# Comments of Powerex Corp. on Local Market Power Mitigation Enhancements Working Group

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Powerex appreciates the opportunity to comment on the October 10, 2018 Local Market Power Mitigation Enhancements Working Group discussion ("Working Group"). Powerex has provided more comprehensive comments on this initiative in response to the CAISO Issue Paper[1] and in its presentation at the Working Group,[2] and hence these comments focus on specific topics that were discussed at the Working Group.

## I. Voluntary Nature Of EIM Participation And Supply Offers

The Working Group included substantial discussion regarding the voluntary nature of the Western Energy Imbalance Market ("EIM"). Critically, this voluntary nature is not limited to the choice of becoming an EIM entity, but extends to the hourly determination of the participation level of EIM entities and participating resources. Powerex appreciates CAISO's confirmation in the Working Group that there is no obligation under the tariff for an EIM entity or participating resource to submit any energy offers into the EIM or to make any quantity of transmission capability available in the EIM.

At the same time, some EIM entities have amended their open access transmission tariffs such that EIM prices are used to financially settle the energy and load imbalances of their transmission customers. This creates the potential for some transmission customers to be exposed to prices that may not be just and reasonable to the extent the potential to exercise market power exists and is actually exercised. The EIM's design, including its local market power mitigation ("LMPM") approach, was the result of applying the market design developed and implemented for the CAISO balancing authority area ("BAA"). While expedient, it means that market power mitigation in the EIM was not designed from a "blank slate" based on the approach that is most appropriate for a voluntary market. The decision to extend California's market design has had the result of putting the purely voluntary nature of supply participation in

[1] Powerex comments on LMPM Enhancements Issue Paper and Straw Proposal (October 4, 2018). *Available at:* http://www.caiso.com/Documents/PowerexComments-LocalMarketPowerMitigationEnhancements-IssuePaper-StrawProposal.pdf

[2] Powerex presentation at October 10, 2018 Working Group on LMPM Enhancements. *Available at:* http://www.caiso.com/Documents/PowerexPresentation-LocalMarketPowerMitigationEnhancementsWorkingGroup_Oct10_2018.pdf

the EIM in tension with the need to protect transmission customers that are exposed to EIM prices for imbalance energy when conditions may not be competitive.

Notably, this tension did not exist prior to the implementation of the EIM. The tariffs of most transmission providers set the rates for energy imbalance and load imbalance service based on published market indices, even if the transmission provider faced an actual cost of energy that was higher or lower than this established rate. The responsibility for providing energy imbalance service at just and reasonable rates, in other words, did not extend beyond the transmission provider. Under the current design of the EIM, however, transmission customers are assured of just and reasonable rates by mitigating the offer prices, and altering the dispatch, of any and all EIM resources capable of serving them. Thus the current design does not merely mitigate the offer prices of resources offered by the particular transmission provider with the obligation to serve its customers at just and reasonable rates, it also mitigates the offer prices of other unaffiliated resources in that BAA, and even unaffiliated resources elsewhere in the EIM, none of whom have any service obligation to the transmission customers being protected. Under the current EIM design, the costs of protecting transmission customers from unduly high prices have effectively been shifted from the customers' transmission provider to potentially *all* sellers in the EIM, who now bear this cost when LMPM measures override their voluntary offer prices and dispatch their resources at those lower mitigated prices.

The shortcomings of transplanting the LMPM design originally developed for resources within the CAISO's full organized market territory to the purely voluntary EIM have proven highly problematic for hydro resources. As discussed extensively in prior comments, the marginal costs of hydro resources cannot be accurately reflected in an administrative default energy bid ("DEB") formula, and the consequences of mitigation include not only economic losses but also operational challenges, both in the current dispatch interval and in future periods. Maintaining operational control and autonomy to decide how to deploy hydro resources is of paramount importance to northwest hydro utilities, making the problematic outcomes under the current LMPM design untenable.

