Local Market Power Mitigation Enhancements

Draft Final Proposal

May 6, 2011

Draft Final Proposal – Local Market Power Mitigation Enhancements

Table of Contents

1. Introduction ... 3

2. Background ... 4

2.1 FERC requirement to use bid-in demand ... 4

2.2 Issues related to the inclusion of new market design features ... 5

2.2.1 Convergence Bidding ... 5

2.2.2 Demand Response ... 6

2.2.3 RMR Concerns ... 6

2.3 Additional Considerations ... 6

3. Comments on the Straw Proposal ... 7

4. The Draft Final Proposal for Local Market Power Mitigation and Reliability Requirements Determination ... 10

4.2.1 Market Power Mitigation ... 10

4.2.2 Reliability Requirements Determination ... 18

Next Steps ... 19

1. INTRODUCTION

The purpose of this paper is to describe the ISO's proposal to update the current Local Market Power Mitigation (LMPM) rules and explain the rationale for applying this approach. The proposal described herein addresses the following important issues:

- Meets the requirements to use bid in demand rather than forecast demand outlined in the September 21, 2006 FERC order[1] and
- Incorporates design elements to reflect the implementation of convergence (virtual) bidding and new demand response products.[2]
- Improves the accuracy of mitigation in the real-time market
- Provides the ability to incorporate dynamic competitive/non-competitive path designation into the LMPM process

In its current design, the ISO performs the market power mitigation-reliability requirements determination process (MPM-RRD) before the integrated forward market (pre-IFM) for the day-ahead market and as part of the hour ahead scheduling process (HASP) for the real-time market. The pre-IFM process uses a forecast of internal demand rather than submitted demand bids. FERC recognized that the ISO was unable to implement MPM-RRD with bid-in demand at the start of the new market, but directed the ISO to revise its process to utilize bid-in demand within three years of the implementation of the new market design in order to reduce the likelihood of over-mitigation on suppliers.

The ISO is taking the opportunity to use this redesign effort to consider how virtual bids should be considered in the LMPM process. Although the ISO is not proposing to mitigate virtual bids, the implementation of virtual bidding causes two concerns. First, since bid-in demand will include virtual demand bids in the IFM, there is an increased likelihood that the unmitigated supply bids could determine the LMPs. That is, if a large amount of demand clears in the IFM due to the addition of virtual demand bids, then unmitigated supply bids may be needed in order to meet this additional demand. This concern was identified and illustrated in the Department of Market Monitoring's November 2007 whitepaper. Similarly, since virtual supply bids do not have default energy bids associated with them, a virtual supply bid can potentially "crowd out" a physical supply bid with higher bid prices but with lower default energy bids. The unmitigated bids of the physical supply resources would then be considered in the IFM with an increased likelihood that resources with unmitigated bids will be needed to meet generation needs in a non-competitive area. The ISO's proposal addresses these concerns without mitigating virtual bids.

There are additional benefits to the proposed LMPM changes. The current LMPM process has two market runs – the competitive constraints (CC) run and the all constraints (AC) run. Each one of these market runs uses ISO system resources and processing time. The new proposal, streamlines

---

[1].The webpage containing the September 21, 2006 FERC Order can be found at: http://www.caiso.com/1bbd/1bbd7bf91bcd0.pdf .

[2] The webpage containing all the documents related to convergence bidding can be found at http://caiso.com/1807/1807996f7020.html ; demand response at http://caiso.com/1893/1893e350393b0.html

the process into one market run, providing the opportunity to run the mitigation process more frequently in the real time (rather than once an hour in HASP) and thus providing more accuracy in the mitigation decisions. In addition, this proposal allows the ISO to implement a dynamic, or inline, competitive path assessment. What this means is that each time the mitigation is run, the competitive path assessment is performed. Again, this will provide more accurate information for the system to make mitigation decisions. The Department of Market Monitoring posted a white paper describing this feature.[3] They anticipate posting further information regarding this proposal in the near future.

On May 13, 2011 the ISO will hold a stakeholder meeting to discuss this proposal and stakeholders are encouraged to comment. Please send comments to LMPM@caiso.com by close of business on May 23.

2. BACKGROUND

2.1 FERC REQUIREMENT TO USE BID-IN DEMAND

The ISO's conceptual MRTU filing in July, 2003 included a market power mitigation proposal (based on a structure used at PJM) designed "to provide strong and effective measures against the exercise of local market power."[4] On September 21, 2006 FERC conditionally approved the ISO's proposal to use forecast demand in the pre-IFM runs at the start of the new market. Specifically,

> "We agree with commenters that in the future the CAISO should use bid-in demand as the basis for market power mitigation in the day-ahead market. However, we are also cognizant of the CAISO's inability to institute this change in Release 1 without substantial delay of MRTU and its associated benefits. Accordingly, we conditionally accept the CAISO's proposal, subject to the CAISO instituting bid-in demand as the basis for applying market power mitigation in the pre-IFM runs no later than MRTU Release 2 to reduce the likelihood of over-mitigation of suppliers." (Paragraph 1089)

The Commission uses the term "MRTU Release 2" to mean that these provisions must be in place no later than three years after the start of the new market. Since the market was implemented in April 2009, the ISO is planning to implement the LMPM redesign in April 2012.

