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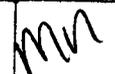
July 31, 2008

Docket Control  
Arizona Corporation Commission  
1200 W. Washington  
Phoenix, AZ 85004

Arizona Corporation Commission  
**DOCKETED**

JUL 31 2008

RE: Docket No. E-00000D-07-0376  
Fifth Biennial Transmission Assessment

DOCKETED BY 

Dear Sir or Madam:

As was discussed at the May 23, 2008, Biennial Transmission Assessment Workshop, Arizona Public Service Company is providing the following documents regarding the status of the California Independent System Operator's Market Redesign and Technology Upgrade impact on seams issues:

APS is providing the *Seams Issues Subcommittee: Report of Findings and Seams Issues Evaluation, California Independent System Operator ("CISO") Market Redesign and Technology Upgrade ("MRTU")*, issued October 4, 2007. This report presented the Seams Subcommittee's findings on potential seams issues associated with the implementation of the CISO's MRTU to determine if California's proposed market structure would cause new, or substantially alter existing seams issues. APS fully supports the findings in the Seams Issue Subcommittee report which identifies seams issues associated with the implementation of the CISO MRTU. Jerry W. Smith of APS is the Chair of the Western Electricity Coordinating Council (WECC) Seams Issues Subcommittee helped develop the report and continues to work diligently with the Subcommittee and other members of WECC on seams issues.

APS is also providing a Memorandum dated July 7, 2008 to the ISO Board of Governors that provides an assessment of the progress through June 2008, and proposes a plan for proceeding towards the "2008 MRTU Go-Live" date.

If you have any questions, please call Jeff Johnson at 602-250-2661.

Sincerely,

John Lucas

Attachments

CC: Prem Bahl, ACC Staff  
Laurie Woodall, KR Saline & Associates  
Jerry D. Smith, KR Saline & Associates

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*Western Electricity Coordinating Council*

## **Seams Issues Subcommittee**

### **Report of Findings Seams Issues Evaluation California Independent System Operator Market Redesign and Technology Upgrade**

October 4, 2007

OCTOBER 2007

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## List of Acronyms in this Report

CAISO	California Independent System Operator
CISO	California Independent System Operator
CRR	Congestion Revenue Rights
DA	Day-Ahead
DAM	Day-Ahead Market
ETC	Existing Transmission Contracts
FERC	Federal Energy Regulatory Commission
FTR	Firm Transmission Rights
HASP	Hour-Ahead Scheduling Process
IFM	Integrated Forward Market
ISAS	Interchange Scheduling and Accounting Subcommittee
LMP	Locational Marginal Pricing
LSE	Load Serving Entity
MIC	Market Interface Committee
MORC	Minimum Operating Reliability Criteria
MRTU	Market Redesign and Technology Upgrade
MW	Megawatt
NERC	North American Electric Reliability Corporation
OC	Operating Committee
RA	Resource Adequacy
RAR	Resource Adequacy Resource
RC	Reliability Coordinator
RMR	Reliability Must Run
RT	Real-Time
RTM	Real-Time Market
RUC	Residual Unit Commitment
SC	Scheduling Coordinator
SIS	Seams Issues Subcommittee
SSG-WI	Seams Steering Group – Western Interconnection
USF	Unscheduled Flow
USFMP	Unscheduled Flow Mitigation Plan
WECC	Western Electricity Coordinating Council

### **Seams Issues Subcommittee Roster of Members**

Jerry Smith - Chair	Arizona Public Service (AZPS)
Jeffrey Ackerman	Western Area Power Administration (WAPA)
Ali Amirali	Dynegy (DYN)
Brenda Anderson	Bonneville Power Administration – Power Business Line (BPAP)
Layne Brown	Western Electricity Coordinating Council (WECC)
John Burnett	Los Angeles Department of Water and Power (LDWP)
Edison Elizeh	PacifiCorp Merchant (PACM)
Alan Hockenson	Transmission Agency of Northern California (TANC)
Richard Lehman	Salt River Project (SRP)
Bill Kirby	Portland General Electric (PGE)
David Lemmons	Public Service Company of Colorado (PSCO)
Melissa Lyons	Public Utility District of Chelan County
Jim McMorran	Sierra Pacific Resources (SPR)
Ken Otto	Western Area Power Administration (WAPA)
Mark Rothleder	California Independent System Operator (CISO)
David Schiada	Southern California Edison (SCE)
Robert Schwermann	Sacramento Municipal Utility District (SMUD)
Casey Sprouse	Public Utility District of Grand County (GRPD)
Brian Theaker	Williams Energy Marketing and Trading (WEMT)
Mike Wells	Western Electricity Coordinating Council (WECC)

Seams Issues Subcommittee  
Report of Findings – MRTU Seams Issues

## **Introduction**

The mission of the Seams Issues Subcommittee (SIS) is to assess market and reliability activities to identify seams issues needing evaluation to assure that outcomes do not unnecessarily impede efficient and competitive electricity markets or the reliability of the Western Interconnection. The SIS has investigated numerous potential seams issues associated with the implementation of the CISO's Market Design and Technology Upgrade (MRTU) to determine if California's proposed market structure would cause new, or substantially alter existing seams issues.

This report presents the Subcommittee's findings on the following subject areas:

- Congestion Management
- Exports from Resource Adequacy Resources
- E-Tagging and Market Timing
- Congestion Revenue Rights
- Parallel Operations During Cutover – Operating Committee (OC) Task Force Coordination
- Contingency Plan for Software Failure

Potential seams issues were evaluated and discussed in an open forum with concerned stakeholders and while several issues are not specifically mentioned in this report they were included in the evaluation. The seams issues beyond the six subject areas of this report were either evaluated with one of the identified subject areas, were not identified as a new seams issue or it was determined that they do not substantially alter an existing seams issue. These issues included, but were not limited to:

- Unaccounted for Energy
- Planning Outage Coordination
- Residual Unit Commitment
- Existing Transmission Contracts
- Determination of Available Transmission Capacity

## **Background**

Due to the Energy Crisis of 2000-2001, a number of significant flaws in the California market structure were identified. Among others, the flaws included inadequate infrastructure (generation, transmission and demand response) and CISO market rules that were not aligned with reliable operation of the system. All of these factors contributed to an environment where the electricity market was subject to manipulation and the exercise of market power. As a result, FERC issued a number of orders directing the CISO to revise its market rules.

In 2002 the CISO launched its then-named Market Design 2002 (MD02) project. Over the next several years, that effort evolved into the CISO's MRTU project. The primary objective of the MRTU project is to substantially revise the CISO's market rules to address the identified flaws and to upgrade the CISO's now dated reliability and market systems. With respect to the CISO's market rules, the principal objective was to establish market rules aligned with the physical operation of the system and all applicable reliability requirements.

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In early 2006, the CISO filed its final MRTU tariff language at FERC. The CISO's filing raised new interest in, and concerns about, the impact of MRTU on the rest of the Western Interconnection. Certain parties raised concerns that MRTU would create new seams issues in the West. In its September 21, 2006 MRTU order, FERC addressed a number of the seams-related issues. In particular, FERC directed the CISO and other entities to file quarterly seams reports that discuss the parties' efforts to identify and resolve seams issues. In addition, FERC staff was to schedule a Seams Technical Conference where these issues could be further addressed. FERC staff scheduled and held that conference on December 14-15, 2006. On April 20, 2007, FERC issued an Order on Rehearing in which it addressed a number of seams issues.

### **Executive Summary**

Following review, evaluation and extensive discussions, the SIS found that the CISO changes in market rules and generation dispatch patterns will result in changes for many entities operating and doing business in the Western Interconnection. The SIS also embraces the concept that there are three viable methods to address seams issues: 1) the CISO stakeholder process, 2) one-on-one (bi-lateral discussions) with adjacent systems, and 3) through regional evaluation such as through the SIS. Given this foundation, the SIS makes the following statement:

*The Seams Issues Subcommittee (SIS) finds no specific seams issues that are created by MRTU or existing seams issues that are substantially worsened by MRTU implementation. Seams issues exist today, particularly between organized markets such as the CISO and bilateral physical markets that dominate the Western Interconnection. The SIS will continue to monitor, evaluate and propose solutions to all regional seams issues.*

### **Congestion Management**

Congestion management concerns have been raised due to the possibility that MRTU may bring significantly different generation patterns within the CISO and previously unseen and unstudied unscheduled flow patterns in the rest of the Western Interconnection. The SIS evaluated congestion management practices in the Western Interconnection under the Unscheduled Flow Mitigation Plan (USFMP).

The SIS agreed that unscheduled flows in the Western Interconnection will change if generation dispatches are implemented that differ significantly from historical dispatches. However, it is the SIS determination that although MRTU may bring refinements to current dispatch patterns, significant changes are unlikely under most operating conditions. The SIS also agreed that an evaluation of WECC-wide congestion management procedures is appropriate and within the scope of the SIS.

*The SIS determined that real-time congestion management issues exist in the WECC today, are an interconnection-wide issue, and are not specifically related to MRTU.*

### **Exports from Resource Adequacy Resources**

Since 2002, California has been developing and implementing Resource Adequacy (RA) requirements for Load Serving Entities (LSE). A critical component of those rules is the requirement that capacity designated as a Resource Adequacy Resource (RAR) be made available to the CISO for possible commitment and dispatch to serve California load.

