

FINAL

**Uneconomic Adjustment Policy for Market Redesign and Technology Upgrade (MRTU)
for Locational Marginal Pricing Scheduling and Pricing Runs**

by

Frank A. Wolak, Chairman

James Bushnell, Member

Benjamin F. Hobbs, Member

Market Surveillance Committee of the California ISO

June 30, 2008

1. Introduction

This opinion comments on the California Independent System Operator's (ISO) proposal for determining the circumstances when and by how much self-schedules, existing transmission rights (ETCs), transmission ownership rights (TORs), ancillary services requirements, and physical characteristics of the transmission network will be relaxed to obtain a feasible day-ahead schedule or real-time operating levels. The ISO summarizes this process as its uneconomic adjustment policy.

As part of the MRTU design process, the ISO made commitments to stakeholders to give priority to existing transmission rights (ETCs), transmission ownership rights (TORs), and self-schedules over economic bids into the day-ahead and real-time energy and ancillary services markets. The ISO had originally stated that it would honor relative priorities between these commitments. Specifically, the ISO had stated that it would exhaust all economic bids and offers first before adjusting any self-schedules. Then the ISO would only adjust ETCs if self-schedule adjustments do not yield a feasible dispatch. Finally, the ISO would only adjust TORs if ETC and self-schedule adjustments do not yield a feasible schedule.

Some of these commitments to honor adjustment priorities are the result of orders by the Federal Energy Regulatory Commission (FERC), while others are the result of compromises among stakeholder groups made during the MRTU market design process. The fundamental point we would like to make in this opinion is that treating these priorities as absolute can result in very large positive and negative locational marginal prices (LMPs) even if suppliers exercise no unilateral market power. Consequently, honoring these priorities as absolute can conflict with the mandate of the Federal Power Act for wholesale markets to set just and reasonable prices. For this reason, the ISO proposes to relax these priorities under certain extreme circumstances in line with reliable grid operation and consistent with reasonable market prices.

We agree with the general principle of the ISO's proposal that it is reasonable to allow relaxation of priority scheduling and operating constraints. These priorities should not be treated as absolute in the day-ahead or real-time market. In particular, these constraints should not be treated as more valuable than meeting customer demand. If these constraints are treated as absolute, the day-ahead market could yield an outcome where demand bid in at the offer cap is reduced to avoid relaxing any of these scheduling constraints to achieve feasible day-ahead schedules. In the real-time market the consequences could be even more extreme. The ISO could

curtail firm load instead of violating one of these constraints. We believe this is inconsistent with any reasonable interpretation of priorities and with existing operating practice. For both of these reasons, we believe that the ISO should have a policy to determine the circumstances when it will relax each of these constraints to avoid these extreme market prices or day-ahead schedules or real-time operating points that create system reliability problems. These circumstances are likely to depend on input fuel prices, the configuration of the transmission network, and the location of generation units.

2. The ISO's Proposal for Uneconomic Adjustment

The ISO's proposal for relaxing the scheduling and operating priorities described above is accomplished through a two-step scheduling and pricing process in both day-ahead and real-time markets. The scheduling process sets penalty parameters for violations of these constraints that are far above the current ISO offer cap or below the offer floor to achieve two goals. The first goal in setting parameters is to ensure that these scheduling and operating priorities will not be relaxed unless there are no economic bids or offers that have a sufficiently high effectiveness factor to relieve the constraint. The second goal is to make the differences between these penalty parameters sufficiently large to ensure that higher priorities will be relaxed less frequently than lower priorities.

If the penalty parameters are not set far above the offer ceiling in the scheduling run, the priorities described above are likely to be adjusted more frequently and to a greater extent when an adjustment occurs than if the parameters are set at a high level. That is because in a locational marginal pricing (LMP) market, whether a supplier's offer is accepted depends not only on the offer price but also on its effectiveness at relieving the constraint. For example, assume a generation unit far from the transmission constraint has an offer price of \$50/MWh and an effectiveness of 0.05 at relieving that constraint. If relaxing an ETC priority on this transmission constraint has an effectiveness of 1.0, then unless the penalty parameter on this ETC priority is greater than $\$1,000/\text{MWh} = \$50/\text{MWh} \div 0.05$ the scheduling run will find it optimal to relax the ETC priority instead of accept the economic offer from a generation unit that has a very low effectiveness. Of course, such a solution might be considered "optimal" from the perspective of the system operator, but as discussed below, this depends upon how much value is placed upon the sanctity of the ETC relative to other system costs.

