California Independent
System Operator Corporation

March 23, 2016

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. ER16- ___-000

Tariff Amendment to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate of a Generating Resource's Minimum Operating Level for Operational Reasons

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits this tariff amendment to enable the CAISO market systems to recognize changes in costs of resources when they increase their minimum operating levels due to temporary changes in their physical characteristics that can alter the resources' operational capabilities.[1] These tariff revisions will improve the quality of the market solution by enabling the market systems to consider changes in minimum load costs in the market run and, therefore, to dispatch and commit resources to meet system needs more efficiently. The tariff revisions will also ensure that resources committed by the CAISO will be able to recover their costs of operating at higher minimum load levels through the CAISO market. The CAISO also proposes tariff revisions to make clarifying and clean-up changes.

[1] The CAISO submits this filing pursuant to section 205 of the Federal Power Act (FPA), 16 U.S.C. § 824d. Capitalized terms not otherwise defined herein have the meanings set forth in the CAISO tariff, and references to specific sections are references to existing sections in the current CAISO tariff or to tariff sections as revised in this filing, unless otherwise indicated.

The CAISO requests that the Commission accept the tariff revisions contained in this filing effective 61 days after the CAISO submits this filing, *i.e.*, May 23, 2016. These changes are necessary for the summer months to ensure the CAISO market is able to better optimize the increased number of resources in the CAISO real-time market that are subject to such changes in minimum load costs because of ambient changes related to their location in desert areas.

I. Background

A. Bidding of Resources in the CAISO Markets

Pursuant to its tariff, the CAISO optimizes the security constrained economic commitment and dispatch of generating resources in the markets it operates based on resources' market bids and their commitment costs, which include the costs of running at minimum operating levels (minimum load costs).[2] The tariff defines a resource's minimum operating level (or PMin) as its minimum load and its maximum operating level (or PMax) as its maximum output, both of which the resource must register in the CAISO master file.[3] The CAISO compensates resources for their minimum load costs through the bid cost recovery (BCR) process set forth in its tariff to the extent that energy revenues based on locational marginal prices (LMPs) do not cover those costs.[4]

The CAISO uses default energy bids (DEBs) to mitigate bids of resources subject to local market power mitigation.[5] When a resource's bid is mitigated in a market run, the CAISO systems substitute the default energy bid for the resource's bid in the market clearing process and use the default energy bid or the LMP, whichever is higher, to determine the resource's bid cost recovery compensation.[6] The CAISO calculates the default energy bid, and it is intended to reflect the resource's marginal cost of producing energy.[7] Scheduling

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[2] *See* existing tariff section 31.3; tariff appendix A, existing definition of "Minimum Load Costs." For the sake of clarity, this transmittal letter distinguishes between existing tariff provisions (*i.e.*, provisions in the current CAISO tariff), new tariff provisions (*i.e.*, new provisions that the CAISO proposes to add to the tariff in this filing), revised tariff provisions (*i.e.*, existing tariff provisions that the CAISO proposes to revise in this filing), and deleted tariff provisions (*i.e.*, existing tariff provisions that the CAISO proposes to delete in this filing).

[3] *See* existing tariff section 4.6.4; tariff appendix A, existing definitions of "PMin," "PMax," and "Master File."

[4] *See* existing tariff section 11.8, *et seq.*

[5] *See* existing tariff section 39.7.1, *et seq.*

[6] See existing tariff sections 11.5.6 and 11.5.5, respectively.

[7] *See California Indep. Sys. Operator Corp.*, 116 FERC ¶ 61,274, at PP 1004-14, 1033-71

coordinators for resources can select one of three options for calculating the default energy bids: (1) the variable cost option; (2) the LMP option; or (3) the negotiated rate option.[8] These options are designed to ensure that the resource is able to recover its costs of producing energy above the minimum load energy.

The variable cost option calculates default energy bids based on the resource's actual estimated costs, including its variable fuel costs, greenhouse gas compliance costs, CAISO market services charges and system operations charges, and variable operation and maintenance costs, plus a 10 percent adder to cover suppliers incidental costs in addition to the fuel cost proxy. The Commission has explained that this option provides a resource with "an opportunity to recover its fixed costs" when the resource is not marginal and does not set the LMP.[9]

The LMP option calculates the resource's default energy bids based on a weighted average of the LMPs at the pricing node in periods when the CAISO dispatched the resource over a preceding 90-day period. The Commission has approved this option as a "reasonable mechanism that captures an estimate of a unit's variable costs."[10]

The negotiated rate option produces a default energy bid that the market participant and the CAISO agree to base on supporting information related to the resource's costs. The negotiated rate option is often the best option for non-gas-fired resources that do not have the typical fuel cost structure captured by fuel indices such as the gas price indices used in calculating default energy bids under the variable cost option. The Commission has also found this option to be reasonable, because it provides resources the opportunity to recover their costs.[11] The default energy bid is a long-standing Commission-approved proxy of a resource's variable energy bid costs above minimum load.[12]

(2006) (Market Redesign Order).

8 Existing tariff sections 39.7.1-39.7.1.3. Further, a scheduling coordinator for a frequently mitigated unit has a fourth option for calculating default energy bids, the frequently mitigated unit option. Existing tariff section 39.7.1.4.

9 Market Redesign Order at PP 1045-48.

10 *Id*. at P 1052.

11 *Id.* at P 1057.

12 *See, e.g.*, *id.* at PP 1033, 1045-48, 1051-52, 1057-58; *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,305, at P 66 (2015) (approving the use of default energy bids as a reasonable estimate of a resource's marginal costs).

The types of resources that can bid into the CAISO markets include not only resources that produce electrical power in a single stage or operating mode but also multi-stage generating (MSG) resources, which differ from other types of resources because they can move (*i.e.*, transition) from one MSG configuration to a higher or lower MSG configuration and operate in that MSG configuration in any given dispatch interval.[13] Each MSG configuration is a qualified and registered operating mode of an MSG resource with a distinct set of operating characteristics.[14]

The CAISO guarantees recovery of minimum load costs for CAISO-committed resources through the bid cost recovery mechanism, in addition to recovery of start-up costs, transition costs, and energy bid costs.[15] To the extent market revenues are insufficient for a resource to recover its minimum load, transition, start-up and energy bid costs, the CAISO will pay the resource uplift to ensure that it recovers such costs.

Resources without use limitations are subject to a proxy cost methodology to recover their start-up and minimum load costs, and resources with use limitations may either elect the proxy cost methodology to recover their start-up and minimum load costs or elect a registered cost methodology to reflect their start-up and minimum load costs in the CAISO master file.[16] The elections by use-limited resources are made every 30 days and remain in effect until 30 days later. The proxy cost methodology estimates the minimum load costs based on the resource's fuel cost, as well as operation and maintenance costs, greenhouse gas compliance costs, CAISO market services charges and system operations charges, and a resource-specific adder, if applicable, for major maintenance expenses.[17] Pursuant to the registered cost methodology,

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[13] Tariff appendix A, existing definition of "Multi-Stage Generating Resource." A higher MSG configuration is one that allows the MSG resource to produce more electrical power and a lower MSG configuration is one that allows the MSG resource to produce less electrical power. The costs associated with transitioning from one MSG configuration to another are called transition costs. Tariff appendix A, existing definition of "Transition Cost."

[14] Tariff appendix A, existing definition of "MSG Configuration." The CAISO requires a resource to register a single value for its minimum and maximum megawatt (MW) output levels in the master file. Therefore, the PMin and PMax values registered for each MSG configuration represent the lowest minimum output level and the highest maximum output level over the highest and lowest ambient temperature condition ranges for the MSG resource.

[15] *See* existing tariff sections 11.8, *et seq.*

[16] *See* existing tariff sections 30.4, *et seq.*

[17] *See* existing tariff section 30.4.1.1.

minimum load costs are registered and validated based on the minimum load costs calculated under the proxy cost methodology.[18]

The CAISO's market software currently treats the minimum load cost of a resource as a single fixed dollar amount representing the bid cost under the resource's minimum load for each operating day. As discussed below, however, treating the minimum load cost as a single fixed amount can cause problems for market efficiency when a resource needs to temporarily increase (*i.e.*, upwardly re-rate) its minimum load during the operating day due to temporary changes in the resource's physical characteristics.

B. Market Inefficiencies Resulting from Use of a Single Fixed Minimum Load Cost for the Operating Day When a Resource Temporarily Increases Its Minimum Load

A resource may need to increase its minimum load during an operating day due to temporary changes in the resource's physical characteristics that can alter the resource's operational capabilities. Three categories of factors can lead to such re-rates: (1) changes in temperature or ambient conditions, (2) mechanical equipment outages, and (3) regulatory restrictions that affect the resource's output levels. These factors may limit the resource's operation such that the resource cannot operate reliably at the minimum load level registered for the resource in the CAISO master file.

The CAISO market clearing process is designed to ensure that the market considers each resource's operating characteristics and honors them in the security constrained economic dispatch or security constrained unit commitment processes. To ensure that the CAISO market systems can accurately model a resource's characteristics in the market, the market participant must change the values for the resource as registered in the master file through the CAISO's outage management system. The CAISO expects that market participants will register their minimum and maximum operating levels in the master file to reflect a resource's maximum dispatchable range. The market participant is then required to submit re-rates and de-rates to reflect temporary changes to the resource's operating characteristics that affect its dispatchable ranges. In the case of maximum output, the market participant reflects a decrease in available capacity through a de-rate. In the case of minimum load, the market participant can only increase the minimum load amount registered in the master file, because the CAISO expects that the master file will reflect the minimum load based on the resource's maximum dispatchable range. Market participants will then re-rate the master file minimum load levels up using the outage

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[18] *See* existing tariff section 30.4.1.2.

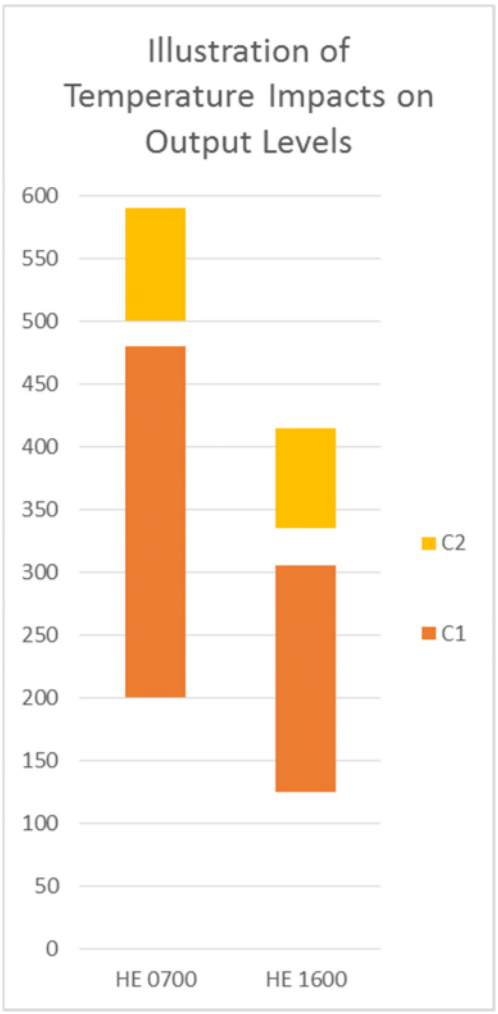
management system as necessary to indicate reductions in dispatchable energy availability.

With regard to the first category of temporary re-rates listed above, a decrease in ambient temperature may cause changes in a resource's fuel combustion characteristics, which necessitates an increase to the resource's minimum load. In the case of an MSG resource with two MSG configurations, an increase in one configuration's maximum output will result in an increase in the other configuration's minimum output levels. Therefore, ambient conditions can impact the minimum load levels of MSG resources as shown below in Figure 1.

These types of ambient changes are more chronic and significant in desert areas, where resources experience large temperature swings between daytime and nighttime. For instance, in the desert of the southwestern United States, where a number of resources that participate in the CAISO markets are located, it is usual for the peak afternoon temperature to be 40 or more degrees warmer than the temperature that morning. These temperature swings are especially pronounced in the summer months. Consequently, as shown in Figure 1 below, it is possible that the afternoon (HE 1600) maximum output of a particular MSG configuration (*i.e.*, the top of each bar designated as C1 in Figure 1) of a resource located in the desert can be 15 percent or more lower than the morning (HE 0700) maximum output of that same MSG configuration. Such a reduction in maximum output will cause a corresponding reduction in the minimum load (*i.e.*, the bottom of each bar designated as C2 in Figure 1) of the next-highest MSG configuration for the MSG resource during the afternoon.[19]

[19] In Figure 1, each bar designated as C1 begins at its PMin for the specified hour, so that the areas underneath the orange C1 bars represent minimum load energy below the PMin of each bar designated as C1.

Figure 1



Resources in the CAISO balancing authority area already have to increase their minimum loads due to such increases in ambient temperature. With the addition of the fleet of resources in the NV Energy balancing authority area that recently began participating in the Energy Imbalance Market (EIM), the CAISO expects re-rates of minimum loads due to increases in ambient temperature to become more significant.[20] Many of those resources are located in the Nevada desert, and a large number of them are MSG resources. The CAISO anticipates that the practice of re-rating resources' minimum loads due to ambient temperature changes will become even more prevalent as the EIM

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[20] NV Energy began participating in the EIM effective December 1, 2015, *i.e.*, prior to the upcoming summer months.

expands further into the desert southwest, when Arizona Public Service Company begins participating in the EIM effective October 1, 2016.[21]

A mechanical equipment outage of a resource is the second type of factor that can lead to temporary changes in operational characteristics. Mechanical equipment outages can reduce capacity, thus compelling the resource to increase its minimum load temporarily during the operating day. For instance, if there is a leak in a combined cycle gas turbine's heat recovery steam generator, which captures exhaust heat from the gas turbine and creates steam from this exhaust heat to deliver to the steam turbine, the resource will need to temporarily increase its minimum load to indicate its reduced capability until the leak is repaired.

Environmental regulations, such as regulations regarding air quality or emissions, constitute a third category or factor that can necessitate a temporary increase in a resource's minimum load. A gas-fired resource has more efficient combustion at higher output levels. Consequently, to manage (*i.e.*, reduce) emissions levels to comply with environmental regulations, the resource may temporarily need to increase its minimum load levels to ensure the resource is operating at the maximum efficiency to manage its emissions below required levels.

When a resource temporarily increases its minimum load during the operating day (regardless of the reason for the increase), the CAISO market systems reflect the increase as a re-rate through the CAISO's outage management system. The minimum load cost is intended to reflect the cost of operating the resource below its minimum load. However, the market systems consider the energy cost under the re-rated minimum load to be the fixed bid-in minimum load costs; the systems do not recognize the change in the costs of the re-rated minimum load (*i.e.*, minimum load) energy. As the resource increases its minimum load levels, the resource must continue to operate and incur costs for operating, but it is not in a stable operating condition and is not considered to be providing energy in the same way it does when it exceeds the minimum load level.

As illustrated in Figure 2 and the related discussion below, this can lead to an inefficient market outcome because the market systems do not optimize the resource based on the cost of the resource operating at its re-rated minimum load level.[22] Rather, the market systems account for the costs based on the

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[21] The addition of the NV Energy fleet in the EIM increased MSG capacity by about 30 percent. Approximately 84 percent of that capacity is located in desert regions.

[22] The CAISO does consider the resource to be providing energy at levels below its PMin.

minimum load costs as they would have applied to the lower minimum load. Those minimum load costs appear to be less expensive than they really are because, at the higher minimum load levels, the optimization process in the market systems incorrectly models the cost as lower than it would be if the optimization process correctly factored in the increase in costs for the higher minimum load levels. As the resource moves to a higher minimum load level, the resource does not incur additional operating and maintenance costs that typically result from operating at minimum load, but the resource does incur variable costs that are normally reflected in the portions of the bid curve above the minimum load. The proposed tariff revisions contained in this filing will provide a mechanism for reflecting those variable costs in the minimum load costs when re-rates occur, so that the CAISO market systems correctly model and compensate for the resource's costs between its minimum load as registered in the master file and the minimum load as re-rated.

Figure 2

	Data	*Units*	*Formula*	Resource A	Resource B	Resource B w/ Increased Minimum Load
[A]	Pmin	MW		100	100	185
[B]	Pmax	MW		300	300	300
[C]	Capacity above Pmin	MW	*[B] - [A]*	200	200	115
[D]	Min load cost	per hour		$7,000	$7,000	$7,000
[E]	Bid cost	per MWh		$30	$50	$50
[F]	Min load cost / MWh	per MWh	*[D / [A]*	$70	$70	$37.84
[G]	Min load cost / hour			$7,000	$7,000	$7,000
[H]	Total bid cost / hour		*[C] x [E]*	$6,000	$10,000	$5,750
[I]	Total cost		*[G] + [H]*	$13,000	$17,000	$12,750

Figure 2 provides resource modeling information for two hypothetical resources, Resource A and Resource B, in a scenario where only one resource is needed to serve load. As shown in rows [A] through [D] and [F] through [G] of the "Resource A" and "Resource B" columns, Resource A and Resource B have the same minimum load or PMin) (100 MW), maximum output or PMax (300 MW), capacity above minimum load (200 MW), minimum load cost per hour (fixed at $7,000), and minimum load cost per megawatt-hour (MWh) ($70). However, as shown in row [E], Resource B has a higher bid cost per MWh ($50) than does Resource A ($30). Consequently, as shown in row [H], the total bid cost per hour for Resource B ($10,000) is higher than the total bid cost per hour for Resource A ($6,000), and the total cost shown in row [I] for Resource B

($17,000) is higher than the total cost for Resource A ($13,000). The efficient market outcome is to commit and pay Resource A rather than Resource B, because Resource A is cheaper than Resource B and provides the same amount of energy.

However, if Resource B temporarily increases its minimum load by 85 MW during the operating day, from 100 MW to 185 MW as shown in row [A] of the "Resource B w/ Increased Minimum Load" column, this temporary increase in minimum load results in a corresponding decrease of 85 MW in its dispatchable range, *i.e.*, the capacity above Resource B's minimum load, from 200 MW to 115 MW as shown in row [C] of that same column. In that event, under today's rules, the CAISO market systems will calculate a total cost (row [H]) for Resource B that is too low, because the market systems will not recognize the temporary movement of a portion of its incremental energy, referred to as capacity above minimum load in row [C] of Figure 2, into its minimum load. This movement changes the costs of Resource B's re-rated minimum load and associated minimum load energy. Specifically, the market systems will inaccurately continue to price Resource B's minimum load cost per hour (rows [D] and [G]) at $7,000 (100 MW x $70), instead of correctly recognizing that Resource B's minimum load cost per hour should be higher due to the re-rate moving a portion of its incremental energy into its minimum load energy. When that too-low amount of $7,000 is added to Resource B's updated and accurate total bid cost per hour of $5,750, *i.e.*, 115 MW x $50 (row [H]), the resulting total cost (row [I]) for Resource B equals $12,750.

Based on Resource A's unchanged total cost of $13,000 and Resource B's "apparent" changed total cost of $12,750, the seemingly efficient market outcome would be to commit and pay Resource B rather than Resource A. But committing and paying Resource B would in fact be an inefficient market outcome, because Resource B's total cost should not change due to its re-rate – in other words, Resource B's total cost after the re-rate should continue to be the $17,000 amount shown in row [I] of the "Resource B" column in Figure 2. It would be inefficient for Resource B's more-expensive minimum load energy to displace Resource A's less-expensive energy in the unit commitment process.

This outcome is not only inefficient for the market but also for Resources A and B themselves. Resource A would lose the benefit of being committed and compensated for energy it would otherwise provide. Although Resource B would be committed, it would not be fully compensated for its costs. Figure 3 below illustrates this compensation issue.

Figure 3

	Data	Units	Formula	Resource A	Resource B	Resource B w/ Increased Minimum Load
[A]	Pmin	MW		100	100	185
[B]	Pmax	MW		300	300	300
[C]	Capacity above Pmin	MW	*[B] - [A]*	200	200	115
[D]	Min load cost	per hour		$7,000	$7,000	$7,000
[E]	Bid cost	per MWh		$30	$50	$50
[F]	Min load cost / MWh	per MWh	*[D / [A]*	$70	$70	$37.84
[G]	Min load cost / hour			$7,000	$7,000	$7,000
[H]	Total bid cost / hour		*[C] x [E]*	$6,000	$10,000	$5,750
[I]	Total cost		*[G] + [H]*	$13,000	$17,000	$12,750
[J]	Dispatch Instruction					250
[K]	LMP					$50
[L]	Total Market Costs					$10,250
[M]	Total Market Revenues		*[J] * [K]*			$12,500
[N]	Rev Surplus (+) / Shortfall (-)		*[M] -[L]*			$2,250
[O]	Bid Cost Recovery Payment					$0
[P]	**Under-compensated amount**					**$2,000**

As shown in Figure 3, when Resource B displaces the more economic Resource A, Resource B is committed to serve 250 MW of hypothetical load as shown in row [J]. Resource B is the marginal unit capable of serving the next MW of load setting the LMP at $50/MWh (row [K]). Resource B receives $12,500 for its energy (row [M]), and the CAISO bid cost recovery mechanism will determine that Resource B had a revenue surplus based on its modelled costs of $10,250 (row [L]), which means that Resource B will not recover any additional costs through BCR.[23] However, Resource B's total cost should be $14,500 ($17,000 for total capacity minus the $2,500 in costs associated with 50 MW of capacity not dispatched). Consequently, under this hypothetical example, Resource B was under-compensated by $2,000 (row [P]) because the entirety of its costs was not captured in the CAISO market systems.

The CAISO and stakeholders determined that a tariff amendment was needed to address inefficient market outcomes such as those illustrated in Figures 2 and 3. Upon implementing the needed tariff revisions, the CAISO

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[23] The modelled costs are a reduction of the total cost seen by the market to dispatch Resource B's entire capacity (row [I]) by the amount of its capacity not needed to serve load, 50 MW.

would also need to implement associated changes to the CAISO market systems.

C. Stakeholder Process

Recognizing that the CAISO market is becoming more susceptible to the market inefficiencies discussed above due to an increase in the number of resources that re-rate their minimum loads during an operating day as a result of temporary changes in physical characteristics that alter the resources' operational capabilities, the CAISO included this issue in the list of issues to be resolved in the CAISO's ongoing bidding rules enhancements stakeholder process.[24] However, because the CAISO anticipates that a significant number of resources (*e.g.*, resources located in the Nevada desert) will become more frequently affected by this issue in the upcoming summer months, the CAISO subsequently determined that it should carve out the issue from the broader examination of bidding rules issues and prepare and file a tariff amendment solely to address the market inefficiency issue, so that the CAISO could implement tariff revisions to resolve the issue before the summer of 2016.[25] Therefore, the CAISO split that issue off from the rest of the bidding rules enhancements initiative for separate consideration and inclusion in this tariff amendment.

The stakeholder process to address this issue specifically included:

- The issuance of a series of four papers by the CAISO, including an Issue Paper (December 3, 2014), Straw Proposal (April 22, 2015), Revised Straw Proposal (December 3, 2015), and Draft Final Proposal (January 8, 2016);

- Stakeholder conference calls to discuss the CAISO papers listed above on, respectively, December 10, 2014, April 29 and December 3, 2015, and January 14, 2016;

- Stakeholders had the opportunity to submit comments on the papers by, respectively, December 30, 2014, May 13 and December 17, 2015, and January 20, 2016;

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[24] Materials regarding this stakeholder process are available on the CAISO website at http://www.caiso.com/informed/Pages/StakeholderProcesses/BiddingRulesEnhancements.aspx. These materials include a Draft Final Proposal, which is also provided in attachment C to this filing.

[25] The CAISO is addressing the balance of the issues in the bidding rules enhancements initiative, which is continuing in 2016.

