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September 9, 2016

Via Electronic Submission

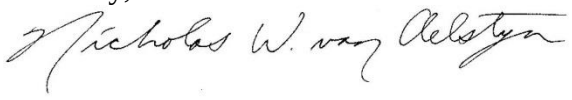
Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95812

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

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

On behalf of Powerex Corp., I submit the enclosed comments on the California Air Resources Board's proposed amendments to its GHG Regulations, *i.e.*, both the Cap-and-Trade Regulation and the Mandatory Reporting Regulation. Powerex would like to thank the Members of the Board as well as the ARB Staff for their consideration of these comments and for their continued efforts to improve the Cap-and-Trade Program.

Sincerely,



Nicholas W. van Aelstyn

Enclosure

cc: Rajinder Sahota, Branch Chief, Cap-and-Trade Program (*w/ encl.*) (*via email*) (rsahota@arb.ca.gov)
Brieanne Aguila, Manager – Mandatory Greenhouse Gas Reporting, Greenhouse Gas Data (*w/ encl.*) (*via email*) (baquila@arb.ca.gov)
Craig Segall, Counsel, Executive Office, California Environmental Protection Agency (*w/ encl.*) (*via email*) (craig.segall@arb.ca.gov)
Derek Nixon, Leakage, Cap-and-Trade Program (*w/ encl.*) (*via email*) (dnixon@arb.ca.gov)

Comments of Powerex Corp. on
Accounting for Greenhouse Gas Emissions
in the Energy Imbalance Market

Background

Powerex Corp. ("Powerex") submits the following comments on the California Air Resources Board's ("CARB's") Proposed Modifications to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions rule as released on July 19, 2016[1] and CARB's Proposed Modifications to the California Cap on Greenhouse Gas Emissions and Market Based Compliance Mechanisms Regulation as released on August 2, 2016[2] (collectively, the "Proposed Amendments to the GHG Regulations").

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").

Executive Summary

The Energy Imbalance Market ("EIM") jointly optimizes the real-time dispatch of physical generation resources across a footprint including Balancing Authority Areas ("BAAs") within California and outside of it. By combining both the loads and the physical resources across an enlarged participating footprint, the EIM is able to reduce the cost of balancing load and generation in real-time. This real-time balancing function is of growing importance—and is an increasing challenge—as greater levels of renewable generation are added to the western grid. Renewable resources that depend on the availability of wind or sunshine introduce significant variability into the supply conditions that a grid operator encounters, requiring both increased adjustments to the output of dispatchable resources, and also improved operational planning to make sure sufficient dispatchable and flexible resources will be available if and when needed. The EIM provides a platform for participating BAAs to benefit from the California Independent System Operator's ("CAISO's") sophisticated real-time tools, as well as from the diversity benefits of being part of a larger, coordinated, real-time system.

For these reasons, the EIM is often described as an important tool to facilitate renewable resource integration in the region. Indeed, the EIM is credited for reducing or avoiding the need to curtail California renewable output by identifying opportunities to export power from California, in turn reducing generation outside of the state (largely from fossil-fueled resources such as those that burn coal or natural gas). Without the EIM, such last-minute export transactions may not have occurred and California renewable

[1] *See* https://www.arb.ca.gov/regact/2016/ghg2016/ghgatta.pdf

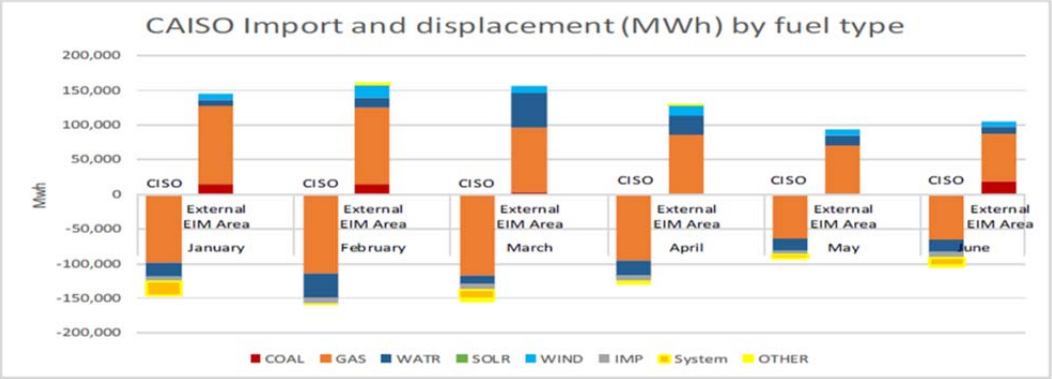
[2] *See* https://www.arb.ca.gov/regact/2016/capandtrade16/appa.pdf

production would have consequently been curtailed, while fossil fuel power plants outside of California continued to produce electricity and greenhouse gas ("GHG") emissions. In such circumstances, the EIM is undoubtedly providing environmental benefits in the form of significantly reduced GHG emissions in the region.

The EIM also is used to arrange for real-time imports into California from energy resources located outside of the state. Such imports—like all California electricity imports—are subject to the regulations of CARB, specifically the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (the "Mandatory Reporting Regulation" or the "MRR") and the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (the "Cap-and-Trade Regulation"; the MRR and the Cap-and-Trade Regulation are collectively referred to as "CARB's GHG Regulations"). CARB's GHG Regulations reflect the requirements under California Assembly Bill 32 ("AB 32") to (1) regulate GHG emissions at the production source for all electricity generation in the state; and (2) regulate GHG emissions for energy imported from resources outside of the state.

In these comments, Powerex addresses the manner that the EIM applies CARB's GHG Regulations for ***imports*** serving load in California, and whether changes are necessary. While there may be significant environmental benefits associated with EIM ***exports out of*** California, that activity is not the subject of CARB's carbon allowance framework[3], nor is it relevant to assessing whether EIM ***imports into*** California comply with CARB's GHG Regulations or the environmental policy objectives of AB 32.

A review of the actual performance of the EIM raises significant concerns about the manner in which the GHG emissions of imports into California have been treated in the EIM dispatch and reported to CARB. The figure below shows the use of out-of-state resources in the EIM through June 2016, as prepared by the CAISO. The bars above the horizontal axis show the monthly EIM dispatch of out-of-state resources, by resource type, during intervals in which there were imports into California.[4] During those periods, it is clear that the EIM dispatched mostly natural gas-fired out-of-state resources (orange bars), with smaller amounts of energy produced by non-emitting hydro (blue) or wind (light blue) generation or by higher-emitting coal-fired generators (red).

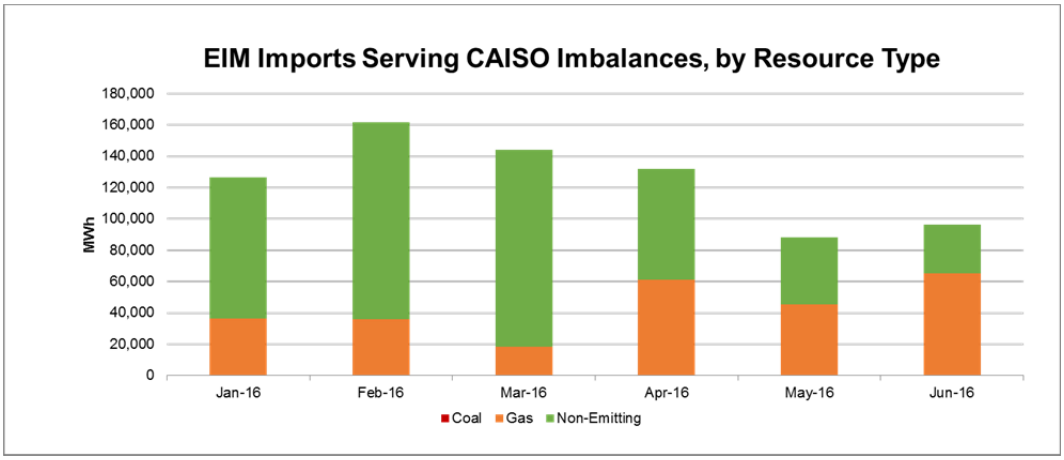


Source: CAISO *EIMGreenhouseGasCounter-FactualComparison-PreliminaryResults_Jan-Jun_2016_.pdf* at slide 3. Available at: http://www.caiso.com/informed/Pages/EIMOverview/Default.aspx

[3] Export activity is, however, included within CARB's reporting framework. CARB also provides a limited provision for "Qualified Exports," which involve imports and exports occurring in the same hour and arranged by the same importer. Powerex believes a Qualified Export is distinct from the issues discussed in this paper and notes that CARB has proposed to remove the Qualified Export provisions from both the Mandatory Reporting Regulation and Cap and Trade Regulation.

[4] The bars below the horizontal axis show the California generation that reduces output pursuant to the EIM dispatch.

In contrast, the chart below shows the EIM's monthly resource-specific allocation of the source of EIM imports serving California load during the same period of 2016 (*i.e.,* how the GHG intensity of those imports will be reported to CARB and, consequently, the amount of GHG emissions allowances that will need to be procured to comply with the Cap-and-Trade Regulation). This chart shows that EIM imports serving load in California have been deemed by the CAISO as mostly from non-emitting resources (green bars), with lower quantities deemed as being from natural gas resources (orange) and none from coal-burning resources.



Source: Plotted from 2016 data in CAISO *MonthlyEIM_Transfer_ISO_Imbalances_MWh.xlsx.* Available at: http://www.caiso.com/informed/Pages/EIMOverview/Default.aspx

These comments examine the underlying cause behind this apparent disconnect between the GHG emissions of out-of-state resources actually dispatched in the EIM and the resources in the EIM that are "deemed delivered" to California. Powerex understands that these outcomes occur largely because the out-of-state resources that can be assigned "deemed deliveries" to California by the EIM algorithm are not limited to the resources that actually increase their production in the EIM. Simply put, the current EIM algorithm does not identify the out-of-state resources that are actually dispatched in order to import energy to serve California load; rather, it selectively "deems" those imports to come from those resources whose CARB compliance costs are lowest. For instance, a non-emitting (*e.g.,* hydro or solar) out-of-state resources might not increase its output in the EIM above its pre-submitted "base schedule" at all, but could still be "deemed" to be the source of a new EIM import serving load in California. Conversely, a high-GHG out-of-state resource could be instructed by the EIM to increase its production, and do so specifically to support additional EIM imports to serve California load, yet the EIM algorithm would not "deem" this resource to be the source of those EIM imports into California. In doing so, the EIM algorithm does not merely minimize CARB compliance costs by reducing emissions, but by minimizing the application of CARB's GHG Regulations to GHG-emitting resources in the first place. This outcome may, indeed, be "optimal" from a "least cost" perspective for the wholesale electricity sector, but it likely diverges from the intended application of AB 32 and CARB's policies regarding electricity imports.

It appears that the current EIM algorithm can lead to numerous outcomes that Powerex believes are inconsistent with California's environmental policy objectives, including understating the GHG emissions of imports into California, causing GHG emissions "leakage," and undermining CARB's market-based incentives to encourage imports from low- or zero-emitting out-of-state resources and to discourage such imports from high-emitting resources. Additionally, the treatment of GHG emissions in the EIM algorithm is impacting price formation in the EIM and CAISO real-time markets. In Powerex's view, the present and continuing environmental and wholesale electricity market impacts require immediate attention and action by CARB, CAISO and stakeholders.

CAISO materials indicate that the current EIM algorithm does not accurately or reliably identify the out-of-state resources dispatched to support imports into California. Consequently, the EIM's "deemed deliveries" are not a reasonable basis for reporting those imports to CARB using a "specified source" emission rate, as the source specified may often be incorrect. It would therefore appear appropriate to modify CARB's GHG Regulations to (1) suspend "specified source" reporting for imports into California occurring through the EIM and (2) require that all such imports be reported using the "unspecified source" GHG emission rate, at least until such time as modifications can be made to the EIM algorithm. But such a change should not be considered to be an optimal long term solution: Powerex also believes it is both preferable and possible to revise the EIM algorithm so that it does accurately identify the specific out-of-state resources that are the actual source of EIM imports into California. In these comments, Powerex outlines one proposed approach to achieve this outcome by addressing the current flaws in the EIM algorithm. Powerex acknowledges that other alternative approaches may be available. Once a solution has been developed and CARB is satisfied that CAISO has implemented the necessary improvements to the EIM algorithm, Powerex believes CARB should once again permit GHG reporting of EIM imports into California on a "specified source" basis.

If and when CAISO expands to become a multi-state regional organized market, it will also be important to ensure that CARB's GHG Regulations and programs are appropriately applied in this new environment. This indicates a need for the solutions adopted for the EIM to be compatible with the existence of a future regionalized market. The alternatives proposed by Powerex satisfy this objective, ensuring the solution adopted by the EIM does not pose a barrier to regionalization, and continues to be workable in an environment where some entities participate in the EIM but remain outside of a regional market. The EIM is distinct from a regional market, particularly in its need to co-exist with (and not conflict with) substantial trade activity and delivery commitments conducted outside of CAISO's organized markets but within the EIM geographical footprint. Whereas the existing "contract path" arrangements for bilateral trading and scheduling are augmented by the EIM, which provides additional opportunities for intra-hour transactions, a regional organized market would replace these existing "contract path" arrangements within the expanded footprint in their entirety. The application of CARB's GHG Regulations to a regional market is therefore likely to differ from application in the EIM. Consequently, the potential for the future expansion of CAISO to a regional organized market should neither delay nor unduly restrict how CARB addresses the immediate concerns over GHG reporting in the EIM.

