Comments of Powerex Corp. on
Local Market Power Mitigation Enhancements
Issue Paper and Straw Proposal

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to comment on the September 13, 2018 Local Market Power Mitigation Enhancements Issue Paper and Straw Proposal and the associated stakeholder discussions ("Straw Proposal"). The Straw Proposal contains multiple proposed enhancements related to various aspects of local market power mitigation ("LMPM"). These proposals are in response to the issues raised in the course of two workshops held earlier this year, under the Energy Imbalance Market Offer Rules initiative.

Powerex generally believes that the Straw Proposal lays out a potentially workable starting point for applying LMPM principles to storage hydro resources in the EIM. As discussed more fully below, Powerex supports several of the specific measures in the Straw Proposal, as well as many of the concepts contained in it. Powerex also identifies specific areas where it believes the Straw Proposal needs to be further refined.

I. Key Principles That Should Guide LMPM Design

The Straw Proposal articulates several principles that Powerex believes should inform and guide the design of a workable LMPM framework.

1. EIM is a voluntary market

The Straw Proposal reiterates that the "EIM is a voluntary market and each balancing authority area should have sufficient supply to meet its own load and reliability responsibilities."[1] Powerex believes that the voluntary nature of EIM participation is critical to properly framing the circumstances under which any type of offer price mitigation is warranted. More specifically, an EIM entity that has sufficient resources to meet its needs will generally not be in a position where it must purchase energy from another supplier in order to serve its imbalance energy needs. Rather, with limited exceptions, transactions between and among resource sufficient entities are assured to be mutually beneficial and voluntarily conducted because the transaction represents a more cost-effective way of meeting imbalance needs.

[1] Straw Proposal at 8.

Powerex recognizes that satisfying the EIM's resource sufficiency requirement does not eliminate *all* possible circumstances under which one EIM entity may rely on supply from another entity to serve its needs. In particular, the resource sufficiency requirement includes an EIM diversity credit, allowing an EIM entity to rely on other entities' resources for a defined quantity of its needs. EIM transactions beyond this quantity, however, are properly regarded as voluntary economic displacement transactions for both the buyer and the seller. The buyer's participation is voluntary, given that it could have used its own resources to provide energy, and the seller's participation is voluntary, given that it was under no obligation or expectation to offer that supply in the EIM in the first instance.

Since the vast majority of EIM transactions represent voluntary economic displacement activity, care should be taken to design an LMPM framework that does not interfere with this activity, for at least two reasons. First, such activity does not appear to raise market power concerns of the type that LMPM measures are typically designed to address. As stated in the Straw Proposal, "[s]upply should not be forced to sell power below its bid price if it cannot exert market power."[2] Second, applying LMPM measures to voluntary supply can be expected to discourage that supply from being offered into the EIM, and may also discourage entities from joining the EIM altogether. Discouraging supply participation appears contrary to promoting robust and competitive outcomes in the EIM.

2. Storage hydro resources present unique challenges and circumstances

A second theme articulated in the Straw Proposal is the unique circumstances presented by use-limited resources, particularly storage hydro systems. The Straw Proposal recognizes that the marginal cost of hydro resources is driven by opportunity costs.[3] These opportunities can be for the same delivery hour, but outside of the EIM (*e.g.,* bilateral transactions) or for a future delivery hour. The Straw Proposal also recognizes that the timeframe over which future opportunities must be considered depends on the timeframe over which the operation of a hydro resource or hydro system is optimized, which can be from a few days (or less) to over a year.[4]

The Straw Proposal appears to recognize the significant challenges associated with attempting to calculate the marginal cost of use-limited EIM resources.[5] Powerex believes this recognition is vital, and has important implications not only for how a default energy bid ("DEB") is calculated, but also how and when it is applied. While the estimation of any resource's marginal cost will be subject to some margin of error, the margin of error for storage hydro resources

[2] Straw Proposal at 8.

[3] Straw proposal at 8, 24.

[4] Straw proposal at 24-25.

[5] The Straw Proposal recognizes that "[t]he accuracy of default energy bids is important," and that inaccurate DEBs "can cause a resource with limited availability to run when it would have been more optimal to run at a later day/time." (Straw Proposal at 23). The Straw Proposal also references the concerns identified by multiple stakeholder regarding the inadequacy of existing DEB options (*Id.* at 7). Finally, the Straw Proposal describes the proposed DEB formula as being "designed to approximate the opportunity costs for EIM use-limited resources," and as a "proxy for the potential value of future sales." (*Id.* at 5, 24).

outside of the CAISO balancing authority area ("BAA") will be significant, in virtually all hours, for two reasons.

