

# Memorandum

**To:** ISO Board of Governors  
**From:** Steve Berberich, Vice President Corporate Services  
**Date:** November 20, 2008  
**Re:** *MRTU Readiness Status*

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*This memorandum requires Board action.*

This memo follows up on the October 22, 2008 “Decision for FERC 60-Day Filing to Support January 31, 2009 MRTU Go-Live” memo that outlined the MRTU readiness status of the California ISO and participants. Management is pleased to present the significant progress made since the October 28, 2008 Board meeting.

The ISO collaborated extensively with participants to close the perception gaps concerning readiness status. Management appreciates the tremendous spirit of cooperation afforded by the participants during these discussions. We hosted multiple executive level meetings, jointly refined simulation exit criteria, worked one-on-one to resolve settlement issues and closed a number of outstanding variances.

At the last Board meeting, the market participants highlighted five key areas they would like addressed prior to filing for readiness. Those items related to market prices, exit criteria, settlements, market monitoring, and status of FERC filings. Since the last Board meeting, progress has been made on all elements but we believe market prices and settlements remain the critical elements to consider for a go live date.

This document reviews the status of the five key areas and progress made since the last Board meeting.

## Market Prices

The ISO addressed many of the questions raised at the last Board meeting. In particular, the ISO ran several base-line market scenarios for the day-ahead market to confirm pricing results from the market simulation tests. The ISO attempted to run similar tests for the real time market but was unsuccessful because we could not duplicate real time bidding scenarios. The day-ahead scenarios, which the ISO developed with involvement from the Department of Market Monitoring and review by certain market participants, eliminate outside influences on prices (system conditions, bidding behavior, etc) and give visibility to how the prices behave in a “pristine” environment. Although the ISO has successfully confirmed the results and reduced gaps in understanding, questions from market participants persist. The remaining questions relate to Residual Unit Commitment (RUC) prices, how they should be

awarded, and the underlying RUC market design. Some market participants also have concerns about prices at Load Aggregation Point (LAP) prices in the north. Management remains confident in the underlying MRTU pricing engines and their output based on simulation to-date, the base case tests and the LECG analysis. While we have seen pricing issues, they are explainable by simulation conditions or quickly resolvable software issues. Achieving comfort with all participants may not be possible, and we are not able to run extensive tests to address each and every question. Nevertheless, we will continue to analyze and explain MRTU simulation prices to increase participants' understanding.

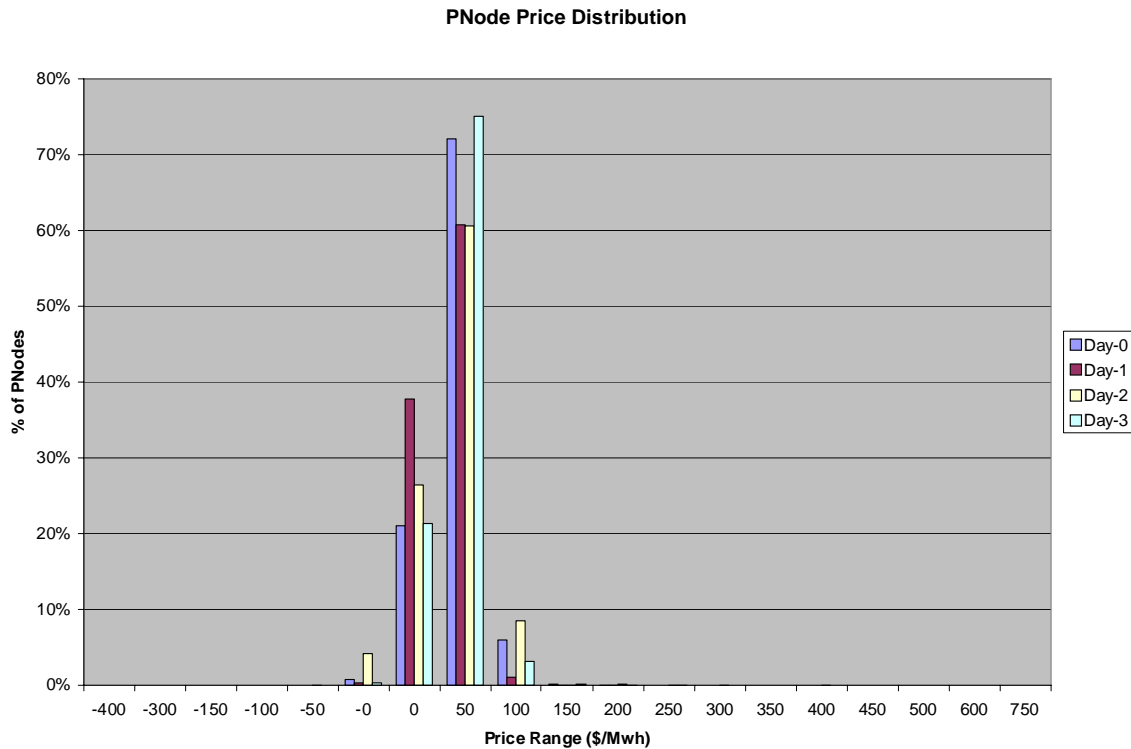
At the October 28, 2008 Board meeting, Management committed to perform additional pricing analysis and evaluation of the underlying software engines, as reflected in the tasks listed below.