Ensuring there is a framework for accurately determining GHG emissions in the EIM—and, eventually, in a regional organized market—is critical to achieving California's environmental objectives in the context of expanding organized electricity markets. The initial experience of the EIM demonstrates that the pursuit of greater regional coordination founded on least-cost optimization solutions requires careful and accurate application of CARB's GHG Regulations in order to advance California's underlying environmental goals. Powerex looks forward to continuing to work with CARB, CAISO, and stakeholders toward solutions that deliver the benefits of organized markets across a multi-state footprint, while fully respecting California's environmental regulations and objectives.

Powerex's comments are organized as follows:

- **Section I** explores the apparent disconnect between the "deemed" GHG emissions of California imports in the EIM and the EIM's actual dispatch of out-of-state resources.
- **Section II** summarizes the importance of appropriately accounting for GHG emissions for out-of-state resources dispatched in the EIM to serve California load in order to achieve the objectives of CARB's Cap-and-Trade Regulation.

- **Section III** sets out Powerex's understanding of the specific mechanism through which GHG costs were to be reflected in the EIM.
- **Section IV** identifies the adverse consequences of the existing EIM approach to assigning GHG responsibility. Powerex believes these problems largely undermine the core objectives of California's carbon program in the EIM and can be expected to become more severe over time.
- **Section V** provides Powerex's initial evaluation of the Proposed Amendments to the GHG Regulations and explains why Powerex believes CARB's current proposal will not address the multiple adverse consequences of the existing GHG framework in the EIM.
- **Section VI** outlines an approach that Powerex believes would properly align the EIM treatment of GHG costs with CAISO's objectives of dispatch efficiency and CARB's objectives of reducing GHG emissions associated with imports to California.
- **Section VII** concludes and suggests next steps.
- **Appendix A** presents several illustrative scenarios that might be encountered in the EIM in order to explore how the current EIM algorithm dispatches out-of-state resources and assigns GHG responsibility, and the associated implications. While CAISO's recent presentation to CARB discussed one example of how the EIM assigns GHG responsibility, Powerex believes there may be additional scenarios that can occur. An examination of these additional scenarios demonstrates the potential for the EIM to produce adverse outcomes, including:
    - Assigning "deemed deliveries" to resources that do not increase their production in the EIM at all;
    - Significantly understating the GHG obligations of resources incrementally dispatched in the EIM;
    - Promoting "leakage" by increasing production from high-GHG out-of-state resources; and
    - Impacting prices and dispatch decisions by not properly considering the GHG adders submitted by participating resources.

I. There is an Apparent Disconnect between EIM GHG Reporting and Actual EIM Dispatch of Out-of-State Resources

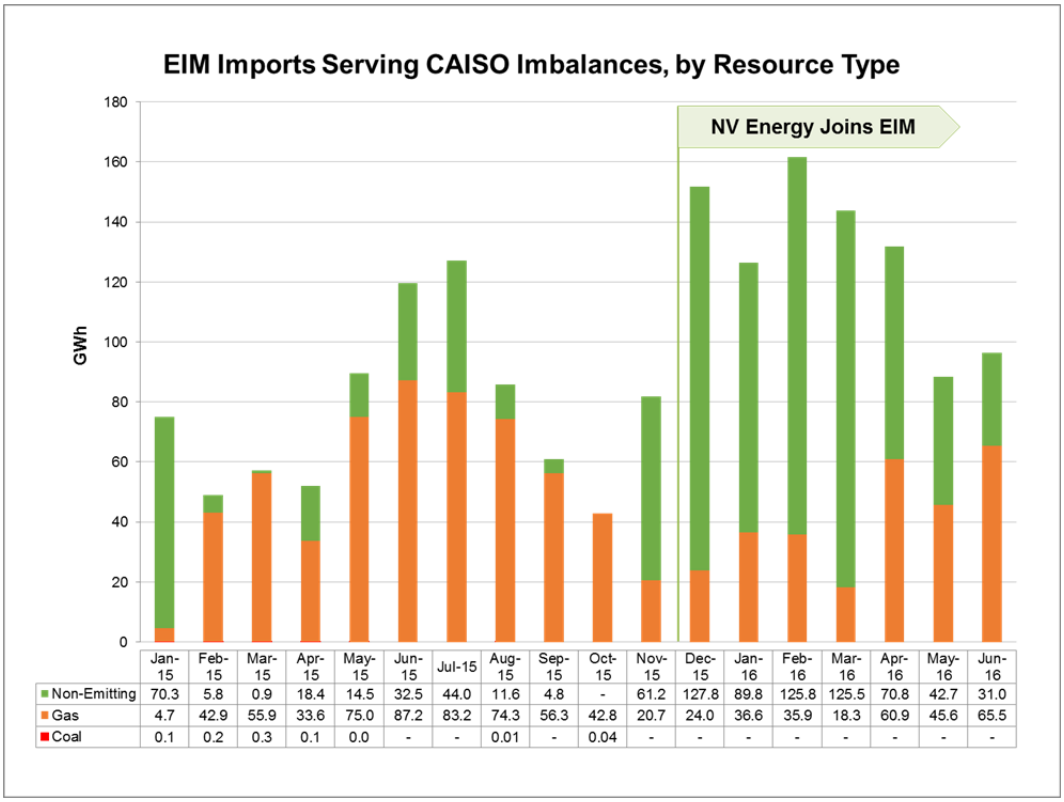
The EIM jointly optimizes the real-time dispatch of physical generation resources across a footprint including BAAs within California and outside of it. This optimization needs to reflect CARB's GHG Regulations, which apply to all electric power generation within California as well as to electricity imports that serve load in California. The application of CARB's GHG Regulations to electricity imports is necessary to prevent out-of-state GHG-emitting resources from displacing in-state resources simply because CARB's GHG Regulations apply to in-state resources but do not directly apply to out-of-state resources. Preventing such "leakage" is particularly challenging in the EIM, since it means that the GHG costs of resources located outside of California must be considered when out-of-state resources are dispatched in the EIM to serve load in California, but those costs must be ignored when out-of-state resources are dispatched in the EIM to serve load outside of California.

To implement the California GHG requirements in the EIM, the CAISO modified its Security Constrained Economic Dispatch ("SCED") algorithms to (1) include a resource-specific GHG bid "adder" to indicate the quantity and price at which the resource is willing to be deemed to be delivered into California; and to (2) assign EIM imports serving load in California to specific EIM participating resources. CAISO explained that the EIM algorithm would incorporate the GHG requirements in a way that results in the lowest total production cost. It was recognized at the time of CAISO's early EIM tariff filings that the new algorithm would result in the cleanest resources *incrementally* dispatched by the EIM being "deemed" to be imported into California, a design feature termed "efficient resource shuffling" by one prominent industry expert.[5] While this concept was illustrated through simplified examples during the early considerations of the EIM, the full ramifications of this approach can now be assessed in more detail, based on the actual operating experience of the EIM over the past 1.5 years.

The three figures below illustrate the need for a more thorough understanding and review of GHG treatment in the EIM.

The first useful metric for assessing GHG treatment in the EIM is the CAISO's reporting of EIM transfers to serve CAISO imbalances, which CAISO allocates among (1) coal resources; (2) natural gas generation; or (3) non-emitting resources. This is shown in the chart below, and appears to report that approximately half of these EIM imports are "deemed delivered" from non-emitting resources (green bars), with the remainder from resources that burn natural gas (orange bars). In many months, particularly in 2016, non-emitting resources are the "deemed" source of the majority of EIM imports serving load in California.

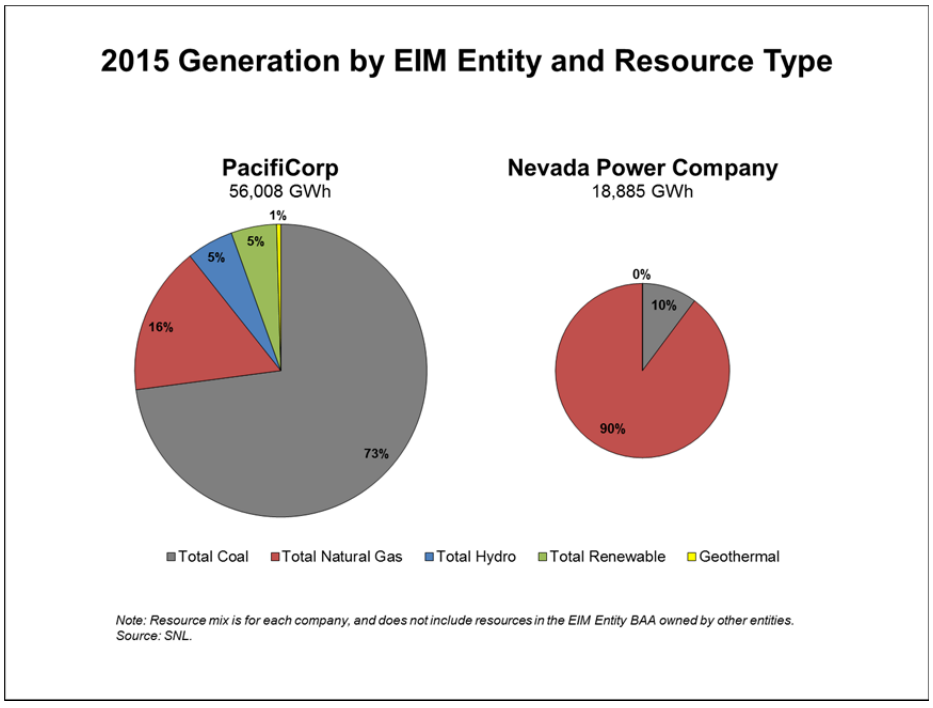
[5] Hogan, W. W. (2013). CAISO Energy Imbalance Market Straw Proposal: Comments (pp. 1–4). Available at http://www.hks.harvard.edu/fs/whogan/Hogan_CAISO_EIM_Notes_062613.pdf



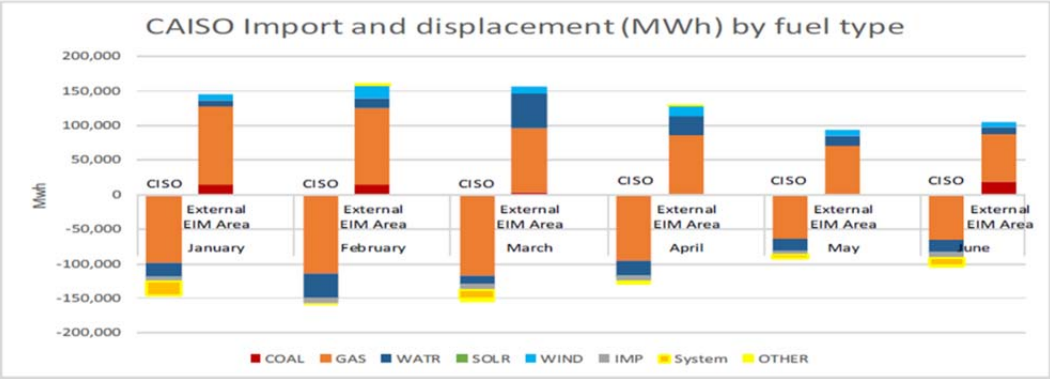
	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16
Non-Emitting	70.3	5.8	0.9	18.4	14.5	32.5	44.0	11.6	4.8	-	61.2	127.8	89.8	125.8	125.5	70.8	42.7	31.0
Gas	4.7	42.9	55.9	33.6	75.0	87.2	83.2	74.3	56.3	42.8	20.7	24.0	36.6	35.9	18.3	60.9	45.6	65.5
Coal	0.1	0.2	0.3	0.1	0.0	-	-	0.01	-	0.04	-	-	-	-	-	-	-	-

Source: Plotted from CAISO *MonthlyEIM_Transfer_ISO_Imbalances_MWh.xlsx.* Available at: http://www.caiso.com/informed/Pages/EIMOverview/Default.aspx

Second, the GHG intensity of EIM imports serving load in California needs to be viewed in the context of the resource mix of the entities that participate in the EIM. This composition is shown below, and consists primarily of coal-fired generation, followed by natural gas resources; with less than 10 percent from non-emitting resources.



Recently, CAISO provided 2016 monthly data on the EIM dispatch of out-of-state resources during the specific intervals that CAISO was importing energy in the EIM. As CAISO explained, "[u]pward bars reflect external supply dispatched in EIM case that would not be dispatched in counter-factual without EIM."[6] The figure below shows that, when electricity is being imported into California in the EIM, the resources increasing their output in the EIM are mostly natural gas resources, with a limited amount of hydro and coal resources increasing output as well.



Source: CAISO *EIMGreenhouseGasCounter-FactualComparison-PreliminaryResults_Jan-Jun_2016_.pdf* at slide 3. Available at: http://www.caiso.com/informed/Pages/EIMOverview/Default.aspx

The above charts present contradictory representations of the GHG emissions associated with California imports in the EIM. On the one hand, these imports are being *reported* as being substantially—and at times predominantly—from "clean" out-of-state resources. But this does not appear to be consistent with the composition of resources in the EIM Entity BAAs, nor with the types of out-of-state resources that *actually increase output* when California is importing energy in the EIM, which appear to be mostly gas generation, with a lesser amount from coal and non-emitting resources.

The addition of NV Energy's resource mix and transmission capacity to the EIM in December 2015 further highlights this disconnect. Beginning in December, the portion of EIM imports serving load in California that was reported as being from non-emitting resources increased sharply. This change does not seem consistent with NV Energy's resource mix—which consists almost entirely of gas or coal generation—nor does it appear to be supported by any increase in the dispatch of non-emitting resources in the EIM.[7] Again, there appears to be a substantial misalignment between the resources being "deemed delivered" to California and the actual dispatch of resources in the EIM.

