both ineffective at addressing the current EIM GHG challenges and potentially counterproductive to the growth of the EIM. Moreover, these problems would be greatly magnified if, as the Proposal anticipates, CAISO applies them to the proposed design of an Extended Day-Ahead Market ("EDAM").

Finally, the Proposal includes a table illustrating how the "floor" would apply to a range of different types of EIM participating resources.⁷ Among the resource types listed are "Asset Controlling Suppliers" ("ACS"). As CAISO is aware, there are three entities that have obtained ACS status from CARB; only one of them—Powerex—has pursued participating in the EIM. However, consistent with the resource-specific design of the EIM, Powerex's EIM participation will be supported by capability of specific hydro resources, and not by the entire capability of a system of resources, which is the basis of the ACS framework. For this reason, the insertion of ACS in the Proposal has no application to any entity and should be removed. Indeed, the entire table is superfluous, as it merely indicates that, under the Proposal, all participating resources would be required to submit a GHG bid price equal to the greater of the resource-specific rate and the secondary emission rate.

C. Powerex Proposes a GHG Bid Price "Adder" That Reflects A Resource's Potential To Contribute To "Secondary Dispatch"

An improved design for applying a residual emission rate to resources' GHG bid prices must address the principal shortcomings of the Proposal's design. As an initial matter, it must recognize that the potential for "secondary emissions" exists in *any* interval that EIM transfers serve California load. This argues in favor of the application of a residual rate as an "adder" to GHG bid prices that applies to all resource types, as opposed to a "floor" that only applies to non- or low-emitting resources. By applying a residual rate "adder" to all resource types, the circumstances of external coal resources being dispatched and natural gas resources being deemed delivered would appropriately be treated through the application of the "adder" to the GHG bid price of the natural gas resources. Moreover, the relative attractiveness of external resources with differing GHG emissions rates would be maintained in both the dispatch and pricing processes. For example, the GHG savings from producing electricity from a natural gas-fired resource rather than a coal-fired resource is approximately \$6.25/MWh⁸; this difference would be preserved in the GHG bid prices of these two resources under the Proposal. However, the GHG savings from producing electricity from a non-emitting hydro resource rather than from a natural gas-fired resource of approximately \$6/MWh would not be preserved; under the Proposal, the difference in the GHG bid prices of these two resources would be greatly reduced, by the application of the bid floor, as an effective adder applied exclusively to non-

⁷ Proposal at 9.

⁸ Based on a GHG emissions rate of 0.942 mTCO₂/MWh for a coal-fired resource and 0.460 mTCO₂/MWh for a natural gas-fired resource (see note 5 *supra*) and a GHG allowance cost of \$13/ mTCO₂.

emitting resources.⁹ It appears contrary to the very purpose of the cap-and-trade program—and of the development of the GHG bids in the EIM—for differences in GHG emissions to be masked in the selection of resources to be dispatched and in the prices established in the EIM when those resources are deployed.

Powerex also believes that the design must be enhanced by applying this “addor” to resource offers only in those circumstances that they can actually contribute to “secondary dispatch,” while reducing or avoiding application to resource offers in the circumstances that they cannot. For instance, a 100 MW resource with zero base scheduled output can only be deemed to serve California load to the extent it actually increases its output in the EIM. Since the core mechanism for “secondary dispatch” is based on designating base scheduled output as serving California load, a resource with no base scheduled output simply cannot cause or exacerbate “secondary dispatch” in that hour. It would be inefficient to apply a secondary emissions “floor” or “addor” to EIM offers from a resource in such circumstances, since doing so will overstate the GHG-related costs of dispatching the resource. Therefore, Powerex proposes that the application of a residual emission “addor” be scaled to reflect how much of a resource’s GHG bid quantity could be associated with base scheduled output (and hence contribute to “secondary dispatch”).

More specifically, Powerex proposes that CAISO calculate a secondary emission “addor” based on the methodology described below (after further discussion with stakeholders and CARB).

In each hour, this secondary emission rate will be added to the GHG bid price for each participating resource, scaled by a “secondary dispatch factor,” defined as:

$$SDF_i = \frac{\min(\text{GHG Bid Quantity}, \text{Base Schedule Quantity})}{\text{GHG Bid Quantity}}$$

The following examples illustrate the application of the Secondary Dispatch Factor in determining the GHG bid price for a resource. All examples assume a 100 MW resource, and a secondary emission rate calculated by CAISO of \$2/MWh.

