

**Comments of Powerex Corp. on
Local Market Power Mitigation Enhancements
Draft Final Proposal**

| Submitted by | Company | Date Submitted |
|---------------------------|----------------|-----------------------|
| Mike Benn 604.891.6074 | Powerex Corp. | February 8, 2019 |

Powerex appreciates the opportunity to comment on the January 31, 2019 Local Market Power Mitigation Enhancements Draft Final Proposal and related stakeholder discussion (“Draft Final Proposal”).

Powerex strongly supports the Draft Final Proposal as a set of inter-related enhancements that can make voluntary participation in the Western Energy Imbalance Market (“EIM”) significantly more workable for storage hydro resources located outside of the CAISO balancing authority area (“BAA”). Furthermore, Powerex believes that the development of the Draft Final Proposal reflects the engagement and responsiveness of the CAISO to the priorities, perspectives, and circumstances of participants outside of the CAISO BAA, which are often different from the priorities, perspectives, and circumstances that initially shaped the current design of the CAISO markets. Powerex is optimistic that this same type of engagement and responsiveness will enable progress on other initiatives to increase coordination and transactions between the CAISO BAA and entities elsewhere in the WECC.

The remainder of Powerex’s comments on the Draft Final Proposal focuses on the use of market index prices from multiple geographic hubs in the calculation of a hydro resource’s default energy bid (“Hydro DEB”).¹ Powerex believes including prices from multiple market hubs is vital to a workable Hydro DEB for entities that transact at multiple locations throughout the west. In particular, Powerex supports CAISO’s proposals to:

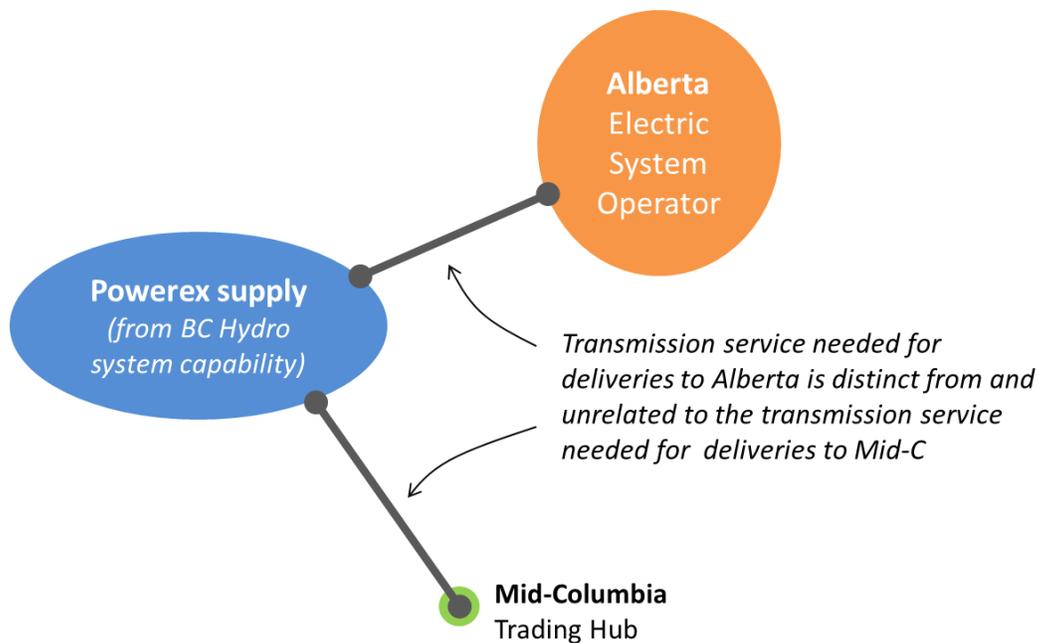
1. Include spot and futures price data for Alberta, as a location that is as “local” to Powerex as Mid-Columbia; and
2. Include spot and futures price data for more distant geographic hubs, in recognition of the very limited current opportunities to de-link the value of energy from the use, and value, of transmission rights in the bilateral market environment.

¹ Powerex’s perspective on and support for other aspects of the proposed enhancements can be found in its comments on prior versions of the CAISO proposal.