This apparent misalignment indicates that the EIM algorithm does not properly recognize GHG emissions when dispatching out-of-state resources. This should be of substantial concern to CARB because, as further discussed herein, it suggests that the current dispatch of resources in the EIM may be leading to several unintended outcomes:

- Carbon leakage appears to be occurring in the EIM on an ongoing basis, and is likely to grow as the EIM expands.

[6] CAISO *EIMGreenhouseGasCounter-FactualComparison-PreliminaryResults_Jan-Jun_2016_.pdf*, at 2.

[7] NV Energy's participation in the EIM also increased the available transfer capability between PacifiCorp East's Balancing Authority Area and the CAISO BAA. However, additional transfers from PACE also would not explain the increase in non-emitting imports into California, given the limited quantity of non-emitting resources in the PACE BAA.

- Resources with high-GHG emissions are increasing production relative to their base schedules, resulting in additional power being transferred to California, but without the appropriate quantity of carbon allowance obligations being incurred.
- The EIM dispatch decisions and price signals for both high-GHG and low-GHG resources do not appear consistent with the way the GHG program seeks to achieve its environmental objectives.
- Compensation provided in the EIM to both high-GHG and low-GHG resources appears inconsistent with the state's environmental objectives; the EIM appears to over-compensate external fossil fuel generation that is incrementally dispatched to supply the CAISO grid, and simultaneously appears not to appropriately compensate—or encourage the expanded participation and use of—clean resources.

As further discussed below, Powerex also believes that, absent appropriate steps being taken to correct the current EIM dispatch and GHG allocation algorithm, the above problems will likely worsen as the EIM expands its footprint and includes additional participating resources. Over time, Powerex believes EIM expansion without correcting these inadvertent flaws can be expected to produce the following problematic results:

- Eventually, it is possible that little if any, GHG carbon allowance obligations will be incurred in the EIM, including in intervals in which increases in production in the EIM are predominantly (or entirely) from GHG-emitting resources. Over time, the EIM footprint may include sufficient non-emitting resources whose output could be selectively "deemed" by the EIM algorithm to support EIM imports into California in every hour, regardless of whether those resources actually increase their production in the EIM.
- The EIM will become a "market of choice" for high-GHG emitting resources located outside of California, because it affords a unique opportunity for such resources to make sales and increase production that directly result in deliveries to California without incurring the appropriate GHG allowance obligations that would otherwise apply to such activity. If the same activity occurred outside the EIM, the resource would face a GHG allowance obligation at either its resource-specific GHG intensity or at the unspecified GHG intensity.[8]
- The EIM will become a relatively less attractive market for real-time energy sales from low-GHG emitting or clean resources located outside of California, as the low/zero-GHG attributes of the resource may receive little, if any, compensation in the EIM.

II. Proper Accounting of GHG Emissions Associated with EIM Imports is Critical to Achieving the Objectives of CARB's Cap-and-Trade Regulation

In AB 32, California set out to track and reduce the state's GHG emissions, including those associated with its electricity sector. CARB regulates GHG emissions from electricity generation in the state, as well as from electricity imports into California.

[8] Arguably, a bilateral trade could be arranged outside of the EIM whereby a high-GHG resource serves the load of an entity that owns non-emitting generation, which in turn is able to then schedule its zero-GHG generation into California. In such a scenario, however, the high-GHG resource would typically receive a discounted price (relative to the price inside California), providing a very important price signal to discourage incremental production from high-GHG resources for import into California. When an analogous transaction is arranged in the EIM, however, this critical price signal is bypassed, and high-GHG resources may be dispatched, and potentially receive compensation, as if there were no CARB program in place at all.

For the majority of the first two years of the Cap-and-Trade Regulation, it was relatively straightforward for the CAISO market design to accommodate the regulations surrounding GHG emissions. The CAISO market either procured energy directly from physical resources located within California or it procured energy from importers into the state.

The implementation of the EIM in November 2014 introduced a new challenge. Through the EIM, CAISO determines the economic dispatch of physical generation resources located outside of California. Emissions from these resources are not subject to the Cap-and-Trade Regulation directly. However, to the extent these resources result in electricity imports into California, then CARB's rules do apply. The result is that the EIM's dispatch of out-of-state resources requires accounting for GHG emissions—and complying with CARB's GHG Regulations—in certain cases, but not in others.

In recent months, CARB has expressed concerns over how the EIM is performing this function. In examining this issue, the CAISO notes that any concerns regarding the reporting of GHG emissions for imports into California in the EIM "should be considered in the context of the atmospheric effect of the EIM dispatch also when it exports renewable output from California."[9] In support of this position, CAISO recently conducted an analysis showing that the EIM has led to significant GHG reductions during periods of California EIM exports, which greatly outweigh the GHG increases it found during periods of California EIM imports.

Notwithstanding the *overall* environmental benefits of the EIM, Powerex believes it is still necessary to examine the manner in which the EIM accounts for GHG emissions associated with California imports, for several reasons.

First, Powerex understands CARB's concern is not whether the EIM is delivering environmental benefits overall. Indeed, Powerex believes the EIM may very well be providing substantial environmental benefits, relative to an EIM not existing at all. But the issue at hand is whether the EIM appropriately applies CARB's GHG Regulations; the answer to that question does not depend on whether GHG emissions in the EIM footprint increase or decrease as a result of the existence of the EIM.[10]

Second, the environmental impacts of EIM exports out of California are not credited by CARB for avoided emissions associated with displaced out-of-state resources, nor does the EIM algorithm incorporate any GHG-related information when deciding which out-of-state resources should reduce output to absorb this exported energy. In other words, these environmental benefits would occur anyway, even without CARB's GHG Regulations regarding out-of-state sources of energy. The proper application of CARB's rules regarding electricity imports cannot be evaluated by pointing to emissions reductions from an entirely different activity (*i.e.,* electricity exports) to which CARB's compliance obligation framework does not even apply.

Third, the fact that the EIM, *overall,* may already be providing significant environmental benefits does not imply that it is providing the *optimal* environmental benefits or is operating consistent with the objectives of the CARB program. In fact, CAISO's own analysis concludes that in recent months the environmental benefits of the EIM have arisen entirely from California *exports*; the EIM's California *imports* actually have increased total GHG emissions in the EIM footprint. Proper application of CARB's rules to EIM imports can be expected to increase the EIM's environmental benefits beyond what is already being achieved.

[9] CAISO *Regional Integration California Greenhouse Gas Compliance Issue Paper* (August 29, 2016) at 8. Available at http://www.caiso.com/Documents/IssuePaper-RegionalIntegrationCaliforniaGreenHouseGasCompliance.pdf.

[10] CARB's Cap-and-Trade Regulation ensures that GHG emissions are reflected in the cost of electricity imports; it does *not* require that regional GHG emissions from electricity production be reduced.

Fourth, there is no reason why GHG emissions associated with EIM imports into California should be "credited" against the GHG emissions reductions associated with EIM exports from California, when a similar "crediting" framework is not available for imports and exports that occur outside of the EIM. For instance, there are exports from California that can be scheduled in the CAISO day-ahead or real-time markets, and these, too, may permit California renewables to avoid being curtailed while permitting out-of-state GHG emissions to be reduced. And yet CARB's GHG Regulations do not provide for such export-driven GHG reductions to reduce the reporting or compliance requirements for electricity imports into California that occur in other periods. No justification has been proposed for treating imports in the EIM any differently.

For the above reasons, Powerex strongly believes that the EIM must be required to accurately and objectively apply CARB's GHG Regulations to all EIM imports into California, notwithstanding the environmental benefits of California exports facilitated by the EIM.

III. GHG Provisions in Initial EIM Design Development Were Appropriately Focused on Incremental Dispatch of Out-of-State Resources

At the time that the EIM framework was being developed in the CAISO stakeholder process, Powerex believes it was widely understood that the EIM would efficiently dispatch and allocate incremental production, and would do so by explicitly including GHG-related costs in its decisions. For instance, if a resource in PacifiCorp's BAA was incrementally dispatched in the EIM to meet real-time load in California, the EIM would include the GHG-related costs of that external resource in its dispatch decision, and this EIM dispatch would result in a "specified source import" into California for purposes of California's carbon program. And since each resource submitting bids into the EIM would specify its unique GHG-related costs, the EIM software would be able to take these costs into account to find the most economical way, including GHG-related costs, of serving California load. This approach represented a potential improvement over how GHG costs are managed for non-EIM imports into California, which are generally deemed as being from an "unspecified source," unless they are delivered directly to California under a contract for the output of a specific resource.

In the course of developing the EIM framework, including the GHG provisions, it was also recognized that there would be situations in which there was ambiguity regarding whether an external resource was used to serve load in California as opposed to serving load outside of California. In examples presented by CAISO during the stakeholder process, multiple generators located outside of California could be incrementally dispatched in the EIM in order to serve incremental loads both within California and outside of California.[11] It was explained that the EIM design in this case would "deem" that the output from the lowest-emitting resources is delivered to California, while the output of higher-emitting resources is "deemed" to be delivered to load outside of California. In other words, the CAISO algorithm would effectively solve these ambiguities in a manner that minimized costs through allocating imports to California to resources in a manner that minimizes the total carbon allowance obligations incurred. CAISO also discussed more complex examples, where the most economic resource to serve California load (*i.e.,* including GHG-related costs) may not be the most economic resource to serve non-California load (*i.e.,* excluding GHG-related costs).

From Powerex's experience as an active participant in the EIM stakeholder process, all of the stakeholder discussions, proposals, and presentations shared a common feature: *GHG responsibility for imports into*

[11] CAISO EIM Draft Final Proposal (September 23, 2013) at 90-95. Available at http://www.caiso.com/Documents/EnergyImbalanceMarket-DraftFinalProposal092313.pdf.

California was always allocated to resources that had been <u>incrementally</u> dispatched in the EIM.[12] In those examples, EIM imports serving load in California were always the result of resources outside of California increasing their production in the EIM. Consequently, Powerex believes it was widely understood that it was <u>*only*</u> the resources that increased their production in the EIM that could be "deemed" to serve California loads in the EIM. As implemented, however, the EIM algorithm can deem a resource to serve California load in excess of that resource's incremental EIM dispatch.

IV. The EIM Algorithm for Assigning GHG Responsibility for Imports has had Significant Unintended Consequences and Is Inconsistent with California's GHG Program and Objectives

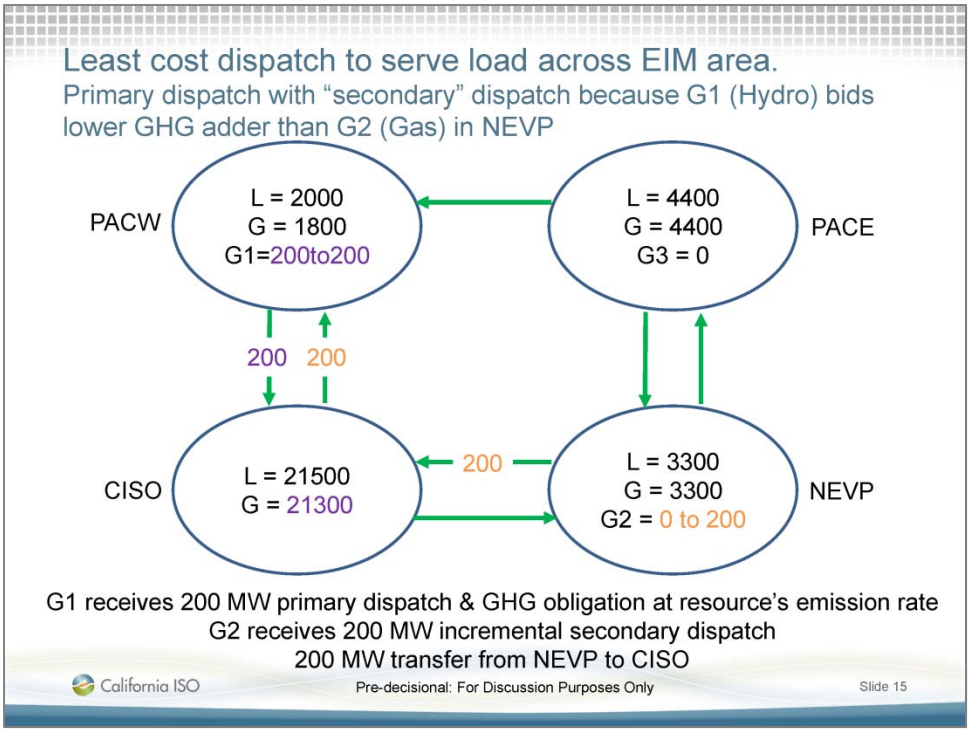
In its simplest form, the EIM algorithm for assigning GHG responsibility is designed in a manner that permits it to "re-arrange" the base schedules of EIM participating resources. Even though a resource outside of California may have a base schedule that clearly and unambiguously commits it to serve load outside of California, it may nevertheless be deemed to also serve load inside of California as a result of the EIM. This appears to be possible even if the level of output of the resource is completely unchanged. In other words, the EIM algorithm goes beyond the "efficient resource shuffling" of the *incremental* production in the EIM—where the lowest-emitting *incremental* output is deemed to serve California load—it may "re-route" *any or all* of the output of a resource.