- **Continue to perform weekly and, if necessary, more frequent pricing reviews and explain the causes of price excursions.** The MRTU Program Team holds weekly hour-long conference calls to review and explain market simulation pricing results. On Friday, November 21, the ISO hosted a day-long stakeholder meeting to discuss results of the structured base cases and quality of solution.
- **Continue to analyze and validate pricing results using LECG tools and processes.** In response to concerns that LECG had not tested RUC to the extent of other pricing, the ISO engaged LECG to test those cases as well. LECG's testing uncovered a potential ramp rate issue that is being resolved by Siemens. The fix is expected by the end of November. We know of no other outstanding RUC issues.
- **Perform a multi-day, structured simulation to evaluate prices under controlled conditions.** Between November 10 and 18, the ISO performed multi-day simulation cases associated with the Day-ahead. The tests held conditions constant to eliminate some of the impacts seen in the simulation related to bidding behavior, extraneous system issues, and EMS simulator conditions. As noted, we were unsuccessful at running effective Real Time cases. The following is an explanation of the results in a controlled case test.

#### *Day Ahead Test Results*

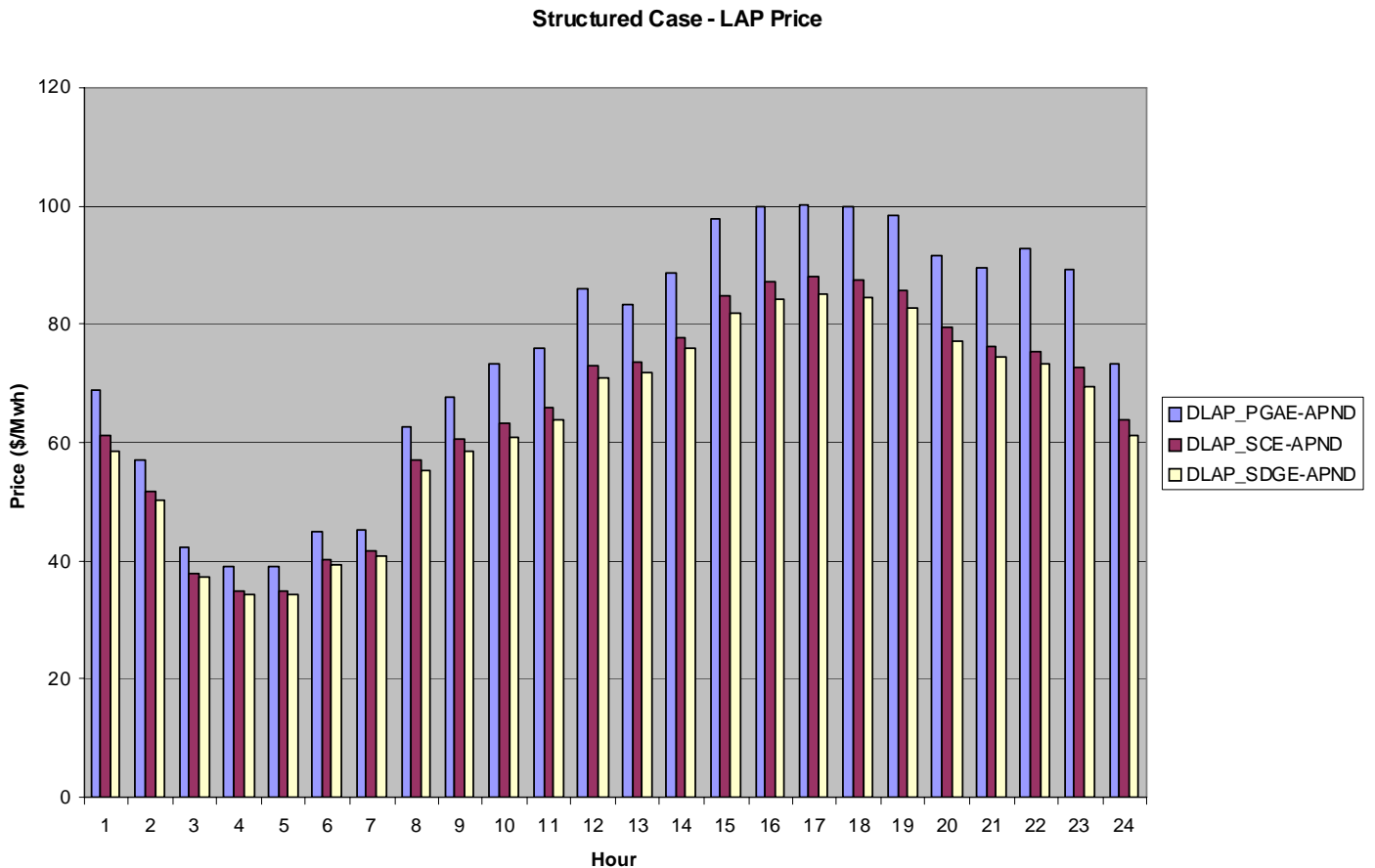
In executing the tests, the Day Ahead market cases exhibited stable prices largely within the expected range of -\$30 to \$500 (see Figure 1). We saw the diminishment of price outliers, need for RUC capacity and other concerning pricing results

Figure 1:  
PNode Prices from Day-Ahead Market Structured Case Testing



