powerex.
Supply. Flexibility. Commitment.

Powerex Corp.
Suite 1300 – 666 Burrard Street
Vancouver BC Canada V6C 2X8

604 891 5000 PHONE
800 220 4907 TOLL FREE
www.powerex.com

July 5, 2018

Via Electronic Submission

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

Re: Powerex Comments on June 21, 2018 Workshop to Continue Informal Discussion on Potential Amendments to the Cap-and-Trade Regulation

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

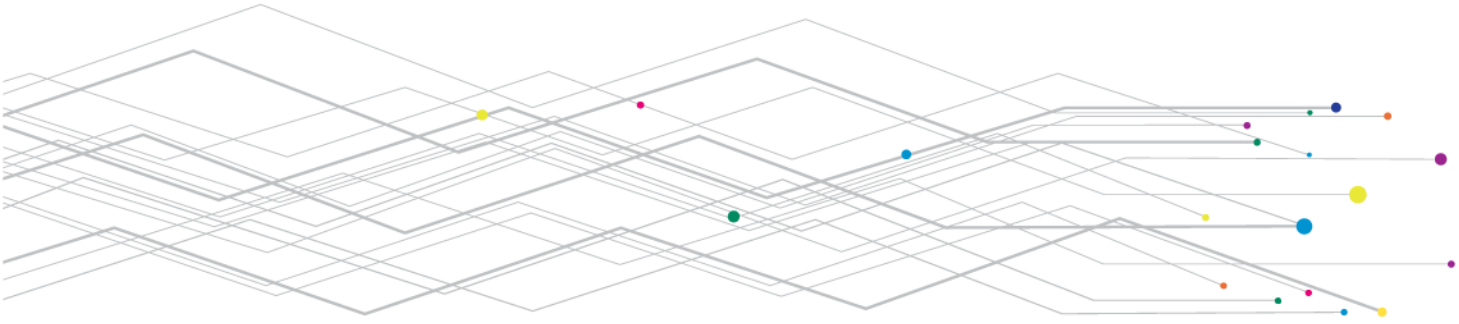
On behalf of Powerex Corp., I submit the enclosed comments to the California Air Resources Board in response to the June 21, 2018 Workshop to Continue Informal Discussion on Potential Amendments to the Cap-and-Trade Regulation.

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

Kind regards,

/s/

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



Comments of Powerex Corp. on June 21, 2018 Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation

I. About Powerex

Powerex Corp. ("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 January 25, 2018.

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 the California Air Resources Board ("CARB") as an Asset Controlling Supplier ("ACS"). In April 2018, Powerex began participating in the Energy Imbalance Market ("EIM") administered by the California Independent System Operator Corp. ("CAISO"), as a Canadian EIM Entity.

II. Introduction

Powerex submits the following comments on the CARB June 21, 2018 Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation.[1] Specifically, Powerex's comments relate to portions of the workshop that focus on aligning CARB greenhouse gas ("GHG") accounting policy and the EIM operated by the CAISO.[2]

Powerex believes that the treatment of GHG emissions under the initial EIM design has led to significant inaccuracy in the accounting of GHG emissions, promoted GHG emissions leakage, and has generally not been aligned with the objectives of CARB's Cap and Trade Program. The CAISO's proposed enhancements are likely to reduce this harm—and hence Powerex supports their implementation—but significant opportunities for inaccuracy will remain.

Powerex therefore strongly supports CARB's efforts to put in place measures to quantify the GHG emissions that are not accounted for in the EIM. These measures can be used to retire additional GHG allowances, as referenced under CARB's EIM Outstanding Emissions methodology, as well as to signal the need for further enhancements to the EIM design in order

[1] CARB presentation, *Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation* (Jun. 21, 2018) ("CARB June 21 Presentation").

[2] CARB June 21 Presentation at 30-34.

to ensure alignment with the objectives of the Cap and Trade Program. As discussed more fully below, Powerex recommends that CARB staff consider the following modifications to its EIM Outstanding Emissions calculation:

- Calculate actual GHG emissions based on EIM resource data, rather than on the default emission factor for unspecified source energy; and
- Allocate responsibility for EIM Outstanding Emissions where it belongs: to the resources emitting GHGs to serve California load, but that received an inaccurately low "deemed" attribution through the EIM software.