The potential for such an outcome to occur was recognized and explained in CAISO's June 24 presentation using the example reproduced below.[13] In the example, PACW G1 is a hydro resource located in the PACW BAA, and has a 200 MW base schedule to serve load in the PACW BAA. NEVP G2 is a gas-fired generator located in the NEVP BAA; its base schedule is zero. In the EIM dispatch, the output of the NEVP G2 gas-fired resource is increased by 200 MW; there is no net change in the output of the PACW G1 hydro resource, and generation within the CAISO BAA is reduced by 200 MW. The net EIM Transfer is therefore 200 MW from NEVP to CAISO.

The GHG responsibility for the EIM imports serving load in California would appear to be most reasonably assigned to the NEVP G2 gas-fired resource, which is the only resource that increased its output in the EIM. But under the EIM algorithm currently employed, this is not the outcome that occurs in this example. Instead, the GHG responsibility for the EIM imports serving load in California is assigned to the PACW G1 hydro resource, even though its output level precisely matches its base schedule; it has not increased its production in the EIM at all.

[12] *See, e.g.,* CAISO EIM Draft Final Proposal at 84 ("Thus, ***only the imbalance energy*** portion that is imported into the ISO would be subject to a GHG compliance obligation." Emphasis added) and CAISO stakeholder meeting presentation at slides 39-40 ("EIM dispatch algorithm will include ***GHG bid adder for imbalance energy*** of EIM Participating Resources that transfer to ISO". Emphasis added). Available at http://www.caiso.com/Documents/Agenda-Presentation-EnergyImbalanceMarket-DraftFinalProposal.pdf.

[13] CAISO *Energy Imbalance Market GHG Design Discussion*, June 24, 2016. Available at http://www.arb.ca.gov/cc/capandtrade/meetings/062016/arb_and_caiso_staff_presentations.pdf.



The CAISO's example demonstrates that the EIM is currently able to procure additional energy from resources outside of California and import that energy without recognizing and reporting the correct GHG emissions associated with the imported energy. In Powerex's view, this is contrary to CARB's GHG Regulations that seek to prevent carbon "leakage,"[14] and is also contrary to the purpose of establishing a GHG adder and assigning GHG responsibility for imports in the EIM. The EIM algorithm will dispatch the NEVP G2 resource, and import a corresponding amount into California, based solely on NEVP G2's energy bid. The EIM algorithm will ignore the GHG adder for NEVP G2, and will also ignore if G2 indicates it is not willing for its output to be imported to California at all.[15] By ignoring the GHG adder, the EIM algorithm may even dispatch NEVP G2 under circumstances in which it would not be dispatched if its GHG adder was appropriately included. Powerex believes this is not how stakeholders expected the EIM's GHG adder to work. Moreover, in Powerex's view the current EIM algorithm not only distorts the dispatch decision, it also assigns GHG responsibility for the import to the wrong resource. In this case, the California import is "deemed" to come from PACW G1, and not from the NEVP G2 resource that was actually dispatched. This incorrect assignment results in the California import being reported as sourced from a non-emitting resource rather than from an emitting resource. It also results in "deemed deliveries" from PACW, even though the e-Tags will show energy transfers in the EIM being delivered from NEVP to CAISO and rather than from PACW to CAISO.

Appendix A contains a more extensive discussion of the CAISO's example, as well as additional scenarios using different assumptions. Each example explores both the dispatch solution that Powerex understands would result from the current EIM least-cost optimization, as well as the assignment of GHG responsibility based on how that algorithm has been described to date.

[14] Under AB 32, "leakage" is defined as "a reduction in emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state." California Health & Safety Code Section 38505(j).

[15] *Supra* note 13 at slide 16.

The outcomes under CAISO's example, above—as well as under each of the other scenarios explored in Appendix A—appear to Powerex to be inconsistent with the core purpose of California's carbon program, in at least the following ways:

1. **Dispatches the wrong resources.** If the EIM algorithm correctly recognized that NEVP G2 was the resource actually producing the incremental energy that is being imported into California, it would evaluate the cost of dispatching that resource based on both the energy bid component and its GHG adder. Under CAISO's example, this may make the dispatch of NEVP G2 uneconomic, and instead the EIM would seek to dispatch other, lower cost and/or lower GHG-emitting resources to meet California's needs.
2. **Promotes carbon "leakage."** The failure to recognize the GHG attributes of resources used to supply imports to California appears to unintentionally undermine CARB's rules to address "leakage," allowing GHG emissions to shift from in-state sources (where they are regulated) to out-of-state sources (where they are not regulated).
3. **Disadvantages California resources compared to out-of-state generation.** The CARB rules regarding imports are also intended to prevent in-state generation from being unfairly disadvantaged and displaced by energy imported from outside of California. The current EIM algorithm appears to unintentionally weaken those protections.
4. **Reduces and/or nullifies incentives for clean electricity imports.** The CARB rules regarding imports also seek to encourage imports from low- or zero-GHG resources rather than from higher-GHG resources. Powerex believes this objective is undermined by the current EIM algorithm, which can allow the GHG intensity of external resource production to be ignored and can result in high-GHG emitting out-of-state resources being dispatched instead of lower-GHG emitting out-of-state resources.
5. **Improperly assigns GHG responsibility to the wrong resources.** In the CAISO example, the PACW G1 hydro resource will be informed that it was deemed to import 200 MW into California, despite having committed and scheduled its 200 MW of output to serve load in the PACW BAA. Despite producing exactly according to its base schedule, PACW G1 will now incur the obligation to report its "deemed" California import to CARB and to surrender the associated quantity of GHG emissions allowances, if any. Critically, this reassigning of energy production associated with PACW G1's base schedules (without any actual changes in PACW G1's production level) occurs even though PACW G1 has already explicitly *chosen* to schedule delivery of its base schedule volume to specific loads outside of California, and even though PACW G1 did *not* offer to sell the base-scheduled portion of its energy production in the EIM. Conversely, NEVP G2 may bear *no* GHG responsibility, even if it was the sole resource incrementally dispatched in the EIM to satisfy an imbalance in the CAISO.
6. **May lead to double-counting of clean imports into California.** The 200 MW of imports assigned to PACW G1 in the CAISO example contradicts the base schedules submitted by PACW G1, in which the output was committed to serve load in PACW. But the EIM would also disregard base schedules in which PACW G1 was committed and e-Tagged prior to the EIM to serve load in California. This could lead to the clean import being claimed twice: first for the scheduled delivery from PACW G1 into California—as confirmed by its e-Tag—and then a second time for the deemed delivery from PACW G1 in the EIM. Through no action of its own,

PACW G1 may appear to be the source of 400 MW of clean imports into California even though it only produced 200 MW in that hour.[16]

7. **Favors EIM participation by (and use of) high-GHG resources.** The current EIM algorithm creates an opportunity for high-GHG generation resources outside of California to do something they cannot otherwise do, which is to produce energy that results in EIM imports into California while potentially avoiding CARB's GHG Regulations. This may make EIM participation highly attractive for high-GHG resources outside the state, and may unintentionally provide additional financial incentives for their increased use and continued operation.

8. **Discourages EIM participation by (and use of) low- or zero-GHG resources.** By not properly distinguishing between high- and low- or zero-GHG resources, the EIM may discourage (or at least may not encourage) participation by clean resources. It may also not provide the appropriate level of financial incentives to expand the use of clean resources as intended under the state's GHG program.

9. **Understates demand for GHG emissions allowances.** By not accurately recognizing the GHG intensity of resources that increase their output in connection with EIM imports serving load in California, the current EIM algorithm understates the GHG emissions allowances that are required to be surrendered. This effectively leaves additional allowances available for other entities to acquire to support additional GHG emissions. Depressing the demand and the price for all California GHG allowances weakens the incentives to achieve the state's emissions reduction targets.

Perhaps of greatest concern to Powerex is that each of these problems can be expected to grow as the EIM footprint expands, regardless of whether each problem is experienced frequently today. For example, there may currently be relatively few day-ahead imports into CAISO that are scheduled and e-Tagged from clean resources in the PacifiCorp or NV Energy BAAs, and hence there may currently be only limited risk that California may double-count clean energy imports from those resources (*i.e.,* once as base schedules associated with day-ahead imports into California, and a second time through the deemed delivery approach of the EIM). However, the EIM footprint is already set to expand to other BAAs that do have significant quantities of zero- or low-GHG resources, and many of these resources may be used to support deliveries to California in the CAISO's day-ahead market, potentially opening the door for significant growth in inadvertent double-counting.

Moreover, given the potential benefits that the EIM affords participants, it is also plausible that the EIM will continue to expand rapidly and may eventually even become the principal real-time market in the West. Under the current EIM approach, this will likely result in little, if any, GHG carbon allowance obligations being incurred at all in the EIM, including in intervals when increases in production in the EIM are predominantly (or entirely) from GHG-emitting resources. This is because a significantly expanded EIM would likely always include large quantities of base schedules from low- or zero-GHG participating resources, providing an ample base of clean out-of-state resources whose delivery commitments can be "re-arranged" by the EIM algorithm and "deemed" to be the source of EIM imports serving load in

[16] Under the current version of MRR Section 95111(b)(2)(E)(3), while hourly meter data is required to verify the import of energy from a specified source via an e-Tag, "untagged power deliveries, including EIM imports" are excluded. The potential for double counting is enhanced in circumstances where PACW G1 is sold to a third party as a "Specified Contract". If the third party imports this energy into California, the third party may claim the import as a specified source and have the import verified based on the associated e-Tag and meter data. This import could also be a "base schedule" under the EIM. If G1 is then deemed delivered in the EIM, the generation output supporting the non-EIM import may also be reported by the EIM entity in support of a "deemed" EIM import. Powerex notes that the EIM exemption in MRR Section 95111(b)(2)(E)(3) is proposed for removal in the *Proposed Amendments to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions,* available at http://www.arb.ca.gov/regact/2016/ghg2016/ghgatta.pdf.

California, even if the resources that actually increase production in the EIM are entirely different and have high GHG emissions.[17] The EIM algorithm already "deems" approximately 75% of all EIM imports into California to be from zero-GHG resources, despite these resources representing less than 10% of the energy produced in the PacifiCorp and NV Energy BAAs. Continued EIM expansion utilizing the current EIM algorithm can only be expected to increase the occurrence and magnitude of this incorrect tracking of GHG emissions.

In Powerex's view, these results would represent a significant setback to California's carbon program. After developing and fostering appropriate price signals to preferentially encourage imports into California from low- and zero-GHG emitting out-of-state resources, the development and expansion of the EIM has substantial potential to increasingly mute these price signals, and to enable imports of energy from high-GHG emitting resources largely as if the CARB program did not exist at all.

V. The Proposed Amendments to the GHG Regulations Are Unlikely to Correct the Adverse Outcomes of the Existing Approach

Powerex agrees with CARB that the existing approach for allocating GHG responsibility for EIM imports serving load in California needs to be examined, and potentially revised. Powerex believes the apparent flawed outcomes produced by the EIM algorithm were unforeseen and unintended. While the adverse consequences are numerous, they are ultimately rooted in two key problems:

- The EIM algorithm does not correctly consider GHG emissions in the dispatch of out-of-state resources to serve load inside the state; and
- The EIM algorithm does not correctly allocate GHG allowance obligations to the out-of-state resources that are used to serve load inside the state.

A. The Proposed Amendments Do Not Address the Key Problems

Neither of these two key problems is remedied by Proposed Amendments to the GHG Regulations. Based on Powerex's preliminary review, only one of the many adverse consequences of the existing EIM algorithm appears to be addressed by the Proposed Amendments to the GHG Regulations. Namely, the Proposed Amendments to the GHG Regulations would increase the total GHG emissions obligations that must be reported—and the allowances that must be purchased and surrendered—to at least equal the application of the "unspecified source" GHG rate to EIM imports serving load in California.[18]

Unfortunately, however, the Proposed Amendments to the GHG Regulations do not appear to require CAISO to make any modifications to its existing approach for selecting which EIM participating resources to dispatch. Consequently, virtually all of the adverse consequences identified above will continue to occur:

[17] More specifically, whenever the EIM includes base schedules from participating clean resources that equal or exceed the EIM transfer capability into California, the current EIM algorithm would automatically create an opportunity for the EIM to increase production from out-of-state fossil fuel generators, directly resulting in increased power deliveries to California, but without incurring any carbon allowance obligation at all.

[18] See proposed new MRR Section 95111(h)(1)(A) in the *Proposed Amendments to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions,* available at http://www.arb.ca.gov/regact/2016/ghg2016/ghgatta.pdf.

- By not correctly recognizing the GHG costs of incremental out-of-state resources, the EIM will continue to dispatch high-GHG out-of-state resources instead of low-GHG out-of-state resources under certain conditions.
- By not correctly recognizing the GHG costs of incremental out-of-state resources, the EIM will continue to displace production from in-state resources with production from out-of-state resources in a manner that results in "leakage" under certain conditions.
- The EIM will continue to become a "market of choice" for high-GHG out-of-state resources, and continue to provide revenue opportunities not otherwise available to such resources.
- The EIM will continue to discourage (or at least not fully encourage) participation by low- or zero-GHG out-of-state resources by not properly recognizing or accurately compensating the clean attributes of these resources.
- The EIM will continue to be able to "re-arrange" base schedules and delivery commitments made prior to the EIM, potentially leading to double-counting of out-of-state clean resources.