During the simulation, we observed that the Pacific Gas & Electric (PG&E) default LAP exhibited higher prices in most hours than other default LAPs. Further review of the case indicated that the higher price in the PG&E default LAP resulted from prevailing flows from supply in the southern system to demand in the northern system, which resulted in differences in the loss component of Locational Marginal Prices (LMPs). This pattern appears to be a result of the bids and schedules utilized for thermal and hydro resources. While this pattern may be consistent with a late summer, low-hydro pattern, other seasonal patterns are expected to result in a north to south flow -- a reverse pattern in which default LAP prices in the south would be higher than northern LAP prices. We do not consider this an aberration and believe the software is producing appropriate results for the conditions (see Figure 2).

Figure 2:  
Structured Case LAP Price



The structured base case results also confirmed that RUC requirements are largely satisfied using resource adequacy capacity. However, we did observe, as we have observed in recent market simulation cases, that the reliance on non-resource adequacy capacity to meet local needs is related to binding congestion and the software is performing as designed and per the tariff. Please note that both the structured case and market simulation results highlight the need to review modeling and load distribution factors in some areas to ensure that the observed congestion is consistent with actual conditions (see Figures 3 and 4). In the Day 0 case, the setup was designed to clear 95% of the load in the integrated forward market, while in the Day 1 case, the setup was designed to clear only 80% of the load in order to put more pressure on the need for residual unit capacity. In the Day 1 case, we see much more RUC procurement, as expected. However, the non-resource adequacy portion of RUC is quite low.