Example 1: A 100 MW non-emitting resource with an output base schedule of 80 MW. In this case, the resource would have the following GHG bid components:

GHG bid quantity: 20 MW, based on the difference between the upper economic limit of 100 MW and base scheduled quantity of 80 MW.

GHG bid price: resource-specific emission rate + (Secondary Emission Rate) * (Secondary Dispatch Factor)

$$= \$0/\text{MWh} + \$2/\text{MWh} * [\min(20 \text{ MW}, 80 \text{ MW}) / 20 \text{ MW}]$$

⁹ For example, this difference could be less than 50 cents if the “floor” price is based on the unspecified source emission rate of 0.428 mTCO₂/MWh (and assuming a GHG emissions rate of 0.460 mTCO₂/MWh for natural gas-fired resource and a GHG allowance cost of \$13/mTCO₂).

$$= \$0/\text{MWh} + \$2/\text{MWh} * 1.0$$

$$= \$2/\text{MWh}$$

In this example, there is an opportunity for the entire amount of the resource's GHG bid quantity (and thus the entire amount of the resource's attributed GHG emissions) to reflect "secondary dispatch." This reflects that the resource may be attributed to serve up to 20 MW of California load, which is less than its base scheduled output of 80 MW. In other words, this resource may be "deemed delivered" to California load even if it does not increase its output in the EIM at all. For this reason, the full amount of the secondary emission rate is added to the resource's GHG bid price.

Example 2: A 100 MW non-emitting resource with an output base schedule of 0 MW.

GHG bid quantity: 100 MW, based on the difference between the upper economic limit of 100 MW and the base scheduled output of 0 MW.

GHG bid price: resource-specific emission rate + (Secondary Emission Rate) * (Secondary Dispatch Factor)

$$= \$0/\text{MWh} + \$2/\text{MWh} * [\min(100 \text{ MW}, 0 \text{ MW}) / 100 \text{ MW}]$$

$$= \$0/\text{MWh} + \$2/\text{MWh} * 0$$

$$= \$0/\text{MWh}$$

In this example, the resource has no output that is base scheduled. It can only be attributed to serve California load to the extent it actually increases its output above this base scheduled level in the EIM. Any GHG attribution to this resource will reflect actual production above base schedule, and not "secondary dispatch." Therefore, it is appropriate for this resource's GHG bid price to not include any of the secondary emission rate.

Example 3: A 100 MW non-emitting resource with an output base schedule of 40 MW.

GHG bid quantity: 60 MW, based on the difference between the upper economic limit of 100 MW and the base scheduled output of 40 MW.

GHG bid price: resource-specific emission rate + (Secondary Emission Rate) * (Secondary Dispatch Factor)

$$= \$0/\text{MWh} + \$2/\text{MWh} * [\min(60 \text{ MW}, 40 \text{ MW}) / 60 \text{ MW}]$$

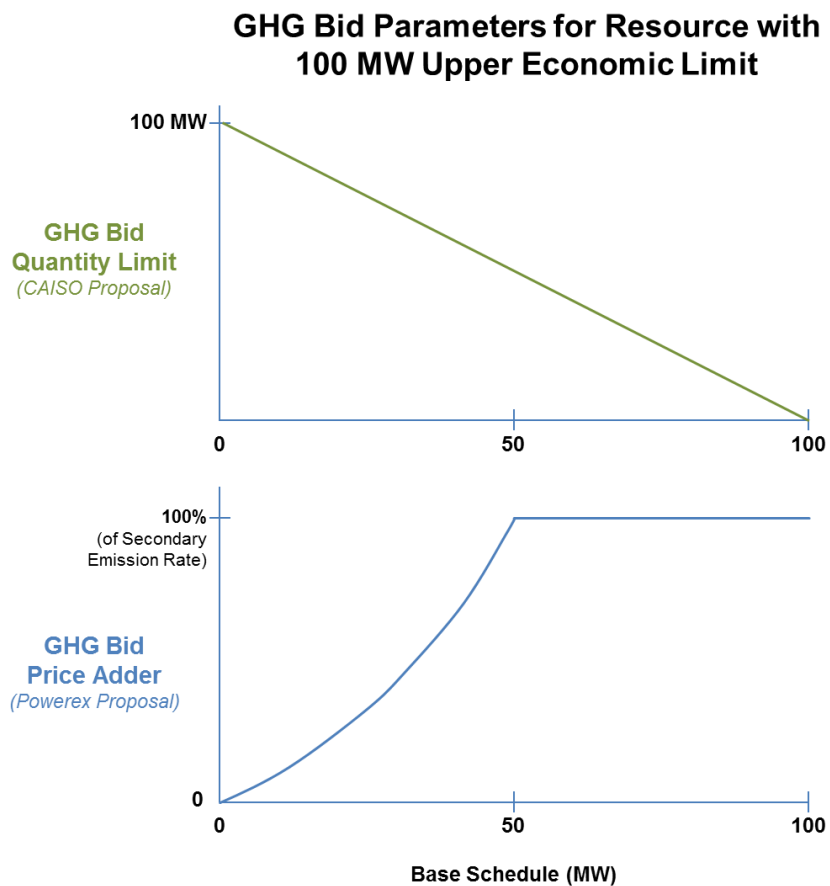
$$= \$0/\text{MWh} + \$2/\text{MWh} * 0.67$$

