

Memorandum

To: ISO Board of Governors
From: Steve Berberich, Vice President, Corporate Services
Mark Rothleder, Principal Market Developer
Date: October 20, 2008
Re: **Deferral of Functionality for MRTU *Go Live***

This memorandum requires Board action.

EXECUTIVE SUMMARY

In preparation for the January 31, 2009 Market Redesign and Technology Upgrade (MRTU) *go live*, Management has determined it is necessary to defer implementation of four non-core features of the MRTU functionality for *go live*. While each of these four features provides flexibility to the market, the complex nature of this functionality posed unanticipated implementation challenges or did not provide the expected value as originally conceived. Management has determined that the consequences of deferring implementation of these features are minimal compared to the risk of not meeting the January 31, 2009 *go live* date if the California Independent System Operator Corporation (the ISO) continues to expend resources towards resolving the implementation challenges it has experienced with these features. Management seeks approval to proceed with the deferment of the following four features: Thus,

- Enforcement of forbidden operating region constraints for generating units in the real-time market;
- Unlimited operating ramp-rate changes for generating units;
- Procurement of incremental ancillary services in the hour ahead scheduling process; and
- Automation of the commitment process for extremely long-start resources.

Over the past several months, Management has endeavored to implement the final MRTU functionality and has succeeded in stabilizing the market simulation environment to provide a rich testing environment for market participants. However, in the ISO's attempts to stabilize the systems, while managing risk to the overall MRTU program, it became apparent that deferment of this functionality is necessary to ensure the features that are supported continue to meet overall policy and operational requirements, in a stable system where performance criteria are achieved. Deferment of each of the four features minimally alters the core functionality under MRTU and does not adversely impact the market.

Forbidden Operating Region

The enforcement of forbidden operating regions through market optimization enables the ISO to ensure feasible schedules and dispatch. Even with this functionality in place in the real-time market, ISO operators will have to, at times, perform exceptional dispatch to move the units through the forbidden operating regions or the resource operator itself can submit a derate/rerate of the resource reflecting the operating

characteristics constraints to deal with the inability to operate during these intervals. The lack of this functionality in the real-time market may increase these actions but only with limited frequency because there are only approximately 53 units with at least a single forbidden operating region. Furthermore, while this functionality is found to be useful for consideration of combined cycling units in the market, it is not as optimal as multi-state modeling, which the ISO has been intending to pursue. The deferment of this functionality enables the ISO to focus its efforts towards modeling combined cycle units, which resource owners also find more optimal. Furthermore, market simulations both with and without this feature, in its current state, have shown that the exclusion of this functionality in the real-time market substantially increases performance and stability of the software. Therefore, Management seeks approval to proceed towards MRTU *go live* without this feature and instead expedite the development and adoption of a multi-state modeling approach that can better support, among other things, the operating characteristics of combined cycling units.

Ramp Rate Change Limitations

The imposition of limitations on changes to operating ramp rates is of very limited impact and market simulation experience reveals that it substantially improves stability and performance of the market functionality. Management is proposing to limit ramp rate changes to no more than a 10 to 1 ratio from one operating range to another within a given time period. Initially the ISO had not anticipated any such limitations were necessary. Market simulation experience, however, has revealed that performance and stability is substantially improved when these ramp rate changes are limited. Even with this limitation, the bulk of the generation fleet available to the ISO will continue to have sufficient flexibility to accommodate operational features of the facilities. Therefore, Management seeks approval to proceed towards *go live* with this limitation in place and will re-evaluate after *go live* whether further limitations or the release of this limitation is necessary.

Incremental Ancillary Services

Market simulation experience, operator review and testing of the software also reveal that, under the existing MRTU functionality, if the ISO were to procure ancillary services in the hour-ahead scheduling process for external resources, it would not have the ability to dispatch the energy from such procured capacity in the real-time market. This is consistent with the timing requirements to deploy such ancillary services reserves (*i.e.*, spinning and non-spinning reserves). Therefore, Management proposes to defer the ability to procure ancillary services from external resources in the hour-ahead process and procure all ancillary services in the real-time unit commitment process which is conducted for each fifteen minute interval for the same trading hour and ensures the ISO can dispatch energy from these resources during that time interval. While this deferral may impede external resources from providing incremental ancillary services in the real-time, this does not substantially change the ISO's ability to procure ancillary services from external resources because the bulk of ancillary services is to be procured in the day-ahead market.