Powerex has been, and remains, committed to working with CAISO and other stakeholders to improve the existing LMPM framework to the point where it can be broadly workable for hydro-based sellers. If a workable solution cannot be reached under the existing framework, however, it may warrant taking a step back and revisiting what type of local market power mitigation is most appropriate for a market in which supply is voluntary. For instance, it is Powerex's understanding that the imbalance energy market implemented in SPP several years ago relied on an offer price cap, which was known to participants ahead of time, and hence did not create the risk of re-pricing a resource after its bid was submitted. Moreover, Powerex understands that the offer price cap in SPP was based on a calculation of the levelized annual cost of a hypothetical new thermal facility divided by the limited number of hours that a region was constrained, resulting in a relatively high offer price cap at most locations. Notably, SPP did not attempt to calculate the marginal cost of each specific resource offered into the market and use that calculation to over-ride the offer price of voluntary supply.

Another potential approach might be to fully restore the voluntary nature of supply participation by eliminating mitigation of offer prices in the dispatch and price formation in the EIM, but cap the rates that transmission providers are permitted to pass through to their transmission customers during the specific limited intervals that competitive market conditions cannot be verified. These two examples indicate that there are numerous potential approaches to protecting customers from high prices that are fully consistent with a voluntary market such as the EIM, and which may be worth considering if a workable solution within the existing LMPM framework cannot be achieved in the coming months.

## II. CAISO's Proposal To Limit EIM Transfers Is A Substantial Improvement That Reduces Forced Sales Due To Mitigation

Bid mitigation is an administrative intervention intended to protect against unduly high prices when competitive conditions do not exist. But those interventions, if not carefully tailored and designed, run the risk of discouraging competitive conditions from arising in the first place, and hence can exacerbate the very problem they were intended to address. For this reason, Powerex strongly supports LMPM enhancements that limit the application of bid mitigation to voluntary supply.

### *1. The CAISO Proposal Reasonably Limits Application Of Bid Mitigation*

CAISO has articulated the principle that "supply should not be forced to sell energy at a mitigated price beyond what is needed to resolve market power."[3] Although all supply offered into the EIM is voluntary, the CAISO presentation appears to focus on the portion of voluntary supply offers beyond an entity's flexible ramping sufficiency test upward capacity requirement.[4] The resource sufficiency test ramping requirement is based on the capacity necessary to meet an EIM entity's potential imbalance energy needs, net of its share of the EIM diversity credit. And while an EIM entity is not required to pass the resource sufficiency test in a given hour, there is arguably an expectation they would generally seek to do so in order to benefit from EIM transfers to and from other EIM BAAs.

A potential LMPM design consistent with the CAISO's identification of additional voluntary supply would be to apply bid mitigation *only* to resource supply offers up to the quantity of the EIM entity's ramping requirement. This would ensure all other EIM participants receive access to the anticipated level of resources at just and reasonable rates, even under conditions of limited competition; no resource supply offers beyond this quantity would be compelled to sell at a price below the seller's offer price. Such a concept was discussed at the September 28, 2018 meeting of the CAISO Market Surveillance Committee. While this concept appeared to generate preliminary interest, some concerns were also raised regarding whether it could be feasibly implemented, and whether it would be workable in the context of internal transmission congestion conditions.

[3] CAISO Issue Paper and Straw Proposal, at 8.

[4] CAISO Working Group presentation, at 6.

The CAISO's current proposal would instead limit the application of bid mitigation by constraining the quantity of EIM transfers out of an EIM entity where bid mitigation was triggered. While bid mitigation would technically apply to all of an entity's resources, the proposal would limit the extent to which those mitigated resources could be deployed to serve another EIM entity's load by restricting EIM transfers from the mitigated entity. The CAISO proposes to limit EIM transfers from a mitigated entity to the greater of:

1. The EIM transfers in the market power mitigation run (*i.e.,* using non-mitigated bids)[5]; and
2. The resource sufficiency test upward ramping requirement, net of the EIM entity's own imbalance energy needs.