First, potential future opportunities for production are inherently difficult to forecast. And even once some view of potential future opportunities is developed, the complexity of hydro system operations makes it highly challenging to anticipate which of those many opportunities will be affected by a change in current production levels. As Powerex has explained before, any formulaic estimate of the marginal opportunity cost of a storage hydro resource will inevitably be subject to considerable inaccuracy in each and every hour.

Second, a storage hydro resource is particularly vulnerable to the harm caused by use of an inaccurate DEB to over-ride its original offer price. Whereas any resource that is mitigated to an erroneously low value will suffer economic harm from being forced to sell at low prices, hydro resources also experience operational impacts that extend into the future as well. More specifically, when a hydro resource's offer price is replaced by an inaccurately low DEB, the result is faster depletion of limited water in the current interval, which reduces the water available for producing in later intervals. Moreover, the increased production in the current interval, particularly when it occurs over numerous intervals and hours, may have other adverse effects, such as on downstream facilities or on environmental constraints.

The significant inaccuracy of DEBs for hydro resources, together with the increased harm experienced by hydro resources when inaccurate DEBs are applied, must be recognized in the design of a workable LMPM framework.

II. Powerex Supports The Proposed Enhancements To Address "Flow Reversal"

The Straw Proposal includes several measures intended to address so-called "flow reversal," where the application of bid mitigation has the potential to change an EIM entity from receiving energy transfers from the CAISO BAA to supplying energy transfers to the CAISO BAA. The Straw Proposal includes the following enhancements to address this issue [6]:

- Eliminate the extension of mitigation from one interval to subsequent intervals, both in RTPD and in RTD;
- Eliminate the extension of mitigation from an RTPD interval to each of the associated RTD intervals;
- Calculate the "competitive LMP" independently in each interval, including allowing increases in competitive LMP from one interval to the next, or between RTPD and RTD; and
- Apply a nominal adder to the competitive LMP to avoid reductions in EIM transfers out of the CAISO BAA between the market power mitigation run and the binding market run.

Powerex supports each of these proposed enhancements. As has been previously documented, a substantial proportion of the intervals in which Powerex has been subject to bid

[6] Straw Proposal at 10-11.

mitigation are due to the extension of mitigation from one interval to the next, or from RTPD to RTD.[7] Powerex does not believe there is any reason to apply mitigation during an interval in which the need for mitigation has not been established based on the facts specific to that interval.

Powerex also supports the proposed enhancements to the calculation and use of the competitive LMP. The competitive LMP operates as a lower bound of the value to which a resource's offer price can be reduced. When the competitive LMP is less than the price of supply in the CAISO BAA in a given interval, it can permit bid mitigation to invert the relative economics of energy transfers to and from the CAISO BAA. Powerex has experienced this "flow reversal" in its own EIM participation on many occasions, and it is one of the reasons why Powerex has had to limit the quantity of transmission it voluntarily makes available to the EIM during hours in which there is an increased risk of such outcomes. Powerex is hopeful that the proposed improvements to the calculation and use of the competitive LMP can reduce or eliminate the risk of "flow reversal" due to bid mitigation.[8]

III. Powerex Supports The Concept Of Limiting Mitigation Of Transfers Between EIM Entities, But Believes Further Refinement Is Needed

The Straw Proposal recognizes that bid mitigation can result in an increase in—or even reversal of—EIM transfers between two EIM entities. Similar to "flow reversal" with respect to the CAISO BAA, discussed above, EIM transfers between EIM entities can be distorted if bid mitigation inverts the relative economics of supply in the two areas. The Straw Proposal includes measures intended to prevent economic displacement between mitigated EIM entities.[9] More specifically, the proposal would restrict EIM transfers in the binding market run to be between zero and the quantity of EIM transfers in the market power mitigation run, using the original offer prices submitted by participants. This would permit bid mitigation to *reduce* EIM transfers from an EIM entity (to no less than zero), but not to increase these transfers.

