

Memorandum

To: ISO Board of Governors
From: Keith Casey, Director, Market Monitoring
Date: December 4, 2007
Re: *Market Monitoring Report*

This is a status report only. No Board action is required.

This month's DMM Board Memo provides a brief summary of two issues:

- 1. Market Performance during the Southern California Wildfires** – DMM closely monitored grid and market operations during the Southern California wildfires. Section I of this memo provides a summary of market performance during this period. Overall market performance was reasonable given the extraordinary system conditions. However, there were significant market costs incurred with regard to managing local constraints within Southern California through the use of RMR and Out-of-Sequence (OOS) dispatch.
- 2. Charges to Deter Declined Pre-Dispatches** – CAISO Management will be seeking Board approval of a settlement charge mechanism designed to deter market participants from declining dispatches of import and export bids in the CAISO Real Time Market. DMM supports the CAISO Management recommendation and Section II of this memo provides some additional background information and recommendations for the Board to consider in reviewing this issue.

I. Market Performance during the Southern California Wildfires

This section provides a review of market performance during the period of severe wildfires in Southern California (October 21-27) and several days after. Several wildfires started throughout Southern California the weekend of October 20 and continued to burn largely uncontrolled throughout the following week, fueled by dry conditions and strong Santa Ana winds. There were, at the peak, roughly twenty separate fires in Southern California – all of which were primarily located in the greater San Diego and Los Angeles areas.

The fires caused transmission lines in many locations in the region to trip out of service for various lengths of time. The San Diego area was the hardest hit with numerous transmission lines forced out of service for significant periods of time. Most notable was the Pacific DC Intertie outage, which began as a derate to approximately 1,300 MW, progressed to a full outage on October 22nd, and returned to 1,200 MW on October 23rd. This facility is a major transmission line that imports energy from the Pacific Northwest to Southern California. Another major transmission path into Southern California, the Southwest Power Link (SWPL) was forced out of service during the

fires which further reduced imports to Southern California by approximately 1,100 MW. The SWPL outage began on October 21st and lasted through October 24th. In addition, there were two other major transmission limitations in transferring energy from Northern to Southern California, both of which were due to scheduled transmission work (i.e., unrelated to the fires), that compounded the overall situation. The Pacific AC Intertie was derated to roughly 1,200 MW on October 22nd and 23rd, and Path 26 was derated to 2,200 - 2,500 MW on October 20th and is expected to continue through November.¹ In addition to the transmission outages that were in effect during parts of this week, the nuclear generation plant at San Onofre was off-line during this period as well, which removed approximately 2,200 MW of generation.

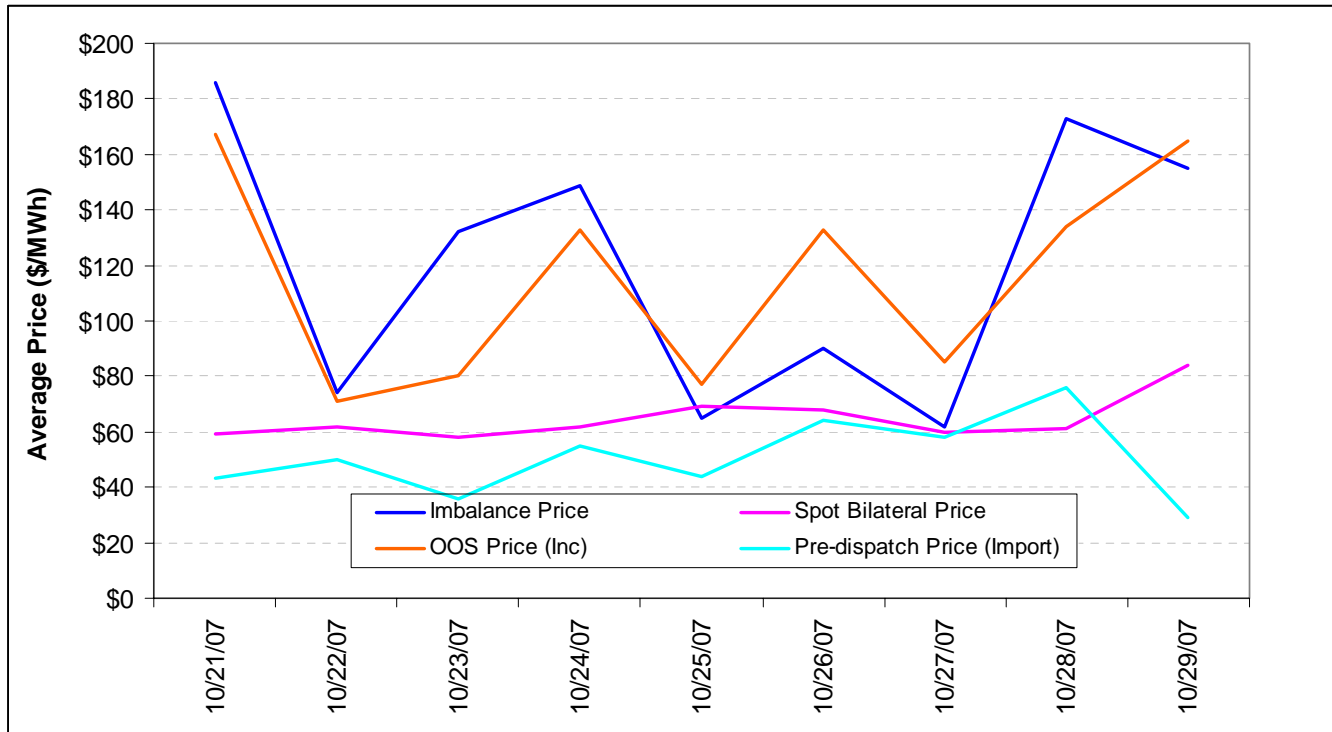
Given the extraordinary grid conditions in Southern California during the wildfires, the energy markets for this region were understandably impacted, with the main impact being a substantial increase in Out-of-Sequence market dispatches (i.e., dispatching generation resources in real-time out of economic merit order due to their particular location in the system). Transmission and generation limitations within Southern California during the wildfires resulted in increased demand for import energy, which increased congestion on the major interfaces leading into Southern California. Day-ahead and hour-ahead congestion on the inter-ties and internal paths during the week beginning Sunday, October 21, was higher than normal with a total gross congestion cost of roughly \$3.6 million compared with a weekly average for the season of less than \$1 million.² Roughly 98 percent of the total congestion costs were incurred in the Day Ahead Market, and primarily on the following interfaces to Southern California: Eldorado, Palo Verde, Mead, and the Adelanto group. Path 26 experienced congestion that week in the north-to-south direction. One factor that may have contributed to import congestion from the Southwest is the outage of the Southwest Power Link, which may have caused imports to be re-scheduled across other interfaces.