Similar logic implies that there must be sizeable differences between the penalty parameters in order to ensure that the frequency that higher priority constraints are relaxed is less than the frequency that lower priority constraints are relaxed. For example, if relaxing a self-schedule has a 0.1 effectiveness at relieving a transmission constraint, but relaxing an ETC has a 0.5 effectiveness, then the penalty parameter for ETCs must be at least $5 = 0.5/0.1$ times larger than the penalty parameter for self-schedules in order for the self-schedule to be relaxed to relieve the constraint instead of the ETC.

Once the scheduling run has determined which scheduling and operating priorities will be relaxed and by how much, the ISO proceeds to the pricing run. All uneconomic adjustments from the scheduling run are fixed at the values that came out of the scheduling run, plus some

small positive or negative number to ensure feasibility of the solution and to facilitate the calculation of prices in the pricing run.¹ For example, if a 100 MW ETC is relaxed to 95 MW in the scheduling run, then in the pricing run, the value of the ETC is set to 95 MW minus this small number. All of the penalty parameters are then reset to smaller values closer to or equal to the offer cap and floor for economic bids. The LMP pricing model is then re-run with these penalty parameters and the adjusted scheduling and operating constraints to obtain the LMPs that will be used for settlement. The “new” ETC constraint of 95 MW minus the small positive number used in the pricing run may be binding during the pricing run, but the price impacts of the constraint will be muted by the use of lower penalty parameters.

3. Economic and Market Implications of ISO Proposal

Normally a market process will establish priorities for access to a service or a good based upon the willingness of participants to pay for that service or good. Firms increase the likelihood of purchasing a good or service by increasing the price they bid for it. The problem with this logic in the ISO’s day-ahead and real-time markets under MTRU is that, for a number of reasons, bids into this market are capped at various levels. Furthermore in the case of ETCs or TORs, there may be *no* bids related to the usage of transmission services; rather, the ISO will attempt to honor the full quantity of those rights. The question is then how to interpret the absence of any bid, and in particular how to compare a reservation for a service with no associated bid to a bid placed at the maximum allowable price. Should the absence of a bid be considered as a signal that the user wants to use the transmission system at *any conceivable* cost or that the ISO must respect that right no matter what economic costs are imposed on other market participants? Or should it be interpreted as implicitly a bid at the highest possible (*i.e.*, capped) level? Indeed, network participants could very well value transmission access at a price higher than the bid cap, but the cap prevents them from conveying this preference in the market mechanisms.

The ISO’s proposal essentially sets the default price offers and bids to be used by the market software in the absence of a bid or offer submitted by a market participant. By plugging in a higher default bid for curtailing an ETC than for curtailing a TOR, the ISO is establishing a relative priority between the two sets of market participants. It is also implicitly trading off the usage of those rights with the values implied by other market bids, including bids to consume energy. The choice of bid levels is somewhat arbitrary (just as is the setting of bid caps for market services), but it is necessary to set penalty parameters on these scheduling and operating priorities to ensure there is a feasible solution of the LMP process. Furthermore, those parameters should not be infinite, because we believe it is unreasonable to enforce ETC and TOR constraints with no regard to the cost to the rest of the market.

¹ Technically, the small negative number is needed to ensure that the pricing run yields unambiguous prices. A mathematical condition called “degeneracy” can result in multiple prices if the hard constraint is set exactly equal to the amount of uneconomic adjustment. With the adjustment, it is possible that the amount of uneconomic adjustment in the pricing run will increase by the amount of that adjustment (relative to the scheduling run amount), but the shadow price of the constraint will likely be less than the level of the penalty in the scheduling run. Furthermore, because of numerical round-off issues, setting the pricing run constraint exactly equal to the amount of deviation may result in an infeasibility in the pricing run.

It is important to recognize, however, that the use of separate scheduling and pricing runs distorts the prices coming out of this process and masks the true marginal costs of the choice of default bid parameters. In the scheduling run, the importance of enforcing an ETC is effectively treated as much more important than serving bid-in demand. Even so, it is possible that the ETC could be curtailed somewhat if, as described above, it is extremely effective at relieving a specific constraint.

If it is determined that honoring ETCs is so very important, then why not use the same parameter values in the pricing run? The ISO believes that to do so would yield unreasonable prices. If this is true it implies that the parameters used in the scheduling run are themselves also unreasonable. Specifically, there appears to be a contradiction between the mandate to treat ETCs and other related commitments with such high priority and the mandate to set just-and-reasonable prices.