Figure 3:  
Structured Case Day 0: RUC Results

RUC - Procurement

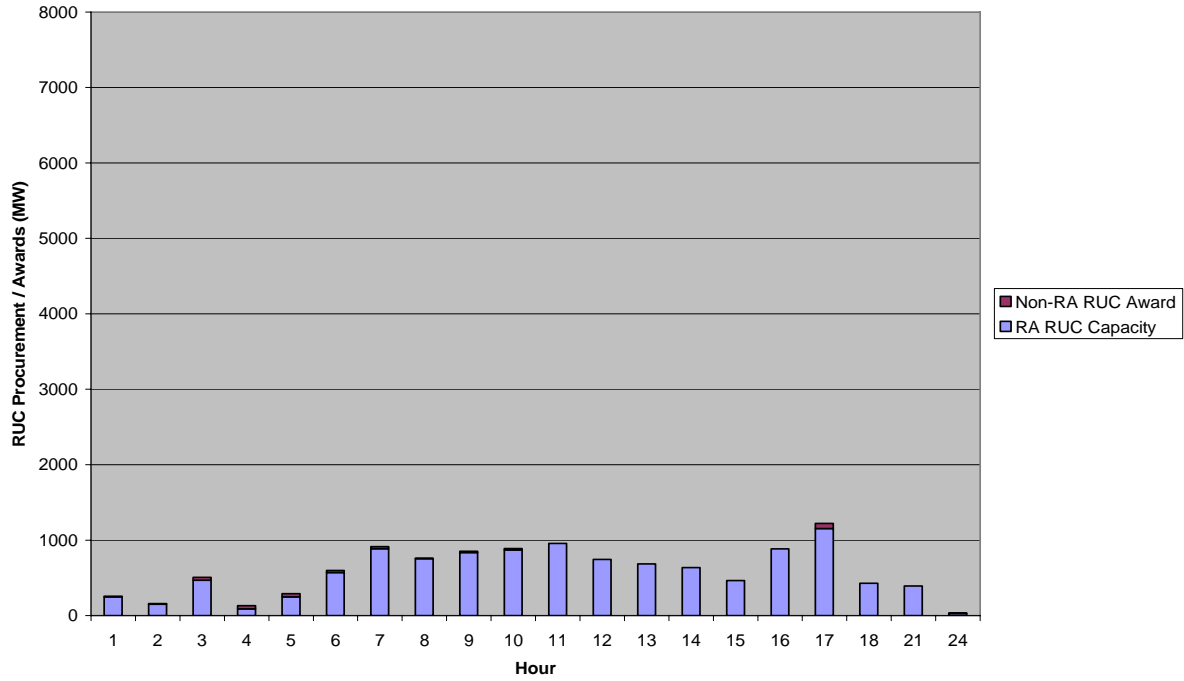
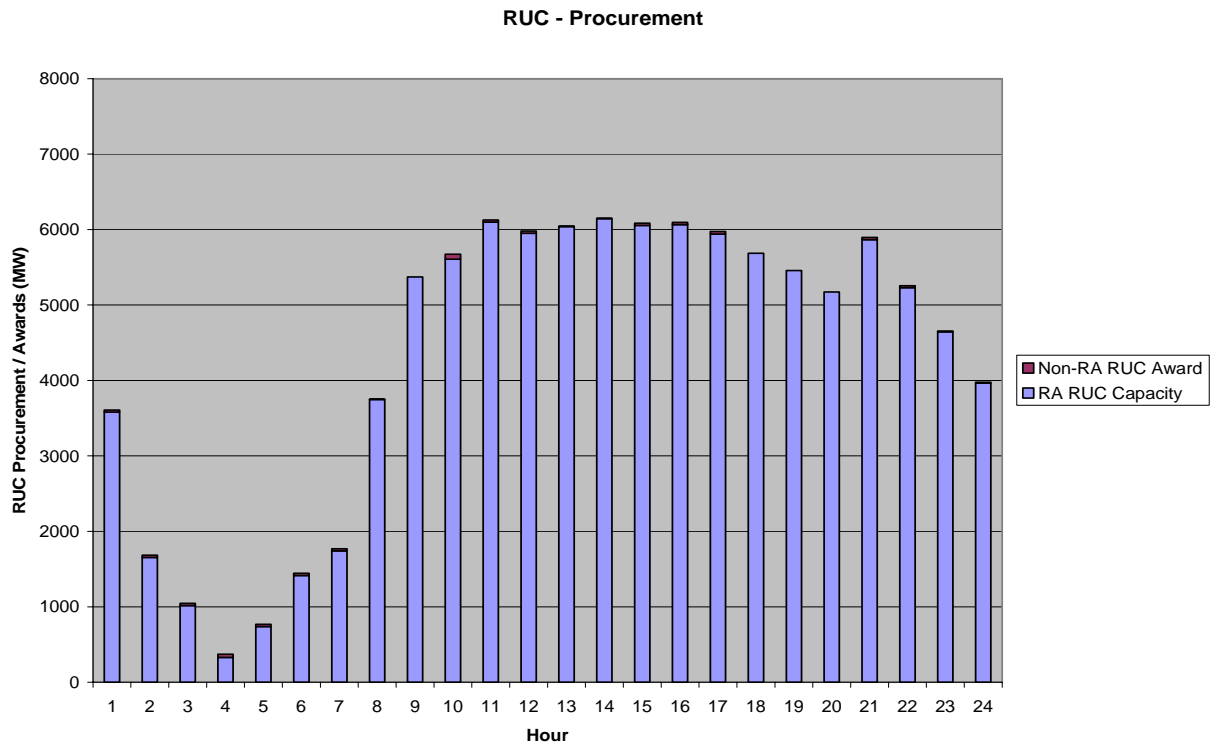