Powerex appreciates CAISO staff's efforts to limit the quantity of transactions affected by bid mitigation. Such limitation is consistent with the key principle of recognizing that transactions between resource-sufficient entities are voluntary, and mitigation is not appropriate or necessary for transactions that do not raise market power concerns. The particular implementation of this

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[7] *See* CAISO Department of Market Monitoring presentation at July 19, 2018 Energy Imbalance Market Offer Rules technical workshop, at 5-6. *Available at:* http://www.caiso.com/Documents/DMMPresentation-EnergyImbalanceMarketOfferRulesTechnicalWorkshop-Jul19-2018.pdf

[8] As pointed out in the September 28 meeting of the Market Surveillance Committee, there is still the potential for the competitive LMP in RTD to be understated, since LMPM is based on the results of the RTD advisory run, nor on a separate LMPM run immediately prior to (and with the same information as) the binding market run. Powerex suggests that CAISO consider analyses that could indicate the likelihood and magnitude of such residual inaccuracy (*e.g.,* distribution of changes in system marginal energy cost between the first advisory interval and the binding RTD interval).

[9] Straw Proposal at 14-15.

concept is complex, however, and Powerex believes further discussion is needed on how best to incorporate this concept into the LMPM framework.

For instance, if resources in an EIM entity area submit very high offer prices, there may be no EIM exports from that EIM entity in the non-mitigated solution from the LMPM run. Under the Straw Proposal, EIM exports would then be entirely blocked in the binding market run. This raises the possibility that the Straw Proposal could prevent other EIM entities from accessing their allocation of the EIM diversity credit from the blocked EIM entity, which they may be relying on to serve load and meet imbalances.

Conversely, the Straw Proposal could still enable large quantities of voluntary economic displacement transactions, which raise no market power concerns, to clear in the initial LMPM run (where offer prices are not mitigated) to be re-priced as a result of mitigation in the binding run. This is because, even under the original offer prices, economic displacement can result in substantial EIM transfers well in excess of the quantities associated with the EIM diversity credit of the importing EIM entity.

In short, the quantity of EIM transfers in the market power mitigation solution does not appear to be a reliable basis for distinguishing between transfers that reflect voluntary economic displacement activity and transfers that reflect the EIM diversity credit that other BAAs may be relying on to serve load and meet imbalances.

1. Potential refinement to limits on EIM transfers in mitigated intervals

Powerex believes that CAISO should explore refining the limitation on EIM transfers in the binding run. One potential modification that could be explored would be to limit EIM transfers from each EIM entity in the binding market run to the <u>difference of</u>

1. The EIM entity's flexible ramping sufficiency test upward requirement; *minus*
2. The EIM entity's net imbalance energy needs.

This would ensure that, when an entity's energy offers are mitigated, the volume of supply that can be exported from that entity is limited to the capacity required to pass the resource sufficiency test, less the capacity needed to meet its own imbalances. This appears consistent with the design of the EIM as a market in which all entities are expected to offer enough supply to be resource sufficient, and the EIM jointly optimizes the dispatch of those resources across the entire market footprint.

Limiting EIM transfers in the binding market run to the above amount effectively means that additional voluntary supply that was offered into the EIM may become unavailable to the rest of the market if mitigation is applied. In other words, voluntary supply—over and above the quantity needed to satisfy resource sufficiency requirements—would be available to other EIM entities only when mitigation is not triggered. While this approach would protect against the risk that economic displacement activity is rendered uneconomic as a result of mitigation, Powerex acknowledges that this approach could also "block" such activity that remains economic *despite* the application of mitigation. This is because even when a resource's bid is mitigated,

transactions are still settled at a market clearing price, which may nevertheless be economically attractive for the seller.

Powerex therefore recommends that CAISO also consider limiting EIM transfers in the binding market run to the *greater of* (1) EIM transfers in the market power mitigation run, as per the Straw Proposal; and (2) the flexible ramping sufficiency requirement net of the EIM entity's own imbalance needs, as discussed above.

2. Limiting the quantity of supply offers subject to mitigation should be explored

As discussed at the September 28 meeting of the Market Surveillance Committee ("MSC"), Powerex believes that it may be possible to achieve the Straw Proposal's goal of not mitigating economic displacement activity by limiting the quantity of supply offers that is subject to bid mitigation, rather than through restricting the volume of EIM transfers in the binding market run. This approach would apply bid mitigation only to the quantity of supply potentially relied upon by wholesale customers and by other EIM entities, while enabling additional voluntary supply to be offered to the EIM without being subject to mitigation. One possible approach to consider would be to limit mitigation to the quantity of offers equal to the EIM entity's flexible ramping upward capacity requirement.

