July 30, 2013

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

Re: California Independent System Operator Corporation
Docket No. ER13-____- 000

Amendment to California ISO FERC Electric Tariff to Require Registration of Multi-Stage Generation Resources and Modify the Minimum Load Costs Tolerance Band Test for Bid Cost Recovery

Dear Secretary Bose:

Pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, and Part 35 of the Federal Energy Regulatory Commission's (FERC or the Commission) regulations, 18 C.F.R. Part 35, and in compliance with Order No. 714 regarding electronic filing of tariff submittals,[1] the California Independent System Operator Corporation (ISO) hereby submits for filing the attached amendment to its Fifth Replacement FERC Electric Tariff. This amendment would enable the ISO to: (1) require certain resources that are operable in multiple configurations to register as multi-stage generation resources; and (2) modify the minimum load cost tolerance band test to eliminate the possibility for a resource to receive minimum load cost recovery payments when the resource is not actually producing at minimum load.

The ISO respectfully requests that the proposed tariff provisions become effective on November 1, 2013.

[1] *Electronic Tariff Filings*, Order No. 714, FERC Stats. & Regs. ¶ 31,276 (2008).

I. BACKGROUND

In 2011, the ISO made two emergency tariff amendment filings that were necessary to mitigate observed adverse market behavior that was leading to an unjustifiable increase in bid cost recovery payments. The Commission approved the ISO's proposed tariff amendments.[2] In one of the filings, the ISO committed to hold a stakeholder process to consider what additional changes or refinements related to the bid cost recovery mechanism may be appropriate, in addition to the specific amendments proposed in the emergency filings.

In November 2011, the ISO commenced the promised stakeholder process to consider what additional tariff amendments or other steps were appropriate in light of the two emergency filings.[3] The stakeholder process identified five potential issues: (1) revising the 200% proxy costs cap on the registered start-up and minimum load costs;[4] (2) improving the monitoring and reporting of bid cost recovery payments;[5] (3) revising bid cost recovery rules specific to intertie resources;[6] (4) making participation in the

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[2] *Cal. Indep. Sys. Operator Corp.*, Tariff Revision and Request for Waiver of Sixty Day Notice Requirements, FERC Docket No. ER11-3856 (Jun. 22, 2011); *Cal. Indep. Sys. Operator Corp.*, Tariff Revision and Request for Expedited Treatment, FERC Docket No. ER11-3149 (Mar. 18, 2011, as amended by errata, Mar. 25, 2011).

[3] Concurrent with the promised stakeholder process, the ISO conducted a separate stakeholder process to develop market rule changes to pay bid cost recovery separately for the day-ahead and real-time markets. This stakeholder process, and a subsequent stakeholder process, also considered refinements to bid cost recovery that were related to aspects of circumstances addressed in the emergency filings that would be exacerbated by separately paying bid cost recovery for the day-ahead and real-time markets. The ISO has not yet filed the proposed tariff changes resulting from these other two stakeholder processes but anticipates doing so this year.

[4] The ISO concluded that changes to the registered cost cap must be considered holistically with other potential changes to commitment costs rather than in isolation. In its filing, the ISO committed to address changes to the registered cost option and its cap in the Commitment Costs, Part 2 stakeholder initiative which was scheduled at that time to commence in the first quarter of 2012. As a result of that stakeholder process, the ISO concluded that the cap should be lowered to 150 percent of the registered costs. The ISO will propose these changes in a separate tariff filing, with a proposed effective date planned for November 1, 2013.

[5] In response to this request to improve the reporting of uplift payments the ISO modified its monthly market performance reports which include daily shortfalls by market (integrated forward market, residual unit commitment and real-time) and daily bid cost recovery provided on the ISO website at: http://www.caiso.com/Documents/Market%20performance%20reports. The ISO modified these reports in response to stakeholder requests to include the requested breakdown of costs and revenues at a monthly aggregation. The ISO provides these reports based on rolling six months of data so that longer term trends can be identified.

[6] One stakeholder raised a potential issue that non-resource specific system resources that import at the ISO interties can avoid netting of energy costs and revenues over the course of the day by employing multiple resource identification numbers at a particular tie point. The ISO concluded that any impact of such a practice would be minimal given that the only netting that can be avoided by such resources is for energy bid cost recovery since such resources do not recover their minimum load or start-

multi-stage generating unit modeling functionality mandatory; and (5) modifying the minimum load cost tolerance band test. Through the stakeholder process, the ISO determined that the first three issues would be better addressed through existing ISO procedures and stakeholder processes. The ISO, in conjunction with its stakeholders, determined that the fourth and fifth issues should be considered in the new stakeholder process that preceded the filing of the instant tariff amendments.

II. DISCUSSION OF FILING

A. Mandatory MSG

1. Development of the Forbidden Operating Region Functionality as a Bridge to the Multi-Stage Modeling Functionality

A basic challenge in operating a centralized unit dispatch is how to handle the unique operational and economic parameters of combined cycle generating units and other resources that have multiple operating or regulating ranges that limit the resource to operating in only one of those ranges at any particular point in time. Prior to the launch of its new market system on April 1, 2009, the Commission ordered the ISO to implement functionality to model combined cycle resources within three years of the start of the new market.[7]

The initial design of the ISO's new market contained functionality for modeling a resource's forbidden operating regions, which was meant partially to address the challenge posed by combined cycle (and similar) units. A forbidden operating region is a range of output through which a resource can transit but within which it cannot operate reliably.[8] Through this functionality, the market software is programmed to dispatch a unit across the forbidden region once it enters the region. The unit only operates in the forbidden region while it transitions through it. Additionally, the functionality considers the time needed to cross through the forbidden region. Due to performance issues observed during market simulation prior to the start of its nodal market in 2009, the ISO was forced to defer the implementation of the full scope of this forbidden operating region functionality.[9] Those issues were resolved and the forbidden operating region functionality was implemented fully on April 15, 2010.[10]

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up costs through the ISO market. Moreover, intertie pricing issues are being addressed in the ISO's ongoing efforts to address real-time market pricing, which are currently being considered in the ISO's market redesign in support of compliance with Commission Order No. 764.

[7] *Cal. Indep. Sys. Operator Corp.*, 116 FERC ¶ 61,274, P 573 (2006).

[8] *Cal. Indep. Sys. Operator Corp.*, 126 FERC ¶ 61,150, P 104 n.173 (2009).

[9] *Cal. Indep. Sys. Operator Corp.*, 126 FERC ¶ 61,081, PP 28-30 (2009) (approving deferral of the forbidden operating region functionality).

[10] *Cal. Indep. Sys. Operator Corp.*, Letter Order, FERC Docket No. ER10-775 (Apr. 8, 2010) (accepting tariff amendments necessary to implement the forbidden operating region functionality).

While an important market functionality, the forbidden operating region functionality is limited. It does not completely model the unique operational and economic parameters of combined cycle generating units and other resources that have multiple operating or regulating ranges. For example, a combined cycle unit may have multiple operating ranges that require the unit to stay in a range for a minimum period of time once it enters the range or to stay out of a range for a minimum period of time once it leaves it. The forbidden region functionality would not recognize this physical constraint.

To improve on these limitations and to comply with the Commission's directive, the ISO developed the multi-stage modeling functionality. This involves modeling the distinct operating modes, or configurations, of generating units with multiple configurations as if each configuration were a distinct unit. This allows scheduling coordinators to offer a unit's multiple configurations into the ISO markets and for each market to consider each of these configurations and its characteristics in its optimization process. The optimization is designed to dispatch only one configuration at a time and to consider and honor the resource's complete set of operating constraints. Essentially, all units that could use the forbidden region functionality could also use the multi-stage functionality, but not all multi-stage units could use the forbidden region functionality. The ISO went live with this functionality on December 7, 2010.[11]

Although the multi-stage functionality is a more robust functionality than the forbidden region functionality, the two functionalities nevertheless have existed in parallel since December 7, 2010. A resource that qualifies to register under both functionalities has been able to choose which one it uses and has been generally free to switch back and forth between the two options.

2. Potential Use of the Forbidden Region Functionality to gain Undue Bid Cost Recovery and Market Payments

Aside from the general structural limitations of the forbidden region functionality as compared to the multi-stage functionality, the ISO also has identified two problematic aspects of the forbidden region functionality that potentially can be used to gain undue bid cost recovery and market payments.

a. Forbidden Operation Region Crossing Times and Deviation from Dispatch Instructions

The ISO has identified the potential for generating units that have multiple operating configurations to gain undue bid cost recovery payments by requesting that

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[11] *Cal. Indep. Sys. Operator Corp.*, 132 FERC ¶ 61,087 (July 30, 2010) (order approving multi-stage proposal); *Cal. Indep. Sys. Operator Corp.*, Letter Order, FERC Docket No. ER10-2056-001 (Nov. 30, 2010) (approving December 7, 2010 go-live date).

their units be modeled under the forbidden region functionality, as opposed to the multi-stage functionality. To take advantage of this opportunity, a generating unit can submit high real-time energy bid prices while it is operating just above its forbidden region. In such a situation, the real-time market would dispatch the unit down if the high bid price made its energy uneconomic. By ignoring the real-time dispatch instruction, the unit can force the ISO to pay the high bid price through bid cost recovery.

This strategy works in conjunction with operating just above a forbidden operating region because to respect the physical characteristics of forbidden operating regions: (1) the market optimization can only dispatch the unit to a point just above the top of the forbidden operating region;[12] and (2) the market will re-dispatch the unit in the next dispatch interval based on its current output, repeating the previous dispatch to a point just above the top of the forbidden operating region.[13] Consequently, the unit essentially forces the ISO to continue to dispatch the unit near its current operating point, *i.e.*, at the top of the forbidden operating unit, and the resultant energy is settled as instructed imbalance energy that is eligible for bid cost recovery at the high bid price. Because the unit ignored its dispatch instruction it received unwarranted bid cost recovery payments.

A related concern is that when a resource using the forbidden region functionality ignores its dispatch instruction for multiple intervals, the resource may continue to be uneconomically dispatched into its forbidden region even though it may have become economic to dispatch the resource in the opposite direction. As described above, the market must dispatch a unit through a forbidden operating region before reversing the dispatch direction. Consequently, ignoring the dispatch instruction in conjunction with a forbidden operating region also results in uneconomic dispatch.

The ISO recognizes, as did one stakeholder,[14] that there are potentially ways for resources that are not multi-stage or forbidden region to earn inflated bid cost recovery by ignoring dispatch instructions**.** However, it is difficult to utilize such a strategy if a resource is participating in the multi-stage functionality because the ISO only dispatches multi-stage resources within the configuration into which the resource was committed. Under the multi-stage functionality, the resource is dispatched within the dispatched configuration rather than adjusting the dispatch based on the telemetry, which would essentially legitimize their uninstructed behavior. Therefore, the resource's deviations correctly incur uninstructed imbalance energy charges and are not compensated using bid cost recovery for such deviations in a different configuration. For example,

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[12] The market must dispatch units to the border of the forbidden operating region boundary to ensure conditions do not change before it proceeds to dispatch the unit through the forbidden operating region.

[13] The market optimization dispatches units based on their current output to mitigate the impact to system imbalance when units cannot meet their dispatch.

[14] PG&E comments.

regarding the situation described above in which a generating unit deviates from its dispatch instruction and operates near the top of a forbidden region, such a unit modeled as a multi-stage resource would be dispatched into a lower configuration at a lower output level, thereby decreasing the instructed imbalance energy eligible for bid cost recovery. Because the multi-stage generating resource functionality addresses these issues effectively, the ISO is proposing that resources with the ability to operate in multiple configurations must register as multi-stage generation resources. This is necessary to eliminate one opportunity to gain unjustifiable bid cost recovery payments. The multi-stage generating functionality also provides more benefits to penalty-based solutions because it enables the ISO and the scheduling coordinator to manage the resource's participation in the market more effectively and efficiently by modeling their characteristics more accurately. Therefore, requiring all resources with the ability to operate in multiple operating modes to be modeled as multi-stage generating resources is most optimal for the market as a whole.

As noted above, the ISO acknowledges that generating units that are not modeled using either the multi-stage or forbidden operating region functionality can engage in a similar strategy to inflate bid cost recovery by deviating from dispatch. The ISO is addressing this concern in a separate stakeholder initiative and intends to make a separate tariff amendment filing dealing with this issue later this year. That filing will propose a metric to detect these deviations and claw back bid cost recovery that otherwise would be earned from such deviations. This measure would not be effective in the situation in which a generating unit deviates from its dispatch instruction and operates near the top of a forbidden region because the deviation from dispatch is so small.

b. Infeasible Awards of Ancillary Services

The use of the forbidden region functionality, as compared to the multi-stage functionality, is also problematic with respect to ancillary services. When a resource without multiple operating ranges is certified to provide ancillary services, it is certified for the entire output range of the plant. That certification considers physical operating characteristics of the resource such as its ramp rate. A unit registered under the forbidden region functionality can be certified to provide ancillary services in one amount below the forbidden region based on the operating characteristics of that region, and for another amount above the forbidden region based on that range's characteristics. Such a resource is considered by the market optimization software to have the maximum of those two ancillary services capacity amounts. Therefore, the resource can receive an ancillary services award that is not consistent with the operating characteristics of the range in which the resource is actually dispatched. This inconsistency can create two problems: (1) the resource receives an ancillary services award that is infeasible and poses a potential reliability issue because the ISO essentially has under-procured ancillary services**;** and (2) the resource receives a capacity payment for ancillary services when it could not have delivered energy had it been called upon to do so.

Some aspects of the existing ISO systems limit the reliability and financial risks from this issue, but they do not eliminate such risks. For example, when a unit is crossing a forbidden region, the optimization will not procure regulation for that crossing period. However, spinning and non-spinning reserves can be procured from a resource when it is crossing a forbidden region. Additionally, the dynamic ancillary services stakeholder process resulted in improvements to the optimization software to account for different ramp rates over the range of a resource's output.[15] This improvement, however, does not address other operating parameters that differ over the resource's output range such as differences in certified capacities, so the risks identified above are not fully addressed through the existing ISO systems. There are also some measures to limit unwarranted payment for ancillary services. For example, the ISO has ancillary services "no-pay" provisions, which disqualify ancillary services capacity payments if post-market checks indicate that a resource was awarded ancillary services which physically could not have been delivered. While these factors limit the extent of the risks, they do not eliminate the potential for these problems altogether. So although the impact of this issue is limited by these other factors, it is nonetheless a continuing concern.

Again, these concerns are addressed through the multi-stage functionality. The multi-stage functionality models each operating range as its own generator. For this reason, each configuration is separately certified for ancillary services by performing the ancillary service test in each pre-defined region. This reduces the likelihood of the ISO granting ancillary services awards that are infeasible. As one stakeholder noted, the ISO alternatively could select the minimum, rather than the maximum, ancillary services range for a resource registered under the forbidden region functionality.[16] The ISO acknowledges the technical feasibility of this approach and that it could be implemented even without making participating in the multi-stage functionality mandatory. However, it poses the opposite drawback of the current approach – it prevents the optimization from considering ancillary services that are in fact available. Essentially, it is too conservative and would prevent units from being awarded ancillary services they are capable of providing. For this reason, it is not an ideal approach towards resolving the problem of infeasible ancillary services awards that mandatory participation in the multi-stage functionality would resolve.

3. Elimination of the Forbidden Region Functionality and Making Participation in the Multi-Stage Functionality Mandatory

The time is ripe to make participation in the multi-stage functionality mandatory. As described above, the forbidden region functionality was designed as a bridge to the

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[15] Information about that stakeholder process is available at: http://www.caiso.com/informed/Pages/StakeholderProcesses/FlexibleRampingProduct.aspx

[16] Calpine comments.

multi-stage functionality, and the forbidden region functionality creates the opportunity for generators to create distorted market outcomes, whereas those opportunities are largely limited if the same resources were registered under the multi-stage functionality. At the same time, the multi-stage functionality has operated stably and successfully for over two years. The ISO and those market participants that have registered their resources as multi-stage generating resources have benefited from the enhancements provided by the multi-stage generating resources functionality. Participants have been able to define the physical limitations and flexibilities of their resources better and bid in their resources in a manner that better reflects the economics of operating within those parameters. This has enabled both the ISO and market participants to optimize the use of such resources through the ISO's market dispatch. Over the past two years, the ISO has been able to enhance the multi-stage generating resource software enhancement adopted in 2010 and has worked through some of the issues experienced after the launch of the multi-stage functionality. For these reasons, it is now an appropriate time for all resources with multiple operating modes to transition to the multi-stage generating resource functionality. Participating in the multi-stage functionality, as compared to the forbidden region functionality, no longer represents the trade-off it might have in 2010. The ISO will phase out the forbidden region functionality and requests Commission approval of the instant tariff amendment to make participation in the multi-stage functionality mandatory for all resources with multiple operating modes, except for certain exceptions, as described further below.