Figure 4:  
Structured Case Day 1: RUC Results



### *Real Time Test Results*

Real Time testing proved to be quite difficult because it is very challenging for the ISO to properly set up bids for the Real Time market absent active bidding input. The team spent two weeks setting up the bids so that testing could proceed. Nevertheless, the two-week effort produced output so anomalous that we do not have confidence in the test results. We will coordinate with DMM and participants to seek an alternative approach to this test.

- **Analyze operational conditions and options to address high prices related to binding congestion.** The ISO is increasing its efforts to review cases with the ISOs Grid Operations department and the ISOs operational and planning engineers. This effort has been productive in identifying areas where load distribution factors need to be modified, ratings need to be corrected and the appropriate contingencies and nomograms need to be enforced. This will be an ongoing process as system conditions change from day to day and from season to season. This should be considered a normal maintenance activity that ensures model quality.
- **Ensure all available resource adequacy capacity is offered into RUC consistent with obligations.** In conjunction with the structured test case, the ISO attempted to update its resource adequacy capacity based on the July 2008 resource adequacy showings. This resulted in the addition of approximately 2,000 megawatts of resource adequacy capacity in

addition to what was in the market in early market simulation. This better reflected the actual market conditions that would be experienced in production.

- **Improve convergence of forecast and modeled conditions between HASP and real-time dispatch.** The ISO modified its real-time forecasting tools to better ensure convergence of the forecasts and is testing the new tools in market simulation.
- **Address Market Monitoring's recommendations.** The ISO took many of the actions described in response to Market Monitoring recommendations. The market monitoring team was also deeply involved in defining the test cases and assessing the outcome. The MRTU Program Team will continue to work with Market Monitoring to analyze pricing results and their root cause.

### Market Simulation Exit Criteria

In recent weeks, the ISO and market participants revisited the market simulation exit criteria to clarify the intentions and agree on measurements to evaluate their successful completion. The revised criteria include two new criteria for a total of 21, along with clarified descriptions and precise measurements for all criteria.

At the time of the last Board meeting, we transitioned to a completely new computing environment – the one that will be in place when we *go live*. When market simulation resumed, connectivity problems and other issues adversely impacted participants' ability to take part in simulation testing. The problems were not related to the functionality or performance of MRTU software systems. Instead, they related to changes in system access that were necessary to tighten up system security in alignment with North America Energy Reliability Corporation (NERC) Critical Infrastructure Protection requirements. Ultimately, the ISO resolved the issues, and system performance for the last two weeks has been solid.

Despite the good performance of the software, we continue to experience a variety of simulation environment-related issues that impact achieving the exit criteria. The systems require a high level of support that is very difficult to sustain. In addition to normal production requirements, ISO staff is supporting five separate computing environments for MRTU. This is stretching our resources, wearing on the staff and resulting in human error and unfortunate mistakes. Almost all of the problems experienced of late would never be seen in our production environments where we support only two environments with very tight controls. For example, on November 17, human error was responsible for the inappropriate transmission of test data into the market simulation environment. This resulted in aberrant pricing and dispatches impacting two days of simulation. We are further tightening controls around MRTU systems to try to eliminate problems of this sort, but cannot eliminate all such risks until we begin pre-production. Market participants are very understanding and have simply requested that we be as transparent as possible about the problems.

