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October 31, 2008

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: California Independent System Operator Corporation

Docket No. ER09-____-000

Pursuant to Section 205 of the Federal Power Act ("FPA"), 16 U.S.C. § 824d, the California Independent System Operator Corporation ("CAISO") hereby submits for Federal Energy Regulatory Commission approval an amendment to the CAISO Market Redesign and Technology Upgrade ("MRTU") Tariff.¹ This amendment is necessary in order to defer the availability of four non-core features of MRTU that provide minimal benefits to the CAISO Markets and, due to implementation challenges, could interfere with successful implementation of MRTU were the CAISO to continue its efforts to include this functionality in the overall MRTU design at MRTU *go live* on February 1, 2009. This amendment defers availability of the following four features of the MRTU Tariff as originally filed:

- Enforcement of Forbidden Operating Region constraints for generating units in the Real-Time Market;
- Unlimited Operational Ramp Rate changes for generating units;
- Procurement of incremental Ancillary Services in the Hour-Ahead Scheduling Process; and

¹ Capitalized terms not otherwise defined herein have the meanings set forth in the Master Definitions Supplement, Appendix A to the CAISO Tariff, and in the Operations Agreement.

- Automation of the commitment process for Extremely Long-Start Resources.

Over the past several months, the CAISO has been preparing to implement MRTU. In the CAISO's attempts to stabilize the MRTU systems, while managing risk to the overall MRTU program, it has become apparent that deferral of these four features is necessary to ensure that the other supported MRTU features continue to meet overall policy and operational requirements in a stable system that meets performance criteria. Deferral of these four features minimally alters the core functionality of MRTU and has no adverse impact on the MRTU markets. The amendment therefore removes these features from the MRTU Tariff pending further evaluation of their benefits and development of the necessary software.

I. BACKGROUND AND PURPOSE OF AMENDMENTS

A. The Deferred MRTU Features

1. Enforcement of Forbidden Operating Region Constraints in the Real-Time Market.

Forbidden Operating Regions consist of a resource's operating ranges through which the resource can transit but within which it cannot operate in a manner such that it can be dispatched up or down with stability. The CAISO Tariff currently provides that the Real-Time Market software will not dispatch a Generating Unit within its Forbidden Operating Region in the Real-Time Market, except for ramping through the Forbidden Operating Region. This software feature was included in MRTU so that the CAISO Market optimization software would be sensitive to operating characteristics submitted by operators of generating units regarding Forbidden Operating Regions. This Forbidden Operating Region software feature would essentially ensure that the resource is not dispatched up or down by the CAISO Market optimization within an operating range that is unstable, *i.e.*, prior to transiting all the way through the Forbidden Operating Region. As explained more fully below, however, the inclusion of this software feature in the Real-Time Market is causing performance and stability issues. Therefore, the CAISO is proposing to defer the implementation of this software or an alternative feature in the Real-Time Market until a later time.

During market simulations over the summer of 2008, the CAISO observed that in the Real-Time Market there is significant opportunity for the CAISO optimization software to result in infeasible optimization solutions due to the complex interaction of the Forbidden Operating Region information provided by operators of generating units with other conditions that the Real-Time Market is required to consider. These other conditions consist of additional constraints inherited by the Real-Time Market such as Ancillary Service awards in the Day-Ahead Market, initial conditions produced by the Day-Ahead Market results or the Energy Management System telemetry, and the allowable ranges for Regulation

Ramp-Rates provided by the resources' operators. This infeasibility leads to a lack of dispatch and pricing results not just for resources with Forbidden Operating Region, but for all resources. These same issues do not arise in the Day-Ahead Market because the optimization of the Day-Ahead Market does not have to take into account such constraints.

It is also apparent that the Forbidden Operating Region feature is predominantly used by generating units as a proxy for information regarding the changes in the operating state of combined cycle resources that require more advanced multi-state modeling in the optimization process. The CAISO recognizes that the Forbidden Operating Regions feature is not the optimal tool for modeling the full set of operational characteristics of combined cycle resources. Rather, the more optimal approach for modeling combined cycle resources is a multi-state modeling approach that gives the commitment and dispatch software the ability to better reflect the additional complexities presented by units like combined cycle units that have multiple stages of operational capability.

The CAISO had been planning to develop the multi-state functionality as a future enhancement, approximately two years after MRTU *go live*. The timeline for implementing such a multi-state model, however, was uncertain due to the limited development and actual implementation of such a multi-state model by vendors and other operating entities. However, in the interim, technology used by other operating entities has progressed significantly, and the CAISO hopes to leverage its own development of multi-state modeling with such technology. Therefore, because the CAISO recognizes the superiority of the multi-state modeling approach, and because of the need to defer the Forbidden Operating Region software feature, the CAISO has already accelerated its efforts to develop and implement the multi-state modeling functionality after MRTU *go live*.

While the CAISO recognizes that the deferral of this software feature does change the landscape for Market Participants somewhat, the CAISO anticipates that the treatment of resources that have Forbidden Operating Regions in the Real-Time Market will not be significantly different in the absence of this software feature. The impact should be manageable because the CAISO and participants can take alternative actions to mitigate this impact and the number of units affected by forbidden regions in the first place is limited. Such actions are the same practices used for dealing with Forbidden Region under current operating practices and therefore the CAISO and participant operators are very familiar with the actions that must would continue to have to be taken under MRTU.

More specifically, the CAISO notes that in its available fleet of over 800 generating resources, there are only 61 resources with Forbidden Operating Regions, of which 53 resources have only one. Operational experience shows that, during a typical day, a resource with a Forbidden Operating Region may be expected to move through the Forbidden Operating Region at least twice, once in

the upward direction and once in the downward direction. Therefore, the number of resources this affects is already a limited number.

It is important to note also that the absence of the Forbidden Operating Region software feature does not significantly alter CAISO's operating requirements under MRTU. The CAISO must have tools in place to address the fact that these resources have Forbidden Operating Regions whether or not the software feature is implemented because, with or without the software feature, the CAISO is required to take action to move such resources once they are dispatched through a Forbidden Operating Region. The software feature would only have allowed the CAISO to avoid dispatching a resource up or down from within a Forbidden Operating Region. The Forbidden Operating Region feature would not have prevented the CAISO from dispatching a resource back through the forbidden region just after transiting the forbidden region. Resources with Forbidden Operating Regions have "hold-times" that must be imposed for stability. For example if the unit is required to pass through a Forbidden Operating Region in the upward direction, the unit must then stay above the Forbidden Operating Region for the specified amount of time. Even with the Forbidden Operating Region software feature in place, the CAISO operator or resource operator must take specific actions to enforce these hold times. In other words, during such operational transitions, as it does today, the CAISO, will be required under MRTU to constrain the resource to deal with the hold-times after transiting a Forbidden Operating Region, with or without the subject software feature. The enforcement of these hold-times to constrain the units can be accomplished either by the CAISO through the use of Exceptional Dispatch or by the resource operator itself through an outage ticket for a re-rate of the resource to constrain the resource.

The CAISO recognizes that without the software feature, because it is more likely that dispatch instructions will be issued to dispatch a resource up or down within a region, there is a potential for an increase in the number of such constraining actions the CAISO or the resource operator might have to take. But the more likely difference is that without the software feature, the timing of such operator actions may need to change. For example, because with the software feature in place resources that have such Forbidden Operating Regions would still be dispatched, the CAISO or the resource operators would have to take action to move the resources through the region by dispatching them up to the next operating levels. This action may consist of the issuance of an exceptional dispatch for the resource to move them through the region or a submission of a re-rate outage ticket by the resource owner to move themselves through the region. In contrast, without the software feature in place, the same resource may be dispatched when actually in a Forbidden Operating Region range by the software, in which case the CAISO or the resource operator has to take action to move the resource in or out of the Forbidden Operating Region. Again the same actions might have to be taken by the CAISO operator or the resource operator to move the resource out of the Forbidden Operating Region.

In any case, given the limited number of resources in the fleet that have such regions, the CAISO does not anticipate a substantial increase in the incidence of Exceptional Dispatches as a result of removing this software feature. The CAISO also notes that because of the limited effectiveness of the Forbidden Operating Regions in dealing with the multi-state operational features of the combined cycle resources, the lack of multi-stage modeling may in and of itself be considered to be the more likely cause for the need to use Exceptional Dispatch in the first place. The CAISO intends to remedy this deficiency by accelerating its efforts to implement multi-state modeling.

The CAISO recognizes that there are implications for non-performance by generation facilities; however these implications are not aggravated by the lack of the Forbidden Operating Region functionality because the CAISO intends to use the same implicit ramp-rate as derived from the forbidden region transit time. If a unit with a Forbidden Operating Region is dispatched the unit may go through a period of non-performance due to its Forbidden Operating Region. As discussed above, the inclusion of the Forbidden Operating Region does not prevent the CAISO from dispatching a unit with a Forbidden Region but only from Dispatching it within a Forbidden Operating Region.

During its discussions with stakeholders regarding the need to defer implementation of this software feature at the start of MRTU, CAISO also discussed with its participants the settlement implications of the existence of Forbidden Operating Regions and how, if at all, these would change with the lack of the software feature. The CAISO does not propose to make any changes to the settlement provisions in light of the deferred functionality because the settlement implications fall out of the actions the parties take to deal with the Forbidden Operating Region, which would be required even with the software feature in place. In the first instance, resources that are constrained only as a result of Forbidden Operating Regions and are not marginal do not set LMP. As discussed above, in order to deal with the existence of the Forbidden Operating Regions, the CAISO may have to itself initiate the constraint of a resource for reliability dispatch and if so it would do so through the use of Exceptional Dispatch. Because excluding this software feature does not change the fact that the market must deal with the existence of these Forbidden Operating Regions, CAISO does not propose any changes to the Exceptional Dispatch payment construct currently under consideration by the Commission in Docket No. ER08-1178. Similarly, in the event that the Scheduling Coordinator initiates constraint of a resource to reflect operational characteristics through the use of the submission of a outages re-rate/derate card, or normal card, then resource will continue to be paid for such energy as currently contemplated, i.e., re-rate imbalance energy is paid LMP pursuant to Section 11.5.1. Also, all resources committed by the CAISO are eligible for bid cost recovery over the time periods they are committed by the CAISO. However, Exceptional Dispatch or derate energy settled pursuant to section 11.5.6, the resource will not receive the bid cost recovery. (See Section 11.8.4).

Therefore, in light of the stability issues observed with the use of Forbidden Operating Region feature in the Real-Time Market during market simulation, and because of the minimal impact of the absence of the Forbidden Operating Region feature, the CAISO proposes to defer implementation of the Forbidden Operating Region feature in the Real-Time Market. In addition, because the better solution for combined cycle resources is multi-state modeling, given that CAISO would be implementing MRTU without the Forbidden Operating Region functionality in the Real-Time Market, the CAISO believes it is appropriate to accelerate its efforts to develop and implement a multi-state model.

The CAISO anticipates that the multi-state modeling functionality may be ready for implementation approximately six to nine months after MRTU *go live*. The development of such functionality requires a stakeholder process to determine the appropriate design, which the CAISO is already preparing to undertake later this year or early 2009. While it is possible that the adoption of multi-state modeling may eliminate altogether the need for the use of Forbidden Operating Regions, this will be evaluated through the stakeholder process the CAISO will conduct in developing its multi-state modeling approach. Any resulting proposed amendments will then be submitted to the CAISO Board of Governors and the Commission for approval.

2. Unlimited Operational Ramp Rate Changes for Generating Units.

The MRTU Tariff requires a Scheduling Coordinator to provide a resource's Operational Ramp Rate as part of an energy bid. Under the current MRTU functionality four ramp-rate segments can be modeled and up to two Forbidden Operating Regions. An aggregate ramp-rate curve made up of the Operational Ramp Rate and Forbidden Operating Regions is created by the CAISO based on the information submitted by the Scheduling Coordinator with the bids. The current MRTU provisions that govern the submission of Operational Ramp Rates to the CAISO do not impose any limits on the magnitude of changes in the Operational Ramp Rate. Due to performance issues observed during market simulation, the CAISO is proposing limiting the magnitude of changes in the Operational Ramp Rates that can be submitted at MRTU *go live*.

During market simulations, the CAISO observed that when units submit Operational Ramp Rates that have a large magnitude of changes in ramping capability from one operating range to another, there is a significant degradation in the ability for the software to obtain a market solution. Most significantly, such large changes could prevent the CAISO from meeting deadlines for market runs and the posting of results because such degradation erodes the performance of the software.

Based on market simulation results and consultation with participants, the CAISO concluded that the performance of the market runs are substantially improved if Operational Ramp Rate changes are no more than a 10 to 1 ratio from one operating range to the next operating range. The proposed amendments therefore establish a maximum 10 to 1 ratio for such changes. For example, such a 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 would be implemented in a manner internal to the CAISO's software. In the event Scheduling Coordinators submit Operational Ramp Rate changes that exceed the 10 to 1 ratio, the CAISO will modify lower Operational Ramp Rate upwards so that they are within the 10 to 1 ratio.

During market simulation, it also became apparent that multiple ramp-rate changes are being used by participants to address constraints of combined-cycle resources. Therefore, the acceleration of the multi-state modeling development is expected to also better deal with these issues raised by combined cycle resources.

The CAISO will continue to evaluate performance of the MRTU systems and will consider further relaxation of the limitation on Operational Ramp Rate changes after thorough testing under a wide range of conditions. The CAISO also proposes to re-evaluate the need to eliminate or relax the proposed Operational Ramp Rate limitation six months after MRTU implementation and will hold a stakeholder process to determine whether to eliminate the currently proposed limitation or impose additional limitations. Any resulting proposed amendments will then be submitted to the CAISO Board of Governors and the Commission for approval.

3. Procurement of Incremental Ancillary Services in the Hour-Ahead Scheduling Process.

Under current MRTU tariff provisions, the CAISO may procure Ancillary Services from resources internal and external to the CAISO Balancing Authority Area through the Day-Ahead Market, Hour-Ahead Scheduling Process ("HASP"), and the Real-Time Market.² Under the current MRTU Tariff, the HASP is designed to determine the optimal mix of Ancillary Services from internal resources, dynamic external resources, and non-dynamic external resources for the next Trading Hour. In the HASP, however, only the Ancillary Services

² In the IFM, the CAISO is required to procure Ancillary Services to meet one hundred percent (100%) of the CAISO Forecast of CAISO Demand requirements. However, if changes in forecasts of Demand and resource outages occur after the Day-Ahead Ancillary Service Awards are established, the CAISO may procure additional Ancillary Services to meet any additional requirements to meet Reliability Criteria.

