

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

California Independent System Operator Corporation	)	Docket Nos. ER02-1656-030 and ER02-1656-009
Investigation of Wholesale Rates of Utility Sellers of Energy and Ancillary Services in the Western Systems Coordinating Council	)	Docket No. EL01-68-017
California Independent System Operator Corporation	)	Docket No. ER06-615-000
	)	(not consolidated)
	)	

**STATUS REPORT ON CONVERGENCE BIDDING  
AND ANSWER OF THE  
CALIFORNIA INDEPENDENT SYSTEM  
OPERATOR CORPORATION**

The California Independent System Operator Corporation (“CAISO”) hereby submits the following report on the status of efforts to consider a “convergence” or “virtual” bidding feature as part of the CAISO’s Market Redesign & Technology Upgrade (“MRTU”) process.<sup>1</sup> The CAISO submits this filing in compliance with the directive in the Commission’s July 1, 2005 *Order on Further Amendments to the California Independent System Operator’s Comprehensive Market Design Proposal* in Docket No. ER02-1656 that the CAISO provide an explanation of why it is not feasible to implement Convergence Bidding simultaneously with the MRTU day-ahead energy market and to provide a date when it would be feasible to implement Convergence

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<sup>1</sup> For purposes of this filing, the CAISO will use the term “Convergence Bidding” to refer to the market design feature alternately referred to as “virtual bidding” or “convergence bidding.”

Bidding,<sup>2</sup> and consistent with the CAISO's commitment in its August 2, 2005, compliance filing in Docket No. ER02-1656, to provide the Commission with a further report on the status of Convergence Bidding by March 15, 2006.<sup>3</sup>

As explained in more detail below, the CAISO cannot incorporate a Convergence Bidding feature into the initial release ("Release 1") of the new market design without a significant delay in the implementation of the new markets. To address the concerns raised by stakeholders, the CAISO is initiating an expedited stakeholder process where Convergence Bidding is considered on a faster track than items that the CAISO has designated as potential Release 2 items. Accordingly, Convergence Bidding is a potential "Release 1A" design element under consideration for implementation as soon as practical after Release 1 and prior to Release 2.<sup>4</sup> This report identifies a number of steps that must be completed before a plan for implementing a Convergence Bidding feature in MRTU can be finalized. Assuming these steps are completed under the schedule proposed by the CAISO, that all necessary approvals to move forward with a specific Convergence Bidding design are received, including approval by the CAISO's Board of Governors, and that unforeseen

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<sup>2</sup> *California Independent System Operator Corporation*, 112 FERC ¶ 61,013 ("July 1, 2005 Market Design Order") at P 174 (2005).

<sup>3</sup> When the CAISO originally proposed to provide a report by March 14, 2006, on the status of the CAISO's efforts to consider Convergence Bidding, the CAISO had hoped to schedule stakeholder meetings to discuss issues related to Convergence Bidding during the first quarter of 2006, based on a target of filing MRTU tariff provisions (the "MRTU Tariff") by the end of November 2005. As discussed below, the process of finalizing the terms and conditions of the Release 1 features included in the MRTU Tariff took substantially more time for both the CAISO and its stakeholders than anticipated in the Summer of 2005.

<sup>4</sup> For ease of reference, the CAISO has referred to all design features and functions that would enhance the MRTU market design and that might be implemented after Release 1 of the new market design as "Release 2" items. As discussed below, the CAISO is now considering whether Convergence Bidding could be implemented in advance of other Release 2 enhancements.

circumstances (including additional design complexities and software implementation issues) do not arise that could affect the implementation schedule, the CAISO believes that it would be feasible to implement a Convergence Bidding feature within approximately twelve months after implementation of MRTU Release 1. In this filing, the CAISO also responds to certain issues related to the implementation of Convergence Bidding raised by other parties submitting filings in Docket No. ER02-1656.<sup>5</sup>

## **I. BACKGROUND**

In the July 1, 2005 Market Design Order, the Commission directed the CAISO to provide a full explanation regarding why simultaneous implementation of convergence bidding with the MRTU day-ahead energy market is not feasible and to provide a date when it would be feasible to implement Convergence Bidding. July 1, 2005 Market Design Order at P 174. In an August 2, 2005 filing in Docket No. ER02-1656, submitted to comply with that order (“August 2005 Compliance Filing”), the CAISO discussed various implementation concerns related to Convergence Bidding and proposed to submit a report to FERC by March 15, 2006 explaining when the CAISO anticipated implementing Convergence Bidding as part of a subsequent release of MRTU. In the August 2005 Compliance Filing, the CAISO explained that it intended to undertake a

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<sup>5</sup> Although the CAISO is submitting this report in both Docket Nos. ER02-1656 and ER06-615, the CAISO does not believe these two proceedings should be consolidated. The extensive service list in Docket No. ER02-1656 includes many parties who are no longer actively commenting on the development of the MRTU market design and who need not receive copies of all filings related to the MRTU Tariff in Docket No. ER06-615. The service list in Docket No. ER02-1656 does not include e-mail addresses for many parties and therefore is not conducive to electronic service of filings. All interested parties will have an opportunity to intervene in Docket No. ER06-615 and to receive electronic service of all future filings related to the MRTU Tariff.

complete evaluation of the pros and cons of Convergence Bidding, once the details of the MRTU Release 1 market design were resolved in sufficient detail to submit the MRTU Tariff to the Commission.

The CAISO briefly addressed the status of Convergence Bidding in its February 9, 2006 filing in Docket No. ER06-616 of revisions to the CAISO Tariff to implement MRTU Release 1 (the “MRTU Tariff Filing”). In that filing, the CAISO noted that the process of finalizing the details of the MRTU Tariff took more time than anticipated last summer. The CAISO stated that it planned to discuss the schedule and deliverables for Release 2 of the MRTU design, including the issue of Convergence Bidding, at the CAISO Board of Governors meeting scheduled for March 8, 2006. MRTU Tariff Filing Transmittal Letter at 95. The CAISO committed to submit a report to the Commission by March 15, 2006, that reflects the discussion with the CAISO Governing Board and updates the Commission on the status of the CAISO’s efforts to implement Convergence Bidding. The instant filing fulfills that commitment.