The impacts of the fires were also evident in the CAISO's real-time energy imbalance market. Figure 1 shows the average peak period price for several energy products for the period October 21 - 29. In-sequence real-time imbalance prices ("Imbalance Price" series in Figure 1) did spike above the \$250/MWh level at times during this week; however, these price spikes occurred with a fairly low frequency compared to what may have been expected during times of stress on the imbalance market. The average peak-period imbalance price across the week was somewhat higher than normal for the season, ranging from \$61/MWh to \$185/MWh; however, average volumes for in-sequence dispatch were fairly low (Figure 2).

¹ Several of the 230 kV class lines also went out of service intermittently. Most notably, the San Onofre – Serrano and Chino – Viejo 220kv lines went out of service the afternoon of the 22nd resulting in involuntary load curtailment of approximately 500 MW for roughly 30 minutes in HE15. In addition to the larger transmission lines, many lines in the lower voltage class, 60kV, were also forced out as a result of damage due to the fires or as a preventative measure.

² Note that some portion of the schedules on these interfaces were hedged against congestion charges through FTRs and the congestion cost figures presented here are not adjusted to account for these hedges. Also, the week prior to the fires also saw unseasonably high inter-zonal congestion prices caused by high congestion costs on Palo Verde.

Figure 1. Average Peak Period Prices for Spot Bilateral Transactions and Imbalance Market Dispatch



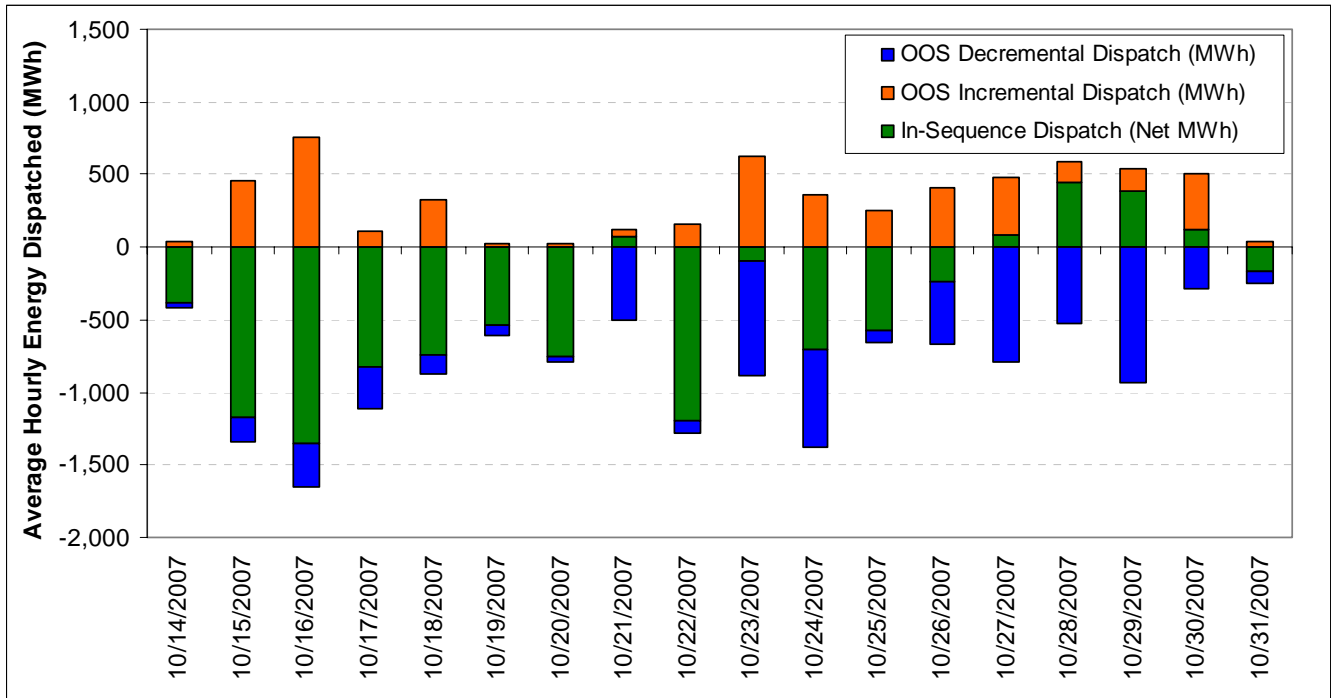
Spot bilateral prices for day-ahead energy purchases (as reported by Powerdex) were generally below the imbalance price throughout the week and remained at the \$60/MWh to \$70/MWh range until October 29th when they increased to just above \$80/MWh. This difference may be explained in part by over-forecasting of load during the week, reducing demand for short-term spot bilateral purchases. Average prices for imbalance import prices (“Pre-dispatch Price (Import)” series in Figure 1) were comparable to the spot bilateral prices throughout the week, with imbalance import prices dropping on October 29th. The close relationship to spot bilateral price may again be due to reduced demand for last-minute imports due to load forecast error as well as congestion on the major interties to the Southwest limiting the amount of import bids that could be dispatched in the imbalance market.