Awards to non-dynamic external resources are binding and cleared for settlements purposes. Dynamic external resources and resources within the CAISO Balancing Authority Area designated in the HASP to provide Ancillary Services for the next Trading Hour are given non-binding advisory Awards, as CAISO would re-optimize the use of such by the subsequent Real-Time Unit Commitment that is run closer to the time the Ancillary Service will actually be needed. In addition, external resources awarded Ancillary Services (Operating Reserves) in HASP must be dispatchable for Energy in the Real-Time. Due to software limitations that prohibit the CAISO from determining that the resources awarded Ancillary Services in the HASP are dispatchable on a ten-minute basis in the real-time, the proposed amendment will require that after the Day-Ahead Market, all incremental Ancillary Services be awarded through the fifteen minute Real-Time Unit Commitment process of the Real-Time Market in any given Trading Hour as opposed to on an hour-ahead basis.

Through market simulation and further evaluation of the MRTU functionality, the CAISO determined that the current software design prevents the CAISO from Dispatching Energy when necessary during Real-Time from non-dynamic external resources that would be awarded Ancillary Services in the HASP. If the CAISO were to continue to procure Ancillary Services from external resources in the hour-ahead through the HASP, the CAISO would be procuring Ancillary Services from resources from that when the next hour occurs are no longer dispatchable for the energy required for the Operating Reserves. This would render the procured and paid for Operating Reserves useless for the CAISO in the Real-Time.

Consequently, it is important to limit procurement of incremental Ancillary Service capacity to the 15-minute Real-Time Unit Commitment process, which procures Ancillary Services for the given fifteen minute time period in a given trading hour. The Real-Time Unit Commitment process only awards Ancillary Services from external resources that are dispatchable for energy during the applicable Real-Time Unit Commitment time horizon, ensuring that the CAISO can dispatch energy from external resources awarded Ancillary Service in that fifteen minute time period. The proposed amendments eliminate all use of the HASP for the purposes of procuring Ancillary Services and eliminates any requirement that the CAISO determine the optimal mix of Ancillary Services from internal and external resources in the HASP.

The CAISO has concluded that the deferral of this functionality will not unduly burden the CAISO markets. Although this deferral may raise some impediments to the ability of non-dynamic external resources to offer incremental Ancillary Services at the Interties in the hour-ahead time period, the bulk of Ancillary Services, from internal or external resources, is procured in the Day-Ahead Market. The CAISO will, therefore, 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 CAISO markets.

Moreover, the CAISO maintains the ability to satisfy incremental Ancillary Services requirements in the Real-Time Market through the Real-Time Unit Commitment. As previously contemplated, only dynamic external resources (*i.e.*, those that can submit Dynamic Schedules) could participate in the Real-Time Unit Commitment procurement for the given trading hour. In order to lessen the consequences of the deferral of HASP Ancillary Services procurement on non-dynamic external resources, the CAISO further proposes to allow non-dynamic external resources that are registered and certified to provide the specific Ancillary Service as required by the CAISO tariff, to participate in the Real-Time Unit Commitment if Energy from such resources is Dispatchable within the ten minutes, based on the definition of the Ancillary Services being provided.

The CAISO anticipates that it will be able to revert to hour-ahead procurement of Ancillary Services six to nine months after MRTU *go live*. The CAISO will conduct a stakeholder process to consider the reversion to procurement of Ancillary Services in HASP. Any resulting proposed amendments will then be submitted to the CAISO Board of Governors and the Commission for approval.

4. Automation of the Commitment Process for Extremely Long-Start Resources.

The MRTU Tariff currently provides for the automatic optimal multi-day commitment of Extremely Long-Start Resources through the Security Constrained Unit Commitment software. Extremely Long-Start Resources are resources with startup times longer than 18 hours. These resources require commitment decisions prior to the normal Day-Ahead Market timeline in order to ensure that the resource is online when operationally necessary.

The CAISO has not yet been able to develop the functionality within the Security Constrained Unit Commitment software for the automatic commitment of Extremely Long-Start Resources. In order to focus efforts on the primary features of the Day-Ahead and Real-Time Market applications in preparation for MRTU implementation, the CAISO months ago stopped pursuing the development of an automated process for making commitment decisions for Extremely Long Start Resources. Instead, the CAISO proposed to make Extremely Long Start Resource decisions through a manual process 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, the CAISO believes that the use of a manual process will have a minimal impact to market efficiency and no adverse effect on reliability. The manual process will ensure that the necessary resources will be committed.

After MRTU implementation, and prior to developing an automated process, the CAISO proposes to conduct a stakeholder process to determine

whether the automated process should be developed. Any resulting proposed amendments will then be submitted to the CAISO Board of Governors and the Commission for approval.

B. Stakeholder Process

1. Enforcement of Forbidden Operating Region Constraints in the Real-Time Market.

The CAISO has discussed the deferral of the Forbidden Operating Region feature with stakeholders and has attempted to address concerns raised. Both on the September 19, 2008 daily MRTU market simulation conference call and again at the September 23, 2008 MRTU implementation workshop, the CAISO discussed and requested feedback on the possible suspension of the Forbidden Operating Regions feature in the Real-Time Market. Southern California Edison (“SCE”) indicated that the suspension of the Forbidden Operating Region and the proposed alternative methodology for addressing Forbidden Operating Regions does not differ significantly from the process used in the CAISO’s current operations. SCE, however, believes that it is necessary to ensure that the outages logging process is fully functional in order to prevent any increase in the frequency of outages logging caused by the absence of the Forbidden Operating Regions feature from unduly burdening the CAISO and SCE staff. The CAISO has committed to ensure that the logging do not pose a problem for SCE or other Market Participants.

Calpine, who has a significant fleet of combined cycle resources, expressed concern about the amount of coordination necessary to manage their fleet. The CAISO believes that Calpine’s concerns are best addressed by accelerating the multi-state modeling approach, as discussed above. Calpine indicated that while the suspension of the Forbidden Operating Regions feature is not ideal for their purposes, they are encouraged by the acceleration and increased focus on the multi-state modeling that will result from this change.

Other participants such as Pacific Gas & Electric and Northern California Power Agency requested that the CAISO perform and provide an impact assessment. The results of that assessment are in part discussed above. The CAISO will continue to observe the performance of the CAISO Markets and the implications of the lack of this functionality throughout the remaining market simulation and will seek to mitigate any adverse impacts discovered through this process.

2. Unlimited Operational Ramp Rate Changes for Generating Units.

On September 19, 2008, on the daily MRTU market simulation call, and again on September 23, 2008 at the MRTU implementation workshop, the CAISO discussed and requested feedback on its proposal to limit the magnitude

of Operational Ramp-Rate changes. The CAISO had previously discussed the difficulties it observed with the large changes in Operational Ramp Rates. Market participants did not express any significant opposition to proposed adoption of the Operational Ramp Rates limitation. Certain stakeholders inquired whether the CAISO would relax or limit further the magnitude of Operational Ramp Rate changes. The CAISO believes the proposed limitations are appropriate for MRTU *go live* and has committed to a stakeholder process to discuss any such changes after MRTU *go live*. The CAISO notes that although the proposed Operational Ramp Rate change limitation is intended to address the system stability and performance issues observed during market simulation, the significant flexibility on Operational Ramp Rate changes as previously contemplated may affect prices because such flexibility poses as an additional constraint on the market optimization. While the proposed limitation was initially considered because of the performance issues observed in market simulation, the CAISO will continue to evaluate the impact flexible Operational Ramp Rate changes have on prices and, if necessary, will propose additional Operational Ramp Rate limitations at a later time.

3. Procurement of Incremental Ancillary Services in the Hour-Ahead Scheduling Process.

On September 23, 2008, at the MRTU implementation workshop, the CAISO described the limitation related to Ancillary Services from System Resources. Market Participants raised no significant objections. Powerex Corporation expressed concern that this may limit its ability to offer additional Ancillary Services after the Day-Ahead Market because it will not know with any certainty how much Ancillary Services they will be awarded until fifteen minutes ahead of when the Ancillary Service is needed. The CAISO, however, believes that Market Participants can adapt their practices such that they should be able to meet the new timeline without too much difficulty. For example, the CAISO contemplates that Powerex should be able to obtain sufficient access to intertie capacity in the Real-Time based on its knowledge of how much Ancillary Services it is likely to be awarded based on past awards.

4. Automation of the Commitment Process for Extremely Long-Start Resources.

The CAISO discussed the need to defer automated commitments for Extremely Long-Start Resources with stakeholders for several months, including at its September 23, 2008 monthly implementation meeting. The CAISO discussed the proposed tariff language with stakeholders on October 17, 2008. The one concern that was raised was in connection with the requirement that 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. CAISO staff explained that this represents no change from the proposed automated process, which would have used the same Bids as will the manual

process to commit resources two days out and for consideration in the next day's day-ahead market.

II. Deferred Items Amendments.

In order to implement the deferral of the four features, this amendment proposes the following revisions to the MRTU Tariff:

A. Deferral of Enforcement of Forbidden Operating Region Constraints in the Real-Time Market.

- Current section 34.15.1(b) of the MRTU Tariff prohibits the Dispatch through SCED of resources within their Forbidden Operating Regions, except for ramping. Section 34.15.1(b) is revised to provide only that the implicit ramp rate as determined from the resource's transit time will be used when Dispatching in the Forbidden Operating Region even if the Forbidden Operating Region constraint is not enforced through the SCED process.
- Section 34.19.2.3, which addresses eligibility to set the Locational Marginal Price, is revised to remove references to constraints when a resources is operating in its Forbidden Operating Region.

B. Deferral of Unlimited Operational Ramp Rate Changes for Generating Units.

- Section 30.7.7 governs the format and validation of operational ramp rates. A new subsection (i) is added to limit the amount of change in Operational Ramp Rates to a maximum of a 10 to 1 ratio, and to provide that any higher ramp-rate producing a higher ratio will be adjusted to achieve the 10 to 1 ratio. The revision also provides that the adjustment will include the implicit ramp rate in the Forbidden Operating Region.

C. Deferral of Procurement of Incremental Ancillary Services in the Hour-Ahead Scheduling Process.

- Sections 8.1, 8.2.3.1, 8.2.3.2, 8.3.1, 8.3.2, 8.3.3.3, 8.3.5, 8.3.7, 8.6.2, and 8.7 all address aspects of the procurement of Ancillary Services. They are all revised to delete reference to procurement of Ancillary Services in the HASP.
- Section 11.10.1.2 currently governs prices for Ancillary Services procured from external resources (System Resources) in the HASP. It will be deleted because all Ancillary Services from all System Resources after the Day-Ahead will be procured through the Real-Time Unit Commitment Process.

- Section 30.7.6.2 establishes procedures for treatment of Ancillary Services Bids. It is revised to remove references to the HASP.
- Current section 33.7 provides for the optimization of the procurement of incremental Ancillary Services in the HASP and for binding Ancillary Services Awards to System Resources. Section 33.7 is deleted.
- Section 33.8 currently governs HASP Prices for HASP Intertie Schedules and HASP Ancillary Services Awards. It is revised to delete those portions governing HASP Ancillary Services Awards.
- Section 34.2.2 addresses Real-Time procurement of Ancillary Services. It is revised to eliminate references to Ancillary Services procured in the HASP. It is also amended to establish procedures for the determination of 15-minute prices for Ancillary Services procured at the Interties.
- Section 34.3 governs Real-Time Dispatch. It is amended to eliminate the requirement that Real-Time Dispatch maintain required Ancillary Services quantities for the next binding target interval (*i.e.*, those quantities that would previous have been procured from System Resources in the HASP).
- Section 34.13 addresses the treatment of Resource Adequacy Capacity in the Real-Time Market. It is revised to remove references to Ancillary Services procured through the HASP.

D. Deferral of Automation of the Commitment Process for Extremely Long-Start Resources.

- Section 27.4.1 addresses Security Constrained Unit Commitment and currently provides that Security Constrained Unit Commitment will be used to Dispatch Extremely Long-Start Resources. It is revised to provide that the CAISO will Dispatch Extremely Long-Start Resources pursuant to section 31.7.
- Section 31.3 governs the Integrated Forward Market. It is revised to eliminate the requirement that the IFM process treat commitments of Extremely Long-Start Capacity as binding and model such capacity as capacity that the resource is under a contractual obligation to provide.
- Section 31.5.1.1 governs eligibility for participation in the Residual Unit Commitment process. It is revised to eliminate the requirement that the Residual Unit Commitment model commitments of Extremely Long-Start Capacity as capacity that the resource is under a contractual obligation to provide.

- Sections 31.7 and 31.7.1 describe the Extremely Long-Start Commitment process and the use of the Security Constrained Unit Commitment software in that process. They are combined into a single section to describe the manual commitment of Extremely Long-Start Resources. The revised section provides that after the Day-Ahead Market results are posted the CAISO will perform the Extremely Long-Start Commitment Process to determine commitment of ELS Resources to be available to the CAISO Markets in the second day out. The CAISO will use forecast Demand and consider Day-Ahead Market Bids from Extremely Long-Start Resources as Bids for the Trading Day two days. The CAISO Operator shall use its operator judgment consistent with Good Utility Practice to determine commitment. The process does not Dispatch Energy for the 48-hour time period and therefore the commitment instructions will not include megawatts schedules greater than the Minimum Load. Extremely Long-Start Resources receiving a commitment instruction must resubmit the same Bid in the next day's Day Ahead Market.
- Sections 31.7.2, 31.7.2.1, 31.7.2.2, 31.7.2.3, 31.7.2.4, 31.7.2.5, and 31.7.3 all address various aspects of the automated Extremely Long-Start Commitment process. They are all deleted.

VI. ATTACHMENTS

The following documents, in addition to this transmittal letter, support the instant filing:

Attachment A	Clean CAISO Tariff Sheets incorporating the modifications proposed herein.
Attachment B	Tariff Sheets showing the modifications blacklined against the existing CAISO Tariff.
Attachment C	Board Memorandum concerning the proposed deferral of certain MRTU items.

VII. SERVICE

Copies of this filing have been served upon the California Public Utilities Commission and the California Energy Commission. In addition, the filing has been served upon all CAISO Scheduling Coordinators and posted on the CAISO's website.

Enclosed for filing are an original and five copies of the instant filing. Also enclosed are two additional copies of this filing to be date-stamped and returned to our messenger.

VIII. CORRESPONDENCE

The CAISO requests that all correspondence, pleadings and other communications concerning this filing be served upon the following:

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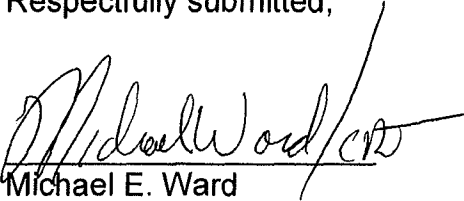
Counsel for the California Independent System Operator Corporation

*Individuals designated for service pursuant to 18 C.F.R. § 203(b)(3).