I. Alberta Must Be Recognized As A Second “Local Market Hub” For Powerex

The Draft Final Proposal expresses CAISO’s willingness to include spot and futures prices from the Alberta market location, subject to verification of the robustness of reported market index prices there. Powerex appreciates CAISO’s responsiveness to this request, and wishes to more fully explain why the inclusion of Alberta is vital to any estimate of Powerex’s opportunity costs.

As an initial matter, Powerex believes it would be incorrect to view Powerex’s supply as “local” only to Mid-Columbia, with Alberta being one of several potential “remote” market locations. In fact, the physical generation capability that supports Powerex’s participation in the EIM is located entirely within British Columbia, and is effectively “between” Mid-Columbia and Alberta. That is, Alberta is not a destination market that lies “beyond” Mid-Columbia, but rather is a second “local market hub” for Powerex, as illustrated below.



In any given period, market conditions at both Alberta and Mid-Columbia are relevant to Powerex. For instance, if prices in Alberta are relatively high while prices at Mid-Columbia are relatively low, Powerex may be efficiently maximizing its sales and exports to Alberta and also, separately, maximizing its purchases and imports from Mid-Columbia. If limited hydro energy is inefficiently depleted as a result of inaccurate mitigation in the EIM, under these circumstances the foregone sale opportunity could indeed be a reduction in the sales to Alberta. It cannot be assumed that any energy depleted in the EIM can simply be replaced via additional purchases from Mid-Columbia, as opportunities to purchase and import energy from Mid-Columbia may be maximized already.

Similarly, during periods when prices at Mid-Columbia are relatively high and prices in Alberta are relatively low, Powerex may be efficiently maximizing its sales and exports to Mid-Columbia and also, separately, maximizing its purchases and imports from Alberta. The opportunity cost of energy dispatched in the EIM may well be based on a reduced ability to sell at Mid-Columbia,

and there may be no opportunities to make additional purchases from Alberta (as they may be maximized already).

Additionally, the value of sales to Alberta (when priced higher than Mid-Columbia) cannot simply be obtained by re-selling transmission rights, for two main reasons:

First, there is no robust secondary market in the west for the re-sale of unused transmission rights to deliver energy between different geographic regions. Without such a robust secondary market, there can be no reasonable expectation that an entity can sell its transmission rights at all, or that the price earned on any sale of transmission rights will reasonably reflect the difference in energy value between two locations.

Second, even if there *was* a deep, liquid and efficient market for the re-sale of unused transmission rights in the west, the specific transmission rights that Powerex uses to deliver energy from BC to Alberta would not enable other entities to deliver energy from Mid-Columbia to Alberta. In order to deliver the output of resources in BC to the market in Alberta requires a single segment of point-to-point transmission service on the BC Hydro transmission system: from within BC to the BC-Alberta border. But this transmission, if re-sold in a hypothetical liquid secondary market, may be of limited value to other entities, as there are very few entities that market the output of resources located within BC *other than Powerex*. In other words, the transmission from BC to Alberta that is valuable and vital *to Powerex* does not, on its own, enable another entity to capture the difference in market value between Mid-Columbia and Alberta.

Powerex therefore requests that the “local price floor” component of the Hydro DEB be defined as the higher of the “local market hubs” for entities, such as Powerex, that participate in the EIM with the capability of resources located between (or adjacent to) two valid local hubs. In the case of Powerex, the “local price floor” would be based on the higher of Alberta or Mid-Columbia prices for the defined temporal products (*i.e.*, day-ahead, balance-of-month ... etc.). CAISO’s Draft Final Proposal, with the inclusion of Alberta, achieves this outcome.

Powerex is supportive of CAISO’s need to verify that price marks in Alberta are sufficiently reliable to be included in a DEB formula. Powerex does not believe that this requirement can be boiled down to a “bright line” test that considers only the volume of transactions relative to the volumes at other locations, however. Even market indices that are based on transaction quantities that are not “large” compared to the total of all transactions at a market hub may still represent a very important consideration for an individual seller, as it is often the best available representation of expected market prices for future physical sales of energy at that market location. Rather than requiring a pre-determined volume of transactions in order to include a market location, Powerex believes that CAISO can gain confidence regarding the validity of price information by examining the methodology used to derive the prices, the independence of the entity that makes these determinations, and the extent to which these prices are published and relied upon by other parties.