- The development of draft tariff provisions posted on February 19, 2016;

- An opportunity for stakeholders to submit written comments on the draft tariff provisions by March 3, 2016, and a further stakeholder conference call on the draft tariff provisions held on March 7, 2016; and

- The posting of revised draft tariff provisions on March 15, 2016.[26]

The CAISO Governing Board (Board) voted unanimously to authorize this filing during its public meeting held on February 3, 2016.[27]

II. Proposed Tariff Revisions

A. Revisions to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate for Operational Reasons

The CAISO proposes to amend its tariff and update its market rules to prevent market inefficiencies that result from the limitations that prevent the CAISO market systems from reflecting temporary increases in a resource's minimum load costs due to temporary changes in the resource's operational capabilities. The CAISO will do this by implementing new rules that enable it to change the calculation of minimum load costs for a resource when the resource increases its minimum load and to consider those costs in clearing the market and in calculating the resource's compensation. Specifically, when the market participant upwardly re-rates its resource's minimum load, the CAISO will calculate the resource's commitment costs by accounting for the incremental minimum load costs based on the default energy bid associated with the capacity range between the minimum load shown in the master file and the re-rated minimum load. The CAISO markets will clear based on the recalculated minimum load costs and the resource's bid cost recovery will also be based on the recalculated amounts.

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[26] A list of key dates in the stakeholder process that are relevant to this tariff amendment is provided in attachment E to this filing. Along with the revised draft tariff provisions, the CAISO also posted a matrix of stakeholder comments on the original draft tariff language and the CAISO's responses, which is available at the website page regarding the stakeholder process linked above.

[27] Materials related to the Board's authorization are available on the CAISO website at http://www.caiso.com/informed/Pages/BoardCommittees/BoardGovernorsMeetings.aspx. All four Board members who were present at the February 3 meeting voted to authorize this filing; the fifth Board member was not present. Prior to authorizing this filing, the Board was provided with a memorandum on the issue from Keith Casey, Vice President, Market & Infrastructure Development for the CAISO (Board Memorandum), which is also provided in attachment D to this filing.

The CAISO proposes to use a resource's default energy bid as a proxy for accounting for the incremental variable costs because it reflects the cost of incremental energy above minimum load. Through the stakeholder process, the CAISO determined it is appropriate to adjust the minimum load costs based on a valuation of incremental energy costs, rather than on costs such as fixed costs that are unaffected by the re-rate.

Specifically, when a resource re-rates its minimum load up, the incremental energy costs incurred consist of the variable costs associated with the higher minimum load amounts. While the increase in minimum load increases the resource's costs for operating at those higher levels, the increased costs do not include all the fixed cost components of the costs the resource faces when committed by the CAISO to start and to be ready to provide energy. The resource's commitment costs estimates are intended to represent the resource's fixed and variable short-run costs for start-up and minimum load. The minimum load costs contained in the master file (regardless of whether the proxy cost methodology or the registered cost methodology applies to the resource) include, if applicable, a major maintenance cost adder to reflect the fixed costs incurred to maintain the resource. Major maintenance costs are incurred infrequently and may appear to be fixed costs, but the frequency of their incurrence is directly correlated with starting the resource or running the resource for a period of time after it is started.

As a result, major maintenance costs are properly characterized as marginal costs with respect to starting or running a unit at its minimum load and not as marginal costs associated with providing an incremental amount of energy above the minimum load. Therefore, simply using the fixed minimum load costs submitted to the CAISO market systems would not be an appropriate means to adjust these minimum load costs. Although major maintenance costs are determined based on operation at the resource's fixed minimum load level, the CAISO is not aware of a circumstance where it would be appropriate to include major maintenance costs in incremental energy costs (as opposed to minimum load costs). Moving the resource's minimum load temporarily into the portion of the resource's capacity above the fixed minimum load level does not increase major maintenance costs, because the resource is not required to incur additional maintenance costs for such a movement. However, the movement does increase the marginal costs of producing the energy in these ranges based on fuel costs and other variable costs.

For these reasons, it is appropriate to adjust the minimum load costs based on the value of the incremental energy costs. The CAISO proposes to use the default energy bid to reflect the incremental costs caused by the minimum load re-rate. As discussed in section I.A of this transmittal letter, the default energy bid is determined for each resource by ranking the resource's preference

for one of the three options (*i.e.*, the variable cost, LMP, and negotiated rate options) to reflect the marginal costs of its energy output above minimum load. Regardless of the option chosen, the default energy bid is designed to approximate the marginal costs that the resource would be paid under competitive market outcomes. Consequently, revising the calculation of actual commitment costs will accurately account for the resource's change in costs due to its temporary increase in minimum load.[28]

The CAISO proposes to implement the tariff revisions described above by adding new tariff section 30.7.10.2 to existing tariff section 30.7.10, which addresses the format and validation of minimum load costs.[29] Proposed section 30.7.10.2 states that, for generating units or resource-specific system resources for which the responsible scheduling coordinator has temporarily increased their minimum load through the CAISO's outage management system as specified in tariff section 9.3.3, regardless of the election made pursuant to tariff section 30.4 (which addresses the proxy cost and registered cost methodologies under the tariff for determining resource commitment costs), the CAISO will add to the minimum load costs submitted by the scheduling coordinator the cost of the incremental minimum load determined as the product of the resource's applicable default energy bid and the corresponding MWs between the resource's original minimum load as registered in the master file and the minimum load increased pursuant to section 9.3.3. Proposed section 30.7.10.2 also states that the CAISO will use the adjusted minimum load cost in the clearing of the applicable CAISO markets as well as for settlement purposes as described in tariff section 11, and that for MSG resources, the adjustments to minimum load cost will be made at the MSG configuration level.[30]

The CAISO also proposes to add new subsection (5) to tariff section 9.3.3, which addresses the submission of requests and information in the CAISO's outage management system. The tariff already requires that changes in the CAISO's scheduling and logging system for the CAISO (SLIC) be based on physical requirements. However, this requirement is set forth in the definition of the outdated term SLIC contained in tariff appendix A, which the CAISO proposes to delete in this filing. Pursuant to the stakeholder process that resulted in this filing, the CAISO determined it is necessary to revise the tariff to

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[28] Section III of this transmittal letter discusses an alternative approach to addressing this issue that was considered in the stakeholder process but not adopted.

[29] In connection with the addition of section 30.7.10.2, the CAISO also proposes to break out section 30.7.10 into subsections 30.7.10.1-30.7.10.3.

[30] In connection with the addition of section 30.7.10.2, the CAISO has also clarified the existing definition of "PMin" set forth in tariff appendix A to state that PMin is equivalent to minimum load.

state unambiguously that resources can temporarily re-rate their minimum loads solely to reflect temporary changes in physical characteristics that alter their operational capabilities, and that resources must notify the CAISO of such re-rates and other temporary changes in physical characteristics through the CAISO's outage management system. For these reasons, new section 9.3.3(5) requires that operators or scheduling coordinators for resources use the outage management system to notify the CAISO of temporary changes in physical characteristics specified in the master file, including the maximum output, minimum load, and ramping capability of the resource, due to changes in their actual physical characteristics.[31]

Section 9.3.3(5) goes on to specify that changes in the physical characteristics related to minimum load will only be for temporary increases in minimum load due to ambient temperature, outages of mechanical equipment, or environmental regulations. The rationale for limiting the allowed changes in physical characteristics related to minimum load to these three categories is to ensure the CAISO market systems reflect resources' physical characteristics accurately so that in committing and dispatching the resources, the CAISO market models their physical characteristics accurately. It would be contrary to this rationale and section 9.3.3(5) for a resource to re-rate its minimum load in order to, for example, augment its bid cost recovery uplift payments rather than to reflect changes in its physical characteristics.

These tariff revisions are just and reasonable because they will eliminate the potential for the market inefficiencies discussed above to occur, by ensuring that more-expensive minimum load energy does not displace less-expensive incremental energy in the unit commitment process, and because the tariff revisions will also appropriately compensate resources (*i.e.*, not over-compensate or under-compensate) for their costs. The impacts of the proposed tariff revisions are illustrated in Figure 4 below, which is identical to Figure 2 above except for the addition below of the "Use DEB" column to show the results of applying the tariff revisions proposed in this filing.

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[31] The CAISO expects that resources will use daily outage management system outage cards with hourly changes to PMin and PMax values as the tool to reflect temporary changes in physical characteristics specified in the master file. Draft Final Proposal at 8.

Figure 4

	Data	Units	Formula	Resource A	Resource B	Resource B w/ Increased Minimum Load Current	Resource B w/ Increased Minimum Load Use DEB
[A]	Pmin	MW		100	100	185	185
[B]	Pmax	MW		300	300	300	300
[C]	Capacity above Pmin	MW	*[B] - [A]*	200	200	115	115
[D]	Min load cost	per hour		$7,000	$7,000	$7,000	$11,250
[E]	Bid cost	per MWh		$30	$50	$50	$50
[F]	Min load cost / MWh	per MWh	*[D / [A]*	$70	$70	$37.84	$60.81
[G]	Min load cost / hour			$7,000	$7,000	$7,000	$11,250
[H]	Total bid cost / hour		*[C] x [E]*	$6,000	$10,000	$5,750	$5,750
[I]	Total cost		*[G] + [H]*	$13,000	$17,000	$12,750	$17,000

As reflected in the "Use DEB" column of Figure 4, if Resource B increases its minimum load to 185 MW due to conditions that satisfy the requirements of section 9.3.3(5), the provisions in section 30.7.10.2 will permit the CAISO market systems to accurately calculate Resource B's minimum load cost per hour (rows [D] and [G]), minimum load cost per MWh (row [F]), and total bid cost per hour (row [H]). Consequently, as shown in row [I], Resource B's total cost will be $17,000, which is the same total cost it had before the re-rate (as shown in the "Resource B" column) and which is higher than Resource A's total cost of $13,000. As a result, the CAISO market systems will commit and pay Resource A instead of committing and paying the more-expensive Resource B.

As shown in Figure 5 below, it is possible that the most efficient unit commitment, based on the market system's evaluation of the total cost of commitment and dispatch to serve load, could result in increases to BCR payments relative to BCR payments under the inefficient market outcome. However, under the inefficient market outcome discussed above, Resource B appears more economic than it actually is, and the market outcome is not reflective of actual costs being incurred to serve load, resulting in Resource B not recovering sufficient revenues to cover its costs.

Figure 5

	Data	Units	Formula	Resource A	Resource B	Resource B w/ Increased Minimum Load (Use DEB)
[A]	Pmin	MW		100	100	185
[B]	Pmax	MW		300	300	300
[C]	Capacity above Pmin	MW	*[B] - [A]*	200	200	115
[D]	Min load cost	per hour		$7,000	$7,000	$11,250
[E]	Bid cost	per MWh		$30	$50	$50
[F]	Min load cost / MWh	per MWh	*[D / [A]*	$70	$70	$60.81
[G]	Min load cost / hour			$7,000	$7,000	$11,250
[H]	Total bid cost / hour		*[C] x [E]*	$6,000	$10,000	$5,750
[I]	Total cost		*[G] + [H]*	$13,000	$17,000	$17,000
[J]	Dispatch Instruction			250		
[K]	LMP			$30		
[L]	Total Market Costs			$11,500		
[M]	Total Market Revenues		*[J] * [K]*	$7,500		
[N]	Rev Surplus (+) / Shortfall (-)		*[M] -[L]*	($4,000)		
[O]	Bid Cost Recovery Payment			$4,000		
[P]	**Under-compensated amount**			**$0**		

Figure 5 shows that, after including additional costs associated with re-rating Resource B's minimum load, Resource A is the most economic unit to serve the 250 MW of load (rows [I] and [J]) and is the marginal unit setting the LMP at $30/MWh (row [K]). Resource A's modelled and incurred costs are $11,500 for producing 250 MW of energy (row [L]), and in this example Resource A receives $7,500 in market revenues for the energy (row [M]). Under this efficient market outcome, Resource A will also receive a bid cost recovery uplift payment of $4,000 to fully compensate it for its total market costs (rows [M] through [P]).

The bid cost recovery examples shown in Figures 3 and 5 above illustrate the possibility that payments to resources may increase to ensure that they recover their operating costs. The proposed tariff revisions will address the current inefficiency where a resource can be forced to serve load at a loss, as when Resource B is committed by the CAISO but is forced to incur the $2,000 loss shown in Figure 3 because its market revenue is not sufficient to cover the cost of operating Resource B at its higher minimum load, and the bid cost recovery mechanism is incapable of accounting for Resource B's increase in minimum load costs. The examples also illustrate that the tariff revisions will result in commitment of the more economic resource, because Resource B's

adjusted minimum load costs will be considered in the security constrained cost minimization process performed by the market optimization.

In these examples, there would be an increase in bid cost recovery uplift payments because market revenues are not sufficient to recover Resource A's costs. In reality, it is not necessarily the case that such a revenue insufficiency and need to increase uplift payments would occur. In a market clearing process with multiple resources, the tariff revisions will not necessarily result in an increase in total uplift payments on the system. The tariff revisions will, however, ensure that resources' costs are more accurately reflected in the market clearing process, which provides better pricing signals, and that their costs are accurately accounted for in the bid cost recovery mechanism.

The CAISO is aware that the tariff revisions may provide an opportunity for expansion of bid cost recovery payments if market participants engage in behavior adverse to the market that unjustly expands such payments. The CAISO already monitors bid cost recovery payments closely to ensure that no behavior adverse to the market is left uncorrected. The CAISO is also adopting new metrics to monitor more closely whether the tariff revisions will result in unexpected increases in uplift payments on the CAISO system.

B. Revisions to Make Clarifying and Clean-up Changes

In response to comments provided by a stakeholder, the CAISO proposes to clarify how it will determine whether a resource is "On" for purposes of determining resource start-up costs, in light of the tariff revisions discussed above. The tariff specifies that a resource is "On" when it is on-line, synchronized to the grid, and available for dispatch.[32] Thus, whether a resource is "On" is based on whether it is operating at or above its minimum load. To provide additional clarity, the CAISO has revised the tariff to state that the CAISO will determine whether a resource is "On" for purposes of determining integrated forward market and real-time market start-up costs based on whether the resource's metered energy is at or above the resource's minimum load as registered in the master file.[33] Further, the CAISO has revised the tariff to state that, for purposes of determining the residual unit commitment (RUC) start-up costs for a RUC commitment period, an actual start-up is detected when the relevant metered energy in the applicable settlement intervals indicates that the resource is "Off" before the time the resource is instructed to be On as specified

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[32] Tariff appendix A, existing definition of "On." In contrast, the tariff specifies that a resource is "Off" when it is off-line or in the process of starting up or shutting down. Tariff appendix A, existing definition of "Off."

[33] Revised tariff sections 11.8.2.1.1(e), 11.8.4.1.1(f).

in its start-up instruction and is "On" in the settlement intervals that fall within the CAISO RUC commitment period. The CAISO will determine whether the resource is "On" for this purpose based on whether its metered energy is at or above the resource's minimum load as registered in the master file.[34]

Lastly, the CAISO proposes a number of other revisions to align the rest of the tariff with the tariff changes discussed above and to make additional clarifying and clean-up changes. Specifically, the CAISO proposes to:

(1) delete the existing and outdated tariff-defined term scheduling and logging system for the CAISO (or SLIC);[35]

(2) cross-reference section 9 and refer to the CAISO's outage management system (rather than to the deleted term SLIC);[36]

(3) clarify that minimum load costs may be modified pursuant to new tariff section 30.7.10.2, if applicable;[37]

(4) clarify, in tariff sections that require such clarification, that minimum load or minimum load values are those values registered or defined in the master file, or if applicable, as modified pursuant to section 9.3.3;[38]

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[34] Revised tariff section 11.8.3.1.1(f).

[35] Tariff appendix A, deleted definitions of "Scheduling and Logging System for the CAISO" and "SLIC." The CAISO replaced SLIC with its current outage management system in the fall of 2014.

[36] Revised tariff sections 4.12.1.1(v), 7.7.15.2.1, 8.10.8.7, 9.3.10.3(a)-(b), 9.3.10.3.1(a)-(b), 11.5.5, 11.8.2.1.3, 11.8.4.1.3, 11.8.4.1.5, 30.7.7(f)-(g), 31.3.1.2, 34.13.2, 34.17.2(a)-(c); tariff appendix L, revised section L.1.5.

[37] Revised tariff sections 11.8.2.1.2, 11.8.3.1, 11.8.3.1.2, 11.8.4.1, 11.8.4.1.2, 31.3, 34.11; tariff appendix A, revised definition of "Minimum Load Costs."

[38] Revised tariff sections 11.8.2.1.2(d), 11.8.2.1.2(f), 11.8.2.1.5, 11.8.2.1.7.1, 11.8.3.1.4.1, 11.8.4.1.7.1, 30.4.1.1.1(a), 30.4.1.1.2(a), 30.5.1(j), 30.5.1(p), 30.7.10.1, 31.4, 31.5.1.2, 40.4.3(1), 40.4.3(6); tariff appendix A, revised definitions of "Day-Ahead Self-Scheduled Energy," "FMM Minimum Load Energy," "Minimum Load," "Minimum Load Energy," "RTD Minimum Load Energy." Under the current tariff rules, re-rated minimum load energy is classified as de-rated energy. Pursuant to the revisions to the definitions of the terms "Minimum Load Energy," "RTD Derate Energy," and "RTD Minimum Load Energy," the CAISO will classify the energy related to the re-rated minimum load as minimum load energy, because the resource's minimum load energy increases with the re-rate. Further, the revised definitions of "FMM Derate Energy" and "RTD Derate Energy" specify that FMM Derate Energy and RTD Derate Energy include residual imbalance energy incurred due to the ramping up towards or ramping down from a minimum load re-rated pursuant to section 9.3.3, as specified in section 11.5.5.

(5) make clarifying revisions to change the term "PMin" to the phrase "applicable Minimum Load";[39]

(6) capitalize existing tariff-defined terms that are currently shown in lower case in the tariff;[40]

(7) change the term "Minimum Load" to the correct term "Minimum Load Cost;"[41]

(8) change the phrase "Energy from Minimum Load" to the more accurate phrase "Minimum Load Energy;"[42] and

(9) clarify that the CAISO will determine the minimum load energy for MSG resources based on the applicable MSG configuration.[43]

III. Response to Stakeholder Comments

Stakeholders generally supported enhancing the CAISO's market systems to better account for the costs associated with temporary increases in a resource's PMin.[44] However, some stakeholders expressed a preference for an alternative solution to the market inefficiency issue different than the solution the CAISO proposes in this tariff amendment. That alternative proposal was to account for the re-rated costs by scaling the bid-in minimum load costs in proportion to the change in minimum load resulting from the re-rate. The stakeholders that favored this alternative approach contended that using the default energy bid pursuant to the CAISO's proposed solution would reduce their flexibility to bid minimum load costs and prevent resources from potentially bidding lower minimum load costs rather than costs resulting from using the default energy bid.

The CAISO rejected the suggested alternative, explaining that the solution contained in this tariff amendment is appropriate because using the default energy bid accounts more accurately than the alternative proposal for the

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39 Revised tariff sections 34.17.2(a)-(b).

40 Revised tariff sections 4.6.1.1(i), 39.6.1.6.1(3).

41 Revised tariff sections 11.8.3.1, 30.4.1.1.4.

42 Revised tariff sections 11.8.4.2.1(a), 11.8.4.2.2(a).

43 Tariff appendix A, revised definition of "Minimum Load Energy." In connection with the revisions to the definition of "Minimum Load Energy", the CAISO also proposes to delete existing tariff section 11.8.2.1.1(f), which contains language redundant of the revised definition.

44 *See* Draft Final Proposal at appendix A.

incremental energy costs associated with an increased minimum operating level. Simply scaling bid-in minimum load costs could overstate the resource costs, because minimum load costs include certain fixed costs (*e.g.*, major maintenance costs) that are not affected by a change in a resource's minimum operating level. For example, suppose that Resource B's minimum load cost is $7,000, of which $2,000 is for major maintenance costs. As described in section II of this transmittal letter, it would not be appropriate to increase the minimum load cost for Resource B by $70/MWh when $20/MWh of it consists of fixed costs that are not affected by the temporary increase of PMin. This potential for overstating resource costs is illustrated in Figure 6 below, which is identical to Figure 4 above except for the addition of the "Scale MLC" column.

Figure 6

	Data	Units	Formula	Resource A	Resource B	Resource B w/ Increased Minimum Load		
						Current	Use DEB	Scale MLC
[A]	Pmin	MW		100	100	185	185	185
[B]	Pmax	MW		300	300	300	300	300
[C]	Capacity above Pmin	MW	*[B] - [A]*	200	200	115	115	115
[D]	Min load cost	per hour		$7,000	$7,000	$7,000	$11,250	$12,950
[E]	Bid cost	per MWh		$30	$50	$50	$50	$50
[F]	Min load cost / MWh	per MWh	*[D / [A]*	$70	$70	$37.84	$60.81	$70
[G]	Min load cost / hour			$7,000	$7,000	$7,000	$11,250	$12,950
[H]	Total bid cost / hour		*[C] x [E]*	$6,000	$10,000	$5,750	$5,750	$5,750
[I]	Total cost		*[G] + [H]*	$13,000	$17,000	$12,750	$17,000	$18,700

As shown in the "Scale MLC" column, using the alternative proposed approach when Resource B increases its PMin to 185 MW (row [A]) due to temporary changes in physical characteristics that alter Resource B's operational capabilities would result in an overstatement of Resource B's minimum load cost per hour (rows [D] and [G]) where its minimum load costs include the $2,000 from its fixed major maintenance costs. Consequently, as shown in row [I], Resource B's total cost would be $18,700, which overstates Resource B's actual total cost after its minimum load re-rate, *i.e.*, $17,000. This is because the minimum load costs include fixed costs components that do not vary by MWh output. Therefore, this scaling alternative would lead to an excessive representation of the minimum load costs due to the re-rate. There is no justification for adjusting the minimum load costs to reflect these excessive costs. Instead, capturing the incremental variable costs incurred as a result of the re-rate based on the default energy bid, as proposed by the CAISO, is the just and reasonable approach.

Moreover, because the CAISO's proposed tariff revisions justly and reasonably resolve the market inefficiency issue discussed above, the Commission should not accept the alternative proposal in place of the CAISO's proposal. As the Commission has explained, "[p]ursuant to section 205 of the FPA, the Commission limits its evaluation of a utility's proposed tariff revisions to an inquiry into 'whether the rates proposed by a utility are reasonable – and not to extend to determining whether a proposed rate schedule is more or less reasonable to alternative rate designs.'"[45] In that same order, the Commission also explained that the revisions proposed by the utility "need not be the only reasonable methodology" and that "even if an intervenor develops an alternative proposal, the Commission must accept a section 205 filing if it is just and reasonable, regardless of the merits of the alternative proposal."[46] Therefore, "[u]pon finding that CAISO's proposal is just and reasonable, [the Commission] need not consider the merits of alternative proposals."[47] That is the case here.

IV. Effective Date

The CAISO requests that the Commission accept the tariff revisions contained in this filing effective 61 days after the filing was submitted, *i.e.*, May 23, 2016.

V. Communications

Correspondence and other communications regarding this filing should be directed to:

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[45] *Cal. Indep. Sys. Operator Corp.*, 141 FERC ¶ 61,135, at P 44 n.43 (2012), quoting *City of Bethany v. FERC*, 727 F.2d 1131, 1136 (D.C. 1984).

[46] *Cal. Indep. Sys. Operator Corp.*, 141 FERC ¶ 61,135, at P44 n.43 (citing federal court and Commission precedent).

[47] *Id.* at P 44.

VI. Service

The CAISO has served copies of this filing on the California Public Utilities Commission, the California Energy Commission, and all parties with scheduling coordinator agreements under the CAISO tariff. In addition, the CAISO has posted a copy of the filing on the CAISO website.

