BEVERIDGE & DIAMOND PC

Nicholas W. van Aelstyn
456 Montgomery Street, Suite 1800
San Francisco, CA 94104-1251
Direct: (415) 262-4008
Fax: (415) 262-4040
nvanaelstyn@bdlaw.com

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Via Electronic Submission

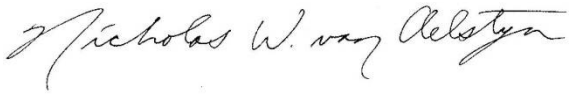
California Air Resources Board
1001 I Street
Sacramento, CA 95812

Re: Comments of Powerex Corp. on ARB's October 21 Stakeholder Workshop on Proposed Amendments to the Cap-and-Trade Regulation

Dear Air Resources Board Staff,

On behalf of Powerex Corp., I submit the attached comments on the California Air Resources Board's October 21, 2016 Stakeholder Workshop, specifically with respect to greenhouse gas emissions accounting in the Energy Imbalance Market. Powerex appreciates the continued dialogue that ARB staff has provided and looks forward to continued progress in resolving the current issues with the EIM.

Sincerely,



Nicholas W. van Aelstyn

Attachment

Comments of Powerex Corp. on October 21, 2016 Workshop Respecting Accounting for Greenhouse Gas (GHG) Emissions in the Energy Imbalance Market (EIM)

I. About Powerex

Powerex is a corporation organized under the *Business Corporations Act* of British Columbia, with its principal place of business in Vancouver, British Columbia, Canada. Powerex is the wholly-owned energy marketing subsidiary of the British Columbia Hydro and Power Authority ("BC Hydro"), a provincial Crown Corporation owned by the Government of British Columbia. Powerex sells wholesale power in the United States pursuant to market-based rate authority granted by the Federal Energy Regulatory Commission ("FERC") in September 1997, renewed most recently on August 29, 2014.

Powerex sells power from a portfolio of resources in the United States and Canada, including Canadian Entitlement resources made available under the Columbia River Treaty, BC Hydro system capability, and various other power resources acquired from other sellers within the United States and Canada. Powerex has been delivering power to California since shortly after receiving its market-based rate authorization and is currently registered with CARB as an Asset Controlling Supplier ("ACS").

II. Introduction

Powerex Corp. ("Powerex") submits the following comments on the California Air Resources Board's ("CARB's") October 21, 2016 Workshop Respecting Mandatory Greenhouse Gas ("GHG") Reporting and the Cap-and-Trade Program.[1] Powerex appreciates the significant time and effort that CARB staff is devoting to exploring solutions to address the existing disconnect between EIM GHG reporting and actual EIM dispatch of out-of-state resources to serve California load. Powerex believes that addressing the serious concerns raised by CARB staff regarding EIM GHG emissions is of significant importance to California's short-term and long-term GHG objectives.

When designing and implementing the EIM, CAISO modified its dispatch algorithm to provide a resource-specific assignment of responsibility for out-of-state generation (and associated GHG emissions) serving California load. Now, after two years of experience with the EIM, it has become clear that the existing approach is having serious unintended consequences and does not provide an accurate accounting of external GHG emissions associated with serving California load in the EIM. A review of the actual performance of the EIM demonstrates that the external resources "deemed delivered" to California through the EIM bear little relationship to the external resources actually dispatched to serve load within California.[2]

Powerex's comments address the three following positions:

1. There are alternative conceptual approaches—including the "incremental deeming option" discussed at the October 21 workshop—that appear to accurately identify the specific out-of-state resources that serve California load in the EIM. Powerex strongly supports CAISO, CARB and

[1] CARB presentation, *Mandatory GHG Reporting and Cap-and-Trade Program Workshop: Energy Imbalance Market (EIM)* (Oct. 21, 2016) ("CARB October 21 Presentation").

[2] For a full discussion of the existing disconnect between the resources "deemed delivered" to California and those actually serving load in California, *see* Comments of Powerex Corp. on the Proposed Amendments to Cap-and-Trade Regulations at 6-9 (Sept. 9, 2016) ("Powerex September 9 Comments").

stakeholders continuing to work to develop such an approach, as it appropriately incorporates the cost of GHG emissions in the dispatch of out-of-state resources when those resources are used to serve California load. Powerex also believes that such an approach, once developed and implemented, would satisfy the requirements for specified source reporting.