II. Relevant Remote Market Hubs Must Be Included In The Hydro DEB, Consistent With The Bundled Value Of Energy And Transmission In Western Bilateral Markets

The Draft Final Proposal explains that the Hydro DEB would include a “short term floor” as well as a “long term/geographic floor” component. The “short term floor” would use price information only from the “default bilateral hub,” but:

a resource owner will also have the opportunity to select additional bilateral hubs, for use in the long term / geographic floor component of the default energy bid. To do this, the market participant will be required to show the CAISO firm transmission from the resource to one of these hubs or an electrically similar location.²

Powerex, as well as many other stakeholders engaged in the sale of the output of storage hydro resources throughout the west, have repeatedly expressed the need for a Hydro DEB to recognize that sellers face a range of potential opportunities at different locations.

Some stakeholders have opposed this aspect of the proposal. For example, the CAISO Department of Market Monitoring (“DMM”) stated that:

this approach inappropriately assigns the *value of transmission* between two regions to the *value of energy* in the lower priced region. The value of the transmission should be equal to the difference in prices between the source and delivery point of the transmission.³

Powerex appreciates that this presumption may, indeed, be valid for a resource located within the footprint of an RTO with locational marginal prices (“LMPs”), since the value of transmission between different locations within the RTO can generally be fully separated from the value of energy at a resource’s node. In the context of an RTO, transmission rights are generally financial in nature, with the holder receiving the “congestion value” between two locations each and every hour, regardless of whether they also have resource output that may flow on the path of the transmission rights. Similarly, opportunities to sell the output of a resource can be entirely independent of whether the seller also holds financial transmission rights on the paths over which the resource delivers its output. Indeed, a core feature of organized markets with LMP is to separate the efficient commitment and dispatch of physical resources from the collection of value related to investments in transmission rights. But this same presumption is entirely invalid outside of a full organized market environment, since the value of transmission is derived primarily through the *use* of that *physical transmission* to deliver the output of a specific resource to a specific delivery location.

² Draft Final Proposal at 38.

³ CAISO DMM comments on Revised Straw Proposal, at 4. (December 10, 2018) (Emphasis in original)

1. *Energy purchased at a local hub is frequently not a substitute for energy produced by (or depleted from) a hydro resource*

The differences between organized markets and bilateral markets are highlighted by further examining DMM's reasons for its concern. DMM states that:

If the resource owner has transmission ... to an alternate hub that it cannot use after selling power today, the resource may still purchase power in the lower priced hub (closest to the resource) and then utilize the transmission and sell the purchased energy at the higher priced hub.⁴

Powerex understands this statement to mean that any foregone production from the resource can be substituted with a market purchase of energy at the resource's local market hub. In practice, however, there are several aspects of bilateral markets and transmission scheduling that severely limit the extent of this substitutability.

First, the sale "at the higher priced hub" may take any number of forms, including an industry standard 16-hour or 8-hour block, a non-standard delivery period of a few hours, or perhaps just a single hour. The sale opportunity "at the higher priced hub" may occur in the forward, day-ahead, or real-time markets. And the sale opportunity may be for generic energy or for specified-source energy (*i.e.*, with a particular greenhouse gas emission factor tied to the generating resource) or certified carbon-free energy. A flexible, non-emitting storage hydro resource could be used as the source for *any* of these sales opportunities. In Powerex's experience, flexible, non-emitting storage hydro resources are generally used to sell the higher priced opportunities, which are often the most attractive individual hours within a standard 16-hour or 8-hour block, on the most attractive days, and often as a premium non-standard product due to its clean attributes. In contrast, "purchase[d] power in the lower priced hub (closest to the resource)" will generally only be a viable supply alternative for a very limited subset of sales opportunities. This is because the bilateral markets primarily transact in standard 16-hour and 8-hour products. These 16-hour and 8-hour products are traded one day at a time (on a day-ahead basis), or as a bundle of all remaining days in the month (balance of month), or as a bundle of all of the days in a future month (monthly futures). In addition, power that is purchased through automated exchanges such as ICE generally does not meet the requirements for specified-source or carbon-free deliveries. Thus the "substitutability" argument simply does not apply if the marginal opportunity for the resource is *anything other* than a standard 16-hour or 8-hour product, traded either day-ahead or in one of the standard multi-day bundles, for "unspecified source" energy.