VIII. CONCLUSION

For the reasons set forth above, the CAISO respectfully requests that the Commission approve the instant tariff amendment filing.

Respectfully submitted,



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Attachment A – Clean Sheets
Deferred Function Amendment Filing
4th Replacement CAISO Tariff (MRTU)
October 31, 2008

8. ANCILLARY SERVICES.

8.1 Scope.

The CAISO shall be responsible for ensuring that there are sufficient Ancillary Services available to maintain the reliability of the CAISO Controlled Grid consistent with Applicable Reliability Criteria. The CAISO's Ancillary Services requirements may be self-provided by Scheduling Coordinators as further provided in the Business Practice Manuals. Those Ancillary Services which the CAISO requires to be available but which are not being self-provided will be competitively procured by the CAISO from Scheduling Coordinators in the Day-Ahead Market and the RTM consistent with Section 8.3. The provision of Ancillary Services from the Interties with interconnected Balancing Authority Areas is limited to Ancillary Services bid into the competitive procurement processes in the IFM and RTM. The CAISO will not accept Submissions to Self-Provide Ancillary Services that are imports to the CAISO Balancing Authority Area over the Interties with interconnected Balancing Authority Areas, except from Dynamic System Resources certified to provide Ancillary Services or if provided pursuant to ETCs, TORs or Converted Rights. The CAISO will calculate payments for Ancillary Services supplied by Scheduling Coordinators and charge the cost of Ancillary Services to Scheduling Coordinators based on their Ancillary Service Obligations.

include, but are not limited to: (a) analysis of the deviation between actual and forecast Demand; (b) analysis of patterns of unplanned Generating Unit Outages; (c) analysis of compliance with Applicable Reliability Criteria; (d) analysis of operation during system disturbances; (e) analysis of patterns of shortfalls between Day-Ahead Schedules and actual Generation and Demand; and (f) analysis of patterns of unplanned transmission Outages.

8.2.3 Quantities of Ancillary Services Required and Use of Ancillary Service Regions.

For each of the Ancillary Services, the CAISO shall determine the quantity and location of the Ancillary Service which is required using Ancillary Service Regions as described in Section 8.3.3. For each of the Ancillary Services, the CAISO shall determine the required locational dispersion in accordance with CAISO Controlled Grid reliability requirements. The Ancillary Services provided must be under the direct Dispatch control of the CAISO on a Real-Time Dispatch Interval basis. The CAISO shall determine the quantities it requires as provided for in Sections 8.2.3.1 to 8.2.3.3.

8.2.3.1 Regulation Service.

The CAISO shall maintain sufficient Generating Units immediately responsive to AGC in order to provide sufficient Regulation service to allow the CAISO Balancing Authority Area to meet Applicable Reliability Criteria by continuously balancing Generation to meet deviations between actual and scheduled Demand and to maintain Interchange Schedules. The quantity of Regulation Down and Regulation Up capacity needed for each Settlement Period of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time shall be determined by the CAISO as a percentage of the applicable CAISO Forecast of CAISO Demand for the Day-Ahead, and Real-Time Markets. The CAISO's determination is based upon its need to meet the Applicable Reliability Criteria.

The CAISO will publish on OASIS the estimated quantity, or the percentage used to determine the estimated quantity, of Regulation Reserves required for each hour of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time for the Trading Day.

8.2.3.2 Spinning and Non-Spinning Reserves.

The CAISO shall maintain minimum contingency Operating Reserve made up of Spinning Reserve and Non-Spinning Reserve in accordance with Applicable Reliability Criteria. The CAISO from time to time may determine to use more stringent criteria.

- (c) Regulation Up and Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up and Spinning Reserve Bids. Spinning Reserve and Regulation may be provided as separate services from the same Generating Unit, provided that the sum of Spinning Reserve and Regulation Up provided is not greater than the maximum Ramp Rate of the Generating Unit (MW/minute) times ten (10);
- (d) Additional Regulation Up and Spinning Reserve capacity can be used to satisfy requirements for Non-Spinning Reserve.
- (e) Regulation Up, Spinning Reserve, and Non-Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up, Spinning Reserve and Non-Spinning Reserve Bids;
- (f) Total MW purchased from the Regulation Up, Spinning Reserve, and Non-Spinning Reserve markets will not be changed by this Section 8.2.3.5; and
- (g) Regulation Energy resulting from Regulation that substituted for another Ancillary Service continues to be treated as Regulation Energy regardless of for what service it substituted.

8.3 Procurement of Ancillary Services, Certification and Testing Requirements for Providers of Ancillary Services, and Time-frame For Contracting for Ancillary Services.

8.3.1 Procurement of Ancillary Services.

The CAISO shall operate competitive Day-Ahead and Real-Time Markets to procure Ancillary Services. The Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) applications used in the Integrated Forward Market (IFM) and the Real-Time Market (RTM) shall calculate optimal resource commitment, Energy, and Ancillary Services Awards and Schedules at least cost to End-Use Customers consistent with maintaining System Reliability. Any

Scheduling Coordinator representing Generating Units, System Units, Loads or imports of System

Resources may submit Bids into the CAISO's Ancillary Services markets provided that it is in possession of a current certificate for the Generating Units, System Units, imports of System Resources or Loads concerned. Regulation Up, Regulation Down, and Operating Reserves necessary to meet CAISO requirements not met by self-provision will be procured by the CAISO as described in this CAISO Tariff.

The amount of Ancillary Services procured in the IFM and in the Real-Time Market is based upon the CAISO Forecast of CAISO Demand plus HASP Intertie Schedule for the Operating Hour net of (i) Self-Provided Ancillary Services from Generating Units internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services and (ii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The CAISO will manage both CAISO procured and Self-Provided Ancillary Services as part of the Real-Time Dispatch. In the Day-Ahead Market, the CAISO procures one-hundred percent (100%) of its Ancillary Service requirements based on the Day-Ahead Demand Forecast net of Self-Provided Ancillary Services. After the Day-Ahead Market, the CAISO procures additional Ancillary Services needed to meet system requirements from **all resources, including** imports **from** System Resources and Generation **from** internal resources in the Real-Time Market. The amount of Ancillary Services procured in the Real-Time Market is based upon the CAISO Forecast of CAISO Demand for the **RTUC Time Horizon** net of Self-Provided Ancillary Services.

The CAISO procurement of Ancillary Services for the Real-Time Market is for a fifteen (15) minute **RTUC Time Horizon**. The CAISO's procurement of Ancillary Services from imports or System Resources in the Real-Time Market is based on the Ancillary Service Bids submitted in the HASP.

As of the CAISO Operations Date, the CAISO will contract for long-term Voltage Support service with owners of Reliability Must-Run Units under Reliability Must-Run Contracts. Black Start capability will initially be procured by the CAISO through individual contracts with Scheduling Coordinators for Reliability Must-Run Units and other Generating Units which have Black Start capability. These requirements and standards apply to all Ancillary Services whether self-provided or procured by the CAISO.

8.3.2 Procurement Not Limited to CAISO Balancing Authority Area.

The CAISO will procure Spinning Reserves and Non-Spinning Reserves from Generating Units operating within the CAISO Balancing Authority Area and from imports of System Resources. Scheduling Coordinators are allowed to bid Regulation from resources located outside the CAISO Balancing Authority Area by dynamically scheduling such resources. Each System Resource used to bid Regulation must comply with the Dynamic Scheduling Protocol in Appendix X. When bidding to supply Ancillary Services in the IFM or RTM, imports compete for use of Intertie transmission capacity when the requested use is in the same direction, e.g., imports of Ancillary Services compete with Energy on Interties in the import direction and exports of Ancillary Services (i.e., on demand obligations) compete with Energy on Interties in the export direction. To the extent there is Congestion, imports of Ancillary Services will pay Congestion costs in the IFM and RTM markets pursuant to Section 11.

8.3.3 Ancillary Service Regions and Regional Limits.

The CAISO will procure Ancillary Services using Ancillary Service Regions and Ancillary Service Sub-Regions. There are two Ancillary Service Regions and eight Ancillary Service Sub-Regions. The two Ancillary Service Regions are the System Region (i.e., the CAISO Balancing Authority Area) and the Expanded System Region (i.e., the System Region and Intertie Scheduling Points with adjacent

8.3.3.2 Criteria For Use of Ancillary Service Regions and Sub-Regions.

The CAISO's use of an Ancillary Service Sub-Region occurs when the CAISO establishes a minimum or maximum limit for that Sub-Region. The CAISO's use of minimum and maximum procurement limits for Ancillary Services help to ensure that the Ancillary Services required in the CAISO Balancing Authority Area are dispersed appropriately throughout the CAISO Balancing Authority Area and accurately reflect the system topology and deliverability needs. The factors the CAISO will look to in determining whether to establish or change minimum or maximum limits, include but are not limited to, the following: (a) the CAISO Forecast of CAISO Demand, (b) the location of Demand within the Balancing Authority Area, (c) information regarding network and resource operating constraints that affect the deliverability of Ancillary Services into or out of an Ancillary Service Region, (d) the locational mix of generating resources, (e) generating resource Outages, (f) historical patterns of transmission and generating resource availability, (g) regional transmission limitations and Constraints, (h) transmission Outages, (i) Available Transfer Capability, (j) DA Schedules or HASP Intertie Schedules, (k) whether any Ancillary Services provided from System Resources requiring a NERC tag fail to have a NERC tag, and (l) other factors affecting System Reliability. Ancillary Services procured within a Sub-Region count toward satisfying the Ancillary Service requirements for the System Region or the Expanded System Region.

8.3.3.3 Notice to Market Participants.

Pursuant to Section 6.5.2.3.3, the CAISO will publish forecasted Ancillary Service requirements, regional constraints, and the minimum and/or maximum Ancillary Service Regional Limits for the Ancillary Service Regions and any Sub-Regions by 6:00p.m. prior to the Day-Ahead Market (two days prior to the Operating Day). After the completion of the DAM for a given Trading Day, the CAISO will publish the limits that were used in the DAM. If prior to the close of the **Real-Time Market** for a Trading Hour the CAISO makes a substantial change to a minimum and/or maximum limit for an Ancillary Service Region or Sub-Region, it

will issue a Market Notice as soon as reasonably practicable after the occurrence of the circumstances that led to the change. After the close of the **Real-Time Market** for a Trading Hour, the CAISO will publish the limits that were used in the **RTUC**.

8.3.3.4 Establishment of New Ancillary Service Regions or Sub-Regions.

The CAISO will consider adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region through a stakeholder process if: (a) there is a persistent difficulty in obtaining an appropriate distribution of Ancillary Services in the CAISO Balancing Authority Area using market procurement mechanisms, and (b) adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region would reduce the persistent difficulty in obtaining an appropriate distribution of Ancillary Services in the CAISO Balancing Authority Area using market procurement mechanisms. Factors that would affect the CAISO's determination to consider adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region include, but are not limited to operational reliability needs, the pattern of the growth of Demand in the CAISO Balancing Authority Area, the addition of new generating resources, the retirement of existing generating resources, the addition of new transmission facilities, changes in regional transmission limitations, changes in Available Transfer Capability, and extended transmission or generating resource Outages. If the CAISO considers adjusting the boundaries of the existing Ancillary Service Regions or creating a new Ancillary Service Region, the CAISO will conduct an analysis to determine whether the adjustments being considered create market power issues in either the new Ancillary Service Regions being considered or the pre-existing Ancillary Service Regions. The CAISO's analysis will be included in the stakeholder process and stakeholders will be able to comment on any new market power mitigation measures proposed for the CAISO's procurement of Ancillary Services.

from resources including Loads, Generating Units, and System Units, which have been certified and tested by the CAISO using the process defined in Part D of Appendix K. Black Start capability may only be provided from Generating Units which have been certified and tested by the CAISO using the process defined in Part E of Appendix K. CAISO certification to provide Ancillary Services may be revoked by the CAISO under the provisions of this CAISO Tariff, including Appendix K.

8.3.5 The CAISO shall procure Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve on a daily, hourly and Real-Time basis in the IFM and RTM, respectively. The CAISO shall procure Ancillary Services on a longer-term basis pursuant to Section 42.1.3 if necessary to meet Reliability Criteria. The CAISO Governing Board must approve all long-term contracts. The CAISO shall contract for Voltage Support annually (or for such other period as the CAISO may determine is economically advantageous) and on a daily or hourly basis as required to maintain System Reliability. The CAISO shall contract annually (or for such other period as the CAISO may determine is economically advantageous) for Black Start Generation.

8.3.6 Market-Based Prices.

Public utilities under the FPA must submit Bids for Ancillary Services capped at FERC authorized cost-based rates unless and until FERC authorizes different pricing. Public utilities under the FPA shall seek FERC Ancillary Services rate approval on bases consistent with the CAISO time-frame for contracting for each Ancillary Service (hourly rate for some Ancillary Services, annual rate or otherwise for other Ancillary Services) so that cost-based Bids and market-based Bids for each service shall be on comparable terms. All other entities may use market-based rates not subject to any restrictions apart from those found in this CAISO Tariff. Public utilities under the FPA which have not been approved to bid at market-based rates will not be paid above their cost-based Bid for the Ancillary Service concerned even if the relevant Market Clearing Price is higher.

8.3.7 Bidding Requirements, Including Submission to Self-Provide an Ancillary Service.

Scheduling Coordinators may submit Bids or Submissions to Self-Provide an Ancillary Service consistent with the rules specified in Section 30 and any further requirements in this Section 8.3.7. Scheduling Coordinators may (i) submit Bids or Submissions to Self-Provide an Ancillary Service from resources located within the CAISO Balancing Authority Area or Dynamic System Resources certified to provide Ancillary Services, (ii) submit Submissions to Self-Provide an Ancillary Service from resources located outside the CAISO Balancing Authority Area if provided pursuant to ETCs, TORs, or Converted Rights, (iii) submit Bids for Ancillary Services from resources located outside the CAISO Balancing Authority Area, or (iv) specify Inter-SC Trades of Ancillary Services. Ancillary Services in the Day-Ahead Market and in the Real-Time Market are comprised of the following: Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve. Each Generating Unit (including Physical Scheduling Plants), System Unit, Participating Load, or System Resource for which a Scheduling Coordinator wishes to submit Ancillary Service Bids must meet the requirements set forth in this CAISO Tariff. The same resource capacity may be offered into more than one CAISO Ancillary Service auction at the same time. Ancillary Services Bids and Submissions to Self-Provide an Ancillary Service can be submitted up to seven (7) days in advance. Ramp Rates will be only used by the CAISO for procuring capacity associated with the specific Ancillary Services. The CAISO will issue Real-Time Dispatch Instructions in the Real-Time Market for the Energy associated with the awarded capacity based upon the applicable Operational Ramp Rate submitted with the single Energy Bid Curve in accordance with Section 30.10. There is no ability to procure Ancillary Services for export. To the extent a Scheduling Coordinator has an on-demand obligation to serve loads outside the CAISO Balancing Authority Area, it can do so provided that (1) it is using export transmission capacity available in Real-Time, and (2) the resource capacity providing Energy to satisfy the on-demand obligation is not under an RMR Contract or Resource Adequacy Capacity obligation, and has not been paid a RUC Availability Payment for the Trading Hour.