VII. Contents of Filing

In addition to this transmittal letter, this filing includes the following attachments:

Attachment A	Clean CAISO tariff sheets incorporating this tariff amendment
Attachment B	Red-lined document showing the revisions contained in this tariff amendment
Attachment C	Draft Final Proposal
Attachment D	Board Memorandum
Attachment E	List of key dates in the stakeholder process

VIII. Conclusion

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission accept the tariff revisions proposed in the filing effective as of May 23, 2016.

Respectfully submitted,

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Attachment A – Clean Tariff Records

Tariff Amendment to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate of a Generating Resource's Minimum Operating Level for Operational Reasons

California Independent System Operator Corporation

March 23, 2016

Minimum Load (PMin) Rerate Tariff Language

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4.6.1 General Responsibilities

4.6.1.1 Operate Pursuant to Relevant Provisions of CAISO Tariff

Participating Generators shall operate, or cause their facilities to be operated, in accordance with the relevant provisions of this CAISO Tariff, including, but not limited to, the operating requirements for normal and emergency operating conditions specified in Section 7 and the requirements for the dispatch and testing of Ancillary Services specified in Section 8.

(i) Each Participating Generator shall immediately inform the CAISO, through its respective Scheduling Coordinator, of any change or potential change in the current status of any Generating Units that are under the Dispatch control of the CAISO. This will include, but not be limited to, any change in status of equipment that could affect the maximum output of a Generating Unit, the Minimum Load of a Generating Unit, the ability of a Generating Unit to operate with automatic voltage regulation, operation of the PSSs (whether in or out of service), the availability of a Generating Unit governor, or a Generating Unit's ability to provide Ancillary Services as required. Each Participating Generator shall immediately report to the CAISO, through its Scheduling Coordinator, any actual or potential concerns or problems that it may have with respect to Generating

Unit direct digital control equipment, Generating Unit voltage control equipment, or any other equipment that may impact the reliable operation of the CAISO Controlled Grid.

(ii) In the event that a Participating Generator cannot meet its Generation schedule as specified in the Day-Ahead Schedule, or comply with a Dispatch Instruction, whether due to a Generating Unit trip or the loss of a piece of equipment causing a reduction in capacity or output, the Participating Generator shall notify the CAISO, through its Scheduling Coordinator, at once. If a Participating Generator will not be able to meet a time commitment or requires the cancellation of a Generating Unit Start-Up, it shall notify the CAISO, through its Scheduling Coordinator, at once.

(iii) In addition to complying with the other requirements of this Section 4.6.1.1 regarding the operation of its Generating Unit, a Participating Generator with a Pseudo-Tie of a Generating Unit to the CAISO Balancing Authority Area shall comply with the requirements of Section 1.2.1 and related provisions of the Pseudo-Tie Protocol in Appendix N.

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4.12.1 General Responsibilities

4.12.1.1 Operate Pursuant to Relevant Provisions of CAISO Tariff

Resource-Specific System Resource owners shall operate, or cause their facilities to be operated, in accordance with the relevant provisions of this CAISO Tariff, including but

not limited to the following.

(i) A Resource-Specific System Resource shall only be eligible for Bid Cost Recovery if the Resource-Specific System Resource has complied with a Start-Up Instruction or Dispatch Instruction issued by the CAISO as specified in Section 11.8.

(ii) In order to be eligible for Bid Cost Recovery pursuant to Sections 30.4 and 30.5.2.4, a Resource-Specific System Resource owner shall ensure that its Scheduling Coordinator makes an election for Start-Up Costs and Minimum Load Costs.

(iii) A Resource-Specific System Resource owner shall ensure that any Ancillary Services Bids submitted by its Scheduling Coordinator are submitted in accordance with Section 30.5.2.6.

(iv) Owners of Dynamic Resource-Specific System Resources that are Resource Adequacy Resources shall comply with additional availability requirements to the extent required by Section 40.6.5.1.

(v) Each Resource-Specific System Resource owner shall immediately inform the CAISO, through its respective Scheduling Coordinator and using the CAISO's outage management system as described in Section 9, of any change or potential change in the current status of any Resource-Specific System Resource that may affect a submitted Bid. This will include, but not be limited to, any change in status of equipment that could affect the maximum output of a Resource-Specific System Resource, the Minimum Load of a

Resource-Specific System Resource, or the ability of a Resource-Specific System Resource to provide Ancillary Services in accordance with its Bid.

(vi) In the event that a Resource-Specific System Resource owner cannot meet its Generation schedule as specified in the Day-Ahead Schedule, or comply with a Dispatch Instruction, whether due to a Resource-Specific System Resource trip or the loss of a piece of equipment causing a reduction in capacity or output, the Resource-Specific System Resource owner shall notify the CAISO, through its Scheduling Coordinator, at once. If a Resource-Specific System Resource owner will not be able to meet a time commitment or requires the cancellation of a Resource-Specific System Resource Start-Up, it shall notify the CAISO, through its Scheduling Coordinator, at once.

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7.7.15 System Operations In The Event Of A Market Disruption

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7.7.15.2 Removal of Bids, in the Event of a Market Disruption, to Prevent a Market Disruption, or to minimize the Extent of a Market Disruption

7.7.15.2.1 Objective Measures

In the event of a Market Disruption, to prevent a Market Disruption, or to minimize the extent of a Market Disruption, as provided in Section 7.7.15.1 (b), the CAISO may remove Bids, which as defined include Self-Schedules, from the relevant CAISO Market. The types of Bids that the CAISO may remove include those that have

previously caused a Market Disruption. These are Bids that are not feasible based on the misalignment of resource-specific conditions and physical constraints represented in the Master File, current outage information, and the Bid itself. For example, these include: (1) Bids that pass through the automated Bid validation rules but are invalid for other reasons not detectable by the automated Bid validation, including derates reflected in the CAISO's outage management system pursuant to Section 9; (2) Bids that are identified prior to the end of the CAISO Market run as causing a feasibility issue that prevents the CAISO Market run from clearing in the time allotted for the run, including Ramping rates in the CAISO's outage management system pursuant to Section 9 that result in infeasible generation Bids; and (3) multiple Bids that do not pose a problem for processing through the CAISO Market when considered individually, but may when submitted in combination with other Bids become infeasible and present an impediment to the successful completion of the CAISO Market.

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8.10.8.7 Rescission of Payments for Resource and Transmission Constraints

If the CAISO determines that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity is not available during the RTM as a result of a resource constraint, then payments for that capacity will be rescinded in accordance with Section 11.10 or, in the case of Self-Provided Ancillary Services capacity, that capacity will not be compensated at the user rate as described in Sections 11.10.2, 11.10.3 and 11.10.4.

If the CAISO determines that any Day-Ahead Market award for Ancillary Services

capacity or Self-Provided Ancillary Services capacity is not available during the RTM as a result of a Transmission Constraint, then payments for that capacity will not be rescinded, except as provided in section 11.10.9.1 for System Resources or, in the case of Self-Provided Ancillary Services capacity, that capacity will continue to be compensated at the user rate as described in Sections 11.10.2, 11.10.3 and 11.10.4. For purposes of applying this Section to Dynamic Resources or Pseudo-Tie resources, the CAISO shall treat a reduction in the Operating Transfer Capability at an Intertie between the Day-Ahead Market and RTM that is registered in CAISO's outage management system pursuant to Section 9 as a Transmission Constraint. For all other constraints that cause the CAISO to determine that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity from Dynamic Resource or Pseudo-Tie resources is not available, the ISO shall treat these constraints as resource constraints.

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9.3.3 Request Submission and Information

The Operator or Scheduling Coordinator of facilities that comprise the CAISO Controlled Grid or of a Participating Generator, Participating Intermittent Resource, Generating Unit, System Unit, Physical Scheduling Plant, Proxy Demand Resource, Reliability Demand Response Resource, Non-Generation Resource, Participating Load, or other resource subject to the outage management requirements of Section 9, shall use the ISO's outage management system to –

(1) Submit all outage requests under Section 9.

(2) Provide the required information about the outage and work to be performed

using the nature of work categories described in the Business Practice Manual.

(3) For transmission outage requests, additionally provide structured and detailed outage modeling information at the facility level and/or the breaker/switch level. If the work to be performed will require a switch position to change during the outage period, the Operator or Scheduling Coordinator must submit a separate outage request for each configuration.

(4) For resource outage requests, additionally provide the required information for the resource at the aggregate project or plant level, and also at the individual unit level for a unit de-rate greater than 50 MW, and any limitations on the resource's availability to provide each type of ancillary service for which it is certified.

(5) Notify the CAISO of temporary changes in physical characteristics specified in the Master File, including the PMax, Minimum Load, and Ramping capability of the unit, due to changes in their actual physical characteristics. Changes in the physical characteristics related to Minimum Load shall only be for temporary increases in Minimum Load due to ambient temperature, outages of mechanical equipment, or environmental regulations.

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9.3.10 Forced Outages

9.3.10.1 Coordination of all Forced Outages (consistent with Sections 9.3.4 and 9.3.5.2.1) will be through the single point of contact between the Operator and the CAISO Control Center.

9.3.10.2 Each Participating TO shall report any change or potential change in equipment status of the Participating TO's transmission assets turned over to the control of the CAISO or in equipment that affects transmission assets turned over to the control of the CAISO immediately upon discovery to the CAISO (this will include line and station equipment, line protection, Remedial Action Schemes and communication problems, etc.). Each Participating TO shall also keep the CAISO immediately informed upon discovery as to any change or potential change in the Participating TO's transmission system that could affect the reliability of the CAISO Controlled Grid. This would include, but is not limited to, adverse weather conditions, fires, bomb threats, system failures, etc. To the extent possible, the CAISO shall reflect all transmission Outages in the Integrated Forward Market and Real-Time Market.

9.3.10.3 The following requirements apply to the advance reporting to the CAISO of anticipated and actual Forced Outages:

(a) Any Operator, upon identification of a situation likely to result in a Forced Outage within the next twenty-four (24) hours unless immediate corrective action is taken, where such action requires the removing from service or reducing the maximum output capability of a Generating Unit or a Resource-Specific System Resource by ten (10) MW or more from the value most recently recorded in the CAISO's outage management system pursuant to Section 9, or removing a transmission facility from service, shall communicate directly with the CAISO Control Center.

(b) Notwithstanding Section 9.3.10.3(a), and unless otherwise exempted pursuant to the terms of a Business Practice Manual, the Operator of an Eligible Intermittent Resource with a PMax of greater than ten (10) MW for its entire generating facility, upon identification of a situation likely to result in a Forced Outage within the next twenty-four (24) hours unless immediate corrective action is taken, where such action requires the removing from service or reducing the maximum output capability of the Eligible Intermittent Resource generating facility by one (1) MW or more from the value most recently recorded in the CAISO's outage management system pursuant to Section 9, shall communicate directly with the CAISO Control Center. The failure of the Operator of the Eligible Intermittent Resource to report a Forced Outage between one (1) MW and ten (10) MW in accordance with this Section 9.3.10.3(b) shall be subject only to the provisions of Section 37.4.1.2(a) and (b)(1) of Section 37.4.1.2.

All notifications of Forced Outages shall be communicated to the CAISO Control Center with as much notice as possible in order that the necessary security analysis and CAISO Controlled Grid assessments may be performed. If prior notice of a Forced Outage cannot be given, the Operator shall notify the CAISO of the Forced Outage within thirty (30) minutes after it occurs. Any Operator, upon identification of a situation likely to result in a Forced Outage but of a nature not requiring a removal from service until some time more than twenty-four (24) hours in the future will be subject to the provisions of Section 9 with respect to any necessary Outage except the requirements

imposing time limits for notification will be waived and the request will be expedited by the CAISO provided notice is given as soon as possible.

9.3.10.3.1 The following requirements apply if prior notice of a Forced Outage cannot be given to the CAISO:

(a) The Operator of a Generating Unit or a Resource-Specific System Resource is required to notify the CAISO within sixty (60) minutes after discovering any change in the maximum output capability of at least ten (10) MW or five percent (5%) of the value registered in the Master File, whichever is greater, from the value registered in the CAISO's outage management system pursuant to Section 9 that lasts for fifteen (15) minutes or longer.

(b) Notwithstanding Section 9.3.10.3.1(a), and unless otherwise exempted pursuant to the terms of a Business Practice Manual, the Operator of an Eligible Intermittent Resource with a PMax of greater than ten (10) MW for its entire generating facility is required to notify the CAISO within sixty (60) minutes after discovering any change in the maximum output capability of the generating facility of at least one (1) MW from the value registered in the CAISO's outage management system pursuant to Section 9 that lasts for fifteen (15) minutes or longer. The failure of the Operator of the Eligible Intermittent Resource to report a Forced Outage between one (1) MW and ten (10) MW in accordance with this Section 9.3.10.3.1(b) shall

be subject only to the provisions of Section 37.4.1.2(a) and (b)(1) of Section 37.4.1.2.

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11.5.5 Settlement Amount For Residual Imbalance Energy

For each Settlement Interval, Residual Imbalance Energy settlement amounts shall be the product of the MWh of Residual Imbalance Energy for that Settlement Interval and the Bid, as mitigated pursuant to Section 39.7 that led to the Residual Imbalance Energy from the relevant Dispatch Interval in which the resource was dispatched, subject to additional rules specified in this section below and in Section 11.17. The relevant Dispatch Interval and Bid that led to the Residual Imbalance Energy may occur prior or subsequent to the interval in which the relevant Residual Imbalance Energy occurs and can be contiguous, or not, with the applicable Trading Hour in which the relevant Residual Imbalance Energy Settlement Interval occurs. For MSS Operators the Settlement for Residual Imbalance Energy is conducted in the same manner, regardless of any MSS elections (net/gross Settlement, Load following or opt-in/opt-out of RUC). When a Scheduling Coordinator increases the Minimum Load pursuant to Section 9.3.3, for the Settlement Interval(s) during which the affected resource is ramping up towards or ramping down from such a Minimum Load change, the Residual Imbalance Energy for the applicable Settlement Interval(s) will be re-classified as Derate Energy and will be paid at the applicable RTD Locational Marginal Price.

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11.8 Bid Cost Recovery

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11.8.2.1.1 IFM Start-Up Cost

The IFM Start-Up Cost for any IFM Commitment Period shall be equal to the Start-Up Costs submitted by the Scheduling Coordinator to the CAISO for the IFM divided by the number of Settlement Intervals within the applicable IFM Commitment Period. For each Settlement Interval, only the IFM Start-Up Cost in a CAISO IFM Commitment Period is eligible for Bid Cost Recovery. The CAISO will determine the IFM Start-Up Costs for Multi-Stage Generating Resources based on the CAISO-committed MSG Configuration. The following rules shall apply sequentially to qualify the IFM Start-Up Cost in an IFM Commitment Period:

(a) The IFM Start-Up Cost for an IFM Commitment Period shall be zero if there is an IFM Self-Commitment Period within or overlapping with that IFM Commitment Period.

(b) The IFM Start-Up Cost for an IFM Commitment Period shall be zero if 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 in the Day-Ahead Market anywhere within the applicable IFM Commitment Period.

(c) The IFM Start-Up Cost for an IFM Commitment Period shall be zero if there is no actual Start-Up at the start of the applicable IFM Commitment Period because the IFM Commitment Period is the continuation of an IFM, RUC, or RTM Commitment Period from the previous Trading Day.

(d) If an IFM Start-Up is terminated in the Real-Time within the applicable IFM Commitment Period through an Exceptional Dispatch Shut-Down Instruction issued while the Bid Cost Recovery Eligible Resource was starting up, the IFM Start-Up Cost for that IFM Commitment Period shall be prorated by the ratio of the Start-Up Time before termination over the total IFM Start-Up Time.

(e) The IFM Start-Up Cost is qualified if an actual Start-Up occurs within the applicable IFM Commitment Period. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Intervals indicates the unit is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Intervals that fall within the CAISO IFM Commitment Period. The CAISO will determine whether the resource is On for this purpose based on whether the resource's metered Energy is at or above the resource's Minimum Load as registered in the Master File.

(f) The IFM Start-Up Cost will be qualified if an actual Start-Up occurs earlier than the start of the IFM Commitment Period if the advance Start-Up is a result of a Start-Up instruction issued in a RUC or Real-Time Market process subsequent to the IFM, or the advance Start-Up is uninstructed but is still within the same Trading Day and the Bid Cost Recovery Eligible Resource actually stays on until the targeted IFM Start-Up.

(g) The Start- Up Costs for a Bid Cost Recovery Eligible Resource that is a Short Start Unit committed by the CAISO in the IFM and that further receives a Start-Up Instruction from the CAISO in the Real-Time Market to start within the same CAISO IFM Commitment Period, will be qualified for the CAISO IFM Commitment Period instead of being qualified for the CAISO RTM Commitment Period; and Start-Up Costs for subsequent Start-Ups will be further qualified as specified in Section 11.8.4.1.1(h).

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, and as modified pursuant to Section 30.7.10.2, if applicable, divided by the number of Settlement Intervals in a Trading Hour subject to the rules described below.

(a) For each Settlement Interval, only the IFM Minimum Load Cost in a CAISO IFM Commitment Period is eligible for Bid Cost Recovery.

(b) 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; or (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.

(c) If the CAISO commits a Bid Cost Recovery Eligible Resource in the

Day-Ahead and the resource receives a Day-Ahead Schedule and the CAISO subsequently de-commits the resource in the Real-Time Market, the IFM Minimum Load Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4.

(d) If a Multi-Stage Generating Resource is committed by the CAISO and receives a Day-Ahead Schedule and subsequently is committed by the CAISO to a lower MSG Configuration where its Minimum Load capacity as registered in the Master File in the Real-Time Market is lower than the CAISO IFM Commitment Period MSG Configuration's Minimum Load as registered in the Master File, the resource's IFM Minimum Load Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4.

(e) If the conditions in Sections 11.8.2.1.2 (c) and (d) do not apply, then the IFM Minimum Load Cost for any Settlement Interval is zero if the Bid Cost Recovery Eligible Resource is determined to be Off 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 its metered Energy in a Settlement Interval is equal to or greater than the difference between its Minimum Load and the Tolerance Band, and the Metered Energy is greater than zero (0) MWh. Otherwise, such resource is determined to be Off.

(f) For Multi-Stage Generating Resources, the commitment period is 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 IFM CAISO Committed MSG Configuration is determined to be On. If it is determined to be On, then, the IFM Minimum Load Costs will be based on the Minimum Load Costs of the IFM committed MSG Configuration. For the purposes of determining IFM Minimum Load Cost for a Multi-Stage Generating Resource, a Bid Cost Recovery Eligible Resource is determined to be On if its metered Energy in a Settlement Interval is equal to or greater than the difference between its IFM MSG Configuration Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and the Tolerance Band, and the Metered Energy is greater than zero (0) MWh. Otherwise, such resource is determined to be Off.

(g) The IFM Minimum Load Costs calculation is subject to the Shut-Down State Variable and is disqualified as specified in Section 11.17.2.

11.8.2.1.3 IFM Pump Shut-Down Cost

For Pumped-Storage Hydro Units and Participating Load only, the IFM Pump Shut-Down Costs for each Settlement Interval shall be equal to the relevant Pump Shut-Down Cost submitted to CAISO in the IFM divided by the number of Settlement

Intervals in a Trading Hour that is preceded by a previous commitment by the IFM to pump, in which actual shut down occurs if the unit is committed by the IFM not to pump and actually does not operate in pumping mode in that Settlement Interval (as detected through Meter Data). The IFM Pump Shut-Down Cost for an IFM Shut-Down period shall be zero if: (1) it is followed by an IFM or RFM Self-Commitment Period in generation mode; (2) the Shut-Down is due to an Outage reported through the CAISO's outage management system as described in Section 9; or (3) the Shut-Down is delayed by the RTM past the IFM Shut-Down period in question or cancelled by the RTM before the Shut-Down process has started.

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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 used in the IFM, if any, from the higher of the Bid Cost Recovery Eligible Resource's Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, 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 calculations are subject to the application of the Day-Ahead Metered Energy Adjustment Factor, and the Persistent Deviation Metric pursuant to the rules specified in Section 11.8.2.5 and Section 11.17.2.3, respectively. In addition, if the CAISO commits a Bid Cost Recovery Eligible Resource in the Day-Ahead and receives a Day-Ahead Schedule and subsequently the CAISO de-commits the resource in the Real-Time Market, the IFM Energy Bid Costs are subject to the

Real-Time Performance Metric for each case specified in Section 11.8.4.4. If the CAISO commits a Multi-Stage Generating Resource in the Day-Ahead Market and the resource receives a Day-Ahead Schedule and subsequently the CAISO de-commits the Multi-Stage Generating Resource to a lower MSG Configuration where its Minimum Load capacity as registered in the Master File in the Real-Time Market is lower than the CAISO IFM Commitment Period MSG Configuration's Minimum Load as registered in the Master File, the resource's IFM Energy Bid Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4. The CAISO will determine the IFM Energy Bid Cost for a Multi-Stage Generating Resource at the Generating Unit level.

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11.8.2.1.7 IFM Transition Cost

For each Settlement Interval, the IFM Transition Costs shall be based on the MSG Configuration to which the Multi-Stage Generating Resource is transitioning and is allocated to the CAISO Commitment Period of that MSG Configuration.

11.8.2.1.7.1 IFM Transition Costs Applicability

Within any eligible IFM CAISO Commitment Period determined pursuant to the rules specified in Section 11.8.1.3, the CAISO shall apply the IFM Transition Costs for the Settlement Intervals in which the Multi-Stage Generating Resource is actually transitioning from the "from" MSG Configuration and reaches the Minimum Load as registered in the Master File of the "to" MSG Configuration to which the Multi-Stage Generating Resource is transitioning, subject to the Tolerance Band.

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11.8.3.1 RUC Bid Cost Calculation

For each Settlement Interval, the CAISO shall determine the RUC Bid Cost for a Bid Cost Recovery Eligible Resource as the algebraic sum of the RUC Start-Up Cost, RUC Transition Cost, RUC Minimum Load Cost and RUC Availability Bid Cost. For Multi-Stage Generating Resources, in addition to the specific RUC Bid Cost rules described in Section 11.8.3.1, the rules described in Section 11.8.1.3 will be applied to further determine the applicable MSG Configuration-based CAISO Market Start-Up Cost, Transition Cost, and Minimum Load Cost, as modified pursuant to Section 30.7.10.2, if applicable, in any given Settlement Interval. For Multi-Stage Generating Resources, the incremental RUC Start-Up, Minimum Load Costs, and Transition Costs to provide RUC awarded capacity for an MSG Configuration other than the self-scheduled MSG Configuration are determined by the RUC optimization rules in specified in Section 31.5.

11.8.3.1.1 RUC Start-Up Cost

The RUC Start-Up Cost for any Settlement Interval in a RUC Commitment Period shall consist of Start-Up Cost of the Bid Cost Recovery Eligible Resource submitted to the CAISO for the applicable RUC Commitment Period divided by the number of Settlement Intervals in the applicable RUC Commitment Period. For each Settlement Interval, only the RUC Start-Up Cost in a CAISO RUC Commitment Period is eligible for Bid Cost Recovery. The CAISO will determine the RUC Start-Up Cost for a Multi-Stage Generating Resource based on the MSG Configuration committed by the CAISO in RUC.

The following rules shall be applied in sequence and shall qualify the RUC Start-Up Cost in a RUC Commitment Period:

(a) The RUC Start-Up Cost for a RUC Commitment Period is zero if there is an IFM Commitment Period within that RUC Commitment Period.

(b) The RUC Start-Up Cost for a RUC Commitment Period is zero if the Bid Cost Recovery Eligible Resource is manually pre-dispatched under an RMR Contract prior to the Day-Ahead Market or is flagged as an RMR Dispatch in the Day-Ahead Schedule anywhere within that RUC Commitment Period.

(c) The RUC Start-Up Cost for a RUC Commitment Period is zero if there is no RUC Start-Up at the start of that RUC Commitment Period because the RUC Commitment Period is the continuation of an IFM, RUC, or RTM Commitment Period from the previous Trading Day.