B. Assigning GHG Responsibility to "EIM Purchasers" is Inequitable

The Proposed Amendments to the GHG Regulations would require an annual calculation of a supplemental compliance obligation based on the annual GHG emissions from out-of-state resources that serve California load through the EIM, but are not otherwise accounted for through the EIM algorithm. This supplemental compliance obligation would be paid for by "EIM purchasers," which are "entities that purchase from EIM … to serve load in California."[19] This implies that the obligation will be assigned to California consumers, and not to the high-GHG out-of-state resources dispatched in the EIM. Powerex believes this is both inappropriate and inefficient. First, California load is settled at locational marginal prices ("LMPs") within California, which already include the GHG adder of the marginal generating unit to serve load at the applicable location. Under the Proposed Amendments to the GHG Regulations, California consumers will also face a second charge for GHG costs, which in many hours will amount to a double recovery of GHG costs from consumers. Second, the proposed approach departs from the CARB framework of assigning GHG reporting and compliance responsibility either to the *resource* or to the *importer* of electricity, and would now assign that responsibility to the entity that receives the import. This would result in two comingled "classes" of CAISO purchases inside California: those that "include" all GHG costs, and those for which the purchaser will still incur an additional GHG-related cost. Notably, this cost will not be known until long after the fact, and purchasers will have little or no ability to avoid incurring it.

Ultimately, the Proposed Amendments to the GHG Regulations would serve only to require the purchase of additional GHG emissions allowances. While this may be considered a limited improvement over the existing approach, Powerex believes that achieving the objectives of the CARB program requires changes to the manner in which the EIM decides to dispatch out-of-state resources to ensure that those decisions correctly consider GHG emissions when energy is being imported into California.

[19] Proposed amendment to Section 95802(a) of the Cap-and-Trade Regulation set forth in *Appendix A – Draft Staff Report: Initial Statement of Reasons - Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation,* available at http://www.arb.ca.gov/cc/capandtrade/draft-ct-reg_071216.pdf.

C. Exposing EIM Participants to Accusations of "Resource Shuffling" is Unnecessary and Harmful

In addition, under the Proposed Amendments to the GHG Regulations, EIM participants could be exposed to accusations of violating CARB's regulations by engaging in "Resource Shuffling," which could carry serious consequences. In the context of the Cap-and-Trade Regulation, "Resource Shuffling" means, in part, "any plan, scheme, or artifice undertaken by a First Deliverer of Electricity to substitute electricity deliveries from sources with relatively lower emissions for electricity deliveries from sources with relatively higher emissions to reduce its emissions compliance obligation."[20] Resource Shuffling is prohibited and a violation of the Cap-and-Trade Regulation.[21] Currently, Resource Shuffling does *not* apply to deliveries "resulting from an economic bid or self-schedule that clears the CAISO day-ahead or real-time market."[22]

The Proposed Amendments to the GHG Regulations include a modification to the above list of activities that do not constitute Resource Shuffling. Specifically, the draft proposes to eliminate safe harbor protections for deliveries resulting from a bid that clears the EIM.[23] Powerex strongly opposes this proposal as both harmful to the EIM and ill-suited to addressing CARB's concerns.

As Powerex understands the proposed regulation, EIM participants could potentially be exposed to claims of having engaged in a "plan, scheme or artifice" as a result of the manner that the EIM determines each resource's "deemed deliveries" to California, because the deemed delivery outcome of the EIM algorithm could result in a lower-GHG source being substituted for a higher-GHG source. This potential liability exposure is inappropriate, as the "deemed deliveries" are the result of the EIM algorithm, and not the result of any dispatch or reporting discretion exercised by EIM participants. Moreover, because the "deemed delivery" determinations are entirely out of the EIM participant's control, there is nothing that an EIM participant can do to ensure its EIM transactions are *not* found to constitute Resource Shuffling under CARB's regulations. To protect against this risk, EIM participants would need to elect to not permit *any* of their output to be deemed by the EIM algorithm to serve load in California, or avoid participating in the EIM altogether. Both outcomes would reduce the efficiency and economic benefits of the EIM, and would also restrict the opportunities for the EIM to substitute GHG-emitting production within California for lower- or non-emitting production that may be available outside of California, and thus would not be consistent with the goals of the CARB programs.

The proposed changes to the provisions regarding Resource Shuffling merely expose individual reporting entities to potentially being held liable for the flaws of the EIM algorithm, but do not address the root of the problem, as discussed in more detail elsewhere in these comments. The proposed removal of EIM transactions from the Resource Shuffling safe harbor is unnecessary, inequitable, and is likely to undermine the other economic benefits provided by the EIM. Powerex urges CARB to eliminate the changes to the Resource Shuffling provisions from its proposed amendments.

[20] As per § 95802(336) of *California Cap On Greenhouse Gas Emissions And Market-Based Compliance Mechanisms*

[21] *Id.* at § 95852(b)(2)

[22] *Id.* at § 95852(b)(2)(A)(10).

[23] As per § 95852(b)(2)(A)(10) of *Appendix A – Draft Staff Report: Initial Statement of Reasons - Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation*

VI. Potential Frameworks for More Accurately Assigning GHG Responsibility in the EIM

Powerex believes that two potential solutions merit further consideration by CARB, CAISO and stakeholders:

1. Modify the EIM to treat all EIM imports serving load in California as "unspecified source" energy and apply the corresponding GHG-related cost; and
2. Modify the EIM to accurately identify the specific source of EIM imports serving load in California as the EIM resources that are instructed to increase dispatch in the EIM.

A. Option 1: Apply the GHG Emission Rate for Unspecified Source Energy to All EIM Imports Serving Load in California:

Powerex believes that it would be both straightforward and defensible for CARB to require that all EIM imports serving load in California be reported using the "unspecified source" GHG emission rate. This would produce the same outcome as if the EIM did not attempt to attribute California imports to specific resources outside of California. Moreover, it would be consistent with the treatment of imports into California occurring outside of the EIM framework, where only resources with a specified resource contract for their output and an e-Tag demonstrating scheduled delivery to the state are permitted to report a "specified source" GHG emission rate to CARB.

Powerex believes this approach would not require any change to the EIM algorithm. The EIM algorithm would continue to determine which entities are responsible for reporting EIM imports into California to CARB, but the reporting entities would be required to apply the default "unspecified source" emission rate to those imports. Specifically, this approach would modify CARB's reporting rules such that:

- The EIM determination of energy "deemed delivered" continues to establish which entity has the reporting obligation to CARB (*i.e.,* the Scheduling Coordinator for the participating resource deemed to be delivered to California); but
- Such deemed deliveries must be reported using the GHG emission rate for "unspecified source" energy, rather than the GHG emission rate for the specific resource that is "deemed" to deliver to California by the EIM algorithm.

It is entirely appropriate for CARB to amend its regulations to require the use of the "unspecified source" emissions rate when it cannot be confident that an import is genuinely served by the specific out-of-state resource that has been identified; indeed, "unspecified source" is the typical "default" rate under existing CARB regulations. As discussed above, CARB cannot be confident that the current EIM algorithm accurately serves the purpose of identifying a specific out-of-state resource that serves load in California. Thus, the use of "specified source" emission rates is not warranted for reporting EIM imports into California at the present time.

This approach appears to offer several improvements over the existing EIM approach:

- It would make the EIM no more favorable than other markets for importing high-GHG energy into California, and thus would prevent the EIM from becoming a "market of choice" that supports, rather than discourages, production from high-GHG resources outside of California to serve load within the state.
- Reporting all EIM imports serving load in California as "unspecified source" energy would significantly reduce the adverse outcomes associated with the current EIM algorithm's selection

of resources that are "deemed delivered" to California.[24] This would also ensure that the EIM algorithm can no longer lead to double-counting of imports from low-GHG resources or other inconsistent treatment of scheduled deliveries outside of the EIM.

- The purpose of the "unspecified source" emission rate is to reflect the GHG emission intensity of marginal generation outside of California. Based on the recent reports from the CAISO on EIM activity, this appears broadly consistent with the type of resource associated with the majority of energy dispatched in the EIM during periods of EIM imports into California (*i.e.,* natural gas resources). It also appears significantly more accurate than the existing EIM algorithm, which systematically and significantly understates the emissions associated with those imports.
- By applying a uniform GHG adder based on the emission rate for unspecified imports to all EIM imports serving load in California, the EIM will no longer systematically put in-state generation at an economic disadvantage to out-of-state resources. This should reduce the GHG emissions "leakage" that currently can occur.[25]
- It is simple to implement, requiring minor modifications of the Mandatory Reporting Regulation, and is consistent with the existing Cap-and-Trade Regulation. The desirable changes to the EIM would be the result of participants rationally submitting GHG adders that reflect the "unspecified source" treatment of EIM imports serving load in California, rather than requiring direct changes to the EIM algorithm.
- This approach does not require changes to the EIM design, hence it appears subject only to the CARB process for modifying its regulations.

In Powerex's view, Option 1 represents a significant improvement over the Proposed Amendments to the GHG Regulations, since it is not merely an after-the-fact allocation of costs, but rather an explicit recognition of those costs at the time that the EIM dispatch decisions are made. This is critically important, as it goes beyond simply requiring additional GHG allowances to be purchased and surrendered, and actually changes the EIM's use of out-of-state resources to meet California load.

Powerex supports implementing Option 1, on a temporary basis, as the first step to improving how GHG emissions are treated in the EIM. It is a workable and reasonable alternative that can be implemented quickly and can remain in place until appropriate improvements to the current EIM algorithm are made.

B. Option 2: Modify the EIM Algorithm to Accurately Identify the Incremental Generation Imported in California

Concurrent with the implementation of CARB's amendments to its regulations to implement Option 1, above, Powerex believes that CARB, CAISO and stakeholders should simultaneously pursue a second—and, in Powerex's view, preferable—approach. Under this Option 2, the EIM would continue to associate

[24] EIM participating resources would rationally submit GHG adders reflecting the common unspecified emission rate, which would be similar or identical across all resources. Thus, differences in the GHG adder would no longer affect the dispatch of out-of-state participating resources in the EIM. Note that all resources with output that is "deemed delivered" would continue to receive the GHG shadow price, and hence would receive compensation sufficient to cover the CARB compliance cost for these unspecified source imports.

[25] This approach should not be viewed as unjustly detrimental to low-GHG out-of-state resources. The EIM is an imbalance energy market only, used for settling deviations from base schedules. Participating resources continue to have the opportunity to realize the value of their zero- or low-GHG resources by entering into specified-source contracts for delivery to California prior to the EIM. It is only deviations from these scheduled deliveries that are settled through the EIM, and that would be subject to the proposed "unspecified source" reporting requirement.

imports into California with the dispatch of specific out-of-state resources, but would do so in a much more accurate manner. Powerex describes Option 2, below, and also suggests a potential enhancement.

1. *Limit "deemed deliveries" to resource output that is increased in the EIM*

Under this approach, the EIM algorithm would continue to work precisely as it does today, except that imports into California could only be recognized as being sourced from ***incremental production*** in the EIM. In other words, the EIM algorithm would treat base schedules as being unavailable to be deemed to support additional imports into California in the EIM, since that output has already been scheduled outside of the EIM. Other key GHG-related aspects of the EIM algorithm would continue to operate as they do today:

- The EIM dispatch would continue to optimally procure energy for import to serve load in California from those out-of-state resources with the lowest combined offer price for energy and GHG;
- The EIM algorithm would continue to compensate all resources that are "deemed delivered" to California loads based on CAISO's calculated "GHG shadow price;" and
- EIM imports serving load in California would continue to be reported to CARB using the "specified source" GHG emission rate for the participating resource(s) that are "deemed delivered" by the EIM algorithm.

In this manner, the EIM would consider the different GHG costs of out-of-state resources in its dispatch decisions; going beyond merely avoiding "leakage" (between in-state and out-of-state resources) to correctly evaluate the different GHG costs of the various participating resources located outside of the state. Unlike the existing EIM algorithm, however, a resource that simply generates according to its base schedule could not be "deemed" to serve load in California. Similarly, a resource that enters the EIM with a 100 MW base schedule and is dispatched in the EIM to produce a total of 120 MW could only be "deemed" to import at most 20 MW into California.[26] Limiting the EIM's assignment of "deemed deliveries" only to the incremental dispatch of participating resources located outside of the state would more accurately associate imports into California with the out-of-state resources that the EIM instructs to increase output. It would also restore the proper functioning of the GHG adder in the EIM, which can currently be ignored by deeming the California import to come from a different resource, even if that resource did not increase its production in the EIM at all.

Since this second proposed approach could never result in a participating resource being "deemed to deliver" energy beyond the volume of its incremental EIM dispatch, it will fully respect the delivery commitments arranged in base schedules prior to the EIM. This will avoid potential problems with double-counting when the resource's output has already committed to serve load in California or elsewhere outside the EIM.

In short, under this second proposed approach, the EIM allocation of GHG would be consistent with the approach initially described by CAISO in 2013, and generally understood by stakeholders. The EIM would be able to distinguish between out-of-state resources with different GHG emission rates—which could not occur under Option 1.

[26] This is a maximum number, since EIM participating resources may still elect for their output to not be eligible for delivery to California.

2. Potential Enhancement: Permit Excess Base Schedules to be Imported to California

As proposed above, Option 2 would strictly prevent the ability for resource output that is based scheduled ahead of the EIM to then be "deemed delivered" to California in the EIM. However, Powerex recognizes that there is a special and narrow case which may arise in which it is arguably appropriate for resource output included in base schedules to be made available to be "deemed delivered" to California in the EIM. This might occur if forecast load in the EIM Entity is below the base-scheduled load, in which case a portion of the resource base schedules would no longer be needed to serve load outside California. Option 2 could arguably be viewed as requiring that positive imbalances in the EIM BAAs outside of California be self-managed entirely outside of California, even though the EIM was intended to provide joint balancing across the combined multi-state footprint.