Under the proposed revisions to section 27.8.1 of the tariff, a resource meeting the definition of a "Multi-Stage Generating Resource" will be required to register as such through the ISO master file registration process. The ISO also proposes to amend the definition of the term "Multi-Stage Generating Resource," as it currently appears in Appendix A of the tariff. Specifically, a multi-stage unit will be defined as a unit that: (1) is a combined cycle, except for one-by-one combined cycles that can operate in a single operating mode, such as units that do not have bypassing capability, duct firing capability, or power augmentation; (2) has more than one forbidden region; (3) has different operating ranges, each of which has different ancillary services capabilities; or (4) has a hold time before or after a transition through a forbidden region. Thus, under this proposal the forbidden region functionality will remain available in limited circumstances (*i.e.*, the unit has a single forbidden region, has no hold times around the forbidden region, and has the same ancillary services capabilities on both sides of the forbidden region). In other words, the forbidden operating region functionality will remain for generating units with a single operating mode that can operate continuously in a certain operating range. Generating units with multiple operating modes will be required to register as multi-stage resources.

The proposed revisions to Appendix A further clarify that regulatory must take resources are not required to register as multi-stage generating resources but that dispatchable Qualifying Facilities that are not qualified as regulatory must take, and that otherwise meet the definition, are required to register as multi-stage. This distinction is necessary because the ISO is not capable of identifying a Qualifying Facility's limitations due to its status as a Qualifying Facility in the ISO markets. If the resource is

not identifiable in the ISO markets systems as a regulatory must take resource, it participates in the ISO market like all other resources. Therefore, this qualification for purposes of the multi-stage functionality is equivalent to how Qualifying Facilities are treated in the ISO markets generally. As is currently the case, metered sub-systems, pumped-storage hydro units, pumping loads, and system resources are not eligible to use the multi-stage functionality, and therefore are not required to convert to the multi-stage functionality.

Under the ISO proposal, only the exclusions and exemptions to mandatory registration expressly discussed above and specified in the tariff will be available. During the stakeholder process, the ISO agreed that it would consider other exemptions (and resulting tariff changes) based on factors not specifically identified and reflected in the instant tariff amendment. If the ISO becomes aware of such limitations, then the ISO will make the appropriate filings with the Commission proposing to apply a registration exemption. Such new exclusions or exemptions would apply only after the Commission has accepted the ISO's proposed tariff amendment in support of such further exclusions or exemptions.[17]

4. Transition to Multi-Stage Functionality

The ISO began the process of converting to mandatory participation in multi-stage modeling on July 1, 2013. The ISO requested that all resources that would be required to register as multi-stage under the proposed amendments to section 27.8.1 voluntarily submit a resource data template with the multi-stage parameters by that date.[18] This request was made to ensure that the ISO would have sufficient time to evaluate and integrate them in the market under the multi-stage functionality. The ISO has offered, and continues to offer, scheduling coordinators the opportunity to participate in market simulation prior to conversion. This assists scheduling coordinators in understanding how their resource will be operated in the market and it enables the ISO to evaluate its ability to transition the resource.

While many scheduling coordinators honored the ISO's request, the ISO nevertheless faces three challenges in implementing the transition to mandatory participation in the multi-stage functionality.

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[17] *See* proposed revisions to Section 27.8.1.

[18] The unit parameters submitted during these early stages prior to the effective date of the tariff were not frozen upon submission. Per the 16-day waiting period currently defined in section 27.8.1, resources will have the opportunity to submit revised master file values between now and the unit's integration into the market as a multi-stage resource. The ISO expects, however, that because the tariff requires master file values to represent a unit's physical operating parameters, the scope of any such revisions would be limited to changes whose need is highlighted based on the results of market simulation.

1. Not all resources the ISO believes would be covered under the new requirement have yet submitted their multi-stage parameters. If these scheduling coordinators all wait to submit their data until the final day required by the tariff, the ISO may not have sufficient ability to prepare for implementing mandatory participation in the multi-stage functionality.

2. Even if all resources had submitted the requested information, they would still all be free to request that their transition become effective on the same day. The ISO cannot feasibly transition too many multi-stage resources on a single date. A mass transition on a single day could cause system reliability issues given the change in how the resources are modeled and therefore dispatched through the market. As of the date of this filing, a relatively small number of the resources that would be required to transition have indicated their intent to do so voluntarily prior to November 1. For this reason, the ISO is concerned that it may face such a mass transition from those scheduling coordinators that are holding out to transition until the final day possible.

3. Mandatory participation in the multi-stage functionality coincides with the Fall Release and is followed shortly thereafter by the end of daylight saving time early on the morning of November 3. For reasons described below, the ISO believes that it makes sense to have the multi-stage functionality become mandatory roughly in conjunction with the Fall Release. However, having too many resources transition on the same day as the Fall Release is implemented could be taxing for the ISO's systems. The end of daylight saving time additionally always creates the potential for unforeseen system issues.

To address these implementation challenges, the ISO intends to utilize the following transition plan. The proposed amendments to section 27.8.1 would require resources to register their multi-stage parameters in master file. If the language were to become effective November 1, then, per the existing 16-day notice period that already exists in section 27.8.1, the first "mandatory" transition could occur on November 16. To account for this factor and to create an adequate buffer of time between the Fall Release and the end of daylight saving time, the ISO will institute a lockout period for multi-stage status transitions from November 1 through November 15. Thus any multi-stage unit that wishes to transition voluntarily must submit its parameters and request the transition no later than October 15, to be effective October 31. Starting on November 16, the ISO would begin making the mandatory transitions in a staged and coordinated fashion to avoid the system reliability issues discussed above. In consultation with the affected scheduling coordinators, the ISO will consider outage schedules and the impact on the ISO system in setting the transition schedule for the resources that choose to wait until participation in the multi-stage functionality becomes

compulsory.[19] The ISO will seek to make all of the transitions as quickly as possible and intends to make all of them effective by December 31, 2013. To clarify that the ISO has the authority to institute a staged transition process, the ISO also proposes to amend section 27.8.1 to note: "In the absence of extenuating circumstances, the ISO will provide [notice of multi-stage registration] on the sixteenth day after the Scheduling Coordinator provides new settings or MSG Configuration details."[20] The ISO views implementation of the instant proposal as constituting such extenuating circumstances. Finally, to avoid any potential confusion regarding this transition, the ISO also proposes to eliminate the substance of tariff Appendix AA and certain language in section 27.8.3. These provisions describe the involved and complex transition plan the ISO utilized to implement the multi-stage functionality when it first went live.

B. Minimum Load Cost Tolerance Band

In reviewing the bid cost recovery mechanism, the ISO identified a problematic aspect of how a resource can qualify for receiving minimum load cost recovery. Qualification for minimum load costs depends on whether a unit reaches its minimum operating level (pmin). The ISO has established a tolerance band for determining whether the unit actually reached its pmin. The tolerance band is defined as 5 MWH or 3% of the unit's maximum operating level (pmax), whichever is greater. As a result, a unit's metered output can be below its pmin (by 5 MWH or 3% of pmax) and still receive minimum load costs. For some resources, however, the entire range from zero to pmin can be covered by the tolerance band. This could allow such resources to be offline but eligible to receive minimum load cost recovery. In general, the purpose of the bid cost recovery mechanism is to allow generating units to recover bid costs that were not recovered through market revenues. Recovering minimum load costs where the unit is offline is plainly inconsistent with this purpose and unjustifiable because the unit would recover costs that were not incurred. Through the instant filing, the ISO seeks to address this issue and ensure that a resource is only eligible to receive minimum load costs if it is actually on. The ISO proposes to amend sections 11.8.2.1.2, 11.8.3.1.2, and 11.8.4.1.2 to clarify that a resource is only eligible for minimum load cost recovery for the integrated forward market, residual unit commitment, and the real-time market, respectively, if "the resource's associated Metered Energy" is greater than zero.

C. Other Miscellaneous Tariff Updates

The ISO proposes to delete references to "Dynamic Resource-Specific System Resource" in the context of the multi-stage functionality. When the ISO adopted the multi-stage generating resource functionality, the ISO understood that certain dynamic resource-specific system resources were interested in becoming multi-stage generating

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[19] In the event that too many resources request that a transition become effective in the final few days of October, the ISO may also be forced to delay those transitions until after the lockout period.

[20] The ISO believes it already has tariff authority to take more than 16 days to implement new multi-stage parameters but nevertheless views this amendment as providing beneficial clarity.

resources. However, in exploring this with market participants further, the ISO has learned that the multi-stage generating resource functionality is not readily adapted by such resources. In addition, given the need to ensure that sufficient intertie capacity is procured, the ISO would have to adopt a number of other system changes to integrate such resources. Therefore, the ISO proposes to remove this requirement from its tariff and will consider adopting and filing for necessary authority to allow such resources to participate as multi-stage generating resources should there be any that wish to do so in the future.

III. DESCRIPTION OF STAKEHOLDER PROCESS

The ISO has followed a robust stakeholder process.[21] The formal stakeholder process commenced in November 2011 with the publication of an issue paper, followed by subsequent rounds of papers and stakeholder teleconferences. The proposal was approved by the ISO Board of Governors on February 16, 2012. Following Board approval, the ISO held a tariff stakeholder process in which it published two sets of proposed tariff language.

At the time Management brought the proposal for the Board's consideration, it was made clear that the proposed changes would not be made effective until the 2013 Spring Release. This timeline was proposed to ensure that market participants would have sufficient time to participate in on-going market simulation efforts and to permit other enhancements in the multi-stage functionality to become effective. In Spring 2013, the ISO determined that it would be appropriate to wait until the 2013 Fall Release to seek mandatory participation in the multi-stage functionality because complementary changes in the overall market structure were scheduled for implementation in the Fall Release. The ISO communicated this decision to stakeholders through a market notice issued on January 14, 2013.[22]

IV. EFFECTIVE DATES

The ISO intends to complete implementation of these rule changes by November 1, 2013 to coincide with the ISO's 2013 Fall Release. For the benefit of the both the ISO and its market participants, the ISO implements major software upgrades twice per year – in the Fall and Spring. Because of the interdependencies between the instant filing and other software enhancements planned for implementation with the 2013 Fall Release, the ISO believes it is important for the instant tariff amendments to become effective at the same time as the other, interdependent changes to the ISO software

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[21] More information on the ISO's stakeholder process (including stakeholder comments) is available at: http://www.caiso.com/informed/Pages/StakeholderProcesses/PostEmergencyBidCostRecoveryFilingReview.aspx.

[22] The market notice is available at: http://www.caiso.com/Documents/MandatoryMulti-StageGeneratingUnitModelingTimelineJan14_2013.htm.

and processes. The ISO requests that the Commission grant any and all necessary waivers to enable these tariff amendments to become effective November 1, 2013 and to be implemented in the manner set forth above.

V. COMMUNICATIONS

Communications regarding this filing should be addressed to the following individuals. The individuals identified with an asterisk are whose names should be placed on the official service list established by the Secretary with respect to this submittal:

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VI. SERVICE

The ISO has served copies of this transmittal letter, and all attachments, on the California Public Utilities Commission and the California Energy Commission, and all parties with effective Scheduling Coordinator Service Agreements under the ISO Tariff. In addition, the ISO is posting this transmittal letter and all attachments on the ISO website.

VII. ATTACHMENTS

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

Attachment A Revised ISO Tariff Sheets – Clean

Attachment B Revised ISO Tariff Sheets – Blackline

Attachment C California Board of Governors Memo on Post-Emergency Bid Cost Recovery Elements

VIII. CONCLUSION

For the foregoing reasons, the ISO respectfully requests that the Commission approve this tariff revision as filed. Please contact the undersigned if you have any questions concerning this matter.

Respectfully submitted,

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Attorneys for the California Independent
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Dated: July 30, 2013

Attachment A – Clean

Required Registration for Multi-Stage Generation Resources and

Modification of Minimum Load Costs Tolerance Band for Bid Cost Recovery

California Independent System Operator Corporation

July 30, 2013

8.10.8.2 Rescission of Payments for Unavailable Ancillary Service Capacity

If the CAISO determines that a Scheduling Coordinator has supplied Uninstructed Imbalance Energy to the CAISO during a Settlement Interval from the capacity of a resource that is obligated to supply Spinning Reserve or Non-Spinning Reserve to the CAISO, payments to the Scheduling Coordinator for the Ancillary Service capacity used to supply Uninstructed Imbalance Energy shall be eliminated to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.2. For Multi-Stage Generating Resources that have supplied Uninstructed Imbalance Energy from capacity obligated to supply Spinning or Non-Spinning Reserves, the CAISO shall calculate the capacity for which payments will be rescinded at the Generating Unit level, as applicable, and will use the MSG Configuration-specific Maximum Operating Limit.

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11.8.1.1 IFM Self-Commitment Period

An IFM Self-Commitment Period for a Bid Cost Recovery Eligible Resource shall consist of one or more sets of consecutive Trading Hours during which the relevant Bid Cost Recovery Eligible Resource has either a Self-Schedule or, except for Self-Provided Ancillary Services for Non-Spinning Reserve by a Fast Start Unit, has a non-zero amount of Self-Provided Ancillary Services. An IFM Self-Commitment Period for a Bid Cost Recovery Eligible Resource may not be less than the relevant Minimum Run Time (MRT), rounded up to the next hour. Consequently, if a Bid Cost Recovery Eligible Resource first self-commits in hour h of the Trading Day, the self-commitment will be extended to hour h + MRT. Two IFM Self-Commitment Periods for a Bid Cost Recovery Eligible Resource may not be apart by less than the relevant Minimum Down Time (MDT) (rounded up to the next hour). Consequently, if a Bid Cost Recovery Eligible Resource has submitted a Self-Schedule or Submission to Self-Provide an Ancillary Service in hours h and h + n, and n is less than the MDT, the IFM Self-Commitment Period will be extended to the hours in between h and h + n inclusive. The number of IFM Self-Commitment Periods for a Bid Cost Recovery Eligible Resource within a Trading Day cannot exceed the relevant Maximum Daily Start-Ups (MDS), or MDS + 1 if the first IFM Self-Commitment Period is the continuation of an IFM or RUC Commitment Period from the previous Trading Day. Consequently, if a Bid Cost

Recovery Eligible Resource has submitted a Self-Schedule or Submission to Self-Provide an Ancillary Service, such that after applying the preceding two rules, the number of disjoint Self Commitment Periods for the Operating Day exceeds the Maximum Daily Start-Ups (MDS), or MDS + 1 if the first IFM Self-Commitment Period is the continuation of an IFM or RUC Commitment Period from the previous Trading Day, the disjoint Self Commitment Periods with smallest time gap in between will be joined together to bring down the number of disjoint Self Commitment Periods to MDS or MDS +1 as relevant. To determine whether an extension of the IFM Self-Commitment Period applies for Multi-Stage Generating Resources, the CAISO will ensure that the respective Minimum Run Time and Minimum Down Time for both the Generating Unit and MSG Configuration levels are simultaneously respected.

11.8.1.2 Real-Time Self-Commitment Period

A Real-Time Market Self-Commitment Period for a Bid Cost Recovery Eligible Resource shall consist of all consecutive Dispatch Intervals not in an IFM Commitment Period or a RUC Commitment Period where the Bid Cost Recovery Eligible Resource has a Self-Schedule or, except for Self-Provided Ancillary Services for Non-Spinning Reserve by a Fast Start Unit, has a non-zero amount of Self-Provided Ancillary Services. A Real-Time Market Self-Commitment Period for a Bid Cost Recovery Eligible Resource may not be less than the relevant MUT (rounded up to the next 15-minute Commitment Interval) when considered jointly with any adjacent IFM Self-Commitment Period. For example, if a Bid Cost Recovery Eligible Resource self-commits at time h, the self-commitment will be extended to Commitment Interval h + MUT, unless an IFM or RUC Commitment Period exists starting after hour h, in which case the self-commitment will be extended to Commitment Interval h + min (MUT, t), where t represents the time interval between the Real-Time Market Self-Commitment Period and the IFM or RUC Commitment Period. A Real-Time Market Self-Commitment Period for a Bid Cost Recovery Eligible Resource may not be apart from an IFM or RUC Commitment Period by less than the relevant MDT (rounded up to the next 15-minute Commitment Interval). For example, if a Bid Cost Recovery Eligible Resource self-commits at time T1 and has a RUC Schedule at time T2 < T1, the Real-Time Market Self-Commitment Period will be extended to the interim Commitment

Intervals if T1 - T2< MDT. The number of Real-Time Market Self-Commitment Periods for a Bid Cost Recovery Eligible Resource within a Trading Day, when considered jointly with any adjacent IFM Self-Commitment Period, may not exceed the relevant MDS (or MDS + 1 if the first Real-Time Market Self-Commitment Period is the continuation of a Real-Time Market Commitment Period from the previous Trading Day). For example, if a Bid Cost Recovery Eligible Resource self-commits at time T1 and has a RUC Schedule at time T2 > T1, the Real-Time Market Self-Commitment Period will be extended to the interim Commitment Intervals if an additional Real-Time Market Start-Up at T1 would violate the MDS constraint. To determine whether an extension of the RTM Self-Commitment Period applies for Multi-Stage Generating Resources, the CAISO will ensure that the respective Minimum Run Time and Minimum Down Time for both the Generating Unit and MSG Configuration levels are simultaneously respected.