(d) The RUC Start-Up Cost for a RUC Commitment Period is zero if the Start-Up is delayed beyond the RUC Commitment Period in question or cancelled by the Real-Time Market prior to the Bid Cost Recovery Eligible Resource starting its start-up process.

(e) If a RUC Start-Up is terminated in the Real-Time within the applicable RUC Commitment Period through an Exceptional Dispatch Shut-Down Instruction issued while the Bid Cost Recovery Eligible Resource is starting up the, RUC Start-Up Cost is prorated

by the ratio of the Start-Up Time before termination over the RUC Start-Up Time.

(f) The RUC Start-Up Cost for a RUC Commitment Period is qualified if an actual Start-Up occurs within that RUC Commitment Period. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Intervals indicates that the resource is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Intervals that fall within the CAISO RUC Commitment Period. The CAISO will determine whether the resource is On for this purpose based on whether its metered Energy is at or above the resource's Minimum Load as registered in the Master File.

(g) The RUC Start-Up Cost shall be qualified if an actual Start-Up occurs. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Intervals indicates the unit is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Intervals that fall within the CAISO RUC Commitment Period.

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, as adjusted pursuant to Section 30.7.10.2, if applicable, 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 committed or Dispatched in the Real-time Market 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 for a Bid Cost Recovery Eligible Resource recovery of the RUC Minimum Load Costs is subject to the Real-Time Performance Metric as specified in Section 11.8.4.4. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. The RUC Minimum Load Cost calculation will be subject to the Shut-Down State Variable and disqualified as specified in Section 11.17.2.

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11.8.3.1.4 RUC Transition Cost

For each Settlement Interval, the RUC Transition Costs shall be based on the MSG Configuration to which the Multi-Stage Generating Resource is transitioning and is allocated to the CAISO commitment period of that MSG Configuration.

11.8.3.1.4.1 RUC Transition Costs Applicability

Within any eligible RUC CAISO Commitment Period determined pursuant to the rules specified in Section 11.8.1.3, the CAISO shall apply the RUC Transition Costs for the Settlement Intervals in which the Multi-Stage Generating Resource is actually transitioning from the “from” MSG Configuration and reaches the Minimum Load as

registered in the Master File of the “to” MSG Configuration to which the Multi-Stage Generating Resource is transitioning, subject to the Tolerance Band.

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11.8.4.1 RTM Bid Cost Calculation

For each Settlement Interval, the CAISO shall calculate RTM Bid Cost for each Bid Cost Recovery Eligible Resource, as the algebraic sum of the RTM Start-Up Cost, RTM Minimum Load Cost, RTM Transition Cost, RTM Pump Shut-Down Cost, RTM Energy Bid Cost, RTM Pumping Cost and RTM AS Bid Cost. For Multi-Stage Generating Resources, in addition to the specific RTM Bid Cost rules described in Section 11.8.4.1, the rules described in Section 11.8.1.3 will be applied to further determine the applicable MSG Configuration-based CAISO Market Start-Up Cost, Transition Cost, and Minimum Load Cost, as modified pursuant to Section 30.7.10.2, if applicable, in given Settlement Interval. For Multi-Stage Generating Resources, the incremental RTM Start-Up Cost, Minimum Load Cost, as modified pursuant to Section 30.7.10.2, if applicable, and Transition Cost to provide RTM committed Energy or awarded Ancillary Services capacity for an MSG Configuration other than the self-scheduled MSG Configuration are determined by the RTM optimization rules in specified in Section 34.

11.8.4.1.1 RTM Start-Up Cost

For each Settlement Interval of the applicable Real-Time Market Commitment Period, the Real-Time Market Start-Up Cost shall consist of the Start-Up 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 the applicable Real-Time Market Commitment Period. For each Settlement Interval, only the Real-Time Market Start-Up Cost in a

CAISO Real-Time Market Commitment Period is eligible for Bid Cost Recovery. The CAISO will determine the RTM Start-Up Cost for a Multi-Stage Generating Resource based on the MSG Configuration committed by the CAISO in RTM. The following rules shall be applied in sequence and shall qualify the Real-Time Market Start-Up Cost in a Real-Time Market Commitment Period:

(a) The Real-Time Market Start-Up Cost is zero if there is a Real-Time Market Self-Commitment Period within the Real-Time Market Commitment Period.

(b) The Real-Time Market Start-Up Cost is zero if the Bid Cost Recovery Eligible Resource has been manually pre-dispatched under an RMR Contract or the resource is flagged as an RMR Dispatch in the Day-Ahead Schedule or Real-Time Market anywhere within that Real-Time Market Commitment Period.

(c) The Real-Time Market Start-Up Cost is zero if the Bid Cost Recovery Eligible Resource is started within the Real-Time Market Commitment Period pursuant to an Exceptional Dispatch issued in accordance with Section 34.9.2 to (1) perform Ancillary Services testing; (2) perform pre-commercial operation testing for Generating Units; or (3) perform PMax testing.

(d) The Real-Time Market Start-Up Cost is zero if there is no Real-Time Market Start-Up at the start of that Real-Time Market Commitment Period because the Real-Time Market Commitment Period is the continuation of an IFM or RUC Commitment Period

from the previous Trading Day.

(e) If a Real-Time Market Start-Up is terminated in the Real-Time within the applicable Real-Time Market Commitment Period through an Exceptional Dispatch Shut-Down Instruction issued while the Bid Cost Recovery Eligible Resource is starting up the Real-Time Market Start-Up Cost is prorated by the ratio of the Start-Up Time before termination over the Real-Time Market Start-Up Time.

(f) The Real-Time Market Start-Up Cost shall be qualified if an actual Start-Up occurs within that Real-Time Market Commitment Period. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Interval(s) indicates the unit is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Interval that falls within the CAISO Real-Time Market Commitment Period. The CAISO will determine whether the resource is On for this purpose based on whether its metered Energy is at or above the resource's Minimum Load as registered in the Master File. The CAISO will determine that the Multi-Stage Generating Resource is On based on the MSG Configuration that the CAISO has committed in the Real-Time Market.

(g) The Real-Time Market Start-Up Cost for a Real-Time Market Commitment Period shall be qualified if an actual Start-Up occurs

earlier than the start of the Real-Time Market Start-Up, if the relevant Start-Up is still within the same Trading Day and the Bid Cost Recovery Eligible Resource actually stays on until the Real-Time Market Start-Up, otherwise the Start-Up Cost is zero for the Real-Time Market Commitment Period.

(h) For Short-Start Units, the first Start-Up Costs within a CAISO IFM Commitment Period are qualified IFM Start-Up Costs as described above in Section 11.8.2.1.1(h). For subsequent Start-Ups of Short-Start Units after the CAISO Shuts Down a resource and then the CAISO issues a Start-Up Instruction pursuant to a CAISO RTM Commitment within the CAISO IFM Commitment Period, the Start-Up Costs shall be qualified as Real-Time Start-Up costs, provided that the resource actually Shut-Down and Started-Up based on CAISO Shut-Down and Start-Up Instructions.

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, as adjusted pursuant to Section 30.7.10.2, if applicable, 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) for all resources that are not Multi-Stage Generating Resources, that Settlement Interval is included in an IFM or RUC Commitment Period; or (4) 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. A resource's RTM Minimum Load Costs for Bid Cost Recovery purposes are subject to the application of the Real-Time Performance Metric as specified in Section 11.8.4.4. For Multi-Stage Generating Resources, the commitment period is further determined based on application of Section 11.8.1.3. For all Bid Cost Recovery Eligible Resources that the CAISO Shuts Down, either through an Exceptional Dispatch or an Economic Dispatch through the Real-Time Market, from its Day-Ahead Schedule that was also from a CAISO commitment, the RTM Minimum Load Costs will include negative Minimum Load Costs for Energy between the Minimum Load and zero (0) MWhs.

11.8.4.1.3 RTM Pump Shut-Down Cost

The RTM Pump Shut-Down Cost for each Settlement Interval is the relevant Pump Shut-Down Cost submitted by the Scheduling Coordinator only for Pumped-Storage Hydro Units and Participating Load, divided by the number of Settlement Intervals in which such resource was committed by the Real-Time Market in a Trading Hour with scheduled pumping operation and in which an actual Shut-Down occurs and the resource does not actually operate in pumping mode or serve Load in that Settlement Interval (as detected through Meter Data). The RTM Pump Shut-Down Cost for a Real-

Time Market Shut-Down event shall be zero if: (1) it is followed by a RTM Self-Commitment Period in generation mode or offline mode; or (2) the Shut-Down is due to an Outage reported through the CAISO's outage management system as described in Section 9.

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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, the Default Energy Bid price, or the Locational Marginal Price, if any, as further described in Section 11.17, for each Dispatch Interval in the Settlement Interval. For Settlement Intervals for which the Bid Cost Recovery Eligible Resource is ramping up to or down from a rerated Minimum Load that was increased pursuant to Section 9.3.3 for the Real-Time Market, the RTM Energy incurred by the ramping will be classified as Derate Energy and will not be included in Bid Cost Recovery. For a Bid Cost Recovery Eligible Resource that is ramping up to or down from an Exceptional Dispatch, the relevant Energy Bid Cost related to the Energy caused by ramping will be settled on the same basis as the Energy Bid used in the Settlement of the Exceptional Dispatch that led to the ramping. The RTM Energy Bid Cost for a Bid Cost Recovery Eligible Resource, including Participating Loads and Proxy Demand Response Resources, for a Settlement Interval is subject to the Real-

Time Performance Metric as described in Section 11.8.4.4 and the Persistent Deviation Metric as described in Section 11.17. Any Uninstructed Imbalance Energy in excess of Instructed Imbalance Energy is also not eligible for Bid Cost Recovery. For a Multi-Stage Generating Resource the CAISO will determine the RTM Energy Bid Cost based on the Generating Unit level.

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11.8.4.1.7 RTM Transition Cost

For each Settlement Interval, the RTM Transition Costs shall be based on the MSG Configuration to which the Multi-Stage Generating Resource is transitioning and are allocated to the CAISO commitment period of that MSG Configuration.

11.8.4.1.7.1 RTM Transition Costs Applicability

Within any eligible RTM CAISO Commitment Period determined pursuant to the rules specified in Section 11.8.1.3, the CAISO shall apply the RTM Transition Costs for the Settlement Intervals in which the Multi-Stage Generating Resource is actually transitioning from the "from" MSG Configuration and reaches the Minimum Load as registered in the Master File of the "to" MSG Configuration to which the Multi-Stage Generating Resource is transitioning, subject to the Tolerance Band.

11.8.4.2 RTM Market Revenue Calculations

The RTM Market Revenue calculations are subject to the Real-Time Performance Metric and the Persistent Deviation Metric as described in Sections 11.8.4.4 and 11.17, respectively.

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 FMM or RTD Instructed Imbalance Energy (including Minimum Load Energy of the Bid Cost Recovery Eligible Resource committed in RUC and 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 FMM and RTD LMP, for each Dispatch Interval in the Settlement Interval.

(b) 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.

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

11.8.4.2.2 For each Settlement Interval in a non-CAISO Real-Time Market Commitment Period, the Real-Time Market Revenue for a Bid Cost Recovery Eligible Resource is subject to the Real-Time Performance Metric and is the algebraic sum of the following:

(a) The sum of the products of the FMM or RTD Instructed Imbalance Energy (excluding the Minimum Load Energy of Bid Cost Recovery

Eligible Resources committed in RUC), 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 FMM or RTD Market LMP, for each Dispatch Interval in the Settlement Interval;

(b) 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.

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

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30.4.1 Start-Up and Minimum Load Costs

30.4.1.1 Proxy Cost Methodology

30.4.1.1.1 Natural Gas-Fired Resources

For each natural gas-fired resource, the Proxy Cost methodology uses formulas for Start-Up Costs and Minimum Load Costs based on the resource's actual unit-specific performance parameters. The Start-Up Cost and Minimum Load Cost values utilized for each such resource in the CAISO Markets Processes will be either (a), if the Scheduling Coordinator does not submit a Proxy Cost Bid, or (b) below:

(a) Formulaic natural gas cost values adjusted for fuel-cost variation on a daily basis using the natural gas price calculated pursuant to Section

39.7.1.1.1.3.

Start-Up Costs also include: (i) the cost of auxiliary power calculated using the unit-specific MWh quantity of auxiliary power used for Start-Up multiplied by a resource-specific electricity price; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement per Start-Up, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource, multiplied by 0.5; and (iv) a resource-specific adder, if applicable, for major maintenance expenses ($ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement at Minimum Load as registered in the Master File, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the

applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource as registered in the Master File; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses ($ per operating hour) determined pursuant to Section 30.4.1.1.4.

(b) Bids specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10, subject to the provisions applicable to Multi-Stage Generating Resources set forth in Section 30.4.1.1.3.

In the event that the Scheduling Coordinator for a resource other than a Multi-Stage Generating Resource or for a Multi-Stage Generating Resource in its lowest startable configuration does not provide sufficient data for the CAISO to determine the resource's Start-Up or Minimum Load Costs or one or more components of the resource's Start-Up or Minimum Load Costs, the CAISO will assume that the resource's Start-Up Costs or Minimum Load Costs, or the indeterminable component(s) of the resource's Start-Up Costs or Minimum Load Costs, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest startable configuration, Section 30.4.1.1.3 applies.

30.4.1.1.2 Non-Natural Gas-Fired Resources

For each non-natural gas-fired resource, Start-Up Cost and Minimum Load Cost values under the Proxy Cost methodology shall be based on either (a) if the Scheduling Coordinator does not submit a Proxy Cost Bid, or (b) below:

(a) The relevant cost information of the particular resource, including fuel or

fuel equivalent input costs, which will be provided to the CAISO by the Scheduling Coordinator and maintained in the Master File.

Start-Up Costs will also include: (i) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (ii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource as registered in the Master File, multiplied by 0.5; and (iii) a resource-specific adder, if applicable, for major maintenance expenses ($ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource as registered in the Master File; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses ($ per operating hour) determined by the CAISO or an Independent Entity selected by the CAISO.

For each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the information provided to the CAISO by the Scheduling Coordinator must be consistent with information submitted to the California Air Resources Board. Adders for major maintenance expenses will be determined pursuant to Section 30.4.1.1.4.

(b) Bids specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10, subject to the provisions applicable to Multi-Stage Generating Resources set forth in Section 30.4.1.1.3.

In the event that the Scheduling Coordinator for a resource other than a Multi-Stage Generating Resource or for a Multi-Stage Generating Resource in its lowest startable configuration does not provide sufficient data for the CAISO to determine the resource's Start-Up or Minimum Load Costs or one or more components of the resource Start-Up or Minimum Load Costs, the CAISO will assume that resource's Start-Up or Minimum Load Costs, or the indeterminable component(s) of the resource's Start-Up Costs or Minimum Load Costs, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest startable configuration, Section 30.4.1.1.3 applies.

30.4.1.1.3 Multi-Stage Generating Resources

The Proxy Cost methodology for calculating Start-Up Costs and Minimum Load Costs will apply to all the MSG Configurations for a Multi-Stage Generating Resource that is not a Use-Limited Resource and for a Multi-Stage Generating Resource that is a Use-Limited Resource and elects to use the Proxy Cost methodology. The Proxy Costs

(Start-Up Cost, Transition Cost, and Minimum Load Cost) for Multi-Stage Generating Resources will be calculated for each specific MSG Configuration, including for each MSG Configuration that cannot be directly started. Notwithstanding the rules set forth in Sections 30.4.1.1.1(b) and 30.4.1.1.2(b), to the extent that a Scheduling Coordinator for a Multi-Stage Generating Resource, other than in its lowest startable configuration, does not provide sufficient data for the CAISO to determine a component of the Start-Up or Minimum Load Costs for a particular MSG Configuration, the CAISO will, if feasible, use the value for that component associated with the next-lowest MSG Configuration.

30.4.1.1.4 Adders for Major Maintenance Expenses

Scheduling Coordinators may propose adders for major maintenance expenses as a component of Start-Up Costs, Minimum Load Costs, or both. Such proposed adders must be based solely on resource-specific information derived from actual maintenance costs, when available, or estimated maintenance costs provided by the Scheduling Coordinators to the CAISO and the Independent Entity. Scheduling Coordinators may submit updated resource-specific major maintenance information for purposes of seeking a change to any major maintenance adder, no sooner than thirty (30) days after a major maintenance adder has been determined. The CAISO or Independent Entity will evaluate the information provided by Scheduling Coordinators, and may require Scheduling Coordinators to provide additional information, to enable the CAISO or Independent Entity to determine reasonable adders for major maintenance expenses or to conduct audits of major maintenance expenses. Within fifteen (15) days of receipt of the information or any requested additional information, the CAISO or Independent

Entity will notify the Scheduling Coordinator in writing whether it has sufficient and accurate information to determine reasonable major maintenance adders to be included in Start-Up or Minimum Load Cost calculations or both. Within ten (10) days after providing written notification to the Scheduling Coordinator that the information is sufficient and accurate, the CAISO or Independent Entity will determine the reasonable adder for major maintenance expenses to be included in Start-Up or Minimum Load Costs or both and will so inform the Scheduling Coordinator in writing.

In the event of a dispute regarding the sufficiency or accuracy of the information provided by the Scheduling Coordinator, the CAISO or Independent Entity and the Scheduling Coordinator will enter a period of good faith negotiations that terminates sixty (60) days after the date the dispute began. If the CAISO or Independent Entity and the Scheduling Coordinator resolve the dispute during the 60-day negotiation period, within ten (10) days of such agreement, the CAISO or Independent Entity will determine the reasonable adder for major maintenance expenses and will provide the adder to the Scheduling Coordinator in writing. If the CAISO or Independent Entity and the Scheduling Coordinator fail to agree upon the sufficiency or accuracy of the information during the 60-day negotiation period, the Scheduling Coordinator has the right to petition FERC to resolve the dispute as to the sufficiency or accuracy of its information.

In the event of a dispute regarding the CAISO's or Independent Entity's determination of adders for major maintenance expenses, the CAISO or Independent Entity and the

Scheduling Coordinator will enter a period of good faith negotiations that terminates sixty (60) days after the date the dispute began. If the CAISO or Independent Entity and the Scheduling Coordinator resolve the dispute during the 60-day negotiation period, the agreed-upon values will be effective as of the first Business Day following the resolution date. If the CAISO or Independent Entity and the Scheduling Coordinator fail to agree on the major maintenance values for either Start-Up or Minimum Load Costs following the 60-day negotiation period, the Scheduling Coordinator has the right to file proposed values and supporting information for major maintenance adders for Start-Up or Minimum Load Costs with FERC pursuant to Section 205 of the Federal Power Act.

In the event of a dispute regarding the reasonableness of the adder for major maintenance expenses determined by the CAISO or Independent Entity, but not a dispute regarding the sufficiency or accuracy of the information provided by the Scheduling Coordinator, the CAISO or Independent Entity will determine a reasonable interim adder for major maintenance expenses until the adder for major maintenance expenses is determined by agreement between the CAISO or Independent Entity and the Scheduling Coordinator or by FERC. Any subsequent agreement or FERC order determining the adder for major maintenance expenses will be reflected in an adjustment to the interim adder for major maintenance expenses in the next applicable Settlement Statement.

30.4.1.1.5 Proxy Transition Cost

For a Multi-Stage Generating Resource under the Proxy Cost methodology, the CAISO

will calculate the Transition Costs utilized for each feasible transition from a given MSG Configuration to a higher MSG Configuration based on the difference between the Start-Up Costs for the higher MSG Configuration, minus the Start-Up Costs for the lower MSG Configuration, as determined in accordance with the Start-Up Cost calculation methodology set forth in Section 30.4.1.1. If the result of this calculation is negative for any transition between two MSG Configurations, then the associated Transition Cost shall be zero. The Transition Costs calculated by the CAISO will be utilized in the CAISO Markets Processes unless the Scheduling Coordinator submits Transition Costs for the Multi-Stage Generating Resource in the form of daily Bids that are less than or equal to one hundred twenty-five (125) percent of the Transition Costs calculated by the CAISO and are not negative, in which case the Transition Costs submitted in the form of daily Bids will be utilized in the CAISO Markets Processes.

30.4.1.2 Registered Cost Methodology

(a) Under the Registered Cost methodology, the Scheduling Coordinator for a Use-Limited Resource may register values of its choosing for Start-Up Costs and/or Minimum Load Costs in the Master File subject to the maximum limit specified in Section 39.6.1.6. A Scheduling Coordinator for a Multi-Stage Generating Resource that is a Use-Limited Resource registering a Start-Up Cost must also register Transition Costs for each feasible MSG Transition, subject to the maximum limit specified in Section 39.6.1.7. For a Use-Limited Resource to be eligible for the Registered Cost methodology there must be sufficient information in the Master File to calculate the value pursuant to the Proxy Cost methodology, which will be used to validate the specific value registered using the Registered

Cost methodology. Any such values will be fixed for a minimum of 30 days in the Master File unless: (a) the resource's costs for any such value, as calculated pursuant to the Proxy Cost methodology, exceed the value registered using the Registered Cost methodology, in which case the Scheduling Coordinator may elect to switch to the Proxy Cost methodology for the balance of any 30-day period, except as set forth in Section 30.4.1.2(b); or (b) any cost registered in the Master File exceeds the maximum limit specified in Section 39.6.1.6 or Section 39.6.1.7 after this minimum 30-day period, in which case the value will be lowered to the maximum limit specified in Section 39.6.1.6 or Section 39.6.1.7. If a Multi-Stage Generating Resource elects to use the Registered Cost methodology, that election will apply to all the MSG Configurations for that resource. The cap for the Registered Cost values for each MSG Configuration will be based on the Proxy Cost values calculated for each MSG Configuration, including for each MSG Configuration that cannot be directly started, which are also subject to the maximum limits specified in Sections 39.6.1.6 and 39.6.1.7.

(b) If the alternative natural gas price set forth in Section 39.7.1.1.1.3(b) is triggered, and a Use-Limited Resource's Start-Up Costs or Minimum Load Costs calculated pursuant to the Proxy Cost methodology using the alternative gas price exceeds the value registered in the Master File, then the CAISO will switch the Use-Limited Resource to the Proxy Cost methodology. Any Use-Limited Resource switched to the Proxy Cost methodology pursuant to this Section 30.4.1.2(b) will revert to the Registered Cost methodology when the Use-Limited Resource's alternative Proxy Cost calculation no longer exceeds the value registered using

the Registered Cost methodology. These determinations will be made separately for both Start-Up Costs and Minimum Load Costs. The CAISO will not make a separate determination for Transition Costs but if a Start-Up Cost is switched to the Proxy Cost methodology, the Transition Costs of the Use-Limited Resource will also be switched to the Proxy Cost methodology.

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30.5 Bidding Rules

30.5.1 General Bidding Rules

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(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 as registered in the Master File.

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(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 as registered in the Master File. This rule shall apply separately

to the Day-Ahead Market and the Real-Time Market.

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30.7.7 Format And Validation Of Operational Ramp Rates

The submitted Operational Ramp Rate expressed in megawatts per minute (MW/min) as a function of the operating level, expressed in megawatts (MW), must be a staircase function with up to four segments. There is no monotonicity requirement for the Operational Ramp Rate. The submitted Operational Ramp Rate shall be validated as follows:

(a) The range of the submitted Operational Ramp Rate must cover the entire capacity of the resource, from the minimum to the maximum operating capacity, as registered in the Master File for the relevant resource.

(b) The operating level entries must match exactly (in number, sequence, and value) the corresponding minimum and maximum Operational Ramp Rate breakpoints, as registered in the Master File for the relevant resource.

(c) If a Scheduling Coordinator does not submit an Operational Ramp Rate for a generating unit for a day, the CAISO shall use the maximum Ramp Rate for each operating range set forth in the Master File as the Ramp Rate for that unit for that same operating range for the Trading Day.