The SIS evaluated California's resource adequacy rules and requirements and the CISO plans to manage the RA requirements when MRTU is implemented. While acknowledging that resource adequacy issues are not directly related to MRTU, the SIS discussed the interface between California's resource adequacy requirements and the MRTU day-ahead and real-time market rules. Specifically, the SIS discussed the following:

- whether an RAR-backed export is subject to recall provisions inconsistent with good utility practices in the West
- the details and likelihood of a real-time recall of a CISO export schedule that is backed by an RAR
- whether an RAR-backed product can be considered "firm"

On April 20, 2007, FERC issued an Order on Rehearing of its earlier MRTU order. FERC stated that exports of energy provided by RA capacity are "non-firm opportunity sales that should be subject to curtailment to prevent or alleviate a system emergency, as is consistent with NERC and WECC guidelines." In response, the CISO prepared a white paper stating that after day-ahead and hour-ahead schedules are finalized, all exports—whether backed by RA or non-RA Resources—are considered firm. The CISO paper further stated that all e-Tags will indicate the schedule is "firm" and that no schedule will be curtailed outside normal contingency operations. After extensive discussions, the SIS members agreed that all exports included in CISO *final schedules* are "firm." (See pages 6-8 for a detailed description.)

Based on the above, the SIS members present unanimously passed the following motion at the SIS meeting of May 30-31, 2007:

***Based on the review process described above, it is the finding of the SIS that 1) the CISO's treatment of export schedules under MRTU is consistent with general operating practice in WECC; 2) export schedules accepted in the CISO day-ahead Integrated Forward Market or Hour Ahead Scheduling Process from RA resources in MRTU shall be considered firm for purposes of commercial transactions in the Western Interconnection. The SIS concurs with the description of the treatment of RA capacity and exports in MRTU in the CISO's white paper dated May 25, 2007.***

### **E-Tagging and Market Timing**

The SIS considered several issues related to e-tagging and market timelines including whether MRTU will change the CISO adherence to all NERC and WECC standards and business practices related to scheduling and tagging of energy, and whether there are impacts of having different market timelines in different regions of WECC.

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The CISO firmly stated they will adhere to all NERC and WECC standards and business practices related to scheduling and e-tagging of energy. Additionally, the CISO presented an analysis of its operating logs that demonstrated that the majority of late market closings occurred when Scheduling Coordinators (SC) were late submitting balanced schedules. Under MRTU, this requirement is removed and further reduces the likelihood of late market closing.

*The SIS concluded MRTU does not create any new seams issues related either to e-tagging or market timelines.*

#### **Congestion Revenue Rights**

Congestion Revenue Rights (CRR) are financial instruments that enable the CRR holders to manage the volatility in transmission congestion costs imbedded in the LMP. The CRRs will replace the Firm Transmission Rights (FTR) that are currently used to hedge transmission congestion costs. The SIS evaluated the change from FTRs to CRRs in relation to potential seams issues and submitted and evaluated several questions to the CISO.

The SIS evaluation concluded that CRRs represent enough of a change from the current FTRs that market participants will need some time to understand how to effectively include CRRs in their portfolios. However, no new seams issues were identified in the evaluation.

*While the industry has varied opinions on the design and allocation of CRRs, the SIS does not find specific seams issues related to CRRs.*

#### **Parallel Operations During Cutover – OC Task Force Coordination**

The purpose of this evaluation was to address concerns that MRTU may cause reliability problems severe enough either to call for immediate mitigation or reversion to the pre-MRTU system, because of dispatch patterns leading to high energy flows and associated voltage concerns throughout the Western Interconnection. The OC created a task force to review any reliability concerns with implementation of MRTU and the SIS coordinated with this task force to determine if any special monitoring of parallel operations was warranted during MRTU implementation.

The OC leadership determined no special monitoring activities are warranted unless a “specific” reliability issue is identified and brought to the OC for evaluation.

*The SIS determined the current system monitoring processes in WECC are sufficient to maintain the integrity of the Interconnection. At this time, no specific reliability concerns regarding MRTU implementation have been brought to the OC for evaluation.*

#### **Contingency Plan for Software Failure**

The SIS discussed what plans the CISO has in place to continue to operate reliably and support continued interchange in the event of a failure of the MRTU software. The CISO is required to submit a Readiness Certification filing, including an MRTU Cutover and Reversion Plan, with FERC prior to implementation of MRTU. FERC has stated that the

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filing is to include “a contingency plan that addresses the failure of MRTU software systems to function as designed.”

*The SIS is satisfied the FERC required Readiness Certification, which will include a Cutover and Reversion Plan, should be sufficient to address concerns related to a failure of the MRTU software. When the filing is submitted, the SIS will review the filing and comment if appropriate.*

The Seams Issues Subcommittee evaluated six seams coordination areas to determine whether the implementation of the CISO Market Redesign and Technology Upgrade (MRTU) would cause or substantially intensify existing seams issues with surrounding control areas. The following sections detail these seams issues.

### **Congestion Management**

Congestion management concerns have been raised that MRTU may bring significantly different generation patterns within the CISO as well as new—and unstudied—unscheduled flow patterns in the rest of the Western Interconnection.

The SIS evaluated congestion management practices in the WECC under the Unscheduled Flow Mitigation Plan (USFMP) and reviewed a document of the Seams Steering Group – Western Interconnection (SSG-WI) from 2003 that presented possible methods for addressing congestion management between the three then-proposed RTOs in the West. The SIS agreed that unscheduled flows in the Western Interconnection will change if generation dispatches are implemented that differ significantly from historical dispatches. However, the magnitude of the problem is difficult to estimate without west-wide system studies and there remained a lack of consensus on the accuracy and value of studies due to widely varying study scenarios.

The SIS determined that MRTU may bring refinements to current dispatch patterns but that significant changes are unlikely under most operating conditions. For example, it is expected that non-dispatchable resources will be loaded such as nuclear units and renewable resources, low-cost base-load coal units will also be loaded and hydro systems will likely be operated in a manner similar to today. This essentially leaves gas-fired units that are already being dispatched in a manner as to avoid transmission congestion. Again, the SIS recognizes dispatch patterns may change but does not expect the changes to be significant. Moreover, the SIS determined that it would be difficult to attribute any change in dispatch patterns solely to MRTU, as opposed to adverse hydro conditions, new generation and/or transmission development and resultant changes in regional trading patterns.

All dispatch patterns affect unscheduled flows in the Western Interconnection and the Reliability Coordinators and Balancing Authorities will monitor system conditions—including under MRTU—with the charge to maintain the reliability of the system. In the event congestion management issues arise after implementation of MRTU, with credible data to suggest a connection to MRTU, the Reliability Coordinators and Balancing Authorities will address the issue in real-time and the SIS will be alert to any such

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occurrences. Existing reliability standards and procedures are sufficient to mitigate line or path overloads from impacting the reliability of the transmission system.

A principle deficiency of the existing USFMP is that it is implemented only for congestion relief on 7 of the 72 Qualified Transfer Paths. These are transmission paths that have demonstrated a history of congestion due to unscheduled flow. Any transmission element that develops congestion problems due to unscheduled flow must be loaded and experiencing schedule cuts for 100 hours before being eligible for consideration in the plan. The SIS recognizes the USFMP plan is the most successful of several methods that have been attempted over the years to address real-time unscheduled flow. However, the industry and available models and tools have evolved, and SIS believes an Interconnection-wide congestion management procedure that can only be made effective for seven transmission paths is deficient.

***The SIS determined that real-time congestion management issues exist in the Western Interconnection today, are an interconnection-wide issue and are not specifically related to MRTU.***

The SIS agreed that an evaluation of WECC-wide congestion management procedures is appropriate and within the scope of the SIS. Improvements in the coordination of data, operational information and development of the West-wide System Model represent opportunities for resolving concerns with the USFMP. The initial phase of the SIS evaluation will not be an attempt to rewrite the USFMP. It will be to evaluate and document the needs and potential benefits of a plan update as the basis for proposing solutions.

### **Exports from Resource Adequacy Resources**

Since 2002, California has been developing and implementing Resource Adequacy requirements for Load Serving Entities (LSE). A critical component of those rules is the requirement that capacity designated as a Resource Adequacy Resource (RAR) be made available to the CISO for possible commitment and dispatch to serve California load. The primary purpose of these rules is to ensure that supply under contract and committed to serve California load is made available to the CISO to serve anticipated real-time load. The availability rules and resource commitment mechanics for RAR are detailed in the CISO's MRTU-related tariff language.

One such rule provides that the CISO has the ability to call on an RAR up to and through real-time. During the course of the CISO's MRTU proceeding, a number of parties raised issues with this rule as it pertains to exports from the CISO market. In particular, parties questioned the CISO's ability to distinguish between RA and non-RA capacity when potentially curtailing exports. The parties called into question whether any export purportedly supported by an RAR was indeed "firm" since it was potentially subject to curtailment.

In its September 21, 2006 order, the Federal Energy Regulatory Commission (FERC) conditionally approved the CISO's proposed rules and applicable tariff language. Subsequent to that order, a number of parties continued to voice concerns regarding the

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treatment and nature of RA-supported exports from the CISO market. Those issues were subsequently presented to the SIS for evaluation and discussion.