A number of commenters have submitted filings in the past few weeks requesting that the Commission take pre-emptive action on the issue of Convergence Bidding. On February 7, 2006, Williams Power Company, Inc. (“Williams”) filed a pleading captioned as an “Answer to the California Independent System Operator Corporation’s Status Report, and Motion to Supplement Protest and Supplemental Protest” in Docket Nos. ER02-1656 and EL01-68 (“Williams Filing”).<sup>6</sup> In its filing, Williams requested that the Commission

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<sup>6</sup> The protest Williams sought to supplement in the filing was Williams’s August 23 protest of the CAISO’s August 2 Filing.

either: (a) direct the CAISO to incorporate Convergence Bidding or a comparable balancing feature into MRTU Release 1 ( Williams Filing at 11) or (b) order a technical conference to address the issue. *Id.* at 17-18. On February 16, 2006, the Western Power Trading Forum (“WPTF”) filed a pleading captioned as an “Answer” (“WPTF Filing”) supporting the Williams Filing.

On February 22, 2006, the CAISO filed an answer to the Williams Filing and the WPTF Filing (“February 22 CAISO Answer”), requesting that the Commission deny Williams’ request without prejudice to the ability of Williams to raise issues concerning Convergence Bidding in response to the CAISO’s MRTU Tariff Filing.

On February 27, 2006, the Independent Energy Producers Association (“IEP”) submitted a filing captioned as a “Motion to Supplement and Supplemental Protest” (“IEP Filing”) supporting the Williams Filing. On March 3, 2006, Morgan Stanley Capital Group, Inc. (“MSCG”) submitted a filing captioned as a “Motion to Support” (“MSCG Filing”) supporting the Williams Filing.

Because they are relevant to the issues discussed in the instant status report, the CAISO responds to certain arguments concerning the implementation of Convergence Bidding raised in the IEP Filing and the MSCG Filing.<sup>7</sup>

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<sup>7</sup> The CAISO is entitled, under the Commission’s rules, to submit an answer to the MSCG Filing, which is captioned as a motion. The CAISO requests waiver of Rule 213(a)(2) (18 C.F.R. § 213(a)(2)) to permit it to respond to the IEP Filing. Good cause for this waiver exists here because the answer will aid the Commission in understanding the issues in the proceeding, provide additional information to assist the Commission in the decision-making process, and help to ensure a complete and accurate record in this case. *See, e.g., California Independent System Operator Corp.*, 105 FERC ¶ 61,074, at P 12 (2003); *Columbia Gas Transmission Corp. and Energy Corp. of America and Eastern American Energy Corp.*, 106 FERC ¶ 61,297, at P 13 (2004); *Niagara Mohawk Power Corp. v. New York State Reliability Council and New York Independent System Operator, Inc.*, 114 FERC ¶ 61,098, at P 18 (2006).

## II. STATEMENT OF ISSUES

In accordance with Rule 203(a)(7), 18 C.F.R. § 385.203(a)(7), the CAISO provides this Statement of Issues:

1. Whether the Commission should accept the instant status report as complying with the Commission's directives on Convergence Bidding in the July 1, 2005 Market Design Order"
2. Whether the Commission should deny the requests of Williams and supporting commenters that either: (a) that the CAISO be required to incorporate convergence bidding or a similar balancing feature into MRTU Release 1, or (b) that FERC order an expedited, on-the-record technical conference to address the ability of the CAISO to include convergence bidding in MRTU Release 1, provided that such denial is without prejudice to the ability of Williams to raise issues concerning convergence bidding in response to the CAISO's MRTU Tariff Filing.
3. Whether the Commission should grant waiver of Rule 213(a)(2) (18 C.F.R. § 213(a)(2)) to permit the CAISO to make an answer to the IEP Filing. *See, e.g., California Independent System Operator Corp.*, 105 FERC ¶ 61,074, at P 12 (2003); *Columbia Gas Transmission Corp. and Energy Corp. of America and Eastern American Energy Corp.*, 106 FERC ¶ 61,297, at P 13 (2004); *Niagara Mohawk Power Corp. v. New York State Reliability Council*

*and New York Independent System Operator, Inc.*, 114 FERC ¶ 61,098, at P 18 (2006).

### **III. STATUS REPORT ON CONVERGENCE BIDDING**

#### **A. The CAISO Is Exploring Expedited Implementation of Convergence Bidding**

The most significant development related to the implementation of Convergence Bidding is the decision of the CAISO Management to initiate an expedited stakeholder process in the second quarter of 2006 where Convergence Bidding will be considered a potential “Release 1A” design element for implementation as soon as practical after Release 1.

Through the course of the MRTU stakeholder process, the CAISO has identified numerous features and functions that are not essential for the initial implementation of the new market design in California but that might be desirable for future updates of the MRTU market design.<sup>8</sup> Therefore, the CAISO identified a number of proposed market design features and functions that will not be included in the “Release 1” design upon start-up of the new markets, but would be considered for a subsequent update of the market design.

As discussed in the MRTU Tariff Filing (Transmittal Letter at 95), CAISO management presented a work plan to address future enhancements to the MRTU market design to the CAISO Operations Committee, during the March 8, 2006, meeting of the Operations Committee of CAISO Board of Governors. This

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<sup>8</sup> As explained in the MRTU Tariff Filing, the CAISO proposes to include in Release 1 all those features and elements of the market design that are necessary to: (1) ensure reliable operation of the grid, (2) ensure that the market design works properly, *i.e.*, does not have a “fatal flaw”, or (3) satisfy a regulatory requirement. MRTU Tariff Filing Transmittal Letter at 4-5.

work plan is discussed in the March 2, 2006 Memorandum on *Work Plan to Address Future Enhancements to MRTU* from Charles King and Farrokh Rahimi to the CAISO Operations Committee, the CAISO Board of Governors, and CAISO Officers, provided as Attachment A to this filing. In preparing this work plan, CAISO management recognized the importance of pursuing a Convergence Bidding stakeholder process on a more expedited basis than other MRTU enhancements. Accordingly, CAISO Management proposed the designation of Convergence Bidding as a “Release 1A” item that could be considered for implementation as soon as practical after Release 1. The designation of Convergence Bidding as a Release 1A priority reflects the Commission’s prior findings on the importance of a Convergence Bidding feature as well as the recommendation of the CAISO’s consultants, LECG, LLC, that Convergence Bidding should be incorporated into the MRTU market design as soon as the practical realities of software development and testing permit.<sup>9</sup>

The high priority the CAISO is placing on consideration of a Convergence Bidding feature is evidenced by the fact that it is the only one of the nearly two dozen potential Release 2 items (listed on p. 3 of Attachment A) that the CAISO is currently elevating to Release 1A status, and by the criterion, stated in Attachment A, that any other functions that might be identified important enough to warrant expeditious implementation as a result of the stakeholder process,

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<sup>9</sup> See Exhibit No. ISO-3, provided as Attachment H to the MRTU Tariff Filing, at 22-23.

would be added to Release 1A only if their addition would not interfere with timely implementation of Convergence Bidding.<sup>10</sup>

The CAISO Board of Governors discussed the proposal and advised that future proposals for market enhancements, including Convergence Bidding, should quantify the benefits of the proposed enhancement relative to the implementation costs and ongoing costs to support the added functionality.