If such circumstances are expected to be frequent, Option 2 could be modified to address these conditions. The enhancement would permit the EIM algorithm to correctly identify the out-of-state resources included in base schedules whose output would otherwise be reduced to balance a reduction in out-of-state load. For instance, if load in an EIM Entity BAA is 100 MW less than base schedule, the EIM algorithm could first identify the participating resources (outside of California) whose output would be reduced by 100 MW to absorb the excess energy. The production cost savings from reducing the output from these resources could then be compared to the production cost savings of importing up to 100 MW into California instead, and the EIM algorithm would choose between these two possible outcomes. If an import into California is the most valuable use of the 100 MW of surplus resource base schedules outside of California, this import can credibly be deemed to be sourced from the resources that otherwise would have reduced their output. In other words, the EIM algorithm would be modified to identify the out-of-state EIM participating resource that would have been backed down but for the EIM import to serve California load, and allow the surplus portion of the base schedule associated with that reduction in output to be imported to California.[27]

Powerex notes that the circumstances addressed by this enhancement are examples of the special circumstances that may arise in the EIM. Any proposed revisions to the EIM algorithm should be tested under a range of possible scenarios to examine its performance regarding dispatch of participating resources and assignment of "deemed deliveries" to California. Powerex is optimistic, however, that the current algorithm can be effectively modified to properly incorporate CARB's regulations and notes that there may be additional options for doing so. Powerex believes a series of technical workshops including CARB, CAISO, and stakeholders may be an effective way to consider, assess, and develop an improved EIM algorithm.

C. Summary of Potential Solutions

The current concerns regarding GHG accounting in the EIM arise from two key design considerations in the EIM algorithm:

[27] Similarly, Option 2 could be refined to allocate GHG allowance obligations to out-of-state resources that increase their output above the level that would have occurred in the EIM absent EIM Transfers into California. Powerex believes that incorporating an algorithm that calculates the optimal EIM dispatch without EIM imports into California—and uses that as a baseline for identifying the specific out-of-state resources that support the imports that occur in the binding EIM dispatch—could lead to the most efficient dispatch while fully adhering to CARB's GHG Regulations. While it is not clear to Powerex whether it would be feasible for CAISO to determine the optimized dispatch in the EIM absent EIM imports to California, Powerex supports exploring the feasibility of such an approach. Powerex further notes that, to protect against "double-counting," the CAISO may need to develop safeguards to ensure that any out-of-state resources that are "deemed delivered" to California were not also scheduled for delivery to California in the base schedules.

- How much of the production of an out-of-state resource is eligible to be "deemed" as an EIM import to serve load in California? Is it only the *additional* production dispatched in the EIM, or does it include the production that was already scheduled in advance of the EIM (*i.e.,* base schedules)?
- On what basis does the EIM algorithm allocate EIM imports serving California load to specific out-of-state resources? Are they allocated based on minimizing carbon allowance obligations, or are they allocated to the resources that actually increase production to support EIM imports serving load in California?

Under the current EIM algorithm, the entire output of participating resources—including the base schedules—is eligible to be allocated a "deemed delivery" to California, limited only by the GHG bid quantity. This provides a larger quantity of eligible "deemed sources" than if such deliveries were limited only to the incremental output of each resource in the EIM, over and above the level in the base schedules. The current EIM algorithm then seeks to allocate EIM imports among these eligible "deemed" sources in the manner that minimizes the cost of the reporting obligation. This allocation has nothing to do with the physical flow of energy, nor on what the GHG emissions would have been if imports into California did not occur in the EIM. The current EIM algorithm simply identifies the combination of out-of-state resources that lead to the lowest electricity sector costs (including GHG related costs), thereby minimizing the effect of California's Cap-and-Trade Regulation.

As discussed in Section III, the allocation of EIM imports into California was discussed with stakeholders and approved by FERC in the CAISO's initial design. However, the potential for "deemed deliveries" to apply to base scheduled output, and not just to the additional output dispatched in the EIM, was not apparent at that time. The EIM algorithm's now-apparent ability to "re-route" base schedules in order to reduce the reported GHG emissions for EIM imports is at the heart of the multiple adverse consequences discussed above.

Powerex believes that an appropriate EIM algorithm must not be designed in a manner that permits re-arranging base schedules when determining which resources are "deemed delivered" in the EIM to California. The options outlined by Powerex achieve this objective, either by recognizing that the "deemed delivered" resources do not actually represent the GHG emissions of EIM imports into California (Option 1) or by improving the EIM algorithm to correctly identify the marginal out-of-state resources actually dispatched to support EIM imports into California (Option 2).

Both of the proposals described above would ensure that the EIM takes into account the GHG emissions associated with imports into California in EIM dispatch decisions. This is critical to addressing the current flaws that promote leakage, encourage participation of high-GHG resources, and may discourage participation of low-GHG resources. Moreover, both of these proposals would prevent the EIM from inappropriately re-arranging the delivery commitments of base scheduled supply, and would prevent double-counting of the output of clean resources outside of California. This is a key feature to ensuring that GHG reporting in the EIM does not contradict GHG reporting for transactions arranged outside of the EIM, including in a potential future regional organized market.

While these above improvements could be achieved under either of the two proposed solutions, additional benefits are available under Option 2 that are not available under Option 1. Specifically, Option 2 would fulfill the intended ability for the EIM to accurately and reliably distinguish between different out-of-state resources with different GHG-related costs. Under Option 2, EIM imports serving load in California would be assigned to specific out-of-state resources *incrementally* dispatched in the EIM.

Powerex believes that the Proposed Amendments to the GHG Regulations—which require an annual after-the-fact calculation of residual GHG emissions, and assign this residual to "EIM Purchasers", would only address one of the adverse consequences of the current EIM algorithm. Namely, the Proposed Amendments to the GHG Regulations would require additional GHG allowances to be procured to a level at least equal to the "unspecified rate" for all EIM imports serving load in California. Moreover, the proposed regulations would create additional adverse consequences, including the creation of new after-the-fact compliance risks related to resource shuffling.

The table below summarizes Powerex's evaluation of each of the proposed alternatives, as well as of the *status quo* approach, with respect to the impacts on CARB's programs and on economic dispatch of the EIM.

Problem	***Status Quo***	**CARB Preliminary Draft Proposal**	**Option 1—** EIM Imports reported at Unspecified Source emission rate	**Option 2—** EIM Imports assigned to incremental out-of-state production	**Option 2 (Enhanced)** —Option 2, but EIM Imports may be assigned to out-of-state resources that would reduce output to balance excess base schedules
Dispatches the wrong resource?	**YES**	**YES**	*Improved*	**NO**	**NO**
Promotes "leakage"?	**YES**	**YES**	**NO**	**NO**	**NO**
Disadvantages California resources vs. out-of-state resources?	**YES**	**YES**	**NO**	**NO**	**NO**
Reduces incentives for clean energy imports?	**YES**	**YES**	*Improved*	**NO**	**NO**
Assigns GHG responsibility to the wrong resource?	**YES**	**YES**	*Assignment is at the unspecified rate*	**NO**	**NO**
Potential for Double-counting of clean imports to California?	**YES**	**YES**	**NO**	**NO**	**NO**
Favors EIM participation by high-GHG resources?	**YES**	**YES**	**NO**	**NO**	**NO**
Discourages EIM participation by low- or zero-GHG resources?	**YES**	**YES**	*Improved*	**NO**	**NO**
Depresses demand for GHG allowances?	**YES**	**NO**	**NO**	**NO**	**NO**
Prevents excess base scheduled resources from being imported?	**NO**	**NO**	**NO**	**YES**	**NO**

VII. Conclusions and Next Steps

Powerex shares CARB's concerns that the current EIM algorithm does not accurately and reliably identify the GHG emissions associated with imports into California. The approach has resulted in imports being reported to CARB with emissions that are not consistent with the additional production of out-of-state EIM participating resources. Consequently, the quantity of GHG emissions allowances that have been purchased and surrendered in connection with these EIM imports has been depressed, permitting these allowances to be acquired to support additional GHG emissions by other entities or in other sectors. Moreover, the current EIM algorithm is not providing the intended incentives to promote the use of low- or non-emitting resources for energy imports into California. Instead, the current EIM algorithm unintentionally provides incentives for the participation by and dispatch of higher-emitting out-of-state resources, and can lead to the "leakage" of GHG emissions. It also results in inaccurate GHG emissions data being reported to CARB. These inaccuracies have the potential to undermine the integrity of the Cap-and-Trade Regulation, which relies on accurate emissions data to achieve the emissions reduction target mandated by AB 32. All of these consequences are contrary to California's environmental policy objectives and CARB's programs, which seek to reduce the GHG emissions associated with its electricity sector.

Many of the existing concerns can be addressed through CARB's actions alone. However, as outlined above, Powerex believes that the Proposed Amendments to the GHG Regulations would not resolve CARB's concerns, and may introduce new problems. Specifically, Powerex recommends that CARB strike the changes included within the Proposed Amendments to the GHG Regulations related to a supplemental compliance obligation for GHG emissions from EIM imports into California. Moreover, Powerex also urges CARB to strike the proposed categorical removal of EIM transactions from the "Resource Shuffling" safe harbor that it currently applies to all other short-term and CAISO market transactions.

Powerex recommends that CARB modify its regulations to require that, under the current circumstances, EIM imports into California must be reported using the "unspecified source" emission rate. Such treatment would be fully consistent with a conclusion that the current EIM algorithm does not accurately identify the specific out-of-state resources whose output supports the EIM imports serving load in California. This change should be straightforward to implement, as it would not require any modification of the EIM algorithm, is consistent with existing CARB approaches, and would not appear to require amending the CAISO's tariff. CARB could pursue this change to its regulations immediately, but it should also leave open the possibility that specified-source reporting could once again be supported if and when the EIM algorithm is modified to provide more accurate identification of the out-of-state sources for EIM imports into California. Powerex would support this change in the regulations as the first step to improving how GHG emissions are treated in the EIM.

In addition to these modifications to the GHG Regulations, Powerex would also support continued work among CARB, CAISO, and stakeholders to develop an improved EIM algorithm. The efficiency and environmental benefits of the EIM can and should be further increased by pursuing changes to the EIM algorithm to accurately identify the out-of-state resources that actually support EIM imports serving load in California. Powerex has outlined one such approach, under Option 2, and is committed to continued efforts to develop an improved EIM algorithm. CARB's involvement in these discussions is critical, however, to ensure that any enhanced EIM algorithm produces results consistent with CARB's GHG Regulations and policy objectives.

Ensuring that the EIM properly supports and applies CARB's GHG Regulations and objectives is especially important given that similar issues are likely to be encountered as the CAISO explores

expanding to a multi-state regional market. The solution adopted for the EIM must be compatible with the approach to GHG reporting under a regional market. Ensuring consistency now will help avoid the need for another re-design of the EIM algorithm once a regional market is implemented, and will also provide an appropriate GHG framework for entities that participate in the EIM but remain outside of a regional organized market.

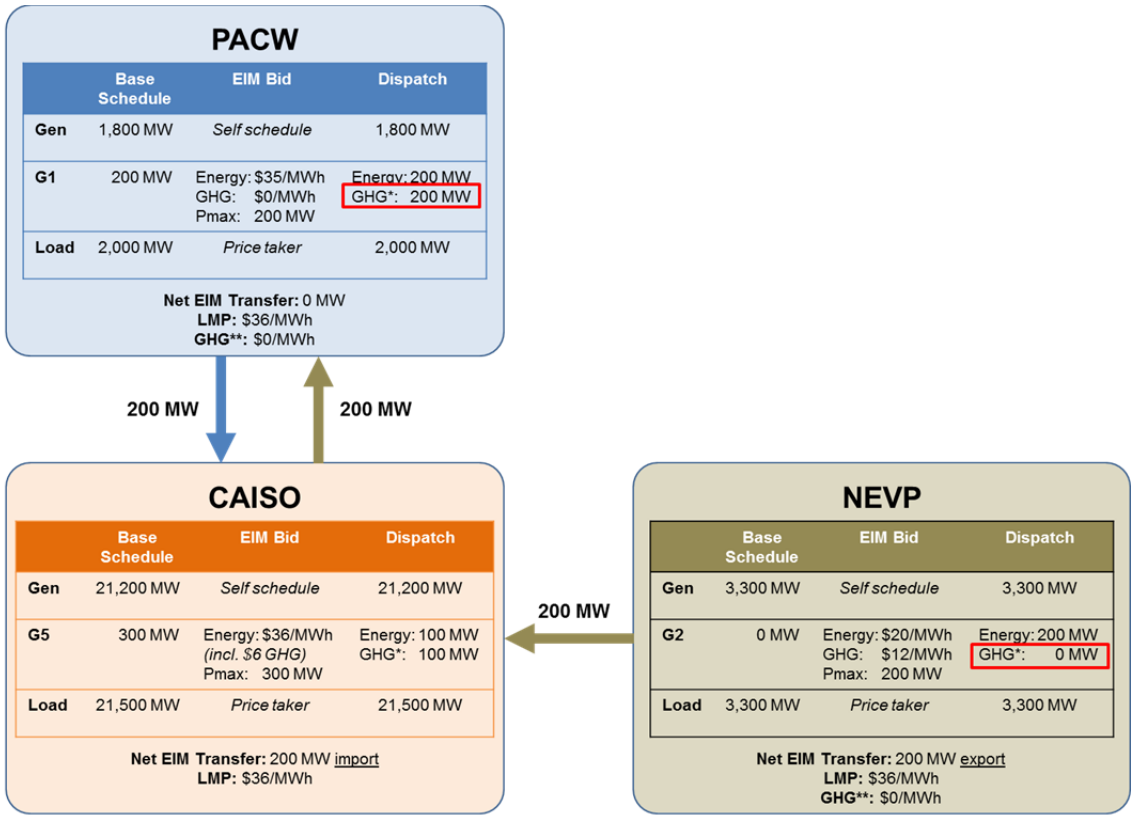
Powerex notes, however, that the specific manner for applying CARB's GHG Regulations in a regional organized market need not be the *same* as the manner for applying them in the EIM. Among other reasons, the EIM applies to a relatively small portion of resource production, serving to *augment* the bilateral transactions with a platform for intra-hour transactions. The EIM must therefore co-exist with a large quantity of transactions and delivery commitments arranged under the contract-path paradigm inside the EIM geographical footprint. The EIM must incorporate GHG emissions in a way that recognizes that not all resource production is due to dispatch in the EIM, and that does not conflict with these non-EIM commitments. A regional organized market, in contrast, would entirely *replace* the existing transaction framework within its footprint. All of a resource's commitment and dispatch will be the result of the regional market optimization, and the market operator will have complete visibility over how the resource is used and how its output flows across the grid. For the above reasons, Powerex believes that improvements in how the EIM treats GHG emissions of out-of-state resources is a distinct and separate issue than how such emissions will be handled in a future regional market.