The SIS evaluated California's resource adequacy rules and requirements and the CISO plans to manage the RA requirements when MRTU is implemented. While acknowledging that resource adequacy issues are not directly related to MRTU, the SIS discussed the interface between California's resource adequacy requirements and the MRTU day-ahead and real-time market rules. Specifically, the SIS discussed the following:

- whether an RAR-backed export is subject to recall provisions inconsistent with good utility practices in the West
- the details and likelihood of a real-time recall of a CISO export schedule that is backed by an RAR
- whether an RAR-backed product can be considered "firm"

The SIS reviewed and discussed a paper presented by the CISO on the matter. The paper focused on how schedules are established in the day-ahead timeframe and how schedules are managed within the operating hour. The CISO paper stated that after day-ahead and hour-ahead schedules are finalized, all exports—whether backed by Resource Adequacy or non-Resource Adequacy Resources—are considered firm. The CISO paper further stated that all e-tags will indicate the schedule is "firm" and that no schedule will be curtailed outside normal contingency operations. At the SIS meeting on March 22, 2007, the SIS was satisfied with the statements and commitments of the CISO and that the CISO's management of export schedules is consistent with general operating practice in WECC.

On April 20, 2007, FERC issued an Order on Rehearing of its earlier MRTU order. In the order, FERC stated that exports of energy provided by Resource Adequacy capacity are "non-firm opportunity sales that should be subject to curtailment to prevent or alleviate a system emergency, as is consistent with NERC and WECC guidelines." Based on the Commission's statement, the SIS re-examined its previous discussion and conclusion regarding whether an export backed by a California Resource Adequacy Resource is subject to recall provisions inconsistent with good utility practices in the West. At the May 30-31, 2007 meeting, the SIS reviewed and discussed the corresponding passages of the Commission's April 20, 2007 Order on Rehearing. The SIS also reviewed subsequent filings made by the CISO; Southern California Edison (SCE); and jointly by the City of Burbank, California (BURB) and the Turlock Irrigation District (TID); in response to the Commission's statements regarding exports supported by California Resource Adequacy Resources. In addition, the CISO prepared a revised version of the white paper presented on the matter at the SIS meeting on April 22, 2007. The revised white paper was discussed at the SIS meeting on May 30-31 2007 and is included in this report as **Attachment 1**.

After an exhaustive discussion, the SIS members reaffirmed their previous finding and agreed that all exports included in CISO *final schedules* are "firm." This position was confirmed by FERC on September 24, 2007 when they issued an order on rehearing addressing the filings made by the CISO, SCE, and Burbank/TID. In that order, FERC agreed with SCE and Burbank/Turlock that "exports supplied by RA capacity should not be considered non-firm opportunity sales but rather firm schedules subject to curtailment only

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during system emergencies.”<sup>1</sup> With respect to other RAR export transactions, the SIS concluded that “firm” bilateral sales that either were *not accepted* as part of the final Day-Ahead Market schedules or were arranged *after* the close of the Day-Ahead Market *but prior to the close* of the Hour-Ahead Scheduling Process (HASP), are firm only if included as part of the final schedules of the Hour-Ahead Scheduling Process. Such bilateral arrangements, regardless of their duration, are “Hourly Firm” transactions that must be finalized and “firmed up” on an hour-by-hour basis throughout the operating day.

In conclusion, the SIS is satisfied with the statements and commitments of the CISO that it will manage export schedules in a way consistent with general operating practice in WECC. Based on the above, the SIS members in attendance unanimously passed the following motion at the SIS meeting of May 30-31, 2007:

*Based on the review process described above, it is the finding of the SIS that 1) the CISO's treatment of export schedules under MRTU is consistent with general operating practice in the WECC; 2) export schedules accepted in the CISO day-ahead Integrated Forward Market or Hour-Ahead Scheduling Process from RA resources in MRTU shall be considered firm for purposes of commercial transactions in the Western Interconnection. SIS concurs with the description of the treatment of RA capacity and exports in MRTU in the CISO's white paper dated May 25, 2007.*

### **E-Tagging and Market Timing**

The SIS considered several issues related to e-tagging and market timelines including whether MRTU will change the CISO adherence to all NERC and WECC standards and business practices related to scheduling and tagging of energy, and whether there are impacts of having different market timelines in different regions of WECC.

The CISO has firmly stated they will adhere to all NERC and WECC standards and business practices related to scheduling and e-tagging of energy and no new seams issues related to these matters are created with the implementation of MRTU.

The SIS discussed whether it would be appropriate to ask the CISO to begin tagging internal schedules to help with assessing unscheduled flow and associated congestion management evaluations given the large geographical size of the CISO. It was noted that NERC and WECC standards and business practices do not require the use of tags for internal transactions. While improved data exchange of schedules within balancing areas may be a benefit when evaluating congestion, it is an Interconnection-wide topic to be reviewed under the SIS evaluation of ways to improve the WECC Unscheduled Flow Mitigation Plan.

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<sup>1</sup> FERC “ORDER GRANTING IN PART AND DENYING IN PART REQUESTS FOR CLARIFICATION AND REHEARING, AND DENYING MOTION TO REOPEN THE RECORD” dated September 24, 2007, Dockets ER06-615-007 and ER02-1656-033, ordering paragraph 35.

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The timing of the CISO market differs from the western bilateral markets. The CISO market accepts bids until 1000h (10:00 a.m.) Pacific Time and final schedules are released at 1300h. In the bi-lateral markets nearly all trading is complete by 0800h with prescheduling commencing immediately. The CISO indicated the 1000h deadline for submitting bids is the current practice and its stakeholders have not expressed any concerns with the 1000h deadline.

The SIS discussed e-tag timing when the CISO market publishes final schedules later than the scheduled close time of 1300h. The concern is to ensure entities have sufficient time to create and submit e-tags prior to the generally-practiced WECC preschedule deadline of 1500h Pacific Time as required by INT-BPS-003-0 (Interchange Prescheduling Calendar) B.WR1. The CISO presented an analysis of its operating logs that demonstrated the large majority of late market results have occurred when Scheduling Coordinators (SC) were late in submitting schedules and that the frequency of late market closings is decreasing over time. The need for balanced schedules, including balanced trades between SCs, has been the source of most of the late submissions. When SCs are late in balancing, the CISO has been unable to run its market on time. Under MRTU, the requirement to submit balanced schedules is eliminated, thus, further reducing the likelihood of this problem becoming a recurring issue.

*The SIS concluded MRTU does not create any new seams issues related either to e tagging or market timelines.*

### **Congestion Revenue Rights**

Congestion Revenue Rights (CRR) are financial instruments that enable the CRR holders to manage the volatility in transmission congestion costs under MRTU, with location-based marginal pricing. The current CISO market utilizes Firm Transmission Rights (FTR) as the means to hedge transmission congestion costs. Therefore, potential seams issues between the CISO's financial markets and neighboring bilateral/physical markets are not new. The SIS evaluated the change from FTRs to CRRs in relation to potential seams issues with the understanding that Existing Transmission Contracts (ETCs) are fully hedged from congestion costs through the ISO's "Perfect Hedge" mechanism. The following highlight some of the questions and associated findings.

### **CRRs as a Barrier to Interregional Interchange**

CRRs are financial instruments not physical transmission rights. As financial instruments, CRRs entitle the holder to a stream of revenues or charges based on the difference in LMPs between the CRR source and CRR sink. This revenue stream is completely independent of whether the CRR holder schedules energy or ancillary services in the CISO markets.

There is no predominant reason why CRRs at the interties should create a "barrier" or disruption to energy flows between the CISO and its neighbors to the northwest and southwest. The CISO's CRR processes are designed to allow up to 100 percent of intertie capacity (after accounting for transmission ownership rights, existing transmission contracts, converted rights, and expected facility outages) to be released as CRRs over the complete

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sequence of the CRR release processes (annual and monthly allocations and auctions, and long-term allocation).

**Stranded Energy at the CISO Borders**

If an import is offered into the Day Ahead (DA) market, with an economic bid, which is not cleared in the Integrated Forward Market (IFM) all the demand in the IFM (including exports) has been economically cleared using other supplies. The import supplier who offered into the DA market, but was not cleared, will have met any bilateral supply obligation it had to the CISO market. By 1300h of the trade day the importer will know the results of tomorrow's DA market and their obligation to the CISO. This information will allow the importer to remarket its uncommitted energy to another buyer, offer it to the CISO's Real Time (RT) market, or opt not to generate the energy and save the operating costs. Alternatively, if the supplier wants certainty that its own supply will be delivered, it can self-schedule the import.

**Limitation on Wheel-Through CRRs**

Wheel-through seasonal CRRs will be available in the annual CRR auction process, and wheel-through monthly CRRs will be available in the monthly auction process. Load external to the CISO can participate in the CRR auctions on the same basis as other eligible auction participants. In addition, Out-of-Control-Area Load-Serving Entities (OCALSEs), can obtain an *allocation* of CRRs if they have qualified sources, as determined through an ongoing source validation process.

**CRRs and Marginal Losses**

As designed under the CISO's tariff, with the implementation of MRTU, the calculation of transmission line losses will change and CRRs will not provide a hedge for these losses. It should be noted that CRRs are not an appropriate instrument for managing losses and that no market in the country has developed such an instrument. Marginal losses are a function of much more stable and predictable conditions than congestion costs.

**Conclusion**

The SIS evaluation of Congestion Revenue Rights under MRTU has led to the conclusion that CRRs represent enough of a change from the current FTRs that market participants will need some time to understand how to effectively include CRRs in their portfolios. Moreover, the SIS acknowledged that certain parties have continuing concerns regarding CRRs, the application of and payment for marginal losses and the potential impacts on ETCs under the CISO's MRTU program. The SIS does not believe that these issues represent seams issues, but rather transition issues for which there are already established mechanisms and venues for addressing these concerns.

