

October 22, 2018

Via Electronic Submission

Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95812

Re: Powerex Comments on the Proposed Amendments to the Regulation for Mandatory Reporting of Greenhouse Gas Emissions

Dear Chairwoman Nichols and Members of the California Air Resources Board,

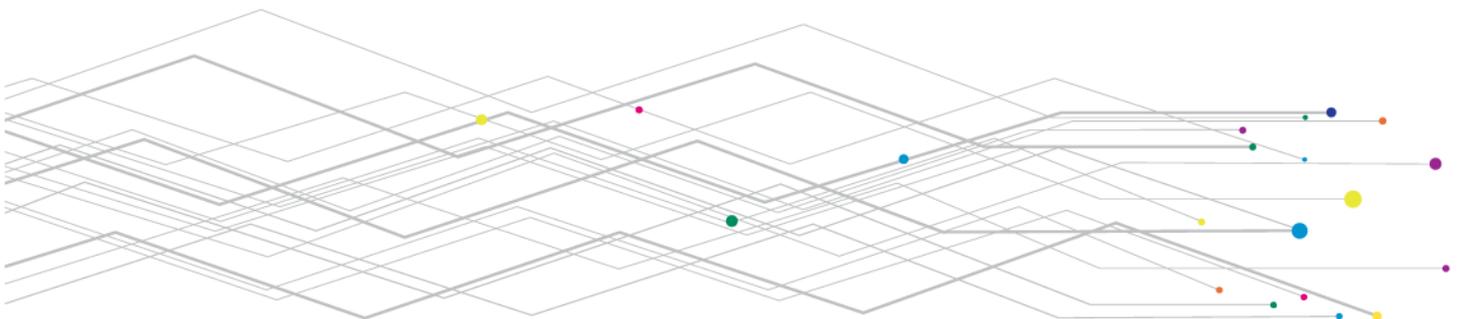
On behalf of Powerex Corp., I submit the enclosed comments to the California Air Resources Board in response to the Proposed Amendments to the Regulation for Mandatory Reporting of Greenhouse Gas Emissions.

Powerex would like to thank the Members of the Board as well as the CARB Staff for their consideration of these comments and for their continued efforts to improve the Cap-and-Trade Program. If you have any questions, please do not hesitate to contact the undersigned.

Kind regards,

/s/

Michael Benn
Energy Trade Policy Analyst
Powerex Corp.
mike.benn@powerex.com
604.891.6074
Encl.



Comments of Powerex Corp. On
California Air Resources Board Proposed Amendments To The Regulation For Mandatory
Reporting Of Greenhouse Gas Emissions

Powerex appreciates the opportunity to provide these written comments on the California Air Resources Board's ("CARB") September 4, 2018 *Proposed Amendments to the Regulation for Mandatory Reporting of Greenhouse Gas Emissions* ("Proposed Amendments").

The Proposed Amendments would assess a compliance obligation on EIM Purchasers based on CARB's calculation of EIM Outstanding Emissions for the prior calendar year (or portion of the year, in the case of 2019). The proposal builds upon the current "bridge solution" under which CARB retires a quantity of unsold emissions allowances equal to the quantity of EIM Outstanding Emissions, with one critical change: rather than CARB retiring unsold allowances, EIM Purchasers would have the obligation to procure and surrender allowances.

Powerex generally supports the Proposed Amendments related to the EIM Purchaser concept. However, Powerex believes that this is a relatively minor improvement in terms of achieving the objective of ensuring that the California Cap-and-Trade Program is appropriately applied to EIM imports that serve California load. Most notably, these improvements will not address the dispatch, pricing and settlement challenges associated with the EIM software continuing to systematically understate the GHG emissions associated with the EIM's dispatch of out-of-state resources that result in imports serving load in California.

