Memorandum

To: ISO Board of Governors

From: Eric Hildebrandt, Director, Market Monitoring

Date: October 20, 2011

Re: **Market Monitoring Report**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This report provides comments and analysis by the Department of Market Monitoring (DMM) on three issues:

- **Multi-stage generating unit enhancements.** DMM is supportive of enhancements being proposed to the multi-stage generating resource software. The performance of this functionality appears to have improved significantly since it was implemented in December 2010. The proposed enhancements can benefit both the ISO system and multi-stage units by dispatching these resources more accurately and efficiently. These enhancements may also encourage more resources to be modeled as multi-stage units. Currently only about one-third of 14,400 MW of combined cycle capacity in the ISO system is operating as multi-stage generating units. However, DMM continues to recommend that as part of a future initiative, the ISO seek to develop an improved approach for limiting bids for transition costs submitted by multi-stage unit owners representing the cost for these units to transition from one configuration to another.

- **Bid cost recovery payments.** Bid cost recovery payments are intended to ensure that generators receive enough market revenues to cover the cost of all their bids that are dispatched by the ISO. Early this year, the ISO had identified several aspects of bid cost recovery calculations which – when exploited by certain manipulative bidding behaviors – led to excessively high bid cost recovery payments for the day-ahead market. In April and June, the ISO made two emergency filings with the Federal Energy Regulatory Commission to modify bid cost recovery rules to mitigate this behavior. After the June filing, the levels of bid cost recovery dropped dramatically. In the third quarter, bid cost payments associated with the day-ahead market have dropped 90 percent and overall bid cost recovery payments have

declined by almost 50 percent compared to the second quarter. However, real-time bid cost recovery payments have increased by about 50 percent for the same period. Analysis by DMM indicates this increase is primarily related to exceptional dispatches made by the ISO to commit additional capacity after the day-ahead market to protect against contingencies during peak system days and requirements for ramping capacity south of Path 26.

- **Convergence bidding on inter-ties.** In September the ISO filed with the FERC to eliminate convergence bidding on the interties. A decision from FERC on this filing is expected in November. The elimination of convergence bidding on interties is expected to decrease revenue imbalances by eliminating convergence supply bids at interties that are offset by an equal quantity of convergence demand bids at nodes within the ISO. Whenever hour-ahead prices are lower than real-time prices, these offsetting supply and demand bids do not help to converge prices in these markets, but create revenue imbalances that are ultimately allocated to load serving entities. In August and September, price convergence in these markets improved substantially due to a series of additional software and operational improvements, leading to a significant reduction in revenue imbalances created by these offsetting convergence bids. However, these offsetting convergence bids still contributed an average of about $3.3 million per month to revenue imbalances. These trends illustrate that that despite recent improvement in price convergence, eliminating convergence bidding at the inter-ties remains important until the ISO addresses structural differences between the hour-ahead and real-time markets.