Importantly, the CAISO proposal would enable bid mitigation to reduce the price at which EIM transfers occur, even if those EIM transfers reflect the deployment of voluntary supply offers beyond what was needed to satisfy the resource sufficiency test. The CAISO proposal may therefore still result in mitigation of at least some amount of additional voluntary supply. Nevertheless, Powerex believes the CAISO proposal would substantially reduce the application of bid mitigation to voluntary supply offers, and hence would help avoid discouraging the participation of additional voluntary supply in the EIM (beyond the resource sufficiency test upward ramping requirement).

Some participants at the Working Group appeared to argue that CAISO must go further, and apply bid mitigation to even greater quantities of supply offers. These parties argued that LMPM should not only (i) lower the price of EIM transfers that cleared the market under the original offer prices, and (ii) enable bid mitigation to force additional exports at mitigated prices, up to the quantity of supply needed to meet the resource sufficiency test upward ramping quantity (net of the EIM entity's own imbalance energy needs), but go far further, and enable CAISO's LMPM processes to force even greater quantities of EIM transfers at mitigated prices as well. Even though the CAISO proposal already would ensure that all EIM transfers that occur are at mitigated prices, these parties appear to argue that bid mitigation should also be used to increase the volume of those transfers. Powerex opposes this view, as it is entirely inconsistent with voluntary participation in the EIM, and no clear rationale has been put forward to justify such a heavy-handed approach. In particular, such volumes are unambiguously greater than what the receiving entity may rely on to meet the imbalance needs of its customers, and hence represent additional purchases at mitigated prices that enable the receiving entity to back down its own generating resources.

[5] Under current practices, bid mitigation can be "extended" from one interval to a subsequent interval. As discussed at the Working Group, in these cases, the market power mitigation run of the subsequent interval uses the mitigated bids for resources that were mitigated in a prior interval. The market power mitigation run will therefore only reflect a solution under original offer prices (i.e., without any bid mitigation) if the current provisions that "extend" bid mitigation across intervals, or from the FMM to RTD, are eliminated, as CAISO has proposed. If bid mitigation continues to be "extended," it may be necessary to limit EIM transfers out of mitigated EIM entities simply to no more than the entity's resource sufficiency test upward ramping requirement net of its imbalance energy needs (*i.e.,* use only the second criterion, above).

The table below summarizes the three potential ways of limiting the application of bid mitigation discussed previously. In the first case (top row) EIM purchasers are assured of being able to access the resource sufficiency ramping quantity at mitigated prices. The CAISO proposal (middle row) goes further, and mitigates supply associated with *all* EIM transfers that are economic under the original un-mitigated market run, even when these exceed the quantity needed to pass the resource sufficiency tests. The bottom row would go further still, and enable EIM purchasers to receive *additional* transfers—which were *not* economic under the original un-mitigated prices—and receive that energy at mitigated prices.

| Quantity Subject to Bid Mitigation | FRST Up Capacity | Additional Quantities That Clear At Original Offer Price | Additional Quantities That Don't Clear At Original Offer Price |
|---|---|---|---|
| **Additional voluntary supply is not mitigated** | *Mitigated* | Not Mitigated | Not Mitigated |
| **CAISO Proposal** | *Mitigated* | *Mitigated* | Not Mitigated |
| **All supply is mitigated** | *Mitigated* | *Mitigated* | *Mitigated* |

### *2. The CAISO Proposal Utilizes Existing EIM Functionality*

The Working Group discussion indicated some potential misunderstanding regarding how the CAISO's proposed limitations on EIM transfers from mitigated EIM entities might work. It is Powerex's understanding that the proposed limit would be a constraint on *net* EIM transfers out of an entity that has been mitigated. The limit would *not* be implemented as a reduction in the scheduling limit of any specific EIM transfer path. A constraint on net EIM transfers out would thus not prevent the EIM solution from scheduling transfers *through* an EIM entity, as these involve an equal quantity of EIM transfers into and EIM transfers out of the entity.