(d) The last Ramp Rate entry shall be equal to the previous Ramp Rate entry and represent the maximum operating capacity of the

resource as registered in the Master File. The resulting Operational Ramp Rate segments must lie between the minimum and maximum Operational Ramp Rates, as registered in the Master File.

(e) The submitted Operational Ramp Rate must be the same for each hour of the Trading Day, i.e., the Operational Ramp Rate submitted for a given Trading Hour must be the same with the one(s) submitted earlier for previous Trading Hours in the same Trading Day.

(f) Outages that affect the submitted Operational Ramp Rate must be due to physical constraints, reported in the CAISO's outage management system pursuant to Section 9 and are subject to CAISO approval. All approved changes to the submitted Operational Ramp Rate will be used in determination of Dispatch Instructions for the shorter period of the balance of the Trading Day or duration of reported Outage.

(g) Operational Ramp Rate derates in the CAISO's outage management system pursuant to Section 9 may be declared for any operational segment established in the Master File. Ramping capability through Forbidden Operating Regions are not affected by derates entered in the CAISO's outage management system pursuant to Section 9.

(h) The amount of change in Ramp Rates from one operating range to

a subsequent operating range must not exceed a 10 to 1 ratio, and any Ramp Rate change in excess will be adjusted to achieve the 10 to 1 ratio. This adjustment will also include the implicit ramp rate in the Forbidden Operating Region.

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

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30.7.10 Format And Validation Of Minimum Load Costs

30.7.10.1 In General

For a Generating Unit or a Resource-Specific System Resource, the submitted Minimum Load Cost expressed in dollars per hour ($/hr) is the cost incurred for operating the unit at Minimum Load as registered in the Master File. The submitted Minimum Load Cost must not be negative. In addition, if the Proxy Cost methodology pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Minimum Load Cost that must not be negative but may be less than or equal to one hundred twenty-five (125) percent of the Proxy Cost value. For a resource that is eligible and has elected to use the Registered Cost methodology pursuant to Section 30.4, any submitted Minimum Load Cost must be equal to the Minimum Load Cost as registered in the Master File.

30.7.10.2 Adjustments to Minimum Load Costs Due to Increases in Minimum Load

For Generating Units or Resource-Specific System Resources for which the responsible Scheduling Coordinator has temporarily increased their Minimum Load through the CAISO's outage management system as specified in Section 9.3.3, regardless of the election made pursuant to Section 30.4, the CAISO will add to the Minimum Load Costs submitted by the Scheduling Coordinator the cost of the incremental Minimum Load determined as the product of the resource's applicable Default Energy Bid and the corresponding MWs between the resource's original Minimum Load as registered in the Master File and the Minimum Load increased pursuant to Section 9.3.3. The CAISO will use the adjusted Minimum Load Cost in the clearing of the applicable CAISO Markets as well as for Settlement purposes as described in Section 11. For Multi-Stage Generating Resources, the adjustments to Minimum Load Cost will be made at the MSG Configuration level.

30.7.10.3 Participating Loads

For Participating Loads, the submitted Minimum Load Cost ($/hr) is the cost incurred while operating the resource at reduced consumption after receiving a Dispatch Instruction. The submitted Minimum Load Cost must not be negative.

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31.3 Integrated Forward Market

After the MPM and prior to RUC, the CAISO shall perform the IFM. The IFM (1) performs Unit Commitment and Congestion Management (2) clears mitigated or unmitigated Bids cleared in the MPM as well as Bids that were not cleared in the MPM process against bid-in Demand, taking into account transmission limits and honoring

technical and inter-temporal operating constraints, such as Minimum Run Times (3) and procures Ancillary Services to meet one hundred (100) percent of the CAISO Forecast of CAISO Demand requirements. The IFM utilizes a set of integrated programs that: (1) determine Day-Ahead Schedules and AS Awards, and related LMPs and ASMPs; and (2) optimally commits resources that are bid in to the DAM. The IFM utilizes a SCUC algorithm that optimizes Start-Up Costs, Minimum Load Costs as modified pursuant to Section 30.7.10.2, if applicable, Transition Costs, and Energy Bids along with any Bids for Ancillary Services as well as Self-Schedules submitted by Scheduling Coordinators. The IFM selects the optimal MSG Configuration from a maximum of ten MSG Configurations of each Multi-Stage Generating Resource as mutually exclusive resources. If a Scheduling Coordinator submits a Self-Schedule or a Submission to Self-Provide Ancillary Services for a given MSG Configuration in a given Trading Hour, the IFM will consider the Start-Up Cost, Minimum Load Cost as modified pursuant to Section 30.7.10.2, if applicable, and Transition Cost associated with any Economic Bids for other MSG Configurations as incremental costs between the other MSG Configurations and the self-scheduled MSG Configuration. In such cases, incremental costs are the additional costs incurred to transition or operate in an MSG Configuration in addition to the costs associated with the self-scheduled MSG Configuration. The IFM also provides for the optimal management of Use-Limited Resources. The ELS Resources committed through the ELC Process conducted two days before the day the IFM process is conducted for the next Trading Day as described in Section 31.7 are binding.

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31.3.1.2 Treatment of Ancillary Services Bids in IFM

As provided in Section 30.7.6.2 the CAISO shall co-optimize the Energy and Ancillary Services Bids in clearing the IFM. To the extent that capacity subject to an Ancillary Services Bid submitted in the Day-Ahead Market is not associated with an Energy Bid, there is no co-optimization, and therefore, no opportunity cost associated with that resource for that Bid for the purposes of calculating the Ancillary Services Marginal Price as specified in Section 27.1.2.2. When the capacity associated with the Energy Bid overlaps with the quantity submitted in the Ancillary Services Bid, then the Energy Bid will be used to determine the opportunity cost, if any, in the co-optimization to the extent of the overlap. Therefore, the capacity that will be considered when co-optimizing the procurement of Energy and Ancillary Services from Bids in the IFM will consider capacity up to the total capacity of the resource as reflected in the Ancillary Services Bid as derated through the CAISO's outage management system pursuant to Section 9, if at all. In the case of Regulation, the capacity that will be considered is the lower of the capacity of the resource offered in the Ancillary Services Bid or the upper Regulation limit of the highest Regulating Range as contained in the Master File. For any Trading Hour within the period in which the Multi-Stage Generating Resource is transitioning from one MSG Configuration to another, the IFM will not award Ancillary Services and any Submission to Self-Provide Ancillary Services will be disqualified. Any Ancillary Services Awards in the IFM to Multi-Stage Generating Resources will carry through to the Real-Time Market in the same MSG Configuration that the Multi-Stage Generating Resource is awarded in the IFM.

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31.4 CAISO Market Adjustments To Non-Priced Quantities In The IFM

All Self-Schedules are respected by SCUC to the maximum extent possible and are protected from curtailment in the Congestion Management process to the extent that there are Effective Economic Bids that can relieve Congestion. If all Effective Economic Bids in the IFM are exhausted, resource Self-Schedules between the resource's Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and the first Energy level of the first Energy Bid point will be subject to adjustments by the CAISO Market optimization based on the scheduling priorities listed below. This functionality of the optimization software is implemented through the setting of scheduling parameters as described in Section 27.4.3 and specified in Section 27.4.3.1 and the Business Practice Manuals. Through this process, imports and exports may be reduced to zero, Demand Bids may be reduced to zero, Price Taker Demand (LAP load) may be reduced, and Generation may be reduced to a lower operating limit (or Regulation Limit) (or to a lower Regulation Limit plus any qualified Regulation Down award or Self-Provided Ancillary Services, if applicable). Any Self-Schedules below the Minimum Load level are treated as fixed Self-Schedules and are not subject to these adjustments for Congestion Management. The provisions of this section shall apply only to the extent they do not conflict with any MSS Agreement. In accordance with Section 27.4.3.5, the resources submitted in valid TOR, ETC or Converted Rights Self-Schedules shall not be adjusted in the IFM in response to an insufficiency of Effective Economic Bids. Thus the adjustment sequence for the IFM from highest priority (last to be adjusted) to lowest priority (first to be adjusted), is as follows:

(a) Reliability Must Run (RMR) Generation pre-dispatch reduction;

(b) Day-Ahead TOR Self-Schedules reduction (balanced demand and supply reduction);

(c) Day-Ahead ETC and Converted Rights Self-Schedules reduction; different ETC priority levels will be observed based upon global ETC priorities provided to the CAISO by the Responsible PTOs;

(d) Internal Transmission Constraint relaxation for the IFM pursuant to Section 27.4.3.1;

(e) Other Self-Schedules of CAISO Demand reduction subject to Section 31.3.1.3, exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports, and Self-Schedules of exports at Scheduling Points explicitly sourced by non-Resource Adequacy Capacity;

(f) Self-Schedules of exports at Scheduling Points not explicitly sourced by non-Resource Adequacy Capacity, except those exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports as set forth in Section 31.4(d);

(g) Day-Ahead Regulatory Must-Run Generation and Regulatory Must-Take Generation reduction;

(h) Other Self-Schedules of Supply reduction.

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31.5.1.2 RUC Availability Bids

Scheduling Coordinators may only submit RUC Availability Bids for capacity (above the Minimum Load as registered in the Master File) for which they are also submitting an Energy Bid (other than a Virtual Bid) to participate in the IFM. Any available Resource Adequacy Capacity and CPM Capacity will be optimized at $0/MW in RUC. For Multi-Stage Generating Resources that fail to submit a $0/MW per hour for the Resource Adequacy Capacity, the CAISO will insert the $0/MW per hour for the resource's Resource Adequacy Capacity at the MSG Configuration level up to the minimum of the Resource Adequacy Capacity or the PMax of the MSG Configuration. Scheduling Coordinators may submit non-zero RUC Availability Bids for the portion of a resource's capacity that is not Resource Adequacy Capacity or CPM Capacity.

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34.11 Exceptional Dispatch

The CAISO may issue Exceptional Dispatches for the circumstances described in this Section 34.11, which may require the issuance of forced Shut-Downs, forced Start-Ups, or forced MSG Transitions and shall be consistent with Good Utility Practice. Dispatch Instructions issued pursuant to Exceptional Dispatches shall be entered manually by the CAISO Operator into the Day-Ahead or RTM optimization software so that they will be accounted for and included in the communication of Day-Ahead Schedules and Dispatch Instructions to Scheduling Coordinators. Exceptional Dispatches are not used to establish the LMP at the applicable PNode. The CAISO will record the circumstances that have led to the Exceptional Dispatch. When considering the

issuance of an Exceptional Dispatch to RA Capacity, the CAISO shall consider the effectiveness of the resource from which the capacity is being provided, along with Start-Up Costs, Transition Costs, and Minimum Load Costs, as adjusted pursuant to Section 30.7.10.2, if applicable, when issuing Exceptional Dispatches to commit a resource to operate at Minimum Load. When the CAISO issues Exceptional Dispatches for Energy to RA Capacity, the CAISO shall also consider Energy Bids, if available and as appropriate. Additionally, where the Exceptional Dispatch results in a CPM designation, the CAISO shall make CPM designations of Eligible Capacity for an Exceptional Dispatch by applying the criteria and procedures specified in Section 43A.4.

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34.13.2 Failure To Conform To Dispatch Instructions

In the event that, in carrying out the Dispatch Instruction, an unforeseen problem arises (relating to plant operations or equipment, personnel or the public safety), the recipient of the Dispatch Instruction must notify the CAISO or, in the case of a Generator, the relevant Scheduling Coordinator immediately. The relevant Scheduling Coordinator shall notify the CAISO of the problem immediately. If a resource is unavailable or incapable of responding to a Dispatch Instruction, or fails to respond to a Dispatch Instruction in accordance with its terms, the resource shall be considered to be non-conforming to the Dispatch Instruction unless the resource has notified the CAISO of an event that prevents it from performing its obligations within thirty (30) minutes of the onset of such event through a submission in the CAISO's outage management system pursuant to Section 9 log entry. Notification of non-compliance via the Automated Dispatch System (ADS) will not supplant nor serve as the official notification mechanism

to the CAISO. If the resource is considered to be non-conforming as described above, the Scheduling Coordinator for the resource concerned shall be subject to Uninstructed Imbalance Energy as specified in Section 11.5.2 and Uninstructed Deviation Penalties as specified in Section 11.23. This applies whether any Ancillary Services concerned are contracted or Self-Provided. For a Non-Dynamic System Resource Dispatch Instruction prior to the Trading Hour, the Scheduling Coordinator shall inform the CAISO of its ability to conform to a Dispatch Instruction via ADS. The Non-Dynamic System Resource has the option to accept, partially accept, or decline the Dispatch Instruction, but in any case must respond within the timeframe specified in a Business Practice Manual. The Non-Dynamic System Resource can change its response within the indicated timeframe. If a Non-Dynamic System Resource does not respond within the indicated timeframe, the Dispatch Instruction will be considered declined. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received at least forty (40) minutes prior to the Trading Hour will be subject to Uninstructed Deviation Penalties as specific in Section 11.23. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received less than forty (40) minutes prior to the Trading Hour will not be subject to Uninstructed Deviation Penalties. A Non-Dynamic System Resource that only partially accepts a Dispatch Instruction is subject to Uninstructed Deviation Penalties for the portion of the Dispatch Instruction that is declined.

When a resource demonstrates that it is not following Dispatch Instructions, the RTM will no longer assume that the resource will ramp from its current output level. The RTM assumes the resource to be "non-compliant" if it is deviating its five (5)-minute Ramping

capability for more than N intervals by a magnitude determined by the CAISO based on its determination that it is necessary to improve the calculation of the expected Imbalance Energy as further defined in the BPM. When a resource is identified as "non-compliant," RTM will set the Dispatch operating target for that resource equal to its actual output in the Market Clearing software such that the persistent error does not cause excessive AGC action and consequently require CAISO to take additional action to comply with reliability requirements. Such a resource will be considered to have returned to compliance when the resource's State Estimator or telemetry value (whichever is applicable) is within the above specified criteria. During the time when the resource is "non-compliant", the last applicable Dispatch target shall be communicated to the Scheduling Coordinator as the Dispatch operating target. The last applicable Dispatch target may be (i) the last Dispatch operating target within the current Trading Hour that was instructed prior to the resource becoming "non-compliant," or (ii) the Day-Ahead Schedule, or (iii) awarded Self-Schedule Hourly Block depending on whether the resource submitted a Bid and the length of time the resource was "non-compliant," or (iv) for a Dynamic System Resource or a Pseudo-Tie Generating Unit that is an Eligible Intermittent Resource, the most recently available telemetry for the actual output.

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34.17.2 Calculation Of Dispatch Operating Points After Instructions

The RTED process shall calculate Dispatch Operating Points as follows:

(a) After the RTUC issues a Start-Up Instruction, RTED moves the Dispatch Operating Point of a resource immediately from zero (0) MW to the applicable Minimum Load, as defined in the Master File or as modified

pursuant to Section 9.3.3, of a Generating Unit at the start of the Dispatch Interval pertaining to the Start-Up Instruction. The Dispatch Operating Point shall then be determined using the resource's applicable Operational Ramp Rate as further described in Sections 34.17.4, 34.17.5, and 34.17.6.

(b) After the RTUC issues a Shut-Down Instruction, RTED shall first ramp the Dispatch Operating Point down to the applicable Minimum Load, as defined in the Master File or as modified pursuant to Section 9.3.3, of a Generating Unit at the end of the Dispatch Interval pertaining to the Shut-Down Instruction, using the resource's applicable Operational Ramp Rate. The Dispatch Operating Point shall then be set immediately to zero (0) MW.

(c) After the RTUC issues a Transition Instruction: (1) for MSG Configurations where the operating ranges of the two MSG Configurations do not overlap, the RTD will move the Dispatch Operating Point of the resource immediately from the boundary of the “from” MSG Configuration to the boundary of the “to” MSG Configuration, as defined in the Master File or as modified via the CAISO’s outages reporting mechanism defined in Section 9, of a Multi-Stage Generating Resource; and (2) for MSG Configurations for which the operating ranges of the two MSG Configurations do overlap, RTD will move the Dispatch Operating Point of the resource within the overlapping operating range of the MSG Configuration until the MSG Transition is complete.

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39.6.1.6.1 Gas Price Component of Projected Proxy Cost

For natural gas-fired resources, the CAISO will calculate a gas price to be used in establishing maximum Start-Up Costs and Minimum Load Costs after the twenty-first day of each month and post it on the CAISO Website by the end of each calendar month. The price will be applicable for Scheduling Coordinators for natural gas-fired Use-Limited Resources electing to use the Registered Cost methodology until a new gas price is calculated and posted on the CAISO Website. The gas price will be calculated as follows:

(1) Daily closing prices for monthly natural gas futures contracts at Henry Hub for the next calendar month are averaged over the first twenty-one (21) days of the month, resulting in a single average for the next calendar month.

(2) Daily prices for futures contracts for basis swaps at identified California delivery points, are averaged over the first twenty-one (21) days of the month for the identified California delivery points as set forth in the Business Practice Manual.

(3) For each of the California delivery points, the average Henry Hub and basis swap prices are combined and will be used as the baseline gas price applicable for calculating the caps for Start-Up and Minimum Load Costs for Use-Limited Resources electing to use the Registered Cost methodology. The most geographically appropriate will apply to a particular resource.

(4) The applicable intra-state gas transportation charge as set forth in the Business Practice Manual will be added to the baseline gas price for each Use-Limited Resource that elects to use the Registered Cost methodology to create a final gas price for calculating the caps for Start-Up and Minimum Load Costs for each such resource.

For non-natural gas-fired resources, the Projected Proxy Costs for Start-Up Costs and Minimum Load Costs will be calculated using the information contained in the Master File used for calculating the Proxy Cost, as set forth in the Business Practice Manual.

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40.4.3 General Qualifications For Supplying Net Qualifying Capacity

Resource Adequacy Resources included in a Resource Adequacy Plan submitted by a Scheduling Coordinator on behalf of a Load Serving Entity serving Load in the CAISO Balancing Authority Area must:

(1) Be available for testing by the CAISO to validate Qualifying Capacity, which can be no less than a resource's PMin as registered in the Master File even if the resource's contractual Resource Adequacy Capacity is less than its PMin, and determine Net Qualifying Capacity for the next Resource Adequacy Compliance Year;

(2) Provide any information requested by the CAISO to apply the performance criteria to be adopted by the CAISO pursuant to Section 40.4.5;

(3) Submit Bids into the CAISO Markets as required by this CAISO Tariff;

(4) Be in compliance, as of the date that the CAISO performs any testing or otherwise determines Net Qualifying Capacity for the next Resource Adequacy Compliance Year, with the criteria for Qualifying Capacity established by the CPUC, relevant Local Regulatory Authority, or federal agency and provided to the CAISO; and

(5) Be subject to Sanctions for non-performance as specified in the CAISO Tariff; and

(6) For a resource with contractual Resource Adequacy Capacity less than PMin as registered in the Master File, make the PMin available to the CAISO for commitment or dispatch at PMin, subject to Section 11.8 provisions for Bid Cost Recovery, so that the resource's Resource Adequacy Capacity can be utilized as required by this CAISO Tariff.

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Appendix A
Master Definitions Supplement

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- Day-Ahead Self-Scheduled Energy

Day-Ahead Scheduled Energy above the Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and below the lower of the Day-Ahead Total Self-Schedule or the Day-Ahead Schedule. Day-Ahead Self-Scheduled

Energy is settled as described in Section 11.2.1.1, and, as indicated in Section 11.8.2.1.5, it is not included in BCR.

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- FMM Derate Energy

Extra-marginal FMM IIE, exclusive of FMM Minimum Load Energy, consumed due to PMax derates, that is consumed below the Day-Ahead Schedule and above the higher of the derated PMax or the FMM Schedule. FMM Derate Energy does not overlap with FMM Minimum Load Energy, FMM Exceptional Dispatch Energy, or FMM Optimal Energy, but it may overlap with Day-Ahead Scheduled Energy and MSS Load Following Energy. FMM Derate Energy is settled as described in Section 11.5.1, and it is not included in BCR as described in Section 11.8.4. FMM Derate Energy also includes Residual Imbalance Energy incurred due to the Ramping up towards or Ramping down from a Minimum Load rerated pursuant to Section 9.3.3 as specified in Section 11.5.5.

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- FMM Minimum Load Energy

FMM IIE produced due to the Minimum Load of a Generating Unit that is committed in the RUC or the FMM and does not have a Day-Ahead Schedule, or of a Constrained Output Generator (COG) that is committed in the IFM with a Day-Ahead Schedule below the Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. If the resource is committed in the FMM for Load following by an MSS Operator, the FMM Minimum Load Energy is accounted as MSS Load Following Energy instead. FMM Minimum Load Energy is FMM IIE above the Day-Ahead Schedule (or zero if there is no Day-Ahead Schedule of Energy) and equal to or

below the Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. FMM Minimum Load Energy does not overlap with any other Expected Energy type. FMM Minimum Load Energy is settled as described in Section 11.5.1, and it is included in BCR as described in Section 11.8.4.1.2. FMM IIE that is consumed when a resource that is scheduled in the DAM is shut down in the FMM is accounted as FMM Optimal Energy and not as FMM Minimum Load Energy.

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- Minimum Load

For a Generating Unit, the minimum sustained operating level at which it can operate at a continuous sustained level, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. For a Participating Load, the operating level at reduced consumption pursuant to a Dispatch Instruction. For a Proxy Demand Resource, the smallest discrete load reduction possible for the Proxy Demand Resource.

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- Minimum Load Costs

The costs a Generating Unit, Participating Load, Reliability Demand Response Resource, or Proxy Demand Resource incurs operating at Minimum Load, which in the case of Participating Load, Reliability Demand Response Resource, or Proxy Demand Resource may not be negative. Minimum Load Costs may be adjusted pursuant to Section 30.7.10.2, if applicable.

- Minimum Load Energy

The product of the relevant Minimum Load, as defined in the Master File, or if

applicable, as modified pursuant to Section 9.3.3, and the duration of the Settlement Interval. The CAISO will determine the Minimum Load Energy for Multi-Stage Generating Resources based on the applicable MSG Configuration.

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- PMin

Equivalent to Minimum Load.

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- RTD Derate Energy

Extra-marginal RTD IIE, exclusive of FMM IIE, Standard Ramping Energy, Ramping Energy Deviation, Residual Imbalance Energy, MSS Load Following Energy, and RTD Minimum Load Energy consumed due to PMax derates. RTD Derate Energy is consumed below the lower of the FMM Schedule or the Dispatch Operating Point and above the higher of the derated PMax or the Dispatch Operating Point. RTD Derate Energy does not overlap with FMM IIE, Standard Ramping Energy, Ramping Energy Deviation, Residual Imbalance Energy, RTD Minimum Load Energy, RTD Exceptional Dispatch Energy, or RTD Optimal Energy, but it may overlap with Day-Ahead Scheduled Energy and MSS Load Following Energy. RTD Derate Energy is settled as described in Section 11.5.1, and it is not included in BCR as described in Section 11.8.4. RTD Derate Energy also includes the Residual Imbalance Energy incurred due to the ramping up towards or ramping down from a Minimum Load rerated pursuant to Section 9.3.3 as specified in Section 11.5.5.

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- RTD Minimum Load Energy

RTD IIE, exclusive of Standard Ramping Energy, Ramping Energy Deviation, and Residual Imbalance Energy, produced due to the Minimum Load of a Generating Unit that is committed in the RUC or the RTM and does not have a Day-Ahead Schedule or a Constrained Output Generator (COG) that is committed in the IFM with a Day-Ahead Schedule below the Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. If the resource is committed in RTM for Load following by an MSS Operator, the RTD Minimum Load Energy is accounted as MSS Load Following Energy instead. RTD Minimum Load Energy is RTD IIE above the Day-Ahead Schedule (or zero if there is no Day-Ahead Schedule of Energy) and below the Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. RTD Minimum Load Energy does not overlap with any other Expected Energy type. RTD Minimum Load Energy is settled as described in Section 11.5.1, and it is included in BCR as described in Section 11.8.4.1.2. RTD IIE that is consumed when a resource that is scheduled in the DAM is shut down in the RTM is accounted as RTD Optimal Energy and not as RTD Minimum Load Energy.