**B. Convergence Bidding Cannot Be Incorporated Into MRTU Release 1 Without a Significant Delay to the Implementation of the New Market Design**

The MRTU Release 1 design to be implemented in Fall 2007 represents an internally consistent and comprehensive redesign of the CAISO markets. For the reasons explained at length in the MRTU Tariff Filing, Release 1 is a just and reasonable market design that includes all of the functionality needed for successful performance of the MRTU markets upon start-up. Because California consumers will benefit from the most timely possible implementation of MRTU, the CAISO urges the Commission not to take actions that will cause significant delay to the implementation of Release 1.

The CAISO has previously addressed the reasons why a Convergence Bidding feature cannot be incorporated into MRTU Release 1 without a significant delay in implementation of Release 1, but believes it may be helpful to the Commission and to the interested parties to provide additional context for this explanation. The challenges associated with developing and ultimately

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<sup>10</sup> The CAISO's work plan permits additional features and functions to be added to the Release 1A category, but only "to the extent they lead to substantial enhancement of the design and do not jeopardize timely implementation of Convergence Bidding." Attachment A at 2.

implementing a Convergence Bidding feature for MRTU generally fall into two categories: (1) the challenges associated with the development, testing and implementation of software to implement a Convergence Bidding feature, and (2) the need to make critical policy determinations about the design of a Convergence Bidding feature before the software requirements for such a feature can be finalized.

When considering the challenges associated with software development, it is important to understand that, although the MRTU market design incorporates many features from the markets of eastern independent system operators (“ISOs”), the MRTU software is based on a wholly different architecture from the market software employed by other ISOs. Thus, features from other markets, such as the various virtual or convergence bidding features employed in eastern ISOs, cannot simply be incorporated into the MRTU markets without substantial effort to design and develop the software and data structures that would implement these features under the CAISO’s software architecture, to test the new features, and to integrate these features into the MRTU production software. In addition, because there is no single convergence or virtual bidding design adopted by other ISOs, it is likely that a final Convergence Bidding design adopted by the CAISO may differ in significant respects from the designs adopted by other ISOs.

The addition of a Convergence Bidding feature to the MRTU software is likely to require changes to data models that are fundamental to the MRTU

design. These changes cannot be made without a significant delay to the implementation of MRTU Release 1.

As discussed in the testimony of Brian Rahman, the CAISO's Program Manager for the MRTU project, the CAISO initiated a complete status review of MRTU after the CAISO's internal reorganization in 2005, reevaluating the logical scheduling progression and determining the critical path for implementation of MRTU.<sup>11</sup> This status review included consultation with the CAISO software vendors and a consideration of whether the software requirements and documentation fully reflected policy decisions reflected in the MRTU Tariff, including those policy decisions based on stakeholder input in late 2005. Based on this review, it became apparent that the then-projected February 2007 implementation date was not achievable. The revised target implementation date for MRTU Release 1 of November 2007 was determined based on this review.<sup>12</sup>

Moreover, as Mr. Rahman explains, "the purpose of the review was first to identify discrepancies between the software development and the then-existing tariff and policy decisions; it did not evaluate the addition of new components to Release 1."<sup>13</sup> In his testimony to support the MRTU Tariff Filing, Mr. Rahman was asked to consider whether additional components could be included in Release 1 due to the delayed implementation date. Mr. Rahman explained that "the November 2007 date includes no addition time for contingencies" such as

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<sup>11</sup> See Exhibit No. ISO-8, provided as Attachment M to the MRTU Tariff Filing, at 5.

<sup>12</sup> See *Id.* at 5-8.

<sup>13</sup> *Id.*

the implementation of a virtual bidding feature.<sup>14</sup> More specifically, Mr. Rahman explained that:

The estimated delay, for example, of the development of the software for the bid submission and settlement system that would be caused by a decision to implement submission of virtual bids in Release 1 could be an additional 12 months on top of the revised implementation date of November 2007.<sup>15</sup>

It is important to note that this estimate assumes that policy and design issues related to Convergence Bidding can be resolved in a timely manner so that software requirements for a Convergence Bidding feature can be documented in the first step of the seven-step software development and implementation process described by Mr. Rahman.<sup>16</sup>

As the CAISO has previously explained,<sup>17</sup> there is no single conceptual design of Convergence Bidding that all the other ISOs have adopted and that the CAISO could adopt under MRTU without any stakeholder engagement in a conceptual design process. In fact, the implementation of convergence bidding is not the same in all ISO markets. For example, the PJM virtual bidding feature is based on a nodal approach while the comparable feature in the NYISO markets utilizes a load zone/hub-based approach. Thus, there are significant design options which must be considered in the context of a stakeholder process before the CAISO could finalize a conceptual design for convergence bidding and direct its vendors to begin the software development and implementation process described above. Striking a proper balance between Convergence

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<sup>14</sup> *Id.* at 10.

<sup>15</sup> *Id.*

<sup>16</sup> See Exhibit No. ISO-8 at 2-3.

<sup>17</sup> February 22 CAISO Answer at 9.

Bidding functionality and other specific design features of MRTU Release 1 may dictate a design of Convergence Bidding that is different from both those implemented at PJM and at NYISO.

As reflected in the August 2005 Compliance Filing, the CAISO had hoped to schedule stakeholder meetings to discuss issues related to Convergence Bidding by the first quarter of 2006 based on a target of filing the MRTU Tariff by the end of November 2005. The process of finalizing the terms and conditions of the Release 1 features included in the MRTU Tariff took substantially more time for both the CAISO and its stakeholders than anticipated in the Summer of 2005. As explained in Attachment E to the MRTU Tariff Filing (a summary of the MRTU stakeholder process), 26 days of stakeholder meetings and conference calls took place between July 2005 and the February 9, 2006 filing of the MRTU Tariff, including fifteen days of stakeholder meetings from October to December 2005 to review drafts of MRTU tariff language with stakeholders. These meetings were held in response to the strong requests of numerous stakeholders. In addition, the policy/software reconciliation process described in Mr. Rahman's testimony was necessary to ensure that the filed MRTU Tariff reflected an attainable set of market design features for the Release 1 implementation date. Although these steps resulted in a delay of the MRTU Tariff Filing and the start of the stakeholder process to consider post-Release 1 items such as Convergence Bidding, the CAISO believes that each of these steps was necessary to ensure that the Commission and interested parties were presented with a well-vetted

and well-developed MRTU Tariff setting forth terms and conditions for critical Release 1 design features.