The average price for incremental out-of-sequence dispatch (“OOS Price (Inc)” series in Figure 1), which is not reflected in the imbalance market clearing prices discussed above,³ followed the in-sequence imbalance price more closely than the other two price indices. The numerous transmission limitations throughout Southern California resulted in a much higher volume of OOS dispatches. As seen in Figure 2, the average volume of incremental or decremental OOS dispatch (orange and blue bars) during the fire period (October 21-30) is significantly greater than the volume of in-sequence dispatch (green bars) compared to a higher proportion of in-sequence dispatch volume observed in the week prior to the fires. The reasons cited for the specific OOS dispatches included in Figure 2 vary, but are all generally related to managing grid conditions resulting from the Southern California fires.⁴

³ Out-of-sequence dispatches are paid “as-bid” and are not allowed to set the imbalance market clearing price.

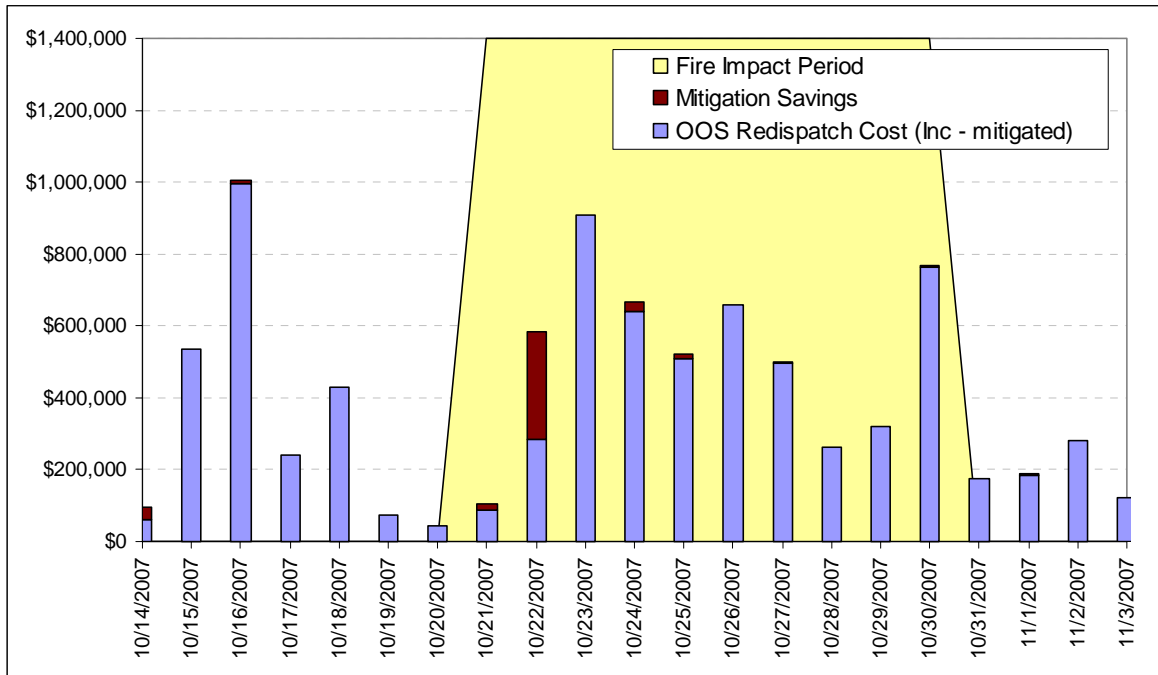
⁴ See the Market Performance Report for October, 2007, posted at <http://www.caiso.com/179d/179ddbce22760.html>.

Figure 2. Daily Average of Hourly Dispatch Volumes for 5-Minute Imbalance Energy



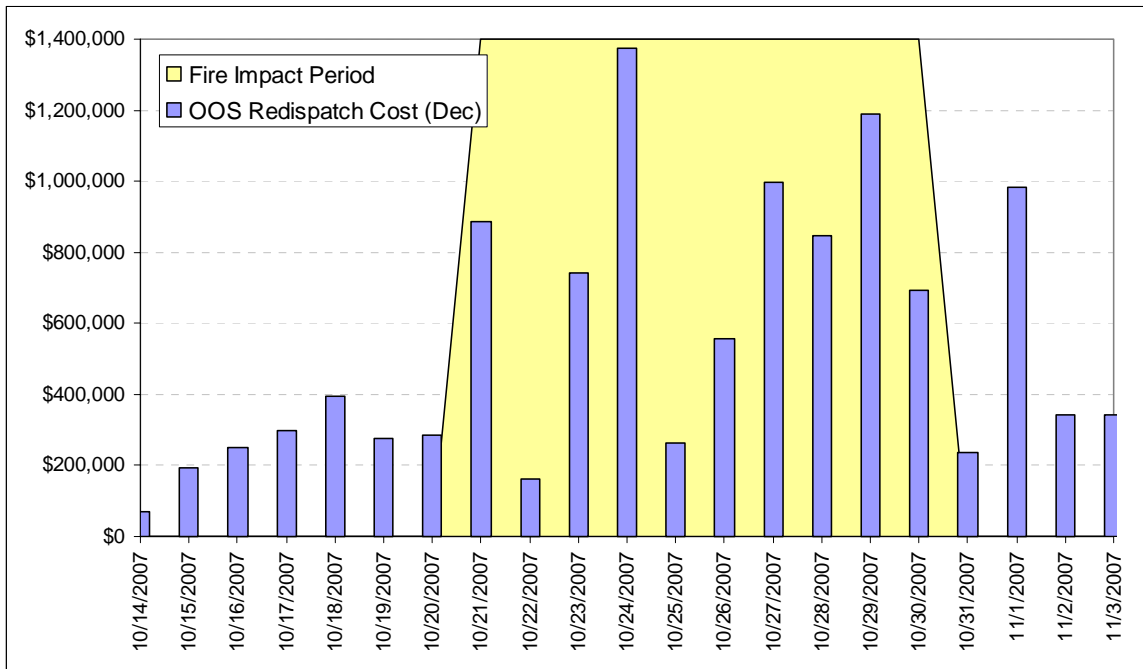
Because OOS dispatches can be susceptible to local market power concerns, the CAISO also applies bid mitigation to OOS dispatches that violate a Local Market Power Mitigation (LMPM) bid conduct threshold. This test evaluates whether or not a resource is exercising local market power through a conduct test that is failed if an OOS bid price is greater than the lesser of \$50 or 200 percent above the zonal imbalance market clearing price. If this test is failed, the bid price for that OOS dispatch is set to the greater of the zonal imbalance market clearing price or the reference price (e.g., mitigated bid) for that resource. Despite the increased volumes of OOS dispatch during the fire week, the amount of OOS dispatch that was subject to bid mitigation was relatively minor – with the exception of October 22nd. The re-dispatch cost associated with incremental OOS dispatches and the savings resulting from the application of LMPM is seen in Figure 3.