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11.8.2.1.2 IFM Minimum Load Cost

The Minimum Load Cost for the applicable Settlement Interval shall be the Minimum Load Cost submitted to the CAISO in the IFM divided by the number of Settlement Intervals in a Trading Hour. For each Settlement Interval, only the IFM Minimum Load Cost in a CAISO IFM Commitment Period is eligible for Bid Cost Recovery. The IFM Minimum Load Cost for any Settlement Interval is zero if: (1) the Settlement Interval is in an IFM Self Commitment Period for the Bid Cost Recovery Eligible Resource; (2) the Bid Cost Recovery Eligible Resource is manually pre-dispatched under an RMR Contract prior to the Day-Ahead Market or the resource is flagged as an RMR Dispatch in the Day-Ahead Schedule for the applicable Settlement Interval; or (3) the Bid Cost Recovery Eligible Resource is determined not actually On during the applicable Settlement Interval. For the purposes of determining IFM Minimum Load Cost, a Bid Cost Recovery Eligible Resource is assumed to be On if: a) its metered Energy in a Settlement Interval is equal to or greater than the difference between its Minimum Load Energy and the Tolerance Band, and b) the resource's associated Metered Energy > 0. Otherwise, the resource is determined to be Off. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. If application of section 11.8.1.3 dictates

that the IFM is the commitment period, then the calculation of the IFM Minimum Load Costs will depend on whether the metered MSG Configuration is equal to or different from the IFM committed MSG Configuration. If the metered MSG Configuration is equal to the IFM committed MSG Configuration, then the IFM Minimum Load Costs will be based on the Minimum Load Costs of the IFM committed MSG Configuration. If the metered MSG Configuration is different from the IFM committed MSG Configuration, then the IFM Minimum Load Costs will be based on the lower of the Minimum Load Costs of the metered MSG Configuration and the Minimum Load Costs of the IFM committed MSG Configuration. The metered MSG Configuration is determined based on the highest MSG Configuration submitted to the IFM for which the Metered Data is within or above the three (3) percent (or 5 MW) Tolerance Band of the PMin of that highest MSG Configuration submitted to the IFM. Between two (2) (or more) MSG Configurations, the highest MSG Configuration is the MSG Configuration with the PMin value that is the greatest MW value.

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11.8.2.1.5 IFM Energy Bid Cost

For any Settlement Interval, the IFM Energy Bid Cost for Bid Cost Recovery Eligible Resources, except Participating Loads, shall be the integral of the relevant Energy Bid submitted to the IFM, if any, from the higher of the registered Bid Cost Recovery Eligible Resource's Minimum Load and the Day-Ahead Total Self-Schedule up to the relevant MWh scheduled in the Day-Ahead Schedule, divided by the number of Settlement Intervals in a Trading Hour. The IFM Energy Bid Cost for Bid Cost Recovery Eligible Resources, except Participating Loads, and except for any portion of the Day-Ahead Schedule associated with an Energy Bid less than zero, for any Settlement Interval is set to zero for any portion of the Day-Ahead Schedule that is not delivered from the otherwise Bid Cost Recovery Eligible Resource that has metered Generation below its Day-Ahead Schedule; any portion of the Day-Ahead Schedule that is actually delivered remains eligible for IFM Energy Bid Cost Recovery. The delivered portions of the Day-Ahead Schedule for this calculation are determined using the Day-Ahead Metered Energy Adjustment Factor. The Day-Ahead Metered Energy Adjustment Factor is not applied to IFM Energy Bid Costs that associate with Energy Bids that are less than zero. The CAISO will determine the IFM Energy

Bid Cost for a Multi-Stage Generating Resource at the Generating Unit level. The CAISO will determine the applicable net IFM Energy Bid Cost surplus or net IFM Energy Bid Cost shortfalls as described in Section 11.8.2.4.

11.8.2.1.6 IFM AS Bid Cost

For any Settlement Interval, the IFM AS Bid Cost shall be the product of the IFM AS Award from each accepted IFM AS Bid and the relevant AS Bid Price, divided by the number of Settlement Intervals in a Trading Hour. The CAISO will determine and calculate IFM AS Bid Cost for a Multi-Stage Generating Resource at the Generating Unit level. The IFM AS Bid Cost shall also include Mileage Bid Costs. For any Settlement Interval, the IFM Mileage Bid Cost shall be the product of Instructed Mileage associated with a Day Ahead Regulation capacity award, as adjusted for accuracy consistent with Section 11.10.1.7, and the relevant Mileage Bid price, divided by the number of Settlement Intervals in a Trading Hour. The CAISO will determine and calculate IFM Mileage Bid Cost for a Multi-Stage Generating Resource at the Generating Unit level.

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11.8.2.2 IFM Market Revenue

In the case of a Multi-Stage Generating Resource, the CAISO will calculate the market revenue at the Generating Unit level.

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11.8.3.1.2 RUC Minimum Load Cost

The Minimum Load Cost for the applicable Settlement Interval shall be the Minimum Load Cost of the Bid Cost Recovery Eligible Resource divided by the number of Settlement Intervals in a Trading Hour. For each Settlement Interval, only the RUC Minimum Load Cost in a CAISO RUC Commitment Period is eligible for Bid Cost Recovery. The RUC Minimum Load Cost for any Settlement Interval is zero if: (1) the Bid Cost Recovery Eligible Resource is manually pre-dispatched under an RMR Contract or the resource is flagged as an RMR Dispatch in the Day-Ahead Schedule in that Settlement Interval; (2) the Bid Cost Recovery Eligible Resource is not actually On in the applicable Settlement Interval; or (3) the applicable Settlement Interval is included in an IFM Commitment Period. For the purposes of determining RUC Minimum Load

Cost, a Bid Cost Recovery Eligible Resource is assumed to be On if: a) its metered Energy in a Settlement Interval is equal to or greater than the difference between its Minimum Load Energy and the Tolerance Band, and b) the resource's associated Metered Energy > 0. Otherwise, the resource is determined to be Off. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. If application of section 11.8.1.3 dictates that RUC is the commitment period, then the calculation of the RUC Minimum Load Costs will depend on whether the metered MSG Configuration is equal to or different from the RUC committed MSG Configuration. If the metered MSG Configuration is equal to the RUC committed MSG Configuration, then the RUC Minimum Load Costs will be based on the Minimum Load Costs of the RUC committed MSG Configuration. If the metered MSG Configuration is different from the RUC committed MSG Configuration, then the RUC Minimum Load Costs will be based on the lower of the Minimum Load Costs of the metered MSG Configuration and the Minimum Load Costs of the RUC committed MSG Configuration. The metered MSG Configuration is determined based on the highest MSG Configuration submitted to the RUC for which the Metered Data is within or above the three (3) percent (or 5 MW) Tolerance Band of the PMin of that highest MSG Configuration submitted to the RUC. Between two (2) (or more) MSG Configurations, the highest MSG Configuration is the MSG Configuration with the PMin value that is the greatest MW value.

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11.8.3.2 RUC Market Revenues

For any Settlement Interval, the RUC Market Revenue for a Bid Cost Recovery Eligible Resource is the RUC Availability Payment as specified in Section 11.2.2.1 divided by the number of Settlement Intervals in a Trading Hour. If the RUC Availability Bid Cost of a BCR Eligible Resource is reduced to zero (0) in a Settlement Interval because of Uninstructed Deviation as stated in Section 11.8.3.1.3, then the RUC Market Revenue for that resource for that Settlement Interval shall also be set to zero (0) since the resource is subject to rescission of RUC Availability Payments as specified in Section 31.5.7. The CAISO will determine the RUC Market Revenues for Multi-Stage Generating Resources based on the Generating Unit level.

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11.8.4.1.2 RTM Minimum Load Cost

The RTM Minimum Load Cost is the Minimum Load Cost of the Bid Cost Recovery Eligible Resource submitted to the CAISO for the Real-Time Market divided by the number of Settlement Intervals in a Trading Hour. For each Settlement Interval, only the RTM Minimum Load Cost in a CAISO RTM Commitment Period is eligible for Bid Cost Recovery. The RTM Minimum Load Cost for any Settlement Interval is zero if: (1) the Settlement Interval is included in a RTM Self-Commitment Period for the Bid Cost Recovery Eligible Resource; (2) the Bid Cost Recovery Eligible Resource has been manually dispatched under an RMR Contract or the resource has been flagged as an RMR Dispatch in the Day-Ahead Schedule or the Real-Time Market in that Settlement Interval; (3) the Bid Cost Recovery Eligible Resource is not actually On in that Settlement Interval; (4) for all resources that are not Multi-Stage Generating Resources, that Settlement Interval is included in an IFM or RUC Commitment Period; or (5) the Bid Cost Recovery Eligible Resource is committed pursuant to Section 34.9.2 for the purpose of performing Ancillary Services testing, pre-commercial operation testing for Generating Units, or PMax testing. For the purposes of RTM Minimum Load Cost, a Bid Cost Recovery Eligible Resource is determined to be On if: a) the metered Energy in that Settlement Interval is equal to or greater than the Tolerance Band referenced by the Minimum Load Energy, and b) the resource's associated Metered Energy >0. Otherwise, the resource is determined to be Off. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. If application of section 11.8.1.3 dictates that the RTM is the commitment period, then the calculation of the RTM Minimum Load Costs will depend on whether the metered MSG Configuration is equal to or different from the RTM committed MSG Configuration. If the metered MSG Configuration is equal to the RTM committed MSG Configuration, then the RTM Minimum Load Costs will be based on the Minimum Load Costs of the RTM committed MSG Configuration. If the metered MSG Configuration is different from the RTM committed MSG Configuration, then the RTM Minimum Load Costs will be based on the lower of the Minimum Load Costs of the metered MSG Configuration and the Minimum Load

Costs of the RTM Committed configuration. The metered MSG Configuration is determined based on the highest MSG Configuration submitted to the Real-Time Market for which the Metered Data is within or above the three (3) percent (or 5 MW) Tolerance Band of the PMin of that highest MSG Configuration submitted to the Real-Time Market. Between two (2) (or more) MSG Configurations, the highest MSG Configuration is the MSG Configuration with the PMin value that is the greatest MW value. For Settlement Intervals that contain two (2) Dispatch Intervals with two (2) different MSG Configurations, the CAISO will determine the Transition Costs, and Minimum Load Costs based on the sum of the two (2) applicable Dispatch Intervals.

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11.8.4.1.5 RTM Energy Bid Cost

For any Settlement Interval, the RTM Energy Bid Cost for the Bid Cost Recovery Eligible Resource except Participating Loads shall be computed as the sum of the products of each Instructed Imbalance Energy (IIE) portion, except Standard Ramping Energy, Residual Imbalance Energy, Exceptional Dispatch Energy, Derate Energy, MSS Load Following Energy, Ramping Energy Deviation and Regulating Energy, with the relevant Energy Bid prices, if any, for each Dispatch Interval in the Settlement Interval. The RTM Energy Bid Cost for a Bid Cost Recovery Eligible Resource except Participating Loads for a Settlement Interval is set to zero for any undelivered Real-Time Instructed Imbalance Energy by the Bid Cost Recovery Eligible Resource. Any Uninstructed Imbalance Energy in excess of Instructed Imbalance Energy is also not eligible for Bid Cost Recovery. The delivered Real-Time Instructed Imbalance Energy for this calculation are determined using the Real-Time Metered Energy Adjustment Factor. For a Multi-Stage Generating Resource the CAISO will determine the RTM Energy Bid Cost based on the Generating Unit level.

11.8.4.1.6 RTM AS Bid Cost

For each Settlement Interval, the Real-Time Market AS Bid Cost shall be the product of the average Real-Time Market AS Award from each accepted AS Bid submitted in the Settlement Interval for the Real-Time Market, reduced by any relevant tier-1 No Pay capacity in that Settlement Interval (but not below zero), with the relevant AS Bid price. The average Real-Time

Market AS Award for a given AS in a Settlement Interval is the sum of the 15-minute Real-Time Market AS Awards in that Settlement Interval, each divided by the number of 15-minute Commitment Intervals in a Trading Hour and prorated to the duration of the Settlement Interval (10/15 if the Real-Time Market AS Award spans the entire Settlement Interval, or 5/15 if the Real-Time Market AS Award spans half the Settlement Interval). For a Multi-Stage Generating Resource the CAISO will determine the RTM AS Bid Cost based on the Generating Unit level. The Real-Time Market AS Bid Cost shall also include Mileage Bid Costs. For each Settlement Interval, the Real-Time Mileage Bid Cost shall be the product of Instructed Mileage associated with a Real-Time Regulation capacity award, as adjusted for accuracy consistent with Section 11.10.1.7, and the relevant Mileage Bid price divided by the number of Settlement Intervals for the Real-Time Market in a Trading Hour. The CAISO will determine and calculate the Real Time Market Mileage Bid Cost for a Multi-Stage Generating Resource at the Generating Unit level.

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11.8.4.2 RTM Market Revenue Calculations

11.8.4.2.1 For each Settlement Interval in a CAISO Real-Time Market Commitment Period, the RTM Market Revenue for a Bid Cost Recovery Eligible Resource is the algebraic sum of the elements listed below in this Section. For Multi-Stage Generating Resources the RTM Market Revenue calculations will be made at the Generating Unit level.

(a) The sum of the products of the Instructed Imbalance Energy (where for Pumped-Storage Hydro Units and Participating Load operating in the pumping mode or serving Load, the MWh is negative), except Standard Ramping Energy, Residual Imbalance Energy, Exceptional Dispatch Energy, Derate Energy, MSS Load following Energy, Ramping Energy Deviation and Regulation Energy, with the relevant Real-Time Market LMP, for each Dispatch Interval in the Settlement Interval. The Instructed Imbalance Energy for this calculation is subject to the Real-Time Metered Energy Adjustment Factor to capture metered energy.

(b) The product of the delivered MWh at or below the resource's Minimum Load submitted to the Real-Time Market (including Energy from Minimum Load of Bid

Cost Recovery Eligible Resources committed in RUC) and the relevant Real-Time Market LMP, for each Dispatch Interval in the Settlement Interval, The delivered portions of the resource's Minimum Load in this case is determined based on the CAISO's determination that the resource was "On" for the applicable Trading Hour as described in Section 11.8.4.1.2; and

(c) The product of the Real-Time Market AS Award from each accepted Real-Time Market AS Bid in the Settlement Interval with the relevant ASMP, divided by the number of fifteen (15)-minute Commitment Intervals in a Trading Hour (4), and prorated to the duration of the Settlement Interval.

(d) The relevant tier-1 No Pay charges for that Bid Cost Recovery Eligible Resource in that Settlement Interval.

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11.8.5 Unrecovered Bid Cost Uplift Payment

Scheduling Coordinators shall receive an Unrecovered Bid Cost Uplift Payment for a Bid Cost Recovery Eligible Resource, including resources for MSS Operators that have elected gross Settlement, if the net of all IFM Bid Cost Shortfalls and IFM Bid Cost Surpluses calculated pursuant to Section 11.8.2, RUC Bid Cost Shortfalls and RUC Bid Cost Surpluses calculated pursuant to Section 11.8.3, and the RTM Bid Cost Shortfalls and RTM Bid Cost Surpluses calculated pursuant to Section 11.8.4 for that Bid Cost Recovery Eligible Resource over a Trading Day is positive. For Multi-Stage Generating Resources, Unrecovered Bid Cost Uplift Payments will be calculated and made at the Generating Unit level and not the MSG Configuration level. For MSS Operators that have elected net Settlement, the Unrecovered Bid Cost Uplift Payment is at the MSS level. The MSS IFM, RUC, and RTM Bid Cost Shortfall or IFM. RUC, and RTM Bid Cost Surplus for each market for each Trading Hour is the sum of the IFM, RUC, and RTM Bid Cost Shortfalls and IFM. RUC, and RTM Bid Cost Surpluses for all resources in the MSS. Scheduling Coordinators for MSS Operators that have elected net Settlement will receive an Unrecovered Bid Cost Uplift Payment if the net of all IFM, RUC, and RTM Bid Cost Shortfalls and IFM, RUC, and RTM Bid Cost Surpluses for that MSS over a Trading Day is positive.