**C. The Process for Considering a Convergence Bidding Feature and a Feasible Implementation Date for Convergence Bidding**

As noted above, the CAISO Management intends to proceed with an expedited stakeholder process exploring Convergence Bidding and other features and functions for consideration in post-Release 1 updates to MRTU. Consistent with the Release 1A approach discussed above, the initial steps in this process will focus on Convergence Bidding. The CAISO intends to issue a white paper by late April to early May setting forth various options for a Convergence Bidding feature, including options concerning the granularity of virtual bids (*i.e.*, nodal or zonal, somewhere in between, *etc.*), as well as other design features. The CAISO will then schedule a stakeholder meeting in early to mid-May to discuss the options related to Convergence Bidding. Additional stakeholder meetings on Convergence Bidding and other candidate post-Release 1 features and functions will be scheduled over the late Spring and Summer months. In cooperation with the stakeholder process, the CAISO plans to have a well vetted conceptual design for Convergence Bidding that can be presented to the CAISO Board of Governors for consideration by the end of Summer 2006.

In the event that a conceptual design has been approved by the CAISO Board of Governors, the CAISO would intend to present the conceptual proposal for Convergence Bidding to the Commission for regulatory review. Once the

conceptual design has been determined, the CAISO also will work with its software vendors to determine a feasible development and delivery schedule.

The CAISO recognizes that the Commission has directed the CAISO to identify “a date when it would be feasible to implement convergence bidding.” July 1, 2005 Market Design Order at P 174. Due to the many variables that could affect the development and implementation of a Convergence Bidding feature, it is impossible for the CAISO to identify a date certain when it would be feasible to implement a Convergence Bidding feature. These variables include the potential for issues and concerns to arise during the stakeholder process that take more time than anticipated to resolve;<sup>18</sup> modifications to the conceptual design for a Convergence Bidding feature that could be mandated through the approval process; the specific design features that may be needed to address issues and concerns specific to the California market with no precedent in other ISOs; the need to resolve software issues with MRTU Release 1 that only become apparent after the new market design is tested or implemented before new functionality can be added; or the need to ensure that the new markets (Release 1) are stable and that market results are consistent and rational before adding new features.<sup>19</sup>

Assuming the steps described above are completed under the schedule proposed by the CAISO and that these variables do not affect the implementation

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<sup>18</sup> The CAISO notes that some stakeholders may need more time than others to enhance their own systems to accommodate a Convergence Bidding feature, and that a reasonable time may be needed to allow stakeholders to adapt their systems and procedures.

<sup>19</sup> The CAISO intends to track both market and software metrics under Release 1 to ensure that the markets are sufficiently stable to accommodate the implementation of post-Release 1 functions and features.

schedule, the CAISO's best estimate for a date when it would be feasible to implement a Convergence Bidding feature as part of MRTU is by approximately twelve months after the start of the new markets under MRTU Release 1.

**D. Commenters Have Not Supported Their Requests for Commission Mandates Concerning Convergence Bidding**

Both MSCG and IEP have recently submitted filings either supporting the requests of Williams for Commission mandates concerning Convergence Bidding. Specifically, MSCG requests that the Commission either direct the inclusion of Convergence Bidding in MRTU Release 1 or establish a technical conference to ascertain when Convergence Bidding can be incorporated into the MRTU design. MSCG Filing at 6. IEP also requests that the Commission direct the inclusion of Convergence Bidding in MRTU Release 1 or initiate a technical conference on the issue of whether Convergence Bidding can be incorporated within six months of Release 1 and whether alternative mechanisms to address the potential underscheduling of Load should be included in MRTU Release 1. IEP Filing at 3, 6.

Many of the arguments offered by MSCG and IEP parallel arguments made in the Williams Filing. The CAISO explained why Williams had not justified its requests in the February 22 CAISO Answer in this proceeding, and the CAISO will not repeat its full response from that Answer here. The CAISO does believe several points raised by MSCG and IEP warrant a further response.

**1. The Issue of Whether MRTU Release 1 is Just and Reasonable Without Convergence Bidding Must Be Considered in the Context of the Full MRTU Tariff Filing**

As with the Williams Filing, the heart of the MSCG and IEP Filings is an argument that MRTU Release 1 will not be just and reasonable or would be unduly discriminatory and preferential if it does not include convergence or virtual bidding. See MSCG Filing at 3, IEP Filing at 3 (statement of issues citing the statutory standards under Section 205 of the Federal Power Act). The Commission cannot make such a finding, however, until it fully considers the CAISO's pending Section 205 filing of the MRTU Tariff which provides extensive detail on MRTU Release 1, including an explanation of why certain design features were not included in Release 1. There is no reason why the Commission should make a pre-emptive finding that the MRTU Tariff Filing is not just and reasonable due to the absence of a Convergence Bidding feature for Release 1 before the Commission has fully assessed the MRTU Tariff itself and the thousands of pages of supporting testimony and documentation. The Commission also should not act on issues related to the MRTU Release 1 design until it has received the comments of all interested parties on the MRTU Tariff Filing.

Similarly, the question of whether the Commission should order a technical conference or additional proceedings on the inclusion of Convergence Bidding in MRTU Release 1 can only be answered after the Commission has fully assessed the record presented in the MRTU Tariff Filing proceeding.

MSCG claims that the issue of Convergence Bidding "can and should" be considered separately from the MRTU Tariff Filing because the issue of the CAISO's compliance with directives of the July 1, 2005 Market Design Order

concerning Convergence Bidding is still open in two sub-dockets of Docket No. ER02-1656. MSCG Filing at 4-5.

With the instant filing, the CAISO has now fully complied with the directives of the July 1, 2005 Market Design Order to provide “a full explanation of the alleged infeasibility to implement convergence bidding simultaneously with the day-ahead market” and “a date when it would be feasible to implement convergence bidding.” July 1, 2005 Market Design Order at P 174. In the discussion above, the CAISO has provided a full explanation of the feasibility issues associated with Convergence Bidding and has also provided the CAISO’s best estimate of a date when it would be feasible to implement a Convergence Bidding feature in light of the many variables that could affect a feasible implementation date.