8.6 Obligations for and Self-Provision of Ancillary Services.

8.6.1 Ancillary Service Obligations.

Each Scheduling Coordinator shall be assigned a share of the total Regulation Down, Regulation Up, Spinning Reserve, and Non-Spinning Reserve requirements by the CAISO, as set forth in Sections 11.10.2, 11.10.3 and 11.10.4, (i.e., a share of the total requirements for each Ancillary Service in the Day-Ahead Market, HASP, and the Real-Time Market). Any references in this CAISO Tariff to Regulation shall be read as referring to Regulation Up or Regulation Down.

8.6.2 Right to Self-Provide.

Each Scheduling Coordinator may choose to self-provide all, or a portion, of its Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve obligations in the Day-Ahead Market, and, to the extent needed to satisfy CAISO's additional requirement and **the** Real-Time Market, from resources eligible for self-provision. The right to self-provide Ancillary Services from capacity that is under a contractual obligation to provide Energy, including but not limited to capacity subject to an RMR Contract and local Resource Adequacy Resources, shall be conditional; self-provision of Ancillary Services from such capacity will only be permitted to the extent that capacity is not needed for Energy as a result of the MPM-RRD process described in this CAISO Tariff. To self-provide Ancillary Services a Scheduling Coordinator must provide the CAISO with a Submission to Self-Provide an Ancillary Service. Both Ancillary Service Bids and Submissions to Self-Provide an Ancillary Service can be provided to the CAISO for the same Ancillary Service and for the same hour in the same market. To the extent the Submission to Self-Provide an Ancillary Service is from a resource that is a Partial Resource Adequacy Resource, and Energy is needed, including for purposes under Section 31.3.1.3, from that resource the

If the total Submissions to Self-Provide Ancillary Services exceed the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region, the submissions that would otherwise be accepted by the CAISO as feasible and qualified will be awarded on a pro-rata basis among the suppliers offering to self-provide the Ancillary Service up to the amount of the requirement. If a regional constraint imposes a limit on the total amount of Regulation Up, Spinning Reserve, and Non-Spinning Reserve, and the total self-provision of these Ancillary Services in that region exceeds that limit, Self-Provided AS are qualified pro rata from higher to lower quality service in three tiers: Regulation Up first, followed by Spinning Reserve, and then by Non-Spinning Reserve. Following this process, unless a higher quality Self-Provided Ancillary Service in a constrained region is fully qualified, the pro rata allocation in the subsequent lower quality Self-Provided Ancillary Service for that region will be nil. Submissions to Self-Provide Ancillary Services in excess of the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region will not be accepted and qualified by the CAISO as Self-Provided Ancillary Services.

The CAISO shall schedule Self-Provided Ancillary Services in the Day-Ahead Market and the RTM and Dispatch Self-Provided Ancillary Services in the Real-Time. To the extent that a Scheduling Coordinator self-provides Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve, the CAISO shall correspondingly reduce the quantity of the Ancillary Services it procures from Bids submitted in the Day-Ahead Market and the Real-Time Market. To the extent a Scheduling Coordinator's Self-Provided Ancillary Service for a particular Ancillary Service is greater than the Scheduling Coordinator's obligation for that particular Ancillary Service in a Settlement Interval, the Scheduling Coordinator will receive the user rate for the Self-Provided Ancillary Service for the amount of the Self-Provided Ancillary Service in excess of the Scheduling Coordinator's obligation.

8.7 Scheduling of Units to Provide Ancillary Services.

The CAISO shall provide Scheduling Coordinators with Ancillary Services Awards for the Day-Ahead and Real-Time Markets. The CAISO shall notify each Scheduling Coordinator no later than 1:00 p.m. of the day prior to the Operating Day of their Ancillary Service Awards and Ancillary Service Schedules for the Day-Ahead Market and no later than fifteen (15) minutes prior to the **next Commitment Interval** in the Real-Time Market. Where long-term contracts are involved, the information may be treated as standing information for the duration of the contract.

Once the CAISO has given Scheduling Coordinators notice of the Day-Ahead Market and Real-Time Market Ancillary Service Awards and Ancillary Service Schedules, these awards and Schedules represent binding commitments made in the markets between the CAISO and the Scheduling Coordinators concerned, subject to any amendments issued as described above.

8.8 Black Start.

- (a) Black Start shall meet the standards specified for Black Start in this CAISO Tariff and Appendix K; and
- (b) the CAISO will dispatch Black Start Generating Units as required in accordance with the applicable Black Start agreement.

8.9 Verification, Compliance Testing, and Audit of Ancillary Services.

Availability of contracted and Self-Provided Ancillary Services and RUC Capacity shall be verified by the CAISO by unannounced testing of Generating Units, Loads and System Resources, by auditing of response to CAISO Dispatch Instructions, and by analysis of the appropriate Meter Data, or Interchange Schedules. The CAISO may test the capability of any Generating Unit, System Unit, System Resource, external import of a System Resource, Participating Load, or reactive device providing Ancillary Services or RUC Capacity. Participating Generators, owners or operators of Participating Loads, operators of

11.10.1.1.1 Congestion Charges for Day-Ahead Intertie Ancillary Service Awards

Suppliers of Day-Ahead Ancillary Services Awards over the Interties also are charged for Congestion if the Ancillary Service Award is at a congested Scheduling Point. The charge shall be equal to the Shadow Price of the applicable congested Scheduling Point multiplied by the quantity of the Ancillary Service Award for the Settlement Period.

11.10.1.2 [NOT USED]

comprising **of** the last fifteen (15) minutes of the imminent Trading Hour and the entire next four Trading Hours. The CAISO will commit Extremely Long Start Resources, for which commitment in the DAM does not provide sufficient time to Start-Up and be available to supply Energy during the next Trading Day as provided in Section 31.7.

27.4.1.1 Timing of Unit Commitment Instructions.

For the Time Horizon of any given CAISO Markets Process, the associated SCUC optimization will typically commit resources having different Start-Up Times, not all of which need to be started up immediately upon completion of that CAISO Markets Process. The CAISO may defer issuing a Start-Up Instruction to a resource that can be started at a later time and still be available to supply Energy at the time the CAISO Markets Process indicated it would be needed. The CAISO shall re-evaluate the need to commit such resources in a subsequent CAISO Markets Process based on the most recent forecasts and other information about system conditions.

27.4.2 Security Constrained Economic Dispatch.

SCED is the optimization engine used to run the RTD to determine the optimal five-minute Dispatch Instructions throughout the Trading Hour consistent with resource and transmission Constraints within the CAISO Balancing Authority Area. The SCED runs every five (5) minutes and utilizes a Time Horizon comprised of up to thirteen (13) five-minute intervals, but produces Dispatch Instructions only for the first five-minute interval of that Time Horizon. The SCED produces LMPs at each PNode that are used for Settlements as described in Section 11.5.

27.5 Full Network Model.

30.7.6.2 Treatment of Ancillary Services Bids.

When Scheduling Coordinators bid into the Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve markets, they may submit Bids for the same capacity into as many of these markets as desired at the same time by providing the appropriate Bid information to the CAISO. The CAISO optimization will evaluate AS Bids simultaneously with Energy Bids. A Scheduling Coordinator may specify that its Bid applies only the markets it desires. A Scheduling Coordinator shall also have the ability to specify different capacity prices for the Spinning Reserve, Non-Spinning Reserve, and Regulation markets. A Scheduling Coordinator providing one or more Regulation Up, Regulation Down, Spinning Reserve or Non-Spinning Reserve services may not change the identification of the Generating Units offered in the Day-Ahead Market or in the Real-Time Market for such services unless specifically approved by the CAISO (except with respect to System Units, if any, in which case Scheduling Coordinators are required to identify and disclose the resource specific information for all Generating Units and Participating Loads constituting the System Unit for which Bids and Submissions to Self-Provide Ancillary Services are submitted into the CAISO's Day-Ahead Market and Real-Time Market.

The following principles will apply in the treatment of Ancillary Services Bids in the CAISO Markets:

- (a) not differentiate between bidders for Ancillary Services and Energy other than through cost, price, effectiveness, and capability to provide the Ancillary Service or Energy, and the required locational mix of Ancillary Services;
- (b) select the bidders with most cost effective Bids for Ancillary Service capacity which meet its technical requirements, including location and operating capability to minimize the costs to users of the CAISO Controlled Grid;
- (c) evaluate the Day-Ahead Bids over the twenty-four (24) Settlement Periods of the following Trading Day along with Energy, taking into transmission constraints and AS Regional Limits;

- (d) evaluate Import Bids along with internal resources;
- (e) establish Real-Time Ancillary Service Awards **through RTUC** from **imports and** generation internal to the CAISO Balancing Authority Area at fifteen (15) minutes intervals to the hour of operation; and
- (f) procure sufficient Ancillary Services in the Day-Ahead and Real-Time Markets to meet its forecasted requirements.

30.7.7 Format and Validation of Operational Ramp Rates.

The submitted Operational Ramp Rate expressed in megawatts per minute (MW/min) as a function of the operating level, expressed in megawatts (MW), must be a staircase function with up to four segments.

There is no monotonicity requirement for the Operational Ramp Rate. The submitted Operational Ramp Rate shall be validated as follows:

- (a) The range of the submitted Operational Ramp Rate must cover the entire capacity of the resource, from the minimum to the maximum operating capacity, as registered in the Master File for the relevant resource.
- (b) The operating level entries must match exactly (in number, sequence, and value) the corresponding minimum and maximum Operational Ramp Rate breakpoints, as registered in the Master File for the relevant resource.
- (c) If a Scheduling Coordinator does not submit an Operational Ramp Rate for a generating unit for a day, the CAISO shall use the maximum Ramp Rate for each operating range set forth in the Master File as the Ramp Rate for that unit for that same operating range for the Trading Day.

- (d) The last Ramp Rate entry shall be equal to the previous Ramp Rate entry and represent the maximum operating capacity of the resource as registered in the Master File. The resulting Operational Ramp Rate segments must lie between the minimum and maximum Operational Ramp Rates, as registered in the Master File.
- (e) The submitted Operational Ramp Rate must be the same for each hour of the Trading Day, i.e., the Operational Ramp Rate submitted for a given Trading Hour must be the same with the one(s) submitted earlier for previous Trading Hours in the same Trading Day.
- (f) Outages that affect the submitted Operational Ramp Rate must be due to physical constraints, reported in SLIC and are subject to CAISO approval. All approved changes to the submitted Operational Ramp Rate will be used in determination of Dispatch Instructions for the shorter period of the balance of the Trading Day or duration of reported Outage.
- (g) If an Operational Ramp Rate is derated in SLIC, the Ramp Rate will only be to four segments. Ramping capability through Forbidden Operating Regions are not affected by derates entered in SLIC.
- (h) The amount of change in Ramp Rates from one operating range to a subsequent operating range must not exceed a 10 to 1 ratio, and any Ramp Rate change in excess will be adjusted to achieve the 10 to 1 ratio. This adjustment will also include the implicit ramp rate in the Forbidden Operating Region.*
- (i) For all CAISO Dispatch Instructions of Reliability Must-Run Units the Operational Ramp Rate will be the Ramp Rate declared in the Reliability Must Run Contract Schedule A.

31.2.2.2 Non-RMR Units.

If the dispatch level produced through the ACR is greater than the dispatch level produced through CCR, then the resource is subject to Local Market Power Mitigation, in which case the entire portion of the unit's Energy Bid Curve that is above the CCR dispatch level will be mitigated to the lower of the Default Energy Bid as specified in Section 39, or the DAM Bid, but no lower than the unit's highest Bid price that cleared the CCR.

31.3 Integrated Forward Market.

After the MPM-RRD and prior to RUC, the CAISO shall perform the IFM. The IFM performs Unit Commitment and Congestion Management, clears the Energy Bids as modified and in the MPM-RRD, taking into account transmission limits and honoring technical and inter-temporal operating Constraints, such as Minimum Run Times, and procures Ancillary Services to meet one hundred percent (100%) of the CAISO Forecast of CAISO Demand requirements. The IFM utilizes a set of integrated programs that: (1) determine Day-Ahead Schedules and AS Awards, and related LMPs and ASMPs; and (2) optimally commits resources that are bid in to the DAM. The IFM utilizes a SCUC algorithm that optimizes Start-Up Costs, Minimum Load Costs, and Energy Bids along with any Bids for Ancillary Services as well as Self-Schedules submitted by Scheduling Coordinators. The IFM also provides for the optimal management of Use-Limited Resources. The ELS Resources committed through the ELC Process conducted two days before the day the IFM process is conducted for the next Trading Day as described in Section 31.7 are binding.

each hour of the next Trading Day. RUC Capacity is selected by a SCUC optimization that uses the same FNM used in the IFM to help ensure the deliverability of Energy from the RUC Capacity.

31.5.1 RUC Participation.

31.5.1.1 Capacity Eligible for RUC Participation.

RUC participation is voluntary for capacity that has not been designated as Resource Adequacy Capacity. Scheduling Coordinators may make such capacity available for participation in RUC by submitting a RUC Availability Bid, provided the Scheduling Coordinator has also submitted an Energy Bid for such capacity into the IFM. Capacity from Non-Dynamic System Resources that has not been designated Resource Adequacy Capacity is not eligible to participate in RUC. Capacity from resources including System Resources that has been designated as qualified Resource Adequacy Capacity must participate in RUC. RUC participation is required for Resource Adequacy Capacity to the extent that Resource Adequacy Capacity is not committed following the IFM. System Resources eligible to participate in RUC will be considered on an hourly basis; that is, RUC will not observe any multi-hour block constraints and the Energy Limits that may have been submitted in conjunction with Energy Bids to the IFM. RMR Unit capacity will be considered in RUC in accordance with Section 31.5.1.3. MSS resources may participate in RUC in accordance with Section 31.5.2.3. COG resources are accounted for in RUC, but may not submit or be paid RUC Availability Payments. The ELS Resources committed through the ELC Process conducted two days before the day the RUC process is conducted for the next Trading Day as described in Section 31.7.