[3] [3] This paper entitled "White Paper – Proposed Modifications to Methodology for Competitive Path Designations for Local Market Power Mitigation" is published on the ISO website - http://caiso.com/docs/2005/10/04/2005100412253314368.html

[4] This was identified as the first of three fundamental objectives of the market power mitigation proposal per the testimony of Keith Casey, dated February 2, 2006. The other two objectives were "to provide an explicit mechanism within the MRTU design for addressing revenue adequacy of Frequently Mitigated Units not under long-term contracts and to provide a defined transition plan for relaxing CAISO system market power mitigation measures so that system market power concerns can be more effectively addressed through greater demand response and additional long-term energy contracting."

2.2 ISSUES RELATED TO THE INCLUSION OF NEW MARKET DESIGN FEATURES

2.2.1 CONVERGENCE BIDDING

Convergence bidding was implemented in February, 2011. The introduction of virtual bidding requires additional modifications to the mitigation process to prevent the undermining of the effectiveness of the LMPM. Specific examples of how virtual bids may undermine the effectiveness of the current LMPM provisions along with proposed changes to the LMPM process were provided in whitepapers issued by the Department of Market Monitoring (DMM) and have been presented to the Market Surveillance Committee (MSC) and stakeholders on several occasions.

Two major concerns have been identified related to the effectiveness of the current LMPM process in the day-ahead market (DAM) under convergence bidding.

The first major concern under the current LMPM process is that the inclusion of virtual demand in the IFM may increase demand to the point where IFM prices are being set by unmitigated bids. The issue was identified and illustrated in DMM's November 2007 whitepaper on convergence bidding.[5] This concern stems from the fact that under the current LMPM approach the amount of generation subjected to mitigation is only sufficient to meet projected physical demand. If additional demand clears due to the addition of virtual demand in the IFM, without any modification to the current LMPM approach, then unmitigated supply bids will be cleared to meet demand in situations where generation is needed in areas subject to non-competitive constraints.

The concern about LMPM being undermined by virtual demand bids described above may be addressed by including all demand and supply (virtual and physical) in the two MPM-RRD runs (the competitive constraints run (CCR) and the all constraints run (ACR)). However, making this modification creates a different concern. With the inclusion of virtual supply bids in CCR and ACR, it would be possible for a physical supply resource with a relatively low default energy bid to escape mitigation by being bid at a price above that of virtual supply in the same local area. Under this scenario, the virtual supply bids can ultimately "crowd out" the physical supply allowing unmitigated physical supply bids to enter the IFM which would have otherwise been used to satisfy generation needs in a non-competitively constrained area and would have been mitigated during the ACR of the LMPM process. This concern was also identified and illustrated in DMM's November 2007 whitepaper on convergence bidding.[6] A more detailed description of this concern and a proposed solution was provided by DMM in an October 6, 2009 whitepaper.[7]

---

[5] See Example 1: Virtual Demand Bidding by Generator, pp 5-8, in *Convergence Bidding: DMM Recommendations, Attachment A: Examples of Convergence Bidding and Local Market Power Mitigation*, November 2007 http://www.caiso.com/1c8f/1c8ff4236e8e0.pdf

[6] See Example 2: Virtual Supply Bidding by Generator, pp 9-12, in *Convergence Bidding: DMM Recommendations, Attachment A: Examples of Convergence Bidding and Local Market Power Mitigation*, November 2007 http://www.caiso.com/1c8f/1c8ff4236e8e0.pdf

[7] Illustrative Examples of Alternative Local Market Power Mitigation Department of Market Monitoring

October 6, 2009, http://www.caiso.com/243f/243fce76bf30.pdf

2.2.2 DEMAND RESPONSE

During the development of the *Proxy Demand Resource* (PDR) product last year, DMM noted that if these types of demand response bids were included in the mitigation process they could cause inefficient results by displacing generation supply bids which have higher unmitigated prices but lower costs and mitigated bid prices. Similar to convergence bids, PDR bids cannot be mitigated as the ISO has no means to develop a default energy bid for these types of resources. Therefore, these bids create the same issue described in the convergence bidding section outlined above. In February 2010 the ISO Board of Governors approved DMM's request to exclude proxy demand resource bids from the MPM process as a short term resolution to the problem. In this market design effort we will address this issue along with the impacts of convergence bidding.

2.2.3 RMR CONCERNS

The current pre-IFM uses a process called *market power mitigation–reliability requirements determination* (MPM-RRD) to evaluate and alleviate local market power concerns. In considering the change from forecasted internal demand to bid-in internal demand for the MPM-RRD process, the ISO has identified a concern regarding the RRD aspect which commits and schedules reliability must-run (RMR) resources. Specifically, if the bid-in demand that clears the MPM-RRD optimization is significantly different than the level of the forecast demand, the procedure will tend to under-commit or over-commit RMR resources for the next day. Going forward, then, the ISO will need to continue to determine the need to commit RMR resources based on physical requirements (i.e. the ISO forecast of internal demand rather than bid-in demand) even after the MPM process is modified to utilize bid-in demand. Section 4.2.2 discusses the ISO's proposal to manually dispatch RMR resources to accommodate this change in the LMPM process.