This approach would appear to have several advantages over an approach that relied on restricting EIM transfers, including ensuring that the full quantity of transmission made available to the EIM remains available to support EIM transfers, even when LMPM measures are applied. Powerex recommends that additional consideration and discussion be devoted to exploring this potential approach.

IV. The DEB Straw Proposal Is A Promising Step Toward An Approach That Is Workable For Storage Hydro EIM Resources

The Straw Proposal sets out a method for calculating a DEB for use-limited resources in the EIM, with such a DEB to be included as an option under the tariff.[10] The proposal utilizes widely available price indices for on-peak day-ahead and monthly futures contracts, for up to 12 future months. The highest of these prices is multiplied by 110% to yield the DEB under the Straw Proposal.

As an initial matter, Powerex appreciates CAISO staff's constructive engagement on the challenging issue of identifying a workable DEB framework for external storage hydro resources in the EIM. The Straw Proposal appears to signal a commitment by CAISO to finding an approach that is workable, credible, and acceptable to entities whose EIM participation is supported by storage hydro resources. Powerex believes the Straw Proposal is a very constructive shift away from proposals that would attempt to gather complex data and information about current and forecast conditions on specific facilities and then try to model the

[10] Straw Proposal at 23-25.

current and future operations of a hydro resource or system, as Powerex believes any such approach would be entirely unacceptable and unworkable for hydro resources.

The Straw Proposal takes a pragmatic approach that recognizes the key attributes of storage hydro resources, while recognizing important differences regarding the potential storage horizons of each participating resource and relevant market locations of the seller. This approach accepts some inherent limitations. For instance, the single highest-priced month arguably overstates the value of future opportunities for a resource that cannot always limit its future sales to just that one month. Conversely, this same approach arguable understates the value of future opportunities for a resource that does not sell its output as flat multi-hour on-peak blocks throughout an entire month, but shapes its output into the most attractive individual hours and days of the optimization horizon.

Both of the above observations are potentially valid, but they ultimately reflect that the Straw Proposal does not—and realistically cannot—attempt to pinpoint the specific future market opportunities impacted by an increase in production in the current interval. This should not be viewed as a limitation of the Straw Proposal, however, but as a strength, as it avoids the false precision of necessarily simplistic and incomplete—and hence inaccurate—representations of hydro systems, which numerous entities have consistently opposed.

Ultimately, Powerex believes that a DEB framework will only be successful if it viewed by all stakeholders as striking a reasonable balance between protecting buyers from the exercise of market power and protecting sellers from the harm of inaccurate and/or excessive mitigation. A mutually acceptable framework will not be found by pursuing models that have the superficial appearance of precision but that are inaccurate in each individual hour, and that are not accepted as credible by the entities with extensive experience with the resources at issue. Rather, Powerex believes a mutually acceptable approach will utilize a limited set of available relevant information, use it in a broadly reasonable way, and apply the outcome in a manner that recognizes the inherent limitations of any such calculation. The Straw Proposal takes this type of approach: it incorporates available information on market prices that are broadly relevant to the resource at issue, recognizing in a general way that use-limited resources will seek out the most valuable of those opportunities, but without attempting to use those prices in an overly granular or specific manner. A bid adder is also applied, in recognition that there are myriad factors that the proposed DEB cannot possibly consider, let alone quantify.

Powerex also supports the Straw Proposal's pragmatic approach to characterizing the general storage horizon for a use-limited resource or aggregation of resources. In particular, Powerex supports limiting the number of future months used in the DEB formula based on the maximum storage horizon of the resource. For instance, if a resource is only capable of storing water for up to three months, it would not be appropriate to consider futures prices more than three months in the future. At the same time, if a resource is capable of storing water for over a year, then it would be appropriate to consider futures prices in each of the next 12 months, as proposed. Powerex believes that the determination of the number of months of futures prices to use in the DEB should be made at the time a resource elects this DEB option under the tariff, provided that adequate substantiation is provided. Powerex believes it would be workable to

require entities to provide documentation such as descriptions of the storage capability that are typically contained in regulatory filings or other public documents. However, Powerex believes it would not be workable to attempt to precisely quantify the storage horizon at any specific point in time. Such attempts would require the same type of extensive data analysis—much of which would entail judgment about future conditions such as inflows, domestic requirements, and constraints—that stakeholders have consistently said would be unworkable.

In the following sections, Powerex identifies specific refinements that it believes are needed to further develop the proposed DEB framework and to address specific circumstances that may not have been previously considered.