$$= \$1.33/\text{MWh}$$

In this example, the resource's 60 MW GHG bid quantity is greater than its 40 MW base scheduled output. That is, up to 40 MW of any GHG attribution could be due to "secondary dispatch," to which the secondary emission rate of \$2/MWh should apply. But it is unambiguous

that GHG attribution greater than 40 MW cannot be due to “secondary dispatch,” and applying the secondary emission rate would inefficiently overstate the cost of dispatching this resource to serve California load. For this reason, a weighted value of \$1.33/MWh is appropriate, reflecting the fact that GHG attributed to this resource may be due in part—but not entirely—to “secondary dispatch.”

The figure below shows, for a participating resource with a 100 MW upper economic limit, the relationships between its output base schedule and its GHG bid quantity (as per the Proposal) and its GHG bid price (as per Powerex’s proposal). Powerex notes that, since a resource’s output base schedule may be different from hour to hour, the calculation of the GHG bid quantity and GHG bid price may also be different from hour to hour.



Powerex believes that the above approach, consisting of an “adder” weighted by the potential for a resource to contribute to “secondary dispatch,” has numerous advantages over the approach set out in the Proposal approach. The table below compares the Proposal’s “floor” approach to two alternatives: an “adder” that applies to all resources, and an “adder” that is weighted by the Secondary Dispatch Factor described above.

Evaluation Criteria	Proposal “Floor”	Simple “Adder”	“Adder” Scaled by Secondary Dispatch Factor
Who is responsible for retiring additional GHG allowances associated with “secondary dispatch”?	External non-emitting resources	All resources that are “deemed delivered” (regardless of the resource type)	All resources that are “deemed delivered” (regardless of resource type)
Who bears the effective cost of retiring the additional amount of GHG allowances?	Primarily borne by external non-emitting resources, including for “secondary dispatch” involving only emitting resources	California load served by EIM transfers through more accurate real-time prices	California load served by EIM transfers during intervals of high “secondary dispatch”, through more accurate real-time prices
Accurately reflects differences in GHG emissions between external resources?	No. Inaccurately reduces the relative attractiveness of non-emitting external resources relative to emitting external resources	Yes	Yes, and also reflects differences in contribution to “secondary dispatch” challenges amongst resources each interval
Addresses “leakage”?	Only in the minority of intervals when non-emitting external resources are the marginal “deemed” resource	Yes, but “adder” does not adjust to reflect resources and intervals with little or no potential “secondary dispatch”	Yes, with “adder” adjusted to reflect potential for “secondary dispatch”
Encourages EIM participation by non-emitting and lower-emitting resources?	No, due to added cost burden of addressing “secondary dispatch” challenges associated with all resource types	Yes	Yes, and especially encourages participation by non-emitting resources that do not contribute to “secondary dispatch”
Workable framework for Enhanced Day Ahead Market?	No	Possibly, but may render EDAM less attractive than existing opportunities to offer day-ahead energy at CAISO interties (specified source)	Possibly

Powerex believes the above approach of an “adder” combined with a scaling factor is workable, more effective, and a significant improvement over the “floor” set out in the Proposal. Similar to the Proposal’s “floor” approach, this approach would result in an automated adjustment to each EIM participating resource’s GHG bid price, and hence would not require any modification to the EIM optimization algorithm. Importantly, however, the adjustment to GHG bid prices would reflect each resource’s potential in each hour to contribute to “secondary dispatch.” It would also apply this scaled “adder” to all of the offers of all resources, regardless of resource type, thus ensuring that all GHG attribution in the EIM contributes to addressing the challenge of “secondary dispatch.”