Extremely Long Start Commitment

Finally, earlier this year, the ISO was informed by its vendors that the automated feature for commitment of extremely long start units was not ready for integration into market simulation. The automated feature would have provided the ISO with the ability through its software to commit resources that are otherwise not perceived to be available because their start-up time is outside the optimization time horizon for the day-ahead and real-time markets. Rather than continue to pursue the development of this functionality at the risk of having to possibly forgo other aspects of the MRTU functionality, Management determined that it could accomplish the commitment of these resources through a manual process. Because the ISO will still be able to commit these resources through the manual process, this deferment has little if any impact on the ISO market.

Management has described, discussed and solicited feedback on these deferrals or limitation on software. There was no significant opposition by market participants to these deferrals or limitations. These deferrals or limitations will require changes to the ISO tariff, which Management intends to make at the end of this month.

Motion

Moved, that the ISO Board of Governors approves the proposed deferment and limitations of certain MRTU functionality as detailed in the memorandum, dated October 20, 200;, 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 to effectuate the proposed functionality deferment and limitations.

DISCUSSION OF MRTU FUNCTIONALITY TO BE DEFERRED OR LIMITED

Forbidden Operating Region

Due to stability and performance issues observed during market simulation posed by the enforcement of the forbidden operating regions through the MRTU software in the real-time market and because of the limited impact on the market as a result of deferring, Management is proposing to suspend this functionality for MRTU *go live*. The forbidden operating region functionality is included in MRTU to provide the optimization with information on the operating ranges within which a generating unit can be transitioned, but cannot be dispatched up or down. During market simulation, Management observed that in the real-time market there is significant opportunity for infeasible solutions due to the complex interaction of submitted forbidden operating regions with other conditions such as the requirement to account for ancillary service awards in the day-ahead market, initial conditions inherited from the day-ahead market results, and allowable ranges for regulation ramp-rates. These stability issues related to the use of the forbidden operating region are not observed in the day-ahead market because the day-ahead market is not challenged by the additional constraints faced within the real-time market such as the initial conditions and awarded ancillary services.

Management has also determined that the forbidden operating region functionality is predominantly used by participants as a proxy for transitions in operating states of combined cycle resources, which the MRTU functionality will lack at *go live*. However, the use of forbidden operating regions is not the optimal tool for modeling operational characteristics of combined cycle resources and multi-state modeling would be more appropriate and superior.

Because of the stability issues observed with the use of forbidden operating regions in the real-time market during market simulation and because the better solution for combined cycle resources is multi-state modeling, Management proposes to not enforce the forbidden operating region functionality in the real-time market at the start of MRTU and instead accelerate its efforts to develop and implement a multi-state model. While it is possible that the adoption of multi-state modeling may eliminate the need for the use of forbidden operating regions, at this time this is not certain.

Management anticipates that its administration of resources that have forbidden operating regions will not be significantly different with or without the forbidden operating region functionality in the real-time market. Management has evaluated the suspension of the forbidden operating region functionality and has

determined impacts are not significant and are manageable. There are 61 resources with multi-states, of which, 53 resources have a single forbidden operating region. During a typical day a resource with a forbidden operating region may be expected to transition through the forbidden operating region at least twice a day, once in the upward direction and once in the downward direction. During these transitions, in order to ensure that the resource is taken through the forbidden operating region, there may be a need for either an ISO operator to conduct exceptional dispatch or for the resource operator itself to submit an outage ticket for a re-rate of the resource. Even with the forbidden operating region functionality in place, the ISO operator and resource owners would be required in certain instances to do the same. However, the lack of the forbidden operating regions functionality in the real-time market and the lack of multi-stage modeling could result in additional use of these measures. The ISO already has provisions for exceptional dispatch and the submission of re-rates that would continue to apply as currently contemplated. Moreover, because the ISO market will not include uninstructed deviation penalties at the start of MRTU, in the event a resource is dispatched but cannot perform in its forbidden operating region, the resource will not actually be penalized for not providing energy during such intervals. While such non-performance may impact the real-time market's feasibility to meet imbalanced energy needs, Management has mitigated this short-coming by utilizing the effective ramp rate through the forbidden operating region when dispatching in such region.