Appendix A: EIM Dispatch and GHG Allocation

This appendix provides several hypothetical numerical examples of how Powerex understands the EIM algorithm will dispatch both in-state and out-of-state resources. These scenarios are intended to explore how the EIM algorithm's approach to "deeming" the out-of-state resources that are the source of an EIM import serving load in California can distort dispatch decisions, can potentially undermine the intended incentives to encourage participation by low-GHG resources, and result in numerous other adverse outcomes. The EIM algorithm is complex, and documentation of its operation is limited. Powerex therefore hopes that CAISO will identify any aspect of the following scenarios that may benefit from correction or clarification.

Scenario 1: CAISO example with "primary" and "secondary" dispatch

This scenario is consistent with the CAISO example discussed in the main text. Specifically, this scenario consists of each BAA that participates in the EIM submitting base schedules that consist of equal quantities of load and of scheduled generation. In other words, the base schedules imply no net transfers between the BAAs participating in the EIM. For simplicity, PACE is not shown since it does not affect the scenario being discussed, though the same concepts apply to its participation. Additionally, the load forecast in the base schedules is assumed to be perfectly accurate, and be equal to the load forecast used to run the EIM.



* Refers to the quantity of the resource's output that is "deemed delivered" to California, and is subject to CARB reporting and compliance requirements, at the resource's GHG emission rate.
** Refers to the EIM GHG shadow price.

CAISO's example identifies two displacement transactions that occur simultaneously.

The CAISO identifies a "secondary dispatch" in which 200 MW of PACW G1, which has an energy cost of $35/MWh and a GHG adder of $0/MWh, is economically displaced by EIM Transfers from NEVP G2, which has an energy cost of $20/MWh and a GHG adder of $12/MWh. The GHG adder for NEVP G2 is ignored because, in the CAISO example, NEVP G2 is "deemed" to serve load in PACW—where CARB's GHG program does not apply. This "secondary dispatch" is shown as the green arrows in the diagram above.

Simultaneously, the CAISO identifies a "primary dispatch" in which the same 200 MW of PACW G1 generation displaced by NEVP G2 is available to displace 200 MW of CAISO base schedule generation that costs $36/MWh (including a $6/MWh GHG adder) by an EIM Transfer from PACW. This "primary dispatch" leads CAISO G5 to reduce its production from 300 MW to 100 MW and is shown as the blue arrow in the diagram above.

The net result is that CAISO G5 produces 200 MW *less* than its base schedule (reducing from 300 MW to 100 MW), and NEVP G2 produces 200 MW *more* than its base schedule. Nevertheless, the EIM algorithm will "deem" that the EIM import serving load in California was not sourced from NEVP G2, but from PACW G1, despite the fact that the output of PACW G1 *exactly* matches its base schedule quantity of 200 MW.

Importantly, this scenario represents a very particular circumstance in which there are two distinct opportunities for economic displacement to occur. First, the CAISO base schedule includes generation from CAISO G5, despite lower cost supply being available from outside California (*e.g.,* from PACW G1). Second, the PACW base schedule includes generation from PACW G1, despite lower cost supply being available from NEVP G2. The EIM simultaneously resolves both of these "inefficiencies" in the base schedules, potentially introducing some ambiguity regarding whether:

A. NEVP G2 was dispatched to serve load in PACW (displacing PACW G1), and simultaneously PACW G1 was dispatched to serve load in California (displacing CAISO G5); or

B. NEVP G2 was dispatched to serve load in CAISO, and PACW G1 simply served PACW load consistent with its base schedule.

In other words, the characterization of this scenario as involving a distinct and economic "primary dispatch" and "secondary dispatch" appears to make its plausible—or at least not patently wrong—that the EIM algorithm would "deem" the EIM import serving load in California to be a zero-GHG import sourced from PACW G1.

Powerex does not believe that the discussion of the "primary" and "secondary" dispatches in this scenario can be applied more generally to characterize how the EIM algorithm assigns GHG responsibility, however. First, the notion of a rational, simultaneous "primary" and "secondary" dispatch is only possible when the prices offered by resources inside and outside of California are arranged in a very narrow and specific manner:

1. CAISO G5 must be more expensive than PACW G1, *including* GHG costs for both resources (creating the "primary dispatch" opportunity); and

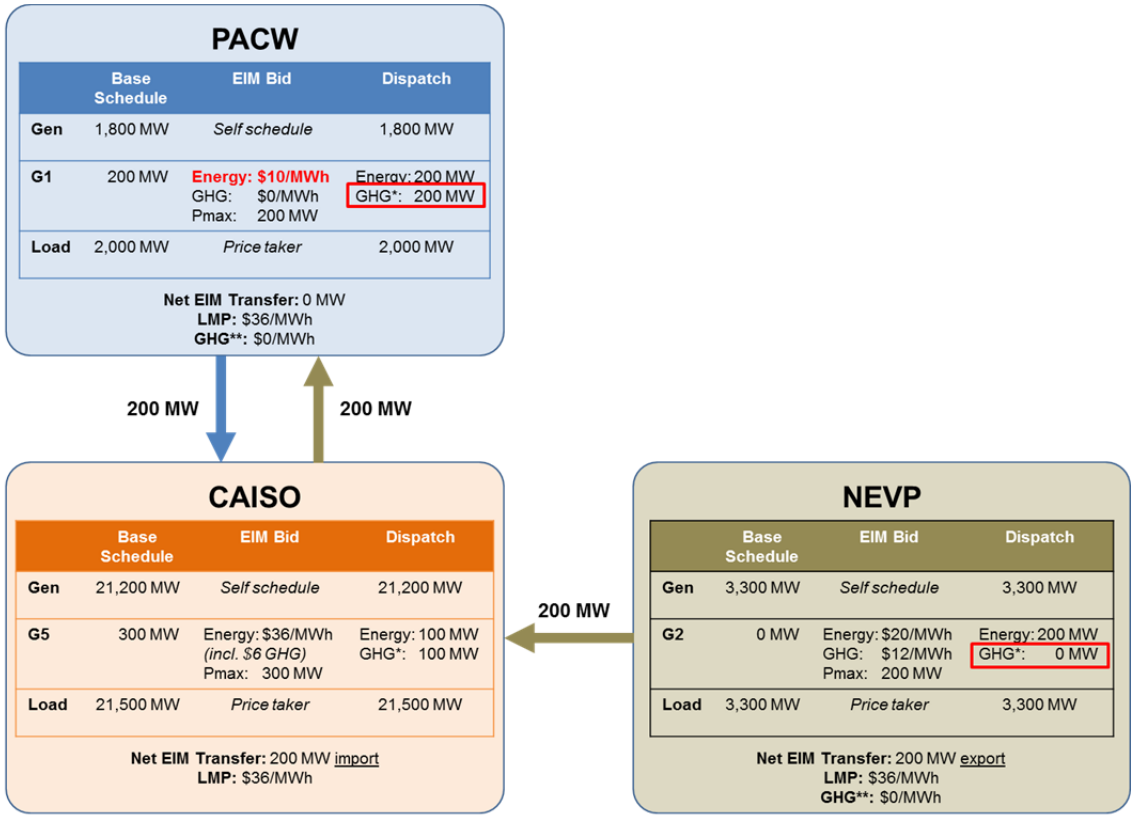
2. PACW G1 must be more expensive than NEVP G2, *excluding* GHG costs for both resources (creating the "secondary dispatch" opportunity).

Powerex believes that such a precise alignment of resource offers is likely to be relatively uncommon in the EIM. In particular, many zero-GHG resources like wind, solar, or run-of-river hydro will tend to have relatively low variable costs, making criterion 2, above, less plausible.

The following scenario shows a much less ambiguous and problematic outcome, in which the EIM algorithm will “deem” the EIM import serving load in California to be a zero-GHG import from PACW G1 even when simultaneous economically driven “primary” and “secondary” dispatch clearly does not occur.

Scenario 2: General example without economically driven "primary" and "secondary" dispatch

This scenario is identical to Scenario 1, except that the energy bid price of PACW G1 is $10/MWh (instead of $35/MWh). This eliminates the economic opportunity for the "secondary dispatch" from Scenario 1, since it is no longer economic to displace the output of PACW G1 ($10/MWh) with output from NEVP G2 ($20/MWh, excluding GHG) on a stand-alone basis. The only economic displacement opportunity available in the EIM is to replace the scheduled output of CAISO G5 ($36/MWh, including GHG) with incremental output from NEVP G2 ($20/MWh energy plus $12/MWh GHG adder). The anticipated solution, based on Powerex's understanding of how the EIM algorithm incorporates GHG costs into its least-cost dispatch, is illustrated below.[28]



** Refers to the quantity of the resource's output that is "deemed delivered" to California, and is subject to CARB reporting and compliance requirements, at the resource's GHG emission rate.*
*** Refers to the EIM GHG shadow price.*

Notably, it appears that the current EIM algorithm would still "deem" that the EIM import serving load in California was sourced from PACW G1, as opposed to from NEVP G2. It is undeniable, however, that the imports into California are due to the incremental output from NEVP G2, and not from PACW G1 (where there is no incremental output at all). For instance, if NEVP G2 did not offer any energy into the EIM, then CAISO G5 would generate according to its base schedule and there would be no imports into California. By the same token, if there were no imports into California, there would be no incremental dispatch of NEVP G2. Reduced output from CAISO G5 is dependent on increased output from NEVP

[28] The least cost nature of the illustrated solution can be compared to the bid-in cost of alternative solutions. In the absence of any incremental output from NEVP G2, CAISO G5 would be dispatched to 300 MW, resulting in a higher bid-in production cost by 200 MW * ($36 - $20) = $3,200. Alternatively, if NEVP G2 displaces CAISO G5, but is deemed to be the source of imports to California (and hence its GHG adder applies), then total bid-in production costs would increase by 200 MW * ($12/MWh) = $2,400 over the solution shown in the diagram. Powerex requests that CAISO confirm whether the current EIM algorithm would produce the solution shown in the graphic, and assign GHG responsibility to PACW G1.

G2, and vice versa, neither of which have any impact on the output of PACW G1. And yet, the current EIM algorithm would "deem" that PACW G1 is the source for the EIM import serving load in California.[29]

There are several adverse consequences in this scenario of the EIM not recognizing that the import serving load in California is, in fact, provided by NEVP G2:

- The GHG emissions associated with serving California load are severely understated. This undermines the accuracy of California's GHG tracking program and reduces demand for California GHG emissions allowances.
- NEVP G2 avoids the cost it would otherwise incur to import energy into California.[30] Instead, NEVP G2 receives the full $36/MWh market clearing price for energy in the EIM. This outcome undermines the price signals intended to be created by California's carbon program to disfavor generation by and imports from high-GHG resources. It also provides greater compensation to high-GHG resources than is otherwise available through transactions outside of the EIM, and thus actually *encourages* EIM participation by, and production from, high-GHG resources.
- PACW G1 incurs a GHG reporting obligation despite not increasing its output or making an energy sale in the EIM. PACW G1 may have fully scheduled its generation to another BAA, but the very act of being an EIM participating resource appears to create the potential to incur a CARB reporting obligation for its full base schedule.
- PACW G1 is "deemed" to deliver energy to California, *in addition* to the delivery arrangements and e-Tags submitted in support of its base schedules. The same 200 MW of PACW G1 may be shown as delivered to the PACW BAA (according to its base schedules)and also to California (according to the EIM "deemed" delivery reports). This undermines the accuracy of California's GHG tracking program, and may even lead to multiple entities reporting delivery of the same energy.

It should be noted that, while this scenario leads to the adverse outcomes above, it does not lead to a distorted displacement of in-state generation by out-of-state resources (*i.e.*, "leakage"). That possibility is explored in the next scenario.

[29] The inclusion in the EIM of the PACW G1 base schedules is critical to the EIM algorithm's ability to ignore the GHG cost of NEVP G2. For instance, if the PACW G1 base schedule (and Pmax) were 100 MW (rather than 200 MW), then NEVP G2 would only be dispatched for 100 MW in this example; beyond that quantity, any further dispatch of NEVP G2 would have to be recognized as serving California loads, which would be uneconomic. As discussed in Section IV, expansion of the EIM will increase the quantity of base schedules from low- or zero-GHG resources, permitting greater amounts of high-GHG resources to be dispatched in the EIM for delivery to California without taking those GHG costs into account.

