

Memorandum

To: ISO Board of Governors
From: Lorenzo Kristov, Principal Market Architect
Anjali Sheffrin, Director, Market and Product Development
Date: July 1, 2008
Re: **Decision on Uneconomic Adjustment Policy in the MRTU Markets**

This memorandum requires Board action.

EXECUTIVE SUMMARY

Current MRTU tariff provisions regarding adjustments to Self-Schedules could potentially lead to extreme prices and schedule adjustments, in rare circumstances. Needing to balance limited adjustments to Self-Schedules against prudent operating practice, Management proposes to make minor tariff revisions by relaxing the current requirement to use *all* Economic Bids before adjusting a single Self-Schedule.

Management requests the Board's approval to modify provisions in the Market Redesign and Technology Upgrade ("MRTU") tariff that allow the CAISO to configure the MRTU software so that a Self-Schedule may be adjusted when the market provides insufficient Economic Bids for the software to establish schedules and dispatch instructions that are feasible and deliverable on the network. The proposed tariff change must be in effect upon start-up of the MRTU markets to avoid potential extreme scheduling and pricing outcomes that would be inconsistent with prudent operating practice and underlying economic factors.

The MRTU software uses Economic Bids (i.e., bids to buy or sell Energy with a price and quantity included) submitted by Scheduling Coordinators ("SCs") as far as is reasonably possible to arrive at a feasible solution, before adjusting submitted Self-Schedules (i.e., bids to buy or sell Energy with just a quantity and no price specified). The feasible solution must balance supply and demand for Energy and fully procure required Ancillary Services ("AS"), subject to transmission and generator operating constraints and accounting for transmission losses.

Under some combinations of system conditions and SC bidding behavior, available Economic Bids may be insufficient to support a feasible solution, or may lead to a solution that is feasible but includes extreme schedule adjustments that violate prudent operating practice or extreme prices unrelated to economic fundamentals. Market Participants can take actions to help avoid such outcomes by submitting sufficient Economic Bids. In the rare situations where the software cannot determine a solution, the MRTU Tariff and the market software provide for "Uneconomic Adjustments" – adjustments to Self-Schedules or to other software constraints such as transmission line limits or AS requirements – to ensure that the

market is able to reach a solution. But this solution (i.e., exhausting all economic bids before uneconomic adjustments) may require extreme adjustments that are not operationally and economically reasonable under all conditions.

Through testing the software, CAISO staff has encountered some extreme solutions when *all* submitted Economic Bids have to be used to clear the market. These extreme solutions are neither economically reasonable nor reflective of good operating practice. Management's proposal is intended to prevent these extreme solutions when MRTU goes into production.

Management proposes to revise the current MRTU Tariff provisions, which require the CAISO to configure the market software to utilize *all* available Economic Bids before adjusting Self-Schedules. The revisions would allow Self-Schedules to be adjusted prior to having exhausted all Economic Bids consistent with prudent operating practice. The current tariff requirement is inflexible in that it requires the CAISO accept *all* Economic Bids rather than adjust Self-Schedules even when using such bids would lead to extreme and unreasonable outcomes.

For example, the current rule would force the software to accept hundreds of megawatts of Economic Bids in the extreme southern part of the system to relieve a few megawatts of congestion in the extreme northern part of the system. Such an action would be operationally unreasonable because prudent grid operators would never solve a northern congestion problem by making a huge adjustment to a generator in the south. Such an action would also not be economically reasonable because the huge adjustment to the southern generator would cause a price differential of thousands of dollars across the offending constraint. The Board should therefore approve the proposed change to allow the CAISO to configure the software to forego ineffective Economic Bids that would result in such unreasonable outcomes and instead, to make more modest adjustments to effective Self-Schedules consistent with prudent grid operation. Management proposes to modify these otherwise restrictive tariff provisions, for both the day-ahead and the real-time market.

The CAISO intends to fully honor the rights of holders of Existing Transmission Contract ("ETCs"), Converted Rights ("CVRs") and Transmission Ownership Rights ("TORs") as approved by Federal Energy Regulatory Commission ("FERC") and incorporated in the MRTU Tariff. In the modifications being requested, they will retain their higher priority order above other types of Self Schedules and Economic Bids. Given the complex set of interactions that occur in the software between bids, transmission constraints and the state of the network, some adjustments to Self Schedules may be made prior to exhausting *all* Economic Bids in rare circumstances and consistent with prudent operating practice.

MOTION

Moved, that the ISO Board of Governors approves the proposed rule changes regarding Uneconomic Adjustments, as detailed in the memorandum, dated July 1, 2008, and

Moved, that the ISO Board of Governors authorizes Management to make all of the necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed rule changes regarding Uneconomic Adjustments.