III. Powerex Supports Near-Term Enhancements To Reduce The Harm From The EIM's Flawed "Deeming" Approach, But Significant Problems Remain

Accurate accounting for GHG emissions in the EIM is critical to ensuring that the EIM operates in a manner consistent with CARB's Cap and Trade Program for wholesale electricity serving load in California. As should now be clear to all parties, the initial design of the EIM has failed to satisfy the need for such accurate accounting of GHG emissions. This inaccuracy has led—and continues to lead—to GHG leakage through the EIM dispatch of out-of-state natural gas and coal resources serving California load without appropriate recognition of their emissions. As a result, the initial EIM design has:

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

The EIM has expanded market opportunities for out-of-state fossil generation to serve California loads by reducing the two key barriers that previously made such resources relatively uncompetitive to serve California loads: (1) the requirement to purchase transmission service at fixed tariff rates on external transmission systems; and (2) the requirement for energy imports into California to be reported to CARB, and to purchase and surrender the necessary GHG emissions allowances. Prior to the EIM, energy produced by an external fossil generator could be imported as unspecified-source energy, incurring a GHG cost of approximately $6/MWh based on a generic default GHG emission factor, or as specified-source energy, incurring a GHG cost based on the resource's specific GHG emission rate (which could be approximately $15/MWh for a coal unit). Together, the fixed tariff costs of transmission service and the costs of GHG compliance put out-of-state fossil resources at a substantial cost disadvantage relative to in-state California generation.

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

But the EIM design has eliminated both of those cost barriers. Transmission service does not incur an incremental charge in the EIM, while the EIM's "deeming" approach effectively allows external gas and coal resources to be dispatched in the EIM to serve load in California without incurring GHG-related costs. Not only did the EIM eliminate these significant cost barriers, its current software-based centralized dispatch algorithm ensures that *every available opportunity* to avoid and/or reduce these costs is pursued, even if the "savings" are based entirely on avoiding the application of CARB rules and compliance obligations that would apply if the transaction occurred outside of the EIM.

Powerex notes that the above inaccuracy is relevant only when California load is served by EIM imports. In a substantial number of hours—primarily during the middle of the day—California is the source of energy exports to the rest of the EIM area. These exports frequently avoid the need to reduce or curtail production from California renewable resources, particularly solar, and enable out-of-state resources to reduce their output and reduce their GHG emissions. The discussion of the inaccurate accounting of out-of-state GHG emission serving California load should not be taken as a criticism of the EIM more generally, or as a conclusive determination that the aggregate impact of the EIM is to increase, rather than reduce, total GHG emissions.

The flaws in the initial EIM design regarding accounting for out-of-state GHG emissions are now widely recognized. Since 2016, CAISO and stakeholders have explored ways in which the EIM design could be improved to provide for accurate accounting of GHG emissions, and hence fully apply CARB's regulations and policies. However, after extensive effort and after examining numerous proposals, an accurate solution remains elusive. The CAISO's current proposal is an important improvement over the *status quo*, as it reduces the extent of the harm caused by the initial design. However, as discussed below, even the proposed enhancements fall well short of accurately identifying the out-of-state resources (and their GHG emissions) serving California load.[4]

As explained in CARB staff's presentation, CARB must account for "all GHG emissions from the generation of electricity delivered to and consumed in California, whether that electricity is generated in-state or imported."[5] In the EIM, as in most organized markets, there is no inherent relationship between the production of electricity by a generating resource and the location where that electricity is consumed. The EIM design therefore devised a method to create that resource-to-load link. In Powerex's view, this link could be accurately inferred by identifying the out-of-state resources that (1) are dispatched in the EIM to a quantity greater than the generation plan developed ahead of the EIM optimization ("base schedules"); but (2) where the resource would *not* have been dispatched to this level if there had been no EIM imports into California. The first criterion identifies the additional GHG emissions resulting from the EIM generally, which includes serving load outside of California. The second criterion distinguishes additional GHG emissions from resources serving California load (which are subject to CARB