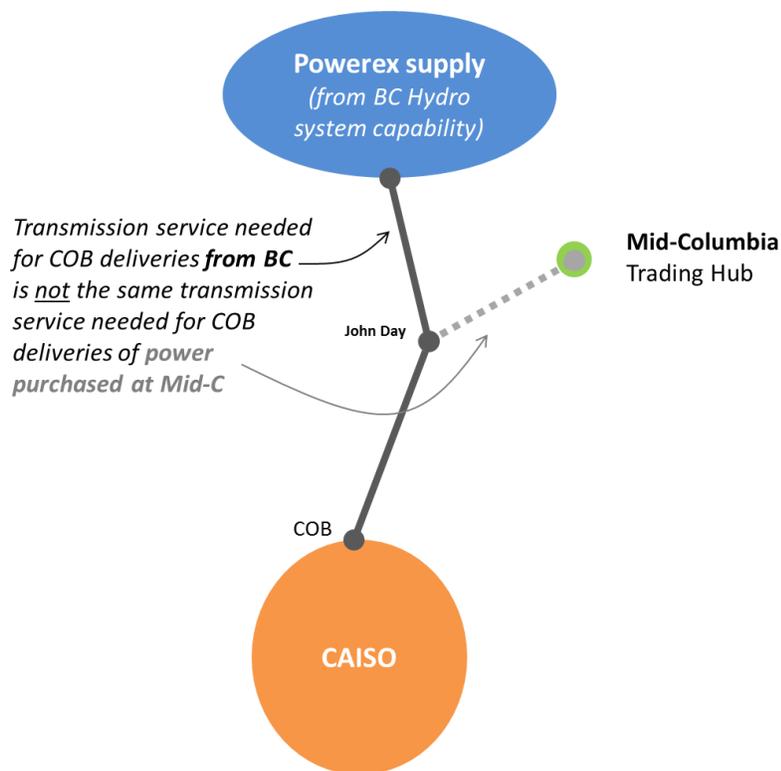
It is also important to recognize that the CAISO is only proposing a limited number of forward hub prices. Out of necessity, the Hydro DEB uses the best price data that is available, recognizing that it is used as a proxy for a wide range of potential future opportunities for which price data is *not* available. While the Hydro DEB may use the price for, say, August 2019 on-peak futures at SP15, this does not mean that the marginal opportunity for a storage hydro

⁴ *Id.*

resource is assumed to be a sale of that exact product. To the contrary, given that one of the key valuable attributes of a storage hydro resource is the ability to shape its output into the highest-value individual days and hours, committing to produce energy for all 16 hours of every on-peak day of August 2019—a total of 432 hours—may well be a very sub-optimal use of such a resource. It is far more likely that a flexible storage hydro resource would anticipate being able to respond to a range of future opportunities during individual hours and on discrete days, whose anticipated value would likely move together with, but not be equal to, the price of the monthly on-peak futures product. It is thus critical to keep in the mind the distinction between the numerous actual opportunities available to the seller of the output of a storage hydro resource and the market hub index prices proposed to be included in the Hydro DEB.

A second major factor that can prevent market purchases from substituting for the output of a specific resource is the need for transmission service. That is, while a participant may have acquired transmission between its resource and a distant delivery location, this does not imply that the participant can acquire transmission service from a local market hub (or another resource located elsewhere in the region) to the distant delivery location. For example, Powerex may have opportunities to sell energy at COB or at NOB (e.g., through the CAISO intertie bidding framework). If its limited energy is depleted in the EIM, it will need to forego some of these other sales opportunities unless it can find an alternative source of supply for those sales. Powerex understands DMM's statement to imply that Powerex could simply purchase energy at Mid-Columbia "and then utilize the transmission and sell the purchased energy at the higher priced hub." But even if Powerex could acquire clean, non-emitting hydro supply for the precise hours of Powerex's foregone sales, the transmission rights that Powerex uses to deliver energy produced in BC to COB or NOB are not necessarily the transmission rights that would be needed to delivery energy purchased from other resources in the region to COB or NOB.

As shown in the diagram below, in order to deliver energy from the BC Hydro system to COB (or NOB), Powerex must generally obtain a segment of BPA transmission service from the BC-US Border to John Day (or Big Eddy), and a second segment of BPA transmission from John Day to COB (or from Big Eddy to NOB). To deliver energy purchased at Mid-Columbia (or another resource location) to COB or NOB, however, requires a segment of BPA transmission from a different location (i.e., from Mid-Columbia) to John Day (or Big Eddy). This segment, shown as the dotted line in the diagram, must either be purchased at additional cost, or Powerex will need to request to "move" its existing service to this new path, but there is no assurance that either request will actually be granted.