V. “California Supply” Is Unnecessary And Discriminatory, And Should Be Eliminated

The Proposal solicits stakeholder feedback on special provisions for the application of the GHG bid price for so-called “California supply.” The Proposal explains that “‘California Supply’ refers to resources outside the CAISO that have a contract with a load serving entity in the CAISO for serving CAISO load.”¹⁰

¹⁰ Proposal at 10.

Powerex notes that the concept of “California supply” is a vestige of the two-pass proposal, which is no longer being pursued. The concept was initially discussed in late 2016, following the Straw Proposal in this initiative. Specifically, “California supply” was proposed to address the scenario in which an external renewable resource under contract to a California LSE would submit an offer price of \$0/MWh and be fully scheduled under the first pass. As explained by CAISO, “[t]his would set the ‘GHG allocation base’ of the wind resource to its forecast, thus this resource cannot be incrementally dispatched” to serve California load in the second pass.

Since the two-pass optimization is no longer being pursued, the concern that led to the initial development of “California supply” no longer exists. The GHG bid quantity under the Proposal is no longer limited by the results of a first pass market optimization, but rather by base schedules, which are under the control of each resource’s scheduling coordinator.

The Proposal has re-purposed the concept of “California supply” in a manner that is highly preferential and discriminatory. Specifically, the Proposal would avoid applying its “floor” emission rate to external resources under contract with California LSEs. This means that, as proposed, resources that are under contract with a California LSE could be dispatched in the EIM ahead of resources that are not under contract with a California LSE. It is patently inefficient to distort the physical dispatch of resources based on irrelevant factors, including who the contractual counterparty to a financial arrangement might be. Furthermore, preferential dispatch of a resource implies preferential access to transmission made available to the EIM by other EIM participants. The foundation of the EIM’s transmission reciprocity framework is that participants contribute to increasing the transmission capability that can support EIM transactions because this will lead to more efficient utilization of that transmission capability and generate economic benefits for all participants. This foundation is undermined by a scheme that would take transmission made available for use in the EIM by the most efficient available resources and instead makes it available first to resources that have contracted with California LSEs.

The Proposal’s new use of the “California supply” concept also means that GHG attributed to resources under contract with a California LSE would avoid the cost of procuring additional GHG allowances associated with “secondary dispatch,” whereas resources that are not under contract with a California LSE would be required to bear to this cost. The Proposal contains no basis to conclude that resources under contract to California LSEs somehow avoid contributing to “secondary dispatch.” Many resources under contract to California LSEs are, in fact, base scheduled to serve load outside California, particularly in circumstances where neither the resource owner nor the California LSE has procured external transmission service to deliver the resource’s output to a CAISO intertie. These resources can contribute to “secondary dispatch” in the very same manner as resources that are not under contract to California LSEs.

To the extent there is a concern that renewable resources outside of California, but funded by California ratepayers, might not be recognized by the EIM algorithm as serving California load, there is already a mechanism in place to ensure California ratepayers receive the full benefit of the low or non-emitting resources they fund. Namely, this objective can be addressed through the existing “RPS adjustment” mechanism under CARB’s cap-and-trade regulations. Under the

RPS adjustment, any output from a renewable resource under contract to a California LSE that is not physically delivered into California entitles the California LSE to a credit that reduces its GHG liability. In other words, the benefits of contracting with low-GHG emitting resources outside of California are not “lost” if the output is not deemed delivered to California in the EIM.

Finally, Powerex notes that prior stakeholder discussions revealed a wide range of views on the appropriate eligibility requirements and verification process for “California supply.” These views ranged from recognizing only those projects that were built under a long-term contract to serve California load to proposals that would grant this “most favored” status as a result of a conventional short-term bilateral purchase.

Given the lack of a clearly articulated need for a “California supply” designation under the present proposal, the numerous concerns related to preferential and discriminatory treatment raised by the concept, and the additional burden of defining eligibility criteria and developing verification processes, Powerex sees no reason to retain this aspect of the Proposal. Nonetheless, if the CAISO continues to believe there is a need for an “exception” or “special treatment” for resources under limited circumstances, Powerex urges the CAISO to provide more details on why this is needed, demonstrate that the exception will not cause “secondary dispatch,” and to propose a framework that is not preferential or discriminatory.