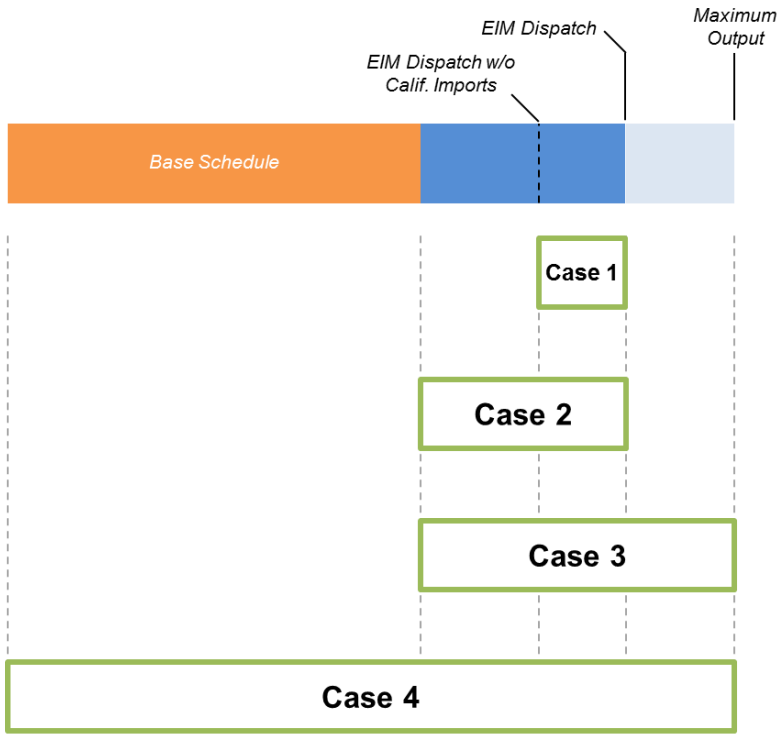
[4] CARB staff notes that the CAISO proposal "does not fully address the [GHG] accounting issue." CARB June 21 Presentation at 31.

[5] CARB June 21 Presentation at 30.

rules) as opposed to additional GHG emissions that would have occurred anyway (which are not).

Figure 1, below, depicts the set of EIM resources satisfying these two criteria, labeled as Case 1. The figure also shows how the group of resources and output that can be "deemed" to serve California load is expanded as each of these criteria are loosened. As discussed in greater detail below, expanding the group of resources that can be "deemed" to serve California load provides the EIM algorithm more opportunities to appear to reduce costs simply by attributing these "deemed deliveries" inaccurately to the lowest-emitting resources. Therefore, as the group of resources that can be "deemed" to serve California load is expanded, the opportunity for inaccurate attribution of GHG emissions is also expanded.

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



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

In Figure 1, above, Case 2 permits GHG attribution to *all* resources that increased production above the quantity included in generation base schedules prior to EIM operation. Some of these resources would have increased production anyway, even if there were not EIM imports into California (*e.g.,* to displace production from other higher-priced out-of-state resources). Case 3 permits GHG attribution to not only all the resources that *actually* increased production above base schedules, but also to all the resources that *could have* done so, since their respective base schedules did not use the full capacity of the resource. Case 4 permits GHG

attribution to all EIM participating resources that are willing to be deemed delivered to California load. This is the loosest case, since it may include all output from every EIM participating resource, even if that output was scheduled outside of the EIM, even if the output did not increase as a result of EIM dispatch, and even if the output would have been exactly the same if California had not received any EIM imports.

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

The CAISO's latest proposal is analogous to Case 3, in which EIM imports serving California load can only be attributed to resources with the *ability* to increase output in the EIM. Compared to the nearly unfettered discretion of the current EIM algorithm (or Case 4), the CAISO's proposal is unequivocally a step in the right direction. But it will still leave significant opportunities for the EIM algorithm to selectively and inaccurately "deem" which resources serve California load. Specifically, California load could still be "deemed" to be served by a clean resource that did not *actually* increase its output in the EIM, or by a clean resource that did increase its output, but would have done so anyway, even with no imports into California. Just like under the existing EIM design, the EIM algorithm will inaccurately "deem" California load to be served from the available resources with the lowest GHG emission factor.

CAISO's prior "two-pass" proposal sought to implement Case 1, by explicitly simulating the EIM dispatch both with and without EIM imports into California. The technical complexity of the two-pass proposal, as well as concerns regarding the potential incentives on bidding behavior, rendered this approach unworkable in the near-term.

The inability to identify a modification to the EIM algorithm that yields a workable, accurate accounting of "GHG emissions from the generation of electricity delivered to and consumed in California"[6] leads Powerex to conclude that the basic premise of how CARB's GHG rules are applied to the EIM is fundamentally and fatally flawed. Simply put, Powerex believes it is not appropriate to apply specified source reporting on the basis of the EIM algorithm's "deemed deliveries" to California. These "deemed deliveries" do not, and cannot, accurately identify the resources dispatched in the EIM to support EIM imports serving California load. Instead, in many cases, the "deemed deliveries" reflect the automated selection of the cleanest participating resources anywhere in the EIM footprint and claiming them on behalf of California.

[6] *Ibid*.

The concept of specified-source reporting is stringent, and deliberately so: it must represent the output of a resource that produced electricity for the specific purpose of delivering energy to be consumed in California. The EIM's "deemed delivered" methodology is entirely inconsistent with this requirement, as the objective function of the EIM algorithm is to minimize total costs, including through the *inaccurate deeming* of which resources served California load.