A constraint on net EIM transfers is already enabled in the current EIM design, as this is how the EIM design prevents "leaning" by EIM entities that do not pass the resource sufficiency tests. In particular, an entity that has insufficient downward ramping capability will be restricted in the quantity of net EIM export transfers. The CAISO proposal appears to use that same type of constraint to limit the application of bid mitigation, and hence does not contemplate a new type of constraint.

## III. Determining A Resource's Storage Horizon

Powerex appreciates the opportunity to provide a more detailed discussion of coordinated storage hydro systems at the Working Group. Of particular importance to the CAISO proposal is the concept of a use-limited resource's "storage horizon." As explained more fully below, the effective storage horizon of a hydro resource, or a system of resources, is the result of complex interactions between numerous inputs and constraints, many of which are subject to substantial uncertainty. Powerex therefore believes it is not workable or credible for any external entity to calculate the effective forward-looking storage horizon of a use-limited EIM participating

resource at any point in time. However, Powerex does believe that ***the potential range of minimum and maximum storage horizons can be verified, even though the specific value within that range at any point in time cannot.***

1. *The Actual Effective Storage Horizon Of Hydro Resources Is Constantly Changing*

The storage horizon of a hydro resource, or system of resources, is constantly changing depending on current conditions, expected future conditions, and various changing constraints. The effective storage horizon of a resource is thus not merely a matter of looking at reservoir capability alone, or even available storage relative to expected inflows. There are other crucial considerations, including the generating capacity of a resource, changing limitations on reservoir elevations and discharge rates, and the range and timing of potential inflows. In addition, hydro utilities generally make market sales from their *residual* capability, after ensuring their domestic load and other power and non-power obligations can be met, and hence forecasts of these requirements must also be considered.

As a result of the above, it is possible for hydro systems with large storage reservoirs to have extensive effective storage capabilities during certain conditions, but also have very little effective storage under other conditions. As one example, BC Hydro's largest reservoir on the Columbia River, Kinbasket, is associated with the Mica generating station. This large reservoir can often provide residual storage that may be as long as a year or longer. However, discharges from Mica contribute to inflows to the Revelstoke facility further downstream, which has a comparatively smaller reservoir. Discharges from the Revelstoke facility, in turn, contribute to inflows to Arrow Lakes, which are limited by various constraints, including international treaty obligations. This means that, under certain conditions, the ability for BC Hydro to sustain high levels of production at Mica can become limited by the downstream conditions and constraints at the Revelstoke facility, as well as by further downstream conditions and constraints at Arrow Lakes.

In the context of Powerex's EIM sales, this could mean that Powerex's opportunity costs associated with EIM sales may often reflect longer-term storage capabilities and longer-term opportunity costs, but Powerex EIM sales quantities may at other times reflect near-term opportunity costs associated with BC Hydro's near-term constraints on additional energy production. Thus Powerex's opportunity costs can quickly shift from longer-term foregone opportunities to near-term foregone opportunities, even when sourced from a single hydro facility.

The above is only one example involving just three facilities on a single river system. BC Hydro's system consists of dozens of facilities on multiple river systems. The operation of these facilities must be planned to account not only for effects on downstream facilities, but myriad other interactions including safety considerations (*e.g.,* managing ice formation and breakup), environmental requirements, recreation objectives, and obligations under international treaties. Generally, hydro systems are planned to be able to satisfy all of these requirements under a range of potential future conditions. And since certain constraints or obligations are more critical than others (*e.g.,* safety takes precedence over recreation) planning decisions may

reflect different risk tolerances associated with different limitations. Hydro operations will also generally be further refined to maximize the hydraulic efficiency of individual facilities and of the system as a whole.

An additional complexity is introduced when multiple hydro facilities, each associated with varying amounts of storage, are represented as a single aggregate resource, as occurs for several hydro resources in the EIM. This aggregation approach is critically necessary for the complex hydro systems that characterize BC and the Pacific Northwest, as these systems are generally operated as coordinated hydro systems. The effective storage horizon of an aggregated resource can also change from hour to hour as a result of changes in which of the underlying resources within the aggregated resource is responding to EIM sales.