2. While the "incremental deeming approach" appears to fully achieve both CAISO's efficient economic dispatch objectives as well as CARB's GHG policy objectives, it is unclear whether such an approach is technically feasible at this time due to the increased computing time that would be required. Therefore, as an interim measure, Powerex supports the use of a hurdle rate applied to all EIM imports serving load in California. The hurdle rate would reflect an aggregate emission rate of external resources, and would also be the basis for reporting and for funding the compliance obligations associated with those imports. Several variations on the use of a hurdle rate are possible, including the "dynamic hurdle rate" introduced at the October 21 workshop.
3. It has become abundantly clear that the existing EIM algorithm is not a valid basis for supporting specified source reporting of EIM imports serving California load. If CARB, CAISO, and stakeholders cannot agree on coordinated modifications to both the EIM algorithm and the associated CARB reporting and compliance rules, it would be appropriate for CARB to independently adopt rules requiring that all EIM imports serving California load be reported as unspecified source energy.

Each of these comments is addressed more fully below.

III. Powerex Strongly Supports "Incremental Deeming" as an Appropriate Methodology for Identifying the Out-of-State Resources Serving Load in California through the EIM

The inability of the existing EIM algorithm to accurately consider GHG emissions associated with serving California load in the EIM can lead to several unintended adverse consequences. Potential alternative approaches should be evaluated based on how effectively they address these unintended consequences, which generally fall into three broad categories:

1. The GHG emissions assigned by the EIM algorithm understate the actual GHG emissions associated with additional out-of-state dispatch to serve California load in the EIM. As a result, ***too few GHG emissions allowances are retired*** under California's cap-and-trade program.
2. When the EIM algorithm does not include the GHG costs of out-of-state resources that are dispatched to meet California load, it makes out-of-state resources appear more economic than in-state resources, whose GHG costs are always included. ***This can result in "leakage"*** because it may shift GHG emissions from in-state resources to out-of-state resources, even when the out-of-state resources are not lower cost (when GHG costs are included).
3. When the EIM algorithm does not accurately include the GHG costs of out-of-state resources that are dispatched to meet California load, it cannot accurately consider GHG emissions in the selection of *which* out-of-state resource to dispatch. In these cases, ***the EIM cannot appropriately dispatch low- or zero-emitting out-of-state resources*** over higher-emitting out-of-state resources, since GHG costs are not accurately considered.

In Powerex's view, the "incremental deeming approach" discussed at the October 21 Workshop is the only alternative that has been identified to date that addresses all three of these unintended consequences. The "incremental deeming approach" appears to offer a robust and comprehensive framework for distinguishing between out-of-state resources that would be economic to serve load outside of California and the additional out-of-state dispatch (and GHG emissions) that occurs in order to

serve load inside of California. Powerex believes this is an appropriate conceptual framework for accurately identifying the out-of-state GHG emissions associated with imports serving load in California. The "incremental deeming approach" would therefore be an appropriate basis for reporting such imports as specified source energy, using the GHG emission rate of the specific resource identified by the new EIM algorithm.

CAISO staff have expressed concern regarding the technical complexity of implementing the "incremental deeming approach," since it requires adding an additional optimization run to the market software in order to identify the economic dispatch to serve load outside of California. This new optimization run would need to be solved prior to each market run, which occur as frequently as every five minutes in the EIM. It is currently unknown how much additional time would be required for this process, and whether it could be completed within the existing market lead times.

Powerex respects CAISO staff's assessment that it may not be feasible to implement the "incremental deeming approach" in the EIM in the near term. Nevertheless, Powerex believes that work should continue toward developing this type of comprehensive and robust specified source framework. This additional work could include stress testing of how the optimization is formulated to ensure this approach consistently leads to the correct outcomes. Developing estimates of computing time necessary to perform the additional optimization would also be helpful. If the "incremental deeming approach" would require more computing time than is available under current market timelines, additional work could evaluate how much accuracy would be reduced by initializing the pre-market optimization run farther in advance of the market run, or with less than full temporal granularity (*e.g.,* performing the pre-market optimization once every 15 minutes rather than every 5 minutes). An exploration of the tradeoffs between potential simplifications and reductions to efficiency will allow CARB, CAISO and stakeholders to make more fully informed decisions regarding whether the "incremental deeming approach" is workable, both in the EIM as well as in a future regional organized market.