Figure 3. Redispatch Cost Associated with Incremental Out of Sequence Dispatch with Local Market Power Mitigation Savings Highlighted



The CAISO was also dispatching internal resources downward (decremental dispatches) to help mitigate local transmission issues during the fires. Figure 4 shows the re-dispatch cost for decremental OOS dispatches. There is no LMPM savings highlighted in these figures since all decremental OOS dispatches are mitigated to their decremental reference curve so there is no distinction between total decremental OOS cost and mitigated decremental OOS cost.

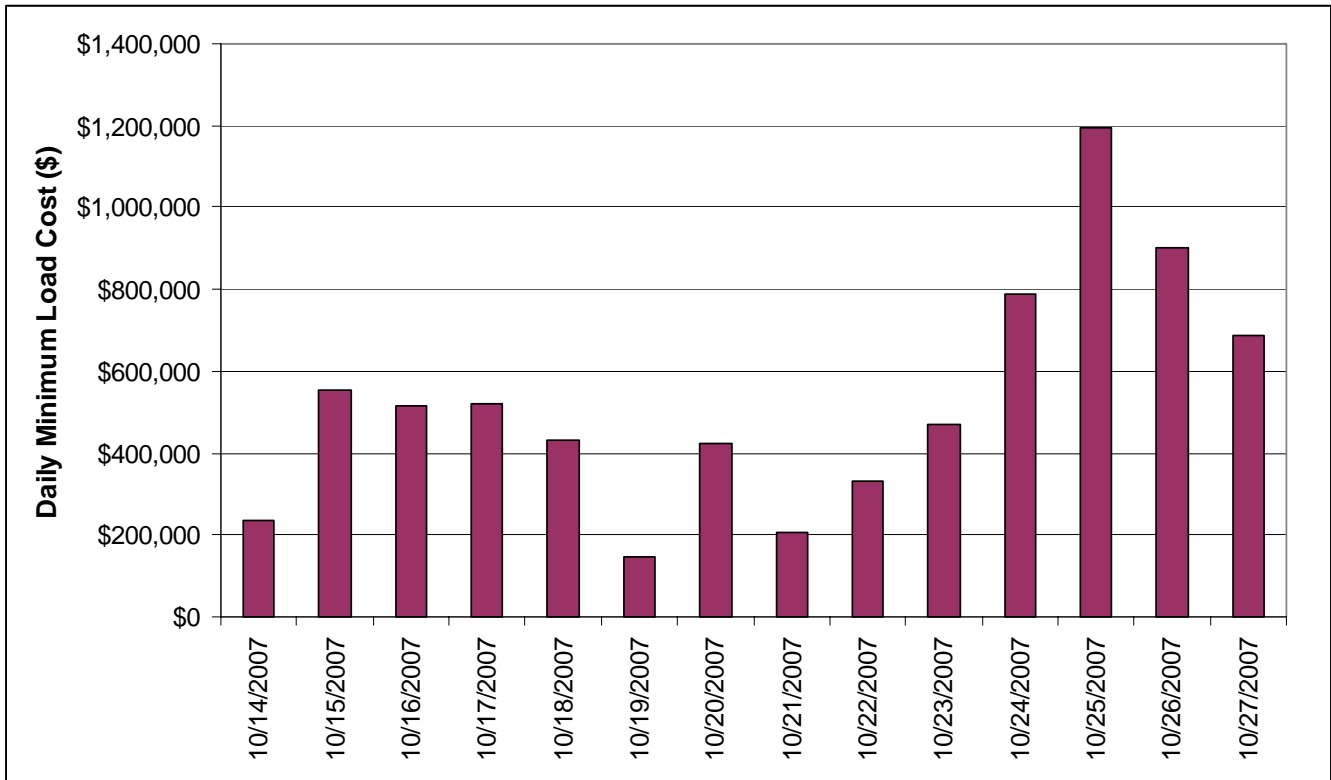
Figure 4. Redispatch Cost Associated with Decremental Out of Sequence Dispatch



Another indicator of the degree to which CAISO Operators were required to manually intervene to mitigate risk to grid reliability is the extent to which the Must Offer Obligation is invoked in the day ahead to support zonal or local reliability. During the week of the fire, minimum load costs attributed to zonal and local reliability issues in Southern California increased steadily from about \$350 thousand per day to a peak of \$1.2 million per day. This increase in unit commitment is primarily attributable to transmission issues created by the fires, and likely compounded by the roughly 2,200 MW forced outage of the SONGS facility. Figure 5 shows the daily commitment cost totals⁵ for zonal and local reliability reasons for Southern California. Compared with the prior week, the incremental cost for (non-RMR) unit commitment for reliability in Southern California was roughly \$1.7 million.