2.3 ADDITIONAL CONSIDERATIONS

Another benefit of this LMPM proposal is that it reduces the overall processing time required for the MPM module since no explicit CC run, with its associated security constrained unit commitment (SCUC) and power flow iterations, is required. The time savings from removing the explicit CC run from MPM module is invaluable because it allows the ISO to:

- Include more advanced features into the market application and still meet our market execution time-line. For example, the savings in time can be used to run the multi-day or the 72-hour residual unit commitment (RUC) in the IFM.
- Include dynamic competitive/non-competitive designation calculation within the market application execution rather than using pre-defined designations based on seasonal studies performed by DMM. This is also referred to as dynamic or inline competitive path assessment.
- Run MPM more frequently than once an hour, as it is currently run in the HASP/real- time MPM process leading to more accurate market power mitigation.

3. COMMENTS ON THE STRAW PROPOSAL

Stakeholders provided verbal and written comments regarding the straw proposal that was posted on March 18.[8] Following are the key concerns:

Topic	Comments	ISO Response
Dynamic Competitive Path Assessment Implementation	Stakeholders urged the ISO to implement the dynamic competitive path assessment in parallel with the LMPM enhancement.	The ISO is required to enhance the LMPM process to use bid in demand by April, 2012. This is the driver for the LMPM implementation date. The ISO will strive to implement the Dynamic CPA with the same timeline however if this is not possible, we anticipate its implementation within the following two months so that this functionality will be in place for summer 2012.
Analysis of decomposition methodology	A number of stakeholders requested additional analysis of the proposal using historical data.	The ISO will be publishing a retrospective analysis of LMPM enhancements which will provide additional information for comparing the decomposition approach to the current local market power mitigation. It will also provide additional analytical information requested by stakeholders.
Genesis of the decomposition method	Because this methodology was introduced in the straw proposal (and not publicly discussed in any stakeholder meeting previously), Calpine wanted to understand the genesis of this alternative	Originally DMM provided a concept for enhancing LMPM to meet the required objectives, however when the ISO analyzed this alternative against other internal proposals, we found that the decomposition method offered the most benefits including meeting DMM's objectives while also increasing the

[8] This paper entitled "Local Market Power Mitigation Enhancements, Straw Proposal" is published on the ISO website - http://caiso.com/2822/28229d8a4b370.html

Topic	Comments	ISO Response
		efficiency of the market performance . Accordingly, we adopted this methodology for our straw proposal.
The ability of virtual supply bids to set the price	The CPUC was concerned that under the decomposition method, unmitigated supply bids may allow virtual supply bids to set the price.	Even though physical supply bids are the only bids that are mitigated to ensure that they are competitive, the virtual supply bids still must compete with the mitigated physical bids and thus must be within that price range to be used.
No mitigation for competitive congestion constraints	The CPUC was concerned that LMPM would not be applied to competitive congestion constraint and bids would not be mitigated.	The ISO's current LMP market design includes local market power mitigation through the MPM-RRD. The MPM-RRD only mitigates bids for non-competitive constraints. Consequently, a foundational assumption of this proposal is that if a constraint is competitive, the LMP is competitive and bid mitigation is not necessary.

Topic	Comments	ISO Response
Perform mitigation based on individual contributions rather than aggregate contributions	PG&E recommends that the LMPM be based on individual non-competitive constraint contributions to a supply resource LMP (SCE comments reflected similar concerns).	The ISO's LMP decomposition has several advantages over individual non-competitive contribution test. The LMP decomposition captures the overall locational advantage due to loop flow, while individual constraint test cannot. If the overall contribution is negative, there is no need to mitigate even there is an individual constraint having positive contribution. PG&E's proposal could cause over-mitigation in this scenario. PG&E's proposal could also cause under-mitigation if each constraint's contribution is below certain threshold, and the aggregated contribution is above the threshold for mitigation. In addition, individual constraint examination cannot provide a competitive price protection floor, which could result in another source of over-mitigation.
Benchmark for Competitive LMPs	PG&E suggests that the appropriate benchmark for competitive LMPs can be obtained by fixing unit commitment in the all constraint run solution and then relaxing all non-competitive constraints in a subsequent pricing run	The CAISO does not believe this approach provides better competitive LMP estimation than the ISO's method. PG&E's proposal will incur an additional market run, which may impact the system performance and dynamic CPA implementation.
Reference Bus	PG&E is concerned that Midway or Vincent may not be free of local market power and it would be more appropriate to use the methodology from the preceding comment.	Either Midway or Vincent is consistently lower in price than the distributed slack bus. Therefore, Midway and Vincent is a better choice than distributed slack bus for market power mitigation

Topic	Comments	ISO Response
		purpose.
	SCE requested clarification on whether the ISO needs to change the definition of a reference bus for the new process.	The ISO will not change the reference bus in the market optimization engine or in the settlement LMP calculation. The reference bus is only changed in the AC run after the optimization finishes as a post-process solely for market power mitigation purpose.
Treatment of contingencies, nomograms	SCE requested an explanation of how competitive and non-competitive contingencies, nomograms, etc. will be treated.	Contingency and nomogram constraints will be treated similar to any other constraint and may be competitive or non-competitive

4. THE DRAFT FINAL PROPOSAL FOR LOCAL MARKET POWER MITIGATION AND RELIABILITY REQUIREMENTS DETERMINATION

This section describes the ISO's LMPM and RRD draft final proposal.