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Appendix L Method To Assess Available Transfer Capability

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L.1.5 Transmission Reliability Margin (TRM) is an amount of transmission transfer capability reserved at a CAISO Intertie point that is necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change.

The CAISO uses TRM at Intertie points to account for the following NERC-approved components of uncertainty:

- Forecast uncertainty in transmission system topology, including forced or unplanned outages or maintenance outages.
- Allowances for parallel path (loop flow) impacts, including unscheduled loop flow.
- Allowances for simultaneous path interactions.

The CAISO establishes hourly TRM values for each of the applicable components of uncertainty prior to the Market Close of the RTM. The CAISO does not use TRM (i.e., TRM values for Intertie points are set at zero) during the beyond day-ahead and pre-schedule (i.e., planning) time frame identified in R.1.3.3 of NERC Reliability Standard MOD-008-1. A positive TRM value for a given hour is set only if one or more of the conditions set forth below exists for a particular Intertie point. Where none of these conditions exist, the TRM value for a given hour is set at zero.

The methodology the CAISO uses to establish each component of uncertainty is as follows:

The CAISO uses the transmission system topology component of uncertainty to address a potential ATC path limit reduction at an Intertie resulting from an emerging event, such as an approaching wildfire, that is expected to cause a derate of one or more transmission facilities comprising the ATC path. When the CAISO, based on existing circumstances, forecasts that such a derate is expected to occur, the CAISO may establish a TRM value for the affected ATC path in an amount up to, but no greater than, the amount of the expected derate.

The CAISO uses the parallel path component of uncertainty to address the impact of unscheduled flow (USF) over an ATC path that is expected, in the absence of the TRM, to result in curtailment of Intertie Schedules in Real Time as a result of the requirements established in WECC's applicable USF mitigation policies and procedures (WECC USF Policy). When the CAISO forecasts, based on currently observed USF conditions and projected scheduled flow for an upcoming Operating Hour(s), that in the absence of a TRM, scheduled flow will need to be curtailed in Real Time under the applicable WECC USF Policy, the CAISO may establish a TRM for the ATC path for the applicable hour(s) in an amount up to, but no greater than, the forecasted amount that is expected to be curtailed in Real Time pursuant to the WECC USF Policy.
The CAISO uses the simultaneous path interactions component of uncertainty to

address the impact that transmission flows on an ATC path located outside the CAISO's Balancing Authority Area may have on the transmission transfer capability of an ATC path located at an Intertie. In the event of such path interactions, the CAISO uses a TRM value to prevent the risk of a system operating limit violation in Real Time for the CAISO ATC path. The amount of the TRM value may be set at a level up to, but not greater than, the forecasted impact on the CAISO ATC path's capacity imposed by expected flow on the non-CAISO ATC path.

The CAISO uses the following databases or information systems, or their successors, in connection with establishing TRM values: the CAISO's outage management system pursuant to Section 9, Existing Transmission Contract Calculator (ETCC), PI, EMS, and CAS.

Attachment B – Marked Tariff Records

Tariff Amendment to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate of a Generating Resource's Minimum Operating Level for Operational Reasons

California Independent System Operator Corporation

March 23, 2016

Minimum Load (PMin) Rerate Tariff Language

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4.6.1 General Responsibilities

4.6.1.1 Operate Pursuant to Relevant Provisions of CAISO Tariff

Participating Generators shall operate, or cause their facilities to be operated, in accordance with the relevant provisions of this CAISO Tariff, including, but not limited to, the operating requirements for normal and emergency operating conditions specified in Section 7 and the requirements for the dispatch and testing of Ancillary Services specified in Section 8.

(i) Each Participating Generator shall immediately inform the CAISO, through its respective Scheduling Coordinator, of any change or potential change in the current status of any Generating Units that are under the Dispatch control of the CAISO. This will include, but not be limited to, any change in status of equipment that could affect the maximum output of a Generating Unit, the Mm~~m~~inimum L~~l~~oad of a Generating Unit, the ability of a Generating Unit to operate with automatic voltage regulation, operation of the PSSs (whether in or out of service), the availability of a Generating Unit governor, or a Generating Unit's ability to provide Ancillary Services as required. Each Participating Generator shall immediately report to the CAISO, through its Scheduling Coordinator, any actual or potential concerns or problems that it may have with respect to

Generating Unit direct digital control equipment, Generating Unit voltage control equipment, or any other equipment that may impact the reliable operation of the CAISO Controlled Grid.

(ii) In the event that a Participating Generator cannot meet its Generation schedule as specified in the Day-Ahead Schedule, or comply with a Dispatch Instruction, whether due to a Generating Unit trip or the loss of a piece of equipment causing a reduction in capacity or output, the Participating Generator shall notify the CAISO, through its Scheduling Coordinator, at once. If a Participating Generator will not be able to meet a time commitment or requires the cancellation of a Generating Unit Start-Up, it shall notify the CAISO, through its Scheduling Coordinator, at once.

(iii) In addition to complying with the other requirements of this Section 4.6.1.1 regarding the operation of its Generating Unit, a Participating Generator with a Pseudo-Tie of a Generating Unit to the CAISO Balancing Authority Area shall comply with the requirements of Section 1.2.1 and related provisions of the Pseudo-Tie Protocol in Appendix N.

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4.12.1 General Responsibilities

4.12.1.1 Operate Pursuant to Relevant Provisions of CAISO Tariff

Resource-Specific System Resource owners shall operate, or cause their facilities to be operated, in accordance with the relevant provisions of this CAISO Tariff, including but

not limited to the following.

(i) A Resource-Specific System Resource shall only be eligible for Bid Cost Recovery if the Resource-Specific System Resource has complied with a Start-Up Instruction or Dispatch Instruction issued by the CAISO as specified in Section 11.8.

(ii) In order to be eligible for Bid Cost Recovery pursuant to Sections 30.4 and 30.5.2.4, a Resource-Specific System Resource owner shall ensure that its Scheduling Coordinator makes an election for Start-Up Costs and Minimum Load Costs.

(iii) A Resource-Specific System Resource owner shall ensure that any Ancillary Services Bids submitted by its Scheduling Coordinator are submitted in accordance with Section 30.5.2.6.

(iv) Owners of Dynamic Resource-Specific System Resources that are Resource Adequacy Resources shall comply with additional availability requirements to the extent required by Section 40.6.5.1.

(v) Each Resource-Specific System Resource owner shall immediately inform the CAISO, through its respective Scheduling Coordinator and using the CAISO's outage management system as described in Section 9, of any change or potential change in the current status of any Resource-Specific System Resource that may affect a submitted Bid. This will include, but not be limited to, any change in status of equipment that could affect the maximum output of a Resource-Specific System Resource, the Minimum Load of a

Resource-Specific System Resource, or the ability of a Resource-Specific System Resource to provide Ancillary Services in accordance with its Bid.

(vi) In the event that a Resource-Specific System Resource owner cannot meet its Generation schedule as specified in the Day-Ahead Schedule, or comply with a Dispatch Instruction, whether due to a Resource-Specific System Resource trip or the loss of a piece of equipment causing a reduction in capacity or output, the Resource-Specific System Resource owner shall notify the CAISO, through its Scheduling Coordinator, at once. If a Resource-Specific System Resource owner will not be able to meet a time commitment or requires the cancellation of a Resource-Specific System Resource Start-Up, it shall notify the CAISO, through its Scheduling Coordinator, at once.

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7.7.15 System Operations In The Event Of A Market Disruption

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7.7.15.2 Removal of Bids, in the Event of a Market Disruption, to Prevent a Market Disruption, or to minimize the Extent of a Market Disruption

7.7.15.2.1 Objective Measures

In the event of a Market Disruption, to prevent a Market Disruption, or to minimize the extent of a Market Disruption, as provided in Section 7.7.15.1 (b), the CAISO may remove Bids, which as defined include Self-Schedules, from the relevant CAISO Market. The types of Bids that the CAISO may remove include those that have

previously caused a Market Disruption. These are Bids that are not feasible based on the misalignment of resource-specific conditions and physical constraints represented in the Master File, current outage information, and the Bid itself. For example, these include: (1) Bids that pass through the automated Bid validation rules but are invalid for other reasons not detectable by the automated Bid validation, including derates reflected in the CAISO's outage management system pursuant to Section 9~~SLIC~~; (2) Bids that are identified prior to the end of the CAISO Market run as causing a feasibility issue that prevents the CAISO Market run from clearing in the time allotted for the run, including R~~r~~amping rates in the CAISO's outage management system pursuant to Section 9~~SLIC~~ that result in infeasible generation Bids; and (3) multiple Bids that do not pose a problem for processing through the CAISO Market when considered individually, but may when submitted in combination with other Bids become infeasible and present an impediment to the successful completion of the CAISO Market.

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8.10.8.7 Rescission of Payments for Resource and Transmission Constraints

If the CAISO determines that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity is not available during the RTM as a result of a resource constraint, then payments for that capacity will be rescinded in accordance with Section 11.10 or, in the case of Self-Provided Ancillary Services capacity, that capacity will not be compensated at the user rate as described in Sections 11.10.2, 11.10.3 and 11.10.4.

If the CAISO determines that any Day-Ahead Market award for Ancillary Services

capacity or Self-Provided Ancillary Services capacity is not available during the RTM as a result of a Transmission Constraint, then payments for that capacity will not be rescinded, except as provided in section 11.10.9.1 for System Resources or, in the case of Self-Provided Ancillary Services capacity, that capacity will continue to be compensated at the user rate as described in Sections 11.10.2, 11.10.3 and 11.10.4. For purposes of applying this Section to Dynamic Resources or Pseudo-Tie resources, the CAISO shall treat a reduction in the Operating Transfer Capability at an Intertie between the Day-Ahead Market and RTM that is registered in ~~SLIC or any successor~~ CAISO's outage management system pursuant to Section 9 as a Transmission Constraint. For all other constraints that cause the CAISO to determine that any Day-Ahead Market award for Ancillary Services capacity or Self-Provided Ancillary Services capacity from Dynamic Resource or Pseudo-Tie resources is not available, the ISO shall treat these constraints as resource constraints.

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9.3.3 Request Submission and Information

The Operator or Scheduling Coordinator of facilities that comprise the CAISO Controlled Grid or of a Participating Generator, Participating Intermittent Resource, Generating Unit, System Unit, Physical Scheduling Plant, Proxy Demand Resource, Reliability Demand Response Resource, Non-Generation Resource, Participating Load, or other resource subject to the outage management requirements of Section 9, shall use the ISO's outage management system to –

(1) Submit all outage requests under Section 9.

(2) Provide the required information about the outage and work to be performed

using the nature of work categories described in the Business Practice Manual.

(3) For transmission outage requests, additionally provide structured and detailed outage modeling information at the facility level and/or the breaker/switch level. If the work to be performed will require a switch position to change during the outage period, the Operator or Scheduling Coordinator must submit a separate outage request for each configuration.

(4) For resource outage requests, additionally provide the required information for the resource at the aggregate project or plant level, and also at the individual unit level for a unit de-rate greater than 50 MW, and any limitations on the resource's availability to provide each type of ancillary service for which it is certified.

(5) Notify the CAISO of temporary changes in physical characteristics specified in the Master File, including the PMax, Minimum Load, and Ramping capability of the unit, due to changes in their actual physical characteristics. Changes in the physical characteristics related to Minimum Load shall only be for temporary increases in Minimum Load due to ambient temperature, outages of mechanical equipment, or environmental regulations.

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9.3.10 Forced Outages

9.3.10.1 Coordination of all Forced Outages (consistent with Sections 9.3.4 and 9.3.5.2.1) will be through the single point of contact between the Operator and the CAISO Control Center.

9.3.10.2 Each Participating TO shall report any change or potential change in equipment status of the Participating TO's transmission assets turned over to the control of the CAISO or in equipment that affects transmission assets turned over to the control of the CAISO immediately upon discovery to the CAISO (this will include line and station equipment, line protection, Remedial Action Schemes and communication problems, etc.). Each Participating TO shall also keep the CAISO immediately informed upon discovery as to any change or potential change in the Participating TO's transmission system that could affect the reliability of the CAISO Controlled Grid. This would include, but is not limited to, adverse weather conditions, fires, bomb threats, system failures, etc. To the extent possible, the CAISO shall reflect all transmission Outages in the Integrated Forward Market and Real-Time Market.

9.3.10.3 The following requirements apply to the advance reporting to the CAISO of anticipated and actual Forced Outages:

(a) Any Operator, upon identification of a situation likely to result in a Forced Outage within the next twenty-four (24) hours unless immediate corrective action is taken, where such action requires the removing from service or reducing the maximum output capability of a Generating Unit or a Resource-Specific System Resource by ten (10) MW or more from the value most recently recorded in ~~SLIC~~the CAISO's outage management system pursuant to Section 9, or removing a transmission facility from service, shall communicate directly with the CAISO Control Center.

(b) Notwithstanding Section 9.3.10.3(a), and unless otherwise exempted pursuant to the terms of a Business Practice Manual, the Operator of an Eligible Intermittent Resource with a PMax of greater than ten (10) MW for its entire generating facility, upon identification of a situation likely to result in a Forced Outage within the next twenty-four (24) hours unless immediate corrective action is taken, where such action requires the removing from service or reducing the maximum output capability of the Eligible Intermittent Resource generating facility by one (1) MW or more from the value most recently recorded in the CAISO's outage management system pursuant to Section 9~~SLIC~~, shall communicate directly with the CAISO Control Center. The failure of the Operator of the Eligible Intermittent Resource to report a Forced Outage between one (1) MW and ten (10) MW in accordance with this Section 9.3.10.3(b) shall be subject only to the provisions of Section 37.4.1.2(a) and (b)(1) of Section 37.4.1.2.

All notifications of Forced Outages shall be communicated to the CAISO Control Center with as much notice as possible in order that the necessary security analysis and CAISO Controlled Grid assessments may be performed. If prior notice of a Forced Outage cannot be given, the Operator shall notify the CAISO of the Forced Outage within thirty (30) minutes after it occurs. Any Operator, upon identification of a situation likely to result in a Forced Outage but of a nature not requiring a removal from service until some time more than twenty-four (24) hours in the future will be subject to the provisions of Section 9 with respect to any necessary Outage except the requirements

imposing time limits for notification will be waived and the request will be expedited by the CAISO provided notice is given as soon as possible.

9.3.10.3.1 The following requirements apply if prior notice of a Forced Outage cannot be given to the CAISO:

(a) The Operator of a Generating Unit or a Resource-Specific System Resource is required to notify the CAISO within sixty (60) minutes after discovering any change in the maximum output capability of at least ten (10) MW or five percent (5%) of the value registered in the Master File, whichever is greater, from the value registered in ~~SLIC~~ the CAISO's outage management system pursuant to Section 9 that lasts for fifteen (15) minutes or longer.

(b) Notwithstanding Section 9.3.10.3.1(a), and unless otherwise exempted pursuant to the terms of a Business Practice Manual, the Operator of an Eligible Intermittent Resource with a PMax of greater than ten (10) MW for its entire generating facility is required to notify the CAISO within sixty (60) minutes after discovering any change in the maximum output capability of the generating facility of at least one (1) MW from the value registered in ~~SLIC~~ the CAISO's outage management system pursuant to Section 9 that lasts for fifteen (15) minutes or longer. The failure of the Operator of the Eligible Intermittent Resource to report a Forced Outage between one (1) MW and ten (10) MW in accordance with this Section 9.3.10.3.1(b) shall

be subject only to the provisions of Section 37.4.1.2(a) and (b)(1) of Section 37.4.1.2.

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11.5.5 Settlement Amount For Residual Imbalance Energy

For each Settlement Interval, Residual Imbalance Energy settlement amounts shall be the product of the MWh of Residual Imbalance Energy for that Settlement Interval and the Bid, as mitigated pursuant to Section 39.7 that led to the Residual Imbalance Energy from the relevant Dispatch Interval in which the resource was dispatched, subject to additional rules specified in this section below and in Section 11.17. The relevant Dispatch Interval and Bid that led to the Residual Imbalance Energy may occur prior or subsequent to the interval in which the relevant Residual Imbalance Energy occurs and can be contiguous, or not, with the applicable Trading Hour in which the relevant Residual Imbalance Energy Settlement Interval occurs. For MSS Operators the Settlement for Residual Imbalance Energy is conducted in the same manner, regardless of any MSS elections (net/gross Settlement, Load following or opt-in/opt-out of RUC). When a Scheduling Coordinator increases the Minimum Load ~~amount for a resource~~ pursuant to Section 9.3.3, ~~through SLIC,~~ for the Settlement Interval(s) during which the affected resource is ramping up towards or ramping down from such a Minimum Load change, the Residual Imbalance Energy for the applicable Settlement Interval(s) will be re-classified as Derate Energy and will be paid at the applicable RTD Locational Marginal Price.

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11.8 Bid Cost Recovery

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11.8.2.1.1 IFM Start-Up Cost

The IFM Start-Up Cost for any IFM Commitment Period shall be equal to the Start-Up Costs submitted by the Scheduling Coordinator to the CAISO for the IFM divided by the number of Settlement Intervals within the applicable IFM Commitment Period. For each Settlement Interval, only the IFM Start-Up Cost in a CAISO IFM Commitment Period is eligible for Bid Cost Recovery. The CAISO will determine the IFM Start-Up Costs for Multi-Stage Generating Resources based on the CAISO-committed MSG Configuration. The following rules shall apply sequentially to qualify the IFM Start-Up Cost in an IFM Commitment Period:

(a) The IFM Start-Up Cost for an IFM Commitment Period shall be zero if there is an IFM Self-Commitment Period within or overlapping with that IFM Commitment Period.

(b) The IFM Start-Up Cost for an IFM Commitment Period shall be zero if 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 in the Day-Ahead Market anywhere within the applicable IFM Commitment Period.

(c) The IFM Start-Up Cost for an IFM Commitment Period shall be zero if there is no actual Start-Up at the start of the applicable IFM Commitment Period because the IFM Commitment Period is the

continuation of an IFM, RUC, or RTM Commitment Period from the previous Trading Day.

(d) If an IFM Start-Up is terminated in the Real-Time within the applicable IFM Commitment Period through an Exceptional Dispatch Shut-Down Instruction issued while the Bid Cost Recovery Eligible Resource was starting up, the IFM Start-Up Cost for that IFM Commitment Period shall be prorated by the ratio of the Start-Up Time before termination over the total IFM Start-Up Time.

(e) The IFM Start-Up Cost is qualified if an actual Start-Up occurs within the applicable IFM Commitment Period. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Intervals indicates the unit is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Intervals that fall within the CAISO IFM Commitment Period. The CAISO will determine whether the resource is On for this purpose based on whether the resource's metered Energy is at or above the resource's Minimum Load as registered in the Master File.

~~(f) The Minimum Load Energy is the product of the relevant Minimum Load and the duration of the Settlement Interval. The CAISO will determine the Minimum Load Energy for Multi-Stage Generating Resources based on the CAISO Commitment Period applicable MSG Configuration.~~

(~~g~~f) The IFM Start-Up Cost will be qualified if an actual Start-Up occurs earlier than the start of the IFM Commitment Period if the advance Start-Up is a result of a Start-Up instruction issued in a RUC or Real-Time Market process subsequent to the IFM, or the advance Start-Up is uninstructed but is still within the same Trading Day and the Bid Cost Recovery Eligible Resource actually stays on until the targeted IFM Start-Up.

(~~h~~g) The Start- Up Costs for a Bid Cost Recovery Eligible Resource that is a Short Start Unit committed by the CAISO in the IFM and that further receives a Start-Up Instruction from the CAISO in the Real-Time Market to start within the same CAISO IFM Commitment Period, will be qualified for the CAISO IFM Commitment Period instead of being qualified for the CAISO RTM Commitment Period; and Start-Up Costs for subsequent Start-Ups will be further qualified as specified in Section 11.8.4.1.1(h).

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, and as modified pursuant to Section 30.7.10.2, if applicable, divided by the number of Settlement Intervals in a Trading Hour subject to the rules described below.

(a) For each Settlement Interval, only the IFM Minimum Load Cost in a CAISO IFM Commitment Period is eligible for Bid Cost Recovery.

(b) 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; or (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.

(c) If the CAISO commits a Bid Cost Recovery Eligible Resource in the Day-Ahead and the resource receives a Day-Ahead Schedule and the CAISO subsequently de-commits the resource in the Real-Time Market, the IFM Minimum Load Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4.

(d) If a Multi-Stage Generating Resource is committed by the CAISO and receives a Day-Ahead Schedule and subsequently is committed by the CAISO to a lower MSG Configuration where its Minimum Load capacity as registered in the Master File in the Real-Time Market is lower than the CAISO IFM Commitment Period MSG Configuration's Minimum Load as registered in the Master File, the resource's IFM Minimum Load Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4.

(e) If the conditions in Sections 11.8.2.1.2 (c) and (d) do not apply, then the IFM Minimum Load Cost for any Settlement Interval is zero if the Bid Cost Recovery Eligible Resource is determined to be Off

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 its metered Energy in a Settlement Interval is equal to or greater than the difference between its Minimum Load and the Tolerance Band, and the Metered Energy is greater than zero (0) MWh. Otherwise, such resource is determined to be Off.

(f) For Multi-Stage Generating Resources, the commitment period is 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 IFM CAISO Committed MSG Configuration is determined to be On. If it is determined to be On, then, the IFM Minimum Load Costs will be based on the Minimum Load Costs of the IFM committed MSG Configuration. For the purposes of determining IFM Minimum Load Cost for a Multi-Stage Generating Resource, a Bid Cost Recovery Eligible Resource is determined to be On if its metered Energy in a Settlement Interval is equal to or greater than the difference between its IFM MSG Configuration Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and the Tolerance Band, and the Metered Energy is greater than zero (0) MWh. Otherwise, such resource is determined to be Off.

(g) The IFM Minimum Load Costs calculation is subject to the Shut-Down State Variable and is disqualified as specified in Section 11.17.2.

11.8.2.1.3 IFM Pump Shut-Down Cost

For Pumped-Storage Hydro Units and Participating Load only, the IFM Pump Shut-Down Costs for each Settlement Interval shall be equal to the relevant Pump Shut-Down Cost submitted to CAISO in the IFM divided by the number of Settlement Intervals in a Trading Hour that is preceded by a previous commitment by the IFM to pump, in which actual shut down occurs if the unit is committed by the IFM not to pump and actually does not operate in pumping mode in that Settlement Interval (as detected through Meter Data). The IFM Pump Shut-Down Cost for an IFM Shut-Down period shall be zero if: (1) it is followed by an IFM or RFM Self-Commitment Period in generation mode; (2) the Shut-Down is due to an Outage reported through the CAISO's outage management system as described in Section 9 ~~SLIC~~; or (3) the Shut-Down is delayed by the RTM past the IFM Shut-Down period in question or cancelled by the RTM before the Shut-Down process has started.

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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 used in the IFM, if any, from the higher of the ~~registered~~ Bid Cost Recovery Eligible Resource's Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, 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 calculations are subject to the application of the Day-Ahead Metered Energy Adjustment Factor, and the Persistent Deviation Metric pursuant to the rules specified in Section 11.8.2.5 and Section 11.17.2.3, respectively. In addition, if the CAISO commits a Bid Cost Recovery Eligible Resource in the Day-Ahead and receives a Day-Ahead Schedule and subsequently the CAISO de-commits the resource in the Real-Time Market, the IFM Energy Bid Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4. If the CAISO commits a Multi-Stage Generating Resource in the Day-Ahead Market and the resource receives a Day-Ahead Schedule and subsequently the CAISO de-commits the Multi-Stage Generating Resource to a lower MSG Configuration where its Minimum Load capacity as registered in the Master File in the Real-Time Market is lower than the CAISO IFM Commitment Period MSG Configuration's Minimum Load as registered in the Master File, the resource's IFM Energy Bid Costs are subject to the Real-Time Performance Metric for each case specified in Section 11.8.4.4. The CAISO will determine the IFM Energy Bid Cost for a Multi-Stage Generating Resource at the Generating Unit level.