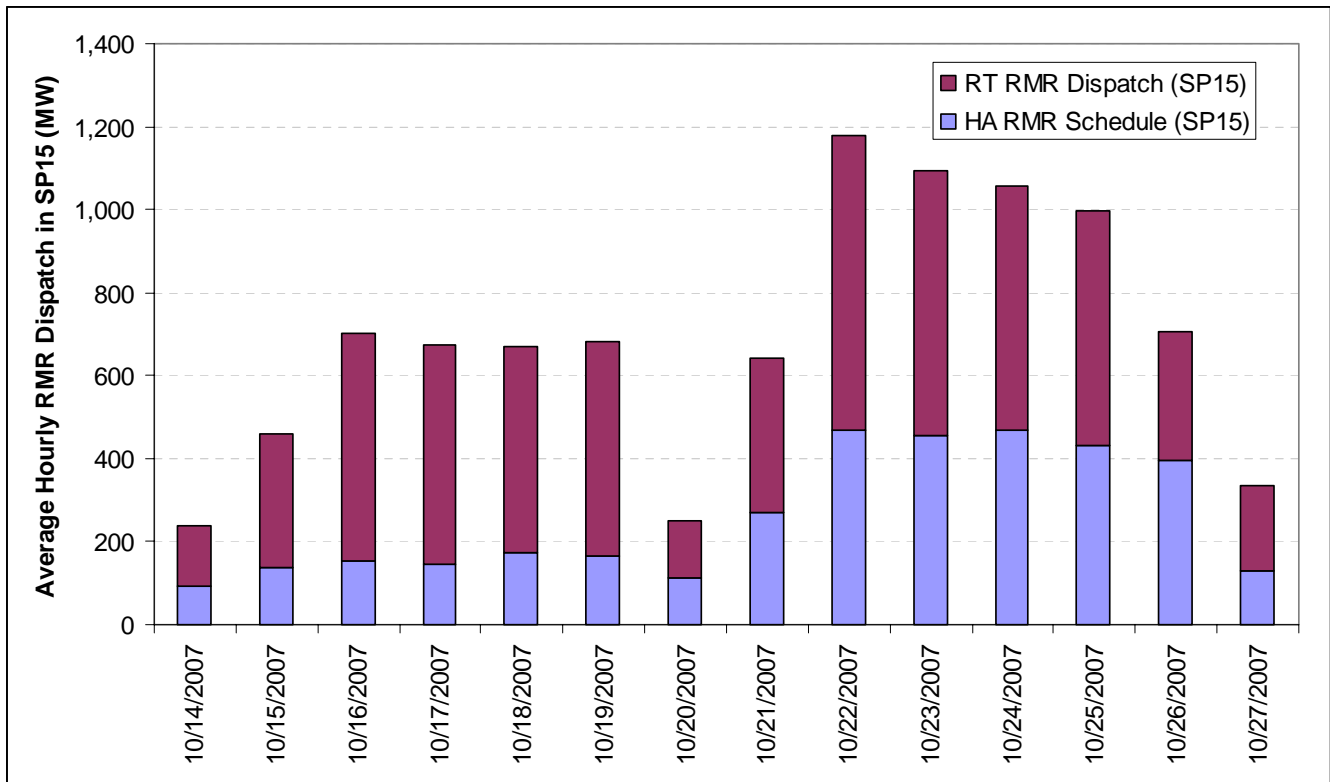
⁵ Otherwise referred to as Minimum Load Cost Compensation (MLCC).

Figure 5. Daily Minimum Load Cost (MLCC) Associated with Day Ahead Unit Commitment for Zonal or Local Reliability Issues



Another reliability tool used by CAISO grid operators is the pool of Reliability Must Run (RMR) resources. These resources are used to support local reliability and were used extensively during the fire week to help mitigate flows on intra-zonal lines that may have posed threats to reliability in Southern California. Figure 6 shows the hourly average forward and real-time dispatch of RMR resources in SP15 for the two week period beginning October 14th. Both forward commitment and real-time dispatch of the pool of RMR resources in Southern California increased significantly (compared to the prior week) as CAISO grid operators leveraged these resources in maintaining the reliability of the grid during the fire week. There will be a non-trivial incremental cost (compared to seasonal norms) associated with this increased use of RMR resources. Accurate estimates of the incremental cost associated with these RMR dispatches were not available at the time this report was prepared.

Figure 6. Average Hourly Reliability Must Run Dispatch in SP15



With the exception of a few price spikes in the Regulation Up market, Ancillary Service prices remained stable and within the normal range during this period, with prices for all services generally ranging between \$5/MW and \$20/MW.

Over the course of the one week period where the Southern California fires had the greatest impact on CAISO grid and market operations, the direct incremental cost of grid management increased roughly \$7.5 million, with a \$2.6 million increase in inter-zonal congestion management cost compared with seasonal norms, a \$3.2 million increase in intra-zonal congestion management cost through OOS dispatches compared with the prior week, and a \$1.7 million increase in associated unit commitment costs. These costs are rough estimates of the CAISO market costs attributable to the Southern California fires and do not include incremental RMR costs nor any market costs associated with impacts to short-term bilateral prices or construction/maintenance costs associated with transmission infrastructure damaged in the fires.

Overall, the CAISO market impact of the fires was seen primarily in the cost of managing local reliability conditions through congestion management and unit commitment. The Ancillary Service markets performed within seasonal norms and the imbalance energy market exhibited somewhat higher prices throughout the first week of the fires; however, most of the real-time market activity was in the form of Out-of-Sequence dispatches.