4.2.1 MARKET POWER MITIGATION

The current LMPM process requires running the market optimization twice, i.e., the CC run and the AC run. This proposal is based on an "LMP decomposition" approach rather than a dispatch approach which is used today. It reduces the process to one pre-market run, i.e., an AC run considering both physical and virtual bids, which shortens the market execution time and provides the opportunity for an inline dynamic competitive path designation.

The LMPM enhancement to handle virtual supply and demand concerns only the day-ahead market. The LMPM enhancement to combine the CC run and AC run is more relevant to real-time markets. However, from an implementation perspective, a consistent design between day-ahead and real-time is highly preferred.

4.2.1.1 "LMP DECOMPOSITION"

The "LMP decomposition" approach only requires an AC run. This run produces dispatches and prices that are potentially impacted by market power. The next step is to "decompose" the LMP.

For location *i*:

$$LMP_i = LMP_i^{EC} + LMP_i^{LC} + LMP_i^{CC} + LMP_i^{NC}$$

Where:

EC = the energy component,

LC = the loss component,

CC = the competitive constraint congestion component, and;

NC = the non-competitive constraint congestion component.

The LMP congestion component is calculated as the sum of shift factor times shadow price for all constraints. With constraints being classified into competitive constraints and non-competitive constraints, the LMP congestion component can be broken into two components: a competitive component LMP_i^{CC} and a non-competitive component LMP_i^{NC}. The competitive component is calculated as the sum of shift factor times shadow price for competitive constraints, and the non-competitive component is calculated as the sum of shift factor times shadow price for non-competitive constraints. The computation of the two LMP components at each pricing node in the system depends on the reference bus selection. Ideally, the reference bus should be at a location free of local market power impact. The LMP at such a reference bus will be used to gauge local market power elsewhere.

In practice, the selection of the reference bus can be either of two following methodologies. One approach is to use the distributed load slack bus as the reference bus. This is consistent with the reference bus used in the residual supply index (RSI) competitive path assessment. However, the load distributed slack bus LMP could be affected by local market power. This impact depends on the shadow prices of the binding non-competitive constraints, and the load distributions behind them. The other approach is to use a major high voltage bus located close to the center of the California transmission grid. For example, the reference bus can be the Midway 500KV bus if path26 flow is from north to south or the Vincent 500KV bus if path26 flow is from south to north. Because the Midway and Vincent 500KV buses are located close to the center of the California transmission grid with sufficient generation and roughly half of the system load on either side of the path, they are considered to be least affected by local market power.

Relative to a reference bus free of local market power, the non-competitive component LMP_i^{NC} is the price mark-up due to non-competitive constraints, and it is an indicator of local market power. If there are no binding non-competitive constraints then $LMP_i^{NC} = 0$. This means there is no local market power, and thus no market power mitigation is necessary. If there are binding non-competitive constraints, the physical resources with $LMP_i^{NC} > 0$ potentially have local market power.

If the non-competitive constraint congestion component of a physical supply bid is greater than 0 ($LMP_i^{NC} > 0$) its bid would be mitigated to the higher of the default energy bid (DEB) and its competitive LMP (LMP_i^{CMP}) if it is lower than the unmitigated bid.

The competitive LMP, mentioned above is analogous to the LMP produced in the current CC run. It is the resource specific LMP without the non-competitive constraint congestion component (LMP_i^{NC}) :

$$LMP_i^{CMP} = LMP_i^{EC} + LMP_i^{CC} + LMP_i^{LC}$$

Today's LMPM scheme needs to estimate the effect of non-competitive constraints on dispatch by running the market optimization twice and taking the difference. Since the LMP decomposition is based on the impact of the non-competitive constraints the LMPM can be performed in one market optimization run.

Virtual supply and virtual demand require no special treatment in this process as shown in the following example. It also demonstrates that this approach eliminates the potential issue of physical resources bypassing market power mitigation by bidding virtual supply to undercut the physical supply.