*While the industry has varied opinions on the design and allocation of CRRs, the SIS does not find specific seams issues related to CRRs.*

**Parallel Operations during Cutover – Operating Committee Task Force Coordination**

The purpose of this evaluation was to address concerns that MRTU may cause reliability problems severe enough to call for immediate mitigation or reversion to the pre-MRTU

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system because of dispatch patterns leading to high energy flows and associated voltage concerns throughout the Western Interconnection.

The Operating Committee created a task force to review any reliability concerns with implementation of MRTU. The principle area in which the SIS coordinated with the OC task force was whether any special monitoring is warranted for parallel operations upon MRTU implementation. To the extent MRTU causes previously unseen and unstudied dispatch patterns that alter flows throughout the Western Interconnection, it may be prudent to monitor for increased congestion, high energy flow or voltage issues. It is noted that the WECC Reliability Coordinators who have the wide-area view of the Interconnection will be monitoring system conditions as usual and will be fully aware of MRTU implementation.

The OC leadership determined special monitoring activities are not warranted and that it would not be spending time on MRTU concerns unless a “specific” reliability issue is identified and brought to the OC for evaluation. In the event a specific concern is identified, the OC will coordinate with the SIS on the evaluation. The OC leadership reported that, to date, no specific reliability issue has been identified. As stated in the Congestion Management section of this report, the SIS finding on this matter is that MRTU may bring refinements to current dispatch patterns but that significant changes are unlikely under most operating conditions and would be difficult to solely attribute to MRTU.

***The SIS determined the current system monitoring processes in WECC are sufficient to maintain the integrity of the Interconnection. At this time, no specific reliability concerns regarding MRTU implementation have been brought to the OC for evaluation.***

#### **Contingency Plan for Software Failure**

The SIS discussed what plans the CISO has in place to continue to operate reliably and support continued interchange in the event of a failure of the MRTU software.

The CISO is required to submit a Readiness Certification filing with FERC prior to implementation of MRTU. FERC stated the filing is to include “a contingency plan that addresses the failure of MRTU software systems to function as designed.” It is noted FERC did not require the CISO to develop the contingency plan through a collaborative process. However, the CISO stated it is creating an MRTU Cutover and Reversion Plan and would be seeking stakeholder input. At the June 13-14, 2007 WECC, MIC and OC meetings, the CISO presented its initial thinking regarding the plan and indicated they would be seeking stakeholder input and feedback over the course of the summer. The CISO stated that its objective is to finalize the plan by the end of 2007 for inclusion in the readiness certification filing to FERC.

***The SIS is satisfied the FERC-required “Readiness Certification,” which will include a Cutover and Reversion Plan, should be sufficient to address concerns related to a failure of the MRTU software. When the filing is submitted, the SIS will review and comment if it deems necessary.***

**ATTACHMENT #1**

**Clarification of CAISO Provisions Regarding Resource Adequacy  
Capacity and Exports under MRTU**

**For discussion at Seams Issues Subcommittee, May 30-31, 2007**

**Overview**

1. This document explains the relationship, in the context of the CAISO's redesigned MRTU markets, between the status of generating capacity within the CAISO control area as Resource Adequacy (RA) capacity or non-RA capacity, and the treatment of exports being supplied by such capacity. In particular, this document is intended to affirm and clarify the fact that export schedules established in the MRTU markets – the day-ahead Integrated Forward Market (IFM) and the real-time Hour Head Scheduling Process (HASP) – are firm energy schedules consistent with the conventional meaning of "firm" as used in the western region.<sup>2</sup> Once export schedules have been established in the MRTU markets they will be tagged as "firm." Paragraphs 2-4 below summarize the basis for this fact; the remainder of the paper provides additional details.
2. Much of the misunderstanding around the matter of the firmness of energy schedules under MRTU stems from the need to distinguish two aspects of the treatment of exports.
  - a. The rules and procedures for establishing firm export schedules in the MRTU markets (IFM and HASP); and
  - b. For firm export schedules that have been established as part of a final IFM or a final HASP schedule, whether there are circumstances under which such schedules might subsequently be curtailed by the CAISO.

The distinction between RA and non-RA capacity is relevant for (A) but not (B). MRTU does specify certain rules affecting the ability to establish firm export schedules in the IFM and HASP, depending on whether an export bid submitted to one of these markets is linked to non-RA generating capacity offered into the same market. However, once an export bid clears the market and becomes part of a final IFM or HASP schedule, the distinction between RA and non-RA capacity has no relevance to the firmness of that schedule. All such final schedules are firm and will be tagged as such.

3. Regarding item (A), because RA capacity is paid for by load-serving entities (LSEs) who serve load within the CAISO control area, capacity that is under contract to meet RA requirements must be available to meet CAISO control area load and operational needs through participation in the Day Ahead Market (DAM), which includes both the Integrated Forward Market (IFM) and the Residual Unit Commitment (RUC), as well as the Real Time Market (RTM) which includes the Hour Ahead Scheduling Process (HASP). This principle and the distinction between RA and non-RA capacity will affect the ability of parties to establish firm export schedules in the IFM and in the HASP. In

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<sup>2</sup> The use of the terms "firm" and "firm schedule" in this paper refer only to firm energy transactions and schedules. There is no discussion of firm versus non-firm transmission because that is not the subject of this paper. It is important to recognize, however, that all transmission service offered by the CAISO, both in the current system and under MRTU, is firm. The CAISO does not today and will not under MRTU offer non-firm transmission service.

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particular, certain special provisions in MRTU allow parties additional flexibility to establish firm day-ahead (IFM) and hour-ahead (HASP) export schedules that explicitly rely on non-RA capacity.

4. Once the DAM has concluded and day-ahead export schedules are established, such export schedules are firm in the usual sense of the word regardless of whether they are served by RA capacity, non-RA capacity, or simply by “the market” which will typically include both RA and non-RA capacity. “Firm” in this case means that the CAISO carries required operating reserves to support these exports, and they are treated as fixed schedules and afforded the highest priority against any reduction in the subsequent RTM/HASP market processes. Similarly, once the HASP has concluded and hour-ahead export schedules are established, such export schedules are firm without regard to their reliance on RA or non-RA capacity, and they are supported by CAISO-procured reserves.

**Background on Bid Submission: Economic Bids and Self Schedules**

5. A “bid” is the generic name for the template that each Scheduling Coordinator (SC) submits to the CAISO – on a daily basis for the Day Ahead Market (DAM) and on an hourly basis for the Real Time Market (RTM) and Hour Ahead Scheduling Process (HASP).
6. Within a bid there are two main ways that energy supply (generation and imports) and demand (load and exports) can be submitted: (1) as an “economic bid” – having MWh quantities and a bid price associated with each quantity, or (2) as a “self-schedule” – having MWh quantities without any prices associated. In the RTM and HASP parties cannot submit self-schedule changes for internal load, so their actual RT load deviation (from DA schedule) is deemed to correspond to any self-scheduled supply changes in HASP.
7. The self-schedule provision was designed into MRTU to allow for the preference of some participants to serve their demand using their own resources or bilateral contracts, without buying or selling energy in the CAISO markets.
  - Under MRTU – in contrast to today’s CAISO markets – there is no requirement for submitted self-schedules to be balanced. Moreover, in almost all cases the market optimization does not recognize any linkage between the supply bids or self-schedules and the demand bids or self-schedules submitted by an SC. Rather, the optimization looks at the entire set of submitted bids and self-schedules for supply and demand, and clears the market as a whole and calculates energy prices at each grid location (LMPs) that are used for settlement. (One special case, of course, is the special treatment available for exports discussed in the next section.)
  - Even if an SC does submit balanced supply and demand self-schedules, such schedules are still using the CAISO grid and must settle for the costs of congestion and losses, even though they are not transacting energy in the markets. For an accepted self-schedule that has balanced quantities of supply and demand, settlement based on the LMP differential between the supply and demand locations will reflect the costs of congestion and losses. (See the separate presentation for detailed examples of how this works.)
8. When the market optimization runs, it will try to “clear the market” – that is, balance supply against demand plus losses for the system without violating any transmission

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constraints – using only the economic bids, that is, by treating all the submitted self-schedules as effectively fixed<sup>3</sup> and not making any adjustments to them.

9. If it is not possible to clear the market using only economic bids, then the optimization will make “non-economic” adjustments to submitted self-schedules in order to balance the system and eliminate congestion. When such adjustments are necessary, two rules apply:
  - a. First, the optimization follows a “scheduling priority” sequence among self-schedules. Starting with the LAST ones to be adjusted (that is, the highest scheduling priority), the order in the DAM is as follows:
    - Reliability Must Run (RMR);
    - Transmission Ownership Rights (TOR);
    - Existing Transmission Contracts and Converted Rights (ETC and CVR);
    - Regulatory Must Run and Regulatory Must Take; and
    - “Generic” energy self-schedules, the first to be adjusted. (See filed Tariff Sec. 31.4. Priority sequence for RTM/HASP is a little different; see Sec. 33.3.)
  - b. Second, within each priority level, the optimization will usually adjust the most effective self-schedules first in order to minimize the total MW amount of submitted self-schedules that are reduced.
10. Because self-schedules do not indicate the prices they are willing to accept for supply or the prices they are willing to pay for demand, accepted self-schedules are settled as price takers. As noted above, for an SC whose accepted self-schedule features a balanced quantity of supply and demand, the settlement based on the LMP differential between the supply and demand locations will reflect only the costs of congestion and losses.