In sum, it is exceedingly challenging—even for entities with dedicated teams of highly experienced staff—to pinpoint precisely how an additional energy sale today might impact energy sales in the future. That is, it is extremely challenging to quantity the actual effective storage horizon for a hydro resource at any particular point in time.[6] The precise and ongoing quantification of an EIM use-limited resource's storage horizon by CAISO—or by any external entity—is therefore not a workable or credible approach for formulating default energy bids to be applied under the LMPM provisions.

### *2. Powerex Proposes That Use-Limited EIM Resources Be Characterized By Their Demonstrated Maximum Storage Horizon*

Powerex does believe, however, that it should be possible to substantiate the *maximum* storage horizon that a particular resource might experience. By identifying the maximum storage horizon, it is possible to "bookend" the range of trade-offs that a use-limited resource may experience as a result of selling energy in the EIM. At one extreme, a resource may have no effective storage at all, and any EIM sales may either require foregoing another sale in the same hour or perhaps alternatively spilling energy. At the other extreme, a resource may have access to its maximum storage capabilities, and an EIM sale implies foregoing a sale at some point in time within—but not beyond—that maximum storage horizon.

The maximum storage horizon is typically reflected in the way hydro systems are described by the entities that own or operate them. For example, BC Hydro has described its system, including its multi-year storage capabilities, in various filings before its regulator, the British Columbia Utilities Commission, as well as in its multi-year resource planning process. The maximum storage horizon may also be reflected in historical data on reservoir levels, with annual storage showing a single minimum and maximum over the course of a year, while facilities with short-term storage may show much more frequent cycling. Importantly, however, the historical data on reservoir cycling, on its own, may not be conclusive as to the amount of storage available to support commercial transactions. That is, a reservoir may show a single

[6] The challenge of quantifying the actual storage horizon for an aggregate EIM participating resource is even greater than for individual EIM participating resources, as the composition of the aggregate resource changes constantly.

annual cycle, but if those changing elevations reflect externally imposed limits that effectively direct hydro operations from hour to hour, then there may be little or no effective storage for commercial transactions at all. For this reason, multiple sources of information may be relevant to substantiating the maximum effective storage horizon of a participating resource.

Powerex recommends that the CAISO include in the next version of the proposal a description of the process it will use to register an EIM resource as a use-limited resource and determine eligibility for the new use-limited DEB option. Powerex believes a workable process would be based on an application by an EIM entity specifying:

- the maximum storage horizon for the resource (which may be a single aggregated resource representing capability from one or more underlying facilities);
- information substantiating the requested maximum storage horizon; and
- the number of future monthly on-peak prices to be included in the DEB formula, which may not exceed the maximum storage horizon.

Powerex proposes that CAISO would then review the material submitted by the applicant, and either accept or reject the registration of the resource and the requested DEB formulation. Given that the maximum storage horizon of a resource is driven by factors that are highly stable (*e.g.* number and size of dams, installed generating capacity, and hydrological patterns), Powerex does not believe that a regular re-evaluation of the maximum storage horizon is necessary. If there is a major event that does imply a change in the maximum storage horizon, Powerex thinks it would be appropriate for CAISO to request a re-evaluation on a case by case basis.

## IV. Refinements To Proposed DEB Formula

The Working Group discussion highlighted several potential improvements to the DEB formula proposed by CAISO.

### *1. DEB Formula Should Reflect Multiple Relevant Geographic Locations*

EIM participants differ with respect to the geographic scope of their commercial activity. This has potential implications for any assessment of alternative market opportunities to selling in the EIM, and to the opportunity costs of EIM use-limited resources.