Multi-stage generating unit enhancements

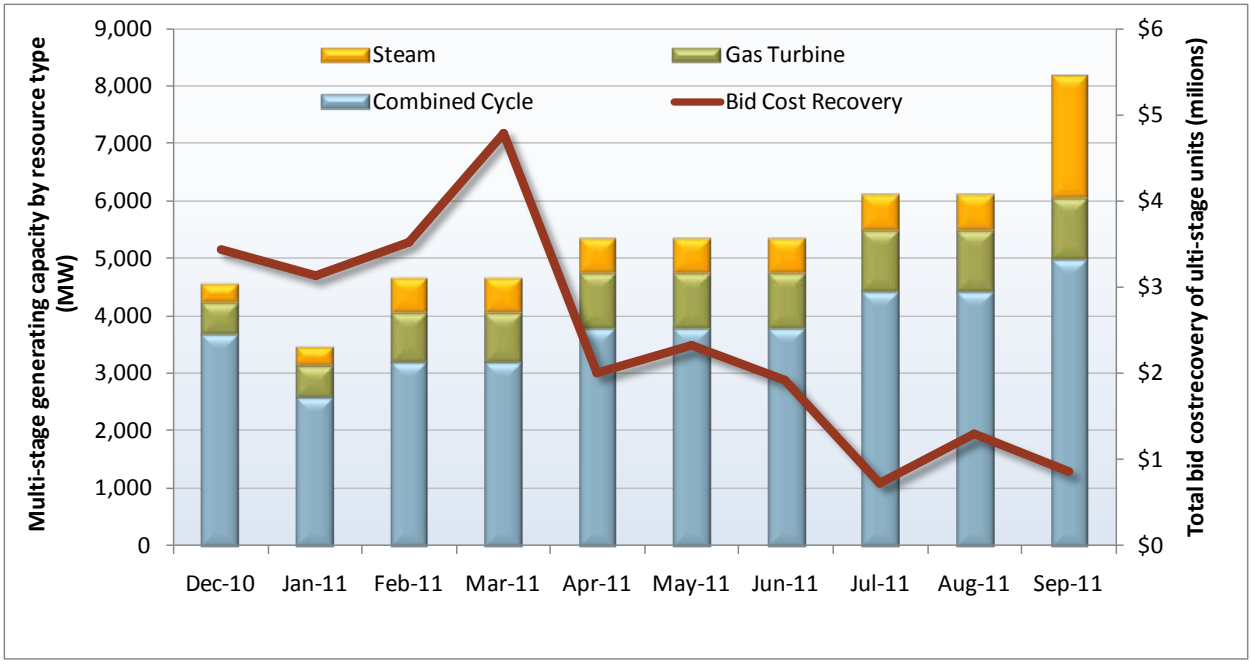
Management is seeking approval for a variety of enhancements to the existing modeling functionality for multi-stage generation resources. Most of these enhancements are designed to provide generators selecting to be treated as multi-stage generating units additional flexibility in how these resources are modeled and scheduled. This flexibility can benefit generators and the ISO system by allowing units to be dispatched more efficiently and consistently with their actual operating characteristics. By making this functionality more attractive for generation owners, the ISO also hopes to increase the amount of generating capacity operating as multi-stage resources.

DMM is supportive of these enhancements as a way of making this functionality more effective for both the ISO and generating units that can be more accurately modeled as multi-stage resources. Currently only about one-third of 14,400 MW of combined cycle capacity in the ISO system is operating as multi-stage generating units. The performance of this functionality appears to have improved significantly since it was implemented in December 2010. Two quantifiable measures of this improvement are reductions in the

frequency of exceptional dispatches issued for multi-stage units and the amount of bid cost recovery payments made to these resources.

As shown in Figure 1, the amount of capacity opting to be modeled as multi-stage generation has increased from about 4,500 MW to almost 8,200 MW since December 2010. Meanwhile, bid cost recovery payments for these units have declined from an average of about $3.7 million per month during the first four months of this new functionality, to an average of about $1 million in the third quarter of 2011. For multi-stage generating units, most bid cost recovery payments occur in the real-time market, with much of this being incurred when ISO operators must issue exceptional dispatches to these units to modify or override dispatch instructions issued directly by the market software.

Figure 1. Multi-stage generation capacity and bid-cost recovery payments



As noted in Management's memo on this topic, one of the potential strengths of multi-stage generating unit modeling is that it accounts for the costs and operational constraints associated with transitioning between operating configurations. Currently, participants are afforded significant flexibility in the value of transition costs they submit to represent the costs incurred by a resource when transitioning from one configuration to another. Transitions costs used by the market software are based on costs submitted by participant to the ISO bounded by rules developed by the ISO.

DMM has previously expressed several concerns about current rules for these transition costs, since transition costs submitted by participants can be significantly in excess of actual costs and the basis for limiting costs is not clearly defined or verifiable. Thus, DMM has recommended an approach for more accurately accounting for transition costs based directly on fuel usage rates. DMM continues to recommend that as part of a future initiative, the ISO seek to develop an approach for limiting transition cost bids based on some percentage of verifiable costs – including both fuel and any non-fuel costs that a generator can demonstrate are associated with transitioning from one configuration to another.[1]

Bid cost recovery payments

Bid cost recovery payments are designed to ensure that generators receive enough market revenues to cover the cost of all their bids dispatched by the ISO. Early this year, the ISO had identified flaws in the calculation of these payments which – when exploited by certain manipulative bidding behaviors – led to excessively high bid cost recovery payments associated with the day-ahead market. In April and June, the ISO made two emergency filings with the FERC to modify bid cost recovery rules to mitigate this behavior.