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27.8.1 Registration and Qualification

Scheduling Coordinators responsible for resources that meet the definition of a Multi-Stage Generating Resource based on their Master File registered characteristics must register such resources with the CAISO as Multi-Stage Generating Resources as further discussed in this Section, and must comply with all requirements that apply to such resources specified in the CAISO Tariff. Scheduling Coordinators must comply with the registration and qualification process described in this Section 27.8.1, in order to effectuate any of the changes described in Section 27.8.3. No less than sixteen (16) days prior to the date that Scheduling Coordinator seeks to have the resource participate in the CAISO Markets under the new settings or MSG Configuration details, the Scheduling Coordinator must complete and submit to the CAISO the registration form and the resource data template provided by the CAISO for registration and qualification purposes. After the Scheduling Coordinator submits a request for registration of a Generating Unit as a Multi-Stage Generating Resource or a change in the attributes in Section 27.8.3, the CAISO will coordinate with that Scheduling Coordinator to validate that the resource qualifies for the requested status and that all the requisite information has been successfully provided to the CAISO. The resource will be successfully registered and qualified as a Multi-Stage Generating Resource, or the requested changes in the attributes listed in Section 27.8.3 will be successfully registered and qualified as of the date on which the CAISO sends the responsible Scheduling Coordinator a notice that the resource has been successfully qualified as such. In the absence of extenuating circumstances, the ISO will provide such notice on the sixteenth day after the Scheduling Coordinator provides new settings or MSG Configuration details. After the date on which the CAISO has provided such notice, any changes to the items listed in Section 27.8.3 will be subject to the timing and process requirements in this Section 27.8.1 and 27.8.3. The Scheduling Coordinator may modify all other Multi-Stage Generating Resource registered characteristics pursuant to the timing and processing requirements specified elsewhere in this CAISO Tariff, as they may apply. If the CAISO has reason to believe that the resource's operating and technical characteristics are not consistent with the registered and

qualified attributes, the CAISO may request that the Scheduling Coordinator provide additional information necessary to support their registered status and, if appropriate, may require that the resource be registered and qualified more consistent with the resource's operating and technical characteristics, including the revocation of its status as a Multi-Stage Generating Resource. Failure to provide such information may be grounds for revocation of Multi-Stage Generating Resource status. Such changes in status or MSG Configuration details would be subject to the registration and qualification requirements in this Section 27.8. Scheduling Coordinators may register the number MSG Configurations as are reasonably appropriate for the resource based on the technical and operating characteristics of the resource, which may not, however, exceed a total of ten MSG Configurations and cannot be fewer than two MSG Configurations. The information requirements specified in Section 27.8.2 will apply.

27.8.2 Informational Requirements

As part of the registration process described in Section 27.8.1, the Scheduling Coordinators for Generating Units that seek to qualify as Multi-Stage Generating Resources must submit to the CAISO a Transition Matrix, which contains the Transition Costs and operating constraints associated with MSG Transitions. The Scheduling Coordinator may register up to six (6) MSG Configurations without any limitation on the number of transitions between the registered MSG Configurations in the Transition Matrix. If the Scheduling Coordinator registers seven (7) or more MSG Configurations, then the Scheduling Coordinator may only include two (2) eligible transitions between MSG Configurations for upward and downward transitions, respectively, starting from the initial MSG Configuration in the Transition Matrix. For each MSG Configuration, the responsible Scheduling Coordinator shall submit an Operational Ramp Rate and, as applicable, an Operating Reserve Ramp Rate and Regulating Reserves ramp rate, each of which shall have at least one (1) segment and no more than two (2) segments. The Scheduling Coordinator must establish the default MSG Configuration and its associated Default Resource Adequacy Path that apply to Multi-Stage Generating Resources that are subject to Resource Adequacy must-offer obligations. The Scheduling Coordinator may submit changes to this information consistent with Sections 27.8.1 and 27.8.3, as they may apply.

27.8.3 Changes in Status and Configurations of Resource

Scheduling Coordinators may seek modifications to the Multi-Stage Generating Resource attributes listed below consistent with the process and timing requirements specified in Section 27.8.1 and the additional requirements discussed below in this Section 27.8.3:

(1) Registration and qualification of a Generating Unit as a Multi-Stage Generating Resource.

(2) Changes to the MSG Configurations attributes, which include:

a. addition of new MSG Configurations;

b. removal of an existing MSG Configuration;

c. a change in the physical units supporting the MSG Configuration;

d. a change to the MSG Configuration Start Up and Shut Down flags;

e. adding or removing an MSG Transition to the Transition Matrix;

f. a material change in the Transition Times contained in the Master File, which consists of a change that more than doubles the Transition Times or reduces it to less than half; and

g. a material change to the maximum Ramp Rate of the MSG Configuration(s) contained in the Master File, which consists of a change that more than doubles the maximum Ramp Rate or reduces it to less than half.

When transitioning to implement these changes across the midnight hour, for any Real-Time Market run in which the changes specified in this Section 27.8.3 are to take effect within the Time Horizon of any of the Real-Time Market runs, the CAISO will Schedule, Dispatch, or award resources consistent with either the prior or new status and definitions, as appropriate, and required by any Real-Time conditions regardless of the resource's state scheduled or awarded in the immediately preceding Day-Ahead Market. A Scheduling Coordinator may unregister a Generating Unit from its Multi-Stage Generating Resource status subject to the timing requirements for Master File changes, and such changes are not subject to the timing requirements in Section 27.8.3. Changes to the attributes listed above in this Section may take effect, including the registration of new Multi-Stage Generating Resources, provided Scheduling

Coordinators have previously followed the registration process requirements listed in Section 27.8.1. Changes to these attributes may only be made every sixty (60) days after the day on which any such changes have taken effect.

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30.5 Bidding Rules

30.5.1 General Bidding Rules

(a) All Energy and Ancillary Services Bids of each Scheduling Coordinator submitted to the DAM for the following Trading Day shall be submitted at or prior to 10:00 a.m. on the day preceding the Trading Day, but no sooner than seven (7) days prior to the Trading Day. All Energy and Ancillary Services Bids of each Scheduling Coordinator submitted to the HASP for the following Trading Day shall be submitted starting from the time of publication, at 1:00 p.m. on the day preceding the Trading Day, of DAM results for the Trading Day, and ending seventy-five (75) minutes prior to each applicable Trading Hour in the RTM. The CAISO will not accept any Energy or Ancillary Services Bids for the following Trading Day between 10:00 a.m. on the day preceding the Trading Day and the publication, at 1:00 p.m. on the day preceding the Trading Day, of DAM results for the Trading Day;

(b) Bid prices submitted by a Scheduling Coordinator for Energy accepted and cleared in the IFM and scheduled in the Day-Ahead Schedule may be increased or decreased in the HASP. Bid prices for Energy submitted but not scheduled in the Day-Ahead Schedule may be increased or decreased in the HASP. Incremental Bid prices for Energy associated with Day-Ahead AS or RUC Awards in Bids submitted to the HASP may be revised. Scheduling Coordinators may revise ETC Self-Schedules for Supply only in the HASP to the extent such a change is consistent with TRTC Instructions provided to the CAISO by the Participating TO in

accordance with Section 16. Scheduling Coordinators may revise TOR Self-Schedules for Supply only in the HASP to the extent such a change is consistent with TRTC Instructions provided to the CAISO by the Non-Participating TO in accordance with Section 17. Energy associated with awarded Ancillary Services capacity cannot be offered in the HASP or Real-Time Market separate and apart from the awarded Ancillary Services capacity;

(c) Scheduling Coordinators may submit Energy, AS and RUC Bids in the DAM that are different for each Trading Hour of the Trading Day;

(d) Bids for Energy or capacity that are submitted to one CAISO Market, but are not accepted in that market are no longer a binding commitment and Scheduling Coordinators may submit Bids in a subsequent CAISO Market at a different price;

(e) The CAISO shall be entitled to take all reasonable measures to verify that Scheduling Coordinators meet the technical and financial criteria set forth in Section 4.5.1 and the accuracy of information submitted to the CAISO pursuant to this Section 30; and

(f) In order to retain the priorities specified in Section 31.4 and 34.10 for scheduled amounts in the Day-Ahead Schedule associated with ETC and TOR Self-Schedules or Self-Schedules associated with Regulatory Must-Take Generation, a Scheduling Coordinator must submit to the HASP and Real-Time Market ETC or TOR Self-Schedules, or Self-Schedules associated with Regulatory Must-Take Generation, at or below the Day-Ahead Schedule quantities associated with the scheduled ETC, TOR or Regulatory Must-Take Generation Self-Schedules. If the Scheduling Coordinator fails to submit such HASP or Real-Time Market ETC, TOR or Regulatory Must-Take Generation Self-Schedules, the defined scheduling priorities of the ETC, TOR, or Regulatory Must-Take

Generation Day-Ahead Schedule quantities may be subject to adjustment in the HASP and the Real-Time Market as further provided in Section 31.4 and 34.10 in order to meet operating conditions.

(g) For Multi-Stage Generating Resources that receive a Day-Ahead Schedule, are awarded a RUC Schedule, or receive an Ancillary Services Award the Scheduling Coordinator must submit an Energy Bid in the Real-Time Market for the same Trading Hour(s). If the Scheduling Coordinator submits an Economic Bid for such Trading Hour(s), the Economic Bid must be for either: the same MSG Configuration scheduled or awarded in the Integrated Forward Market, or the MSG Configuration committed in RUC. If the Scheduling Coordinator submits a Self-Schedule in the Real-Time Market for such Trading Hour(s), then the Energy Self-Schedule may be submitted in any registered MSG Configuration, including the MSG Configuration awarded in the Day-Ahead Market, that can support the awarded Ancillary Services (as further required by Section 8). Scheduling Coordinators for Multi-Stage Generating Resources may submit into the Real-Time Market bids from up to six (6) MSG Configurations in addition to the MSG Configuration scheduled or awarded in the Integrated Forward Market and Residual Unit Commitment, provided that the MSG Transitions between the MSG Configurations bid into the Real-Time Market are feasible and the transition from the previous Trading Hour are also feasible.

(h) For the Trading Hours that Multi-Stage Generating Resources do not have a CAISO Schedule or award from a prior CAISO Market run, the Scheduling Coordinator can submit up to six (6) MSG Configurations into the RTM.

(i) A Scheduling Coordinator cannot submit a Bid to the CAISO Markets for a MSG Configuration into which the Multi-Stage Generating Resource

cannot transition due to lack of Bids for the specific Multi-Stage Generating Resource in other MSG Configurations that are required for the requisite MSG Transition.

(j) In order for Multi-Stage Generating Resource to meet any Resource Adequacy must-offer obligations, the responsible Scheduling Coordinator must submit either an Economic Bid or Self-Schedule for at least one MSG Configuration into the Day-Ahead Market and Real-Time Market that is capable of fulfilling that Resource Adequacy obligation, as feasible. The Economic Bid shall cover the entire capacity range between the maximum bid-in Energy MW and the higher of Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin.

(k) For any given Trading Hour, a Scheduling Coordinator may submit Self-Schedules and/or Submissions to Self-Provide Ancillary Services in only one MSG Configuration for each Generating Unit.

(l) In any given Trading Hour in which a Scheduling Coordinator has submitted a Self-Schedule for a Multi-Stage Generating Resource, the Scheduling Coordinator may also submit Bids for other MSG Configurations provided that they concurrently submit Bids that enable the applicable CAISO Market to transition the Multi-Stage Generating Resource to other MSG Configurations.

(m) If in any given Trading Hour the Multi-Stage Generating Resource was awarded Regulation or Operating Reserves in the IFM, any Self-Schedules or Submissions to Self-Provide Ancillary Services the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Regulation or Operating Reserve is Awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour.

(n) If a Multi-Stage Generating Resource has received a binding RUC Start-Up Instruction as provided in Section 31, any Self-Schedule or Submission to Self-Provide Ancillary Services in the RTM must be in the same MSG Configuration committed in RUC.

(o) If in any given Trading Hour the Multi-Stage Generating Resource is scheduled for Energy in the IFM, any Self-Schedules the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Energy is scheduled in IFM for that Multi-Stage Generating Resource in that given Trading Hour.

(p) For a Multi-Stage Generating Resource, the Bid(s) submitted for the resource's configuration(s) shall collectively cover the entire capacity range between the maximum bid-in Energy MW and the higher of the Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin. This rule shall apply separately to the Day-Ahead Market and the Real-Time Market.

* * *

31.5.7.2 Rescission of Payments for Undelivered RUC Capacity

For each Settlement Interval in which a Generating Unit, Participating Load, Proxy Demand Resource, System Unit or System Resource fails to supply Energy from capacity committed in RUC in accordance with a Dispatch Instruction, or supplies only a portion of the Energy specified in the Dispatch Instruction, the RUC Availability Payment will be reduced to the extent of the deficiency, in accordance with the provisions of Section 11.2.2.2.2, which for a Multi-Stage Generating Resource is evaluated for the Generating Unit and not by the MSG Configuration.

* * *

34.5 General Dispatch Principles

The CAISO shall conduct all Dispatch activities consistent with the following principles:

(1) The CAISO shall issue AGC instructions electronically as often as every four (4) seconds from its Energy Management System (EMS) to resources providing Regulation and on Automatic Generation Control to meet NERC and WECC performance requirements;

(2) In each run of the RTED or RTCD the objective will be to meet the projected Energy requirements over the applicable forward-looking time period of that run, subject to transmission and resource operational constraints, taking into account the short term CAISO Forecast of CAISO Demand adjusted as necessary by the CAISO Operator to reflect scheduled changes to Interchange and non-dispatchable resources in subsequent Dispatch Intervals;

(3) Dispatch Instructions will be based on Energy Bids for those resources that are capable of intra-hour adjustments and will be determined through the use of SCED except when the CAISO must utilize the RTDD and RTMD;

(4) When dispatching Energy from awarded Ancillary Service capacity the CAISO will not differentiate between Ancillary Services procured by the CAISO and Submissions to Self-Provide an Ancillary Service;

(5) The Dispatch Instructions of a resource for a subsequent Dispatch Interval shall take as a point of reference the actual output obtained from either the State Estimator solution or the last valid telemetry measurement and the resource's operational ramping capability. For Multi-Stage Generating Resources the determination of the point of reference is further affected by the MSG Configuration and the information contained in the Transition Matrix;

(6) In determining the Dispatch Instructions for a target Dispatch Interval while at the same time achieving the objective to minimize Dispatch costs to meet the forecasted conditions of the entire forward-looking time

period, the Dispatch for the target Dispatch Interval will be affected by: (a) Dispatch Instructions in prior intervals, (b) actual output of the resource, (c) forecasted conditions in subsequent intervals within the forward-looking time period of the optimization, and (d) operational constraints of the resource, such that a resource may be dispatched in a direction for the immediate target Dispatch Interval that is different than the direction of change in Energy needs from the current Dispatch Interval to the next immediate Dispatch Interval, considering the applicable MSG Configuration;

(7) Through Start-Up Instructions the CAISO may instruct resources to start up or shut down, or may reduce Load for Participating Loads and Proxy Demand Resources, over the forward-looking time period for the RTM based on submitted Bids, Start-Up Costs and Minimum Load Costs, Pumping Costs and Pump Shut-Down Costs, as appropriate for the resource, or for Multi-Stage Generating Resource as appropriate for the applicable MSG Configuration, consistent with operating characteristics of the resources that the SCED is able to enforce. In making Start-Up or Shut-Down decisions in the RTM, the CAISO may factor in limitations on number of run hours or Start-Ups of a resource to avoid exhausting its maximum number of run hours or Start-Ups during periods other than peak loading conditions;

(8) The CAISO shall only start up resources that can start within the applicable time periods of the various CAISO Markets Processes that comprise the RTM;

(9) The RTM optimization may result in resources being shut down consistent with their Bids and operating characteristics provided that: (a) the resource does not need to be on-line to provide Energy, (b) the resource is able to start up within the applicable time periods of the

processes that comprise the RTM, (c) the Generating Unit is not providing Regulation or Spinning Reserve, and (d) Generating Units online providing Non-Spinning Reserve may be shut down if they can be brought up within ten (10) minutes as such resources are needed to be online to provide Non-Spinning Reserves;

(10) For resources that are both providing Regulation and have submitted Energy Bids for the RTM, Dispatch Instructions will be based on the Regulation Ramp Rate of the resource rather than the Operational Ramp Rate if the Dispatch Operating Point remains within the Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation;

(11) For Multi-Stage Generating Resources the CAISO will issue Dispatch Instructions by Resource ID and Configuration ID;

(12) The CAISO may issue Transition Instructions to instruct resources to transition from one MSG Configuration to another over the forward-looking time period for the RTM based on submitted Bids, Transition Costs and Minimum Load Costs, as appropriate for the MSG Configurations involved in the MSG Transition, consistent with Transition Matrix and operating characteristics of these MSG Configurations. The RTM optimization will factor in limitations on Minimum Run Time and Minimum Down Time defined for each MSG configuration and Minimum Run Time and Minimum Down Time at the Generating Unit.