In its presentation and its prior comments, Powerex highlighted the need for the DEB formula to include prices at multiple relevant geographic locations. Including multiple locations explicitly in the DEB formula reduces the need to account for these opportunities implicitly through application of a larger adder or multiplier. This approach will also make the DEB formula more durable over time, as specific locations become relatively more or less attractive.

Powerex recommends that CAISO include in the next version of its proposal additional detail regarding how the DEB formula will incorporate prices at multiple locations, as well as describing how an EIM participant will substantiate which locations should be included. Powerex believes that an entity requesting additional geographic locations should first

demonstrate that the requested locations are a relevant part of its commercial activity. This can be demonstrated by:

- The applicant's transmission service reservations between the location of its participating resource and the requested destination market location(s); and
- Demonstrated actual sales activity at the requested market location(s) in the prior year.

These two types of information are complementary. As a practical matter, forward-looking transmission reservations will generally be for long-term service, but such advance reservation may not be necessary over certain segments of a delivery path where short-term transmission service is frequently available. The ability to access geographic market locations that do not typically need long-term transmission service reservations for all transmission segments along the delivery path can instead be supported by transaction data, which can include public submissions such as the FERC Electronic Quarterly Report.

CAISO could then review the information and accept or reject the inclusion of the requested geographic market locations. Generally, Powerex believes that an applicant should be required to demonstrate a reasonable expectation of its *ability* to transact a material quantity at those locations, but that CAISO should not require a specific level of transaction activity at any location. Powerex also believes it would be reasonable for CAISO to require an annual update to the information supporting continued inclusion of the requested geographic locations.

In its Working Group presentation Powerex recommended that future market opportunities at CAISO's major interties, such as Malin, Sylmar DC, and Sylmar AC also be included. Powerex noted there are no consistently published futures prices at these locations, but that CAISO may be able to propose a reasonable proxy for each applicable location and month, based on other indices that are regularly published. Powerex proposes, as a starting point, that CAISO consider defining proxy futures indices, for each future delivery month *i,* as follows:

- $\text{Malin}_i = X\% * \text{Mid-C}_i + (1-X\%) * \text{NP15}_i$
- $\text{SylmarDC}_i = X\% * \text{Mid-C}_i + (1-X\%) * \text{SP15}_i$
- $\text{SylmarAC}_i = X\% * \text{SP15}_i$

Powerex suggests that CAISO would determine the appropriate values for X, above, by analyzing historical IFM prices at SP15 and NP15 as well as ICE Day Ahead Index prices at Mid-Columbia.

### *2. Powerex Agrees With BPA's Request To Include A Balance-of-Month Price Index*

Powerex agrees with BPA's recommendation to include a balance-of-month ("BOM") price index in the DEB formula. A BOM price provides important information regarding potential market opportunities farther out than day-ahead transactions but sooner than a full monthly product. The gap between the day-ahead and monthly prices in the CAISO proposal can be particularly large in the first half of a month.

Powerex notes that, like the day-ahead price index, the balance-of-month price index is relevant to resources with maximum storage horizons that are considerably longer, and should be included in the DEB formula for those resources. As discussed previously, even resources with a maximum storage horizon of a year or longer may face conditions in which their near-term energy production is limited. This can result, for example, from a limit on the total amount of water that can be absorbed at a downstream facility with smaller effective storage capabilities, which in turn may limit the total amount of water that can be discharged, and the energy that can be produced, at an upstream facility. Such near-term constraints on upstream facilities can occur for a variety of reasons, including relatively high natural inflows and/or relatively high reservoir levels at downstream facilities, as well as planned or forced generation outages at downstream facilities. These near-term constraints can also be exacerbated during periods when spot market prices are high relative to expected future prices, as these are the conditions under which a hydro seller has an incentive to allocate as much of its projected residual energy to near-term sales as it can. But after several hours (or days) of increased output, and corresponding discharge, in order to maximize sales at the high spot market prices, a hydro resource is likely to approach one or more limits on its near-term energy production. At that point, an additional sale to one market (such as the EIM) cannot be supplied by further increasing near-term production, but instead requires a reduction in *other* near-term sales to other markets or counterparties. For this reason, even resources with a storage horizon that can extend to a year or longer may still face opportunity costs based on potential sales in the spot or near-term markets, and hence a DEB formula for such resources needs to include day-ahead and balance-of-month index prices, in addition to the monthly futures prices across the maximum storage horizon.