In light of the above, Powerex supports CAISO's implementation of its current proposed GHG-related EIM enhancements, but only as a near-term measure, and only because the alternative—continuing the extensive leakage enabled under the *status quo*—is far worse. But no party should be under the erroneous impression that the problem will be "fixed" by the proposal. It is therefore imperative for CARB to assess the extent to which leakage continues to occur in the EIM, and do so in a robust and accurate manner. Such ongoing assessment will inform CARB, CAISO and stakeholders of the need to more fundamentally reconsider how CARB's reporting and compliance obligations apply to the EIM.

Moreover, no party should be under the erroneous impression that the enhanced EIM approach is a suitable framework for a regional day-ahead organized market. Quite the opposite: part of what limits the harm from the current and proposed EIM approaches is the relatively modest volumes of energy that serve California load in that market. But the far larger volume of transactions and deliveries that occur on a day-ahead basis significantly increase the need for accurate GHG tracking, and also increase the consequences for getting it wrong. Powerex therefore supports CARB staff's clarification that the current informal discussions are limited *only* to the need to make near-term improvements in the EIM. Any consideration of a regional day-ahead market will require a fresh examination of how to align California's GHG rules with a multi-state organized market. If an accurate GHG framework is developed such that a regional day-ahead market can move forward, it will then be necessary to extend that framework to the real-time market (*i.e.,* the EIM).

IV. The Calculation Of EIM Outstanding Emissions Should Be Based On Actual Emissions Of EIM Resources Dispatched To Serve California Load

CARB staff proposes to retain the current methodology for calculating EIM Outstanding Emissions. In particular, Total California EIM Emissions would continue to be calculated by multiplying the total EIM imports into California (including a transmission loss factor) by the default emission factor for unspecified source energy imports, which is currently 0.428 $MTCO_2$/MWh.[7]

The calculation of the EIM Outstanding Emissions would remain unchanged, and hence would begin from the assumption that each MWh of EIM imports serving California load emitted 0.428 $MTCO_2$. This assumption would be made for every hour of the day, across all seasons of the year, and regardless of changes in the composition of EIM participating resources from year

[7] CARB June 21 Presentation at 33.

to year. Any such blanket assumption will necessarily be wrong, and its use would only be warranted in the absence of a more accurate and workable alternative.

Powerex believes that a more accurate and workable approach is available now. Namely, CAISO will have granular data on both the actual dispatch of each EIM participating resource, as well as the quantity of its output that was "base scheduled" to serve non-California loads in advance of the EIM dispatch. It will therefore be straightforward to calculate, for each 5-minute interval, the total amount by which each EIM participating resource was dispatched to increase its output in the EIM. And since each EIM participating resource will be associated with a resource-specific GHG emission rate, it will also be straightforward to calculate the additional GHG emissions from the resources that are dispatched to increase their output in the EIM.

To be clear, Powerex is *not* proposing to change the default emission factor, or the manner in which it is calculated. Powerex does propose, however, that the default emissions factor not be used in the calculation of Total California EIM Emissions. Powerex believes the calculation of EIM Outstanding Emissions should be modified, and should begin from a calculation of Total California EIM Emission that is based on accurate data regarding the weighted average GHG emissions rate of the specific EIM participating resources that are dispatched to produce additional electrical output in each EIM interval. This will support a more accurate assessment of the additional GHG emissions that will need to be retired through CARB's proposed program, and will also provide a more accurate metric for gauging whether further improvements to the EIM algorithm are necessary.

Powerex believes that a more accurate calculation of Total California EIM Emissions is necessary because the default emission factor very likely understates the actual GHG emissions from EIM participating resources serving California load. As demonstrated in prior comments, the entities that are dispatched in the EIM above base schedules in the intervals that California load is served by EIM imports have a generation fleet that is predominantly comprised of natural gas and coal resources.[8] Such a generation mix will almost certainly emit GHGs at a rate that exceeds the default emission factor of 0.428 $MTCO_2$/MWh. And, in the unlikely event that the actual GHG emissions of EIM resources serving California load are lower than the default emission factor, the use of actual emissions to calculate EIM Outstanding Emissions can avoid needlessly increasing the cost of the Cap and Trade Program.

Minimizing the potential harm from over- or under-stating GHG emissions requires using the best available information to estimate Total California EIM Emissions. Powerex believes that the granular resource-specific data on EIM dispatch and EIM base schedules constitutes this best available information, and urges CARB to leverage this data to ensure the most accurate possible accounting for GHG emissions in the EIM. Powerex has provided a detailed description of how this calculation could be accomplished in Appendix A to its *Comments on April 26, 2018 Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation,* submitted to CARB on May 10, 2018.