IV. Powerex Supports Applying a Hurdle Rate to all EIM Imports Serving Load in California Until An Acceptable Resource-Specific Solution is Developed and Implemented

CARB staff also presented a "dynamic hurdle rate approach" at the October 21 Workshop. Under the "dynamic hurdle rate approach" the EIM would not attempt to identify the specific out-of-state resources whose output is delivered to California loads. Instead, all EIM imports serving California load would be deemed to have a GHG emission rate equal to the "5-minute average emission rate of the external grid."[3]

The introduction of a hurdle rate, such as proposed by CARB, can correct for the *systematic* understatement of GHG emissions associated with out-of-state resources that serve load in California. This approach has the potential to address two of the three types of adverse outcomes currently occurring in the EIM:

1. Applying a hurdle rate can ensure that the total quantity of GHG emissions assigned in the EIM more closely matches the additional GHG emissions from out-of-state resources dispatched to serve California load.

2. Applying a hurdle rate can reduce GHG "leakage" by modifying the EIM algorithm to recognize the average actual GHG emission rate across all out-of-state participating resources that increase their production in the EIM, and thus reduce the tendency to understate external GHG costs when

[3] CARB October 21 Workshop Presentation, at 8.

the algorithm determines whether to meet California load from out-of-state resources as opposed to in-state resources.

A hurdle rate approach, however, does not address the third adverse outcome discussed previously, related to how the EIM algorithm selects between multiple out-of-state resources with different GHG costs. Under the "dynamic hurdle rate approach," the EIM will ignore differences in GHG emission rates between out-of-state resources when determining which resource to dispatch to serve load in California. As a result, zero- or low-emitting resources will not be appropriately dispatched over higher-emitting resources. While this is an important shortcoming of the "dynamic hurdle rate approach," the only solution identified so far that addresses this issue—the "incremental deeming approach"—requires changes to the optimization that CAISO staff believe may not be computationally feasible at this time.

An important feature of the "dynamic hurdle rate approach" is that it does not need to allocate CARB reporting and compliance obligations to specific out-of-state resources. Importantly, this eliminates the need to provide an "opt out" mechanism for participants that are not willing to accept that obligation, as required by FERC. As currently implemented, the "opt out" mechanism can reduce the quantity of out-of-state resources that can be dispatched in the EIM, potentially resulting in lower-priced resources not being dispatched, even though they are available. In other words, efficient dispatch may currently be sacrificed in order to avoid imposing a California state reporting obligation to out-of-state entities unwilling to accept it. This efficiency loss can be avoided under a hurdle rate approach, since the CARB reporting obligation would not be assigned to any out-of-state resources in the first place.

The following subsections respond to CARB's request for stakeholder input on specific aspects of the "dynamic hurdle rate approach."

Calculation of Dynamic Hurdle Rate

As presented, the "dynamic hurdle rate approach" would apply a hurdle rate to all EIM imports serving load in California based on the "5-minute average emissions rate of the external grid." Powerex notes that there is a potential circularity in this approach. Namely, the hurdle rate appears to depend on knowing the output (and GHG emissions) from out-of-state resources in each upcoming 5-minute interval. However, the output of out-of-state resources itself depends on the quantity of EIM imports dispatched by the EIM optimization, which will depend in part on the hurdle rate that is applied to those imports. This circularity can be removed by calculating the hurdle rate based on the average emissions rate of out-of-state resources in the most recent 5-minute dispatch solution. In other words, dispatch during the current 5-minute interval will use a hurdle rate derived from the dispatch in the prior 5-minute interval.

Powerex also strongly recommends that the dynamic hurdle rate be based on the average emissions rates associated with dispatched increases in output of out-of-state resources above their EIM base schedule levels. This is consistent with the goal of the dynamic hurdle rate option, which is to represent the *additional out-of-state GHG emissions* associated with dispatch in the EIM. Powerex believes it would be inappropriate to base the hurdle rate on GHG emissions associated with the output of out-of-state resources that are entirely unchanged by the EIM.