II. Charges to Deter Declined Pre-Dispatches

Summary

Real-time market bids for energy imports and exports that are pre-dispatched by the CAISO, but then not delivered (or "declined") by market participants, have, on occasion, resulted in operational problems and market

inefficiencies. Under MRTU, such declined pre-dispatched bids could create additional market distortions and potential gaming concerns. In order to deter excessive declined pre-dispatches, the CAISO is proposing to establish a charge for declined pre-dispatched bids. The CAISO's proposed charge for declined pre-dispatches is described in a separate memo to the Board from Market Services.⁶

DMM supports the CAISO's proposed charges for declined pre-dispatched bids as a prudent and effective measure for deterring excessive declined pre-dispatches, and avoiding the detrimental effects that excessive declined pre-dispatched bids can have on reliability and market performance, particularly under MRTU. DMM believes the proposed changes strike an appropriate balance between the need to establish a sufficient deterrent for excessive declined pre-dispatches, without creating an excessive financial risk that could significantly reduce participation or increase bid prices in the CAISO's market for imports and exports of real-time energy.

Declined Pre-Dispatches

Declined pre-dispatched bids can detrimentally affect reliability and market efficiency in a variety of ways:⁷

- **Sub-optimal Imbalance Energy Dispatch.** The CAISO software seeks to optimally dispatch bids for real-time energy imports, exports and resources within the CAISO, based on the assumption that all bids will perform as dispatched. Thus, declined pre-dispatches result in sub-optimal dispatch of these various sources of real-time incremental and decremental energy. For example, declines of pre-dispatched import bids would typically be expected to cause the CAISO software to dispatch incremental bids from internal energy resources at a higher price than if the pre-dispatched bids were not declined or were not originally submitted.
- **CAISO Support of Exports or Imports Dispatched due to Market Clearing.** The CAISO "clears" the market for real-time energy by dispatching all incremental and decremental bids with "overlapping" bid prices (i.e., incremental energy bids to sell energy at prices less than any decremental energy bids to buy energy or reduce energy schedules). Declines of pre-dispatched import bids can cause the CAISO to be forced to provide energy from within the CAISO system to support export bids that were pre-dispatched as a result of this market clearing process. Similarly, declines of pre-dispatched export bids can cause the CAISO to decrement energy from within the CAISO system to accommodate the additional imports that were pre-dispatched as a result of declined export bids. Both these situations can create reliability problems, as well as additional costs to other market participants.
- **Gaming Concerns.** The ability to decline pre-dispatched bids also creates the potential for gaming of market rules if participants treat pre-dispatched real-time energy bids at the inter-ties as essentially a cost-free option to sell or purchase energy. Under this scenario, the market participant would only deliver on a dispatched bid if the price is favorable in comparison to other opportunities the market participant has to buy or sell energy in bilateral markets that exist at the time the CAISO pre-dispatches the bid.
- **Impacts on Market Prices Under MRTU.** Under the current market design, declined pre-dispatches do not affect the price paid or charged for pre-dispatched imports or exports because of the current "as-bid" settlement. Under MRTU, unless provisions such as those being proposed by the CAISO are implemented to deter excessive declined pre-dispatches, declined pre-dispatched inter-tie bids could pose additional market inefficiencies and gaming concerns stemming from the fact that under MRTU all imports and exports pre-dispatched in the Hour Ahead Scheduling Process (HASP) will be settled based on a single market clearing

⁶ See Memorandum to ISO Board of Governors from Greg Ford, Manager of Market Services, re: *CAISO Final Proposal on Decline of Real-Time Import Export Bids*, December 4, 2007,

⁷ See discussion on pages 2-8 of DMM's October 10, 2007 whitepaper on this issue (*Declined Pre-Dispatched Inter-tie Bids*, Department of Market Monitoring, October 10, 2007). <http://www.caiso.com/1c72/1c72dd7669f90.pdf>

price. Under MRTU, excessive declined pre-dispatches of import bids will tend to decrease the HASP price used to settle all pre-dispatched import and export bids that are accepted, while excessive declined export bids will tend to increase the HASP price. Thus, excessive declined pre-dispatch bids could have a greater potential impact in terms of distorting HASP prices, and the relationship between the HASP price and the real-time MCP. However, the CAISO's proposal would mitigate this concern by creating a strong incentive for participants to avoid excessive declines of pre-dispatched bids.

Figure 7 shows the portion of pre-dispatched energy declined during each month from November 2006 through October 2007. As shown in Figure 7, declined pre-dispatches increased during the first few months of 2007, and dropped significantly in May after DMM expressed concern to participants about a trend of high rates of declined pre-dispatches. While over 20 percent of import energy pre-dispatched by the CAISO was declined during the first four months of 2007, less than 10 percent of pre-dispatched imports has been declined since April. Similarly, over 5 percent of export energy pre-dispatched by the CAISO was declined during the first four months of 2007, while less than 3 percent of pre-dispatched exports has been declined in each subsequent month.

Review of Market Rules and Experience in Other ISOs

As part of the process of developing the market rule being proposed by the CAISO, DMM performed extensive review of the market rules and experience of other ISOs relating to declined import and export bids. However, in general, DMM found that significant differences exist between the market conditions and rules of the CAISO and other ISOs, so that a different approach to declined imports and export bids may be warranted. For example:

- The ISO New England (ISO-NE) does not have any charge for declined import or exports. However, according to ISO-NE staff, the ISO-NE's decline rates in the ISO-NE market are extremely low and its dispatch system and process allow for dispatch of other bids to replace those market participants decline. This appears to be due largely to the fact that the ISO-NE requires that a specific source/sink for delivery on bids must be submitted with each bid. In addition, the timeline for finalizing import and export schedules in the NE-ISO occurs just after a similar process occurs in the adjacent New York ISO (NYISO), so that ISO-NE immediately knows if a bid can be delivered and has the opportunity to issue additional pre-dispatches if needed to compensate for declines.
- In the NYISO, imports and exports are pre-dispatched based on a forecasted LMP, but are settled on the actual real-time LMP, with provisions for bid guarantees. If the real-time LMP is higher than the forecasted LMP, declined import bids are charged the difference between these two prices. Similarly, if the real-time LMP is lower than the forecasted LMP, declined exports are charged the difference between the two LMPs. Otherwise, there is no financial consequence for declined pre-dispatches. The NYISO applies this charge to all declines without exception, unless due to a curtailment by a reliability authority.
- PJM Interconnection (PJM) does not have any charge for declined imports or exports. However, PJM is much less dependent on imports and exports than the CAISO, and does not include import and export bids in market clearing.