31.5.1.2 RUC Availability Bids.

Scheduling Coordinators may only submit RUC Availability Bids for capacity (above the Minimum Load) for which they are also submitting an Energy Bid to participate in the IFM. The RUC Availability Bid for the Resource Adequacy Capacity submitted by a Scheduling Coordinator must be \$0/MW per hour for the entire Resource Adequacy Capacity. If the Scheduling Coordinator fails to submit a \$0/MW per hour for

31.6.4 Demand Information.

By 6:00 a.m. on the day preceding the Trading Day, each Scheduling Coordinator shall provide to the CAISO a Demand Forecast specified by UDC Service Area for which it will submit a Bid for each of the Settlement Periods of the following Trading Day. The CAISO shall aggregate the Demand information by UDC Service Area and transmit the aggregate Demand information to each UDC serving such aggregate Demand.

31.7 Extremely Long-Start Commitment Process.

The CAISO shall perform the Extremely Long-Start Commitment Process (ELC Process) after the regular DAM results are posted. ELS Resources are flagged in the Master File and are the only resources eligible to be committed in the ELC Process. Each day after the DAM results are posted, the CAISO shall conduct the ELC Process to determine commitment of ELS Resources to be available to the CAISO Markets in the second day out. The CAISO will use the latest CAISO Forecast of CAISO Demand available to the CAISO for the Trading Day two days ahead of the current day that the ELC Process is executed. *For commitment purposes for a resource whose start-up time would exceed the definition of an ELS based on the resources initial condition and cooling time, the CAISO will consider DAM Bids from ELS Resources as Bids for the Trading Day two days ahead of the current day that the ELC Process is executed.* The CAISO Operator shall use its operator judgment consistent with Good Utility Practice to determine whether ELS Resources for the second day in the 48-hour *time period* should be *committed*. The ELC Process *does* not dispatch Energy for the *48-hour time period* and therefore the commitment instructions *will* not include megawatts schedules greater than the Minimum Load. *ELS Resources receiving a commitment instruction are obligated to resubmit the same Bid in the next day's Day-Ahead Market.* The CAISO Commitment Period or Self-Commitment Period determination for the ELS Resources depends on the DAM results and the Clean and Generated Bids, following the same rules that apply to other resources. All Commitment Intervals for the ELS Resources will be classified as CAISO Commitment Periods, unless there is a Self-Schedule or Self-Provided AS for that interval.

[NOT USED]

[NOT USED]

[NOT USED]

33.5 [NOT USED]

33.6 HASP Results.

The CAISO publishes the binding HASP Intertie Schedules and HASP AS Awards for System Resources, as well as HASP Advisory Schedules and HASP AS Awards for internal Generating Units no later than forty-five (45) minutes prior to the Trading Hour.

33.7 [NOT USED]

33.8 HASP Prices for HASP Intertie Schedules.

he RTUC will produce fifteen-minute LMPs for the four fifteen-minute **RTUC** intervals for the applicable Trading Hour. The fifteen-minute LMPs corresponding to the Scheduling Points are then used to derive a simple average hourly price for the Settlement of hourly Intertie Schedules at each Scheduling Point. HASP Intertie Schedules are settled in accordance with Section 11.4

34.2.1 Commitment of Fast Start and Short Start Resources.

RTUC produces binding and advisory Start-Up and Shut-Down Dispatch Instructions for Fast Start and Short Start resources that have Start-Up Times that would allow the resource to be committed prior to the end of the relevant Time Horizon of the RTUC run. A Start-Up Dispatch Instruction is considered binding if the resource could not achieve the target start time as determined in the current RTUC run in a subsequent RTUC run as a result of the Start-Up Time of the resource. A Start-Up Instruction is considered advisory if it is not binding, such that the resource could achieve its target Start-Up Time as determined in the current RTUC run in a subsequent RTUC run based on its Start-Up Time. A Shut-Down Instruction is considered binding if the resource could achieve the target Shut-Down Time as determined in the current RTUC in a subsequent RTUC run. A Shut-Down Dispatch Instruction is considered advisory if the resource Shut-Down Instruction is not binding such that the resource could achieve its target Shut-Down time as determined in the current RTUC run in a subsequent RTUC run. A binding Dispatch Instruction that results in a change in Commitment Status will be issued, in accordance with Section 6.3, after review and acceptance of the Start-Up Instruction by the CAISO Operator. An advisory Dispatch Instruction changing the Commitment Status of a resource may be modified by the CAISO Operator to a binding Dispatch Instruction and communicated in accordance with Section 6.3 after review and acceptance by the CAISO Operator. Only binding and not advisory Dispatch Instructions will be issued by the CAISO.

34.2.2 Real-Time Ancillary Services Procurement.

If the CAISO determines that additional Ancillary Services are required, other than those procured in the DAM and the RTUC will procure Ancillary Services on a fifteen-minute basis as necessary to meet reliability requirements and will determine Real-Time Ancillary Service interval ASMPs for such AS for the next Commitment Period. All Operating Reserves procured in the RTM are considered Contingency Only Operating Reserves. Any Ancillary Service awarded in RTUC will be taken as fixed for

the three five-minute RTD intervals of its target fifteen-minute interval. In the RTUC, all resources certified and capable of providing Operating Reserves that have submitted Real-Time Energy Bids shall also submit applicable Spinning or Non-Spinning Reserves Bids, respectively, depending on whether the resource is online or offline. The CAISO will utilize the RTUC to procure Operating Reserves to restore its Operating Reserve requirements in cases when: (1) Operating Reserves awarded in DAM have been dispatched to provide Energy, (2) resource(s) awarded to provide Operating Reserves in the DAM are no longer capable of providing such awarded Operating Reserves, or (3) the Operator determines that additional Operating Reserves are necessary to maintain Operating Reserves within Applicable Reliability Criteria. The CAISO will utilize the RTUC to procure additional Regulation capacity in Real-Time in cases when: (1) resource(s) awarded to provide Regulation in the DAM are no longer capable of providing such awarded Regulation, or (2) the Operator determines that additional Regulation is necessary to maintain sufficient control consistent with Applicable Reliability Criteria and Good Utility Practice. *The RTUC will produce fifteen-minute ASMPs for the four binding fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute ASMPs are then used for the Settlement of the fifteen minute AS Awards. The RTUC run will also produce fifteen-minute Shadow Prices for each of the Interties for the four fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute Shadow Prices are then used to charge for Intertie Real-Time AS Award providers for Congestion on the Interties. RTUC AS Awards are settled in accordance with 11.10.1.3.*

34.3 Real-Time Dispatch.

The RTD can operate in three modes: RTED, RTCD and RTMD. The RTD (RTED and RTCD mode) uses a Security Constrained Economic Dispatch (SCED) algorithm every five (5) minutes throughout the Trading Hour to determine optimal Dispatch Instructions to balance Supply and Demand. The Real-Time Economic Dispatch (RTED) will be used under most circumstances and will optimally dispatch resources based on their Energy Bids, excluding Contingency Only Operating Reserves except when needed to avoid an imminent System Emergency. The Real-Time Contingency Dispatch (RTCD) will be invoked when a transmission or generation contingency occurs and will include all Contingency Only Operating Reserves in the optimization. The Real Time Manual Dispatch (RTMD) will be invoked as a fall-back mechanism only when the RTED or RTCD fails to provide a feasible Dispatch. These three modes of the RTD are described in Sections 34.3.1 to 34.3.3.

34.12 Metered Subsystems.

Scheduling Coordinators that represent MSSs may submit Bids for Supply of Energy to the RTM, irrespective of whether the MSS is a Load following MSS. All Bids submitted for MSS generating resources for the RTM and all Dispatch Instructions shall be generating resource-specific. MSS non-Load following resources are responsible for following Dispatch Instructions. Load following MSS Operators shall provide the CAISO with an estimate of the number of MWs the applicable generating resource(s) will be generating over the next two hours in five-minute interval resolution. The Dispatch Instructions for Load following resources are incorporated with Generation estimates provided by MSS Operators. Such MSS Load following resources can deviate from the Dispatch Instructions in Real-Time to facilitate the following of Load without being subject to the Uninstructed Deviation Penalty as further described in Section 11.23 of the CAISO Tariff. The State Estimator will estimate all MSS Load in Real-Time and will incorporate the information provided by the Load following MSS Operator in clearing the RTM and its Dispatch Instructions.

34.13 Treatment of Resource Adequacy Capacity in the Real-Time Market.

Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40 shall be required to submit Energy Bids for: (1) all such Resource Adequacy Capacity and (2) any Ancillary Services capacity awarded or self-provided in the Day-Ahead or Real-Time Market. In the absence of submitted Bids, as part of the validation described in 30.7, Generated Bids will be used for Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40. For any capacity from a Resource Adequacy Resource not required to offer Resource Adequacy Capacity in accordance with Section 40 that was awarded or is self-providing Operating Reserves capacity in the Day-Ahead Market, Scheduling Coordinators must submit an Energy Bid for no less than the amount of awarded or self-provided Operating Reserves capacity above their Day-Ahead

Schedule. Resource Adequacy Resources that are not required to offer their Resource Adequacy Capacity in accordance with Section 40 may voluntarily submit Energy Bids. Submitted Energy Bids shall be subject to the maximum and minimum Bid requirements and Mitigation Measures as set forth in Section 39.

34.14 Real-Time Operational Activities in the Hour Prior to the Settlement Period.

34.14.1 Confirm Interchange Transaction Schedules (ITSs).

Also in the hour prior to the beginning of the Operating Hour the CAISO will:

- (a) adjust Interchange transaction schedules (ITSs) as required under Existing Contracts in accordance with the procedures in the CAISO Tariff for the management of Existing Contracts;
- (b) adjust ITSs as required by changes in transfer capability of transmission paths occurring after Market Close of the HASP; and
- (c) agree on ITS changes with adjacent Balancing Authorities.

34.15 Rules For Real-Time Dispatch of Imbalance Energy Resources.

34.15.1 Resource Constraints.

The SCED shall enforce the following resource physical Constraints:

- (a) Minimum and maximum operating resource limits. Outages and limitations due to transmission clearances shall be reflected in these limits. The more restrictive operating or regulating limit shall be used for resources providing Regulation so that the SCED shall not Dispatch them outside their Regulating Range.
- (b) Forbidden Operating Regions. *When ramping in the Forbidden Operating Region, the implicit ramp rate as determined from the resource's transit time will be used when Dispatching in the Forbidden Operating Region even if the Forbidden Operating Region constraint is not enforced through the SCED process.*

34.19.1 General Principles.

Instructed and Uninstructed Imbalance Energy shall be paid or charged the applicable Resource-Specific Settlement Interval LMP except for hourly pre-dispatched Instructed Imbalance Energy, which shall be settled as set forth in Section 11.5.2. These prices are determined using the Dispatch Interval LMPs. The Dispatch Interval LMPs shall be based on the Bid of the marginal Generating Units, System Units, and Participating Loads dispatched by the CAISO to increase or reduce Demand or Energy output in each Dispatch Interval as provided in Section 34.19.2.1.

The CAISO will respond to the Dispatch Instructions issued by the SCED to the extent practical in the time available and acting in accordance with Good Utility Practice. The CAISO will record the reasons for any variation from the Dispatch Instructions issued by the SCED.

34.19.2 Determining Real-Time LMPs.

34.19.2.1 Dispatch Interval Real-Time LMPs.

34.19.2.2 Computation.

For each Dispatch Interval, the CAISO will compute updated Supply and Demand curves, using the Generating Units, System Units, Dynamic System Resources and Participating Load Dispatched according to the CAISO's SCED during that time period to meet Imbalance Energy requirements. The RTM transactions will be settled at the Dispatch Interval LMPs in accordance with Section 11.5.

34.19.2.3 Eligibility to Set the Real-Time LMP.

All Generating Units, Participating Loads, Dynamic System Resources, System Units, or COGs subject to the provisions in Section 27.7, with Bids, including Default Energy Bids, that are unconstrained due to Ramp Rates or other temporal Constraints are eligible to set the LMP, provided that the Generating Unit, Participating Load, Dynamic System Resource, or System Unit is Dispatched within its submitted Economic Bid range. If a resource is Dispatched beyond its Economic Bid range or the CAISO enforces a resource-specific Constraint on the resource due to an RMR or Exceptional Dispatch,

the resource will not be eligible to set the LMP. Resources identified as MSS Load following resources are not eligible to set the LMP. A resource constrained at an upper or lower operating limit or dispatched for a quantity of Energy such that its full Ramping capability is constraining the ability of the resource to be dispatched for additional Energy in target interval, cannot be marginal (i.e., it is constrained by the Ramping capability) and thus is not eligible to set the Dispatch Interval LMP. Non-Dynamic System Resources are not eligible to set the Dispatch Interval LMP. Dynamic System Resources are eligible to set the Dispatch Interval LMP. A Constrained Output Generator that has the ability to be committed or shut off within the two-hour Time Horizon of the RTM will be eligible to set the Dispatch Interval LMP if any portion of its Energy is necessary to serve Demand. Dispatches of Regulation resources by EMS in response to AGC will not set the RTM LMP. Dispatches of Regulation resources to a Dispatch Operating Point by RTM SCED will be eligible to set the RTM LMP.

34.19.2.4 Real-Time LMP When Responding To A Contingency.

In cases when a Contingency occurs and the CAISO must activate its Operating Reserves, it may perform a Real-Time Contingency Dispatch (RTCD) for a target interval 10 minutes from the current time. When activating a Contingency Dispatch and returning to normal Dispatch in RTM, LMPs shall be based on the last available price from either the Contingency Dispatch or normal Dispatch run relative to the five-minute pricing target.

34.19.2.5 Price for Uninstructed Deviations for Participating Intermittent Resources.

Deviations associated with each Participating Intermittent Resource in a Scheduling Coordinator's portfolio shall be settled as provided in Section 11.12 at the monthly weighted average Dispatch Interval LMP, as calculated in accordance with Section 11.5.4.1 at each Pnode associated with the Participating Intermittent Resource, and using the monthly weighted average with weights equal to total Real-Time Generation.

Commercial Operation	The status of a Generating Unit or project phase at a Generating Facility that has commenced generating electricity for sale, excluding electricity generated during Trial Operation.
Commercial Operation Date	The date on which a Generating Unit or project phase at a Generating Facility commences Commercial Operation as agreed to by the applicable Participating TO, the CAISO, and the Interconnection Customer pursuant to Appendix E to the Large Generator Interconnection Agreement, and in accordance with the implementation plan agreed to by the Participating TO and the CAISO for multiple individual Generating Units or project phases at a Generating Facility where an Interconnection Customer intends to establish separate Commercial Operation Dates for those Generating Units or project phases.
Commitment Interval	The fifteen minute period of time for which the CAISO commits resources or procures Ancillary Services through the Real-Time Unit Commitment process.
Commitment Period	The consecutive Time Periods within a Trading Day with an "On" Commitment Status.
Commitment Status	The "On" or "Off" state for each unit in each Time Period.
Competitive Constraints Run (CCR)	The first optimization run of the MPM-RRD process through which all pre-designated competitive Constraints are enforced.
Condition 1 RMR Unit	A resource operating pursuant to Condition 1 of its RMR Contract.
Condition 2 RMR Unit	A resource operating pursuant to Condition 2 of its RMR Contract.
Congestion	A characteristic of the transmission system produced by a binding Constraint to the optimum economic dispatch to meet Demand such that the LMP, exclusive of Marginal Cost of Losses, at different Locations of the transmission system is not equal.
Congestion Charge	A charge attributable to the Marginal Cost of Congestion at a given pricing PNode.
Congestion Data Summary	A report issued by the CAISO on the schedule set forth in the Business Practice Manual that sets forth historic Congestion on the CAISO Controlled Grid.
Congestion Management	The alleviation of Congestion in accordance with applicable CAISO procedures, the CAISO Tariff, and Good Utility Practice.