MSCG suggests that the CAISO “ignored the Commission [July 2005] order” when the CAISO “asked for a nine-month extension to provide a date as to when the CAISO could implement convergence bidding.” MSCG at 5. By definition, however, the CAISO was not and could not have ignored the Commission’s directives when it requested additional time to comply with those directives. Requesting that the Commission grant an extension of the deadline for a compliance report is a routine matter and is the proper course of action when a full compliance report could not be completed in the time originally specified by the Commission.

Putting aside the consideration of the CAISO’s compliance with its reporting requirements under the July 1, 2005 Market Design Order, there is still

no basis for the Commission to mandate incorporation of Convergence Bidding into MRTU Release 1, and certainly no reason why the Commission should ignore the extensive documentation supporting the MRTU Release 1 design that will be considered in the MRTU Tariff docket in considering whether to direct the CAISO to incorporate Convergence Bidding into MRTU under any particular timetable.

**2. LECG Recognizes that Incorporation of Convergence Bidding Should Reflect the Practical Realities of Software Development and Testing**

Both MSCG and IEP selectively quote from the MRTU Tariff testimony of the CAISO's consultant, Dr. Scott Harvey of LECG. Specifically, MSCG and IEP note Dr. Harvey's general support for a Convergence Bidding feature and quote the statement of Dr. Harvey that Convergence Bidding was not identified as an issue in the February 2005 LECG report on the MRTU design "because at that time, we [LECG] understood that the market design would include convergence bidding." MSCG Filing at 4 and IEP Filing at 4, *quoting* MRTU Tariff Filing Exhibit No. ISO-3 at 23 n.22. Both parties take the quoted footnote out of context, however. A full review of Dr. Harvey's testimony does not support the conclusion that a Convergence Bidding feature must be included in MRTU Release 1. Dr. Harvey identifies Convergence Bidding as a market design element that the CAISO should implement "when the MRTU market design is implemented *or as soon thereafter as possible.*" Exhibit No. ISO-3 at 22-23 (emphasis added). Dr. Harvey's testimony also states that Convergence Bidding and the other identified market design features "should be incorporated in the MRTU design as soon as the practical realities of software development and testing permit." *Id.* Section

III.B of this filing provides an explanation of the practical realities of software development and testing with respect to the development and implementation of a Convergence Bidding feature for MRTU.

### **3 The CAISO Treatment of Metered Subsystems Under MRTU Needed to Be Resolved Prior to MRTU Release 1**

Lastly, MSCG and IEP repeat the claim made by Williams that the incorporation of provisions in the MRTU Tariff Filing addressing Metered Subsystems under MRTU Release 1 is evidence that the CAISO can add functionality to MRTU Release 1. MSCG Filing at 2, IEP Filing at 1. This is demonstrably incorrect. It is true that the delay in the MRTU Tariff Filing allowed the CAISO to complete discussions with affected parties and to document in the Tariff Filing certain details of how Metered Subsystems will be treated under MRTU. However, this process did not result in the addition of new functionality to the Release 1 software. Because Metered Subsystems exist in today's market structure, the CAISO has always recognized that the MRTU Tariff for Release 1 would have to address the treatment of Metered Subsystems under the new market design.

The need to address Metered Subsystems under the MRTU Tariff was discussed in the CAISO's May 13, 2005 conceptual MRTU filing in Docket No. ER02-1656. As explained in the May 2005 MRTU White Paper provided as Attachment A to that filing, the CAISO first proposed MRTU provisions for Metered Subsystems in a separate white paper issued to stakeholders in November 2004.<sup>20</sup> The May 2005 MRTU White Paper explained that:

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<sup>20</sup> May 2005 MRTU White Paper at 30.

The MRTU proposal will grant Metered Subsystems (“MSS”) the option of fully participating in the ISO’s markets and being treated like any other market participant. However, to the extent a MSS operator wants different treatment in recognition of its unique features and functions, the ISO will accord them such treatment.<sup>21</sup>

The May 2005 MRTU White Paper also explained that the details of treatment of Metered Subsystems under MRTU would be “developed in [a] parallel stakeholder process” as part of the “MRTU Tariff Development Process.”<sup>22</sup>

The MRTU Tariff development process was therefore always designed to include any necessary features to reflect the treatment of Metered Subsystems. The delay in the MRTU Tariff Filing simply allowed the CAISO to finalize policy decisions related to Metered Subsystems for inclusion in the version of the MRTU Tariff submitted with that filing.

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<sup>21</sup> *Id.*

<sup>22</sup> *Id.* at 34.

#### IV. CONCLUSION

Wherefore, for the foregoing reasons the CAISO respectfully requests that the Commission accept this status report as complying with the Commission's July 1, 2005 Market Design Order and deny the requests of Williams and supporting commenters either: (a) that the CAISO be required to incorporate convergence bidding or a comparable balancing feature into MRTU Release 1, or (b) that FERC order an expedited, on-the-record technical conference to address the ability of the CAISO to include convergence bidding in MRTU Release 1.

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Date: March 15, 2006

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I hereby certify that I have this day served a copy of this document upon all parties listed on the official service list compiled by the Secretary in the above-captioned proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated this 15<sup>th</sup> day of March, 2006 at Folsom in the State of California.

/s/ Cayden Jenness

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## ATTACHMENT A

# Memorandum

**To:** ISO Operations Committee

**From:** Charles King, Vice President, Market Development & Program Management  
Farrokh Rahimi, Ph.D., Principal Market Engineer, Market & Product Development

**cc:** ISO Board of Governors, ISO Officers

**Date:** March 2, 2006

**Re:** *Work Plan to Address Future Enhancements to MRTU*

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*This memorandum is for information only.*

## EXECUTIVE SUMMARY

The MRTU Release 1 to be implemented in Fall 2007 represents an internally consistent comprehensive redesign of the CAISO markets. As such, Release 1 includes all functionality indispensable for successful performance of the MRTU markets upon start-up.

Nevertheless, Management has recognized that some additional functionality is highly desirable to enhance the performance of the MRTU markets or provide capabilities desired by market participants, and over the past year has developed a list of candidate market design features to be considered for a subsequent software release. Collectively, these items are referred to as "Release 2".