**Resource Adequacy (RA) Capacity and Exports in the DAM**

11. In general, exports submitted as self-schedules in the DAM are “generic” self-schedules with respect to the scheduling priorities listed above.
12. Within the class of generic self-schedules, generic export self-schedules usually have lower scheduling priority than generic internal demand self-schedules. This means that if the market optimization cannot clear the market using only economic bids, because the amount of available supply in the market is not sufficient to cover both self-scheduled internal demand and self-scheduled exports, the self-scheduled exports will be reduced first.
13. The reason for establishing this priority is because LSEs serving load within the CAISO were required to procure RA capacity to meet a specified planning reserve requirement, and this capacity must be offered into the DAM. In the extreme situations where such capacity is not enough to meet self-scheduled internal demand, the LSEs who paid for the RA capacity get the first opportunity to utilize the associated energy in the DAM.

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<sup>3</sup> The submitted self-schedules are effectively fixed relative to economic bids by using extremely high-priced extensions to form a bid curve around the self-schedule, to ensure that economic bid adjustments are made prior to non-economic adjustments to self-schedules.

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14. There are two ways for a party to submit self-scheduled exports and receive scheduling priority in the DAM that is equal to the scheduling priority of generic internal demand.
  - a. Submit a wheeling schedule, in which the MW of self-scheduled exports are matched with equal MW of self-scheduled imports. The optimization will see the two sides of this self-schedule as matched and either will not adjust them at all or will adjust them in a balanced manner. Moreover, any such adjustment would only occur as a result of congestion, not for a supply-demand imbalance. The reason is that adjusting a wheeling schedule would always adjust supply and demand in equal quantities and thus would have no effect on relieving a supply-demand imbalance.
  - b. Submit an export self-schedule linked to an equal MW quantity of non-RA capacity that is offered – with either a self-schedule or economic bids – into the DAM (which may be used in the IFM or the RUC), and into the RTM if the unit is physically capable. In this case the market optimization might not even schedule energy from the non-RA capacity, but the fact that it was offered is sufficient to obtain scheduling priority for the self-scheduled export that is equal to the priority for self-scheduled internal load.
15. Once an export that is registered in the Master File as firm clears the DAM and is part of a final DA schedule, it is a firm schedule consistent with the conventional meaning of that term. Under current WECC MORC, this means the CAISO as the sending Control Area will ensure sufficient operating reserves are procured to support the firm export. In doing so, the CAISO expects such firm export to be tagged accordingly. Moreover, as a firm schedule that has cleared the DAM, the export also has the highest priority against any subsequent curtailment in the RTM/HASP processes, as described below.

#### **RA Capacity and Exports in the HASP**

16. Bids are submitted no later than T-75 to be used in the HASP and RTM processes.<sup>4</sup> In the HASP, all of the economically bid and self-scheduled supplies (generation and imports) are cleared against the CAISO's forecast of internal RT demand plus all the economically bid and self-scheduled exports.
17. As in the DAM, the market optimization tries to clear the market using only economic bids, treating all the submitted self-schedules as fixed. In this optimization, the final DA schedule is also treated as fixed and cannot be adjusted. If economic bids are not sufficient to clear the market in the HASP, then "non-economic" adjustments are applied to newly-submitted self-schedules in a manner analogous to the DAM, following the sequence of scheduling priorities.
18. Analogous to the DAM rule for "generic" self-schedules, export self-schedules in HASP have lower priority than the CAISO forecast of internal demand, which means that if there is not enough supply to meet the internal demand forecast, export self-schedules will be reduced.
19. As in the DAM, a party wishing to submit an export self-schedule in the HASP and receive equal scheduling priority to the internal demand forecast can submit either a

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<sup>4</sup> Actually, the HASP is one of the several market processes that comprise the RTM. The best way to think about HASP is as the MRTU equivalent – with some additional functionality – of today's Real Time Pre-dispatch by which the CAISO procures Supplemental Energy from imports.

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wheeling self-schedule, or an export self-schedule that is linked to an equal MW quantity – that is offered into the RTM – of non-RA capacity or even to RA capacity that was not scheduled in the DAM (IFM or RUC).

20. As in the DAM, once an export clears the HASP and is part of a final HASP schedule, it is a firm schedule consistent with the conventional meaning of that term. Under current WECC MORC, this means the CAISO as the sending Control Area will ensure sufficient operating reserves are procured to support the firm export. In doing so, the CAISO expects such firm export to be tagged accordingly.

**RA Capacity and Exports in the Real Time Operating Time Frame**

21. Although the CAISO has tariff and operating provisions that allow it in principle to curtail exports in RT under contingency conditions, in practice the CAISO has consistently avoided such action because it is not viewed as an effective way to manage contingencies. That is, CAISO operators fully expect that any RT curtailment of exports would be promptly offset by a comparable curtailment of our imports, resulting in zero net impact.
22. The CAISO believes that its emergency provisions allowing curtailment of exports in RT are fully equivalent to the capabilities all western control area operators or balancing authorities have available to them to manage emergencies, and therefore should not be viewed as in any way degrading the firmness of established DAM or HASP export schedules.



# Memorandum

**To:** ISO Board of Governors  
**From:** Steve Berberich, Vice President, Corporate Services  
Deborah Le Vine, Director of Market Services and MRTU Program Manager  
**Date:** July 7, 2008  
**Re:** Assessment of Progress Towards Fall 2008 MRTU Go-Live

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*This memorandum does not require Board action.*

## EXECUTIVE SUMMARY

This memorandum describes the Market Redesign and Technology Upgrade (MRTU) status through June 2008 and proposes a plan for proceeding towards a Fall 2008 Go Live date.

The CAISO has now reached a point of a very significant change in its readiness. Indicators show that there has been a remarkable change in trend in the state of systems' stability and that full testing has been consistently available to participants since the last report to the Board. The Day-Ahead Market is running consistently and is publishing results within the production timeline. The Hour-Ahead Scheduling Process ("HASP") has been finishing on time and is publishing results within the availability and timeline objectives set for the market simulation. The 15-minute Real-Time Pre-Dispatch ("RTPD") and 5-minute Real-Time Dispatch ("RTD") are also finishing on time and dispatching within the availability and timeline objectives set for the market simulation. The settlement charge codes are individually unit tested and the bid-to-bill validation process is in progress. To date, a total of 46 charge codes out of 123 have been initially validated through the bid-to-bill process but have not been fully validated by market participants.

During June, CAISO grid operators performed an intensive two day walkthrough of MRTU processes and systems. The walkthrough was a resounding success and demonstrated that the systems were now at a point where the grid could be effectively operated. Related to quality of solution, we received the final report from LECG which reported once again that there were no material issues with the pricing engines.

Market participants continue to have a number of concerns. Notably the concerns relate to questions about pricing, data traceability, and settlement charge code availability. It is critical that CAISO resolve these issues quickly to instill the confidence necessary for support of a Fall Go Live date.

To allow market participants sufficient time to gain confidence with the improved systems CAISO will address CAISO readiness and MRTU program status at the July Board meeting. The August 14 Board meeting will then be an opportunity for market participants to apprise the Board on their readiness and allow CAISO to provide a further MRTU

program status. This should provide the Board with sufficient information to make an informed decision on the Fall Go Live date. Once the Go Live date is established, CAISO will need to file with the Federal Energy Regulatory Commission, at least 60-days in advance of the Go Live date, the MRTU Readiness Certification which based on this timeline can be no earlier than November 1, 2008.

Below is additional information detailing CAISO's current state of MRTU market readiness and our ongoing efforts to prepare ourselves and our market participants for the market launch. Specifically, this memo updates our status with respect to:

- Technology Readiness
- Internal (Business Unit) Readiness
- External (Market Participant) Readiness
- MRTU Readiness Criteria
- Market Simulation Exit Criteria
- Timeline for Upcoming Events

### ***TECHNOLOGY READINESS STATUS:***

#### **Market Simulation Status**

The ISO is currently executing its final phase of market simulation, known as Integrated Market Simulation Update 2 (IMS U2). In this phase, all MRTU systems have been integrated, such that market participants can test all MRTU applications end-to-end and all market functionality is available. As demonstrated in the tables below, overall, the market solution availability to participants and participation metrics for IMS U2 indicate that system stability has improved, particularly with respect to the Real-Time Market, and that market participant involvement remains high. Coordinating with market participants, CAISO executed IMS U2 following a graduated approach, initially submitting bids on behalf of market participants until market participants were ready to submit bids without CAISO intervention. By executing in this manner, CAISO was able to demonstrate increased system stability and provide market participants with reasonable confidence as the market simulation moved into testing specific market scenarios.

#### **Day-Ahead Market Status**

Though we have run the market simulation continuously since June 1, we do not officially track metrics on the weekend, as that is CAISO's down time to install application patches and validate the patches that were promoted to the market simulation environment. So currently, Monday 8:00 AM through Friday 5:00 PM is considered our market simulation time. Notably during this time, practically all intervals (daily, hourly, 15-minute and 5-minute) have been solved with an alternating current (AC) solution using simulated power flows versus a direct current (DC) solution which allows for a better quality of power flows and pricing.