Attachment B – Blacklines
Deferred Function Amendment Filing
4th Replacement CAISO Tariff (MRTU)
October 31, 2008

8. ANCILLARY SERVICES.

8.1 Scope.

The CAISO shall be responsible for ensuring that there are sufficient Ancillary Services available to maintain the reliability of the CAISO Controlled Grid consistent with Applicable Reliability Criteria. The CAISO's Ancillary Services requirements may be self-provided by Scheduling Coordinators as further provided in the Business Practice Manuals. Those Ancillary Services which the CAISO requires to be available but which are not being self-provided will be competitively procured by the CAISO from Scheduling Coordinators in the Day-Ahead Market, ~~the Hour-Ahead Scheduling Process (the hourly HASP Ancillary Service Awards)~~ and the RTM consistent with Section 8.3. The provision of Ancillary Services from the Interties with interconnected Balancing Authority Areas is limited to Ancillary Services bid into the competitive procurement processes in the IFM, ~~HASP~~ and RTM. The CAISO will not accept Submissions to Self-Provide Ancillary Services that are imports to the CAISO Balancing Authority Area over the Interties with interconnected Balancing Authority Areas, except from Dynamic System Resources certified to provide Ancillary Services or if provided pursuant to ETCs, TORs or Converted Rights. The CAISO will calculate payments for Ancillary Services supplied by Scheduling Coordinators and charge the cost of Ancillary Services to Scheduling Coordinators based on their Ancillary Service Obligations.

For purposes of this CAISO Tariff, Ancillary Services are: (i) Regulation Up and Regulation Down, (ii) Spinning Reserve, (iii) Non-Spinning Reserve, (iv) Voltage Support, and (v) Black Start capability.

These services will be procured as stated in Section 8.3.5. Bids for Non-Spinning Reserve may be submitted by Scheduling Coordinators for Curtailable Demand as well as for Generation. Bids for Regulation, Spinning Reserve, Non-Spinning Reserve, and Voltage Support may be submitted by a Scheduling Coordinator for other non-generation resources that are capable of providing the specific service and that meet applicable Ancillary Service standards and technical requirements, as set forth in Sections 8.1 through 8.4, and are certified by the CAISO to provide Ancillary Services. The provision of Regulation, Spinning Reserve, Non-Spinning Reserve, and Voltage Support by other non-generation resources is subject to the same requirements applicable to other providers of these Ancillary Services, as set forth in Sections 8.5 through 8.11. Identification of specific services in this CAISO Tariff shall not

preclude development of additional interconnected operation services over time. The CAISO and Market Participants will seek to develop additional categories of these unbundled services over time as the operation of the CAISO Controlled Grid matures or as required by regulatory authorities.

* * *

8.2.3.1 Regulation Service.

The CAISO shall maintain sufficient Generating Units immediately responsive to AGC in order to provide sufficient Regulation service to allow the CAISO Balancing Authority Area to meet Applicable Reliability Criteria by continuously balancing Generation to meet deviations between actual and scheduled Demand and to maintain Interchange Schedules. The quantity of Regulation Down and Regulation Up capacity needed for each Settlement Period of the Day-Ahead Market ~~and the HASP~~, and in each fifteen (15) minute period in Real-Time shall be determined by the CAISO as a percentage of the applicable CAISO Forecast of CAISO Demand for the Day-Ahead, ~~HASP~~, and Real-Time Markets. The CAISO's determination is based upon its need to meet the Applicable Reliability Criteria.

The CAISO will publish on OASIS the estimated quantity, or the percentage used to determine the estimated quantity, of Regulation Reserves required for each hour of the Day-Ahead Market, ~~each hour in the HASP~~, and in each fifteen (15) minute period in Real-Time for the Trading Day.

* * *

8.3.1 Procurement of Ancillary Services.

The CAISO shall operate competitive Day-Ahead, ~~HASP~~, and Real-Time Markets to procure Ancillary Services. The Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) applications used in the Integrated Forward Market (IFM), ~~HASP~~, and the Real-Time Market (RTM) shall calculate optimal resource commitment, Energy, and Ancillary Services Awards and Schedules at least cost to End-Use Customers consistent with maintaining System Reliability. Any Scheduling Coordinator representing Generating Units, System Units, Loads or imports of System Resources may submit Bids into the CAISO's Ancillary Services markets provided that it is in possession of a current certificate for the Generating Units, System Units, imports of System Resources or Loads concerned. Regulation Up, Regulation Down, and Operating Reserves necessary to meet CAISO

requirements not met by self-provision will be procured by the CAISO as described in this CAISO Tariff.

The amount of Ancillary Services procured in the IFM and ~~HASP~~ and in the Real-Time Market is based upon the CAISO Forecast of CAISO Demand plus HASP Intertie Schedule for the Operating Hour net of (i) Self-Provided Ancillary Services from Generating Units internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services and (ii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The CAISO will manage both CAISO procured and Self-Provided Ancillary Services as part of the Real-Time Dispatch. In the Day-Ahead Market, the CAISO procures one-hundred percent (100%) of its Ancillary Service requirements based on the Day-Ahead Demand Forecast net of Self-Provided Ancillary Services. After the Day-Ahead Market, the CAISO procures additional Ancillary Services needed to meet system requirements from all resources, including: ~~(a) imports from~~ System Resources ~~in the HASP~~, and ~~(b) Generation from~~ internal resources to the CAISO Balancing Authority Area in the Real-Time Market. The amount of Ancillary Services procured ~~in the HASP and~~ in the Real-Time Market is based upon the CAISO Forecast of CAISO Demand for the ~~Operating Hour~~ RTUC Time Horizon net of Self-Provided Ancillary Services. The CAISO procurement of Ancillary Services ~~from imports or System Resources in the HASP is for the entire Operating Hour. The procurement of Ancillary Services from Generation internal to the CAISO Balancing Authority Area for the Real-Time Market is for a fifteen (15) minute RTUC Time Horizon~~ time period. The CAISO's procurement of Ancillary Services from imports or System Resources ~~in the HASP and from Generating Units~~ for the Real-Time Market is based on the Ancillary Service Bids submitted in the HASP.

As of the CAISO Operations Date, the CAISO will contract for long-term Voltage Support service with owners of Reliability Must-Run Units under Reliability Must-Run Contracts. Black Start capability will initially be procured by the CAISO through individual contracts with Scheduling Coordinators for Reliability Must-Run Units and other Generating Units which have Black Start capability. These requirements and standards apply to all Ancillary Services whether self-provided or procured by the CAISO.

8.3.2 Procurement Not Limited to CAISO Balancing Authority Area.

The CAISO will procure Spinning Reserves and Non-Spinning Reserves from Generating Units operating within the CAISO Balancing Authority Area and from imports of System Resources. Scheduling

Coordinators are allowed to bid Regulation from resources located outside the CAISO Balancing Authority Area by dynamically scheduling such resources. Each System Resource used to bid Regulation must comply with the Dynamic Scheduling Protocol in Appendix X. When bidding to supply Ancillary Services in the IFM, ~~HASP~~ or RTM, imports compete for use of Intertie transmission capacity when the requested use is in the same direction, e.g., imports of Ancillary Services compete with Energy on Interties in the import direction and exports of Ancillary Services (i.e., on demand obligations) compete with Energy on Interties in the export direction. To the extent there is Congestion, imports of Ancillary Services will pay Congestion costs in the IFM, ~~HASP~~ and RTM markets pursuant to Section 11.

* * *

8.3.3.3 Notice to Market Participants.

Pursuant to Section 6.5.2.3.3, the CAISO will publish forecasted Ancillary Service requirements, regional constraints, and the minimum and/or maximum Ancillary Service Regional Limits for the Ancillary Service Regions and any Sub-Regions by 6:00p.m. prior to the Day-Ahead Market (two days prior to the Operating Day). After the completion of the DAM for a given Trading Day, the CAISO will publish the limits that were used in the DAM. If prior to the close of the Real-Time Market ~~HASP~~ for a Trading Hour the CAISO makes a substantial change to a minimum and/or maximum limit for an Ancillary Service Region or Sub-Region, it will issue a Market Notice as soon as reasonably practicable after the occurrence of the circumstances that led to the change. After the close of the Real-Time Market ~~HASP~~ for a Trading Hour, the CAISO will publish the limits that were used in the ~~HASP~~ RTUC.

* * *

8.3.5 The CAISO shall procure Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve on a daily, hourly and Real-Time basis in the IFM, ~~HASP~~ and RTM, respectively. The CAISO shall procure Ancillary Services on a longer-term basis pursuant to Section 42.1.3 if necessary to meet Reliability Criteria. The CAISO Governing Board must approve all long-term contracts. The CAISO shall contract for Voltage Support annually (or for such other period as the CAISO may determine is economically advantageous) and on a daily or hourly basis as required to maintain System Reliability. The CAISO shall contract annually (or for such other period as the CAISO may determine is economically advantageous) for Black Start Generation.

* * *

8.3.7 Bidding Requirements, Including Submission to Self-Provide an Ancillary Service.

Scheduling Coordinators may submit Bids or Submissions to Self-Provide an Ancillary Service consistent with the rules specified in Section 30 and any further requirements in this Section 8.3.7. Scheduling Coordinators may (i) submit Bids or Submissions to Self-Provide an Ancillary Service from resources located within the CAISO Balancing Authority Area or Dynamic System Resources certified to provide Ancillary Services, (ii) submit Submissions to Self-Provide an Ancillary Service from resources located outside the CAISO Balancing Authority Area if provided pursuant to ETCs, TORs, or Converted Rights, (iii) submit Bids for Ancillary Services from resources located outside the CAISO Balancing Authority Area, or (iv) specify Inter-SC Trades of Ancillary Services. Ancillary Services in the Day-Ahead Market, ~~in the HASP,~~ and in the Real-Time Market are comprised of the following: Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve. Each Generating Unit (including Physical Scheduling Plants), System Unit, Participating Load, or System Resource for which a Scheduling Coordinator wishes to submit Ancillary Service Bids must meet the requirements set forth in this CAISO Tariff. The same resource capacity may be offered into more than one CAISO Ancillary Service auction at the same time. Ancillary Services Bids and Submissions to Self-Provide an Ancillary Service can be submitted up to seven (7) days in advance. Ramp Rates will be only used by the CAISO for procuring capacity associated with the specific Ancillary Services. The CAISO will issue Real-Time Dispatch Instructions in the Real-Time Market for the Energy associated with the awarded capacity based upon the applicable Operational Ramp Rate submitted with the single Energy Bid Curve in accordance with Section 30.10. There is no ability to procure Ancillary Services for export. To the extent a Scheduling Coordinator has an on-demand obligation to serve loads outside the CAISO Balancing Authority Area, it can do so provided that (1) it is using export transmission capacity available in Real-Time, and (2) the resource capacity providing Energy to satisfy the on-demand obligation is not under an RMR Contract or Resource Adequacy Capacity obligation, and has not been paid a RUC Availability Payment for the Trading Hour.

* * *

8.6.2 Right to Self-Provide.

Each Scheduling Coordinator may choose to self-provide all, or a portion, of its Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve obligations in the Day-Ahead Market, and, to the extent needed to satisfy CAISO's additional requirement, ~~HASP and the Real-Time Market~~, from resources eligible for self-provision. The right to self-provide Ancillary Services from capacity that is under a contractual obligation to provide Energy, including but not limited to capacity subject to an RMR Contract and local Resource Adequacy Resources, shall be conditional; self-provision of Ancillary Services from such capacity will only be permitted to the extent that capacity is not needed for Energy as a result of the MPM-RRD process described in this CAISO Tariff. To self-provide Ancillary Services a Scheduling Coordinator must provide the CAISO with a Submission to Self-Provide an Ancillary Service. Both Ancillary Service Bids and Submissions to Self-Provide an Ancillary Service can be provided to the CAISO for the same Ancillary Service and for the same hour in the same market. To the extent the Submission to Self-Provide an Ancillary Service is from a resource that is a Partial Resource Adequacy Resource, and Energy is needed, including for purposes under Section 31.3.1.3, from that resource the CAISO shall only disqualify the self-provision of Ancillary Services from the portion of the resource's capacity that has must-offer obligation, provided that the Scheduling Coordinator has not submitted an Energy Bid for the capacity that is not subject to a must-offer obligation. If there is an Energy Bid submitted for the capacity of a Partial Resource Adequacy Resource that is not subject to a must-offer obligation the CAISO may disqualify the Submission to Self-Provide an Ancillary Service for the portion of the resources capacity that is not under a must-offer obligation consistent with the principles of co-optimization under the CAISO Tariff.

Prior to evaluating Ancillary Service Bids, the CAISO will determine whether Submissions to Self-Provide Ancillary Services are feasible with regard to resource operating characteristics and regional constraints and are qualified to provide the Ancillary Services in the markets for which they were submitted.

If the total Submissions to Self-Provide Ancillary Services exceed the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region, the submissions that would otherwise be accepted by the CAISO as feasible and qualified will be awarded on a pro-rata basis among the suppliers offering to self-provide the Ancillary Service up to the amount of the requirement. If a regional constraint imposes a limit on the total amount of Regulation Up, Spinning Reserve, and Non-Spinning Reserve, and

the total self-provision of these Ancillary Services in that region exceeds that limit, Self-Provided AS are qualified pro rata from higher to lower quality service in three tiers: Regulation Up first, followed by Spinning Reserve, and then by Non-Spinning Reserve. Following this process, unless a higher quality Self-Provided Ancillary Service in a constrained region is fully qualified, the pro rata allocation in the subsequent lower quality Self-Provided Ancillary Service for that region will be nil. Submissions to Self-Provide Ancillary Services in excess of the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region will not be accepted and qualified by the CAISO as Self-Provided Ancillary Services.