Management now proposes to expedite implementation of additional MRTU functionality after Release 1 in two steps. The first step, referred to as "Release 1A," is targeted for implementation as soon as practical after Release 1, and includes Convergence Bidding as the main new functionality.

Attachment A lists additional candidate features and functions that were identified by LECG in their February, 2005 review of CAISO's initial MRTU proposal, by the stakeholders in the course of stakeholder discussions and the MRTU Tariff page turn in 2005, or by Management in the process of Tariff/Policy/Software reconciliation process prior to MRTU Tariff filing. Management proposes to conduct a stakeholder process beginning in 2<sup>nd</sup> quarter 2006 to discuss and prioritize the features and functions on this list, along with any other candidate features that are identified for consideration, (Release 2).

This memorandum summarizes and provides brief descriptions of the candidate design features identified to date, and offers a draft timetable for the stakeholder process mentioned above.

## BACKGROUND

In their February 23, 2005 review report of CAISO's initial MRTU design, LECG identified a dozen areas of concern that needed to be reviewed by the CAISO for potential inclusion in the MRTU implementation. Three of these (Load Aggregation Point (LAP) clearing, Hour-Ahead Scheduling Process (HASP) pricing, and Local Market Power Mitigation (LMPM) were considered critical to

address before starting the MRTU market, and have already been incorporated in MRTU Release 1. Others were judged to be significant but not critical enough to warrant delaying the MRTU Release 1 to accommodate them.

In 2005, in the course of the MRTU stakeholder discussions, and during the MRTU Tariff page turn, a number of additional highly desirable features and functions were also identified that could not be accommodated in Release 1. Finally, during CAISO's Tariff/Policy/Software reconciliation effort prior to MRTU filing, Management identified a number of highly desirable software functionality that could not be accommodated in Release 1.

## **NEXT STEPS**

Convergence Bidding is slated for implementation in Release 1A. CAISO will issue a white paper in April 2006, stating various options including granularity of Convergence Bidding and CAISO's recommended solution for stakeholder discussions. CAISO targets to have the conceptual design of Convergence Bidding completed by Summer 2006 for Board approval. Once the functional requirements are determined, the CAISO will work with its software vendors to determine a feasible development and delivery schedule.

Regarding the rest of the features and functions, the CAISO will initiate a scoping stakeholder process in the 2<sup>nd</sup> quarter of 2006. The primary objective will be to discuss and classify the candidate features and functions into three categories, namely:

- Release 1A: This category, intended for expedited delivery, presently includes only Convergence Bidding. Additional features and functions may be added to the extent they lead to substantial enhancement of the design and do not jeopardize timely implementation of Convergence Bidding.
- Release 2: This category will include features and functions that lead to substantial enhancement of the MRTU market. A work plan to determine the details of the functions in this category will be developed as part of the stakeholder scoping effort by mid-May 2006. The results of these efforts will be incorporated into the 3-year Roadmap as described in the CAISO Business Plan. Upon completion of conceptual designs, individual elements will be forwarded to the Board of Governors for approval and to the Program Management Office for the development of detailed software specifications. Software implementation will be scheduled consistent with CAISO periodic release cycles.
- Deferred: This category may include items in which the cost to implement significantly exceeds the estimated value to the marketplace, or items that have otherwise been characterized as "non-essential" through the stakeholder scoping process.

## ATTACHMENT A – Post-MRTU Candidate Features and Functions

The following is a list of the candidate post Release 1 features and functions identified to date with no particular order as to their relative priority or originating source, except for Convergence Bidding. CAISO is under order from FERC to implement Convergence Bidding as quickly as feasible. The CAISO has targeted expeditious implementation of Convergence Bidding with an aggressive schedule after MRTU Release 1. The rest of the features and functions listed below are slated for discussion and prioritization in a scoping stakeholder process to be initiated in the 2<sup>ND</sup> quarter of 2006.

It is worth noting that some of these suggestions will be given higher priorities than others with due consideration of stakeholder input. Other items may be deferred if it is determined that the value added is not significant, or that the item is deemed non-essential to a well-functioning marketplace.

1. Convergence Bidding (Proposed expedited treatment)
2. Day-Ahead Market Power Mitigation and Unit Commitment issues, including the following elements:
  - (a) Use of bid-in Demand rather than Demand forecast in Pre-Integrated Forward Market (IFM) passes in the Day-Ahead Market
  - (b) Eliminating use of extreme DEC bids on the Pass 1 pre-IFM schedules in Pass 2 pre-IFM
  - (c) Unrestricting the pool of resources in the IFM pass for the Day-Ahead Market
  - (d) Developing an alternative means to determine RMR pre-dispatch
3. Simultaneous Residual Unit Commitment (RUC) and IFM
4. Participating Load demand response in Day-Ahead Market
5. The California Energy Commission's proposal on rebate of loss over-collection for renewable resources
6. System-level scarcity pricing
7. Consideration of a full Hour-Ahead settlement market
8. Dynamic pivotal supplier test for market power mitigation
9. Multi-settlement system for Ancillary Services
10. Consideration of import energy in the RUC process
11. Multi-day unit commitment in the IFM
12. DEC Bidding Activity Rule on Final Day-Ahead Resource Schedules
13. Ramping Limits for the Real-Time Pricing Run with Constrained Output Generation (COG)
14. LMPM for COG units; provision for daily bidding of minimum load
15. Ramp Rates
  - a. Operational ramp rate function
  - b. Operating Reserve ramp rate
16. Ancillary Service Self-Provision at the Interties
17. Reservation of transmission capacity for Ancillary Service exports
18. Hourly designation of Ancillary Service Contingency Only Flag
19. Combined-cycle modeling
20. Treatment of use-limited resources with limited number of hours or start ups
21. Start Up Energy
22. Automatic treatment of conditional A/S self provision
23. Automation of sub-LAP adjustments in step 3 of LAP clearing validation

A brief explanation of each of the above features and functions is presented below.

### **Convergence Bidding**

Convergence or “Virtual” Bidding is a mechanism whereby market participants can make financial sales (or purchases) of energy in the Day Ahead market, with the explicit requirement to buy back (or sell back) that energy in the Real Time market, thereby arbitraging their expected differences between Day Ahead and Real Time prices. The exact mechanics of convergence bidding under MRTU will be developed by the CAISO in collaboration with stakeholders in the context of the Release 1A stakeholder process.