ISSUE STATEMENT

Uneconomic Adjustment provisions are common in all spot power market software that use the types of algorithms included in the MRTU software. The software must be able to resolve situations in which the submitted bids – which associate a bid price with each bid quantity to buy or sell Energy or to sell AS capacity – are not sufficient to determine a solution that is feasible within the confines of prudent operating practice. Such situations can arise as a result of unusual grid or market conditions, or due to participants' bidding behavior such as a high proportion of Self-Schedules (bid quantities without associated prices) relative to Economic Bids. When the available Economic Bids are not sufficient, the market software must still reach a feasible solution, and it does so by making "Uneconomic Adjustments" to quantities that do not have associated bid prices. The proposal Management is recommending for your approval today concerns the effective and prudent use of Uneconomic Adjustments in the MRTU markets.

The MRTU Tariff already contains extensive provisions for Uneconomic Adjustments in both the day-ahead and real-time markets, so the proposal discussed in this memorandum is a very specific, narrow refinement to those rules. Management proposes to soften what is stated as a strict and inflexible requirement in the current MRTU Tariff. The current text states that the markets must utilize *all* Economic Bids to reach a solution before adjusting Self-Schedules. Market simulation testing has demonstrated that this inflexible rule will lead to unreasonable outcomes in some cases. Although such cases are expected to be rare, they are within the realm of possibility and therefore must be addressed. The current tariff provision could result, for example, in the market reducing the output of a generator in one part of the state by hundreds of megawatts to achieve a few megawatts of relief on a congested transmission line at the opposite end of the state. Such an outcome would not reflect prudent operational practice, and would be accompanied by a congestion price differential potentially in the thousands of dollars. This inflexible rule therefore needs to be changed.

Management is asking the Board to act on this proposal at this time because a decision by the FERC is needed for the start-up of the MRTU markets. If the Board approves, Management plans to file the needed tariff revisions at FERC later in July. At the same time, Management also plans to file tariff revisions related to an existing FERC compliance requirement on the Load Aggregation Points (LAP) mechanism which is also related to Uneconomic Adjustment but does not require further Board action.¹

OPTIONS TO ADDRESS THE BOARD DECISION ISSUE

The current MRTU tariff essentially characterizes the scheduling priority for Self-Schedules as a *guaranteed outcome* of the market by saying that Self-Schedules will be adjusted only when the market runs out of Economic Bids. The complex interactions of bids, constraints and the state of the network within the optimization software make such guaranteed outcomes numerically impossible. Management now proposes, in contrast, to characterize the scheduling priority for Self-Schedules as an *input* to the market, without the absolute guarantee that all Economic Bids will be utilized in all circumstances before adjusting Self-Schedules. CAISO Staff conducted a review of the practices of other ISO's that all are required to deal with similar concerns. CAISO Staff concluded the revision being requested was more in line with the operating experience of those running other LMP based markets including the New England ISO and the Mid west ISO.

¹ FERC's compliance requirement is concerned with one particular type of Uneconomic Adjustment for which a detailed procedure and implementation approach were specified in the MRTU Tariff when it was first filed in February 2006. Since that time CAISO staff has determined that the procedure as specified in the current MRTU Tariff Section 31.3.1.3 could be implemented in a more practical way than the current tariff language requires. The procedure deals with situations where a Demand Self-Schedule submitted by an SC at the level of a Load Aggregation Point (LAP) could be drastically reduced in the Integrated Forward Market (IFM) due to the impact of a local transmission constraint. LAP-level Demand covers a large geographic area (e.g., the entire service territory of Pacific Gas & Electric ("PG&E") or Southern California Edison ("SCE"), so reducing Demand over so large an area due to a local constraint would not be operationally or economically reasonable. The approach for mitigating extreme LAP Demand reductions that will be clarified on compliance follows the same measures specified as Steps One and Two in the February 2006 MRTU Tariff. Moreover, it improves upon the original version by performing those measures within the IFM optimization, and by dropping Step Three of the original version based on Management's determination that the cost and complexity of implementing Step Three would outweigh its potential benefits.

The flexibility being requested in this memo will be implemented through setting software parameters, which establish thresholds beyond which the market will switch from using extremely large quantity adjustments of ineffective Economic Bids to using smaller, more reasonable adjustments of more effective Self-Schedules. In so doing, the software will respect all of the hierarchical scheduling priorities specified in the current MRTU Tariff (Sections 31.4 and 34.10), but instead of using every last Self-Scheduled megawatt in each priority level before moving to the next level, the software will have a threshold setting that tells it to move to the next level when the prior level is running out of effective megawatt adjustments.²

POSITIONS OF THE PARTIES

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The stakeholder process included the following steps which allowed for two written comment opportunities and two public opportunities for stakeholders to express their opinions and react to CAISO proposals. Members of the Market Surveillance Committee (“MSC”) participated in both stakeholder engagements. A copy of the MSC Opinion is included as Attachment B.