I. Assessment Of The Current EIM GHG Allocation Algorithm

Accurate accounting for GHG emissions in the EIM is critical to ensuring that the EIM operates in a manner consistent with CARB's Cap-and-Trade Program for wholesale electricity serving load in California. It has become increasingly clear, however, that the initial design of the EIM has failed to satisfy the need for such accurate accounting of GHG emissions. This inaccuracy has led—and continues to lead—to significant amounts of GHG leakage through the EIM dispatch of out-of-state natural gas and coal resources serving California load without appropriate recognition of their emissions. In particular, Powerex believes that the existing framework for accounting for GHG emissions within the EIM has:

1. failed to provide price signals to encourage the increased use of non-emitting resources to serve California load;
2. failed to require that the appropriate quantity of GHG emissions allowances be procured by the GHG-emitting generators actually being dispatched; and
3. created new and expanded opportunities for out-of-state natural gas and coal resources to produce and sell electricity to serve California loads.¹

Although the EIM has generally provided environmental benefits during hours when California is a net exporter in the EIM, it has also expanded market opportunities for out-of-state fossil fuel generation to serve California loads during hours when California is a net importer in the EIM. The EIM has achieved this by reducing the two key barriers that previously made external coal and natural gas resources

¹ For a more detailed discussion of the consequences of the initial EIM algorithm, please see *Comments of Powerex Corp. on the Proposed Amendments to the Cap-and-Trade Regulation* (September 9, 2016), at 12-16.

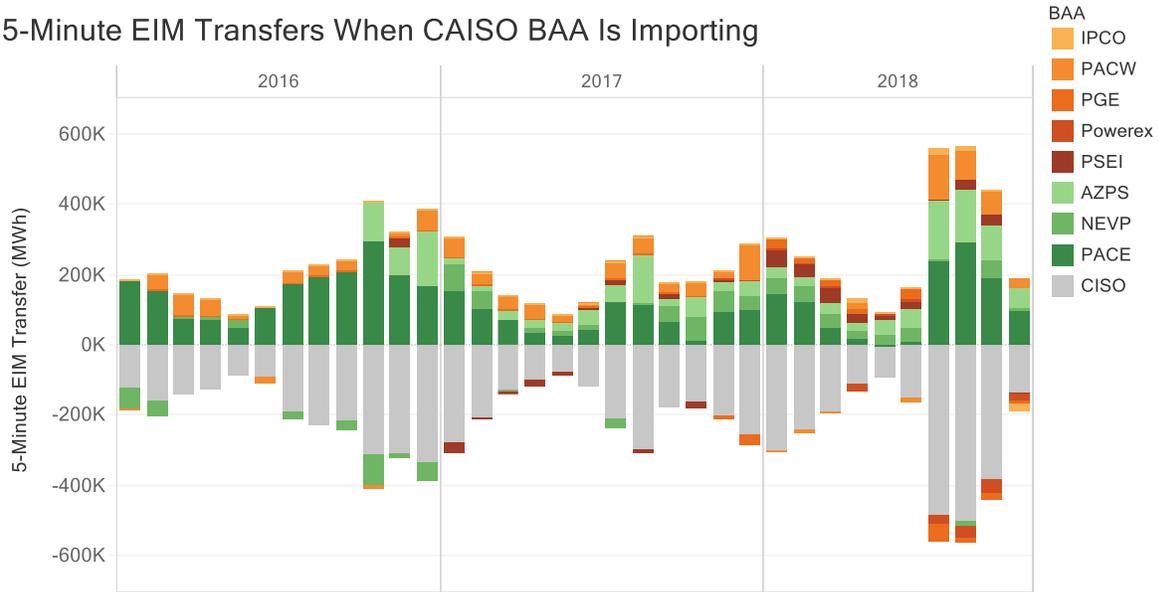
relatively uncompetitive to serve California loads. The first barrier is the requirement to purchase transmission service at fixed tariff rates, both to exit the balancing authority area (“BAA”) where a generation resource is located, as well as to traverse other BAAs in order to reach California.