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11.8.2.1.7 IFM Transition Cost

For each Settlement Interval, the IFM Transition Costs shall be based on the MSG Configuration to which the Multi-Stage Generating Resource is transitioning and is allocated to the CAISO Commitment Period of that MSG Configuration.

11.8.2.1.7.1 IFM Transition Costs Applicability

Within any eligible IFM CAISO Commitment Period determined pursuant to the rules specified in Section 11.8.1.3, the CAISO shall apply the IFM Transition Costs for the Settlement Intervals in which the Multi-Stage Generating Resource is actually transitioning from the "from" MSG Configuration and reaches the Minimum Load as registered in the Master File of the "to" MSG Configuration to which the Multi-Stage Generating Resource is transitioning, subject to the Tolerance Band.

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11.8.3.1 RUC Bid Cost Calculation

For each Settlement Interval, the CAISO shall determine the RUC Bid Cost for a Bid Cost Recovery Eligible Resource as the algebraic sum of the RUC Start-Up Cost, RUC Transition Cost, RUC Minimum Load Cost and RUC Availability Bid Cost. For Multi-Stage Generating Resources, in addition to the specific RUC Bid Cost rules described in Section 11.8.3.1, the rules described in Section 11.8.1.3 will be applied to further determine the applicable MSG Configuration-based CAISO Market Start-Up Cost, Transition Cost, and Minimum Load Cost, as modified pursuant to Section 30.7.10.2, if applicable, in any given Settlement Interval. For Multi-Stage Generating Resources, the incremental RUC Start-Up, Minimum Load Costs, and Transition Costs to provide RUC awarded capacity for an MSG Configuration other than the self-scheduled MSG Configuration are determined by the RUC optimization rules in specified in Section 31.5.

11.8.3.1.1 RUC Start-Up Cost

The RUC Start-Up Cost for any Settlement Interval in a RUC Commitment Period shall consist of Start-Up Cost of the Bid Cost Recovery Eligible Resource submitted to the CAISO for the applicable RUC Commitment Period divided by the number of Settlement Intervals in the applicable RUC Commitment Period. For each Settlement Interval, only the RUC Start-Up Cost in a CAISO RUC Commitment Period is eligible for Bid Cost Recovery. The CAISO will determine the RUC Start-Up Cost for a Multi-Stage Generating Resource based on the MSG Configuration committed by the CAISO in RUC.

The following rules shall be applied in sequence and shall qualify the RUC Start-Up Cost in a RUC Commitment Period:

(a) The RUC Start-Up Cost for a RUC Commitment Period is zero if there is an IFM Commitment Period within that RUC Commitment Period.

(b) The RUC Start-Up Cost for a RUC Commitment Period is zero if the Bid Cost Recovery Eligible Resource is manually pre-dispatched under an RMR Contract prior to the Day-Ahead Market or is flagged as an RMR Dispatch in the Day-Ahead Schedule anywhere within that RUC Commitment Period.

(c) The RUC Start-Up Cost for a RUC Commitment Period is zero if there is no RUC Start-Up at the start of that RUC Commitment Period because the RUC Commitment Period is the continuation of an IFM, RUC, or RTM Commitment Period from the previous

Trading Day.

(d) The RUC Start-Up Cost for a RUC Commitment Period is zero if the Start-Up is delayed beyond the RUC Commitment Period in question or cancelled by the Real-Time Market prior to the Bid Cost Recovery Eligible Resource starting its start-up process.

(e) If a RUC Start-Up is terminated in the Real-Time within the applicable RUC Commitment Period through an Exceptional Dispatch Shut-Down Instruction issued while the Bid Cost Recovery Eligible Resource is starting up the, RUC Start-Up Cost is prorated by the ratio of the Start-Up Time before termination over the RUC Start-Up Time.

(f) The RUC Start-Up Cost for a RUC Commitment Period is qualified if an actual Start-Up occurs within that RUC Commitment Period. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Intervals indicates that the resource is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Intervals that fall within the CAISO RUC Commitment Period. The CAISO will determine whether the resource is On for this purpose based on whether its metered Energy is at or above the resource's Minimum Load as registered in the Master File. ~~An actual Start-Up is detected between two consecutive Settlement Intervals when the relevant metered Energy in the applicable Settlement Intervals~~

~~increases from below the Minimum Load Energy and reaches or exceeds the relevant Minimum Load Energy. The Minimum Load Energy is the product of the relevant Minimum Load and the duration of the Settlement Interval. The CAISO will determine the Minimum Load Energy for Multi-Stage Generating Resources based on the CAISO-committed MSG Configuration.~~

(g) The RUC Start-Up Cost shall be qualified if an actual Start-Up occurs. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Intervals indicates the unit is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Intervals that fall within the CAISO RUC Commitment Period.

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, as adjusted pursuant to Section 30.7.10.2, if applicable, 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 committed or Dispatched in the Real-time Market 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 for a Bid Cost Recovery Eligible Resource recovery of the RUC Minimum Load Costs is subject to the Real-Time Performance Metric as specified in Section 11.8.4.4. For Multi-Stage Generating Resources, the commitment period is further determined based on application of section 11.8.1.3. The RUC Minimum Load Cost calculation will be subject to the Shut-Down State Variable and disqualified as specified in Section 11.17.2.

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11.8.3.1.4 RUC Transition Cost

For each Settlement Interval, the RUC Transition Costs shall be based on the MSG Configuration to which the Multi-Stage Generating Resource is transitioning and is allocated to the CAISO commitment period of that MSG Configuration.

11.8.3.1.4.1 RUC Transition Costs Applicability

Within any eligible RUC CAISO Commitment Period determined pursuant to the rules specified in Section 11.8.1.3, the CAISO shall apply the RUC Transition Costs for the Settlement Intervals in which the Multi-Stage Generating Resource is actually transitioning from the "from" MSG Configuration and reaches the Minimum Load as registered in the Master File of the "to" MSG Configuration to which the Multi-Stage Generating Resource is transitioning, subject to the Tolerance Band.

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11.8.4.1 RTM Bid Cost Calculation

For each Settlement Interval, the CAISO shall calculate RTM Bid Cost for each Bid Cost Recovery Eligible Resource, as the algebraic sum of the RTM Start-Up Cost, RTM

Minimum Load Cost, RTM Transition Cost, RTM Pump Shut-Down Cost, RTM Energy Bid Cost, RTM Pumping Cost and RTM AS Bid Cost. For Multi-Stage Generating Resources, in addition to the specific RTM Bid Cost rules described in Section 11.8.4.1, the rules described in Section 11.8.1.3 will be applied to further determine the applicable MSG Configuration-based CAISO Market Start-Up Cost, Transition Cost, and Minimum Load Cost, as modified pursuant to Section 30.7.10.2, if applicable, in given Settlement Interval. For Multi-Stage Generating Resources, the incremental RTM Start-Up Cost, Minimum Load Cost, as modified pursuant to Section 30.7.10.2, if applicable, and Transition Cost to provide RTM committed Energy or awarded Ancillary Services capacity for an MSG Configuration other than the self-scheduled MSG Configuration are determined by the RTM optimization rules in specified in Section 34.

11.8.4.1.1 RTM Start-Up Cost

For each Settlement Interval of the applicable Real-Time Market Commitment Period, the Real-Time Market Start-Up Cost shall consist of the Start-Up 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 the applicable Real-Time Market Commitment Period. For each Settlement Interval, only the Real-Time Market Start-Up Cost in a CAISO Real-Time Market Commitment Period is eligible for Bid Cost Recovery. The CAISO will determine the RTM Start-Up Cost for a Multi-Stage Generating Resource based on the MSG Configuration committed by the CAISO in RTM. The following rules shall be applied in sequence and shall qualify the Real-Time Market Start-Up Cost in a Real-Time Market Commitment Period:

(a) The Real-Time Market Start-Up Cost is zero if there is a Real-Time

Market Self-Commitment Period within the Real-Time Market Commitment Period.

(b) The Real-Time Market Start-Up Cost is zero if the Bid Cost Recovery Eligible Resource has been manually pre-dispatched under an RMR Contract or the resource is flagged as an RMR Dispatch in the Day-Ahead Schedule or Real-Time Market anywhere within that Real-Time Market Commitment Period.

(c) The Real-Time Market Start-Up Cost is zero if the Bid Cost Recovery Eligible Resource is started within the Real-Time Market Commitment Period pursuant to an Exceptional Dispatch issued in accordance with Section 34.9.2 to (1) perform Ancillary Services testing; (2) perform pre-commercial operation testing for Generating Units; or (3) perform PMax testing.

(d) The Real-Time Market Start-Up Cost is zero if there is no Real-Time Market Start-Up at the start of that Real-Time Market Commitment Period because the Real-Time Market Commitment Period is the continuation of an IFM or RUC Commitment Period from the previous Trading Day.

(e) If a Real-Time Market Start-Up is terminated in the Real-Time within the applicable Real-Time Market Commitment Period through an Exceptional Dispatch Shut-Down Instruction issued while the Bid Cost Recovery Eligible Resource is starting up the Real-Time Market Start-Up Cost is prorated by the ratio of the

Start-Up Time before termination over the Real-Time Market Start-Up Time.

(f) The Real-Time Market Start-Up Cost shall be qualified if an actual Start-Up occurs within that Real-Time Market Commitment Period. An actual Start-Up is detected when the relevant metered Energy in the applicable Settlement Interval(s) indicates the unit is Off before the time the resource is instructed to be On as specified in its Start Up Instruction and is On in the Settlement Interval that falls within the CAISO Real-Time Market Commitment Period. The CAISO will determine whether the resource is On for this purpose based on whether its metered Energy is at or above the resource's Minimum Load as registered in the Master File. The CAISO will determine that the Multi-Stage Generating Resource is On ~~when, based on its metered Energy, the resource has been detected to have delivered the Minimum Load Energy of~~based on the MSG Configuration that the CAISO has committed in the Real-Time Market. ~~The Minimum Load Energy is the product of the relevant Minimum Load and the duration of the Settlement Interval.~~

(g) The Real-Time Market Start-Up Cost for a Real-Time Market Commitment Period shall be qualified if an actual Start-Up occurs earlier than the start of the Real-Time Market Start-Up, if the relevant Start-Up is still within the same Trading Day and the Bid Cost Recovery Eligible Resource actually stays on until the Real-

Time Market Start-Up, otherwise the Start-Up Cost is zero for the Real-Time Market Commitment Period.

(h) For Short-Start Units, the first Start-Up Costs within a CAISO IFM Commitment Period are qualified IFM Start-Up Costs as described above in Section 11.8.2.1.1(h). For subsequent Start-Ups of Short-Start Units after the CAISO Shuts Down a resource and then the CAISO issues a Start-Up Instruction pursuant to a CAISO RTM Commitment within the CAISO IFM Commitment Period, the Start-Up Costs shall be qualified as Real-Time Start-Up costs, provided that the resource actually Shut-Down and Started-Up based on CAISO Shut-Down and Start-Up Instructions.

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, as adjusted pursuant to Section 30.7.10.2, if applicable, 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) for all resources that are not Multi-Stage Generating Resources, that Settlement Interval is

included in an IFM or RUC Commitment Period; or (4) 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. A resource's RTM Minimum Load Costs for Bid Cost Recovery purposes are subject to the application of the Real-Time Performance Metric as specified in Section 11.8.4.4. For Multi-Stage Generating Resources, the commitment period is further determined based on application of Section 11.8.1.3. For all Bid Cost Recovery Eligible Resources that the CAISO Shuts Down, either through an Exceptional Dispatch or an Economic Dispatch through the Real-Time Market, from its Day-Ahead Schedule that was also from a CAISO commitment, the RTM Minimum Load Costs will include negative Minimum Load Costs for Energy between the Minimum Load and zero (0) MWhs.

11.8.4.1.3 RTM Pump Shut-Down Cost

The RTM Pump Shut-Down Cost for each Settlement Interval is the relevant Pump Shut-Down Cost submitted by the Scheduling Coordinator only for Pumped-Storage Hydro Units and Participating Load, divided by the number of Settlement Intervals in which such resource was committed by the Real-Time Market in a Trading Hour with scheduled pumping operation and in which an actual Shut-Down occurs and the resource does not actually operate in pumping mode or serve Load in that Settlement Interval (as detected through Meter Data). The RTM Pump Shut-Down Cost for a Real-Time Market Shut-Down event shall be zero if: (1) it is followed by a RTM Self-Commitment Period in generation mode or offline mode; or (2) the Shut-Down is due to an Outage reported through the CAISO's outage management system as described in

Section 9~~SLIC~~.

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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, the Default Energy Bid price, or the Locational Marginal Price, if any, as further described in Section 11.17, for each Dispatch Interval in the Settlement Interval. For Settlement Intervals for which the Bid Cost Recovery Eligible Resource is ramping up to or down from a rerated Minimum Load that was increased pursuant to Section 9.3.3~~in SLIC~~ for the Real-Time Market, the RTM Energy incurred by the ramping will be classified as Derate Energy and will not be included in Bid Cost Recovery. For a Bid Cost Recovery Eligible Resource that is ramping up to or down from an Exceptional Dispatch, the relevant Energy Bid Cost related to the Energy caused by ramping will be settled on the same basis as the Energy Bid used in the Settlement of the Exceptional Dispatch that led to the ramping. The RTM Energy Bid Cost for a Bid Cost Recovery Eligible Resource, including Participating Loads and Proxy Demand Response Resources, for a Settlement Interval is subject to the Real-Time Performance Metric as described in Section 11.8.4.4 and the Persistent Deviation Metric as described in Section 11.17. Any Uninstructed Imbalance Energy in excess of Instructed Imbalance Energy is also not eligible for Bid Cost Recovery. For a Multi-

Stage Generating Resource the CAISO will determine the RTM Energy Bid Cost based on the Generating Unit level.

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11.8.4.1.7 RTM Transition Cost

For each Settlement Interval, the RTM Transition Costs shall be based on the MSG Configuration to which the Multi-Stage Generating Resource is transitioning and are allocated to the CAISO commitment period of that MSG Configuration.

11.8.4.1.7.1 RTM Transition Costs Applicability

Within any eligible RTM CAISO Commitment Period determined pursuant to the rules specified in Section 11.8.1.3, the CAISO shall apply the RTM Transition Costs for the Settlement Intervals in which the Multi-Stage Generating Resource is actually transitioning from the "from" MSG Configuration and reaches the Minimum Load as registered in the Master File of the "to" MSG Configuration to which the Multi-Stage Generating Resource is transitioning, subject to the Tolerance Band.

11.8.4.2 RTM Market Revenue Calculations

The RTM Market Revenue calculations are subject to the Real-Time Performance Metric and the Persistent Deviation Metric as described in Sections 11.8.4.4 and 11.17, respectively.

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 FMM or RTD Instructed Imbalance Energy (including ~~Energy from~~ Minimum Load Energy of the Bid Cost Recovery Eligible Resource committed in RUC and 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 FMM and RTD LMP, for each Dispatch Interval in the Settlement Interval.

(b) 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.

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

11.8.4.2.2 For each Settlement Interval in a non-CAISO Real-Time Market Commitment Period, the Real-Time Market Revenue for a Bid Cost Recovery Eligible Resource is subject to the Real-Time Performance Metric and is the algebraic sum of the following:

(a) The sum of the products of the FMM or RTD Instructed Imbalance Energy (excluding the ~~Energy from~~ Minimum Load Energy of Bid Cost Recovery Eligible Resources committed in RUC), 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 FMM or RTD Market LMP, for each Dispatch Interval in the Settlement Interval;

(b) 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.

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

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30.4.1 Start-Up and Minimum Load Costs

30.4.1.1 Proxy Cost Methodology

30.4.1.1.1 Natural Gas-Fired Resources

For each natural gas-fired resource, the Proxy Cost methodology uses formulas for Start-Up Costs and Minimum Load Costs based on the resource's actual unit-specific performance parameters. The Start-Up Cost and Minimum Load Cost values utilized for each such resource in the CAISO Markets Processes will be either (a), if the Scheduling Coordinator does not submit a Proxy Cost Bid, or (b) below:

(a) Formulaic natural gas cost values adjusted for fuel-cost variation on a daily basis using the natural gas price calculated pursuant to Section 39.7.1.1.1.3.

Start-Up Costs also include: (i) the cost of auxiliary power calculated using

the unit-specific MWh quantity of auxiliary power used for Start-Up multiplied by a resource-specific electricity price; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement per Start-Up, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource, multiplied by 0.5; and (iv) a resource-specific adder, if applicable, for major maintenance expenses ($ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement at Minimum Load as registered in the Master File, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of

the resource as registered in the Master File; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses ($ per operating hour) determined pursuant to Section 30.4.1.1.4.

(b) Bids specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10, subject to the provisions applicable to Multi-Stage Generating Resources set forth in Section 30.4.1.1.3.

In the event that the Scheduling Coordinator for a resource other than a Multi-Stage Generating Resource or for a Multi-Stage Generating Resource in its lowest startable configuration does not provide sufficient data for the CAISO to determine the resource's Start-Up or Minimum Load Costs or one or more components of the resource's Start-Up or Minimum Load Costs, the CAISO will assume that the resource's Start-Up Costs or Minimum Load Costs, or the indeterminable component(s) of the resource's Start-Up Costs or Minimum Load Costs, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest startable configuration, Section 30.4.1.1.3 applies.

30.4.1.1.2 Non-Natural Gas-Fired Resources

For each non-natural gas-fired resource, Start-Up Cost and Minimum Load Cost values under the Proxy Cost methodology shall be based on either (a) if the Scheduling Coordinator does not submit a Proxy Cost Bid, or (b) below:

(a) The relevant cost information of the particular resource, including fuel or fuel equivalent input costs, which will be provided to the CAISO by the Scheduling Coordinator and maintained in the Master File.

Start-Up Costs will also include: (i) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (ii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource as registered in the Master File, multiplied by 0.5; and (iii) a resource-specific adder, if applicable, for major maintenance expenses ($ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource as registered in the Master File; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses ($ per operating hour) determined by the CAISO or an Independent Entity selected by the CAISO.

For each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the information provided

to the CAISO by the Scheduling Coordinator must be consistent with information submitted to the California Air Resources Board. Adders for major maintenance expenses will be determined pursuant to Section 30.4.1.1.4.

(b) Bids specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10, subject to the provisions applicable to Multi-Stage Generating Resources set forth in Section 30.4.1.1.3.

In the event that the Scheduling Coordinator for a resource other than a Multi-Stage Generating Resource or for a Multi-Stage Generating Resource in its lowest startable configuration does not provide sufficient data for the CAISO to determine the resource's Start-Up or Minimum Load Costs or one or more components of the resource Start-Up or Minimum Load Costs, the CAISO will assume that resource's Start-Up or Minimum Load Costs, or the indeterminable component(s) of the resource's Start-Up Costs or Minimum Load Costs, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest startable configuration, Section 30.4.1.1.3 applies.

30.4.1.1.3 Multi-Stage Generating Resources

The Proxy Cost methodology for calculating Start-Up Costs and Minimum Load Costs will apply to all the MSG Configurations for a Multi-Stage Generating Resource that is not a Use-Limited Resource and for a Multi-Stage Generating Resource that is a Use-Limited Resource and elects to use the Proxy Cost methodology. The Proxy Costs (Start-Up Cost, Transition Cost, and Minimum Load Cost) for Multi-Stage Generating Resources will be calculated for each specific MSG Configuration, including for each

MSG Configuration that cannot be directly started. Notwithstanding the rules set forth in Sections 30.4.1.1.1(b) and 30.4.1.1.2(b), to the extent that a Scheduling Coordinator for a Multi-Stage Generating Resource, other than in its lowest startable configuration, does not provide sufficient data for the CAISO to determine a component of the Start-Up or Minimum Load Costs for a particular MSG Configuration, the CAISO will, if feasible, use the value for that component associated with the next-lowest MSG Configuration.

30.4.1.1.4 Adders for Major Maintenance Expenses

Scheduling Coordinators may propose adders for major maintenance expenses as a component of Start-Up Costs, Minimum Load Costs, or both. Such proposed adders must be based solely on resource-specific information derived from actual maintenance costs, when available, or estimated maintenance costs provided by the Scheduling Coordinators to the CAISO and the Independent Entity. Scheduling Coordinators may submit updated resource-specific major maintenance information for purposes of seeking a change to any major maintenance adder, no sooner than thirty (30) days after a major maintenance adder has been determined. The CAISO or Independent Entity will evaluate the information provided by Scheduling Coordinators, and may require Scheduling Coordinators to provide additional information, to enable the CAISO or Independent Entity to determine reasonable adders for major maintenance expenses or to conduct audits of major maintenance expenses. Within fifteen (15) days of receipt of the information or any requested additional information, the CAISO or Independent Entity will notify the Scheduling Coordinator in writing whether it has sufficient and accurate information to determine reasonable major maintenance adders to be included

in Start-Up or Minimum Load Cost calculations or both. Within ten (10) days after providing written notification to the Scheduling Coordinator that the information is sufficient and accurate, the CAISO or Independent Entity will determine the reasonable adder for major maintenance expenses to be included in Start-Up or Minimum Load Costs or both and will so inform the Scheduling Coordinator in writing.

In the event of a dispute regarding the sufficiency or accuracy of the information provided by the Scheduling Coordinator, the CAISO or Independent Entity and the Scheduling Coordinator will enter a period of good faith negotiations that terminates sixty (60) days after the date the dispute began. If the CAISO or Independent Entity and the Scheduling Coordinator resolve the dispute during the 60-day negotiation period, within ten (10) days of such agreement, the CAISO or Independent Entity will determine the reasonable adder for major maintenance expenses and will provide the adder to the Scheduling Coordinator in writing. If the CAISO or Independent Entity and the Scheduling Coordinator fail to agree upon the sufficiency or accuracy of the information during the 60-day negotiation period, the Scheduling Coordinator has the right to petition FERC to resolve the dispute as to the sufficiency or accuracy of its information.

In the event of a dispute regarding the CAISO's or Independent Entity's determination of adders for major maintenance expenses, the CAISO or Independent Entity and the Scheduling Coordinator will enter a period of good faith negotiations that terminates sixty (60) days after the date the dispute began. If the CAISO or Independent Entity

and the Scheduling Coordinator resolve the dispute during the 60-day negotiation period, the agreed-upon values will be effective as of the first Business Day following the resolution date. If the CAISO or Independent Entity and the Scheduling Coordinator fail to agree on the major maintenance values for either Start-Up or Minimum Load Costs following the 60-day negotiation period, the Scheduling Coordinator has the right to file proposed values and supporting information for major maintenance adders for Start-Up or Minimum Load Costs with FERC pursuant to Section 205 of the Federal Power Act.

In the event of a dispute regarding the reasonableness of the adder for major maintenance expenses determined by the CAISO or Independent Entity, but not a dispute regarding the sufficiency or accuracy of the information provided by the Scheduling Coordinator, the CAISO or Independent Entity will determine a reasonable interim adder for major maintenance expenses until the adder for major maintenance expenses is determined by agreement between the CAISO or Independent Entity and the Scheduling Coordinator or by FERC. Any subsequent agreement or FERC order determining the adder for major maintenance expenses will be reflected in an adjustment to the interim adder for major maintenance expenses in the next applicable Settlement Statement.