Step #	Date	Process
1	3/25/08	Presentation to stakeholders on role of parameter tuning in MRTU Implementation
2	5/6/08	Issue Paper posted
3	5/9/08	Conference Call with MSC Chair
4	5/13/08	Stakeholder Meeting to discuss Issue Paper
5	5/23/08	Comments due on Issue Paper
6	6/9/08	Draft Final Proposal posted
7	6/13/08	Conference Call to discuss Draft Final Proposal
8	6/20/08	Comments due on Draft Final Proposal

Key issues brought up by stakeholders can be summarized into two categories:

Greater flexibility to adjust Self-Schedules

Stakeholder concern was expressed in opposition to the policy of allowing greater flexibility in the use of Self-Schedule adjustments to avoid unreasonable economic outcomes. For example, the State Water Project (“SWP”) was concerned that relaxing the absolute priority for Self-Schedules over Economic Bids may negatively impact the holders of Existing Transmission Contract rights by reducing the firmness of their contractual rights to transmission service and thereby exposing them to financial or operational consequences.

² The determination of the appropriate settings of these threshold values for Uneconomic Adjustments is an implementation process referred to as “Parameter Maintenance” (formerly called “Parameter Tuning”), which staff are performing through the analysis of various market simulation test cases. Staff’s efforts in this area have already been discussed with stakeholders in one all-day meeting and one half-day conference call, and further discussions will be held throughout the summer until the start-up values of the Uneconomic Adjustments are finalized roughly 45 days prior to MRTU start-up.

In response, the CAISO has confirmed its intent to fully honor the rights of holders of ETCs, CVRs, and TORs as approved by FERC and incorporated in the MRTU Tariff. The ultimate firmness of such Self-Schedules is not undermined by this simple policy change in the tariff. Firmness for the Self-Schedules of existing rights holders will be comparable to the priority in firmness they are afforded today. The parameter maintenance effort is an essential process of testing and analysis to establish numerical parameters in the MRTU market software which will ensure that appropriate levels of scheduling priority for ETCs, CVRs and TORs are respected as the software determines market schedules and prices. In other words, this modification will not alter the higher relative priority given to ETC Self-Schedules in the MRTU markets than a simple Self-Schedule as already reflected in the MRTU Tariff. It simply addresses how the software will honor that priority. This means that the proposed change does not change the requirement that if the market software cannot solve using Economic Bids and must curtail a Self-Schedule to relieve a transmission constraint, it must use all the lower classes first and still be unable to relieve the constraint before it had to curtail one of these high priority Self-Schedules. The CAISO staff has explained to SWP that we would still expect ETC Self-Schedules to be curtailed only under rare occurrences, in extreme system conditions that reduce grid transfer capacity in areas of the grid where these higher-priority ETC Self-Schedules would be extremely effective in providing congestion relief. Furthermore, the CAISO will continue to conduct its parameter maintenance efforts in an open and transparent manner so that all Market Participants can continue to evaluate and comment on the impact of this effort on their schedules.

Stakeholder concerns expressed regarding issues not before the Board for approval

Several parties expressed concerns about the "Parameter Maintenance" effort, which is not before the Board for approval. These concerns fall into two general categories: (1) concerns or preferences regarding the actual parameter values that will be implemented in the software, and (2) concerns about how the parameter values in the software will be made publicly available and what process will be followed when changes are made by the CAISO.

Regarding the category (1) type of concerns, it is important to recognize that Parameter Maintenance is a work in progress, so the parameter values that have been posted and are incorporated in the market simulation software are not necessarily the final values that will be used when the markets begin production operation. Not surprisingly, stakeholders on the supplier side of the market want the parameters set so as to allow more extreme prices to result, whereas stakeholders on the Load Serving Entity ("LSE") side of the market want the parameters set so as to ensure that prices will not go far beyond the established Energy Bid caps.

In published papers and stakeholder discussions, the CAISO staff has emphasized that there are no absolutely "right" parameter values, and that finding optimal values for the Uneconomic Adjustment parameters requires balancing several competing objectives:

- a. Observe the specified priorities for Self-Schedule adjustment, consistent with MRTU design principles and the MRTU Tariff;
- b. Provide efficient economic signals – i.e., appropriately high prices to reflect Uneconomic Adjustments – so as to link settlement charges to cost causation and avoid creating incentives for participants to utilize Self-Schedules excessively;
- c. Prevent extreme, unreasonable price outcomes, which may occur if Self-Schedule priorities are enforced inflexibly even under the most extreme circumstances;
- d. Achieve scheduling and pricing outcomes consistent with good operational practice and support reliable operation of the CAISO transmission system; and

- e. Achieve stable market outcomes. Small changes in parameter values should not lead to significant changes in schedules and/or prices.