Since these rule changes, bid cost recovery payments have dropped significantly, particularly for the day-ahead market. As shown in Figure 2:

- Overall bid cost recovery payments are down about 50 percent in the third quarter relative to the second quarter.

- Bid cost recovery payments associated with the day-ahead market (represented by the blue bar) have decreased by 90 percent in the three months since bid cost recovery rules were last modified.

- However, bid cost recovery payments associated with real-time market dispatches have increased by almost 50 percent in the third quarter.

Operating logs indicate the increase in real-time payments primarily related to exceptional dispatches made by the ISO to commit additional capacity after the day-ahead market for two reasons:

- Exceptional dispatches for system capacity help to meet generation capacity requirements for the entire ISO region. As noted in DMM's 2010 annual report, this

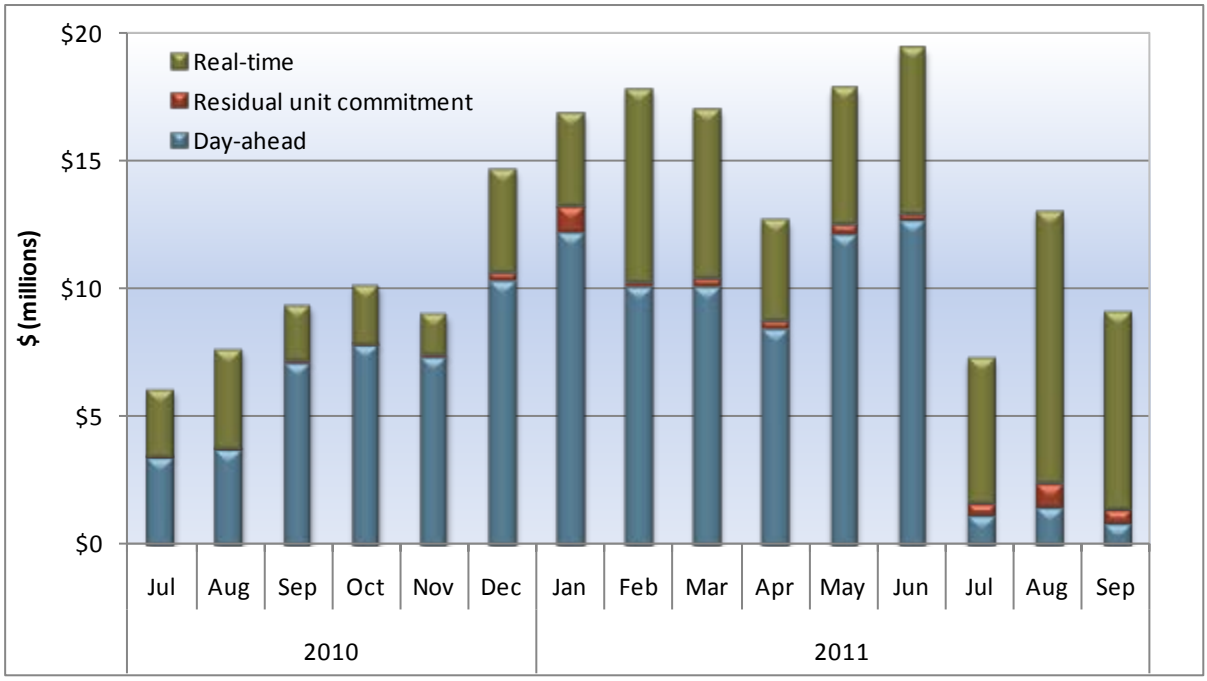
[1] The ISO's original proposal under this initiative called for modifying transition cost rules along the lines previously recommended by DMM. Some stakeholders argued that there are significant non-fuel costs associated with transitioning between configurations that should be included in transition costs. However, no specific information on these costs has been provided. Nevertheless, in response to this stakeholder input, Management's final proposal does not include any modifications to current transition cost limitation rules.

type of unit commitment typically occurs when system loads approach their annual peaks in the late summer months.[2] These additional unit commitments are made after the day-ahead market to protect the system from voltage collapse and potential thermal overloads on critical inter-ties should worst-case contingencies occur.