The second barrier is the requirement for the source of energy imports into California to be properly reported to CARB, and for the importer to purchase and surrender the necessary GHG emissions allowances, based on the volume of energy imported and the GHG-emissions rate of the source of the supply. Prior to the EIM, energy produced by an external fossil-fueled generator could only be imported as either unspecified-source energy, incurring a GHG cost of approximately \$6/MWh based on a generic default GHG emission factor, or as specified-source energy, incurring a GHG cost based on the resource’s specific GHG emission rate, which could generally range from approximately \$6/MWh for natural gas resources to \$15/MWh for coal resources. Together, the significant fixed tariff cost of transmission service and the significant cost of GHG compliance put out-of-state fossil-fueled resources at a substantial cost disadvantage relative to in-state California generation. The current EIM design has eliminated both of those cost barriers. Transmission service does not incur an incremental charge in the EIM, while the EIM’s “deeming” approach effectively allows external natural gas and coal resources to be dispatched in the EIM and the energy to be imported to serve California load, but without incurring appropriate GHG-related costs.

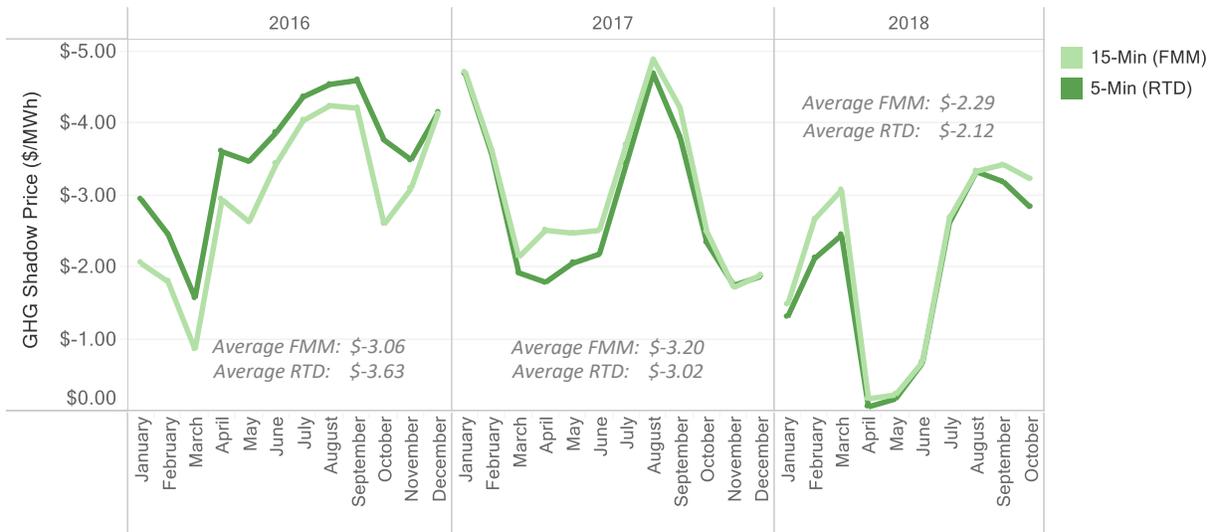
The failure of the existing EIM framework to accurately account for GHG emissions has been widely discussed. For the purpose of adding specific insights to the issue, Powerex has performed a preliminary analysis, based on public data from CAISO’s 5-minute real-time market, that shows the net EIM exports from various BAAs in the EIM during each 5-minute interval that the CAISO BAA was receiving net EIM imports.² The initial results are presented below for each month since January 2016:

² Powerex notes that this analysis is preliminary, and has not been independently validated by CAISO or any other party. Powerex welcomes other parties’ input on this analysis.

5-Minute EIM Transfers When CAISO BAA Is Importing



Average GHG Shadow Price When CAISO BAA Is Importing



The top panel shows that in virtually every month, the largest exporters in the EIM when the CAISO BAA was importing energy were the three largest BAAs in the Desert Southwest. Although significant quantities of renewable resources have been added in recent years in the Desert Southwest, the resource mix in the region continues to consist predominantly of natural gas and coal-fired generation. Moreover, during the hours of the day when the CAISO BAA is a large EIM importer, prices in the EIM are at levels that generally reflect incremental production from natural gas and coal-fired generation, as opposed to the lower prices that would indicate increased production (or reduced curtailment) of out-of-state wind or solar resources. That is, in the hours when California load is served from out-of-state resources through the EIM, much of the additional production is from GHG-emitting facilities. The EIM's failure to accurately attribute those imports serving load in the CAISO BAA to GHG-emitting out-of-state resources is seen in the lower panel, which tracks the average GHG shadow prices in the EIM during intervals that California load is served by EIM imports. GHG shadow prices during such intervals in the