CAISO staff has also emphasized to stakeholders that the frequency with which Uneconomic Adjustments will occur in the markets will depend on the relative volumes of Self-Schedules and Economic Bids in the markets. The greater the amount of Economic Bids, the more easily the software will find a feasible and reasonable solution based purely on the economics, whereas high volumes of Self-Schedules make it more likely the market will run out of effective Economic Bids before it can reach a solution, and have to use Uneconomic Adjustments. Market participants can manage the potential impacts through their own behavior, by (i) using Self-Schedules judiciously, to contribute to the liquidity of the Economic Bid pool as much as possible and thereby minimize their own costs of serving their load, and (ii) where they must use Self-Schedules, using Economic Bids for at least a portion of their Self-Schedules to limit their exposure to the potential price impacts of Uneconomic Adjustments.

Regarding the category (2) type of concerns, some stakeholders argue for less flexibility for the CAISO and more stakeholder process when changes are needed to parameter values. At this point Management is proposing to make scheduling run parameter values, whose role is to insure the priority order of schedules, available through an Operating Procedure and to post any revisions to that Operating Procedure in advance of implementing revised scheduling run parameter values in the market software. The pricing run parameters that may have a direct impact on prices will be posted in the Market Operations Business Process Manual (BPM).³ Parties who want more stakeholder process are arguing for all parameter values to be maintained in a BPM and the associated BPM Change Management Process, or the Tariff as the place where the parameters reside. It is Management's view that operational experience is needed to determine if and how often changes in scheduling run parameters will be made and flexibility needs to be preserved to allow the operators to interact with the software in achieving an operationally feasible solution.

OTHER RELATED ISSUES DISCUSSED WITH STAKEHOLDERS

CAISO staff also discussed other issues in addition to the action being requested of the Board today. These additional items included (1) pricing of ancillary services procurement, and (2) the setting of specific parameter levels referred to as "Parameter Tuning" or "Parameter Maintenance." Although Management does not need any action from the Board on these subjects, we are discussing them briefly in this memorandum to ensure that the Board is fully informed about their nature and status if the subjects are raised by Market Participants.

Regarding item (1), Management initially believed that additional tariff changes requiring Board-approval might be warranted to address the pricing of AS when one or more of the AS requirements is not fully met in the market solution. CAISO staff therefore discussed this subject in the stakeholder process on the assumption that such changes would be needed. Upon further assessment of the existing MRTU Tariff provisions, however, we concluded that the existing provisions are sufficient to address these cases and that the market software will produce results in these cases that are fully consistent with the existing Tariff provisions. In the context of the Parameter Maintenance effort, CAISO staff will continue to test and analyze a variety of market simulation cases that include such scenarios and will discuss the results with stakeholders over the course of the summer. Therefore no Board action is needed at this time.

Regarding item (2), the stakeholder process has revealed diverse and often strong stakeholder views regarding the appropriate numerical values for the various software parameters used to implement Uneconomic Adjustments in the

³ Many of the pricing run parameters are based on the level of the bid cap which will be \$500/MWh at MRTU start-up. The CAISO anticipates adjusting these parameters accordingly as the bid cap increases as specified in the CAISO's MRTU filings.

MRTU markets. We discuss this issue here because it is likely stakeholders will raise it in comments to the Board. Management wishes to emphasize, however, that the Parameter Maintenance effort is limited to implementation of policy already approved by the Board and FERC and does not raise any new issues that require Board approval. Moreover, the Parameter Maintenance effort is not yet complete at this time. Scenario testing will continue over the next few months so as to determine and publish, approximately 45 days prior to MRTU start-up, the parameter values to be used at start-up. During that time CAISO staff will continue to discuss its testing results with stakeholders and invite their input regarding the parameter settings.

Attachment A contains a summary of the Stakeholder positions and the CAISO response.

MANAGEMENT RECOMMENDATION

Management recommends that the Board approve the proposed rule change and authorize the CAISO to revise the current MRTU Tariff so that the CAISO may configure the market software to ensure the relative priority of the different types of Self-Schedules above Economic Bids are respected but not require that *all* Economic Bids be used before adjusting Self-Schedules, or that Self-Schedules with a lower priority be curtailed before adjusting a higher priority schedule, in every circumstance. The relaxation of this rule will help us avoid extreme and unreasonable market and operational outcomes. The proposed rule change will enable the CAISO to configure its market software to forego ineffective Economic Bids that would result in unreasonable outcomes and instead, to make more modest adjustments to effective Self-Schedules consistent with prudent grid operation.