The following table summarizes the progress made on the market simulation exit criteria since the October Board meeting.

## Detailed Performance/Exit Criteria

Criteria	Oct. 28 Meeting Status	Nov. 24 Meeting Status
ISO will make all externally facing MRTU applications available for 100% of scheduling coordinators to participate.	Met	Met
ISO will publish the daily list of scheduling coordinators participating in market simulation.	Met	Met
Simulation concludes without any open Critical and Very High software variances. All High variances will be resolved or mitigated.	0 Critical 17 Very High 188 High variances	0 Critical 3 Very High 107 High variances
Patches in ISO systems to address Critical, Very High, or High variances that require market participant software changes will be fully tested, installed by ISO and validated by participants.	A production level release process was put in place for most applications on 10/1.	A production level release process is in place for functionality changes. Three releases have been completed.
Day-Ahead Market successfully solves and results are published by 1:00 PM (within a 30 minute window) for at least seven consecutive trading days.	On track but not met	11 consecutive days at or before 1:30 PM (11/4 - 11/14/08)
No more than five consecutive 5-minute RT cases fail for seven consecutive trading days.	On track but not met	8 Consecutive days (11/5 - 11/12/08)
Market Portal, SIBR, CMRI, OASIS, SLIC, ADS, BAPI, OMAR, and programmatic interfaces are available 97.5%.	Met	Met
All operational scenarios agreed to by market participants and the ISO will be successfully completed and participants affirm completion in accordance with the Scenario Dashboard.	28 scenarios run 24 preliminary reports published 2 final reports published	30 scenarios run 25 preliminary reports published 23 final reports published
Market result data is traceable based on market inputs and awards and consistent across external market applications CMRI, OASIS, ADS, SLIC, OMAR, BAPI.	Extensive traceability issues impacting settlement validation.	All known traceability issues are fixed. We continue to work with participants as issues are identified.



Criteria	Oct. 28 Meeting Status	Nov. 24 Meeting Status
HASP Market successfully solves and publishes within timing guidelines 90% of the time for seven consecutive trading days.	On track but not met	9 consecutive days (11/6 - 11/14/08)
Real-Time Market successfully solves and publishes within timing guidelines 95% of the time for seven consecutive trading days.	On track but not met	11 consecutive days (11/5 - 11/15/08)
Quality of solution to be 90% AC solution over the last four weeks of simulation.	Met	AC solution daily for several months
Day Ahead and Real Time Markets produce dispatches based on inputs and operational rules are consistent with operating characteristics or results justified.	Partially met	Some dispatch issues are still experienced.
Day Ahead and Real Time prices are consistent with solution or justified. High prices in and of themselves are not necessarily violations of criteria, however need to be explained as to the cause.	Partially met	Solution quality base cases have been run. Day-ahead results confirm quality of solution while real-time results need more analysis and are likely to require minor software modification and parameter tuning.
ISO publishes settlement statements consistent with the settlement code and all supporting settlements documentation including Business Practice Manuals, Configuration Guides and the Bill Determinant Matrix relevant for each trade date within TD+15 BD for each initial settlement statement through 2/8/2008 for each SC that participated in IMS U2 consistent with the respective SC's participation.	Not met	After fixing most of the data issues connected to settlements, we are focusing on quality statements starting Nov. 1. In addition to daily statements, we are publishing 4 mini-monthly statements in November.