* * *

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 will be used as determined based on the time it takes for the resource to cross its Forbidden Operating Region. A resource can only be ramped through a Forbidden Operating Region after being dispatched into a Forbidden Operation Region. The CAISO will not Dispatch a resource within its Forbidden Operating Regions in the Real-Time Market, except that the CAISO may Dispatch the resource through the Forbidden Operating Region in the direction that the resource entered the Forbidden Operating Region at the maximum applicable Ramp Rate over consecutive Dispatch Intervals. A resource with a Forbidden Operating Region cannot provide Ancillary Services in a particular fifteen (15) minute Dispatch Interval unless that resource can complete its transit through the relevant Forbidden Operating Region within that particular Dispatch Interval.

(c) Operational Ramp Rates and Start-Up Times. The submitted Operational Ramp Rate for resources shall be used as the basis for all Dispatch Instructions, provided that the Dispatch Operating Point for resources that are providing Regulation remains within their applicable Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation. 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. The Dispatch Instruction shall consider the relevant Start-Up Time

as, if the resource is off-line, the relevant Operational Ramp Rate function, and any other resource constraints or 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.

(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 Run Time 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 Run Time expires. For Multi-Stage Generating Resources these requirements shall be observed both for the Generating Unit and MSG Configuration.

(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.

* * *

Appendix A

Master Definition Supplement

* * *

- Multi-Stage Generating Resources

A Generating Unit that for reasons related to its technical characteristics can be operated in various MSG Configurations such that only one such MSG Configuration can be operated in any given Dispatch Interval. In addition, subject to the requirements in Section 27.8, the following technical characteristics qualify a Generating Unit as a Multi-Stage Generating Resource if the resource: (1) is a combined cycle resource, excluding those that are one-by-one combined cycle resources without bypassing, duct firing capability or power augmentation capability; (2) has more than one Forbidden Operating Region; (3) has multiple operating modes, including Regulating Ranges associated with different Ancillary Services capability; or (4) has hold times before or after a Transition through a Forbidden Operating Region. A hold time is an operational restriction that requires the resource to stay in or out of a specific operating mode for a given period of time, derived from the physical characteristics registered in the Master File for the resource, which may be in the form of a requirement that the resource stay in a particular operating mode for a period of time once it is in, or that the resource must stay out of a particular operating mode for a period of time once it is out of that operating mode. Metered Subsystems, Pumped-Storage Hydro Units, and Pumping Loads, and System Resources do not qualify as Multi-Stage Generating Resources and therefore cannot register as such as provided in Section 27.8. Regulatory Must-Take Resources are not required to be registered as Multi-Stage Generating Resources. Dispatchable Qualifying Facilities that are not qualified as Regulatory Must-Take resources are required to register as Multi-Stage Generating Resources, provided they meet the qualifying technical characteristics described above.

* * *

Appendix AA

[Not Used]

Attachment B – Marked

Required Registration for Multi-Stage Generation Resources and

Modification of Minimum Load Costs Tolerance Band for Bid Cost Recovery

California Independent System Operator Corporation

July 30, 2013

8.10.8.2 Rescission of Payments for Unavailable Ancillary Service Capacity

If the CAISO determines that a Scheduling Coordinator has supplied Uninstructed Imbalance Energy to the CAISO during a Settlement Interval from the capacity of a resource that is obligated to supply Spinning Reserve or Non-Spinning Reserve to the CAISO, payments to the Scheduling Coordinator for the Ancillary Service capacity used to supply Uninstructed Imbalance Energy shall be eliminated to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.2. For Multi-Stage Generating Resources that have supplied Uninstructed Imbalance Energy from capacity obligated to supply Spinning or Non-Spinning Reserves, the CAISO shall calculate the capacity for which payments will be rescinded at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level, as applicable, and will use the MSG Configuration-specific Maximum Operating Limit.

* * *

11.8.1.1 IFM Self-Commitment Period

An IFM Self-Commitment Period for a Bid Cost Recovery Eligible Resource shall consist of one or more sets of consecutive Trading Hours during which the relevant Bid Cost Recovery Eligible Resource has either a Self-Schedule or, except for Self-Provided Ancillary Services for Non-Spinning Reserve by a Fast Start Unit, has a non-zero amount of Self-Provided Ancillary Services. An IFM Self-Commitment Period for a Bid Cost Recovery Eligible Resource may not be less than the relevant Minimum Run Time (MRT), rounded up to the next hour. Consequently, if a Bid Cost Recovery Eligible Resource first self-commits in hour h of the Trading Day, the self-commitment will be extended to hour h + MRT. Two IFM Self-Commitment Periods for a Bid Cost Recovery Eligible Resource may not be apart by less than the relevant Minimum Down Time (MDT) (rounded up to the next hour). Consequently, if a Bid Cost Recovery Eligible Resource has submitted a Self-Schedule or Submission to Self-Provide an Ancillary Service in hours h and h + n, and n is less than the MDT, the IFM Self-Commitment Period will be extended to the hours in between h and h + n inclusive. The number of IFM Self-Commitment Periods for a Bid Cost Recovery Eligible Resource within a Trading Day cannot exceed the relevant Maximum Daily Start-Ups (MDS), or MDS + 1 if the first IFM Self-Commitment Period is the continuation of an

IFM or RUC Commitment Period from the previous Trading Day. Consequently, if a Bid Cost Recovery Eligible Resource has submitted a Self-Schedule or Submission to Self-Provide an Ancillary Service, such that after applying the preceding two rules, the number of disjoint Self Commitment Periods for the Operating Day exceeds the Maximum Daily Start-Ups (MDS), or MDS + 1 if the first IFM Self-Commitment Period is the continuation of an IFM or RUC Commitment Period from the previous Trading Day, the disjoint Self Commitment Periods with smallest time gap in between will be joined together to bring down the number of disjoint Self Commitment Periods to MDS or MDS +1 as relevant. To determine whether an extension of the IFM Self-Commitment Period applies for Multi-Stage Generating Resources, the CAISO will ensure that the respective Minimum Run Time and Minimum Down Time for both the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ and MSG Configuration levels are simultaneously respected.

11.8.1.2 Real-Time Self-Commitment Period

A Real-Time Market Self-Commitment Period for a Bid Cost Recovery Eligible Resource shall consist of all consecutive Dispatch Intervals not in an IFM Commitment Period or a RUC Commitment Period where the Bid Cost Recovery Eligible Resource has a Self-Schedule or, except for Self-Provided Ancillary Services for Non-Spinning Reserve by a Fast Start Unit, has a non-zero amount of Self-Provided Ancillary Services. A Real-Time Market Self-Commitment Period for a Bid Cost Recovery Eligible Resource may not be less than the relevant MUT (rounded up to the next 15-minute Commitment Interval) when considered jointly with any adjacent IFM Self-Commitment Period. For example, if a Bid Cost Recovery Eligible Resource self-commits at time h, the self-commitment will be extended to Commitment Interval h + MUT, unless an IFM or RUC Commitment Period exists starting after hour h, in which case the self-commitment will be extended to Commitment Interval h + min (MUT, t), where t represents the time interval between the Real-Time Market Self-Commitment Period and the IFM or RUC Commitment Period. A Real-Time Market Self-Commitment Period for a Bid Cost Recovery Eligible Resource may not be apart from an IFM or RUC Commitment Period by less than the relevant MDT (rounded up to the next 15-minute Commitment Interval). For example, if a Bid

Cost Recovery Eligible Resource self-commits at time T1 and has a RUC Schedule at time T2 < T1, the Real-Time Market Self-Commitment Period will be extended to the interim Commitment Intervals if T1 - T2< MDT. The number of Real-Time Market Self-Commitment Periods for a Bid Cost Recovery Eligible Resource within a Trading Day, when considered jointly with any adjacent IFM Self-Commitment Period, may not exceed the relevant MDS (or MDS + 1 if the first Real-Time Market Self-Commitment Period is the continuation of a Real-Time Market Commitment Period from the previous Trading Day). For example, if a Bid Cost Recovery Eligible Resource self-commits at time T1 and has a RUC Schedule at time T2 > T1, the Real-Time Market Self-Commitment Period will be extended to the interim Commitment Intervals if an additional Real-Time Market Start-Up at T1 would violate the MDS constraint. To determine whether an extension of the RTM Self-Commitment Period applies for Multi-Stage Generating Resources, the CAISO will ensure that the respective Minimum Run Time and Minimum Down Time for both the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ and MSG Configuration levels are simultaneously respected.

* * *

11.8.2.1.2 IFM Minimum Load Cost

The Minimum Load Cost for the applicable Settlement Interval shall be the Minimum Load Cost submitted to the CAISO in the IFM divided by the number of Settlement Intervals in a Trading Hour. For each Settlement Interval, only the IFM Minimum Load Cost in a CAISO IFM Commitment Period is eligible for Bid Cost Recovery. The IFM Minimum Load Cost for any Settlement Interval is zero if: (1) the Settlement Interval is in an IFM Self Commitment Period for the Bid Cost Recovery Eligible Resource; (2) the Bid Cost Recovery Eligible Resource is manually pre-dispatched under an RMR Contract prior to the Day-Ahead Market or the resource is flagged as an RMR Dispatch in the Day-Ahead Schedule for the applicable Settlement Interval; or (3) the Bid Cost Recovery Eligible Resource is determined not actually On during the applicable Settlement Interval. For the purposes of determining IFM Minimum Load Cost, a Bid Cost Recovery Eligible Resource~~, except for a Multi-Stage Generating Resource,~~ is assumed to be On if: a) its metered Energy in a Settlement Interval is equal to or greater than the difference

between its Minimum Load Energy and the Tolerance Band, and b) the resource's associated Metered Energy > 0. Otherwise, ~~such non-Multi-Stage Generating Resources are~~the resource is determined to be Off. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. If application of section 11.8.1.3 dictates that the IFM is the commitment period, then the calculation of the IFM Minimum Load Costs will depend on whether the metered MSG Configuration is equal to or different from the IFM committed MSG Configuration. If the metered MSG Configuration is equal to the IFM committed MSG Configuration, then the IFM Minimum Load Costs will be based on the Minimum Load Costs of the IFM committed MSG Configuration. If the metered MSG Configuration is different from the IFM committed MSG Configuration, then the IFM Minimum Load Costs will be based on the lower of the Minimum Load Costs of the metered MSG Configuration and the Minimum Load Costs of the IFM committed MSG Configuration. The metered MSG Configuration is determined based on the highest MSG Configuration submitted to the IFM for which the Metered Data is within or above the three (3) percent (or 5 MW) Tolerance Band of the PMin of that highest MSG Configuration submitted to the IFM. Between two (2) (or more) MSG Configurations, the highest MSG Configuration is the MSG Configuration with the PMin value that is the greatest MW value.

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11.8.2.1.5 IFM Energy Bid Cost

For any Settlement Interval, the IFM Energy Bid Cost for Bid Cost Recovery Eligible Resources, except Participating Loads, shall be the integral of the relevant Energy Bid submitted to the IFM, if any, from the higher of the registered Bid Cost Recovery Eligible Resource's Minimum Load and the Day-Ahead Total Self-Schedule up to the relevant MWh scheduled in the Day-Ahead Schedule, divided by the number of Settlement Intervals in a Trading Hour. The IFM Energy Bid Cost for Bid Cost Recovery Eligible Resources, except Participating Loads, and except for any portion of the Day-Ahead Schedule associated with an Energy Bid less than zero, for any Settlement Interval is set to zero for any portion of the Day-Ahead Schedule that is not delivered from the otherwise Bid Cost Recovery Eligible Resource that has metered Generation below its Day-Ahead Schedule; any portion of the Day-Ahead Schedule that is actually delivered remains

eligible for IFM Energy Bid Cost Recovery. The delivered portions of the Day-Ahead Schedule for this calculation are determined using the Day-Ahead Metered Energy Adjustment Factor. The Day-Ahead Metered Energy Adjustment Factor is not applied to IFM Energy Bid Costs that associate with Energy Bids that are less than zero. The CAISO will determine the IFM Energy Bid Cost for a Multi-Stage Generating Resource at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level. The CAISO will determine the applicable net IFM Energy Bid Cost surplus or net IFM Energy Bid Cost shortfalls as described in Section 11.8.2.4.

11.8.2.1.6 IFM AS Bid Cost

For any Settlement Interval, the IFM AS Bid Cost shall be the product of the IFM AS Award from each accepted IFM AS Bid and the relevant AS Bid Price, divided by the number of Settlement Intervals in a Trading Hour. The CAISO will determine and calculate IFM AS Bid Cost for a Multi-Stage Generating Resource at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level. The IFM AS Bid Cost shall also include Mileage Bid Costs. For any Settlement Interval, the IFM Mileage Bid Cost shall be the product of Instructed Mileage associated with a Day Ahead Regulation capacity award, as adjusted for accuracy consistent with Section 11.10.1.7, and the relevant Mileage Bid price, divided by the number of Settlement Intervals in a Trading Hour. The CAISO will determine and calculate IFM Mileage Bid Cost for a Multi-Stage Generating Resource at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level.

* * *

11.8.2.2 IFM Market Revenue

In the case of a Multi-Stage Generating Resource, the CAISO will calculate the market revenue at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level.

* * *

11.8.3.1.2 RUC Minimum Load Cost

The Minimum Load Cost for the applicable Settlement Interval shall be the Minimum Load Cost of the Bid Cost Recovery Eligible Resource divided by the number of Settlement Intervals in a Trading Hour. For each Settlement Interval, only the RUC Minimum Load Cost in a CAISO RUC

Commitment Period is eligible for Bid Cost Recovery. The RUC Minimum Load Cost for any Settlement Interval is zero if: (1) the Bid Cost Recovery Eligible Resource is manually pre-dispatched under an RMR Contract or the resource is flagged as an RMR Dispatch in the Day-Ahead Schedule in that Settlement Interval; (2) the Bid Cost Recovery Eligible Resource is not actually On in the applicable Settlement Interval; or (3) the applicable Settlement Interval is included in an IFM Commitment Period. For the purposes of determining RUC Minimum Load Cost, a Bid Cost Recovery Eligible Resource~~, except for a Multi-Stage Generating Resource,~~ is assumed to be On if: a) its metered Energy in a Settlement Interval is equal to or greater than the difference between its Minimum Load Energy and the Tolerance Band, and b) the resource's associated Metered Energy > 0. Otherwise, ~~such non-Multi-Stage Generating Resources are~~the resource is determined to be Off. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. If application of section 11.8.1.3 dictates that RUC is the commitment period, then the calculation of the RUC Minimum Load Costs will depend on whether the metered MSG Configuration is equal to or different from the RUC committed MSG Configuration. If the metered MSG Configuration is equal to the RUC committed MSG Configuration, then the RUC Minimum Load Costs will be based on the Minimum Load Costs of the RUC committed MSG Configuration. If the metered MSG Configuration is different from the RUC committed MSG Configuration, then the RUC Minimum Load Costs will be based on the lower of the Minimum Load Costs of the metered MSG Configuration and the Minimum Load Costs of the RUC committed MSG Configuration. The metered MSG Configuration is determined based on the highest MSG Configuration submitted to the RUC for which the Metered Data is within or above the three (3) percent (or 5 MW) Tolerance Band of the PMin of that highest MSG Configuration submitted to the RUC. Between two (2) (or more) MSG Configurations, the highest MSG Configuration is the MSG Configuration with the PMin value that is the greatest MW value.

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11.8.3.2 RUC Market Revenues

For any Settlement Interval, the RUC Market Revenue for a Bid Cost Recovery Eligible Resource is the RUC Availability Payment as specified in Section 11.2.2.1 divided by the number of Settlement Intervals in a Trading Hour. If the RUC Availability Bid Cost of a BCR Eligible Resource is reduced to zero (0) in a Settlement Interval because of Uninstructed Deviation as stated in Section 11.8.3.1.3, then the RUC Market Revenue for that resource for that Settlement Interval shall also be set to zero (0) since the resource is subject to rescission of RUC Availability Payments as specified in Section 31.5.7. The CAISO will determine the RUC Market Revenues for Multi-Stage Generating Resources based on the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level.