GHG Compliance Obligation

Under the "dynamic hurdle rate approach," there will be no need for individual out-of-state resources to be "deemed delivered" to California, and hence the responsibility for CARB reporting and compliance will no longer need to be assigned directly to out-of-state resources. This raises the question of what entity *will* assume the CARB reporting and compliance obligations.

Numerous possibilities exist, though the reporting and compliance mechanics will be the same regardless of what entity performs them. Namely, the application of a hurdle rate will result in CAISO collecting more revenue from California loads (which pay an LMP for the imports that includes the hurdle rate) than it will pay to out-of-state generators (which are paid an LMP that excludes the hurdle rate). The "hurdle rate revenue" in each interval will be equal to the product of the hurdle rate and the quantity of EIM imports serving California load. This hurdle rate revenue will also be equal to the cost of purchasing the GHG emissions allowances associated with the EIM imports serving California load at the applicable emissions rate for that interval. The GHG allowances that need to be procured and retired to comply with CARB's GHG regulations, in other words, should be fully self-funding through the hurdle rate revenues collected by CAISO. The entity (or entities) that is assigned the GHG compliance obligation for EIM imports serving California load will therefore receive the hurdle rate revenues collected by CAISO.

Powerex believes that the most workable alternative may be to create a new entity for the specific purpose of undertaking the CARB reporting and compliance requirements associated with EIM imports serving load in California. CAISO could conceivably fulfill this role directly, but it has expressed its opposition to becoming a regulated reporting entity. It is also unclear how this relationship would be affected by CAISO's evolving role as a regional market operator. And while CARB has previously contemplated assigning this obligation to "EIM purchasers," this approach would require allocating the obligation among multiple entities, adding unnecessary complexity. Powerex thus recommends that CARB consider establishing a new entity that undertakes the responsibility for reporting and compliance requirements associated with EIM imports serving load in California.

Zero Compliance Obligation for Renewable Contracts with California LSEs

Powerex generally supports policies that create financial incentives for out-of-state renewable resources to contract with California load-serving entities ("LSEs") and help achieve the state's renewable energy goals. It is unclear how CARB's proposal to not impose a GHG compliance obligation to renewable resources under contract with California LSEs could work in the context of the "dynamic hurdle rate approach," since that approach would not assign GHG compliance obligations to any resources at all.

If, alternatively, CARB is proposing that renewable resources under contract with a California LSE be exempt from application of the hurdle rate, this poses some significant challenges. For instance, it seems problematic for the EIM to waive applying the hurdle rate to the dispatch of one out-of-state renewable resource, but to enforce the hurdle rate when dispatching an identical renewable resource that happens to not be under a renewable contract to a California LSE. And, as a technical matter, it is unclear exactly how the CAISO would selectively apply a hurdle rate to some out-of-state resources but not others, without once again leading back to the challenge of determining which out-of-state resources serve load in California and which ones do not.

Finally, while Powerex supports the general goal of recognizing the carbon intensity of out-of-state resources in the EIM optimization, Powerex also believes it is important to recognize that the EIM is only one of several opportunities for out-of-state renewable resources to sell their output to California. More specifically, the EIM is designed to be a residual, intra-hour imbalance market, and not the primary market for the portion of output that can be forecasted in advance. Thus, the forecasted output of all resources—including renewable resources under contract with a California LSE—is generally expected to be scheduled ahead of the EIM, under arrangements that support specified source treatment. Accordingly, Powerex believes the application of a hurdle rate to all EIM imports serving load in California—with no exemptions—will affect only the *residual* intra-hour imbalance output of renewable resources under contract with a California LSE. The limited nature of this impact will need to be weighed against the

potential complexity of attempting to create exemptions from the hurdle rate for certain classes of out-of-state resources.

V. If There is No Agreement on Changes to the EIM Algorithm, CARB Should Consider Requiring All EIM Imports Serving California Load to be Reported as Unspecified Source Energy

The potential approaches presented by CARB and discussed above involve changes to both CARB's regulations and to CAISO's EIM optimization software. These approaches therefore require CARB and CAISO to identify mutually satisfactory enhancements, and to coordinate development and implementation of the respective modifications. While Powerex is optimistic that CARB, CAISO and stakeholders can agree on a path forward, it is conceivable that this will not occur, or that reaching agreement will take an extended period of time. CARB may therefore need to articulate what it will do in the absence of timely agreement on coordinated modifications for the EIM.