1. The Straw Proposal should incorporate prices from multiple relevant market locations

The Straw Proposal indicates that the index prices in the proposed DEB formula would all be for a single market location, which CAISO would select based on the physical location of the resource.[11] In some circumstances, this approach may be appropriate, such as for resources whose output is sold primarily in "local" markets that can be accessed without need for arranging transmission to more distant locations. But there are other entities, including Powerex, that regularly transact at multiple geographic locations, including not only Mid-Columbia but also in the Desert Southwest, Alberta, and at the CAISO interties at COB, NOB, and Sylmar. A DEB based only on index prices at one of these locations would systematically understate the value of opportunities in other geographic markets. In the case of Powerex, its closest liquid trading hub (Mid-Columbia) can often represent the *lowest*-value market opportunity during certain months of the year, and Powerex is often a purchaser, not a seller, at Mid-Columbia. The additional value of being able to enter into physical sales at market locations other than Mid-Columbia is an important reason why Powerex has made extensive investments to reserve long-term transmission service between British Columbia and other geographic markets. This value would be systematically ignored if only index prices at Mid-Columbia are considered in a DEB calculation.

Consistent with the general approach of the Straw Proposal, Powerex believes that the DEB formula should utilize widely available index prices at additional locations that are relevant to each participant. In addition to Mid-Columbia, day-ahead and future monthly on-peak index prices are also consistently available for Alberta and Palo Verde. Index prices for COB, NOB, and Sylmar are generally not consistently available, but a reasonable proxy could be calculated by CAISO based on the historical relationships between index prices at Mid-Columbia, NP15 and SP15, all of which are consistently published.

The purpose of using additional locations is to provide a more complete assessment of relevant future market opportunities, but this does not necessarily translate to a higher DEB value. Powerex recommends that resources that elect to include multiple geographic markets (and can

[11] Straw Proposal at 24.

reasonably support doing so) calculate a DEB based on the *average* of the highest prices, rather than selecting only the single highest price. More specifically:

- A resource with 6 months of storage that elects to use 3 geographic market locations will have a total of 18 future index prices considered in its DEB formula. Rather than using the single highest of those 18 data points, Powerex suggests using the average of the 3 highest data points. This preserves the relative 1-in-6 weighting of future prices under the Straw Proposal.
- A resource with 12 months of storage that elects to use 5 geographic market locations will have a total of 60 future index prices in its DEB formula, of which the average of the 5 highest data points would be taken, preserving the 1-in-12 weighting of future prices under the Straw Proposal.

Powerex notes that the result of the proposed multi-location approach could be higher or lower than if only a single location were used. But the point is not to permit the opportunistic selection of high future index prices, but for the DEB calculation to be based on more representative information for each resource.

There are two key benefits of extending the Straw Proposal to multiple relevant geographic market locations. First, it more appropriately reflects the types of opportunities actually available to the seller. If the value of these opportunities is not reflected directly in the DEB calculation, then it will need to be reflected implicitly through a higher adder or multiplier. But a higher adder or multiplier is an inferior approach, since it will lead to higher DEB values even when opportunities at all geographic markets are relatively similar. Second, including multiple locations ensures that the DEB formula remains workable over time, even if geographic market prices diverge. If, for instance, Mid-Columbia prices were to become persistently less than prices in Alberta, a DEB based exclusively on Mid-Columbia index prices will become increasingly unworkable for sellers that are able to shift their sales to the higher-priced Alberta market. A DEB based on multiple relevant geographic market locations is therefore more likely to be durable than a DEB based on a single market location whose relevance may change over time.

2. Further discussion of an appropriate adder or multiplier is needed, with special consideration for resources with limited storage

Powerex believes the Straw Proposal, with the refinements to include multiple geographic locations as described above, may be workable for hydro resources that can optimize their output over several weeks or months. A key factor, however, in evaluating any proposed formula is the assessment of an appropriate multiplier or adder. Powerex believes additional discussion with stakeholders is needed to identify an acceptable multiplier or adder. While Powerex believes that the Straw Proposal formula can be workable with a multiplier that is lower than what was included in prior proposals, it is likely that a multiplier will need to be larger than the 110% value in the Straw Proposal. Powerex also notes that the effectiveness of a percentage-based adder can be very limited in low-priced market environments, and therefore

recommends that CAISO and stakeholders consider placing a "floor" on the DEB adder specified in absolute dollars-per-MWh.