4.2.1.3 EXAMPLE 1 – TWO BUS SYSTEM

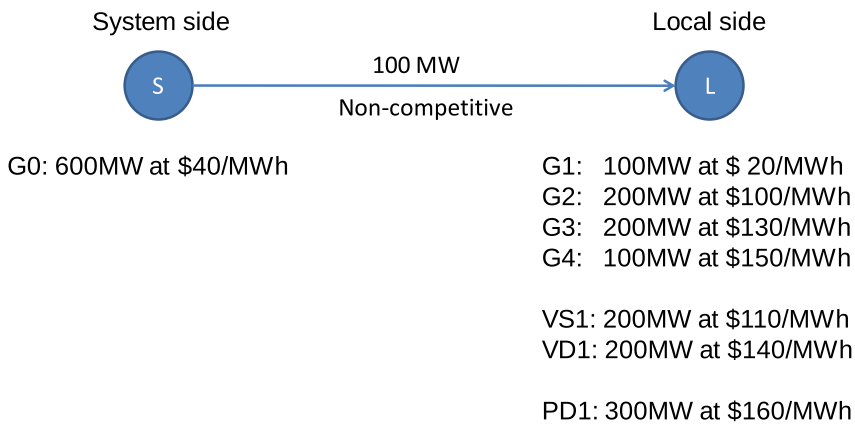

FIGURE 1: TWO-BUS SYSTEM

In this example "S" represents the system side of a constraint, and "L" is a local constrained area (load pocket). L is connected to S by a 100 MW capacity flowgate S-L. The S side has 30,000 MW total cleared demand at $40/MWh. In addition, 600 MW of supply at $40/MWh from G0 is still available. Because of the S-L constraint, only 100 MW can reach the L side. The L side has 300 MW physical bid-in demand (PD1 at $160/MWh) and 200 MW virtual demand VD1 at $140/MWh. On the L side, there are four generators G1, G2, G3 and G4 and virtual supply VS1 at $110/MWh. The capacity and bids are illustrated in the following figure. For simplification, losses are not considered.

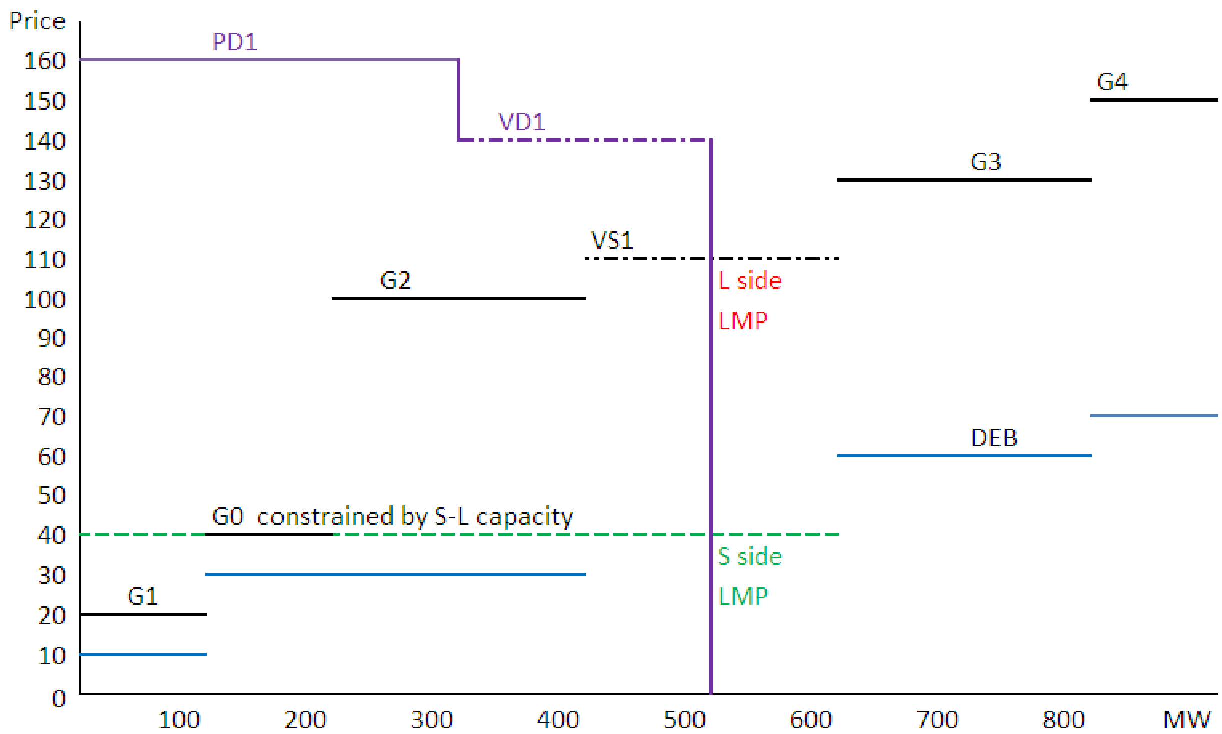

FIGURE 2: L SIDE BIDS AND AWARDS

Table 1 lists the outcome under the current LMPM scheme. If both physical and virtual supply and demand are considered in both CC run and AC run, G3 is able to bypass market mitigation because virtual supply VS1 undercuts ("crowds out") G3.

Supply	CC run	AC run	CC LMP	AC LMP	DEB	LMPM	Mitigated Bid
G0	400 MW	100 MW	$40	$40	$30	N	$40
G1	100 MW	100 MW	$40	$110	$10	N	$20
G2	0 MW	200 MW	$40	$110	$30	Y	$40
G3	0 MW	0 MW	$40	$110	$60	N	$130
G4	0 MW	0 MW	$40	$110	$70	N	$150
VS1	0 MW	100 MW	$40	$110	N/A	N	$110

TABLE 1: LMPM UNDER CURRENT APPROACH

Table 2 uses the new LMPM methodology. If the S side is assumed to be free of local market power, and is used as the reference bus, the LMP energy component is $40/MWh.