Some stakeholders have taken the position that the *status quo* is an acceptable interim solution. Powerex strongly disagrees. The *status quo* does not meet the requirement to "ensure accurate accounting of full GHG burden on the atmosphere as a consequence of electricity generated and consumed in California."[4] As discussed more fully in Powerex's prior comments to CARB, the *status quo* undermines not only the state's environmental policy objectives, but also distorts wholesale electricity market outcomes.[5]

Not only is the *status quo* an unacceptable solution, there is also a better alternative that CARB can implement quickly and with limited complexity. Namely, CARB can decline to allow EIM "deemed deliveries" to California to be reported as specified source energy. This change would be fully consistent with CARB's explanation at the October 21 Workshop that unspecified imports include "power that does not meet specified source requirements."[6] The requirements for specified source reporting, in turn, include demonstrating that power was "directly delivered to California from the source."[7] But as has already been broadly recognized, the current EIM algorithm does not accurately identify which out-of-state resources were used to deliver energy to California.

Some stakeholders have claimed it would be inappropriate to deny resources an opportunity to make specified source sales in the EIM. In Powerex's view, this argument is without merit. If it is desirable for deliveries in the EIM to be treated by CARB as specified source imports, then it is the responsibility of CAISO and its stakeholders—and not of CARB—to develop an EIM design that is consistent with CARB's requirements for specified source deliveries. CARB is not under any obligation to permit specified source treatment of transactions through each and every type of market platform. Indeed, CARB has expressly denied specified source reporting for energy transacted on exchanges, such as ICE, even if delivery is ultimately scheduled from a low- or zero-GHG resource.[8]

[4] CARB October 21 Presentation, at 4.

[5] Powerex September 9 Comments, at 12-16.

[6] CARB October 21 Workshop Presentation, at 3.

[7] *Id.*

[8] Transactions on ICE for physical power at an out of state market hub are often scheduled into California. The e-Tag "source" identifies the physical source of the energy being delivered. CARB has already identified that the e-Tag "source" is not, by itself, sufficient to report the import as specified source energy. It is only if that e-Tag "source" was identified in a written power contract (or delivered by a Generating Providing Entity) that specified source reporting is permitted. Transactions on exchanges such as ICE do not satisfy the requirement for identifying a specific resource at the time of contracting.

It has also been suggested that out-of-state resources, especially low- or zero-emitting resources, would be "harmed" by the elimination of specified source reporting for EIM sales. Powerex disagrees. Out-of-state resources will continue to have every opportunity to make specified source energy sales outside of the EIM, including in the forward, day-ahead, and real-time bilateral markets. The EIM does not replace or preclude any of those other alternatives, where specified source transactions can and do occur. The EIM is an *additional* opportunity to make sales within the operating hour based on the residual capability of participating resources. It is unclear how this additional opportunity becomes "harmful" if it is limited to sales for unspecified source energy for an interim period.

CARB should also be skeptical of claims that eliminating specified source reporting for EIM "deemed deliveries" will undermine participation in the EIM (and would, by extension, reduce the environmental benefits associated with exports of California generation). It seems improbable that a participating resource would elect to not sell their residual output at all unless it could be sold as specified source energy. Moreover, there is nothing about requiring unspecified source reporting that increases the financial risk to low-GHG resources of participating in the EIM; all participating resources in the EIM will continue to be dispatched to sell energy only if they will be paid at least as much as their offer price.

The only reduction in EIM participation that Powerex anticipates would be from higher-emitting resources that are currently able to sell their output in the EIM for import into California, while avoiding the full and proper application of California's GHG regulations. But ensuring that the EIM applies CARB's GHG regulations and policies is precisely the point of CARB's proposed revisions, and in no way represents a legitimate argument against those changes.

Powerex emphasizes that it fully supports permitting specified source reporting of EIM deliveries *if and when* the EIM design is modified to accurately identify the out-of-state resource output that is delivered to California loads. Powerex looks forward to continuing to work with CARB, CAISO and other stakeholders to develop a workable design that meets this objective.