15-minute and 5-minute markets averaged approximately \$3.06/MWh and \$3.63/MWh respectively in 2016, approximately \$3.20/MWh and \$3.02/MWh in 2017 and fell to approximately \$2.29/MWh and \$2.12/MWh in 2018 (through mid-October). At typical GHG emissions allowance prices of between \$13 and \$15/MTCO_{2e}, this means that, on average, the EIM has attributed GHG emissions of only 0.15-0.3 MTCO_{2e} for each MWh of energy imported in the EIM to serve California load. This is less than half of the typical emission factor for an efficient natural gas-fired generator, and only a small fraction of the GHG emission factor for a coal-fired generator.

The depressed GHG shadow prices point to a simple conclusion: *through the EIM, California consumers have been effectively compensating out-of-state natural gas and coal-fired resources for their environmental attributes as if those resources had very low GHG emissions.*

For example, when California consumers pay, say, \$36/MWh for electricity purchased in the real-time market (which includes the EIM), this price will most typically reflect the variable production cost of the marginal natural gas resource located inside California of say, \$30/MWh, plus approximately \$6/MWh of additional variable costs associated with GHG allowances (based on the particular marginal resource's emissions rate). In other words, California consumers in this example are paying approximately \$6/MWh in additional costs for real-time energy purchases, including from EIM imports, to reflect the cost of GHG emissions. For in-state, GHG-emitting resources, including the marginal natural gas resource described above, this generally does not translate to an additional \$6/MWh of economic benefit, however, as it is generally offset by the cost of procuring GHG emissions allowances (based on each resource's actual emissions rate). For example, the marginal natural gas resource described above would have carbon allowance obligations of approximately \$6/MWh, resulting in net revenues of \$30/MWh. But coal and natural gas resources located *outside* of California may receive net revenues of \$34/MWh, since these resources receive the \$36/MWh for their energy output but incur only \$2/MWh, on average, to procure GHG allowances for EIM imports into the CAISO BAA in that interval. The result is that external natural gas and coal resources serving California load are not only better off than in-state natural gas resources, but are receiving net financial benefits from California consumers as a result of the Cap-and-Trade Program itself. This overcompensation of out-of-state GHG-emitting resources is to the detriment of California ratepayers, clean, non-emitting resources who are often "stepped ahead of" in the real-time market dispatch, and, perhaps most importantly, California's goals of reducing its reliance on fossil fuels and increasing the use of renewable and non-emitting resources.

Powerex's preliminary analysis also highlights a troubling trend: as the EIM has grown, the volume of EIM imports serving California load has grown while the average GHG emissions attributed to those imports has declined, despite these imports predominantly being sourced from the Desert Southwest region. For example, net EIM imports into the CAISO BAA totaled approximately 2,300 GWh in 2016 and 2,200 GWh in 2017. By the end of September of 2018, by contrast, net EIM imports into the CAISO BAA had already reached nearly 2,500 GWh, surpassing the total annual deliveries from both prior years. This growth in import volume has occurred as the average GHG emissions associated with each imported MWh has declined. In other words, the problem of EIM Outstanding Emissions is getting worse, and at an accelerating rate.