[30] This cost would be either (1) $12/MWh if the import was under a "specified source" contract; or (2) approximately $5/MWh if the import was reported as an "unspecified source" delivery.

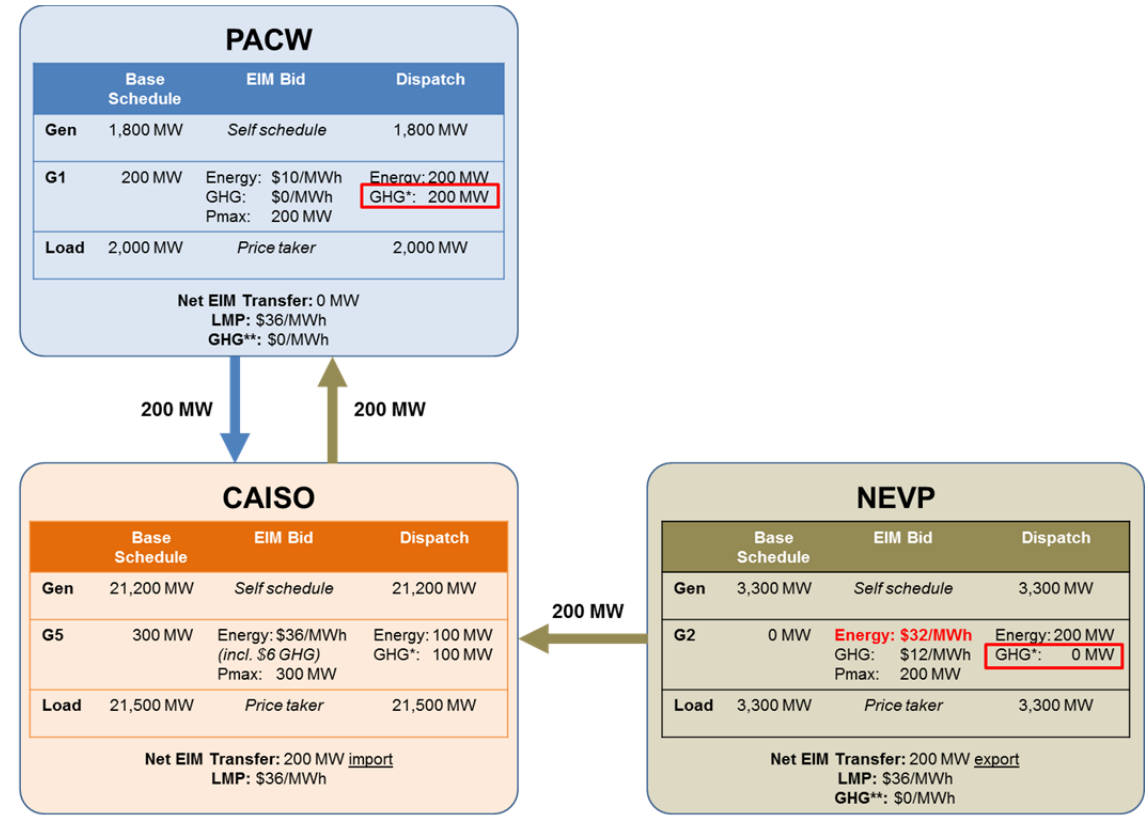
Scenario 3: Example of EIM Algorithm causing "leakage" by dispatching the wrong resource

This scenario is identical to Scenario 2, except that the energy bid price of NEVP G2 is increased to $32/MWh (compared to $20/MWh in Scenario 2). This means that the combined cost of energy and GHG emissions from NEVP G2 is now $44/MWh, which is higher than the combined cost of energy and GHG emissions from CAISO G5 (which remains at $36/MWh).

If the GHG emissions of NEVP G2 were correctly taken into account, then NEVP G2 would not be used to displace the output of CAISO G5. But if the GHG emissions of NEVP G2 are ignored, then it could appear economic to reduce the output of CAISO G5 (saving $36/MWh) and increase the output of NEVP G2 (incurring $32/MWh). The potential for GHG emissions to simply be "shifted" out of California to resources that are not subject to CARB's GHG Regulations has long been recognized, and avoiding such "leakage" is an important part of CARB's mandate. For this reason, CARB has crafted rules to ensure that the GHG emissions of imported power are *not* ignored, and the EIM must be designed to be fully consistent with those rules.

In fact, if CAISO and NEVP were the only two BAAs participating in the EIM, the EIM algorithm would not result in "leakage" in this scenario. The incremental dispatch of NEVP G2 for import into California would be evaluated as having a total cost of $44/MWh (including its GHG adder), and the EIM would correctly recognize this as being a more costly alternative than dispatching CAISO G5, at a cost of $36/MWh.

However, when the EIM also includes the PACW BAA and the base scheduled generation from PACW G1, the EIM algorithm is able to ignore the GHG-related costs of NEVP G2, and it does lead to "leakage," as shown below.



* Refers to the quantity of the resource's output that is "deemed delivered" to California, and is subject to CARB reporting and compliance requirements, at the resource's GHG emission rate.
** Refers to the EIM GHG shadow price.

As with Scenario 2, there is no doubt that the incremental production from NEVP G2 is used to allow CAISO G5 to reduce its output; if there were no EIM imports serving load in California, NEVP G2 would not be dispatched at all in the EIM. In other words, NEVP G2 is clearly used to serve load in California. But also as in Scenario 2, the EIM algorithm does not assign the EIM import serving load in California to NEVP G2, but assigns it instead to PACW G1. By "deeming" this EIM import to California to be from PACW G1, the GHG cost of NEVP G2 is ignored in the EIM dispatch.[31]

This scenario leads to all of the adverse consequences discussed for Scenario 2. In addition, however, this scenario shows that the EIM algorithm for assigning GHG responsibility can actually distort the dispatch of physical generation in the EIM. In this case, NEVP G2 is producing 200 MW, whereas it should not be producing anything at all. This leads to a dispatch solution that actually entails higher total costs (resulting from the EIM dispatch algorithm ignoring some of these costs) as well as higher GHG emissions (compared to base schedules). Yet this outcome would not be reflected in reporting to CARB, which would indicate that EIM imports into California were only from non-emitting resources.

This scenario is especially problematic because NEVP G2 is actually uneconomic for sales both outside California as well as into California:

- Its energy bid price of $32/MWh is higher than the other out-of-state resource in this example (*i.e.* PACW G1, with an energy bid price of $10/MWh); and
- Its energy-plus-GHG bid price of $44/MWh is higher than the other California resource in this example (*i.e.,* CAISO G5, with a total bid price of $36/MWh).

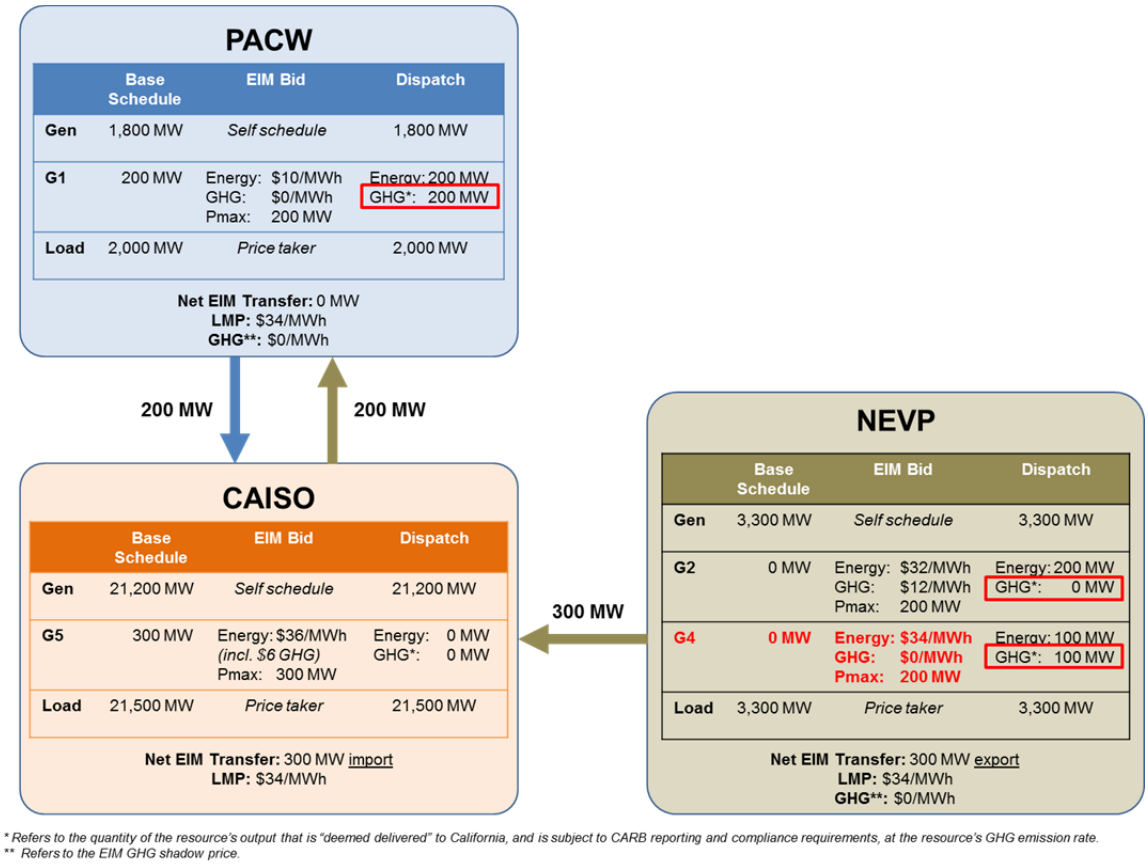
In other words, NEVP G2 cannot economically displace any other generation resource. It is *only* able to appear economic as a result of the current EIM algorithm, which dispatches NEVP G2 but avoids recognizing it as the source of energy imported into California. As a result, the EIM currently provides a unique and favorable opportunity for high-GHG out-of-state resources to make additional sales and earn additional revenue. Rather than discouraging the use of high-GHG out-of-state resources, the current EIM algorithm appears to do the opposite.

The following scenario shows that "leakage" and the favorable opportunities for high-GHG resources can occur even when lower-GHG out-of-state resources are available, and when "leakage" could be avoided.

[31] The least cost nature of the illustrated solution can be compared to the bid-in cost of alternative solutions. In the absence of any incremental output from NEVP G2, CAISO G5 would be dispatched to 300 MW, increasing bid-in production cost by 200 MW * ($36 - $32) = $800. Alternatively, if NEVP G2 displaces CAISO G5, but is deemed to be the source of imports to California (and hence its GHG adder applies), then total bid-in production costs would increase by 200 MW * ($12/MWh) = $2,400 over the solution shown in the diagram. Powerex requests that CAISO confirm whether the current EIM algorithm would produce the solution shown in the graphic, and assign GHG responsibility to PACW G1.

Scenario 4: Example of EIM algorithm causing "leakage" even when a zero-GHG resource was available

This scenario is identical to Scenario 3, except that NEVP includes an additional participating resource (NEVP G4), with an incremental energy offer in the EIM of 200 MW at an energy bid price of $34/MWh and a zero GHG adder. If the EIM consisted of only the CAISO and NEVP, NEVP G4 would be fully dispatched to displace CAISO G5, and NEVP G2 would not be dispatched at all. The inclusion of PACW—and the base schedule of PACW G1—however, leads to a different outcome in which NEVP G2 is fully dispatched and NEVP G4 is only partially dispatched. As in the prior examples, the ability of the EIM algorithm to "deem" the EIM import serving load in California to be sourced from PACW G1 allows the GHG cost of NEVP G2 to be ignored, and hence it appears to be a lower-cost resource than NEVP G4.[32]



** Refers to the quantity of the resource's output that is "deemed delivered" to California, and is subject to CARB reporting and compliance requirements, at the resource's GHG emission rate.*
*** Refers to the EIM GHG shadow price.*

This scenario, like Scenario 3, results in "leakage" of GHG emissions through the dispatch of a resource (NEVP G2) that occurs only because its GHG costs are ignored. Additionally, however, this outcome occurs *even when a lower-cost, lower-GHG resource was available for additional dispatch*. The EIM algorithm does not fully dispatch NEVP G4—even though it is more economic than CAISO G5—and instead dispatches NEVP G2 whose high GHG costs are ignored. In other words, the current EIM

[32] The least cost nature of the illustrated solution can be compared to the bid-in cost of alternative solutions. Scenario 3 showed that the dispatch of NEVP G2 is a lower cost solution than the dispatch of CAISO G5, as long as GHG responsibility was assigned to PACW G1. Alternatively, if NEVP G4 were fully dispatched, then total bid-in production costs would increase by 100 MW * ($34 - $32) = $400 over the solution shown in the diagram. Powerex requests that CAISO confirm whether the current EIM algorithm would produce the solution shown in the graphic, and assign GHG responsibility to PACW G1.

algorithm not only distorts the dispatch between in-state and out-of-state resources (*i.e.,* “leakage”) but it also distorts the dispatch decision between different out-of-state participating resources.

As was also evident in Scenario 3, the EIM algorithm provides uniquely favorable opportunities to high-GHG out-of-state resources. Additionally, however, this scenario indicates that the EIM algorithm may also not be providing the intended favorable market opportunities for low-GHG out-of-state resources.