## Day-Ahead Market Running Consistently and Producing Quality Results

	Requirement	Market Simulation Results
DA Market Publishing	Daily	100%
DA Market Publishing Timeline	1300	83% <sup>1</sup>
Availability to submit bids	Graphical User Interface	100%
	Automated Programmatic Interface	100%
Ability to submit bilateral trades	Graphical User Interface	100%
	Automated Programmatic Interface	100%
Quality of Solution	Alternating Current	98% <sup>2</sup>

<sup>1</sup> During the June Market Simulation began, publishing of the Day-Ahead Market by 1300 was not met on 5 days. June 5 DA results were published at 1340; June 6 DA results were published at 1335; and June 12 DA results were published at 1313. While the results were published after 1300, they were all published by 1400, the market simulation timeline goal. CAISO received a performance patch from the vendor which was promoted to the market simulation environment on June 15. Since that time 1300 was only missed 2 days – June 19 when DA results were published at 1303 due to the Quality of Solution issue discussed below and on June 24 when CAISO held the market open to allow bids to be received that will trigger additional charge codes.

<sup>2</sup> The only day where a DC solution was observed was due to ~16,000 MW of participant load missing in the Day-Ahead Market to meet the CAISO Forecast of CAISO Demand and thus a dynamic power flow solution could not be found which is what would be expected in this situation. The results were solved using a DC solution in 13 intervals of the Day-Ahead Market. There are 720 intervals in the 30 days of June.

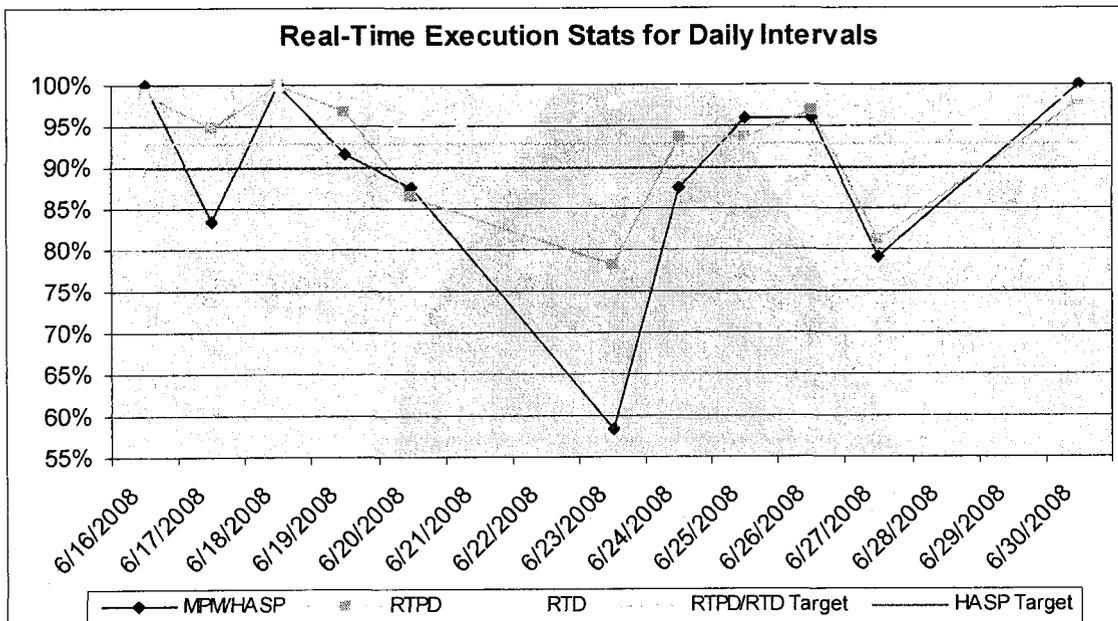
### Real-time Market Status

The Real-Time Market has been consistently running and publishing results. Since a number of major patches were deployed into the market simulation environment on June 15, the performance of the Hour-Ahead Scheduling Process ("HASP"), the 15-minute Real-time Pre-Dispatch ("RTPD") and the 5-minute Real-time Dispatch ("RTD") have improved significantly. We are reviewing the results to ensure all necessary data from Real-Time systems are available and appropriately published and passing the correct data to other downstream systems.

With respect to the quality of the solution, the real-time results are generally solving with Alternating Current ("AC") power-flow rather than have to revert to a less complex Direct Current ("DC") solution. This fact is further highlighted because we are now integrated with the Energy Management System ("EMS") simulator and are using the State Estimator solutions from the simulator. Achieving an integrated solution with the EMS simulator is a major accomplishment and represents as far as one can go in a testing environment. Since we are simulating each resource's response to coming online, running and shutting down instead of having actual telemetry from resources that are physically responding like in production, we are encountering some simulation challenges that are resulting in some unrealistic imbalance and pricing results at various times. Actions are being taken to improve the simulation responsiveness to address these observations.

Real-Time Market Running Consistently and Producing Quality Results

	Target	6/16	6/17	6/18	6/19	6/20	6/23	6/24	6/25	6/26	6/27	6/30
HASP	90%	100%	83.3%	100%	91.7%	87.5%	58.5%	87.5%	95.8%	95.8%	79.2%	100%
RTPD	93%	98.96%	94.79%	100%	96.9%	87.5%	78.1%	93.75%	93.75%	96.88%	81.25%	97.92%
RTD	93%	98.96%	98.61%	100%	98.3%	94.4%	96.2%	99.31%	99.31%	99.65%	91.32%	98.96%



## Settlement Status

While all 123 charge codes have been tested with stubbed data, CAISO is performing a bid-to-bill validation in the market simulation integrated environment to ensure that both the charge code is correct and the data received by the settlement system is correct. Each charge code typically requires a number of pieces of data or billing attributes to completely calculate (i.e. awarded bids, meter data, nodal prices, exemptions, etc.). Most participants would see approximately 48 charge codes on a daily or monthly basis. The remaining 75 charge codes require specific instances to trigger the data needed to get the charge code to calculate completely with all billing attributes. In numerous instances we have charge codes that have calculated for all of the data available, however to be completely validated, the charge code needs to have one final piece of data. As an example, for the Real-Time Congestion charge codes to completely calculate, CAISO needs 1) a participant to successfully bid an import on an intertie that 2) becomes congested in the Hour-Ahead Scheduling Process ("HASP") and then 3) the transmission line has to be derated in Real-Time. We have seen imports on lines that are congested, or imports on lines that are derated, but not all three requirements simultaneously. So the charge code is valid for all of these separate conditions, but has not been completely validated for this final (all three simultaneously) condition and therefore not considered to have completed the Bid-to-Bill validation process. As of June 30, 2008, 44 of 123 Charge Codes were confirmed by CAISO to meet Bid-to-Bid validation and therefore considered to be in-scope for Market Participant validation.

## Market Participant Scenarios

For IMS Update 2, CAISO has worked with market participants to define forty (40) operational scenarios for execution during market simulation. Execution of the scenarios started on May 13, 2008 and will continue until all defined scenarios have been successfully executed. The scenarios center around testing various operational conditions that may exist once we start production including:

- Impact to supply, demand and Existing Contracts when there is a transmission derate
- Insufficient energy, Residual Unit Commitment or Ancillary Service bids or self-schedules and relaxation of limits
- Insufficient bids to relieve congestion and the impact on prices
- Evaluate pump impacts, pseudo ties, tie scheduling priority, over generation conditions, and load flow
- Test Exceptional Dispatch, Extremely Long Start, Daylight Savings transition and nomogram implementation

The scenarios test the impact on the various applications when one of the events described above occurs. Scenarios are scheduled for the Day-Ahead Market or the Real-Time Market, and in some instances a scenario is run in both markets. This information should provide guidance to participants on the impact of various bidding strategies and financial outcomes when a similar operational event occurs in production.

Scenario testing was temporarily suspended for the week of June 16 to ensure the systems were stable with all of the new patches. However during this time the participants were able to continue to fully test the systems by putting in any bid set they desired. The process for executing scenarios requires CAISO to execute them in advance on a test system to determine the type of bids and quantities needed to make the scenario work as expected. CAISO then provides this information to market participants one week in advance to allow participants time to properly structure their bid sets. The day after the scenario is run in the Day-Ahead Market, CAISO briefs the participants on its observations on a morning briefing call. If the scenario is run in Real-Time, CAISO will again verbally brief the participants as to what we saw the day after the trade day, again at a morning briefing call. Then CAISO puts out a written report describing the scenario, the set-up, its observations in the execution of the scenario and whether the scenario went as expected – generally in accordance with the CAISO Tariff and Business Practice Manuals. To date, CAISO has executed 6 scenarios; provided preliminary reports to participants on 5 scenarios and provided final reports on 4 scenarios. Market participants are then asked to validate the scenarios and confirm the results were as expected.

## Remaining MRTU Activities

The completion of the following activities will prepare MRTU to exit IMS Update 2. The Program Management and Market Simulation Team are monitoring these on a daily basis:

- Resolution of all critical and very high variances, and resolution or mitigation of all high variances – this varies on a daily basis and a current status will be provided during the Board presentation
- Tracking and completion of all exit criteria is discussed further below
- Execution of all operational scenarios is discussed above

The following phases of market participant testing will continue through MRTU Go Live:

- *Scenario Testing:* Market participants will submit bids and trades based on the operational scenario for the day and for the hours of the specific scenario testing for that day.
  - Round 1: First pass of all defined scenarios.
  - Round 2: Retest effort if scenario does not pass.
- *Market participant testing:* During the scenarios and prior to pre-production, the participants have requested three months of testing and additional training time for their staffs.
- *Pre-Production / Parallel Operations:*
  - Pre-production: CAISO MRTU Operations and Operations Support are running 24 hours a day, with internal processes and roles evolving to MRTU paradigm.
  - Parallel operations: Market participants put in bids and trades consistent with the actual CAISO Forecast of CAISO Demand, generator availability, and trades they are actually making in non-MRTU production that day, mirroring how the participants will actually meet their load and resource configuration on 10/1/2008. Today's requirement in production is to submit a balanced schedule (load + exports = resources + imports). However in the MRTU market structure submitting balances schedules is not required. Therefore for parallel operations participants may submit self-schedules, bids and trades into the MRTU markets.