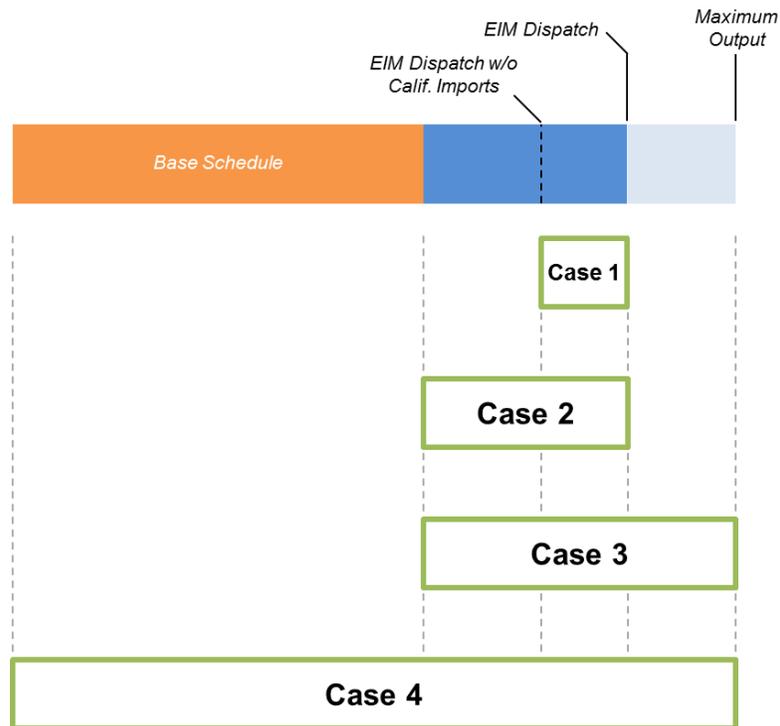
II. Ensuring Accurate Accounting Of GHG Emissions In The EIM

The preferred solution to the issues identified above is to improve the EIM software so that it accurately identifies and accounts for the *specific resources* that increase their production (and GHG emissions) to support EIM imports serving California load. The challenge, however, is that there is no inherent relationship in an organized market between the production of electricity by a generating resource and the location of the load consuming that electricity. In Powerex's view, this link could be effectively established

by identifying the out-of-state resources that (1) are dispatched in the EIM to a quantity greater than the generation plan developed ahead of the EIM optimization (“base schedules”); but (2) where the resource would *not* have been dispatched to this level if there had been no EIM imports into California. The first criterion identifies the additional out-of-state GHG emissions resulting from the EIM generally, which includes serving load outside of California. The second criterion distinguishes the additional out-of-state GHG emissions associated with energy imports serving California load (which are subject to CARB rules) as opposed to additional out-of-state GHG emissions that would have occurred anyway (which are not).

Figure 1, below, depicts the set of EIM resources satisfying these two criteria, labeled as Case 1. That is, Case 1 shows the difference between the EIM dispatch of an out-of-state resource, and what that dispatch would have been if there were no EIM imports serving California load. This is the resource output (and GHG emissions) that, in Powerex’s view, can properly be associated with serving California load. The figure also shows how the resource output that that can be “deemed” to serve California load is expanded as each of these criteria are loosened. As the operation of the EIM to date highlights, expanding the group of resources that can be “deemed” to serve California load provides the EIM algorithm more opportunities to appear to reduce costs simply by inaccurately attributing these “deemed deliveries” to the lowest-emitting resources. Therefore, as the group of resources that can be “deemed” to serve California load is expanded, the opportunity for inaccurate attribution of GHG emissions is also expanded.

Figure 1. Alternative Approaches To Limiting The Output That Can Be “Deemed Delivered” to California Loads



Green bars represent the maximum GHG attribution that an EIM Participating resource may indicate it is willing to accept. GHG attribution is also constrained to not exceed the total output of the resource.

In Figure 1, above, Case 2 permits GHG attribution to *all* out-of-state resources that increased production above the quantity included in generation base schedules prior to EIM operation. Some of these resources would have increased production anyway, even if there were not EIM imports into California (e.g., to displace production from other higher-priced out-of-state resources). Case 3 permits GHG attribution to not only all the resources that *actually* increased production above base schedules, but also to all the resources that *could have* done so, since their respective base schedules did not use the full capacity of the resource. Case 4 permits GHG attribution to all EIM participating resources that are willing to be deemed delivered to California load. This is the loosest case, since it may include all output from every EIM participating resource, even if that output was scheduled outside of the EIM, even if the output did not increase as a result of EIM dispatch, and even if the output would have been exactly the same if California had not received any EIM imports.