- Additional on-line capacity located south of Path 26 that can be ramped up in 30 minutes to meet a contingency such as an outage on the of the Nevada-Oregon Border (NOB) transmission path, also known as the Pacific DC Inter-tie (PDCI).

In July and August, most unit commitments for these two reasons coincided with peak load days. In September, much of these commitment were associated with the outage of the 500 kV line connecting Arizona with the ISO and peak load days.

Figure 2. Bid cost recovery payments



Exceptional dispatches will continue to be necessary to resolve circumstances not addressed by the market model. Even so, DMM recommends that the ISO monitor its use of exceptional dispatches and seek to limit its impact on bid cost recovery payments. DMM will continue to monitor and analyze bid cost recovery payments for anomalies and will make further recommendations and referrals as necessary.

[2] See discussion of exceptional dispatches in DMM's *2010 Annual Report on Issues and Performance*, pp. 70-74. http://www.caiso.com/Documents/2010AnnualReportonMarketIssuesandPerformance.

Convergence bidding on inter-ties

As noted in DMM's report for the August Board meeting, market performance since convergence bidding was implemented in February 2011 has shown that fundamental structural aspects of the ISO's current market design tend to create systematic differences in hour-ahead and real-time prices. Under this current market design, convergence bidding on inter-ties has allowed some participants to profit from persistent and predictable differences in hour-ahead and real-time price differences. These profits contribute to revenue imbalances that are allocated to load-serving entities without providing any significant market efficiency benefits.

In September, the ISO filed with the FERC to eliminate convergence bidding on inter-ties, pursuant to the Board's decision on this issue at its August meeting. A decision from FERC on this filing is expected in November. The elimination of convergence bidding on inter-ties is expected to decrease revenue imbalances by eliminating convergence supply bids at inter-ties that are offset by an equal quantity of convergence demand bids at nodes within the ISO. Whenever hour-ahead prices are lower than real-time prices, these offsetting convergence bids create revenue imbalances without helping to converge prices in these markets. These revenue imbalances are ultimately allocated to load serving entities through real-time imbalance energy and congestion offset charges.

Although price convergence in the hour-ahead and real-time markets has improved in recent months due to a series of additional software and operational improvements, significant systematic price differences continue in these markets during some periods. As a result, off-setting convergence bids continue to contribute to real-time imbalance energy and congestion offset charges. As show in Figure 3:

- In August and September, real-time offset costs were lower than in any month since May 2010, but still totaled about $12 million per month.

- Despite significant improvements in overall price convergence, offsetting convergence bids still contributed an average of about $3.3 million per month to these charges in August and September.

- The remainder of the convergence bidding costs in August and September were mostly attributable to unaccounted for energy.[3] Historically, these costs have been revised downward as better meter data becomes available.

These trends illustrate that that despite recent improvement in price convergence, eliminating convergence bidding at the inter-ties remains important. Historically, the

[3] Unaccounted for energy is attributable to meter measurement errors, power flow modeling errors, energy theft, statistical load profile errors, and distribution loss deviations.

divergence of hour-ahead and real-time prices has also tended to increase in winter and spring months due to market conditions during these periods. Whenever such divergences occur, convergence bidding at the interties can exacerbate real-time offset charges without providing any market efficiency benefits. Thus, DMM believes that the suspension of convergence bidding at the inter-ties is important until the ISO addresses structural differences between the hour-ahead and real-time markets.

Figure 3. Estimated contribution of off-setting convergence bids to real-time imbalance offset charges