[8] Powerex Comments on April 26, 2018 Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation (Submitted May 10, 2018),

V. CARB Should Explore Alternative Proposals To Ensure A More Equitable Allocation Of Responsibility For EIM Outstanding Emissions

CARB staff proposes to place the obligation for EIM Outstanding Emissions on California "EIM Purchasers," defined as "[a]n entity that purchases energy through EIM to serve California load."[9] Powerex does not support this approach. We note that, while entities in California that purchase energy in the real-time market (which includes the EIM) likely receive *some* of the benefit of inaccurate GHG attribution, they are neither the *only* beneficiaries nor even the primary ones. This raises concerns about whether the proposal would be equitable, particularly if implemented as a long-term measure.

The EIM Outstanding Emissions arise because the EIM algorithm, even with the proposed enhancements, understates the GHG emissions of out-of-state resources serving California load. This is to the benefit, first and foremost, of the particular out-of-state resources whose emissions are understated, as these resources will produce and sell more electricity (than if their emissions were accurately reflected in the EIM algorithm), but will avoid the reporting and compliance obligations intended under CARB's Cap and Trade Program.

A secondary beneficiary of understated GHG emissions is purchasers of real-time electricity in California, including both loads that did not fully meet their needs in the day-ahead markets as well as generators that are dispatched to produce less energy than their day-ahead awards. California purchasers of real-time energy can benefit in those intervals that the market price for real-time electricity is based on a marginal resource that is located outside of California *and* the GHG-related costs for that resource are understated in that interval. These conditions have the effect of lowering the real-time market price paid by purchasers of real-time energy relative to what it would otherwise be. Given the conditions that must be present for California purchasers to significantly benefit from EIM GHG inaccuracy, however, Powerex believes the overall benefit to California purchasers is likely to be modest.

CARB staff's proposal would allocate the entire obligation for EIM Outstanding Emissions to California EIM Purchasers. This will result in California purchasers bearing all of the costs associated with the leakage-related benefits received by both California purchasers *and* by out-of-state GHG-emitting sellers. While this approach would likely negate any benefit derived by California EIM Purchasers, it also effectively subsidizes the GHG-related compliance costs that should properly be incurred by out-of-state resources producing and selling electricity in the EIM to serve California load.

In light of these concerns, Powerex does not support CARB staff's proposal to allocate the entire obligation to California EIM Purchasers, particularly on a long-term basis. Instead, Powerex urges CARB to explore a more equitable approach for determining who will bear the cost of those additional GHG allowances.

[9] CARB June 21 Presentation at 32.

VI. Powerex Proposal For Calculating Total California EIM Emissions

Powerex proposes the following amendment to 95111.(h).(1).(B).

§ 95111.(h).(1.) (B) Total California EIM Emissions as calculated by ARB. Annually, based on each 5-minute interval, ARB will calculate the CO2 equivalent mass emissions associated with imported electricity in EIM using the following equation:

$CO2e = MWh$ ~~$\times EFunsp$~~ $\times TL \times EF_{EIM}$

Where:

CO_{2e} = CO2 equivalent mass emissions from Total California EIM electricity (MT of CO_{2e}).
MWh = Megawatt-hours of EIM imports used to serve California load.
~~EFunsp = Default emission factor for unspecified electricity imports in 95111(b)(1)~~
~~EFunsp = 0.428 MT of CO2e/MWh~~
TL = 1.02 (transmission loss factor) in 95111(b)(1).

EF_{EIM} = emissions factor for all EIM participating resources with positive incremental dispatch in the 5-minute interval.

EF_{EIM} = Sum of EIM Emissions MT of CO_{2e} / Sum of Incremental dispatch MWH in EIM

Sum of EIM Emissions, MT of CO_{2e} = Σ $EF_{EIM\text{-}PR}$ * ($MWH_{RTD\text{-}PR}$-$MWH_{Base\text{-}PR}$)

Sum of Incremental dispatch, MWH in EIM = Σ ($MWH_{RTD\text{-}PR}$-$MWH_{Base\text{-}PR}$)

$EF_{EIM\text{-}PR}$ = Emissions Factor in CAISO EIM Master file for Participating resource

$MWH_{RTD\text{-}PR}$ = Final dispatch energy quantity for EIM Participating Resource

$MWH_{Base\text{-}PR}$ = Base schedule energy quantity for EIM Participating Resource

This proposal is detailed in *Comments of Powerex Corp. on April 26, 2018 Workshop to Continue Informal Discussion on Potential Amendments to Cap-and-Trade Regulation,* submitted on May 10, 2018