For the foregoing reasons, the presumption that the output of a hydro resource can be perfectly replaced by energy purchased at a local market hub is not valid, as the products typically traded in the bilateral markets are very limited, and delivery of purchases generally requires transmission rights on a different path, which may not be available or which may result in additional costs. If limited energy from a storage hydro resource is depleted in the EIM, it may reduce the ability of the resource to make high-value sales at other times during the storage horizon, with no ability to supply that sale through a market purchase. This highlights the disconnect between the theoretical ability to separate transmission value from a resource’s sale opportunities, through the replacement of energy supply with market purchases, and the actual ability to do so in areas outside of organized markets.

2. A Robust Secondary Market For Transmission Rights Does Not Currently Exist

DMM proposes a second reason why it believes it is not necessary to include prices from additional market locations in the Hydro DEB. Specifically, DMM states that “the resource owner could sell the transmission, which should be valued at the difference in prices between the two points.”⁵ Powerex agrees with the theoretical concept, but this opportunity simply does not meaningfully exist in practice. There is very little activity in the re-sale of unused transmission rights from one transmission customer to another over the major transmission segments that are key to inter-regional trade in the west. As one example, the tables below

⁵ *Id.*

summarize analysis by BPA regarding re-sale of transmission service on its Southern Intertie (i.e., between John Day and COB and between Big Eddy and NOB).

Table 3.1: Count of Southern Intertie Resales

| Fiscal Year of Start Date | Duration of Resale | | | | | Grand Total |
|---------------------------|--------------------|-----|------|-------|------|-------------|
| | Hour | Day | Week | Month | Year | |
| 2012 | 0 | 0 | 0 | 4 | 0 | 4 |
| 2013 | 538 | 1 | 1 | 13 | 2 | 555 |
| 2014 | 165 | 16 | 1 | 10 | 2 | 194 |
| 2015 | 61 | 2 | 0 | 14 | 2 | 79 |
| 2016 | 22 | 0 | 1 | 3 | | 26 |
| 2017 | 50 | 0 | 1 | 2 | 0 | 53 |
| 2018 | 11 | 1 | 0 | 4 | 1 | 17 |

Table 3.2: Average Price \$/MWh of Southern Intertie Resales Weighted by MWh

| Fiscal Year of Start Date | Duration of Resale | | | | | Grand Total |
|---------------------------|--------------------|--------|--------|--------|--------|-------------|
| | Hour | Day | Month | Week | Year | |
| 2012 | | | \$ 4.2 | | | \$ 4.2 |
| 2013 | \$ 3.3 | \$ 3.5 | \$ 4.9 | \$ 2.3 | \$ 3.8 | \$ 4.1 |
| 2014 | \$ 3.1 | \$ 3.0 | \$ 2.5 | \$ 1.3 | \$ 3.8 | \$ 3.4 |
| 2015 | \$ 3.2 | \$ 3.3 | \$ 3.7 | | \$ 3.8 | \$ 3.8 |
| 2016 | \$ 2.7 | | \$ 2.7 | \$ 2.1 | | \$ 2.7 |
| 2017 | \$ 4.4 | | \$ 3.8 | \$ 3.8 | | \$ 4.0 |
| 2018 | \$ 2.1 | \$ 3.8 | \$ 4.3 | | \$ 2.0 | \$ 2.2 |

Table 3.3: MWh of Southern Intertie Resales

| Fiscal Year of Start Date | Duration of Resale | | | | | Grand Total |
|---------------------------|--------------------|--------|--------|-----------|-----------|-------------|
| | Hour | Day | Week | Month | Year | |
| 2012 | | | | 1,155,000 | | 1,155,000 |
| 2013 | 59,598 | 1,200 | 67,200 | 867,840 | 1,752,000 | 2,747,838 |
| 2014 | 17,257 | 22,775 | 11,400 | 763,200 | 1,752,000 | 2,566,632 |
| 2015 | 2,977 | 1,656 | | 1,375,200 | 876,000 | 2,255,833 |
| 2016 | 1,886 | | 17,400 | 330,000 | | 349,286 |
| 2017 | 23,442 | | 16,800 | 18,000 | | 58,242 |
| 2018 | 1,887 | 1,800 | | 65,448 | 701,280 | 770,415 |