Supply	Schedule	LMP	EC	CC[9]	LC	NC	Unmitigated Bid	DEB	LMPM	Mitigated Bid
G0	100 MW	$40	$40	$0	$0	$0	$40	$30	N	$40
G1	100 MW	$110	$40	$0	$0	$70	$20	$10	Y	$20
G2	200 MW	$110	$40	$0	$0	$70	$100	$30	Y	$40
G3	0 MW	$110	$40	$0	$0	$70	$130	$60	Y	$60
G4	0 MW	$110	$40	$0	$0	$70	$150	$70	Y	$70
VS1	100 MW	$110	$40	$0	$0	$70	$110	N/A	N	$110

TABLE 2: LMPM STRAW PROPOSAL WITH THE S SIDE AS THE REFERENCE BUS[10]

Summary of results

- G0 is not subject to mitigation because its LMP non-competitive component is less than or equal to 0.
- G1, G2, G3, and G4 are all subject to mitigation because their LMP non-competitive components are greater than 0.
- Virtual supply is not subject to mitigation, so VS1 is not mitigated.
- G1's bid is not changed because its unmitigated bid ($20) is less than the LMP competitive component (EC + CC + LC = $40).
- G2 is mitigated to $40 because its unmitigated bid ($100) is greater than the LMP competitive component ($40) and the LMP competitive component is higher than its DEB.
- G3 and G4 are mitigated to their DEBs because they bid above their DEBs, and their DEBs are higher than the LMP competitive component ($40). Although G3 and G4 are "crowded out" by VS1, the market power potential is captured by the non-competitive constraint price mark-up LMP_L^{NC}. Therefore, G3 and G4 are identified for mitigation. Resources that withhold their capacity may be identified for mitigation in this new proposal even though they are not dispatched.

Alternatively, the load distributed slack bus can be used as the reference bus. The results in the following table are similar to the case above with one exception, the LMP energy component. In this case, the LMP energy component is

$$LMP^{EC} = 40 \times 0.9857 + 110 \times 0.0143 = \$41/\text{MWh},$$

[9] The competitive constraint congestion component is $0 because in this example there is only one constraint and it is non-competitive.

[10] Acronyms – LMP=Locational Marginal Price; EC= Energy Component; CC=Competitive Constraint congestion component; LC=Loss Component; NC=Non-competitive Constraint congestion component; LMPM=Local Market Power Mitigation

where it is assumed that the S side load distribution factor is 0.9857, and the L side load distribution factor is 0.0143. Compared with the case above, the LMP energy component is inflated by $1/MWh ($41/MWh vs $40/MWh). In other words, the load distributed slack bus may be affected by local market power. The larger the local load distribution factor and non-competitive constraint shadow price are, the larger the impact on the LMP energy component is.

Supply	Schedule	LMP	EC	CC	LC	NC	Unmitigated Bid	DEB	LMPM	Mitigated Bid
G0	100 MW	$40	$41	$0	$0	-$1	$40	$30	N	$40
G1	100 MW	$110	$41	$0	$0	$69	$20	$10	Y	$20
G2	200 MW	$110	$41	$0	$0	$69	$100	$30	Y	$41
G3	0 MW	$110	$41	$0	$0	$69	$130	$60	Y	$60
G4	0 MW	$110	$41	$0	$0	$69	$150	$70	Y	$70
VS1	100 MW	$110	$41	$0	$0	$69	$110	N/A	N	$110

TABLE 2: LMPM STRAW PROPOSAL WITH LOAD DISTRIBUTED SLACK BUS BEING THE REFERENCE BUS

For comparison purposes Table 4 displays the outcome under the DMM approach that was considered as a potential option during the convergence bidding stakeholder process:

Supply	CC run	AC run	CC LMP	AC LMP	DEB	LMPM	MITB
G0	400 MW	100 MW	$40	$40	$30	N	$40
G1	100 MW	100 MW	$40	$60	$10	N	$20
G2	0 MW	200 MW	$40	$60	$30	Y	$40
G3	0 MW	100 MW	$40	$60	$60	Y	$60
G4	0 MW	0 MW	$40	$60	$70	N	$40
VS1	0 MW	0 MW	$40	$60	N/A	N	$110

TABLE 4: LMPM UNDER "DMM APPROACH"

Under the "DMM approach", running the AC run with DEB can identify G3 for mitigation. Although virtual supply VS1 undercuts G3 unmitigated bid, it does not undercut G3 DEB. Therefore, when G3 DEB is used in the AC run, its dispatch increases compared with the CC run. Using DEB in the AC run is a crucial to the DMM approach. Under this approach, G4 is not identified for mitigation because it is not dispatched in either the CC or the AC run.