The CAISO shall schedule Self-Provided Ancillary Services in the Day-Ahead Market and the RTM and Dispatch Self-Provided Ancillary Services in the Real-Time. To the extent that a Scheduling Coordinator self-provides Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve, the CAISO shall correspondingly reduce the quantity of the Ancillary Services it procures from Bids submitted in the Day-Ahead Market, ~~HASP~~, and the Real-Time Market. To the extent a Scheduling Coordinator's Self-Provided Ancillary Service for a particular Ancillary Service is greater than the Scheduling Coordinator's obligation for that particular Ancillary Service in a Settlement Interval, the Scheduling Coordinator will receive the user rate for the Self-Provided Ancillary Service for the amount of the Self-Provided Ancillary Service in excess of the Scheduling Coordinator's obligation.

Scheduling Coordinators may trade Ancillary Services so that any Scheduling Coordinator may reduce its Ancillary Services Obligation through purchase of Ancillary Services capacity from another Scheduling Coordinator, or self-provide in excess of its obligation to sell Ancillary Services to another Scheduling Coordinator.

* * *

8.7 Scheduling of Units to Provide Ancillary Services.

The CAISO shall provide Scheduling Coordinators with Ancillary Services Awards for the Day-Ahead, ~~HASP~~ and Real-Time Markets. The CAISO shall notify each Scheduling Coordinator no later than 1:00 p.m. of the day prior to the Operating Day of their Ancillary Service Awards and Ancillary Service Schedules for the Day-Ahead Market; ~~no later than one (1) hour prior to the Operating Hour of their Ancillary Services Schedules for Ancillary Services from imports or System Resources in the HASP;~~ and

no later than fifteen (15) minutes prior to the next Commitment Interval ~~Operating Hour~~ in the Real-Time Market. Where long-term contracts are involved, the information may be treated as standing information for the duration of the contract.

Once the CAISO has given Scheduling Coordinators notice of the Day-Ahead Market, ~~HASP~~ and Real-Time Market Ancillary Service Awards and Ancillary Service Schedules, these awards and Schedules represent binding commitments made in the markets between the CAISO and the Scheduling Coordinators concerned, subject to any amendments issued as described above.

* * *

11.10.1.2 ~~NOT USED~~ ~~Ancillary Services Provided in HASP.~~

~~For Ancillary Services provided from System Resources in the HASP, hourly pre-dispatch schedules, awards, and prices are established in HASP optimization. Suppliers of Ancillary Services from System Resources are paid an amount equal to the product of the simple average of the ASMPs computed four 15-minute intervals of HASP for the each Ancillary Service times the quantity of the capacity awarded for the Ancillary Service for the Settlement Period. Scheduling Coordinators for resources that receive an Ancillary Service Award in the Day-Ahead Market that are unable to satisfy their Ancillary Services Obligation due to an Outage or derate, may use the HASP to substitute another resource to provide the awarded Ancillary Service. The Scheduling Coordinator for the substituting resource must: (a) submit an Outage notification to the CAISO indicating that the awarded resource is not available, and (b) provide another resource to fulfill the awarded Ancillary Service. The substitution must clear the co-optimization in HASP (including Ancillary Service Regional Limits) and the substitution will be exposed to a price difference between the ASMPs, or if self provided, between the ASMP and the user rate, if any. Scheduling Coordinators that receive an Ancillary Service Award at the Scheduling Point in HASP are charged the simple average of the 15-minute MCC using the relevant Shadow Price of the applicable congested Scheduling Point.~~

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27.4.1 Security Constrained Unit Commitment.

The CAISO uses SCUC to run the MPM-RRD processes associated with the DAM and the HASP, the

IFM, the RUC, the HASP, the STUC and the RTUC. SCUC uses a multi-interval Time Horizon to commit and schedule resources and to meet Demand for which Bids have been submitted and procure AS in the IFM, and to meet the CAISO Forecast of CAISO Demand in the MPM-RRD, RUC, HASP, STUC and RTUC. In the Day-Ahead MPM-RRD, IFM and RUC processes, the SCUC optimizes over the twenty-four (24) hourly intervals of the next Trading Day. In the RTUC, which runs every fifteen (15) minutes, the SCUC optimizes over from four to seven 15-minute intervals comprising a portion of the current or imminent Trading Hour and the entire subsequent Trading Hour. In the HASP, which is a special run of the RTUC that runs once per hour just before the top of the hour, and its associated MPM-RRD process, the SCUC optimizes over seven (7) 15-minute intervals comprising the last forty-five (45) minutes of the imminent Trading Hour and the entire subsequent Trading Hour. Following the HASP run of the RTUC, each of the next three runs of the RTUC successively drops one 15-minute interval from the front of the optimization Time Horizon. In the STUC, the SCUC optimizes over seventeen fifteen-minute intervals comprising of the last fifteen (15) minutes of the imminent Trading Hour and the entire next four Trading Hours. The CAISO will ~~also utilize the SCUC algorithm on a two-day-ahead basis to~~ commit Extremely Long Start Resources, for which commitment in the DAM does not provide sufficient time to Start-Up and be available to supply Energy during the next Trading Day as provided in Section 31.7.

* * *

30.7.6.2 Treatment of Ancillary Services Bids.

When Scheduling Coordinators bid into the Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve markets, they may submit Bids for the same capacity into as many of these markets as desired at the same time by providing the appropriate Bid information to the CAISO. The CAISO optimization will evaluate AS Bids simultaneously with Energy Bids. A Scheduling Coordinator may specify that its Bid applies only the markets it desires. A Scheduling Coordinator shall also have the ability to specify different capacity prices for the Spinning Reserve, Non-Spinning Reserve, and Regulation markets. A Scheduling Coordinator providing one or more Regulation Up, Regulation Down, Spinning Reserve or Non-Spinning Reserve services may not change the identification of the Generating Units offered in the Day-Ahead Market, ~~HASP~~ or in the Real-Time Market for such services unless specifically approved by the CAISO (except with respect to System Units, if any, in which case

Scheduling Coordinators are required to identify and disclose the resource specific information for all Generating Units and Participating Loads constituting the System Unit for which Bids and Submissions to Self-Provide Ancillary Services are submitted into the CAISO's Day-Ahead Market, ~~HASP~~ and Real-Time Market.

The following principles will apply in the treatment of Ancillary Services Bids in the CAISO Markets:

- (a) not differentiate between bidders for Ancillary Services and Energy other than through cost, price, effectiveness, and capability to provide the Ancillary Service or Energy, and the required locational mix of Ancillary Services;
- (b) select the bidders with most cost effective Bids for Ancillary Service capacity which meet its technical requirements, including location and operating capability to minimize the costs to users of the CAISO Controlled Grid;
- (c) evaluate the Day-Ahead Bids over the twenty-four (24) Settlement Periods of the following Trading Day along with Energy, taking into transmission constraints and AS Regional Limits;
- ~~(d) evaluate Bids in the HASP and establish Ancillary Service Awards from imports at approximately sixty-five (65) minutes prior to the hour of operation;~~
- ~~(ed)~~ evaluate Import Bids along with internal resources ~~Bids and establish hourly Ancillary Service Awards in the HASP;~~
- ~~(fe)~~ establish Real-Time Ancillary Service Awards through RTUC from imports and generation internal to the CAISO Balancing Authority Area at fifteen (15) minutes intervals to the hour of operation; and
- ~~(gf)~~ procure sufficient Ancillary Services in the Day-Ahead, ~~HASP~~, and Real-Time Markets to meet its forecasted requirements.

30.7.7 Format and Validation of Operational Ramp Rates.

The submitted Operational Ramp Rate expressed in megawatts per minute (MW/min) as a function of the operating level, expressed in megawatts (MW), must be a staircase function with up to four segments.

There is no monotonicity requirement for the Operational Ramp Rate. The submitted Operational Ramp Rate shall be validated as follows:

- (a) The range of the submitted Operational Ramp Rate must cover the entire capacity of the resource, from the minimum to the maximum operating capacity, as registered in the Master File for the relevant resource.
- (b) The operating level entries must match exactly (in number, sequence, and value) the corresponding minimum and maximum Operational Ramp Rate breakpoints, as registered in the Master File for the relevant resource.
- (c) If a Scheduling Coordinator does not submit an Operational Ramp Rate for a generating unit for a day, the CAISO shall use the maximum Ramp Rate for each operating range set forth in the Master File as the Ramp Rate for that unit for that same operating range for the Trading Day.
- (d) The last Ramp Rate entry shall be equal to the previous Ramp Rate entry and represent the maximum operating capacity of the resource as registered in the Master File. The resulting Operational Ramp Rate segments must lie between the minimum and maximum Operational Ramp Rates, as registered in the Master File.
- (e) The submitted Operational Ramp Rate must be the same for each hour of the Trading Day, i.e., the Operational Ramp Rate submitted for a given Trading Hour must be the same with the one(s) submitted earlier for previous Trading Hours in the same Trading Day.
- (f) Outages that affect the submitted Operational Ramp Rate must be due to physical constraints, reported in SLIC and are subject to CAISO approval. All approved changes to the submitted Operational Ramp Rate will be used in determination of Dispatch Instructions for the shorter period of the balance of the Trading Day or duration of reported Outage.

(g) If an Operational Ramp Rate is derated in SLIC, the Ramp Rate will only be to four segments. Ramping capability through Forbidden Operating Regions are not affected by derates entered in SLIC.

(h) The amount of change in Ramp Rates from one operating range to a subsequent operating range must not exceed a 10 to 1 ratio, and any Ramp Rate change in excess will be adjusted to achieve the 10 to 1 ratio. This adjustment will also include the implicit ramp rate in the Forbidden Operating Region.

(h_i) For all CAISO Dispatch Instructions of Reliability Must-Run Units the Operational Ramp Rate will be the Ramp Rate declared in the Reliability Must Run Contract Schedule A.

* * *

31.3 Integrated Forward Market.

After the MPM-RRD and prior to RUC, the CAISO shall perform the IFM. The IFM performs Unit Commitment and Congestion Management, clears the Energy Bids as modified and in the MPM-RRD, taking into account transmission limits and honoring technical and inter-temporal operating Constraints, such as Minimum Run Times, and procures Ancillary Services to meet one hundred percent (100%) of the CAISO Forecast of CAISO Demand requirements. The IFM utilizes a set of integrated programs that: (1) determine Day-Ahead Schedules and AS Awards, and related LMPs and ASMPs; and (2) optimally commits resources that are bid in to the DAM. The IFM utilizes a SCUC algorithm that optimizes Start-Up Costs, Minimum Load Costs, and Energy Bids along with any Bids for Ancillary Services as well as Self-Schedules submitted by Scheduling Coordinators. The IFM also provides for the optimal management of Use-Limited Resources. The ELS Resources committed through the ELC Process conducted two days before the day the IFM process is conducted for the next Trading Day as described in Section 31.7 are binding and the IFM process will model such capacity as capacity that is under a contractual obligation to provide.

* * *

31.5.1.1 Capacity Eligible for RUC Participation.

RUC participation is voluntary for capacity that has not been designated as Resource Adequacy Capacity. Scheduling Coordinators may make such capacity available for participation in RUC by submitting a RUC Availability Bid, provided the Scheduling Coordinator has also submitted an Energy Bid for such capacity into the IFM. Capacity from Non-Dynamic System Resources that has not been designated Resource Adequacy Capacity is not eligible to participate in RUC. Capacity from resources including System Resources that has been designated as qualified Resource Adequacy Capacity must participate in RUC. RUC participation is required for Resource Adequacy Capacity to the extent that Resource Adequacy Capacity is not committed following the IFM. System Resources eligible to participate in RUC will be considered on an hourly basis; that is, RUC will not observe any multi-hour block constraints and the Energy Limits that may have been submitted in conjunction with Energy Bids to the IFM. RMR Unit capacity will be considered in RUC in accordance with Section 31.5.1.3. MSS resources may participate in RUC in accordance with Section 31.5.2.3. COG resources are accounted for in RUC, but may not submit or be paid RUC Availability Payments. The ELS Resources committed through the ELC Process conducted two days before the day the RUC process is conducted for the next Trading Day as described in Section 31.7 are binding and the RUC process will model such capacity as capacity that is under a contractual obligation to provide.

* * *

31.7 Extremely Long-Start Commitment Process.

The CAISO shall perform the Extremely Long-Start Commitment Process (ELC Process) after the regular DAM results are posted. ~~During the ELC Process the CAISO shall use a 48-hour simultaneous SCUC to assist it in determining the commitment of ELS Resources.~~ ELS Resources are flagged in the Master File and are the only resources eligible to be committed in the ELC Process.

~~31.7.1 Execution of the Extremely Long-Start Commitment Process.~~

Each day after the DAM results are posted, the CAISO shall conduct the ELC Process to determine commitment of ELS Resources to be available to the CAISO Markets in the second day out. The CAISO will use the latest CAISO Forecast of CAISO Demand available to the CAISO for the Trading Day two days ahead of the current day that the ELC Process is executed. For commitment purposes for a resource whose start-up time would exceed the definition of an ELS based on the resources initial

~~condition and cooling time, the CAISO will consider DAM Bids from ELS Resources as Bids for the Trading Day two days ahead of the current day that the ELC Process is executed. For the purpose of conducting the ELC Process, the CAISO will set the Ancillary Services requirements for the second day out based on the CAISO Forecast of CAISO Demand and forecasted firm imports. The CAISO shall execute a 48-hour simultaneous SCUC process to inform the decisions made in the ELC Process. The result of the 48-hour simultaneous SCUC process shall be reviewed by the CAISO Operator. The CAISO Operator shall use its operator judgment consistent with Good Utility Practice to determine whether the commitment instructions to the ELS Resources for the second day in the 48-hour Time Horizon time period should be implemented committed. The ELC Process shall does not dispatch Energy for the ELC Process Time Horizon 48-hour time period and therefore the commitment instructions de will not include megawatts schedules greater than the Minimum Load. ELS Resources receiving a commitment instruction are obligated to resubmit the same Bid in the next day's Day-Ahead Market. The Energy and Ancillary Service requirements are re-evaluated by the IFM executed the day after the applicable ELC Process. The Commitment Statuses of the ELS Resources are passed to the Bid validation process for use in the DAM for the Trading Day two days after the current day when the ELC Process is executed.~~

~~31.7.2 Inputs Used in the Extremely Long Start Commitment Process.~~

~~31.7.2.1 Energy Bids and Ancillary Services Bids for the First Day of the ELC Process Time Horizon.~~

~~The commitment results that have been determined in the DAM for the Trading Day as reflected in the Day-Ahead Schedule and RUC Schedule issued on the current day that the ELC Process is executed, representing the first day of the 48-hour ELC Process, are modeled as self-committed. These resources are modeled as self-scheduled at the greater of the Day-Ahead Schedule for Energy or RMR Generation requirement, plus any RUC Awards for the purpose of running the 48-hour SCUC optimization in the ELC Process. This self-scheduled consideration is only for modeling purposes and does not affect eligibility for BCR of such resources for that Trading Day. The Self-Provided Ancillary Services and the Ancillary Service Awards produced by the IFM application on the current day that the ELC Process is executed are fixed in the applicable ELC Process and, therefore, the ELC Process does not procure any additional Ancillary Services for the first day of the ELC Process Time Horizon.~~

31.7.2.2 Energy Bids and Ancillary Services Bids for the Second Day of the ELC Process Time Horizon.

For all resources that are not ELS Resources, Bids for Supply of Energy and Ancillary Services submitted for the first Trading Day of the ELC Process as submitted for the DAM for the same Trading Day are replicated as a surrogate for the Bids for the second Trading Day of the ELC Process Time Horizon. For all ELS Resources, Bids submitted for the Trading Day two days ahead of the current day on which the ELC Process is executed will be used as the Bids used for the second Trading Day of the ELC Process Time Horizon.