Source: Bonneville Power Administration, *Southern Intertie Data As Of FY 2018*, at pg. 7. (Note that years refer to Bonneville's fiscal year, with ends September 30.) Available at: https://www.bpa.gov/Finance/RateCases/BP-20/Models/Southern%20Intertie%20Data%20Report_FY2018.pdf

Even though the Southern Intertie facilities are the primary transmission link between the Pacific Northwest and California, BPA's analysis identified only a very limited number of transactions, representing less than 2% of outstanding BPA rights in the North to South direction, and an average re-sale price that is generally less than \$5/MWh. Clearly, a secondary transmission market that consists of less than 2% of the potential transaction volume cannot be regarded as providing a reasonable opportunity for entities to sell any unused transmission rights and realize the expected value of regional price differences.

3. *Residual Value Of Transmission, If It Becomes Material, Could Potentially Be Deducted From Value Of Energy At Remote Hubs*

The inclusion in the Hydro DEB of prices from multiple major market hubs is necessitated by the limited ability to unbundle the value of energy produced by a resource from the value of using transmission rights to deliver that output to a destination market or customer. Powerex recognizes that the “bundling” of energy and transmission value is largely an empirical matter; driven by circumstances rather than by design. Indeed, one may consider a spectrum of potential conditions. At one extreme, energy and transmission are completely separable; the value of transmission between two locations does not depend on the dispatch of any particular resource, nor is the dispatch of a resource affected by whether or not the same seller holds transmission rights. The CAISO BAA could be described as being close to this end of the “unbundling spectrum,” as a generator generally has a full opportunity to sell every defined product right at its own location, and can do so even if it holds no congestion revenue rights, while an entity that holds congestion revenue rights receives the value of those rights even if it does not have a generator.

At the other extreme, energy and transmission are completely linked, and the opportunity to capture *any* value of transmission *requires* access to the output of a resource. In this scenario, there is no value to the transmission rights to the extent there is no available output from the resource that intended to use these transmission rights; the transmission rights entitle the holder to a delivery service, and provide no financial value otherwise. The current bilateral markets in the WECC outside the CAISO BAA could be described as being close to this end of the spectrum, with limited exceptions.

Market conditions are always evolving, however, and the circumstances that currently lead to relatively tight bundling of energy and transmission rights in areas outside the CAISO BAA may diminish in the years ahead. For instance, a robust secondary market for re-sale of transmission rights may develop, perhaps spurred through the development of organized day-ahead markets. If so, and if CAISO determines that the re-sale value of unused transmission rights may be material, then CAISO could revisit whether modifications are needed to incorporate the resale value of unused transmission rights in the calculation of the Hydro DEB. For instance, the CAISO could revise the formula to use the price at a remote hub *net of any material resale value* of the hydro entity’s transmission rights between the local market hub and that remote location.⁶

Under current conditions, however, Powerex does not believe that CAISO should make any adjustments or modifications to its proposed use of multiple market hub locations. Both the available data and the comments of numerous entities with direct experience selling the output of storage hydro resources support viewing the value of a resource’s output as closely bundled

⁶ In the theoretical and unrealistic case of perfect efficiency, the resale value would entirely offset the difference in price, effectively collapsing the Hydro DEB formula to only the local market hub. Realistically, however, the resale value is likely to represent only a portion of this price difference, and it would be inappropriate to eliminate the use of multiple market locations altogether absent a complete transition to a full RTO across the west.

with the value of transmission rights to specific delivery locations in the areas outside the CAISO BAA. The Draft Final Proposal strikes a balance between fully recognizing this fact and limiting the number of market locations considered in the Hydro DEB to only a subset of the large number of locations at which many entities actually transact. If the CAISO were to go further, as some have suggested, and completely eliminate additional market locations from the Hydro DEB at this late stage of the proposal, it would create a significant disconnect between the Hydro DEB calculation and the information that many entities have stated they actually consider when formulating the opportunity cost of their resources. Such a disconnect can only result in a less accurate Hydro DEB, thereby reducing incentives for voluntary participation in the EIM.