4.2.1.4 EXAMPLE 2 – THREE BUS SYSTEM WITH BINDING CONSTRAINT BETWEEN SYSTEM AND LOCAL

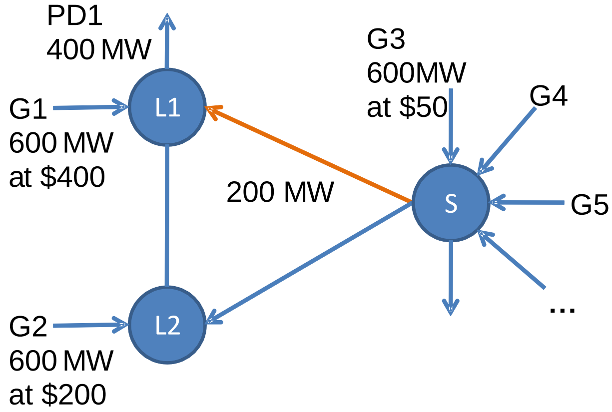

FIGURE 3: THREE-BUS SYSTEM

The next two three-bus examples demonstrate how the new LMPM approach works in looped networks. Similar to the previous example, "S" represents the system side; "L1" and "L2" are local constrained areas. Assume the S side is selected as the reference bus. On the S side, after meeting the rest of the S side load, G3 is the only resource with available capacity. It has a bid of 600 MW at $50/MWh. On the local side, there is a 600 MW generator G1 at L1 bidding $400/MWh, and a 600 MW generator G2 at L2 biding $200/MWh. Flowgate S-L1 has 200 MW of capacity, and is deemed non-competitive. The other two flowgates S-L2 and L1-L2 have sufficiently large capacities. A physical demand of 400 MW, PD1, is located at L1.

The mitigation results under the current LMPM approach are listed in Table 3. In the CC run, PD1 is met by G3, and the LMP is $50/MWh at all locations. In the AC run, PD1 is met by 200 MW from G2 and 200MW from G3 respecting the S-L1 200 MW capacity. The AC run LMP at L1 is $350/MWh. This is because one extra MW of load at L1 will be served by dispatching up G2 by 2 MW and dispatching down G3 by 1 MW ($200 x 2 – $50 = $350/MWh) without overloading flowgate S-L1.

Supply	CC run	AC run	Bid	CC LMP	AC LMP	DEB	LMPM	Mitigated Bid
G1	0 MW	0 MW	$400	$50	$350	$50	N	$400
G2	0 MW	200 MW	$200	$50	$200	$80	Y	$80
G3	400 MW	200 MW	$50	$50	$50	$45	N	$50

TABLE 3: LMPM UNDER CURRENT APPROACH

Under the current LMPM approach, G1 is not dispatched in either the CC or the AC run and is not subject to mitigation. By bidding high enough, G1 is able to bypass mitigation under the current LMPM approach. G2 is dispatched up in the AC run, and will be mitigated to its DEB. G3 is dispatched down in the AC run, and is not subject to mitigation.

With S being the reference bus, the mitigation results under the new LMPM approach are listed in Table 4. Both G1 and G2 have greater than zero non-competitive LMP components, and will be mitigated. G1 and G2's mitigated bids will be equal to their DEBs in this case. Remember, a bid is mitigated to the greater of its DEB and LMP_i^{CMP} (the resource specific LMP without the non-competitive constraint congestion component) . The new LMPM approach correctly identifies G1 for mitigation.

Supply	Schedule	LMP	EC	CC	LC	NC	Unmitigated Bid	DEB	LMPM	Mitigated Bid
G1	0 MW	$350	$50	$0	$0	$300	$400	$50	Y	$50
G2	200 MW	$200	$50	$0	$0	$150	$200	$80	Y	$80
G3	200 MW	$50	$50	$0	$0	$0	$50	$45	N	$50

TABLE 4: LMPM STRAW PROPOSAL

4.2.1.4 EXAMPLE 3 – THREE BUS SYSTEM WITH BINDING CONSTRAINT BETWEEN LOCAL PATHS

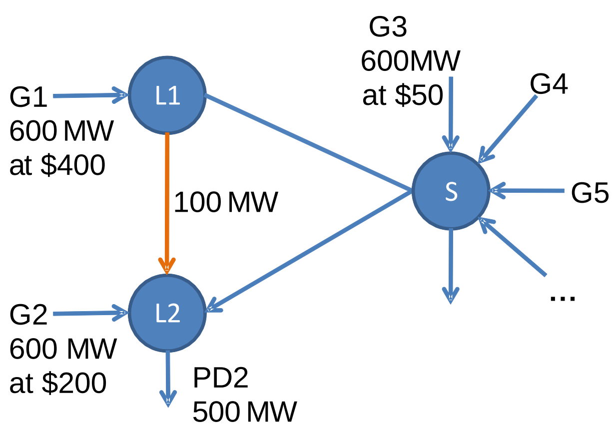

FIGURE 4: THREE-BUS SYSTEM

The conventions and generators are exactly the same as the previous example. The differences compared with the previous example are as follows. Flowgate L1-L2 has 100 MW capacity, and is deemed non-competitive. The other two flowgates S-L1 and S-L2 have sufficiently large capacities. There is a 500 MW physical demand PD2 at L2.