Criteria	Oct. 28 Meeting Status	Nov. 24 Meeting Status
ISO publishes settlement statements consistent with the settlement code and all supporting settlements documentation including Business Practice Manuals, Configuration Guides and the Bill Determinant Matrix for month end within TD + 25 BD for each scheduling coordinator that participated in IMS U2 consistent with the respective to the SC's participation.	Not met	Same as previous.  See discussion below.
ISO publishes settlement statements consistent with the settlement code and all supporting settlements documentation including Business Practice Manuals, Configuration Guides and the Bill Determinant Matrix for month end within TD + 25 BD for each scheduling coordinator that participated in IMS U2 consistent with the respective to the SC's participation..	Not met	Same as previous.  See discussion below.
ISO publishes accurate Invoices and supporting Settlements documentation for a Trade Month based on respective monthly Settlement Statements for each SC that participated in IMS U2.	Not met	Same as previous.  See discussion below.
Every Charge Type must be exercised and valid by the ISO in accordance with the Business Practice Manual for Settlements & Billing and the ISO Tariff during IMS Trade Dates with possible exceptions per day, per charge code but not every SC will necessarily be assessed the Charge Type. Known exceptions with any charge code will be corrected and revalidated.	Not met	Same as previous.  See discussion below.
Backup and restore plans executed for 100% of the market simulation impacted servers deemed operational critical during normal operating hours.	On track but not met	Completion expected by mid-December.
Archiving and data retention plans for all market simulation systems performed for each day.	Completed daily	Completed daily

## Settlements

Since the last Board meeting, through close collaboration with the participants, we concluded that our definition of charge code validation was not the same as the market participant's definition. For the ISO, validation was based on whether the charge code calculated correctly in our

settlement system. For the participants, it is based on whether they could fully trace the data bid-to-bill from our external facing reporting systems and their settlement statement. This misunderstanding is the fundamental reason for our differing views on the status of settlements. We now agree that the participants' approach is correct and should be used for future assessments of settlement status. Accordingly, we believe that November statements will provide the first truly useable settlement statements.

Settlements statements prior to November 1 are missing data from upstream MRTU systems, resulting in incomplete statements that are difficult for participants to understand and validate. The ISO has addressed most of the data issues affecting past settlements statements and is in the process of producing daily settlement statements that are of a much higher quality. We also implemented a thorough quality assurance process around the statement production process and hold statements until they are as correct as possible. Mini-monthly statements produced in November have accelerated participants' opportunities to validate simulation statements and charge code use. Even so, a handful of variances impact November charge codes and therefore, statements:

- Pump variance impacting all pump resources on the system (to be fixed in the November 24 trade date):
  - Real-time pump dispatch is not being populated when the resource is in pumping mode for the Automated Dispatch System (ADS).
  - Pumping startup instruction had 0 MW instead of pumping schedule (negative value).
  - Pump issues appear to affect the ADS but do not seem to affect the expected energy coming from the Market Quality System. Therefore, settlement for pumps may be correct but not able to validate against ADS information.
  
- Physical trades inappropriately converted in the real-time market regardless of the self-schedule. (fixed as of the November 17 trade date).
  
- Congestion Revenue Rights: a few nodes lack the applicable Marginal Congestion Cost Price (partially fixed on November 3, and fully fixed on the November 14 trade date)

The settlements team is now producing statements every 7 business days, whereas the production timeline is over 38 business days during. The shortened timeline is contributing to quality problems because the team does not have as long as usual to review and correct results. Ultimately, settlement statement quality will be assessed through the November daily, monthly and mini-monthly statements. We have no doubt that settlement related issues will be fully resolved through close collaboration between the ISO and participants.

## Tariff Issues

The ISO must demonstrate that critical tariff issues either undecided or yet to be filed at FERC will not put the January 31, 2009 market start at risk.

The ISO is continuing to make any necessary tariff amendments in time to allow FERC to issue

orders before *go live*. FERC has shown a willingness to resolve issues quickly and deliver orders in a timely manner.

## Market Monitoring

The Department of Market Monitoring (DMM) must demonstrate it has completed development and testing and has market simulation tools available for use.

As reported at the October 28, 2008 Board meeting by Dr. Keith Casey, Director of Market Monitoring, DMM is fully staffed, trained and equipped to monitor the new MRTU markets post launch. Since the last Board meeting, DMM conducted multiple participant meetings to address questions and concerns associated with market monitoring and market manipulation. Dr. Casey has reviewed areas with the participants associated with potential manipulation possibilities and how DMM will monitor for them.

## Remaining Issues to Address

MRTU readiness continues to improve as remaining issues are diminished and resolved. As of this report, we are tracking a few major issues that need to be resolved prior to *go live*.