## Environments

Hardware and operating system requirements were initially established by each vendor when the initial contract was executed in 2003 – 2004. Since that time hardware opportunities have changed and MRTU testing with the contracted environment structure has not attained the performance levels needed and CAISO's operating system strategy has changed. Analysis of the requirements and monitoring results has concluded that additional hardware design considerations are needed for the final production environment build. These analysis results primarily included different hardware and operating system options for the database servers. With the new hardware and operating systems, CAISO can obtain substantially improved performance of the applications and reduced overall system costs. In order to maintain system integrity and reliability, and facilitate proper promotion of the environments to production, the final MRTU hardware and operating system configuration will include today's industry standard environments. The status of needed Go Live environments follows:

### *Production - Folsom and Alhambra with High Availability*

- The hardware for the production environments has been delivered.
- Build, configuration, and validation of Folsom production environment to be completed by July 1, 2008.
- Build, configuration and validation of Alhambra production environment is substantially complete and is targeted for completion by July 15, 2008.
- Operational testing
  - Begin failover testing July 1, 2008.
  - Begin fallback/fall forward testing July 15, 2008.

- Remediate any findings
- Cutover high availability environments to market simulation are targeted for August.

**Staging**

- \* Current MRTU Update 2 environment to be renamed to staging environment when high availability environments are cutover.

**Testing**

- \* The current MRTU Testing environment will remain the testing environment in production.

**Cutover / Reversion**

Over the last six months, CAISO has worked with participants on the cutover and reversion plan previously presented to the Board. CAISO is in the process of affirming the plan and scheduling an external table-top review with market participants in August.

We are currently reviewing detailed internal cutover and reversion plans for all the MRTU systems and applications. In these plans we are documenting the detailed steps of transitioning to the MRTU version of the applications from the current production and the reversion steps to be taken, if needed. At the same time, we are reviewing and updating the support plan, which includes hardware environment and logistics plans, and the internal communication plan to support the MRTU Cutover and Reversion activities. Internal CAISO table-top reviews are also in progress.

**INTERNAL READINESS STATUS**

In an effort to accurately monitor, track, and report the readiness activities of each CAISO business unit, we created several phases, each with different milestones for deliverables, training, and process identification: Plan, Analysis, Design, Build, and the Implement Assessment.

Phase	Group A Milestone	Group B Milestone
Plan	10/1/06 – 11/31/06	11/1/06 – 1/31/07
Analysis	10/1/07 – 11/31/07	2/1/07 – 3/31/07
Design	3/1/07 – 5/31/07	3/1/07 – 5/31/07
Build	6/1/07 – 8/31/07	6/1/07 – 8/31/07
Implement Phase	9/1/07 – 11/30/07	9/1/07 – 11/30/07
Go Live Punch List	1/16/08 – Go-live	1/16/08 – Go-live

As of June 2008, each business unit has completed the Plan, Analysis, Design, Build, and Implement Phase Assessments and is currently tracking remaining activities to Go Live.

After the Implement phase assessment was completed, in an effort to monitor internal readiness activities leading up to Go Live, CAISO drafted a checklist of remaining activities. These activities are reported on a weekly basis and the checklist is updated accordingly. The final hands-on technical training courses are scheduled for completion by the end of July. Scenario execution for business units is ongoing and will continue up until MRTU pre-production.

Final sign-off packets have been assembled for all 14 Tier 1 business processes tested end-to-end in April. Business process owners are identifying the gaps and issues that will need to be closed prior to sign-off as well as developing workarounds for those gaps out of their immediate control. CAISO has targeted July 1 as sign-off for the business processes with no outstanding issues. For business processes with gaps and issues still outstanding, we will test and

sign-off on effective workarounds by the end of July, in advance of the FERC certification filing notice. As of July 1, 11 Tier 1 business processes have been transitioned from MRTU to the business units.

**EXTERNAL READINESS STATUS**

In an effort to monitor market participants' readiness activities in the year prior to Go Live, CAISO initially decided to conduct three participant assessments (initial Assessment, First Follow-up Assessment, and the Final Assessment) from November 2006 until Go Live. To date, CAISO has conducted two assessments. Both consisting of questions surrounding three categories: People, Process, and Technology in the areas of Communication, Market Simulation, Training, Organizational Readiness and Technical Readiness. The Initial Participant Assessment began in November 2006 and ended January 2007. CAISO used this assessment to engage the scheduling coordinators. The assessment in turn is used to ensure that scheduling coordinators have what they need to obtain information, training and the answers to their questions from CAISO. The First Follow-up Assessment began in June 2007 and ended in August 2007. The primary focus was to gauge the participants' MRTU implementation progress. The Assessment also provided the market participants with another venue to ask questions or express concerns over their MRTU implementation.

Due to changes in the program, the CAISO readiness team revised the MRTU Assessment activities to better gauge market participant readiness in the months leading up to MRTU Go Live through a series of touch point surveys and assessments. The readiness team is currently conducting a Pre-Final Assessment and functionality touch point survey to confirm that the areas of People, Process, and Technology are either complete or on track for a 2008 Fall Go-Live date. Of the 91 scheduling coordinators that have been sent the survey, 39 have responded as of June 30 (42%). Results from this Pre-Final Assessment will be used to define the scope of the questions asked in the Final Assessment. The results to date are as follows:

Category	% On Track	% On Track with Risk	% Not On Track
People	74%	21%	5%
Process	44%	51%	5%
Technology	51%	5%	44%

The readiness team is preparing for two additional functional touch point surveys and the Final Assessment process scheduled to begin in August. Though the functional touch point surveys are intended to identify gaps in the participant's readiness, the results of the surveys facilitate the development of mitigation plans with the scheduling coordinator. The plans are then used for continuing discussions to monitor implementation of the needed actions and to ensure that the scheduling coordinator is ready for the MRTU Go Live date. We will use the Final Assessment to confirm our understanding and gain agreement with scheduling coordinators that we have no gaps in the People, Process, and Technology areas that would prevent the scheduling coordinator from operating in the market under the MRTU rules and processes.

The CAISO has continued with various communication forms and outreach activities to ensure that market participants are in the best possible position to achieve MRTU readiness by Go Live. The CAISO has observed a consistent participation rate of market participants in the Implementation Workshops, Market Simulation Planning sessions,

IMS U2 daily phone calls and open bridge, System Interface User Group ("SIUG"), and Settlements and Market Clearing ("SaMC") meetings.

Recognizing that market simulation testing is an integral part of participant readiness, the readiness team has carried out several efforts during IMS Update 2 to ensure that market participants have an effective testing experience. To gain better visibility into market participants' simulation experience, 11 scheduling coordinators, selected overall by the market participants themselves, participated in testing at the CAISO's facilities at the start of IMS Update 2. Participants and CAISO found the on-site testing beneficial. With the open conference bridge, CAISO was able to hold continuous discussion with the market participants who have devoted the time to perform their market simulation testing at CAISO and share that experience with those doing the testing in their offices. This has helped us understand and resolve market participants' issues. The CAISO committed to keep the room supported as long as both CAISO and the market participants felt there were mutual benefits. As of May 2 the room was temporarily closed; however, the room will be re-opened when the market participants and CAISO agree that the market would benefit from the client testing team's return.

In addition, the readiness team closely monitored IMS U2 participation. Scheduling coordinators, identified as not participating in IMS Update 2, were contacted by their client representatives to gauge any issues or risks that were preventing them from participating. Identified issues were addressed by the appropriate party, and scheduling coordinators were encouraged to participate in the market simulation. Additionally, an IMS Update 2 functionality touch point was conducted to assess the first 5 weeks of testing in the areas of system connectivity, performance, and successful execution of the systems' functionalities. This functionality touch point discussed above will be used during summer testing to monitor IMS testing progress.

To ensure that issues are resolved, CAISO has hosted multiple meetings to discuss outstanding participant issues, the most recent major review of all open issues taking place May 19. The meeting's objective was to provide market participants with the latest general status of open issues, with specific status where possible, to consolidate and close currently open issues and to flag issues for further investigation based on market participants' suggestions for reprioritization. During the meeting, market participants recommended 30 issues as needing immediate attention. The CAISO conducted a follow-up meeting with participants on June 11 to address these important issues and continue to work on closing the critical open issues and closing or mitigating the remaining open high issues.

### **External Training**

Externally, CASIO has offered 100 through 300 level training and settlements workshops for market participants through computer based training and instructor led training. Over 1000 representatives of market participants have attended the instructor led training sessions hosted at the CAISO and at the sites of several scheduling coordinators.

Recognizing that most of the formal CAISO training has been presented to the market and made available on DVDs or on the CAISO website, CAISO has focused on the development and presentation of a series of refresher training courses over the last few months. These courses included refresher training on Day Ahead and Real Time Scheduling Activities, Bidding and Scheduling Resource Adequacy, and more focused training on the Metered Subsystem activities. All classes have received strong attendance and high marks from market participants.