Case 4 describes the current EIM algorithm. It adopts the broadest view of out-of-state resource output that can be “deemed” to serve California load. And because this approach casts such a wide net, the output that *can* be “deemed” to serve California load greatly exceeds the quantity of EIM imports to California. The EIM algorithm must therefore choose from among this wide array of choices, and does so by “deeming” California load to be served by the output from resources with the lowest GHG emission factor. By selectively “deeming” California load to be served from the cleanest out-of-state production in each interval, the EIM algorithm appears to minimize the cost of complying with CARB’s rules. But it does not achieve this outcome simply by reducing actual GHG emissions—as one might logically expect given the goals of CARB’s Cap-and-Trade Program—but by attributing imported power to the lowest-emitting resources, without regard to whether those are the actual resources that were dispatched in order to enable imports into California.

The challenges that have arisen surrounding accurate accounting of GHG emissions within the EIM framework has led Powerex to conclude that the basic premise of how CARB’s GHG rules are applied to the EIM is fundamentally and fatally flawed. Simply put, Powerex believes it is not appropriate to apply specified source reporting on the basis of the EIM algorithm’s “deemed deliveries” to California. These “deemed deliveries” do not, and cannot, accurately identify the resources dispatched in the EIM to support EIM imports serving California load. Instead, in many cases, the “deemed deliveries” reflect the automated selection of the cleanest participating resources anywhere in the EIM footprint and claiming them on behalf of California. The concept of specified-source reporting is stringent, and deliberately so: it is intended to represent a specific resource that produced and delivered energy to be consumed in California. The EIM’s “deemed delivered” methodology is entirely inconsistent with this goal, as the objective function of the EIM algorithm is to minimize total costs, including through the *inaccurate deeming* of which resources served California load. The EIM algorithm simply fails to establish any link between the resource that actually produces energy to serve California load and the resource that is “deemed delivered”, making specified-source reporting entirely inappropriate.

CAISO previously considered a “two-pass proposal” that sought to implement Case 1, by explicitly simulating the EIM dispatch both with and without EIM imports into California. The technical complexity of the two-pass proposal, as well as concerns expressed by some parties regarding the potential incentives on bidding behavior, led CAISO to view this approach as unworkable in the short-term, however. Instead, CAISO has proposed an approach reflected in Case 3 above. Under this approach, EIM imports serving California load can only be attributed to resources with the *ability* to increase output in the EIM. Compared to the nearly unfettered discretion of the current EIM algorithm (or Case 4), the CAISO’s proposal is unequivocally a step in the right direction. But it will still leave very significant opportunities for the EIM algorithm to continue to selectively and inaccurately “deem” which resources serve California load. Specifically, California load could still be “deemed” to be served by a clean resource that did not

actually increase its output in the EIM at all, or by a clean resource that did increase its output, but would have done so anyway, even if there were no EIM imports into California. Just like under the existing EIM design, the EIM algorithm will inaccurately “deem” California load to be served from the available resources with the lowest GHG emission factor.

Importantly, as the EIM expands to include more non-emitting resources, such as Pacific Northwest hydro resources, the base schedules associated with those resources will increasingly *enable* the EIM to dispatch additional coal and gas resources to serve California load *without* requiring the retirement of the appropriate quantity of carbon allowances. This is true under both Case 4 (the status quo) and under Case 3 (the approach proposed by CAISO that includes improvements to the EIM algorithm to limit deemed quantities to the quantity of upward dispatch range above a resource’s base schedule). Ultimately, once there are sufficient non-emitting resources participating in the EIM, the EIM algorithm will be able to dispatch natural gas and coal resources without *any* carbon allowance obligations being incurred.

While Powerex supports implementation of CAISO’s proposal as a near-term measure to reduce the potential for GHG leakage, it would be incorrect to consider the problem “fixed” by these changes. Additionally, no party should be under the erroneous impression that the enhanced EIM approach could be a suitable framework for a regional day-ahead organized market. Quite the opposite: part of what limits the harm from the current and proposed EIM approaches is the relatively modest volume of California load served by energy imports in the EIM. But the far larger volume of transactions and deliveries that occur on a day-ahead basis significantly increases the need for accurate GHG tracking, and also increases the consequences of getting it wrong. Moreover, like the EIM, the potential development of an organized day-ahead market will likely further reduce “friction” that applies to bilateral scheduling activity; but this friction currently helps limit opportunities to schedule clean energy to California in a manner that results in increased GHG emissions through “backfill” activity and “secondary emissions”. The EIM has demonstrated the power of algorithms to maximize opportunities to reduce costs, even where such cost reductions are achieved by reducing the accuracy of the application of CARB’s rules. A day-ahead organized market would transact far greater volumes, and would pose an even greater challenge to achieving California’s environmental policy objectives, unless a more robust GHG attribution framework is applied.