### *3. Identifying Appropriate Multipliers*

The limited information and simplified composition of a DEB formula means that it will necessarily be unable to fully reflect all opportunities that may be relevant to a use-limited EIM resource. For this reason, the CAISO proposal includes a multiplier of 1.10. In its Working Group presentation, Powerex explained that additional analysis can help inform the multiplier or adder needed to achieve a workable DEB formula.

Powerex offers two specific recommendations regarding the construction of a multiplier or adder. First, Powerex believes specifying both a percentage-based multiplier *and* a dollar-based adder can be more efficient than using one approach alone. Specifically, the magnitude of the percentage multiplier needed to reduce the risk of inefficient depletion of a use-limited resource may be substantially reduced if applied together with a dollar-based minimum adder.

Second, Powerex observed that the risk of inefficient depletion of a use-limited resource under a given DEB formula appears to vary considerably depending on the maximum storage horizon of a resource. Specifically, resources with a maximum storage horizon of less than 24 hours may often be at increased risk for inefficient depletion at a given multiplier value than resources with longer storage horizons under the CAISO's proposed approach to a DEB formula for energy-limited EIM resources. This is because, unlike resources with shorter maximum storage horizons, resources with longer maximum storage horizons will receive the benefit of the highest

monthly future index price in their storage horizon. This means that the multiplier necessary to reduce the risk of inefficient depletion for resources with limited storage may often be considerably greater than the multiplier necessary to reduce that risk for resources with longer storage horizons, under the CAISO's proposed approach. For this reason, Powerex suggests that CAISO consider using different multiplier/adder for each of three broad categories of use-limited EIM resources:

- Resources with a maximum storage horizon of less than 24 hours;
- Resources with a maximum storage horizon of less than one month; and
- Resources with a maximum storage horizon of one month or longer.

In addition to the structural recommendations, ***Powerex also believes it is important to emphasize that an appropriate multiplier should be designed to lower the risk of inefficient depletion of a use-limited EIM resource to an acceptably low level***. Critically, this risk must be sufficiently low so as to not materially interfere with efficient operation of hydro resources, as the consequences of such interference go far beyond economic losses for the seller. An LMPM and DEB approach that results in material risk of interference will thus undoubtedly result in a barrier to the participation of hydro resources in the EIM.

Importantly, the risks associated with bid mitigation harming sellers and materially interfering with hydro operations is one-sided: bid mitigation can *reduce* a seller's offer price, down to its DEB, but it will never *increase* the bid price. In other words, instances that a DEB that is higher than the seller's offer price in no way make up for instances in which a DEB is below the seller's offer price. What matters, in terms of the risk of mitigation, is how often a DEB, if applied each hour, is likely to be less than the seller's own estimate of its marginal cost.

Powerex's Working Group presentation included several highly simplified preliminary analyses aimed at measuring this risk. For resources with less than 24 hours of storage, the preliminary analysis estimated the number of days in which a daily run-time limit would be exceeded under a given DEB formula multiplier. For resources with less than one month of storage, the preliminary analysis estimated the number of days in which the resource would be unavailable to make economic sales because its energy had already been depleted earlier in the month. This type of analysis evaluates the potential for a DEB to force sales in excess of a given energy budget; that is, the energy budget is appropriately reflected a constraint on the use of an energy-limited resource.

Powerex believes that once the CAISO clarifies the structural aspects of the proposed DEB formula (*i.e.,* price components, locations, including a dollar-based minimum adder, and categorization of resources), additional analyses should be conducted to identify a workable range of multiplier/adder combinations. Powerex also notes that a key driver of appropriate multiplier/adder values is the price volatility observed at the hourly and daily levels, relative to the multi-hour and multi-hour price indices used to calculate the DEB. Since price volatility is subject to change over time, especially as the grid continues to evolve, Powerex believes that the multiplier/adder should be reviewed periodically, perhaps annually, with adjustments made if warranted by substantial changes in price volatility.