As part of the discussion of the appropriate level and design of the DEB adder, special consideration appears necessary to address the circumstances of hydro resources that are optimized over shorter periods. For instance, consider a resource that only has sufficient storage to operate for approximately 24 hours over the next week. Assume that the entity that sells the output of that resource believes that a short-term weather event will lead to higher loads and elevated prices during that week, and therefore expects to be able to sell in the four highest-priced hours of each of the next six days, at an average price of $80/MWh.

The Straw Proposal is likely to significantly understate the value of these short-term opportunities, however, since it is based only on index prices for day-ahead and monthly future transactions. For example, if the day-ahead on-peak price was $30/MWh and the prompt month futures price was $50/MWh, the Straw Proposal would yield a DEB of $55/MWh. If mitigation is applied using the Straw Proposal DEB of $55/MWh, the limited water of this resource may be depleted in as little as a single day, making it unavailable for sales during the anticipated higher-priced hours of each of the subsequent days. Importantly, there is no index price or other directly observable data point that reflects the entity's expectation of receiving $80/MWh during certain hours of the following week. Any formulaic DEB will be simply unable to reflect the various factors that influence an entity's expectations of its future short-term opportunities during any particular period.

The divergence between the resource's actual opportunity costs and the Straw Proposal DEB in this example is the combined result of three key challenges:

- 16-hour on-peak block prices will systematically be less than the average of the best 4 hours of a day; [12]
- Average prices during any given week can depart significantly from the average price over an entire month; and
- The opportunity costs in this example are based on expectations of the prices for future hourly sales, and not on current prices that can be locked in for future delivery, meaning there is no ability to directly observe the potential value of these relevant opportunities.

Furthermore, a resource with limited storage also may have opportunity costs that are highly volatile, which can expose the resource to severe operational challenges as a result of mitigation. For example, a resource with limited storage may experience an unanticipated reduction in inflows to its facilities (*e.g.,* due to last-minute changes in the operation of upstream facilities managed by a different entity). In this case, the EIM participant may wish to reduce its sales in the EIM to others—and may even seek to make purchases in the EIM—in order to conserve as much water as possible to manage the reduced inflow conditions. This could be

[12] The 16 hours of a standard on-peak product include the midday "belly of the duck" hours. Consequently, the average price over the 16 on-peak hours is typically substantially less than the prices during just the four or five highest-price hours of the day.

achieved by offering the resource at a much higher price than before the inflow conditions changed. However, since the sudden change in inflow conditions is not reflected in the DEB, the resource's efforts to conserve water can be nullified if its energy offer price is mitigated.[13] A hydro resource with limited storage and low near-term inflows can rapidly run into limits due to environmental restrictions, federal operating licenses, or other conditions if efforts to conserve water are countermanded by a DEB that simply cannot reflect these conditions.

Powerex believes that the Straw Proposal may not adequately address the circumstances of use-limited resources with short-term storage, and believes that a significantly higher multiplier or adder may be necessary to make the DEB proposal workable for such resources. Powerex recommends that CAISO consider a historical analysis of the amount by which prices in the highest hours within a day can exceed 16-hour on-peak block prices, as well as the amount by which prices in a given week can exceed the futures prices for the associated month. Such analysis could provide useful insight into the adjustments needed to make the Straw Proposal workable for resources with limited storage.

V. The Analyses In The Straw Proposal Are Flawed And Irrelevant To Assessing Whether A DEB Proposal Is Workable

The Straw Proposal includes analyses that purport to demonstrate that the proposed DEB is reasonable.[14] Powerex believes the analyses are not relevant to assessing the reasonableness of the proposed DEB, as they are based on an unrealistic model of how a use-limited resource could operate and the market into which it would be dispatched.

The primary analysis in the Straw Proposal estimates an "average monthly dispatched price" by assuming that a resource would be dispatched in any interval that the market price is equal or greater than the resource's DEB. Of course, this does not reflect any of the attributes of a use-limited resource, as the dispatch the CAISO has modeled is not subject to any energy limitation whatsoever, let alone any of the myriad other operational constraints common to any hydro resource. Moreover, the hypothetical market price in the primary analysis is the price at the NP15 trading hub inside the CAISO BAA. As a result of frequent congestion between the northwest and California, as well as the effect of carbon policies, the prices at NP15 are substantially higher than prices at the locations of northwest hydro resources participating in the EIM. CAISO next compares the average monthly NP15 price during the intervals dispatched under this model to actual sales prices (discussed further below) in the same month. The average simulated NP15 revenues compare favorably to the actual sales prices, which is claimed by CAISO to be a demonstration of the reasonableness of the proposed DEB. But this result should be obvious: if a hydro resource is freed from the myriad constraints that limit its operations, if it is not at all energy limited, and if it is further assumed to make all of its sales into

[13] While the Straw Proposal includes measures to permit real-time reference level adjustments, this would not address the scenario described here, which is not driven by unanticipated changes in market prices, but by unanticipated changes to projected near-term inflows.