- **Pumps** – As indicated in the settlements discussion above, pump functionality is still not operating properly within MRTU systems. Our primary software vendor indicates a solution is expected by November 24, 2008.
- **Exceptional Dispatch** – As FERC directed, we must implement additional types of exceptional dispatch that will require the ISO and the participants to modify systems. This change has not yet been scheduled.
- **Pricing Issues** – Two significant pricing issues remain. The first is associated with shift factors that are being reversed and impacting pricing. The second involves the handling of load distribution factors. Both are expected to be resolved by the end of November.
- **Integer Precision on the Ties** – The Western Electricity Coordinating Council (WECC) requires whole number integers on the ties while the MRTU software accepts less than whole numbers. The ISO must correct the inconsistency and expects to do so by November 23, 2008.
- **Additional Information for Grid Operations** – As the grid operators advance their readiness to operate MRTU systems, they have requested additional displays for the applications. Development of these displays will not impact market participants but are required for effective grid operation. Siemens is currently assembling the necessary displays.
- **Final SIBR Rules** – Several additional SIBR rules are required for *go live*. We expect these changes to be in the final major release (on December 6) prior to *go live*.

- **Simplified Ramping** – The simplified ramping solution smoothes ramping across hours and better manages capacity and energy related to operational and reserve ramp rates. This solution is currently in test and is expected to deploy no later than December 6.

## Options Available to the Board

As outlined in this memo, the ISO has made significant progress toward *go live*, and it is feasible to address the remaining issues. Nonetheless, market participants appear unsupportive of a February 1 *go live* date largely because of concerns around quality of solution and settlements. Quality of solution concerns may by their nature never be addressed to market participants' satisfaction. The long lag times of settlements presents another concern. If we wait until all settlements issues are cleared and the resulting monthly cycles are completed, we will extend the schedule unnecessarily. Further, the current cycle of simulation and support of multiple environments in parallel with operating the ISO is becoming unsustainable. No doubt participants have the same issues related to their operations. Furthermore, as we close the gaps and provide more credible information to the market participants, it is fair to assume that they are likely to find issues on their side that need time to resolve

Given the status outlined in this memo and the other considerations described above, the Board may consider the following options or decide on another course of action. In each option, we believe that conditions for *go live* still need to be satisfied.

### 1. *Maintain the directive to file readiness on December 1 for a February 1 go live date*

Although ISO management is still confident of internal system readiness, market participants do not share the same confidence to support a February 1 *go live* date given concerns with quality of solution and settlements. The considerations for and against this option are:

#### Pros

- Maintains the current course of action including budget and schedule.
- Acknowledges that the current course has reached its limits of sustainability.
- Acknowledges that we have reached the limits of demonstrating what can be demonstrated through the simulation.
- Turn focus to production systems more quickly

#### Cons

- Limited confidence by the market participants.
- Limits the amount of participant testing of their internal systems.
- Limits the demonstration of settlement processes.

### 2. *Direct ISO management to file a readiness status report update on December 1 for a March 1 go live date followed by a certificate filing on January 2<sup>nd</sup>.*

In this option, the ISO would file an extensive status update on December 1 and follow with the official *go live* certification on January 2. This option provides more time for the ISO to publish

settlement statements and more time to resolve other lingering participant concerns. The considerations for and against this option are:

Pros

- Provides more time for participants to test internal systems.
- Allows at least three monthly settlement statements prior to *go live* (Nov, Dec, Jan)

Cons

- Extends the timeline for difficult support levels.
- Potentially increases costs for the ISO and participants.
- Reduces contingency prior to summer.

**3. *Direct the ISO to file readiness on January 2 for a March 1 go live date***

This option preserves a sixty day filing, does not begin the FERC regulatory clock and provides the same benefits as the option 2. The considerations for and against this option are:

Pros

- Provides the opportunity for more confidence before filing.
- Preserves the 60 day filing period.
- Provides more time for participants to test internal systems.
- Likely more supported by participants.
- Allows at least three monthly settlement statements prior to go live (Nov, Dec, Jan) and two prior to readiness filing.

Cons

- Extends the timeline for difficult support levels.
- Potentially increases costs for the ISO and participants.
- Reduces contingency prior to summer.
- Extensive filing effort through the holiday season which is disliked by the participants.