*** * ***

11.8.4.1.2 RTM Minimum Load Cost

The RTM Minimum Load Cost is the Minimum Load Cost of the Bid Cost Recovery Eligible Resource submitted to the CAISO for the Real-Time Market divided by the number of Settlement Intervals in a Trading Hour. For each Settlement Interval, only the RTM Minimum Load Cost in a CAISO RTM Commitment Period is eligible for Bid Cost Recovery. The RTM Minimum Load Cost for any Settlement Interval is zero if: (1) the Settlement Interval is included in a RTM Self-Commitment Period for the Bid Cost Recovery Eligible Resource; (2) the Bid Cost Recovery Eligible Resource has been manually dispatched under an RMR Contract or the resource has been flagged as an RMR Dispatch in the Day-Ahead Schedule or the Real-Time Market in that Settlement Interval; (3) the Bid Cost Recovery Eligible Resource is not actually On in that Settlement Interval; (4) for all resources that are not Multi-Stage Generating Resources, that Settlement Interval is included in an IFM or RUC Commitment Period; or (5) the Bid Cost Recovery Eligible Resource is committed pursuant to Section 34.9.2 for the purpose of performing Ancillary Services testing, pre-commercial operation testing for Generating Units, or PMax testing. For the purposes of RTM Minimum Load Cost, a Bid Cost Recovery Eligible Resource~~, other than a Multi-Stage Generating Resource,~~ is determined to ~~not actually~~ be On if: a) the metered Energy in that Settlement Interval is ~~less~~ equal to or greater than the Tolerance Band referenced by the Minimum Load Energy, and b) the resource's associated Metered Energy

>0. Otherwise, the resource is determined to be Off. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. If application of section 11.8.1.3 dictates that the RTM is the commitment period, then the calculation of the RTM Minimum Load Costs will depend on whether the metered MSG Configuration is equal to or different from the RTM committed MSG Configuration. If the metered MSG Configuration is equal to the RTM committed MSG Configuration, then the RTM Minimum Load Costs will be based on the Minimum Load Costs of the RTM committed MSG Configuration. If the metered MSG Configuration is different from the RTM committed MSG Configuration, then the RTM Minimum Load Costs will be based on the lower of the Minimum Load Costs of the metered MSG Configuration and the Minimum Load Costs of the RTM Committed configuration. The metered MSG Configuration is determined based on the highest MSG Configuration submitted to the Real-Time Market for which the Metered Data is within or above the three (3) percent (or 5 MW) Tolerance Band of the PMin of that highest MSG Configuration submitted to the Real-Time Market. Between two (2) (or more) MSG Configurations, the highest MSG Configuration is the MSG Configuration with the PMin value that is the greatest MW value. For Settlement Intervals that contain two (2) Dispatch Intervals with two (2) different MSG Configurations, the CAISO will determine the Transition Costs, and Minimum Load Costs based on the sum of the two (2) applicable Dispatch Intervals.

* * *

11.8.4.1.5 RTM Energy Bid Cost

For any Settlement Interval, the RTM Energy Bid Cost for the Bid Cost Recovery Eligible Resource except Participating Loads shall be computed as the sum of the products of each Instructed Imbalance Energy (IIE) portion, except Standard Ramping Energy, Residual Imbalance Energy, Exceptional Dispatch Energy, Derate Energy, MSS Load Following Energy, Ramping Energy Deviation and Regulating Energy, with the relevant Energy Bid prices, if any, for each Dispatch Interval in the Settlement Interval. The RTM Energy Bid Cost for a Bid Cost Recovery Eligible Resource except Participating Loads for a Settlement Interval is set to zero for any undelivered Real-Time Instructed Imbalance Energy by the Bid Cost Recovery Eligible Resource.

Any Uninstructed Imbalance Energy in excess of Instructed Imbalance Energy is also not eligible for Bid Cost Recovery. The delivered Real-Time Instructed Imbalance Energy for this calculation are determined using the Real-Time Metered Energy Adjustment Factor. For a Multi-Stage Generating Resource the CAISO will determine the RTM Energy Bid Cost based on the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level.

11.8.4.1.6 RTM AS Bid Cost

For each Settlement Interval, the Real-Time Market AS Bid Cost shall be the product of the average Real-Time Market AS Award from each accepted AS Bid submitted in the Settlement Interval for the Real-Time Market, reduced by any relevant tier-1 No Pay capacity in that Settlement Interval (but not below zero), with the relevant AS Bid price. The average Real-Time Market AS Award for a given AS in a Settlement Interval is the sum of the 15-minute Real-Time Market AS Awards in that Settlement Interval, each divided by the number of 15-minute Commitment Intervals in a Trading Hour and prorated to the duration of the Settlement Interval (10/15 if the Real-Time Market AS Award spans the entire Settlement Interval, or 5/15 if the Real-Time Market AS Award spans half the Settlement Interval). For a Multi-Stage Generating Resource the CAISO will determine the RTM AS Bid Cost based on the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level. The Real-Time Market AS Bid Cost shall also include Mileage Bid Costs. For each Settlement Interval, the Real-Time Mileage Bid Cost shall be the product of Instructed Mileage associated with a Real-Time Regulation capacity award, as adjusted for accuracy consistent with Section 11.10.1.7, and the relevant Mileage Bid price divided by the number of Settlement Intervals for the Real-Time Market in a Trading Hour. The CAISO will determine and calculate the Real Time Market Mileage Bid Cost for a Multi-Stage Generating Resource at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level.

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11.8.4.2 RTM Market Revenue Calculations

11.8.4.2.1 For each Settlement Interval in a CAISO Real-Time Market Commitment Period, the RTM Market Revenue for a Bid Cost Recovery Eligible Resource is the algebraic sum of the

elements listed below in this Section. For Multi-Stage Generating Resources the RTM Market Revenue calculations will be made at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ level.

(a) The sum of the products of the Instructed Imbalance Energy (where for Pumped-Storage Hydro Units and Participating Load operating in the pumping mode or serving Load, the MWh is negative), except Standard Ramping Energy, Residual Imbalance Energy, Exceptional Dispatch Energy, Derate Energy, MSS Load following Energy, Ramping Energy Deviation and Regulation Energy, with the relevant Real-Time Market LMP, for each Dispatch Interval in the Settlement Interval. The Instructed Imbalance Energy for this calculation is subject to the Real-Time Metered Energy Adjustment Factor to capture metered energy.

(b) The product of the delivered MWh at or below the resource's Minimum Load submitted to the Real-Time Market (including Energy from Minimum Load of Bid Cost Recovery Eligible Resources committed in RUC) and the relevant Real-Time Market LMP, for each Dispatch Interval in the Settlement Interval, The delivered portions of the resource's Minimum Load in this case is determined based on the CAISO's determination that the resource was "On" for the applicable Trading Hour as described in Section 11.8.4.1.2; and

(c) The product of the Real-Time Market AS Award from each accepted Real-Time Market AS Bid in the Settlement Interval with the relevant ASMP, divided by the number of fifteen (15)-minute Commitment Intervals in a Trading Hour (4), and prorated to the duration of the Settlement Interval.

(d) The relevant tier-1 No Pay charges for that Bid Cost Recovery Eligible Resource in that Settlement Interval.

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11.8.5 Unrecovered Bid Cost Uplift Payment

Scheduling Coordinators shall receive an Unrecovered Bid Cost Uplift Payment for a Bid Cost Recovery Eligible Resource, including resources for MSS Operators that have elected gross

Settlement, if the net of all IFM Bid Cost Shortfalls and IFM Bid Cost Surpluses calculated pursuant to Section 11.8.2, RUC Bid Cost Shortfalls and RUC Bid Cost Surpluses calculated pursuant to Section 11.8.3, and the RTM Bid Cost Shortfalls and RTM Bid Cost Surpluses calculated pursuant to Section 11.8.4 for that Bid Cost Recovery Eligible Resource over a Trading Day is positive. For Multi-Stage Generating Resources, Unrecovered Bid Cost Uplift Payments will be calculated and made at the Generating Unit level ~~or Dynamic Resource-Specific System Resource~~ and not the MSG Configuration level. For MSS Operators that have elected net Settlement, the Unrecovered Bid Cost Uplift Payment is at the MSS level. The MSS IFM, RUC, and RTM Bid Cost Shortfall or IFM. RUC, and RTM Bid Cost Surplus for each market for each Trading Hour is the sum of the IFM, RUC, and RTM Bid Cost Shortfalls and IFM. RUC, and RTM Bid Cost Surpluses for all resources in the MSS. Scheduling Coordinators for MSS Operators that have elected net Settlement will receive an Unrecovered Bid Cost Uplift Payment if the net of all IFM, RUC, and RTM Bid Cost Shortfalls and IFM, RUC, and RTM Bid Cost Surpluses for that MSS over a Trading Day is positive.

* * *

27.8.1 Registration and Qualification

Scheduling Coordinators responsible for resources that meet the definition of a Multi-Stage Generating Resource based on their Master File registered characteristics must register such resources with the CAISO as Multi-Stage Generating Resources as further discussed in this Section, and must comply with all requirements that apply to such resources specified in the CAISO Tariff. Scheduling Coordinators must comply with the registration and qualification process described in this Section 27.8.1, in order to effectuate any of the changes described in Section 27.8.3. No less than sixteen (16) days prior to the date that Scheduling Coordinator seeks to have the resource participate in the CAISO Markets under the new settings or MSG Configuration details, the Scheduling Coordinator must complete and submit to the CAISO the registration form and the resource data template provided by the CAISO for registration and qualification purposes. After the Scheduling Coordinator submits a request for registration of a Generating Unit ~~or Dynamic Resource-Specific System Resource~~ as a Multi-Stage Generating

Resource or a change in the attributes in Section 27.8.3, the CAISO will coordinate with that Scheduling Coordinator to validate that the resource qualifies for the requested status and that all the requisite information has been successfully provided to the CAISO. The resource will be successfully registered and qualified as a Multi-Stage Generating Resource, or the requested changes in the attributes listed in Section 27.8.3 will be successfully registered and qualified as of the date on which the CAISO sends the responsible Scheduling Coordinator a notice that the resource has been successfully qualified as such. In the absence of extenuating circumstances-, the ISO will provide such notice on the sixteenth day after the Scheduling Coordinator provides new settings or MSG Configuration details. After the date on which the CAISO has provided such notice, any changes to the items listed in Section 27.8.3 will be subject to the timing and process requirements in this Section 27.8.1 and 27.8.3. The Scheduling Coordinator may modify all other Multi-Stage Generating Resource registered characteristics pursuant to the timing and processing requirements specified elsewhere in this CAISO Tariff, as they may apply. If the CAISO has reason to believe that the resource's operating and technical characteristics are not consistent with the registered and qualified attributes, the CAISO may request that the Scheduling Coordinator provide additional information necessary to support their registered status and, if appropriate, may require that the resource be registered and qualified more consistent with the resource's operating and technical characteristics, including the revocation of its status as a Multi-Stage Generating Resource. Failure to provide such information may be grounds for revocation of Multi-Stage Generating Resource status. Such changes in status or MSG Configuration details would be subject to the registration and qualification requirements in this Section 27.8. Scheduling Coordinators may register the number MSG Configurations as are reasonably appropriate for the resource based on the technical and operating characteristics of the resource, which may not, however, exceed a total of ten MSG Configurations and cannot be fewer than two MSG Configurations. The information requirements specified in Section 27.8.2 will apply.

27.8.2 Informational Requirements

As part of the registration process described in Section 27.8.1, the Scheduling Coordinators for Generating Units ~~or Dynamic Resource-Specific System Resources~~ that seek to qualify as Multi-

Stage Generating Resources must submit to the CAISO a Transition Matrix, which contains the Transition Costs and operating constraints associated with MSG Transitions. The Scheduling Coordinator may register up to six (6) MSG Configurations without any limitation on the number of transitions between the registered MSG Configurations in the Transition Matrix. If the Scheduling Coordinator registers seven (7) or more MSG Configurations, then the Scheduling Coordinator may only include two (2) eligible transitions between MSG Configurations for upward and downward transitions, respectively, starting from the initial MSG Configuration in the Transition Matrix. For each MSG Configuration, the responsible Scheduling Coordinator shall submit an Operational Ramp Rate and, as applicable, an Operating Reserve Ramp Rate and Regulating Reserves ramp rate, each of which shall have at least one (1) segment and no more than two (2) segments. The Scheduling Coordinator must establish the default MSG Configuration and its associated Default Resource Adequacy Path that apply to Multi-Stage Generating Resources that are subject to Resource Adequacy must-offer obligations. The Scheduling Coordinator may submit changes to this information consistent with Sections 27.8.1 and 27.8.3, as they may apply.

27.8.3 Changes in Status and Configurations of Resource

Scheduling Coordinators may seek modifications to the Multi-Stage Generating Resource attributes listed below consistent with the process and timing requirements specified in Section 27.8.1 and the additional requirements discussed below in this Section 27.8.3:

(1) Registration and qualification of a Generating Unit ~~or Dynamic Resource-Specific System Resource~~ as a Multi-Stage Generating Resource.

(2) Changes to the MSG Configurations attributes, which include:

a. addition of new MSG Configurations;

b. removal of an existing MSG Configuration;

c. a change in the physical units supporting the MSG Configuration;

d. a change to the MSG Configuration Start Up and Shut Down flags;

e. adding or removing an MSG Transition to the Transition Matrix;

f. a material change in the Transition Times contained in the Master File, which consists of a change that more than doubles the Transition Times or reduces it to less than half; and

g. a material change to the maximum Ramp Rate of the MSG Configuration(s) contained in the Master File, which consists of a change that more than doubles the maximum Ramp Rate or reduces it to less than half.

When transitioning to implement these changes across the midnight hour, for any Real-Time Market run in which the changes specified in this Section 27.8.3 are to take effect within the Time Horizon of any of the Real-Time Market runs, the CAISO will Schedule, Dispatch, or award resources consistent with either the prior or new status and definitions, as appropriate, and required by any Real-Time conditions regardless of the resource's state scheduled or awarded in the immediately preceding Day-Ahead Market. A Scheduling Coordinator may unregister a Generating Unit ~~or Dynamic Resource-Specific System Resource~~ from its Multi-Stage Generating Resource status subject to the timing requirements for Master File changes, and such changes are not subject to the timing requirements in Section 27.8.3. ~~For the first forty-four (44) days after the effective date of this Section, Scheduling Coordinators may not change any of Multi-Stage Generating Resource attributes listed above in this Section. On the forty-fifth (45th) day following the effective day of this Section, c~~Changes to the attributes listed above in this Section may take effect, including the registration of new Multi-Stage Generating Resources, provided Scheduling Coordinators have previously followed the registration process requirements listed in Section 27.8.1. ~~Subsequently, further changes to the attributes listed above in this Section 27.8.3 may not take effect until after the one hundred-and fifth (105th) day following the effective date of this Section, subject to the procedures described in Section 27.8.1. As of the one hundred-fifth (105th) day following the effective date of this Section, c~~Changes to these attributes may only be made every sixty (60) days after the day on which any such changes have taken effect.

30.5 Bidding Rules

30.5.1 General Bidding Rules

(a) All Energy and Ancillary Services Bids of each Scheduling Coordinator submitted to the DAM for the following Trading Day shall be submitted at or prior to 10:00 a.m. on the day preceding the Trading Day, but no sooner than seven (7) days prior to the Trading Day. All Energy and Ancillary Services Bids of each Scheduling Coordinator submitted to the HASP for the following Trading Day shall be submitted starting from the time of publication, at 1:00 p.m. on the day preceding the Trading Day, of DAM results for the Trading Day, and ending seventy-five (75) minutes prior to each applicable Trading Hour in the RTM. The CAISO will not accept any Energy or Ancillary Services Bids for the following Trading Day between 10:00 a.m. on the day preceding the Trading Day and the publication, at 1:00 p.m. on the day preceding the Trading Day, of DAM results for the Trading Day;

(b) Bid prices submitted by a Scheduling Coordinator for Energy accepted and cleared in the IFM and scheduled in the Day-Ahead Schedule may be increased or decreased in the HASP. Bid prices for Energy submitted but not scheduled in the Day-Ahead Schedule may be increased or decreased in the HASP. Incremental Bid prices for Energy associated with Day-Ahead AS or RUC Awards in Bids submitted to the HASP may be revised. Scheduling Coordinators may revise ETC Self-Schedules for Supply only in the HASP to the extent such a change is consistent with TRTC Instructions provided to the CAISO by the Participating TO in accordance with Section 16. Scheduling Coordinators may revise TOR Self-Schedules for Supply only in the HASP to the extent such a change is consistent with TRTC Instructions provided to the CAISO by the Non-Participating TO in accordance with Section 17. Energy associated with

awarded Ancillary Services capacity cannot be offered in the HASP or Real-Time Market separate and apart from the awarded Ancillary Services capacity;

(c) Scheduling Coordinators may submit Energy, AS and RUC Bids in the DAM that are different for each Trading Hour of the Trading Day;

(d) Bids for Energy or capacity that are submitted to one CAISO Market, but are not accepted in that market are no longer a binding commitment and Scheduling Coordinators may submit Bids in a subsequent CAISO Market at a different price;

(e) The CAISO shall be entitled to take all reasonable measures to verify that Scheduling Coordinators meet the technical and financial criteria set forth in Section 4.5.1 and the accuracy of information submitted to the CAISO pursuant to this Section 30; and

(f) In order to retain the priorities specified in Section 31.4 and 34.10 for scheduled amounts in the Day-Ahead Schedule associated with ETC and TOR Self-Schedules or Self-Schedules associated with Regulatory Must-Take Generation, a Scheduling Coordinator must submit to the HASP and Real-Time Market ETC or TOR Self-Schedules, or Self-Schedules associated with Regulatory Must-Take Generation, at or below the Day-Ahead Schedule quantities associated with the scheduled ETC, TOR or Regulatory Must-Take Generation Self-Schedules. If the Scheduling Coordinator fails to submit such HASP or Real-Time Market ETC, TOR or Regulatory Must-Take Generation Self-Schedules, the defined scheduling priorities of the ETC, TOR, or Regulatory Must-Take Generation Day-Ahead Schedule quantities may be subject to adjustment in the HASP and the Real-Time Market as further provided in Section 31.4 and 34.10 in order to meet operating conditions.