[14] Straw Proposal at 25-29.

a higher-priced market than where it actually transacts in the real world, then *of course* it would earn greater revenues.

Additionally, the analysis is based on the aggregate monthly revenues that would be earned by a hypothetical resource dispatched under a proposed DEB. This is a flawed and irrelevant metric, however. A DEB could be wildly inaccurate, but still result in high monthly average revenues simply because the market prices chosen were high. In other words, the analysis does not "prove" that a DEB is accurate or reasonable, it merely shows that the high priced hours in a month were sufficient to mask the hours in which a DEB caused a resource to be dispatched inefficiently at a price less than its alternative market opportunities.

Finally, Powerex notes that the analyses in the Straw Proposal do not recognize or address important limitations of the FERC EQR dataset. Namely, Powerex's EQR data includes all of its sales transactions at locations within the United States, regardless of whether or not the transaction was supported by the surplus capability of the BC Hydro system. Moreover, Powerex's EQR data does *not* include its sales transactions at locations outside the United States, and hence omits its extensive activity in Alberta. While Powerex's EQR data can be useful in showing the range of prices at which it transacted, there is no reason to view the CAISO's calculation of the 75th percentile of sales prices as an appropriate representation of the opportunities for sales sourced from the BC Hydro system.

VI. Further Measures Are Needed To Limit The Application of LMPM Only To Activity That Raises Market Power Concerns

Powerex supports the principle in the Straw Proposal that "supply should not be forced to sell energy at a mitigated price beyond what is needed to resolve market power."[15] Powerex believes that this stakeholder process should more clearly articulate the specific circumstances in which market power concerns are present, and when they are not, with the goal of limiting LMPM procedures only to the former.

1. The inherent inaccuracy of any DEB formula requires a defined offer price threshold prior to mitigating offer prices

Under the current LMPM design, all offers at prices above the resource's DEB are subject to mitigation when conditions are deemed to be non-competitive. For example, a resource with a DEB of $30/MWh may be subject to mitigation any time that its offer price exceeds $30/MWh, even if it does so by only a small amount. Whenever the *potential* for market power is found, the LMPM design effectively treats all offers at prices above the DEB as actual *attempts* to exercise market power.

The margin of error inherent in any DEB formula for storage hydro resources makes the DEB unsuitable as a "bright line" test for whether or not a resource's offer price reflects its marginal cost. In the example above, an offer price of $38/MWh would seem to most likely reflect that

[15] Straw Proposal at 8.

the seller simply had a different view of the marginal cost of the resource, as opposed to the seller attempting to exercise market power by raising its offer price by $8. But if that seller were to submit an offer price of $150/MWh, it would seem less likely to reflect a genuine difference of opinion regarding the marginal cost of the resource, and more likely to reflect a decision to offer the resource at a price that exceeds even its own estimate of marginal costs.

Powerex believes it is both appropriate and necessary to develop an "offer price threshold" to define a range of offer prices within which a seller's offer price is *not* presumed to reflect a departure from marginal costs, and hence is not subject to mitigation even if LMPM measures are otherwise triggered. The current LMPM design has an implicit offer price threshold of zero, effectively regarding a resource's DEB as an infallible estimate of its marginal costs. This seems highly inappropriate, particularly for storage hydro resources, given that any DEB will be highly inaccurate in any particular hour or day. Defining an "offer price threshold" would enable sellers to submit offer prices reflecting their own estimates of a resource's marginal costs, recognizing that some reasonable degree of divergence from the resource's DEB is to be expected, and should not expose the seller to the economic harm and operational consequences of having their offer price replaced by the DEB formula.