Both on the September 19, 2008, daily MRTU market simulation conference call and again at the September 23, 2008, MRTU implementation workshop, Management discussed and requested feedback on the possible suspension of the forbidden operating regions functionality in the real-time market for MRTU *go live*. Southern California Edison (SCE) indicated that the suspension of the forbidden operating region and the proposed implications for dealing with the existence of forbidden operating regions does not differ significantly from the process currently used in the ISO's current operations. SCE, however, expressed the need to ensure that the outages logging process is fully functional to ensure that any increase in the frequency of outages logging caused by the suspension of the forbidden operating regions functionality does not unduly burden the ISO and SCE staff. Management committed to better understand SCE's concerns and attempt to address any issues regarding logging that causes an issue for this process. Calpine, who has a significant fleet of combined cycle resources, expressed concern about the amount of coordination necessary to manage their fleet. Management believes that Calpine's concerns are better addressed by accelerating the multi-state modeling approach because of the limitations of the forbidden operating region functionality in dealing with combined cycle resources. Calpine has expressed that while the suspension of the forbidden operating regions functionality is not ideal for their purposes, they are encouraged by the acceleration and focus on the multi-state modeling as a result of this change. Other participants such as Pacific Gas & Electric (PG&E) and Northern California Power Agency (NCPA) requested that the ISO perform and provide an impact assessment, which Management has in part conducted, the results of which are as discussed above.

Management anticipates that the multi-state modeling functionality may be ready for implementation approximately six to nine months after MRTU *go live*. The suspension of the forbidden operating region functionality in the real-time market for *go live* will require certain changes to the ISO MRTU tariff which currently contemplates that the forbidden operating regions will be observed and honored by the optimization. Prior to implementing the multi-state functionality, Management will evaluate the need for both the multi-state modeling and forbidden operating regions through a stakeholder process. Management will then inform the ISO Board of Governors (the Board) of the results of this process and whether both the multi-state modeling and forbidden operating region functionality are necessary. Management will then request approval of any required tariff changes with the Federal Energy Regulatory Commission.

Ramp-Rate Changes Limitations

Due to stability issues observed during market simulation resulting from the wide range of ramp rate changes submitted by market participants, Management is proposing to limit the number of changes from one operating range to another. Under the current MRTU functionality, participants are not restricted in the ramp-rate changes they can submit within any time period. Market simulation has demonstrated that large changes in ramping capability from one operating range to another operating range for generating units has resulted in degradation of the solution performance. This degradation can affect the ISO's ability to meet market runs and posting of results timelines. Management has conducted a significant amount of testing on this issue to see the impact unencumbered ramp rate changes could have and it has determined that performance and stability of the market runs could be substantially improved if operational ramp-rate changes are limited to no more than a 10 to 1 ratio from one operating range to the next operating range. For example, this limitation would require that if a resource has a ramp-rate of 10 MW/minute for the operating range of 0 MW to 20 MW and a ramp-rate of 0.5 MW/minute for the operating range from 20 MW to 30 MW, the ramp-rate from 20 MW to 30 MW would be modified to be at least equal to 1 MW/minute.

The 10 to 1 ramp rate ratio limitation will be implemented internal to the integrated forward market and real-time market software. In the event scheduling coordinators submit ramp-rate changes that exceed the 10 to 1 ratio, the ISO will modify lower ramp-rate upwards of submitted ramp rates so that they are within the 10 to 1 ratio.

On September 19, 2008 on the daily MRTU market simulation call and again on September 23, 2008 at the MRTU implementation workshop, Management discussed and requested feedback on its proposal to enforce the ramp-rate rule limitation. Market participants were familiar with the issue because Management had previously discussed the difficulties it observed with the large change in ramp-rates submitted previously. Market participants did not express opposition to proposed adoption of the ramp-rates limitation. NCPA and SCE both asked if the ISO would be informing the participants via SIBR when the ramp-rates were modified as a result of this limitation. Management indicated that since a clear rule is being applied and the fact that the modification has to be performed based on the last available ramp-rate curve provided via either scheduling infrastructure and business rules system or the outages, rerates and derates submission process, there was no means for the ISO staff to inform the participants of the ramp-rate modification that might occur.

Other participants to the conference call and implementation meeting asked whether the ISO would relax or limit further the magnitude of ramp-rate changes. The current tariff provisions do not have any limitations on the ramp-rate changes and in order to effectuate this limitation, Management proposes to make changes to the bid submission and validation rules that would effectuate this limitation. Management will continue to evaluate stability and performance of the MRTU systems and will allow further relaxation of this limitation after thorough testing of a wide range of conditions. Management recognizes that significant flexibility on ramp-rate changes can impact prices. However, the proposed ramp-rate limitation is intended to address the system stability and performance challenges observed during market simulation and not the concern that the ramp rate changes are causing pricing issues. Management and the Department of Market Monitoring will, however, continue to investigate the impact flexible ramp-rate changes have on prices and if necessary will consider additional ramp-rate limitations. Management also proposes to re-evaluate the need to eliminate or increase the proposed ramp-rate limitation six months after *go live* and will review the outcome of this process with stakeholders. Management will then inform the Board of Governors of the outcome and make any necessary filings with the Federal Energy Regulatory Commission to effectuate those changes.