As part of an initial whitepaper outlining potential options for addressing declined pre-dispatches, DMM included an option similar to the settlement rule in effect in New York, under which declined pre-dispatches would be subject to a charge based on the difference between pre-dispatch and real-time prices. However, under this approach, participants could be subject to extremely high charges for declined pre-dispatches due to the volatility of differences in pre-dispatch and real-time prices. DMM believes this approach would not accurately reflect the actual impacts of declined pre-dispatches, and could impose excessive financial risks for declined pre-dispatches beyond the level needed to simply deter excessive levels of declined pre-dispatches. Meanwhile, because of the

widely varying nature of bilateral transactions to deliver imports/exports in the California market and various seams issues of interactions between the CAISO and the rest of the West, DMM believes a threshold or “allowance” for declines, below which the decline charges are not assessed, is appropriate. Consequently, a charge for declines above a threshold rate that is based on a multiple of the pre-dispatch price, rather than the difference between the real-time and pre-dispatch prices, would provide a more consistent deterrent to declined pre-dispatches, while avoiding excessive financial risks for bidders in the real-time market.

Proposed Charge for Declined Pre-Dispatches

The CAISO’s proposal closely mirrors the Uninstructed Deviation Penalty (UDP) provisions that are incorporated in the current and MRTU tariffs, but which can only be activated upon a filing by the CAISO in the event that uninstructed deviations are found to be creating reliability or market problems. If activated, these current UDP provisions would apply to uninstructed deviations by generating resources within the CAISO – as well as to declined import and export bids. The CAISO’s recent experience with declined pre-dispatched bids suggests that such declines have indeed had such detrimental reliability and market impacts, and that the potential for such impacts may increase under MRTU. Thus, DMM believes it is reasonable to proceed with steps to implement charges for declined pre-dispatched bids at this time.

While the proposed charges closely mirror UDP provisions that are incorporated in the current and MRTU tariffs, the CAISO proposal includes a variety of provisions that make the proposal less stringent than UDP provisions for imports and exports that have been previously developed by the CAISO. For example:

- Under current UDP provisions, declined decremental pre-dispatches would be charged at the full real-time MCP, rather than only 50 percent of the pre-dispatch price under the CAISO proposal.
- Current UDP provisions do not include the 10 percent monthly threshold or “allowance” included in the CAISO’s proposal.

Although both these modifications make the proposal significantly less stringent than previously developed UDP provisions, DMM believes the proposed changes strike an effective balance between the need to establish a sufficient deterrent for excessive declined pre-dispatches, while not creating an unnecessarily excessive financial risk that could significantly reduce participation or increase bid prices in the CAISO’s market for imports and exports of real-time energy. In addition, DMM notes that these components of the charge for declined pre-dispatches could be adjusted based on actual experience as needed to avoid excessive declines or any unanticipated impacts of specific charges included in the CAISO’s proposal that may be observed over time.

At the same time, since the CAISO’s proposed charges for declined import and export bids is consistent with the existing UDP provisions, there may be a very limited need to modify any of these provisions in the event that at a future date, the CAISO determines there is a need to implement the UDP provisions for resources within the CAISO system.

Potential Impact of Charges for Declined Pre-Dispatches

While declined pre-dispatches can detrimentally affect reliability and market efficiency in a variety of ways, one of the concerns about establishing a charge for declined pre-dispatches is the potential effect this may have on the price and volume (or liquidity) of supply from imports and demand from exports in the real-time market. DMM recognizes that charges for declined pre-dispatches could have some impact in terms of increasing the bid price and decreasing the volume of bids for energy imports in the real-time market from some sources. However, DMM believes this concern must be balanced against the detrimental effects of declined pre-dispatches on reliability and market efficiency.

One indication of the potential impact of a charge for declines on *market liquidity* (i.e., the actual available supply of imports/exports) may be the portion of pre-dispatched inter-tie bids that have been accepted by participants with relatively low monthly decline rates.⁸ Figure 8 shows the portion of total energy bids for imports and exports pre-dispatched by the CAISO that were accepted by Scheduling Coordinators (SCs) categorized by the monthly pre-dispatch decline rate of the SC over the six month period from May through October 2007.⁹ As shown in Figure 8:

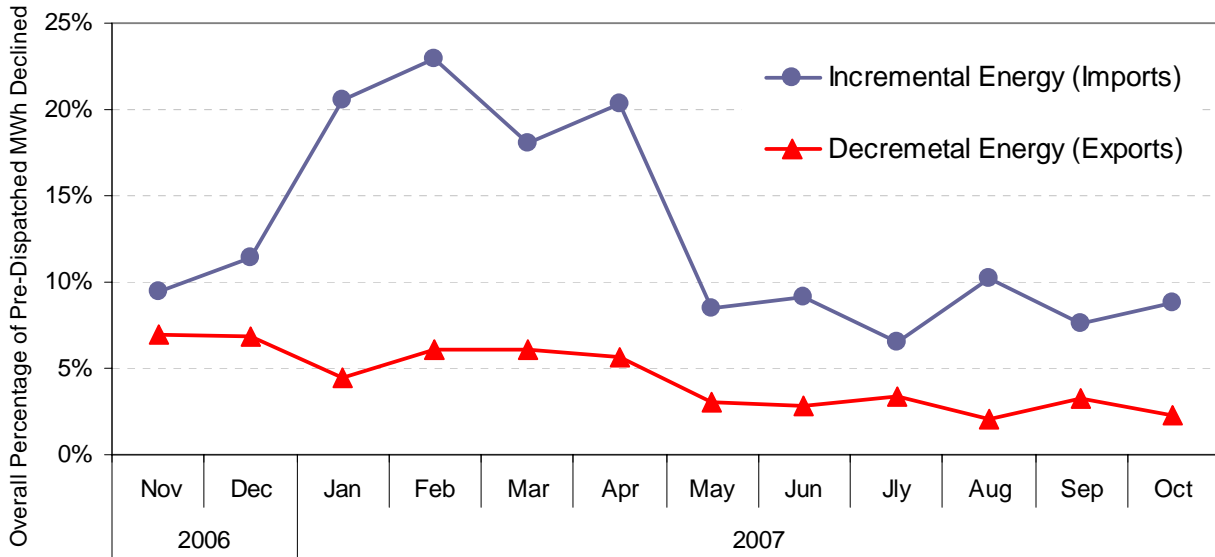
- About 63 percent of the total incremental energy pre-dispatched by the CAISO that was accepted was provided by SCs with monthly incremental energy decline rates of less than 5 percent. Meanwhile, about 77 percent of the total incremental energy pre-dispatched by the CAISO that was accepted by participants was provided by SCs with monthly decline rates of less than 10 percent.
- Meanwhile, about 88 percent of the total decremental energy pre-dispatched by the CAISO that was accepted was provided by SCs with monthly decremental energy decline rates of less than 5 percent. Approximately 95 percent of the decremental energy pre-dispatched by the CAISO that was accepted by participants was provided by SCs with monthly decline rates of less than 10 percent.

While DMM believes that the historical data presented in Figure 8 provide a benchmark for assessing the potential impacts of the CAISO's proposal, this analysis should not be viewed as a basis for directly projecting any of these impacts. Most notably, historical data on declined pre-dispatches does not reflect potential improvements in decline rates that would be likely to result if a charge for declined pre-dispatched bids were actually in effect, since such a charge would establish a financial incentive for SCs to submit bids that they expect to be able to deliver with a high level of confidence. DMM believes a charge for declined pre-dispatches could "weed out" many bids for imports or exports that SCs do not have a relatively high confidence of fulfilling if dispatched by the CAISO, and would also provide an additional incentive for SCs to accept bids that are pre-dispatched.

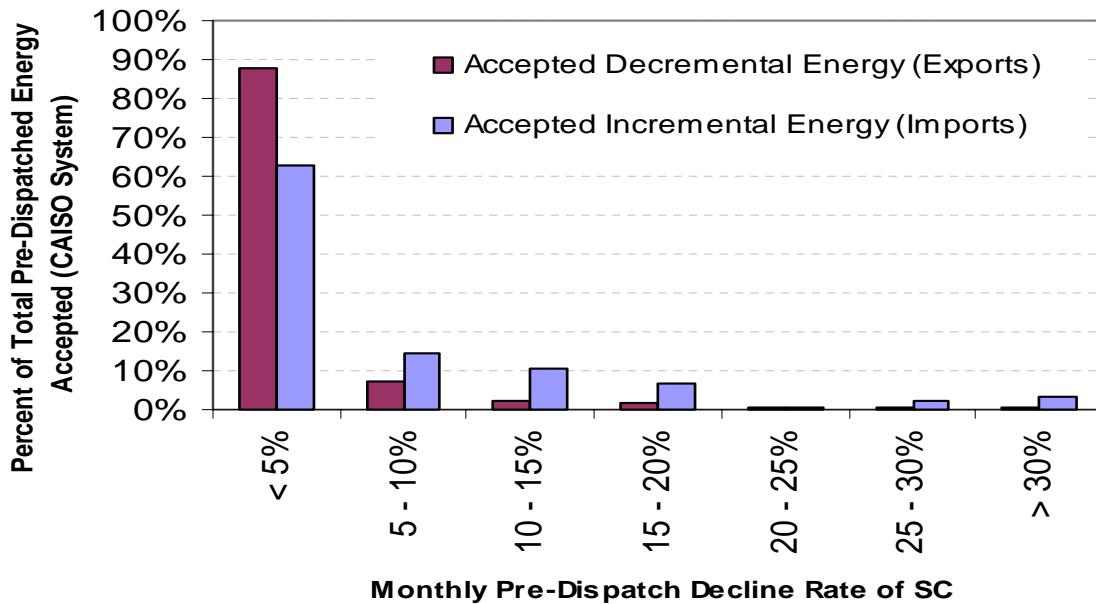
⁸ The rationale for this is that any such charges should not decrease the volume of energy bid and provided by SCs with relatively low decline rates (i.e., below or just above the threshold that would trigger charges). Meanwhile, if charges for declined pre-dispatches were in effect, SCs with decline rates significantly above the threshold might reduce the amount bid and ultimately provided into the CAISO Real Time Market.

⁹ As shown in Figure 7, declined pre-dispatch rates were significantly lower during this more recent six month period from May to October 2007 than over the previous six month period from November 2006-April 2007. This analysis is based on data for this more recent six month period, reflecting the assumption that this data would be more representative of potential future conditions.

**Figure 7. Pre-Dispatched Import/Export Energy Declined (CAISO System)
November 2006 – October 2007**



**Figure 8. Pre-Dispatched Energy Accepted (CAISO System)
By Monthly Decline Rate of SC - May to October 2007**



Conclusions

DMM believes the CAISO's proposed charges for declined pre-dispatched bids constitute an effective measure for deterring excessive declined pre-dispatches and avoiding the detrimental effects that excessive declined pre-dispatched bids can have on reliability and market performance, particularly under MRTU. DMM believes the

proposed changes strike an effective balance between the need to establish a sufficient deterrent for excessive declined pre-dispatches, while not creating excessive financial risk that could significantly reduce participation or increase bid prices in the CAISO's market for imports and exports of real-time energy.