III. CARB’s Proposal Represents A Reasonable Near-Term Solution, But Broader Changes Are Needed

Absent a solution that comprehensively addresses the root of the problem, CARB has implemented a “bridge solution”. The existing “bridge solution” enacted by CARB in its 2016 MRR amendments represents an attempt to quantify the extent to which the EIM understates out-of-state GHG emissions associated with serving California load, but it does not allocate the cost of that shortfall to any party. The Proposed Amendments take the next logical step, and assess a compliance obligation—and hence a cost—for EIM Outstanding Emissions to the California loads that are served by EIM imports whose GHG emissions are understated. Powerex believes the Proposed Amendments represent an improvement over the *status quo*, and supports their adoption.

Powerex is mindful that the Proposed Amendments seek only to address the narrow issue of assigning GHG allowance obligations associated with the systemic understatement of GHG emissions in the EIM. However, the Proposed Amendments do not represent a comprehensive solution to the EIM challenges that continue to be experienced, nor do they address any challenges associated with import activity conducted outside of the EIM. Powerex believes it is important for CARB to recognize that the issues experienced in the EIM are only one example of the various challenges that exist under the current

approach to applying CARB's Cap-and-Trade Program and Mandatory Reporting Regulation to electricity imports.

Among other things, concerns have been raised that certain external entities with non-emitting generation that has historically been used to serve domestic load obligations are now making that supply available to be scheduled to California as specified-source clean power, while having this supply concurrently "backfilled" with purchases from GHG-emitting and/or unspecified sources to meet their own needs. These concerns have been focused on the potential that such specified sale and backfill activity has the net effect of increasing the energy production from GHG-emitting and/or unspecified sources, and without reporting, and being accountable for, the associated GHG emissions to CARB. At the same time, suppliers that deliberately take steps to ensure that *their* own activity aligns with CARB's policy objectives – by either limiting their specified-source deliveries to California to supply that is surplus to their domestic load requirements or by registering as an Asset Controlling Supplier and reporting, and being accountable for, their import activity to CARB – are put at a competitive disadvantage. Importantly, Powerex believes that this specified sale and backfilling activity can only be expected to grow as the price of GHG emissions allowances increases, thereby increasing the financial gains associated with this activity.

The above would already constitute a significant challenge to CARB's programs and policies, but the need for a careful reassessment of the reporting and compliance framework for all electricity imports has been made even greater by the recent passage of SB 100. That legislation requires that its objective be pursued in a manner that "shall not increase carbon emissions elsewhere in the western grid and shall not allow resource shuffling."³

Powerex believes that continued strong leadership from CARB is necessary to ensure the effectiveness of CARB's Cap-and-Trade Program in light of the continued evolution and expansion of organized markets. In fact, Powerex believes that it is highly likely that these problems will only get worse as the CAISO markets expand and the price of GHG emissions allowances increases, thereby increasing the opportunities and incentives for both "inaccurate deeming" in the EIM and "specified sale and backfill" activities outside the EIM. Therefore, when CARB conducts its rulemaking to implement SB100, Powerex urges CARB to consider undertaking a comprehensive review of its rules and requirements related to all electricity imports into California. Given the significant inaccuracy that is occurring in identifying the source of deliveries to California, it is not clear to Powerex that the current "specified source" reporting construct is sustainable, either in the EIM or more broadly outside the EIM. Powerex suggests that California's environmental policy goals may be better served by a framework in which the *default presumption* is that all imports are considered "unspecified," with this presumption avoided only when *entities or jurisdictions* adopt robust, comprehensive GHG reporting measures comparable to those that apply to resources in California.

³ Sen. Bill 100 § 5, 2017-2018 Reg. Sess. (Cal. 2018).