(g) For Multi-Stage Generating Resources that receive a Day-Ahead Schedule, are awarded a RUC Schedule, or receive an Ancillary Services Award the Scheduling Coordinator must submit an Energy Bid in the Real-Time Market for the same Trading Hour(s). If the Scheduling Coordinator submits an Economic Bid for such Trading Hour(s), the Economic Bid must be for either: the same MSG Configuration scheduled or awarded in the Integrated Forward Market, or the MSG Configuration committed in RUC. If the Scheduling Coordinator submits a Self-Schedule in the Real-Time Market for such Trading Hour(s), then the Energy Self-Schedule may be submitted in any registered MSG Configuration, including the MSG Configuration awarded in the Day-Ahead Market, that can support the awarded Ancillary Services (as further required by Section 8). Scheduling Coordinators for Multi-Stage Generating Resources may submit into the Real-Time Market bids from up to six (6) MSG Configurations in addition to the MSG Configuration scheduled or awarded in the Integrated Forward Market and Residual Unit Commitment, provided that the MSG Transitions between the MSG Configurations bid into the Real-Time Market are feasible and the transition from the previous Trading Hour are also feasible.

(h) For the Trading Hours that Multi-Stage Generating Resources do not have a CAISO Schedule or award from a prior CAISO Market run, the Scheduling Coordinator can submit up to six (6) MSG Configurations into the RTM.

(i) A Scheduling Coordinator cannot submit a Bid to the CAISO Markets for a MSG Configuration into which the Multi-Stage Generating Resource cannot transition due to lack of Bids for the specific Multi-Stage Generating Resource in other MSG Configurations that are required for the requisite MSG Transition.

(j) In order for Multi-Stage Generating Resource to meet any Resource Adequacy must-offer obligations, the responsible Scheduling Coordinator must submit either an Economic Bid or Self-Schedule for at least one MSG Configuration into the Day-Ahead Market and Real-Time Market that is capable of fulfilling that Resource Adequacy obligation, as feasible. The Economic Bid shall cover the entire capacity range between the maximum bid-in Energy MW and the higher of Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin.

(k) For any given Trading Hour, a Scheduling Coordinator may submit Self-Schedules and/or Submissions to Self-Provide Ancillary Services in only one MSG Configuration for each Generating Unit ~~or Dynamic Resource-Specific System Resource~~.

(l) In any given Trading Hour in which a Scheduling Coordinator has submitted a Self-Schedule for a Multi-Stage Generating Resource, the Scheduling Coordinator may also submit Bids for other MSG Configurations provided that they concurrently submit Bids that enable the applicable CAISO Market to transition the Multi-Stage Generating Resource to other MSG Configurations.

(m) If in any given Trading Hour the Multi-Stage Generating Resource was awarded Regulation or Operating Reserves in the IFM, any Self-Schedules or Submissions to Self-Provide Ancillary Services the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Regulation or Operating Reserve is Awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour.

(n) If a Multi-Stage Generating Resource has received a binding RUC Start-Up Instruction as provided in Section 31, any Self-Schedule or

Submission to Self-Provide Ancillary Services in the RTM must be in the same MSG Configuration committed in RUC.

(o) If in any given Trading Hour the Multi-Stage Generating Resource is scheduled for Energy in the IFM, any Self-Schedules the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Energy is scheduled in IFM for that Multi-Stage Generating Resource in that given Trading Hour.

(p) For a Multi-Stage Generating Resource, the Bid(s) submitted for the resource's configuration(s) shall collectively cover the entire capacity range between the maximum bid-in Energy MW and the higher of the Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin. This rule shall apply separately to the Day-Ahead Market and the Real-Time Market.

* * *

31.5.7.2 Rescission of Payments for Undelivered RUC Capacity

For each Settlement Interval in which a Generating Unit, Participating Load, Proxy Demand Resource, System Unit or System Resource fails to supply Energy from capacity committed in RUC in accordance with a Dispatch Instruction, or supplies only a portion of the Energy specified in the Dispatch Instruction, the RUC Availability Payment will be reduced to the extent of the deficiency, in accordance with the provisions of Section 11.2.2.2.2, which for a Multi-Stage Generating Resource is evaluated for the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ and not by the MSG Configuration.

* * *

34.5 General Dispatch Principles

The CAISO shall conduct all Dispatch activities consistent with the following principles:

(1) The CAISO shall issue AGC instructions electronically as often as every four (4) seconds from its Energy Management System (EMS) to

resources providing Regulation and on Automatic Generation Control to meet NERC and WECC performance requirements;

(2) In each run of the RTED or RTCD the objective will be to meet the projected Energy requirements over the applicable forward-looking time period of that run, subject to transmission and resource operational constraints, taking into account the short term CAISO Forecast of CAISO Demand adjusted as necessary by the CAISO Operator to reflect scheduled changes to Interchange and non-dispatchable resources in subsequent Dispatch Intervals;

(3) Dispatch Instructions will be based on Energy Bids for those resources that are capable of intra-hour adjustments and will be determined through the use of SCED except when the CAISO must utilize the RTDD and RTMD;

(4) When dispatching Energy from awarded Ancillary Service capacity the CAISO will not differentiate between Ancillary Services procured by the CAISO and Submissions to Self-Provide an Ancillary Service;

(5) The Dispatch Instructions of a resource for a subsequent Dispatch Interval shall take as a point of reference the actual output obtained from either the State Estimator solution or the last valid telemetry measurement and the resource's operational ramping capability. For Multi-Stage Generating Resources the determination of the point of reference is further affected by the MSG Configuration and the information contained in the Transition Matrix;

(6) In determining the Dispatch Instructions for a target Dispatch Interval while at the same time achieving the objective to minimize Dispatch costs to meet the forecasted conditions of the entire forward-looking time period, the Dispatch for the target Dispatch Interval will be affected by: (a) Dispatch Instructions in prior intervals, (b) actual output of the

resource, (c) forecasted conditions in subsequent intervals within the forward-looking time period of the optimization, and (d) operational constraints of the resource, such that a resource may be dispatched in a direction for the immediate target Dispatch Interval that is different than the direction of change in Energy needs from the current Dispatch Interval to the next immediate Dispatch Interval, considering the applicable MSG Configuration;

(7) Through Start-Up Instructions the CAISO may instruct resources to start up or shut down, or may reduce Load for Participating Loads and Proxy Demand Resources, over the forward-looking time period for the RTM based on submitted Bids, Start-Up Costs and Minimum Load Costs, Pumping Costs and Pump Shut-Down Costs, as appropriate for the resource, or for Multi-Stage Generating Resource as appropriate for the applicable MSG Configuration, consistent with operating characteristics of the resources that the SCED is able to enforce. In making Start-Up or Shut-Down decisions in the RTM, the CAISO may factor in limitations on number of run hours or Start-Ups of a resource to avoid exhausting its maximum number of run hours or Start-Ups during periods other than peak loading conditions;

(8) The CAISO shall only start up resources that can start within the applicable time periods of the various CAISO Markets Processes that comprise the RTM;

(9) The RTM optimization may result in resources being shut down consistent with their Bids and operating characteristics provided that: (a) the resource does not need to be on-line to provide Energy, (b) the resource is able to start up within the applicable time periods of the processes that comprise the RTM, (c) the Generating Unit is not providing Regulation or Spinning Reserve, and (d) Generating Units

online providing Non-Spinning Reserve may be shut down if they can be brought up within ten (10) minutes as such resources are needed to be online to provide Non-Spinning Reserves;

(10) For resources that are both providing Regulation and have submitted Energy Bids for the RTM, Dispatch Instructions will be based on the Regulation Ramp Rate of the resource rather than the Operational Ramp Rate if the Dispatch Operating Point remains within the Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation;

(11) For Multi-Stage Generating Resources the CAISO will issue Dispatch Instructions by Resource ID and Configuration ID;

(12) The CAISO may issue Transition Instructions to instruct resources to transition from one MSG Configuration to another over the forward-looking time period for the RTM based on submitted Bids, Transition Costs and Minimum Load Costs, as appropriate for the MSG Configurations involved in the MSG Transition, consistent with Transition Matrix and operating characteristics of these MSG Configurations. The RTM optimization will factor in limitations on Minimum Run Time and Minimum Down Time defined for each MSG configuration and Minimum Run Time and Minimum Down Time at the Generating Unit ~~or Dynamic Resource-Specific System Resource~~.

* * *

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 will be used as determined based on the time it takes for the resource to cross its Forbidden Operating Region. A resource can only be ramped through a Forbidden Operating Region after being dispatched into a Forbidden Operation Region. The CAISO will not Dispatch a resource within its Forbidden Operating Regions in the Real-Time Market, except that the CAISO may Dispatch the resource through the Forbidden Operating Region in the direction that the resource entered the Forbidden Operating Region at the maximum applicable Ramp Rate over consecutive Dispatch Intervals. A resource with a Forbidden Operating Region cannot provide Ancillary Services in a particular fifteen (15) minute Dispatch Interval unless that resource can complete its transit through the relevant Forbidden Operating Region within that particular Dispatch Interval.

(c) Operational Ramp Rates and Start-Up Times. The submitted Operational Ramp Rate for resources shall be used as the basis for all Dispatch Instructions, provided that the Dispatch Operating Point for resources that are providing Regulation remains within their applicable Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation. 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. The Dispatch Instruction shall consider the relevant Start-Up Time as, if the resource is off-line, the relevant Operational Ramp Rate function, and any other resource constraints or 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.

(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 Run Time 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 Run Time expires. For Multi-Stage Generating Resources these requirements shall be observed both for the Generating Unit ~~or Dynamic Resource-Specific System Resource~~ and MSG Configuration.

(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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Appendix A

Master Definition Supplement

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- Multi-Stage Generating Resources

A Generating Unit ~~or Dynamic Resource-Specific System Resource~~ that for reasons related to its technical characteristics can be operated in various MSG Configurations such that only one such MSG Configuration can be operated in any given Dispatch Interval. In addition, subject to the requirements in Section 27.8, the following technical characteristics qualify a Generating Unit ~~or Dynamic Resource-Specific System Resource~~ as a Multi-Stage Generating Resource if the resource~~,~~: (1) is a combined cycle ~~gas turbine~~ resource, excluding those that are one-by-one combined cycle resources without bypassing, duct firing capability or power augmentation capability; (2) ~~is a Generating Unit or Dynamic Resource-Specific System Resources with multiple operating or regulating ranges but which can operate in only one of these ranges at any given time; or (3)~~ has ~~one or~~ more than one Forbidden Operating Region~~s.~~; (3) has multiple operating modes, including Regulating Ranges associated with different Ancillary Services capability; or (4) has hold times before or after a Transition through a Forbidden Operating Region. A hold time is an operational restriction that requires the resource to stay in or out of a specific operating mode for a given period of time, derived from the physical characteristics registered in the Master File for the resource, which may be in the form of a requirement that the resource stay in a particular operating mode for a period of time once it is in, or that the resource must stay out of a particular operating mode for a period of time once it is out of that operating mode. Metered Subsystems, Pumped-Storage Hydro Units, and Pumping Loads, and System Resources ~~that are not Dynamic Resource-Specific System Resources~~ do not qualify as Multi-Stage Generating Resources and therefore cannot register as such as provided in Section 27.8. Regulatory Must-Take Resources are not required to be registered as Multi-Stage Generating Resources. Dispatchable Qualifying Facilities that are not qualified as Regulatory Must-Take resources are required to register as Multi-Stage Generating Resources, provided they meet the qualifying technical characteristics described above.

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Appendix AA

[Not Used]

~~**Transition Plan for Multi-Stage Generating Resources**~~

~~This Appendix AA describes the registration and qualification requirements for Generating Units and Dynamic Resource-Specific System Resources that intend to qualify and participate in the CAISO Markets as Multi-Stage Generating Resources as of the first day on which the Multi-Stage Generating Resource CAISO Tariff provisions are effective.~~

~~No later than fifty-four (54) days prior to effective date of the CAISO Tariff provisions enabling the Multi-Stage Generating Resource functionality, Scheduling Coordinators shall commence the registration process to register and qualify Generating Units or Dynamic Resource-Specific System Resources as Multi-Stage Generating Resources, or any other change to the fundamental attributes as described below, as of the effective date of the CAISO Tariff provisions for the Multi-Stage Generating Resource functionality. The registration process commences with the submission by the responsible Scheduling Coordinator of the completed Multi-Stage Generating Resource registration form and the resource data template for Generating Unit or Dynamic Resource-Specific System Resource, which the CAISO provides as part of the registration process. After such submission, the CAISO will coordinate with the responsible Scheduling Coordinator to validate that the resource qualifies as a Multi-Stage Generating Resource, and that all the requisite information has been successfully provided to the CAISO. Successful completion of the registration process will occur upon the CAISO's notification to the responsible Scheduling Coordinator that the resource has been successfully qualified as a Multi-Stage Generating Resource. Once the CAISO has provided such notice, the resource will be registered and qualified to participate as a Multi-Stage Generating Resource as of the effective date of the CAISO Tariff provisions enabling the implementation of the Multi-Stage Generating Resource functionality. Scheduling Coordinators may register the number of MSG Configurations as are reasonably appropriate for the unit based on the operating characteristics of the unit, which may not, however, exceed a total of ten MSG Configurations and cannot be fewer than two~~

MSG Configurations. The resource will be successfully registered and qualified for the requested status and MSG Configuration definitions on the date that the CAISO sends the notification to the responsible Scheduling Coordinator that the resource has been successfully qualified. If the CAISO has reason to believe that the resource's operating and technical characteristics are not consistent with the registered and qualified attributes, the CAISO may request that the Scheduling Coordinator provide additional information necessary to support their registered status and, if appropriate, may require that the resource be registered and qualified more consistent with the resource's operating and technical characteristics, including the revocation of its status as a Multi-Stage Generating Resource. Failure to provide such information may be grounds for revocation of Multi-Generating Resource status.

As part of the registration process, the Scheduling Coordinators must submit to the CAISO a Transition Matrix, which contains the cost and operating constraints associated with feasible transitions between MSG Configurations. The responsible Scheduling Coordinator shall submit for each MSG Configuration a single segment Operational Ramp Rate, and as applicable an Operating Reserves Ramp Rate and Regulating Reserves Ramp Rate. The Scheduling Coordinator must establish the default MSG Configuration and its associated Default Resource Adequacy Path that apply to Multi-Stage Generating Resources that are subject to Resource Adequacy must-offer obligations as part of the resource data template provided in the registration process. The MSG Configurations and operational characteristics submitted to and accepted by the CAISO during this registration process will be in effect until the forty-fourth (44th) day following the effective date of Section 27.8 of the CAISO Tariff, unless modified as specified below. Prior to that date, the Scheduling Coordinators may not make the following changes to a Generating Unit's or Dynamic Resource-Specific System Resource's attributes, which for the purposes of this Appendix AA are described as the fundamental attributes:

(a) Register a Generating Unit or Dynamic Resource-Specific System Resource as a Multi-Stage Generating Resource;

(b) Change the registered MSG Configurations for a Multi-Stage Generating Resource, which includes the;

(a) addition of new MSG Configurations;

(b) removal of an existing MSG Configuration;

(c) a change to the definition of a registered MSG Configuration, which includes:

(1) a change in the physical units supporting the MSG Configuration;

(2) a change to the MSG Configuration Start Up and Shut Down flags; and

(3) adding or removing a MSG Transition to the Transition Matrix;

(d) a material change in the Transition Times contained in the Master File, which consists of a change that more than doubles a Transition Time or reduces it to less than half; and

(e) a material change to the maximum Ramp Rate of the MSG Configuration(s) contained in the Master File, which consists of a change that more than doubles the maximum Ramp Rate or reduces it to less than half.