The development of an "offer price threshold" would have many of the same properties as the conduct test employed by several eastern RTOs. It would not, however, require the CAISO's LMPM provisions to be replaced by a full conduct-and-impact test. Instead, Powerex believes an offer price threshold can be readily applied as a condition for whether or not a resource's offer is subject to mitigation. If mitigation is triggered, and the resource's offer price exceeds the DEB by more than the defined offer price threshold, then the existing price mitigation procedure would apply (*i.e.,* the offer price would be replaced by the higher of the resource's DEB or the competitive LMP).

2. CAISO should further explore with stakeholder circumstances where the potential for market power does not exist

At prior meetings related to this topic, stakeholders have discussed scenarios in which suppliers lacked any incentive or opportunity to benefit from higher market clearing prices, and/or where there are no wholesale customers that would be exposed to EIM prices. Powerex requests that CAISO further explore with stakeholder whether there is a need to apply LMPM measures under these and other scenarios. More specifically, Powerex believes this stakeholder process should examine at least the following questions:

- **Should LMPM apply in situations where a single EIM entity is import-constrained in the market power mitigation run, but where there are no wholesale customers other than the EIM entity itself that are exposed to EIM prices?** This scenario describes Powerex's circumstances, but could also apply to other EIM entities that do not amend their transmission tariff to use EIM prices to settle customer imbalances. In such cases, the EIM entity is both the entity that submits the supply offers and also the only entity with transactions settled at the EIM price affected by those offers.

- **Should LMPM apply to resources whose output is reduced to less than base scheduled quantities in the market power mitigation run?** In such scenarios, the resources are exposed to *purchases* at EIM prices, and may not be in a position to benefit from any ability to increase clearing prices. Exploring this issue may require identifying the appropriate level at which to determine the EIM-settled position (*i.e.,* at the resource level, participant level, or EIM entity level) and identify any additional information that such an assessment may require, such as allocation of congestion rents on constrained paths.

Powerex believes that further discussion of these and similar scenarios can help ensure that bid mitigation is only applied to the extent necessary to resolve market power concerns, consistent with the Straw Proposal's stated principle.

VII. Miscellaneous Items Raised In Stakeholder Discussion

During the September 19 stakeholder call on the Straw Proposal, there was discussion about the extent to which any of the circumstances or proposals under consideration are appropriately limited to use-limited resources located outside of the CAISO BAA.

For instance, CAISO explained that bilateral market opportunities, while highly relevant to the marginal costs of resources located outside the CAISO BAA, do *not* drive marginal costs for resources located within the CAISO BAA.[16] Powerex agrees, and believes this distinction would benefit from additional detail. Bilateral market transactions are generally physical in nature, and require a specific generation source to be identified prior to the delivery hour. This creates a direct link between undertaking a physical bilateral sale and the need for additional output from a defined resource or group of resources. Even if a different resource in a different BAA happens to be available, it is generally not possible, feasible, or economic for that resource to be used as the source of the original bilateral transaction. The circumstances in an organized market are very different, as the "resource" supporting an external physical energy sale is the totality of resources in the ISO or RTO, rather than a specific unit or set of units within the ISO. The ISO, in other words, serves as an intermediary that selects which specific resources will be dispatched in a given interval, while also ensuring that the dispatch solution procures the energy needed to support the external sale (as well as all other needs). Stated differently, an entity that owns 100 MW of generation located within an ISO footprint is not limited to selling only 100 MW of power to be delivered at an external location; the ISO, as market operator, will undertake to procure sufficient energy to support any level of external sales. An entity that owns 100 MW of generation that is located outside of an ISO footprint, however, will generally be limited to physical bilateral sales that do not exceed the anticipated output of the resource.

Powerex believes that further exploring this topic would require a separate discussion focused on whether the principle of not mitigating voluntary economic displacement activity between EIM entities should also apply to resources in the CAISO BAA that do not have a must-offer

[16] Recording of September 19, 2018 Local Market Power Mitigation Enhancements stakeholder meeting, beginning at approximately 08:15. *Available at:* https://youtu.be/bZP3aowvvwo

obligation pursuant to a resource adequacy or other contract. Powerex believes that resources located in the CAISO BAA are already protected from being dispatched at mitigated prices in order to export energy to other EIM entities. This is because, unlike resources located in other EIM entities, resources in the CAISO BAA are mitigated only to address *local* market power concerns related to *local* transmission constraints that are *internal* to the CAISO BAA. Thus, the situation being addressed in the Straw Proposal—where a resource in on EIM entity area may be mitigated while that area exports energy to another EIM entity area—does not arise in the context of the CAISO BAA.