If it is determined that honoring an ETC or some other scheduling priority is in fact as important as the scheduling parameter implies, then using lower values in the pricing run dampens the price impacts of enforcing those constraints. Such practices are not unheard of in electricity markets – zonal pricing of transmission constraints is but one example – and it is our understanding that other ISOs that use LMP have adopted similar approaches for certain scheduling and operating constraints. However, it is important to recognize that this practice does distort price signals and masks the marginal costs of enforcing these constraints. This, in turn, mutes the incentives for firms to take actions to relieve those constraints. In particular, in the face of prevailing bid caps, holders of ETCs and TORs would not be able to submit market-based bids that reflect the value to them of preserving those schedules (if this value exceeds the prevailing bid cap), while other market participants would have less incentive to “buy out” the holders of the ETCs and TORs.

It is important to note that in most cases, the market participant with the ability to self-schedule or the owner of the ETC or TOR bears little, if any, of the explicit cost of respecting this scheduling or operating priority. On the other hand, there is a potentially high *opportunity cost* of rigidly enforcing such constraints. Other market participants would typically bear the cost of the significantly higher or lower market prices that result from honoring these priorities. For this reason, the ISO would prefer not to set LMPs based on the values of the penalty parameters necessary to enforce these priorities with a high degree of certainty in the priority order specified in the ISO tariff. Consequently, the ISO recommends setting lower (in absolute value) penalty parameters in the pricing run that will produce more reasonable prices in the event that some of these priorities are violated, even after the uneconomic adjustments made in the scheduling run. One reason for doing so is that process for setting the penalties in the scheduling run has not been based on an economic analysis of the societal benefits and costs of curtailing ETCs and TOCs versus self-scheduled load or other constraints. Consequently, it is difficult to develop an economic framework for valuing rights that were created and prioritized based on legal and political processes.

We therefore recognize the appeal of using somewhat arbitrary penalty parameters to make adjustments in the scheduling run in a manner that is generally consistent with the above-

mentioned scheduling priorities that do not greatly alter or increase prices for consumers. Because the penalty parameters for the scheduling and pricing runs that achieve these goals are likely to depend on input fuel prices, the configuration of the transmission network, and the mix of available generation capacity as well as a number of other factors likely to change over time, we believe it is important to give the ISO discretion to adjust these penalty parameters in response to changes in these variables. However, these adjustments should be done through an open and transparent process to balance the competing goals of honoring scheduling priorities and protecting consumers from unjust and unreasonable market prices.

4. Concluding Comments

We believe that it would be unreasonable to treat the schedules of ETCs, TORs, and self-scheduled resources as completely sacrosanct and inviolable. There are many other important constraints, including meeting demand, that need to be balanced in some way. Therefore, the use of finite penalty parameters for allowing such trade-offs is both necessary and consistent with current practices.

However, we also believe that the true impacts of enforcing these constraints will be masked by the use of much higher penalty values in the scheduling run than in the pricing run. Among other problems, this scheduling and pricing run mechanism permits stakeholders to avoid confronting and defining the relative costs of the choices that need to be made between various priorities. We recognize the need to allow a divergence between penalty parameters in the scheduling and pricing run during the initial stages of the MRTU market to protect consumers from unjust and unreasonable prices. We prefer a process in which there is only one combined scheduling/pricing run with one set of parameters that are used to determine both priorities and prices, in which the penalties are based on an agreed upon economic and regulatory rationale for relative marginal values of preserving different schedules. Then prices would provide appropriate incentives for rights holders and market participants to adjust schedules and increase flexibility. As market participants gain greater experience with the MRTU market, we recommend that the ISO take actions to equate the penalty parameters between the scheduling and pricing runs.

We recognize that achieving the proper balance between protecting against unjust and unreasonable prices and shielding market participants from price signals that reflect the benefits that certain generation resources provide to the ISO control area is an extremely complex task. We also recognize that there are great political and legal challenges involved in creating of market mechanisms in an integrated power system in which there are parties with existing rights who for their own reasons do not wish to fully participate in the new markets; as a result of these challenges, practical compromises have been necessary in the form of non-market prioritizations for some parties. However, it is also important to recognize that enforcing the scheduling run parameter imposes costs on the system, even if the price impacts of those costs are muted by the lower pricing-run parameters. We expect that the ISO will have to monitor these impacts, both on the scheduling parties and on other parties, of whatever values are chosen. We encourage the ISO to evaluate both the *cost* and *price* impacts of these choices. This logic supports our recommendation that the process for setting the values of these penalty parameters recognize that

it is extremely unlikely that these parameters can be set once and never again be adjusted. As noted above, many factors that are continually subject to change go into setting the values of these parameters.