### **Day-Ahead Market Power Mitigation and Unit Commitment Issues**

In their review of CAISO’s proposal for the day-ahead market processes (Pre-IFM, IFM, and RUC), LECG expressed concerns with three aspects of CAISO’s proposal, namely, the use of forecast load rather than bid-in demand in Pre-IFM, the use of extreme DEC bids in Pre-IFM Pass 2 for schedules selected in Pre-IFM Pass 1, and restricting the pool of resources in IFM and RUC based on unit commitment in Pre-IFM. CAISO could address only one of these issues partially (unrestricting the pool of resources in RUC) in release 1, and after analysis of the underlying issues concluded (and LECG agreed) that these elements were not critical enough to delay implementation of Release 1. Subsequently, FERC ordered CAISO to revise its pre-IFM procedure to base it on bid-in demand. The CAISO filed a rehearing request explaining that such a change could not be accommodated in Release 1 without substantial delay of the Release 1 implementation schedule. A related issue not addressed by LECG (or FERC) that will have to be worked out if pre-IFM is to be based on bid-in demand is RMR pre-dispatch. RMR pre-dispatch relies on the use of forecast rather than bid-in demand. Therefore, the features slated in this category consist of four elements:

- a) Use of bid-in Demand rather than Demand forecast in Pre-IFM passes in the Day-Ahead Market
- b) Eliminating use of extreme DEC bids on the Pass 1 pre-IFM schedules in Pass 2 pre-IFM
- c) Unrestricting the pool of resources in the IFM pass for the Day-Ahead Market
- d) Developing an alternative means to determine RMR pre-dispatch

### **Simultaneous RUC and IFM**

In the current MRTU design Residual Unit Commitment (RUC) is performed after completion of the IFM and does not impact Day-ahead Market Energy, A/S, and Congestion/CRR pricing and settlement. The question here is whether to perform IFM and RUC simultaneously.

### **Participating Load demand response in Day-Ahead Market (DAM)**

The CAISO’s initial design proposed that Participating Loads would be able to purchase energy in the DAM at the LAP price and sell back demand response – also in the DAM – at the nodal price. LECG’s February 2005 comments identified this treatment of Demand Response as a major implementation issue that would create poor market incentives. As a result, in Release 1 MRTU will support Demand Response only from Participating Loads that can respond to real-time dispatch instructions by reducing their demand, and will settle these entities at the nodal price for both their energy consumption and their real-time demand response. As part of release 2, the CAISO will

consider potential alternative designs to allow Participating Loads to offer demand response in the DAM.

### **The California Energy Commission's (CEC) proposal on rebate of loss over-collection for renewable resources**

In spring 2005 in the context of the MRTU stakeholder process the CEC proposed a method for reducing the impact of LMP-based marginal transmission loss charges on intermittent resources. At the time the ISO and the stakeholders agreed to defer discussion of this proposal for consideration in the context of MRTU Release 2. Subsequently, in the 2005 MRTU stakeholder and policy resolution process the ISO agreed to modify the crediting back of marginal loss surplus revenues and accelerate that process, so the question for discussion in 2006 is whether special treatment for intermittent resources is still needed.

### **System-level scarcity pricing**

The current MRTU design provides for scarcity pricing for Energy; however, no explicit measures are included for scarcity pricing of Reserves. In the MRTU Release 1, Reserve prices may exceed the bid cap to the extent of the opportunity cost of Energy. In other words, Reserve prices will generally be limited to the sum of the prevailing bid cap for Reserves plus the prevailing bid cap for Energy. The question is whether explicit scarcity pricing for Reserves should be provided.

### **Consideration of a full Hour-Ahead settlement market**

The question is whether to augment the two-settlement market design of MRTU Release 1 with a third Hour Ahead settlement market, which could be either a substitute for or in addition to the Hour Ahead Scheduling Process (HASP) element of the Release 1 design.

### **Dynamic pivotal supplier test for market power mitigation**

Local Market Power Mitigation in Release 1 is accomplished through prior classification of transmission constraints as "Competitive" or "Non-competitive". The question here is whether this process should (or could) be replaced by "on-the-fly" determination of pivotal suppliers in the market-clearing process.

### **Multi-settlement system for Ancillary Services**

LECG's February 2005 report stated that the lack of a full multi-settlement system for Ancillary Services that optimizes real-time reserves and settles deviations from day-ahead schedules at real-time prices could raise consumer costs when reserves scheduled in the Day Ahead market must generate energy in Real Time as a result of minimum run times, minimum down times or transmission constraints. The Release 1 design procures A/S in the Day Ahead market to meet 100% of forecasted real-time needs, and then procures additional A/S incrementally in Real Time only to the extent that they are needed due to changes in system conditions or demand exceeding the Day Ahead forecast. Moreover, unless the Operating Reserves are designated as "Contingency Only", their energy will be dispatched economically, and if as a result the Operating Reserves fall below the NERC/WECC's Minimum Operating Reserves Criteria (MORC), CAISO will procure additional Operating Reserves in real-time. The question to be considered is whether to modify the Release 1 design to create a multi-settlement A/S market as suggested by LECG.

### **Consideration of import energy in the RUC process**

Early in the 2005 MRTU stakeholder process it was suggested that import energy bids that were not cleared in the IFM could be considered in the RUC optimization by treating such bids in the same manner as the minimum load bids of internal generators that were not committed in the IFM. The question to consider is whether, in light of the treatment of imports in RUC as filed in the Release 1 MRTU tariff, any additional provisions for considering imports in RUC are needed or appropriate.

### **Multi-day unit commitment in the IFM**

In MRTU Release 1, the forward looking time horizon in IFM is one day, taking into account the impact of prior commitment of units with very long start up times. During the MRTU Stakeholder meetings there were requests that the CAISO make commitment decisions in the IFM that look out beyond a single day in order to create a commitment decision that is more efficient and better reflects the impact of startup-up cost for a resources that have long start-up times. There are several design issues, including the need for bidding and bid replication rules as well as software performance and solution time requirements, that must be discussed and resolved via a stakeholder process before considering modification of the software to accommodate Multi-Day unit commitment in IFM.

### **DEC Bidding Activity Rule on Final Day-Ahead Resource Schedules**

The bidding activity rules in MRTU Release 1 disallow post Day-Ahead Market reduction of the Energy Bid prices that have been accepted in the IFM. This activity rule was designed to prevent the "DEC" game in situations where transmission derates require re-dispatch of generation in the real-time market. LECG pointed out problems with this activity rule. The issue under consideration is to relax this activity rule without the risk of creating "DEC" game incentives. One proposed solution is to allow a limited re-bid period (e.g., a couple of hours) shortly after the publication of the Day-Ahead market results without enforcing this activity rule. Accordingly, during the re-bid period, accepted Day-Ahead bids can be changed above or below the corresponding Day-Ahead bid prices for use in the Real-Time market.