The mitigation results under the current LMPM approach are listed in Table 5. In the CC run, PD2 is met by G3, and the LMP is $50/MWh at all locations. In the AC run, PD2 is met by 200 MW from G2 and 300 MW from G3 respecting the L1-L2 100 MW capacity. The LMP at L1 is -$100/MWh. This is because one extra MW of load at L1 will be served by dispatching up G3 by 2MW and dispatching down G2 by 1 MW ($50 x 2 – $200 = -$100/MWh) without overloading flowgate L1-L2.

Supply	CC run	AC run	Bid	CC LMP	AC LMP	DEB	LMPM	Mitigated Bid

G1	0 MW	0 MW	$400	$50	-$100	$50	N	$400
G2	0 MW	200 MW	$200	$50	$200	$80	Y	$80
G3	500 MW	300 MW	$50	$50	$50	$45	N	$50

TABLE 5: LMPM UNDER CURRENT APPROACH

Under the current LMPM approach, G1 is not dispatched in either the CC or the AC run and is not subject to mitigation. G2 is dispatched up in the AC run, and will be mitigated to its DEB. G3 is dispatched down in the AC run, and is not subject to mitigation.

With S being the reference bus, the mitigation results under the new LMPM approach are listed in Table 6. G2 has greater than zero non-competitive LMP components, and will be mitigated to its DEB. In this case, the new LMPM approach and the current approach produce exactly the same mitigation results.

Supply	Schedule	LMP	EC	CC	LC	NC	Unmitigated Bid	DEB	LMPM	Mitigated Bid
G1	100 MW	-$100	$50	$0	$0	-$150	$400	$50	N	$400
G2	300 MW	$200	$50	$0	$0	$150	$200	$80	Y	$80
G3	200 MW	$50	$50	$0	$0	$0	$50	$45	N	$50

TABLE 6: LMPM STRAW PROPOSAL

4.2.2 RELIABILITY REQUIREMENTS DETERMINATION

The current RMR process includes both the ability to issue manual RMR dispatches as well as automated dispatches through the MPM-RRD process. [11] Today's MPM-RRD process uses RMR proxy bids instead of default energy bids for the capacity under an RMR contract. For condition 1 RMR units, market bids, if any, are considered in the CCR and RMR proxy bids are utilized in the ACR. If the dispatch level in the ACR is higher than the CCR, the RMR proxy bids above the CCR level are considered in the IFM. For RMR condition 2 units, RMR proxy bids are considered in the ACR. If the resource is needed in the ACR, the RMR proxy bids will be considered in the IFM (or HASP for real-time). If the resource was issued a manual RMR dispatch prior to the MPM-RRD, RMR Proxy bids will be considered in the CCR as well due to RMR contract obligation to submit RMR contract cost-based bids in to the next available market.[12]

[11] The manual RMR commitment process is described in Operating Procedure for the Day-Ahead Market, M-401, Section 2.1, step 4. This procedure can be accessed from http://caiso.com/thegrid/operations/opsdoc/marketops/index.html

[12] In the absence of a manual RMR contract dispatch, the RMR owner is precluded from submitting market bids.

Since the market power mitigation proposal will change to use bid in demand rather than forecast demand as it does today, the current MPM-RRD cannot be relied on to dispatch RMR resources at the level necessary to meet reliability needs and to address non-competitive constraints. This is due in part because of the change to bid-in demand as well as the introduction of virtual bidding. Use of bid-in demand (without virtual biding) may cause the ISO to either under or over commit RMR resources. Adding virtual bidding may also result in either under or over commitment of RMR resources.

Due to the dramatic reduction of RMR units,[13] the ISO has concluded that it can continue to rely on a similar process today—the combination of manual RMR commitments and use of RMR proxy bids in lieu of default energy bids in the redesigned MPM-RRD process.

Thus, if ISO operators believe that an RMR unit needs to be committed to address voltage requirements, they will issue a manual RMR dispatch. For RMR condition 2 units, unless the ISO issues a manual RMR dispatch, the resource will not be considered at all in the MPM-RRD. If it is issued manual RMR dispatch, then it will be considered on the basis of its RMR proxy bids. For RMR condition 1 units, its market bids will be utilized in the AC run and its RMR proxy bids will be used instead of default energy bids to construct the mitigated bids. For determination of the RMR requirement MW under the new proposal stated in section 4.2.1, we will compare the LMP_i^{CMPC} with the market bid curve to determine the equivalent "CCR" schedule level as in current methodology. The maximum MW on the market bid curve, which has bid price less than or equal to LMP_i^{CMPC}, will be used as the equivalent "CCR" schedule level.

All RMR units continue to be subject to being dispatched through manual RMR dispatches for local reliability or to address a non-competitive constraint. This option is the simplest to implement from a process and resource perspective;

- It is anticipated that there will only be a few RMR resources in the near term;
- The operators will not have to perform additional studies or analysis to make these determinations
- If more RMR resources are required in the future, the ISO may want to re-evaluate this option if it becomes too cumbersome.

NEXT STEPS

Date	Milestone
May 6	Post draft final proposal
May 13	Meeting to discuss draft final proposal

[13] For contract year 2011, only Dynegy Oakland operated under an RMR contract.

May 23	Comments due on draft final proposal
June 29-30	Board of Governors Decision