Incremental Ancillary Services

Due to software limitations revealed during market simulation, Management proposes to procure any required incremental ancillary services (spinning and non-spinning operating reserves) after the day-ahead market from external resources in the fifteen minute real-time unit commitment process for the same trading hour as opposed to the hour-ahead scheduling process, as previously contemplated. Through market simulation and further evaluation of the MRTU functionality, Management determined that the current software design prevents the ISO from dispatching the energy from resources awarded ancillary services in the hour-ahead when necessary in the real-time. In order for external resource capacity procured in the hour-ahead to be effective as operating reserves in the real-time, the ISO must be able to dispatch energy from such reserves within 10 minutes. Because the hour-ahead procurement cannot ensure that only such dispatchable external resources are awarded ancillary services in the hour-ahead process, the ISO can only procure incremental ancillary service capacity from external resources in the real-time unit commitment process, which will procure ancillary services on a 15-minute basis within the current real-time market for the given trading hour.

Management has determined that the deferral of this functionality does not unduly burden the ISO market. Management recognizes that deferral of this functionality may raise some impediments for some external resources to offer incremental ancillary services at the interties in real-time, but because the bulk of ancillary services is procured in the day-ahead market, the ISO will continue to have access to ancillary services at the interties and external resources will continue to have the ability to sell ancillary services into the ISO market. Moreover, Management proposes to retain the ability to procure ancillary services in the real-time for any incremental ancillary services needed through the real-time unit commitment process, and further proposes to modify its practice so that non-dynamic external resources can also participate in this process so long as energy from such resources is dispatchable within the ten minutes based on the definition of the ancillary services being provided. This will ensure that the resources awarded such capacity will be dispatchable for energy and useful as operating reserves.

On September 23, 2008 at the MRTU implementation workshop, Management described the limitation related to ancillary services from external resources. No significant opposition to this limitation has been raised by market participants. Powerex expressed concern that this may limit their ability to offer additional ancillary services after the day-ahead market because they will not know with any certainty how much they will be awarded until fifteen minutes ahead of when the ancillary service is needed. To address the concern that there is not enough time to obtain the appropriate external capacity during this time frame, Management has suggested that participants that intend to sell ancillary services into the market adapt their practices to meet this new timeline for the temporary suspension of procurement of ancillary services in the hour-ahead process.

Because the tariff currently contemplates that incremental ancillary services from external resources may be procured in the hour-ahead process and the real-time unit commitment process, Management will be required to submit proposed tariff changes with the Federal Energy Regulatory Commission that eliminates the ability to procure ancillary services in the hour-ahead process. Management anticipates that the ISO will be able to revert to hour-ahead procurement of ancillary services six to nine months after *go live*. Prior to implementing this reversion Management will conduct a stakeholder process and will inform the Board of the outcome of this process. At such time, Management will again make any necessary tariff changes to implement the outcome of that process

Extremely Long Start Commitment

Extremely long start resources are resources with start times longer than 18 hours and therefore require commitment decisions be made prior to the normal day-ahead market timeline in order to ensure the resources is online when operationally necessary. In order to concentrate efforts on the main market functional features of the day-ahead and real-time market applications, Management proposes to defer development of an automated process for making commitment decisions for extremely long start resources and instead will make extremely long start decisions manually based on good utility practice considering bids, start-up and minimum load costs from resources that have submitted bids.

Because there are so few resources that qualify as extremely long start resources, Management believes that there is minimal impact to market efficiency and no adverse effect on reliability. The manual process will ensure that the resources will get committed if necessary.

In previous months and then again in its September 23, 2008 monthly implementation meeting, Management discussed the need to defer automated process for making extremely long start decision with stakeholders for several months. The main stakeholder feedback consisted of requests for clarification on how bids for extremely long-start resources will be treated when they are submitted into the day-ahead market. Management has provided participants this clarification and will make necessary changes in the ISO tariff to effectuate this manual process.

ISO staff discussed the proposed tariff language with stakeholders on October 17, 2008. The one concern that was raised was in connection with the requirement that any extremely long start resources receiving commitments two days in advance of the operating day to resubmit the same bid in the next day's day-ahead market. ISO staff explained that this represented no change from the proposed automated process which would have utilized the same bids as the manual process to commit resources two days out and for consideration in the next day's day-ahead market.

After *go live*, and prior to developing an automated process, Management proposes to conduct a stakeholder process to determine whether the automated process should be developed. Management will then inform the Board of the outcome of this process.