### **Ramping Limits for the Real-Time Pricing Run with Constrained Output Generation (COG)**

The February 2005 LECG report stated that the mechanism proposed for implementation of real-time constrained output generator (COG) pricing could result in the calculation of inappropriately high prices during circumstances in which uneconomic gas turbines are operating as a result of either minimum run time or minimum-down time constraints. The proposed solution to be considered, which is used in the NYISO markets, is to use the dispatch level of non-COG resources from the previous interval's pricing run as the initial operating point of the non-COG resources in the pricing run for the current interval, rather than using telemetry as basis for the initial operating point of non-COG resources as the Release 1 software will do.

### **LMPM for COG units; provision for daily bidding of minimum load**

In the course of the stakeholder discussions and during the Tariff page turn in 2005, the ability for the COG resources to bid their Minimum load on a daily basis, subject to local market power mitigation, was stated as a highly desirable feature. During the Tariff/Policy/Software reconciliation process, it was noted that local market power mitigation of COG resources could not be

implemented in Release 1. This feature is thus slated as a potential post Release 1 feature for discussion and prioritization.

## **Ramp Rates**

The issues in this category consist of Operational ramp rates and Operating Reserve ramp rates. These are explained briefly below:

a. Operational ramp rate function

Operational ramp rates are used for scheduling and dispatch in real time. In order to maintain performance of the software within the required solution timing parameters, the number of operational ramp-rate segments supported in Release 1 is limited to 4 (versus 10 segments initially contemplated). Only 5% of the resources with ramp-rates operational ramp-rates defined in the Master-File would have ramp rates with more than 4 segments defined. Some participants have concerns about the reduction in the number of ramp-rate segments. After actual performance is determined, the CAISO can work with its vendor to determine if additional operational ramp-rate segments can be supported.

b. Operating Reserve ramp rate

While a separate Operating Reserve ramp-rate is used for procuring the spinning and non-spinning reserves, the Operational ramp rate is used for all dispatching of a resource. To the extent the operational ramp rate at a given operating level is less than the Operating Reserve ramp-rate, the resource may be subject to A/S “No-Pay” charge for reserves that are not actually available based on the lower Operational ramp rate. Modifications to the software would be necessary to more closely align procurement of A/S with energy dispatch from A/S capacity in real-time.

## **Ancillary Service Self-Provision at the Interties**

Under MRTU Release 1 the self-provision of Ancillary Services from interties is not supported. Import A/S can only be bid and must compete with import energy bids for the use of New Firm Use (NFU) transmission capacity. A candidate feature to be studied for a subsequent MRTU release is to accommodate A/S self provision from the inter-ties. To accommodate simultaneous clearing of Energy, A/S, and Congestion, this additional functionality may have to be limited to the entities having physical transmission rights.

## **Reservation of transmission capacity for Ancillary Service exports**

Under MRTU Release 1 there is no formal mechanism or specific process for on-demand export of A/S. The optimization does not reserve transmission capacity for this functionality. In MRTU Release 1, a manual workaround will be provided for entities with on-demand obligation, to the extent transmission capacity is available (or must be reserved according to ETC/TOR rights). A candidate feature for a subsequent MRTU release is to build the reservation of transmission capacity into the optimization so that market participants who might have an obligation to supply Ancillary Service energy in real-time to neighboring control areas can serve this obligation.

## **Hourly designation of Ancillary Service Contingency Only Flag**

In MRTU Release 1 the designation of “Contingency Only” Ancillary Services is accommodated on a daily basis. Provisions for hourly designation of “Contingency Only” A/S is slated as a potential post Release 1 feature.

## **Combined-cycle modeling**

In MRTU Release 1 different configurations of a combined cycle unit are modeled collectively as a single resource. The idea here is to model each configuration as a separate resource, and incorporate software capability to ensure changes in configuration during different scheduling and commitment cycles in the course of the optimization process respect all relevant technical and inter-temporal constraints. This approach is of interest to different ISOs, but has not yet been implemented successfully.

## **Treatment of use-limited resources with limited number of hours or start ups**

Use-limited resources accommodated in MRTU Release 1 are those with Energy (MWh) limitations. The idea here is to incorporate software capability to accommodate other types of use limitation, including limitation on the number of hours of usage, or the number of start-ups a resource may be used for, during the scheduling horizon.

## **Start Up Energy**

The current MRTU design (Release 1) will not explicitly recognize the time lapse from unit synchronization to operations at its minimum stable operating unit. Any Start Up Energy, i.e., energy produced during the time interval from synchronization to minimum load, is assumed to be uninstructed deviation. Various stakeholders have requested that Start-up energy be considered as instructed energy during the dispatch process. Some resources may take time to ramp to minimum load. Better recognition of this start-up ramp will better reflect the imbalance energy needs and reduce uninstructed deviations during resource start-up.

## **Automatic treatment of conditional A/S self provision**

Under MRTU Release 1 resources can indicate their intention to self provide A/S. Resources self-providing A/S are not optimized in the IFM engine, but are protected. This means that if a resource under contractual obligation to offer (e.g., an RMR or RA unit) self-provides A/S then that capacity is no longer available to resolve local constraints in pre-IFM runs. Effectively, self-provided A/S that is not disqualified has higher priority than load. In MRTU Release 1 qualification of Self Provided A/S occurs before co-optimization of Energy, A/s, and Congestion. The CAISO has detailed a manual workaround to qualify/disqualify Self Provided A/S from resource under contractual obligation to offer (e.g., an RMR or RA unit). A candidate feature for a subsequent MRTU release is to automate this process.

## **Automation of sub-LAP adjustments in step 3 of LAP clearing validation**

As explained in the MRTU Tariff and testimonies, the LAP clearing procedure recommended by LECG and incorporated in MTU Release 1, may under some rare conditions result in unintended inefficiencies. A three-step process was suggested to deal with such rare situations. The third step in this process involves “softening” the constraints imposed by fixed LAP Load Distribution Factors (LDFs) and allowing independent adjustment of nodal loads. A manual process in MRTU Release 1 will accomplish this step. The issue here is to automate this step in the post Release 1 MRTU software.