Scheduling Coordinators may make any other changes to their non-fundamental attributes, until twenty-one days prior to the effective date of the CAISO Tariff provisions enabling the implementation of the Multi-Stage Generating Resource functionality, subject to the timing requirements of the Master File time line. After the twenty-first (21st) day prior to the effective date of the CAISO Tariff provisions enabling the implementation of the Multi-Stage Generating Resource functionality, no changes may be made to any of the Multi-Stage Generating Resource attributes, fundamental or otherwise, except that the resources can drop out Multi-Stage Generating Resource status subject to the timing requirements of the Master file time line. When transitioning to implement these changes across the midnight hour, for any Real-Time Market run

in which the changes specified above are to take effect within the Time Horizon of any of the Real-Time Market runs, the CAISO will Schedule, Dispatch, or award resources consistent with either the prior or new status and definitions, as appropriate and required by any Real-Time conditions regardless of the resource's state Scheduled or awarded in the immediately preceding Day-Ahead Market.

Resources that will be participating in the CAISO Markets as Multi-Stage Generating Resources when the CAISO Tariff Multi-Stage Generating Resource provisions become effective must submit all Outages reports required in Section 9 of the CAISO Tariff consistent with the registered MSG Configurations for such resources no later than forty-eight hours prior to the start of the first hour of the effective date of the CAISO Tariff provisions enabling the implementation of the Multi-Stage Generating Resource functionality.

Definitions

Default Resource Adequacy Path
The registered sequence of MSG Configurations a Multi-Stage Generating Resource has to Start-Up and transition from off-line to reach the default Resource Adequacy MSG Configuration.

Multi-Stage Generating Resources
A Generating Unit or Dynamic Resource-Specific System Resource that for reasons related to its technical characteristics can be operated in various MSG Configurations such that only one such MSG Configuration can be operated in any given Dispatch Interval. In addition, subject to the requirements in Section 27.8, the following technical characteristics qualify a Generating Unit or Dynamic Resource-Specific System Resource as a Multi-Stage Generating Resource if the resource; (1) is a combined cycle gas turbine resource; (2) is a Generating Unit or Dynamic Resource-Specific System Resources with multiple operating or regulating ranges but which can operate in only one of these ranges at any given time; or (3) has one or more Forbidden Operating Regions. Metered Subsystems, Pumped-Storage Hydro Units, and Pumping Loads, and System Resources that are not Dynamic Resource-Specific System Resources do not qualify as Multi-Stage Generating Resources.

~~MSG Configuration~~

~~A qualified and registered operating mode of a Multi-Stage Generating Resource, with a distinct set of operating characteristics. All MSG Configurations for Multi-Stage Generating Resources are operable on-line modes.~~

~~Transition Matrix~~

~~A matrix that, for Multi-State Generating Resources defines the possible MSG Transitions between all online MSG Configurations including the Transition Times and Transition Costs.~~

Attachment C – Board Memo

Required Registration for Multi-Stage Generation Resources and

Modification of Minimum Load Costs Tolerance Band for Bid Cost Recovery

California Independent System Operator Corporation

July 30, 2013

Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President – Market & Infrastructure Development

Date: February 9, 2012

Re: **Decision on Post-Emergency Bid Cost Recovery Elements**

This memorandum requires Board action.

EXECUTIVE SUMMARY

In the first half of 2011, the ISO made two emergency filings with FERC to amend the tariff to change the rules for calculating bid cost recovery uplift payments. These rule changes were designed to mitigate adverse market behavior that caused the inflation of bid cost recovery payments to certain generating units. As part of these filings, the ISO committed to conducting a stakeholder process to provide stakeholders an opportunity to comment and raise any further changes or refinements to the ISO's proposed tariff amendments. Through the ensuing stakeholder initiative, Management sought to rule-out unintended consequences of the bid cost recovery rule changes resulting from the emergency filings, and to identify and eliminate any remaining opportunities for participants to inequitably inflate bid cost recovery payments.

Five potential issues were identified and discussed throughout this process.[1] At this time, however, Management proposes a policy change related to only two of those five issues.[2] Stakeholder positions on these two issues and Management's response are included in the positions of the parties section below.

Specifically, Management recommends the following:

- Resources only be eligible for minimum load cost recovery if they are within or above the minimum load tolerance band of their minimum operating level, i.e., online; and

[1] A sixth potential bid cost recovery issue related to resource uninstructed deviations and the proposed separation of the day-ahead and real-time markets in the bid cost recovery calculations is being addressed in a separate stakeholder process that is a follow-up to the Renewable Integration and Product Review – Phase 1 stakeholder process.

[2] Policy changes are not being proposed for the three remaining issues because they will either be addressed through other upcoming stakeholder processes or can be addressed through existing policy.

- Resources that have operating characteristics that are most accurately and efficiently modeled using the multi-stage generating resource functionality be required to be registered as multi-stage generating resources by spring of 2013.

Moved, that the ISO Board of Governors approves the policy to implement modifications to the minimum load cost tolerance band and to implement required multi-stage generating unit modeling registration, as described in the memorandum dated February 9, 2012; and

Moved, that the ISO Board of Governors authorizes Management to make all the necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

DISCUSSION AND ANALYSIS

Minimum load cost tolerance band

Management has identified an issue with the rules for determining if a resource is eligible to recover minimum load costs through bid cost recovery in the limited instances in which a resource's metered output is zero and the resource has a low minimum operating level registered with the ISO. Specifically, the ISO determines whether a resource is eligible for recovering minimum load costs by checking whether the resource was operating within or above a tolerance band around its minimum operating level. That tolerance band is 5 MWh or 3% of the resource's maximum operating level, whichever is greater. For some resources, the entire range from zero to the resource's minimum operating level can be covered by the tolerance band. In that case, the resource can be offline, but still be eligible to receive minimum load cost recovery under the current rules.

IManagement proposes to make a change to the tariff to reflect the intention of the cost recovery policy in such cases, which is to deem minimum load costs eligible for cost recovery only if a resource is in fact online.

Required multi-stage generating unit modeling registration

As part of the evaluation of any remaining opportunities for market participants to strategically inflate bid cost recovery payments, Management identified a potential opportunity to inflate bid cost recovery payments associated with not utilizing the multi-stage generating resource modeling functionality. Specifically, some resources have instead been registered with the ISO using the forbidden operating region functionality. This functionality designates one or more output ranges through which the ISO must dispatch a resource without stopping, because the resource cannot stably operate while holding in the range. In addition, Management has identified that using forbidden

operating regions to reflect multiple operating regions for resources that have operating characteristics that can be most accurately and efficiently modeled using the multi-stage generating unit functionality can result in infeasible ancillary services awards. Furthermore, not using the multi-stage generating resource modeling functionality for resources with multiple operating configurations results in additional market and operational inefficiencies. To address these concerns, Management proposes that resources be required, by spring 2013, to be registered as multi-stage generating resources if those resources have multiple operating regions and meet criteria described further below in this memorandum.

Background

Prior to the launch of its locational marginal price-based market, the ISO received an order from the Federal Energy Regulatory Commission compelling it to implement functionality to accurately model combined-cycle resources within three years. About one year later, the ISO implemented forbidden operating region functionality in the real-time market that provides for designating a resource's output level ranges through which the ISO must dispatch a unit without stopping. The forbidden operating region functionality was sufficient to enable the ISO to address the operational need for dispatch accuracy while the multi-stage generating unit model – the more robust solution to the modeling of resources with multiple operating regions – was under development.

For most units with multiple operating regions, the forbidden operating region functionality was only viewed as an interim solution because the forbidden operating region functionality lacks the multi-stage generating resource functionality's advantages of modeling each of a resource's operating ranges as a "logical generator." The multi-stage generating unit model was designed to robustly model generating resources with multiple operating configurations thereby addressing the inefficiencies and inaccuracies inherent in the forbidden operating region approach. By respecting the unique operating characteristics of each configuration, the multi-stage generating resource can be feasibly and efficiently awarded ancillary service, committed and subsequently dispatched for energy. This is a significant benefit to market participants and to the ISO market and operations.

Consequently, not using the multi-stage generating resource model for many resources with multiple operating regions leads to significant gaps and inefficiencies. Importantly, the use of forbidden operating regions has always been considered, in nearly all cases, to be a temporary solution to be used only until multi-stage generating unit modeling was in place. With increasing penetration of variable energy resources, responsive commitment and dispatch, and accurate procurement of ancillary services is crucial.

Stakeholders were universally supportive of the multi-stage generating resource design that was approved by the Board in May 2009 and implemented in December 2010. Since then, the ISO market and operations, as well as stakeholders, have benefitted

from the successful, stable operation of the multi-stage generating unit functionality that has been achieved over the past year. The ISO has made numerous refinements in the multi-stage generating resource functionality by tuning the model during 2011. Further enhancements are scheduled for implementation in April 2012.

Bid cost recovery issues with forbidden operating regions

In addition to the market and operational efficiencies gained by using the multi-stage generating resource model when appropriate, Management has identified a potential strategy for market participants to artificially inflate bid cost recovery uplift payments involving deviations from dispatch in conjunction with a forbidden operating region.

This strategy would involve submission of high real-time bid prices for a resource's operating range above a forbidden operating region. In the event the real-time dispatch attempted to economically dispatch the resource down through the forbidden operating region, and the resource did not follow the downward dispatch and stayed operating above the forbidden operating region, the ISO systems would repeatedly attempt to dispatch the resource down from its current output level. Because forbidden operating regions generally have low ramp rates, the resource would be dispatched for relatively greater amounts of instructed energy than if the forbidden operating region did not exist. As instructed energy is eligible for bid cost recovery, the resource's bid cost recovery payments would be increased.

In addition to this strategy, the ISO also has observed an operational concern when a resource does not follow an ISO dispatch into its forbidden operating region for multiple intervals. In this event, the resource may continue to be uneconomically dispatched into its forbidden operating region even though it has become economic to start dispatching the resource in the opposite direction. This can further inflate the resource's costs and create dispatch inefficiencies.

Both of these two situations cannot occur for resources dispatched by the multi-stage generating resource functionality. This is because bid cost recovery for multi-stage resources is based on the costs associated with the instructed operating configuration rather than the configuration into which the resource deviated.

Infeasible awards of ancillary services

In addition to the issues noted above, there are inefficiencies related to ancillary services associated with modeling a multi-stage generating resource using only forbidden operating regions. When a resource without multiple operating regions is certified for ancillary services, it is certified for the entire output range of the plant. The certification considers physical operating characteristics of the resource such as its ramp rate. A resource with a forbidden operating region can be certified to provide ancillary services in one amount below the forbidden operating region based on the operating characteristics of that region, and for another amount above the forbidden operating region based on that range's characteristics. Such a forbidden operating

region resource is considered by the market optimization software to have the maximum of those two ancillary services capacities. Therefore, the resource can receive an ancillary services award that is not consistent with the operating characteristics of the range in which the resource is dispatched. The resulting problem is two-fold: (1) the resource receives an infeasible ancillary services award which poses a reliability concern, and (2) the resource receives a capacity payment for ancillary services when it could not have delivered the service had it been called upon to do so.

Multi-stage generating resource modeling will address this problem fully to the extent a resource has a configuration that cannot provide reserves within a certain range. The ISO developed and implemented the multi-stage generating resource modeling functionality in December 2010 precisely to address this type of reliability and financial issues. This modeling functionality does so by recognizing ranges with different operating characteristics as logical generators and certifying and awarding them ancillary services accordingly.

Definition and exceptions

Management recommends that resources that have certain characteristics be required to be registered as a multi-stage generating unit. Registration as a multi-stage generating resource would be required for (1) combined cycle resources, (2) resources with multiple operating regions with a hold- or off-times after a transition through a forbidden operating region, or (3) generating units with multiple operating ranges from which a forbidden operating region would prevent the resource from providing the amount of awarded ancillary service capacity.

Per the original tariff definition of multi-stage generating resources, metered sub-systems, pumped-storage hydro units, and pumping loads are not eligible to use the multi-stage generating resource modeling functionality. Management proposes that system resources and resources designated as “regulatory must take” not be required to register as multi-stage generating resources. The ISO is required to take any or all of the output from regulatory must take resources; thus they are not dispatchable. This obviates the need to schedule and dispatch the resources efficiently and accurately using multi-stage generating unit modeling. However, dispatchable qualifying facilities that are not under a regulatory must-take provision that meet the above definition would be required to register as multi-stage generating resources.

Management recognizes that there may be parties that have resources with physical or contractual circumstances other than those noted here such that multi-stage generating resources modeling may not be optimal or even feasible. Because currently these circumstances are not fully known, Management requests authority as part of this proposal to pursue a regulatory strategy to provide an exception from required multi-stage generating resource registration for such resources as they arise.

Forbidden operating region functionality would remain available for resources with a single simple forbidden operating region such that the resource must simply transit

through the forbidden operating region after entering it with no hold times around the forbidden operating region and the same ancillary service capability for the two regions on either side of the forbidden operating region.

Proposed implementation timeline

Management proposes that resources be required to register as multi-stage generating resources (as described above) in time for the ISO's spring software release in 2013. This extended timeline is proposed so that resources have ample time to participate in the on-going market simulations through which they can fine-tune the specification of their resource configurations and costs, and also develop expertise in bidding those configurations into the ISO market.

By spring 2013, the ISO and stakeholders will have had approximately two years and four months of experience with the multi-stage generating resource modeling functionality. Additionally, by spring 2013, the ISO will have offered a market simulation environment for multi-stage generating resource modeling on an ongoing basis for nearly three years. Finally, the suite of multi-stage generating resource modeling enhancements, approved by the Board in October 2011, will go into effect in April 2012. Those enhancements include, among other things, improvements to the accounting of costs for multi-stage generating resources which will enable those resources to recover their minimum load costs.

POSITIONS OF THE PARTIES

As noted previously, the two items herein presented for decision by the Board have been vetted with stakeholders through the stakeholder initiative process. Stakeholder feedback these two items are described briefly below.

Comments throughout this initiative have shown stakeholder support for making minimum load costs eligible for cost recovery only when the resource meets the minimum load tolerance band and is also online.

In their written comments, Stakeholders have not been supportive of Management's recommendation that resources best modeled using the multi-stage generating unit modeling functionality be required to register as multi-stage generating resources. Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric, Six Cities and Calpine expressed a lack of confidence in multi-stage generating unit real-time dispatch. Despite their acknowledgement of significant improvements in the model's performance, they expressed the need for further improvements to the current multi-stage generating resource model.

In concert with stakeholders, ISO staff has identified and pursued opportunities to further improve the multi-stage generating resource modeling functionality. The multi-stage generating unit modeling functionality is being improved through software tuning, and through efforts such as the multi-stage generating unit enhancements approved by

the Board in October 2011. As described earlier in this memorandum, that suite of enhancements will be implemented in April 2012.

In response to written stakeholder comments on the draft final proposal and subsequent discussions, Management has further clarified the definition of resources for which registration as multi-stage generating resource would be required. These clarifications appear to have alleviated some stakeholder concerns over the registration requirement that they previously submitted as written comments. Furthermore, Management has established an extended timeline for the proposed required registration to provide both the ISO and stakeholders with additional opportunities to identify and resolve issues. This timeline will enable the ISO and market participants to gain additional market experience to identify and make futher refinements to the multi-stage generating resource modeling functionality.

The California Department of Water Resources – State Water Project, the Northern California Power Agency, Pacific Gas and Electric, NRG, and Calpine commented that the problems created by resources using forbidden operating region functionality instead of using multi-stage generating unit modeling can be addressed by means other than requiring resources to use the multi-stage generating resource modeling functionality. Suggestions include monitoring and enforcement, the use of penalties for non-response to dispatch instructions, and implementing improvements to the forbidden operating region functionality. Management maintains that the development and implementation of multi-stage generating unit modeling was specifically undertaken to address the types of issues identified above, and that developing other means to address such issues is duplicative and not the best means of addressing them.

CONCLUSION

Management recommends that the Board approve the motion to implement the provisions for mandatory registration of multi-stage generation resources and to clarify that resources must be on-line to receive minimum load cost compensation.