Some Working Group participants seemed to express the view that the risk of inefficient depletion and economic harm due to bid mitigation should reflect the expected frequency of bid mitigation. Powerex strongly disagrees. As an initial matter, an inaccurate DEB is not made any less inaccurate simply by virtue of being applied infrequently. The objective of developing a new DEB option should be to have it be workable no matter how frequently it applies. And prior experience shows that DEBs can and have been applied in contexts that differ radically from their original expectation. The existing DEB options, for instance, were developed for resources within the CAISO BAA when needed to resolve internal transmission congestion on non-competitive paths. DEBs were subsequently applied by FERC to limit offer prices in *every hour* for certain EIM entities. Additionally, while bid mitigation is relatively infrequent in the EIM at present, this may change as grid conditions continue to evolve.

In fact, the infrequent application of bid mitigation should actually argue for DEBs that are higher, not lower. When non-competitive conditions are infrequent, the potential exposure of EIM purchasers to the exercise of market power is reduced, which in turn reduces the incremental benefit of more intrusive administrative pricing interventions such as bid mitigation. This principle is reflected in the design of market power mitigation designs that have been adopted in other markets. For instance, the conduct-and-impact tests used in multiple other RTOs provides for greater thresholds for resources in locations where the potential for the exercise of market power occurs in a relatively low number of hours, while applying more stringent thresholds for resources in locations where the potential occurs in a higher number of hours. This same concept was seen in the design of the initial imbalance market in SPP, where the offer price restrictions were directly tied to the number of hours that a transmission constraint was binding (resulting in potential market separation and raising market power concerns). There is nothing to support the view expressed at the Working Group that administrative intervention such as bid mitigation should be *more stringent* when it applies *less often*. If anything, precisely the opposite principle should prevail, with administrative intervention of seller's offer prices being *less stringent* when the potential to exercise seller market power occurs infrequently.

## V. Summary Of Powerex Recommendations For Revised Proposal

Powerex reiterates its support for CAISO's extensive efforts to identify multiple LMPM enhancements that improve the accuracy of when and how bid mitigation is applied. The CAISO's proposal responds to many of the issues and concerns raised by stakeholders during prior discussions on this topic. Powerex believes the proposal marks considerable progress toward a LMPM framework that appropriately balances the need to protect EIM purchasers from unduly high prices with the need to protect voluntary sellers from the economic and operational consequences of forced sales.

In particular, Powerex supports the CAISO's proposals to:

- Eliminate the extension of bid mitigation in one RTPD interval to future intervals in the same operating hour;

- Eliminate the extension of bid mitigation in an RTPD interval to all three RTD intervals in that 15-minute interval;
- Eliminate the extension of bid mitigation in one RTD interval to future intervals in the same 15-minute interval;
- Calculate the competitive LMP independently in each interval and market process; and
- Apply a nominal adder to the calculation of the competitive LMP for EIM entities to prevent flow reversal with respect to the CAISO BAA.

Each of the above measures will help ensure that the determination of whether bid mitigation should apply is based on the most accurate information available, and prevent unintended distortions to the dispatch of resources.

Powerex disagrees with comments that some of the "extension" provisions should be preserved. In particular, it was suggested in the Working Group that mitigation in RTPD should be extended to RTD to avoid the possibility of an entity experiencing mitigated sales in RTPD and buying back those purchases at unmitigated prices in RTD. While such an outcome may be problematic, the solution is not to mitigate offers in RTD even in the absence of market power concerns. Rather, the appropriate response is to ensure mitigation is only triggered when necessary to resolve market power concerns, and that offers are not mitigated to price levels below sellers' estimates of their resource's marginal costs.