31.7.2.3 Outages Considerations.

Any resource and transmission Outages and de-rates, including Ramp Rate de-rates, are considered in the applicable Commitment Intervals in the two-day Time Horizon.

31.7.2.4 Initial and Boundary Conditions.

The CAISO will make the following assumptions in the ELC Process regarding resources already committed:

- (1) A resource that is committed by the IFM in a Trading Hour in the Trading Day is considered committed in the same hour in the same Trading Day within the ELC Process Time Horizon.
- (2) A resource that has an RMR Generation requirement in a Trading Hour in the Trading Day is considered committed in the same hour in the same Trading Day within the ELC Process Time Horizon.
- (3) A resource that has a RUC Schedule in a Trading Hour in the Trading Day is considered committed in the same hour in the same Trading Day within the ELC Process Time Horizon.

31.7.2.5 Constraints.

The ELC Process optimization will enforce the same Constraints that are enforced in RUC on the day the ELC Process is executed. These include but are not limited to the following:

- (1) ~~The Energy balancing Constraints to meeting CAISO Forecast of CAISO Demand adjustable by RUC Zones.~~
- (2) ~~The resource Constraints including capacity, Ramp Rates, Energy Limits, Forbidden Operating Regions, Minimum Run Time and Minimum Down Time Constraints, considering any Outages in the ELC Process Time Horizon.~~
- (3) ~~The transmission Constraints including branch limits, Transmission Interface limits, and Nomograms, considering any Outages in the ELC Process Time Horizon.~~
- (4) ~~Both Self Provided Ancillary Services and Ancillary Services Awards are fixed for the first day of the ELC Process Time Horizon. The AS requirements, as used in the IFM, remain the same for the first day of the ELC Process Time Horizon optimization. The Ancillary Services requirements for the second day of the ELC Process Time Horizon are specified for the ELC Process optimization using the Ancillary Services procurement process.~~

~~31.7.3 Output of Extremely Long Start Commitment Process.~~

~~The results of the ELC Process are produced by 1500 hours two days ahead of the Trading Day. The results of the ELC Process indicate the commitment decisions for ELS Resources that were made in the ELC Process the day before. These commitment decisions are binding and the DAM applications model the committed ELS Resources as resources that are under a contractual obligation to provide. The CAISO Commitment Period or Self-Commitment Period determination for the ELS Resources depends on the DAM results and the Clean and Generated Bids, following the same rules that apply to other resources. All Commitment Intervals for the ELS Resources will be classified as CAISO Commitment Periods, unless there is a Self-Schedule or Self-Provided AS for that interval.~~

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~~33.7 [NOT USED] Ancillary Services in the HASP and the RTUC.~~

~~To maintain required Ancillary Services when changes in forecasts of Demand and resource Outages occur after the Day Ahead AS Awards are established, the CAISO utilizes the RTUC runs, including the~~

~~HASP, to procure additional Ancillary Services needed to meet Reliability Criteria. The HASP meets the expected need for additional Ancillary Services for the Trading Hour by utilizing the optimal mix of Ancillary Services from System Resources and from Generating Units. Only the AS from System Resources are binding AS Awards, and these are for the full Trading Hour. Those Generating Units designated in the HASP to provide Ancillary Services for the same Trading Hour are given non-binding advisory AS Awards as a result of the HASP because the use of Generating Units to provide AS will be re-optimized by a subsequent RTUC that is run closer to the time the AS will actually be needed, as described in Section 34.2. The HASP AS Awards for System Resources are settled at hourly ASMPs that are calculated in the HASP as described in Section 33.8. All Operating Reserves procured in HASP are Contingency Only Operating Reserves.~~

33.8 HASP Prices for HASP Intertie Schedules and HASP AS Awards.

~~The RTUC will produce fifteen-minute LMPs for the four fifteen-minute RTUC intervals for the applicable Trading Hour. The fifteen-minute LMPs corresponding to the Scheduling Points are then used to derive a simple average hourly price for the Settlement of hourly Intertie Schedules at each Scheduling Point. The RTUC will also produce fifteen minute ASMPs for the four fifteen minute intervals for the applicable Trading Hour. These fifteen minute ASMPs are then used to derive an average hourly price for the Settlement of hourly HASP AS Awards. The RTUC run will also produce fifteen minute Shadow Prices for each of the Interties for the four fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute Shadow Prices are then used to derive an average hourly price for charging hourly Intertie AS Award providers for Congestion on the Interties. HASP Intertie Schedules and HASP AS Awards are settled in accordance with Sections 11.4 and 11.10.1.2 respectively.~~

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34.2.2 Real-Time Ancillary Services Procurement.

If the CAISO determines that additional Ancillary Services are required, other than those procured in the DAM and ~~the HASP~~, the RTUC will procure Ancillary Services on a fifteen-minute basis as necessary to meet reliability requirements and will determine Real-Time Ancillary Service interval ASMPs for such AS for the next Commitment Period. All Operating Reserves procured in the RTM are considered Contingency Only Operating Reserves. Any Ancillary Service awarded in RTUC will be taken as fixed for

the three five-minute RTD intervals of its target fifteen-minute interval. In the RTUC, all resources certified and capable of providing Operating Reserves that have submitted Real-Time Energy Bids shall also submit applicable Spinning or Non-Spinning Reserves Bids, respectively, depending on whether the resource is online or offline. The CAISO will utilize the RTUC to procure Operating Reserves to restore its Operating Reserve requirements in cases when: (1) Operating Reserves awarded in DAM ~~or HASP~~ have been dispatched to provide Energy, (2) resource(s) awarded to provide Operating Reserves in the DAM ~~or HASP~~ are no longer capable of providing such awarded Operating Reserves, or (3) the Operator determines that additional Operating Reserves are necessary to maintain Operating Reserves within Applicable Reliability Criteria. The CAISO will utilize the RTUC to procure additional Regulation capacity in Real-Time in cases when: (1) resource(s) awarded to provide Regulation in the DAM ~~or HASP~~ are no longer capable of providing such awarded Regulation, or (2) the Operator determines that additional Regulation is necessary to maintain sufficient control consistent with Applicable Reliability Criteria and Good Utility Practice. The RTUC will produce fifteen-minute ASMPs for the four binding fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute ASMPs are then used for the Settlement of the fifteen minute AS Awards. The RTUC run will also produce fifteen-minute Shadow Prices for each of the Interties for the four fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute Shadow Prices are then used to charge for Intertie Real-Time AS Award providers for Congestion on the Interties. RTUC AS Awards are settled in accordance with 11.10.1.3.

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34.3 Real-Time Dispatch.

The RTD can operate in three modes: RTED, RTCD and RTMD. The RTD (RTED and RTCD mode) uses a Security Constrained Economic Dispatch (SCED) algorithm every five (5) minutes throughout the Trading Hour to determine optimal Dispatch Instructions to balance Supply and Demand ~~and maintain required Ancillary Service quantities for the next binding target interval~~. The Real-Time Economic Dispatch (RTED) will be used under most circumstances and will optimally dispatch resources based on their Energy Bids, excluding Contingency Only Operating Reserves except when needed to avoid an imminent System Emergency. The Real-Time Contingency Dispatch (RTCD) will be invoked when a transmission or generation contingency occurs and will include all Contingency Only Operating Reserves

in the optimization. The Real Time Manual Dispatch (RTMD) will be invoked as a fall-back mechanism only when the RTED or RTCD fails to provide a feasible Dispatch. These three modes of the RTD are described in Sections 34.3.1 to 34.3.3.

* * *

34.13 Treatment of Resource Adequacy Capacity in the Real-Time Market.

Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40 shall be required to submit Energy Bids for: (1) all such Resource Adequacy Capacity and (2) any Ancillary Services capacity awarded or self-provided in the Day-Ahead, ~~the HASP or~~ Real-Time Market. In the absence of submitted Bids, as part of the validation described in 30.7, Generated Bids will be used for Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40. For any capacity from a Resource Adequacy Resource not required to offer Resource Adequacy Capacity in accordance with Section 40 that was awarded or is self-providing Operating Reserves capacity in the Day-Ahead Market, Scheduling Coordinators must submit an Energy Bid for no less than the amount of awarded or self-provided Operating Reserves capacity above their Day-Ahead Schedule. Resource Adequacy Resources that are not required to offer their Resource Adequacy Capacity in accordance with Section 40 may voluntarily submit Energy Bids. Submitted Energy Bids shall be subject to the maximum and minimum Bid requirements and Mitigation Measures as set forth in Section 39.

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34.15.1 Resource Constraints.

The SCED shall enforce the following resource physical Constraints:

- (a) Minimum and maximum operating resource limits. Outages and limitations due to transmission clearances shall be reflected in these limits. The more restrictive operating or regulating limit shall be used for resources providing Regulation so that the SCED shall not Dispatch them outside their Regulating Range.
- (b) Forbidden Operating Regions. When ramping in the Forbidden Operating Region, the implicit ramp rate as determined from the resource's transit time will

be used when Dispatching in the Forbidden Operating Region even if the Forbidden Operating Region constraint is not enforced through the SCED process. Resources can only be ramped through these regions. The SCED shall not Dispatch resources within their Forbidden Operating Regions unless at the maximum applicable Ramp Rate to clear the Forbidden Operating Region in consecutive Dispatch Intervals. Resources ramping through a Forbidden Operating Region shall not set LMP at its location and cannot provide Ancillary Services and will not be called upon to provide Ancillary Services, unless the resource can cross the Forbidden Operating Region in less than twenty (20) minutes.

- (c) Operational Ramp Rates and Start-Up Times. The submitted Operational Ramp Rate for resources that are not providing Regulation, and the submitted Regulation Ramp Rate for resources that are providing Regulation shall be used for all Dispatch Instructions. The Ramp Rate for Non-Dynamic System Resources cleared in the HASP will not be observed. Rather, the ramp of the Non-Dynamic System Resource will respect inter-Balancing Authority Area Ramping conventions established by WECC. Ramp Rates for Dynamic System Resources will be observed like Participating Generators in the RTD. Each Energy Bid shall be Dispatched only up to the amount of Imbalance Energy that can be provided within the Dispatch Interval based on the applicable Operational Ramp Rate or Regulation Ramp Rate. The Dispatch Instruction shall consider the relevant Start-Up Time as, if the resource is off-line, the relevant Ramp Rate function, and any prior commitments such as Schedule changes across hours and previous Dispatch Instructions. The Start-Up Time shall be determined from the Start-Up Time function and when the resource was last shut down. The Start-Up Time shall not apply if the corresponding resource is on-line or expected to start. The CAISO Markets optimization considers fast and slow Ramping resources. Fast Ramping resources can ramp from PMin to PMax based on their

Operational Ramp Rate in twenty (20) minutes or less. Slow Ramping resources take more than twenty (20) minutes to ramp from PMin to PMax based on their Operational Ramp Rate. The CAISO determines whether it is appropriate to procure Ancillary Services or Energy from fast Ramping and slow Ramping resources based on the RTUC optimization.

- (d) Maximum Number of Daily Start-Ups. The SCED shall not cause a resource to exceed its daily maximum number of Start-Ups.
- (e) Minimum Up and Down time. The SCED shall not start up off-line resources before their Minimum Down Time expires and shall not shut down on-line resources before their minimum up time expires.
- (f) Operating (Spinning and Non-Spinning) Reserve. The SCED shall Dispatch Spinning and Non-Spinning Reserve subject to the limitations set forth in Section 34.16.3.
- (g) Non-Dynamic System Resources. If Dispatched, each Non-Dynamic System Resource flagged for hourly pre-dispatch in the next Trading Hour shall be Dispatched to operate at a constant level over the entire Trading Hour. The HASP shall perform the hourly pre-dispatch for each Trading Hour once prior to the Operating Hour. The hourly pre-dispatch shall not subsequently be revised by the SCED and the resulting HASP Intertie Schedules are financially binding and are settled pursuant to section 11.4.
- (h) Daily Energy use limitation to the extent that Energy limitation is expressed in a resource's Bid. If the Energy Limits are violated for purposes of Exceptional Dispatches for System Reliability, the Bid will be settled as provided in Section 11.5.6.1.

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34.19.2.3 Eligibility to Set the Real-Time LMP.

All Generating Units, Participating Loads, Dynamic System Resources, System Units, or COGs subject to the provisions in Section 27.7, with Bids, including Default Energy Bids, that are unconstrained due to Ramp Rates or other temporal Constraints are eligible to set the LMP, provided that the Generating Unit, Participating Load, Dynamic System Resource, or System Unit is Dispatched within its submitted Economic Bid range. If a resource is Dispatched beyond its Economic Bid range, or the CAISO enforces a resource-specific Constraint on the resource due to an RMR or Exceptional Dispatch, ~~or the resource is Ramping through a Forbidden Operating Region,~~ the resource will not be eligible to set the LMP. Resources identified as MSS Load following resources are not eligible to set the LMP. A resource constrained at an upper or lower operating limit, ~~a boundary of a Forbidden Operating Region~~ or dispatched for a quantity of Energy such that its full Ramping capability is constraining the ability of the resource to be dispatched for additional Energy in target interval, cannot be marginal (i.e., it is constrained by the Ramping capability) and thus is not eligible to set the Dispatch Interval LMP. Non-Dynamic System Resources are not eligible to set the Dispatch Interval LMP. Dynamic System Resources are eligible to set the Dispatch Interval LMP. A Constrained Output Generator that has the ability to be committed or shut off within the two-hour Time Horizon of the RTM will be eligible to set the Dispatch Interval LMP if any portion of its Energy is necessary to serve Demand. Dispatches of Regulation resources by EMS in response to AGC will not set the RTM LMP. Dispatches of Regulation resources to a Dispatch Operating Point by RTM SCED will be eligible to set the RTM LMP.

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CAISO Tariff Appendix A

Master Definitions Supplement

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Commitment Interval

The fifteen minute period of time for which the CAISO commits resources or procures Ancillary Services through the Real-Time Unit Commitment process.

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Attachment C

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/erate 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, 2003; 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.