In preparation for Go Live, CAISO has designed and will implement a Go Live training program that will run July through September, consisting of a 2-day refresher training course entitled "Market Participant Operations 'Go Live' Training". The course is designed to focus on Day-Ahead and Real-Time Market Operations and will target the market participants' operators, traders, marketers or trainers: individuals who will actually be performing the day-to-day operations of our clients' businesses or trainers who will be responsible for teaching their coworkers how to operate in the CAISO MRTU Markets. The class will provide a brief overview of the MRTU program and will demonstrate

concepts through the use of participatory exercises for the Day-Ahead Market, the Real-Time Market and Inter-SC Trades.

### **MRTU READINESS CRITERIA**

As directed in FERC Order 1417 and with the support of the market participants, CAISO developed measurable Readiness Criteria that allowed CAISO to:

- Develop a tracking system tied to milestones within the MRTU program timeline,
- Establish a methodology to determine whether scheduling coordinators and the market participants are prepared for MRTU Implementation as well as if CAISO is ready,
- Provide for a monthly update to FERC on the status of these Readiness Criteria, and
- Use as input into the CAISO's certification of readiness to be filed with FERC 60-days prior to the MRTU effective date.

The CAISO began tracking and publishing the status of the Readiness Criteria on January 31, 2007 and has provided monthly status to the Market and to FERC via the MRTU Readiness Criteria Dashboard. The June 30, 2008 update of the Readiness Criteria is attached for reference.

As of July 1, the status of the Readiness Criteria is as follows:

- Total Number of MRTU Readiness Criteria: **33**
- # of Completed Readiness Criteria: **7**
- # of "On Track" Readiness Criteria: **24**
- # of "Not On Track" Readiness Criteria: **2**

The Readiness Criteria that are on-track but incomplete consist predominately of those that will remain unfinished until the market simulation is completed or actual production starts. Below are some examples of Readiness Criteria considered to be "On Track":

- Congestion Revenue Rights need to demonstrate a monthly allocation and auction which can be done until 30 days prior to Go Live.
- The revised Grid Operations Procedures and Emergency Procedures are posted on the CAISO website. This activity can not be completed until the day before production commences, but all procedures have been updated and are ready for posting.
- CAISO will develop tools, processes and procedures for Locational Marginal Pricing validation.
- The Final Competitive Path Assessment (CPA) will be posted one month prior to go live. CAISO has held extensive discussion with participants on the three sets of CPA results published to date.

The two Readiness Criteria considered "Not On Track":

- CAISO will test and implement its final settlement charge code configuration prior to entry of pre-production. Thus, this criterion is waiting for both the bid-to-bill validation and pre-production.
- CAISO will publish accurate and complete settlement statements and invoices during the Update 2 Market Simulation. This criterion is waiting for both the bid-to-bill validation and invoicing.

## MARKET SIMULATION EXIT CRITERIA

The CAISO has also worked with market participants to define Exit Criteria for IMS Update 2, and is tracking the progress and completion of each scenario and Exit Criteria on a consolidated dashboard and progress chart. The IMS Update 2 Exit Criteria will help ensure the readiness of both CAISO and market participants before entering Pre-Production. While the Exit Criteria were originally written for a March 31, 2008 Go Live date, the functions required have not changed. The IMS U2 Exit Criteria consist of the following:

Number	Updated Criteria	Status
<b>Variance Availability</b>		
U2.01	Simulation concludes without any open Critical and Very High variances. At least one meeting will be scheduled with market participants as a collaborative effort to review all variances prior to exiting IMS U2. High variances will be repaired and tested when possible while remaining High variances will be mitigated.	Currently no open Critical issues and 8 Very High issues. CAISO has met twice with market participants to review the issues. High issues are being evaluated to determine which will be resolved versus mitigated.
U2.17	Patches in CAISO systems to address Critical, Very High, or High variances that require market participant software changes will be fully tested, installed by CAISO and validated by participants prior to exiting IMS U2.	CAISO is following this on an on-going basis.
<b>IMS Participation</b>		
U2.02	CASIO will make all externally facing MRTU applications available for 100% of SCs to participate.	All external interfaces are available to participants.
U2.03	CASIO will publish the daily list of SCs participating in IMS U2 for SIBR, BAPI, and CMRI for Market Participants to evaluate what SCs that have an obligation to bid resources but are not participating.	CAISO is publishing the daily list of participants.
<b>Settlements</b>		
U2.04	CAISO publishes Settlement Statements and all supporting Settlement documentation including Configuration Guides and Bill Determinants 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.	CAISO is currently publishing settlement statements at TD + 5BD for each initial daily settlement statement. CAISO has been publishing configurations guides and billing determinants in advance of the statement publishing.
U2.05	CAISO publishes Settlement Statements and all supporting Settlements documentation for Month End within TD + 25 BD for each SC that participated in IMS U2 consistent with the respective SC's participation.	CAISO has publishing March and April monthly settlement statements.
U2.06	CAISO publishes Settlement Statements and all supporting Settlements documentation for CRR Auction for each SC that participated in IMS U2 consistent with the respective SC's participation.	CRR charge types are not currently in scope, but expected within the next month. These Charge Codes are being evaluated by the bid to bill team for inclusion into IMS.
U2.07	CAISO 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.	Sample Initial Invoices have been distributed to market participants however a market simulation invoice has not been published. The April invoice is currently being validated before presentation to participants.
U2.14	Every Charge Type must be exercised and valid in accordance with the BPM for Settlements & Billing and CAISO Tariff during IMS Update 1 or 2 between 12/10/2007 and 2/8/2008 Trade Dates but not every SC will necessarily be assessed the Charge Type	44 Charge Codes are currently in scope. Scenarios are being created to include the remaining Charge Codes.

Number	Updated Criteria	Status
<b>Markets Run/Solve</b>		
U2.08	Day Ahead market successfully solves and results are published by 1:00 PM for 7 consecutive trading days during IMS U2 Semi-Structured testing.	The Day-Ahead Market has consistently solved for the past several months, with the latest occurrence of six consecutive trade days (6/14-6/19) having published prior to or by 1 PM, we continue to track this progress toward the stated criteria
U2.09	No more than 5 consecutive 5-minute RT cases fail for 7 consecutive trading days during IMS U2 Semi-Structured testing (except in scenarios specifically testing RT failure and contingency plans or during planned outages for patch deployment). RT case failure means no dispatchable solution was reached; does not include DC solutions or solutions achieved through constraint relaxation.	Since early June, market simulation has been consistently running with market participant bids and shortly thereafter, has been trending 90-100% solutions and external market results availability. We continue to track this progress toward the stated criteria.
U2.10	Market Portal, SIBR, CMRI, OASIS, SLIC, ADS, BAPI, OMAR, and Programmatic Interfaces are available 97.5% of the time during the last 4 weeks of IMS U2 (other than periods of disaster recovery testing and backup and restore testing).	Essentially completed. In June, various participants have had intermittent access issues which CAISO responds to quickly.
U2.13	Quality of solution to be 90% AC solution over the last 4 weeks of IMS U2.	To date, the only DC solution seen in 2008 market simulation was on 6/19 as discussed above.
U2.15	All scenarios agreed to by market participants and CAISO will be successfully completed and market participants affirm completion in accordance with scenario dashboard.	The latest scenario execution schedule is published, with the accompanying scenario detail and a published process in place for review, We continue to track this progress toward the stated criteria
U2.16	Market results are based on market inputs and consistent across external markets application	Since early June, market simulation has been consistently running with market participant bids and shortly thereafter, has been trending 90-100% solutions and external market results availability
U2.18	HASP Market successfully solves and publishes within timing guidelines 95% of the time for 7 consecutive trading days during Update 2 Semi-Structured testing	As discussed previously in this document and displayed in "Real-Time Market Running Consistently and Producing Quality Results" table above, we continue to trend in a positive direction toward completion of this criteria.
U2.19	Real-Time Market successfully solves and publishes within timing guidelines 95% of the time for 7 consecutive trading days during Update 2 Semi-Structured testing	As discussed previously in this document and display in "Real-Time Market Running Consistently and Producing Quality Results" table above, we continue trend in a positive direction toward completion of this criteria.
<b>CAISO IT</b>		
U2.11	Backup and restore plans executed for 100% of the market simulation impacted servers deemed operational critical during normal operating hours.	Scheduled for July
U2.12	Archiving and data retention plans for all market simulation systems performed for each day of phase.	Scheduled for July

### **TIMELINE FOR UPCOMING EVENTS**

Market participant testing will continue through the summer. The scenarios will be run and completed as soon as possible. The CAISO will continue to posts on its website:

- Daily Charge Code Status
- Daily Participation Reports
- Daily Market Simulation Issue Reports;
- Daily Market Simulation Status Reports;
- Market Simulation Real Time Data Exchange Reports;
- Weekly Market Simulation Issues Reports;
- Weekly Market Simulation Results; and,
- Weekly Market Simulation Report Cards.

In addition, CAISO will publish weekly the status of the IMS U2 Exit Criteria, scenario execution and the Market Simulation Completion Profile. This data should provide sufficient advance notice of the status of the program to participants. Key upcoming dates include:

August 7 – Annual process for the 2009 Congestion Revenue Rights begins

August 14 - ISO Governing Board Meeting: Provide Board the MRTU status and discuss participant readiness

August 26 – MRTU Implementation Workshop: confirm that the Board provisions have been met.

September 8 – 9 – ISO Governing Board Meeting: Provide Board the MRTU status

September 23 - MRTU Implementation Workshop

October 28 – 29 - ISO Governing Board Meeting: Provide Board the MRTU status