30.4.1.1.5 Proxy Transition Cost

For a Multi-Stage Generating Resource under the Proxy Cost methodology, the CAISO will calculate the Transition Costs utilized for each feasible transition from a given MSG Configuration to a higher MSG Configuration based on the difference between the Start-

Up Costs for the higher MSG Configuration, minus the Start-Up Costs for the lower MSG Configuration, as determined in accordance with the Start-Up Cost calculation methodology set forth in Section 30.4.1.1. If the result of this calculation is negative for any transition between two MSG Configurations, then the associated Transition Cost shall be zero. The Transition Costs calculated by the CAISO will be utilized in the CAISO Markets Processes unless the Scheduling Coordinator submits Transition Costs for the Multi-Stage Generating Resource in the form of daily Bids that are less than or equal to one hundred twenty-five (125) percent of the Transition Costs calculated by the CAISO and are not negative, in which case the Transition Costs submitted in the form of daily Bids will be utilized in the CAISO Markets Processes.

30.4.1.2 Registered Cost Methodology

(a) Under the Registered Cost methodology, the Scheduling Coordinator for a Use-Limited Resource may register values of its choosing for Start-Up Costs and/or Minimum Load Costs in the Master File subject to the maximum limit specified in Section 39.6.1.6. A Scheduling Coordinator for a Multi-Stage Generating Resource that is a Use-Limited Resource registering a Start-Up Cost must also register Transition Costs for each feasible MSG Transition, subject to the maximum limit specified in Section 39.6.1.7. For a Use-Limited Resource to be eligible for the Registered Cost methodology there must be sufficient information in the Master File to calculate the value pursuant to the Proxy Cost methodology, which will be used to validate the specific value registered using the Registered Cost methodology. Any such values will be fixed for a minimum of 30 days in the Master File unless: (a) the resource's costs for any such value, as calculated

pursuant to the Proxy Cost methodology, exceed the value registered using the Registered Cost methodology, in which case the Scheduling Coordinator may elect to switch to the Proxy Cost methodology for the balance of any 30-day period, except as set forth in Section 30.4.1.2(b); or (b) any cost registered in the Master File exceeds the maximum limit specified in Section 39.6.1.6 or Section 39.6.1.7 after this minimum 30-day period, in which case the value will be lowered to the maximum limit specified in Section 39.6.1.6 or Section 39.6.1.7. If a Multi-Stage Generating Resource elects to use the Registered Cost methodology, that election will apply to all the MSG Configurations for that resource. The cap for the Registered Cost values for each MSG Configuration will be based on the Proxy Cost values calculated for each MSG Configuration, including for each MSG Configuration that cannot be directly started, which are also subject to the maximum limits specified in Sections 39.6.1.6 and 39.6.1.7.

(b) If the alternative natural gas price set forth in Section 39.7.1.1.1.3(b) is triggered, and a Use-Limited Resource's Start-Up Costs or Minimum Load Costs calculated pursuant to the Proxy Cost methodology using the alternative gas price exceeds the value registered in the Master File, then the CAISO will switch the Use-Limited Resource to the Proxy Cost methodology. Any Use-Limited Resource switched to the Proxy Cost methodology pursuant to this Section 30.4.1.2(b) will revert to the Registered Cost methodology when the Use-Limited Resource's alternative Proxy Cost calculation no longer exceeds the value registered using the Registered Cost methodology. These determinations will be made separately for both Start-Up Costs and Minimum Load Costs. The CAISO will

not make a separate determination for Transition Costs but if a Start-Up Cost is switched to the Proxy Cost methodology, the Transition Costs of the Use-Limited Resource will also be switched to the Proxy Cost methodology.

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30.5 Bidding Rules

30.5.1 General Bidding Rules

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(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 as registered in the Master File.

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(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 as registered in the Master File. This rule shall apply separately

to the Day-Ahead Market and the Real-Time Market.

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30.7.7 Format And Validation Of Operational Ramp Rates

The submitted Operational Ramp Rate expressed in megawatts per minute (MW/min) as a function of the operating level, expressed in megawatts (MW), must be a staircase function with up to four segments. There is no monotonicity requirement for the Operational Ramp Rate. The submitted Operational Ramp Rate shall be validated as follows:

(a) The range of the submitted Operational Ramp Rate must cover the entire capacity of the resource, from the minimum to the maximum operating capacity, as registered in the Master File for the relevant resource.

(b) The operating level entries must match exactly (in number, sequence, and value) the corresponding minimum and maximum Operational Ramp Rate breakpoints, as registered in the Master File for the relevant resource.

(c) If a Scheduling Coordinator does not submit an Operational Ramp Rate for a generating unit for a day, the CAISO shall use the maximum Ramp Rate for each operating range set forth in the Master File as the Ramp Rate for that unit for that same operating range for the Trading Day.

(d) The last Ramp Rate entry shall be equal to the previous Ramp Rate entry and represent the maximum operating capacity of the

resource as registered in the Master File. The resulting Operational Ramp Rate segments must lie between the minimum and maximum Operational Ramp Rates, as registered in the Master File.

(e) The submitted Operational Ramp Rate must be the same for each hour of the Trading Day, i.e., the Operational Ramp Rate submitted for a given Trading Hour must be the same with the one(s) submitted earlier for previous Trading Hours in the same Trading Day.

(f) Outages that affect the submitted Operational Ramp Rate must be due to physical constraints, reported in the CAISO's outage management system pursuant to Section 9~~SLIC~~ and are subject to CAISO approval. All approved changes to the submitted Operational Ramp Rate will be used in determination of Dispatch Instructions for the shorter period of the balance of the Trading Day or duration of reported Outage.

(g) Operational Ramp Rate derates in the CAISO's outage management system pursuant to Section 9~~SLIC~~ may be declared for any operational segment established in the Master File. Ramping capability through Forbidden Operating Regions are not affected by derates entered in the CAISO's outage management system pursuant to Section 9~~SLIC~~.

(h) The amount of change in Ramp Rates from one operating range to

a subsequent operating range must not exceed a 10 to 1 ratio, and any Ramp Rate change in excess will be adjusted to achieve the 10 to 1 ratio. This adjustment will also include the implicit ramp rate in the Forbidden Operating Region.

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

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30.7.10 Format And Validation Of Minimum Load Costs

30.7.10.1 In General

For a Generating Unit or a Resource-Specific System Resource, the submitted Minimum Load Cost expressed in dollars per hour ($/hr) is the cost incurred for operating the unit at Minimum Load as registered in the Master File. The submitted Minimum Load Cost must not be negative. In addition, if the Proxy Cost methodology pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Minimum Load Cost that must not be negative but may be less than or equal to one hundred twenty-five (125) percent of the Proxy Cost value. For a resource that is eligible and has elected to use the Registered Cost methodology pursuant to Section 30.4, any submitted Minimum Load Cost must be equal to the Minimum Load Cost as registered in the Master File.

30.7.10.2 Adjustments to Minimum Load Costs Due to Increases in Minimum Load

For Generating Units or Resource-Specific System Resources for which the responsible Scheduling Coordinator has temporarily increased their Minimum Load through the CAISO's outage management system as specified in Section 9.3.3, regardless of the election made pursuant to Section 30.4, the CAISO will add to the Minimum Load Costs submitted by the Scheduling Coordinator the cost of the incremental Minimum Load determined as the product of the resource's applicable Default Energy Bid and the corresponding MWs between the resource's original Minimum Load as registered in the Master File and the Minimum Load increased pursuant to Section 9.3.3. The CAISO will use the adjusted Minimum Load Cost in the clearing of the applicable CAISO Markets as well as for Settlement purposes as described in Section 11. For Multi-Stage Generating Resources, the adjustments to Minimum Load Cost will be made at the MSG Configuration level.

30.7.10.3 Participating Loads

For Participating Loads, the submitted Minimum Load Cost ($/hr) is the cost incurred while operating the resource at reduced consumption after receiving a Dispatch Instruction. The submitted Minimum Load Cost must not be negative.

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31.3 Integrated Forward Market

After the MPM and prior to RUC, the CAISO shall perform the IFM. The IFM (1) performs Unit Commitment and Congestion Management (2) clears mitigated or unmitigated Bids cleared in the MPM as well as Bids that were not cleared in the MPM process against bid-in Demand, taking into account transmission limits and honoring

technical and inter-temporal operating constraints, such as Minimum Run Times (3) and procures Ancillary Services to meet one hundred (100) percent of the CAISO Forecast of CAISO Demand requirements. The IFM utilizes a set of integrated programs that: (1) determine Day-Ahead Schedules and AS Awards, and related LMPs and ASMPs; and (2) optimally commits resources that are bid in to the DAM. The IFM utilizes a SCUC algorithm that optimizes Start-Up Costs, Minimum Load Costs as modified pursuant to Section 30.7.10.2, if applicable, Transition Costs, and Energy Bids along with any Bids for Ancillary Services as well as Self-Schedules submitted by Scheduling Coordinators. The IFM selects the optimal MSG Configuration from a maximum of ten MSG Configurations of each Multi-Stage Generating Resource as mutually exclusive resources. If a Scheduling Coordinator submits a Self-Schedule or a Submission to Self-Provide Ancillary Services for a given MSG Configuration in a given Trading Hour, the IFM will consider the Start-Up Cost, Minimum Load Cost as modified pursuant to Section 30.7.10.2, if applicable, and Transition Cost associated with any Economic Bids for other MSG Configurations as incremental costs between the other MSG Configurations and the self-scheduled MSG Configuration. In such cases, incremental costs are the additional costs incurred to transition or operate in an MSG Configuration in addition to the costs associated with the self-scheduled MSG Configuration. The IFM also provides for the optimal management of Use-Limited Resources. The ELS Resources committed through the ELC Process conducted two days before the day the IFM process is conducted for the next Trading Day as described in Section 31.7 are binding.

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31.3.1.2 Treatment of Ancillary Services Bids in IFM

As provided in Section 30.7.6.2 the CAISO shall co-optimize the Energy and Ancillary Services Bids in clearing the IFM. To the extent that capacity subject to an Ancillary Services Bid submitted in the Day-Ahead Market is not associated with an Energy Bid, there is no co-optimization, and therefore, no opportunity cost associated with that resource for that Bid for the purposes of calculating the Ancillary Services Marginal Price as specified in Section 27.1.2.2. When the capacity associated with the Energy Bid overlaps with the quantity submitted in the Ancillary Services Bid, then the Energy Bid will be used to determine the opportunity cost, if any, in the co-optimization to the extent of the overlap. Therefore, the capacity that will be considered when co-optimizing the procurement of Energy and Ancillary Services from Bids in the IFM will consider capacity up to the total capacity of the resource as reflected in the Ancillary Services Bid as derated through the CAISO's outage management system pursuant to Section 9~~SLIC~~, if at all. In the case of Regulation, the capacity that will be considered is the lower of the capacity of the resource offered in the Ancillary Services Bid or the upper Regulation limit of the highest Regulating Range as contained in the Master File. For any Trading Hour within the period in which the Multi-Stage Generating Resource is transitioning from one MSG Configuration to another, the IFM will not award Ancillary Services and any Submission to Self-Provide Ancillary Services will be disqualified. Any Ancillary Services Awards in the IFM to Multi-Stage Generating Resources will carry through to the Real-Time Market in the same MSG Configuration that the Multi-Stage Generating Resource is awarded in the IFM.

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31.4 CAISO Market Adjustments To Non-Priced Quantities In The IFM

All Self-Schedules are respected by SCUC to the maximum extent possible and are protected from curtailment in the Congestion Management process to the extent that there are Effective Economic Bids that can relieve Congestion. If all Effective Economic Bids in the IFM are exhausted, resource Self-Schedules between the resource's Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and the first Energy level of the first Energy Bid point will be subject to adjustments by the CAISO Market optimization based on the scheduling priorities listed below. This functionality of the optimization software is implemented through the setting of scheduling parameters as described in Section 27.4.3 and specified in Section 27.4.3.1 and the Business Practice Manuals. Through this process, imports and exports may be reduced to zero, Demand Bids may be reduced to zero, Price Taker Demand (LAP load) may be reduced, and Generation may be reduced to a lower operating limit (or Regulation Limit) (or to a lower Regulation Limit plus any qualified Regulation Down award or Self-Provided Ancillary Services, if applicable). Any Self-Schedules below the Minimum Load level are treated as fixed Self-Schedules and are not subject to these adjustments for Congestion Management. The provisions of this section shall apply only to the extent they do not conflict with any MSS Agreement. In accordance with Section 27.4.3.5, the resources submitted in valid TOR, ETC or Converted Rights Self-Schedules shall not be adjusted in the IFM in response to an insufficiency of Effective Economic Bids. Thus the adjustment sequence for the IFM from highest priority (last to be adjusted) to lowest priority (first to be adjusted), is as follows:

(a) Reliability Must Run (RMR) Generation pre-dispatch reduction;

(b) Day-Ahead TOR Self-Schedules reduction (balanced demand and supply reduction);

(c) Day-Ahead ETC and Converted Rights Self-Schedules reduction; different ETC priority levels will be observed based upon global ETC priorities provided to the CAISO by the Responsible PTOs;

(d) Internal Transmission Constraint relaxation for the IFM pursuant to Section 27.4.3.1;

(e) Other Self-Schedules of CAISO Demand reduction subject to Section 31.3.1.3, exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports, and Self-Schedules of exports at Scheduling Points explicitly sourced by non-Resource Adequacy Capacity;

(f) Self-Schedules of exports at Scheduling Points not explicitly sourced by non-Resource Adequacy Capacity, except those exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports as set forth in Section 31.4(d);

(g) Day-Ahead Regulatory Must-Run Generation and Regulatory Must-Take Generation reduction;

(h) Other Self-Schedules of Supply reduction.

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31.5.1.2 RUC Availability Bids

Scheduling Coordinators may only submit RUC Availability Bids for capacity (above the Minimum Load as registered in the Master File) for which they are also submitting an Energy Bid (other than a Virtual Bid) to participate in the IFM. Any available Resource Adequacy Capacity and CPM Capacity will be optimized at $0/MW in RUC. For Multi-Stage Generating Resources that fail to submit a $0/MW per hour for the Resource Adequacy Capacity, the CAISO will insert the $0/MW per hour for the resource's Resource Adequacy Capacity at the MSG Configuration level up to the minimum of the Resource Adequacy Capacity or the PMax of the MSG Configuration. Scheduling Coordinators may submit non-zero RUC Availability Bids for the portion of a resource's capacity that is not Resource Adequacy Capacity or CPM Capacity.

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34.11 Exceptional Dispatch

The CAISO may issue Exceptional Dispatches for the circumstances described in this Section 34.11, which may require the issuance of forced Shut-Downs, forced Start-Ups, or forced MSG Transitions and shall be consistent with Good Utility Practice. Dispatch Instructions issued pursuant to Exceptional Dispatches shall be entered manually by the CAISO Operator into the Day-Ahead or RTM optimization software so that they will be accounted for and included in the communication of Day-Ahead Schedules and Dispatch Instructions to Scheduling Coordinators. Exceptional Dispatches are not used to establish the LMP at the applicable PNode. The CAISO will record the circumstances that have led to the Exceptional Dispatch. When considering the

issuance of an Exceptional Dispatch to RA Capacity, the CAISO shall consider the effectiveness of the resource from which the capacity is being provided, along with Start-Up Costs, Transition Costs, and Minimum Load Costs, as adjusted pursuant to Section 30.7.10.2, if applicable, when issuing Exceptional Dispatches to commit a resource to operate at Minimum Load. When the CAISO issues Exceptional Dispatches for Energy to RA Capacity, the CAISO shall also consider Energy Bids, if available and as appropriate. Additionally, where the Exceptional Dispatch results in a CPM designation, the CAISO shall make CPM designations of Eligible Capacity for an Exceptional Dispatch by applying the criteria and procedures specified in Section 43A.4.

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34.13.2 Failure To Conform To Dispatch Instructions

In the event that, in carrying out the Dispatch Instruction, an unforeseen problem arises (relating to plant operations or equipment, personnel or the public safety), the recipient of the Dispatch Instruction must notify the CAISO or, in the case of a Generator, the relevant Scheduling Coordinator immediately. The relevant Scheduling Coordinator shall notify the CAISO of the problem immediately. If a resource is unavailable or incapable of responding to a Dispatch Instruction, or fails to respond to a Dispatch Instruction in accordance with its terms, the resource shall be considered to be non-conforming to the Dispatch Instruction unless the resource has notified the CAISO of an event that prevents it from performing its obligations within thirty (30) minutes of the onset of such event through a submission in the CAISO's outage management system pursuant to Section 9 ~~SLIC~~ log entry. Notification of non-compliance via the Automated Dispatch System (ADS) will not supplant nor serve as the official notification mechanism

to the CAISO. If the resource is considered to be non-conforming as described above, the Scheduling Coordinator for the resource concerned shall be subject to Uninstructed Imbalance Energy as specified in Section 11.5.2 and Uninstructed Deviation Penalties as specified in Section 11.23. This applies whether any Ancillary Services concerned are contracted or Self-Provided. For a Non-Dynamic System Resource Dispatch Instruction prior to the Trading Hour, the Scheduling Coordinator shall inform the CAISO of its ability to conform to a Dispatch Instruction via ADS. The Non-Dynamic System Resource has the option to accept, partially accept, or decline the Dispatch Instruction, but in any case must respond within the timeframe specified in a Business Practice Manual. The Non-Dynamic System Resource can change its response within the indicated timeframe. If a Non-Dynamic System Resource does not respond within the indicated timeframe, the Dispatch Instruction will be considered declined. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received at least forty (40) minutes prior to the Trading Hour will be subject to Uninstructed Deviation Penalties as specific in Section 11.23. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received less than forty (40) minutes prior to the Trading Hour will not be subject to Uninstructed Deviation Penalties. A Non-Dynamic System Resource that only partially accepts a Dispatch Instruction is subject to Uninstructed Deviation Penalties for the portion of the Dispatch Instruction that is declined.

When a resource demonstrates that it is not following Dispatch Instructions, the RTM will no longer assume that the resource will ramp from its current output level. The RTM assumes the resource to be "non-compliant" if it is deviating its five (5)-minute Ramping

capability for more than N intervals by a magnitude determined by the CAISO based on its determination that it is necessary to improve the calculation of the expected Imbalance Energy as further defined in the BPM. When a resource is identified as "non-compliant," RTM will set the Dispatch operating target for that resource equal to its actual output in the Market Clearing software such that the persistent error does not cause excessive AGC action and consequently require CAISO to take additional action to comply with reliability requirements. Such a resource will be considered to have returned to compliance when the resource's State Estimator or telemetry value (whichever is applicable) is within the above specified criteria. During the time when the resource is "non-compliant", the last applicable Dispatch target shall be communicated to the Scheduling Coordinator as the Dispatch operating target. The last applicable Dispatch target may be (i) the last Dispatch operating target within the current Trading Hour that was instructed prior to the resource becoming "non-compliant," or (ii) the Day-Ahead Schedule, or (iii) awarded Self-Schedule Hourly Block depending on whether the resource submitted a Bid and the length of time the resource was "non-compliant," or (iv) for a Dynamic System Resource or a Pseudo-Tie Generating Unit that is an Eligible Intermittent Resource, the most recently available telemetry for the actual output.

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34.17.2 Calculation Of Dispatch Operating Points After Instructions

The RTED process shall calculate Dispatch Operating Points as follows:

(a) After the RTUC issues a Start-Up Instruction, RTED moves the Dispatch Operating Point of a resource immediately from zero (0) MW to the applicable Minimum Load~~PMin~~, as defined in the Master File or as

modified pursuant to Section 9.3.3~~via SLIC~~, of a Generating Unit at the start of the Dispatch Interval pertaining to the Start-Up Instruction. The Dispatch Operating Point shall then be determined using the resource's applicable Operational Ramp Rate as further described in Sections 34.17.4, 34.17.5, and 34.17.6.

(b) After the RTUC issues a Shut-Down Instruction, RTED shall first ramp the Dispatch Operating Point down to the applicable Minimum Load ~~PMin~~, as defined in the Master File or as modified pursuant to Section 9.3.3~~via SLIC~~, of a Generating Unit at the end of the Dispatch Interval pertaining to the Shut-Down Instruction, using the resource's applicable Operational Ramp Rate. The Dispatch Operating Point shall then be set immediately to zero (0) MW.

(c) After the RTUC issues a Transition Instruction: (1) for MSG Configurations where the operating ranges of the two MSG Configurations do not overlap, the RTD will move the Dispatch Operating Point of the resource immediately from the boundary of the “from” MSG Configuration to the boundary of the “to” MSG Configuration, as defined in the Master File or as modified via the CAISO’s outages reporting mechanism defined in Section 9, of a Multi-Stage Generating Resource; and (2) for MSG Configurations for which the operating ranges of the two MSG Configurations do overlap, RTD will move the Dispatch Operating Point of the resource within the overlapping operating range of the MSG Configuration until the MSG Transition is complete.

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39.6.1.6.1 Gas Price Component of Projected Proxy Cost

For natural gas-fired resources, the CAISO will calculate a gas price to be used in establishing maximum Start-Up Costs and Minimum Load Costs after the twenty-first day of each month and post it on the CAISO Website by the end of each calendar month. The price will be applicable for Scheduling Coordinators for natural gas-fired Use-Limited Resources electing to use the Registered Cost methodology until a new gas price is calculated and posted on the CAISO Website. The gas price will be calculated as follows:

(1) Daily closing prices for monthly natural gas futures contracts at Henry Hub for the next calendar month are averaged over the first twenty-one (21) days of the month, resulting in a single average for the next calendar month.

(2) Daily prices for futures contracts for basis swaps at identified California delivery points, are averaged over the first twenty-one (21) days of the month for the identified California delivery points as set forth in the Business Practice Manual.

(3) For each of the California delivery points, the average Henry Hub and basis swap prices are combined and will be used as the baseline gas price applicable for calculating the caps for Start-Up and Minimum Load C~~c~~osts for Use-Limited Resources electing to use the Registered Cost methodology. The most geographically appropriate will apply to a particular resource.

(4) The applicable intra-state gas transportation charge as set forth in the Business Practice Manual will be added to the baseline gas price for each Use-Limited Resource that elects to use the Registered Cost methodology to create a final gas price for calculating the caps for Start-Up and Minimum Load Costs for each such resource.

For non-natural gas-fired resources, the Projected Proxy Costs for Start-Up Costs and Minimum Load Costs will be calculated using the information contained in the Master File used for calculating the Proxy Cost, as set forth in the Business Practice Manual.

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40.4.3 General Qualifications For Supplying Net Qualifying Capacity

Resource Adequacy Resources included in a Resource Adequacy Plan submitted by a Scheduling Coordinator on behalf of a Load Serving Entity serving Load in the CAISO Balancing Authority Area must:

(1) Be available for testing by the CAISO to validate Qualifying Capacity, which can be no less than a resource's PMin as registered in the Master File even if the resource's contractual Resource Adequacy Capacity is less than its PMin, and determine Net Qualifying Capacity for the next Resource Adequacy Compliance Year;

(2) Provide any information requested by the CAISO to apply the performance criteria to be adopted by the CAISO pursuant to Section 40.4.5;

(3) Submit Bids into the CAISO Markets as required by this CAISO Tariff;

(4) Be in compliance, as of the date that the CAISO performs any testing or otherwise determines Net Qualifying Capacity for the next Resource Adequacy Compliance Year, with the criteria for Qualifying Capacity established by the CPUC, relevant Local Regulatory Authority, or federal agency and provided to the CAISO; and

(5) Be subject to Sanctions for non-performance as specified in the CAISO Tariff; and

(6) For a resource with contractual Resource Adequacy Capacity less than PMin as registered in the Master File, make the PMin available to the CAISO for commitment or dispatch at PMin, subject to Section 11.8 provisions for Bid Cost Recovery, so that the resource's Resource Adequacy Capacity can be utilized as required by this CAISO Tariff.

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Appendix A
Master Definitions Supplement

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- Day-Ahead Self-Scheduled Energy

Day-Ahead Scheduled Energy above the ~~registered~~ Minimum Load as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and below the lower of the Day-Ahead Total Self-Schedule or the Day-Ahead Schedule. Day-Ahead Self-

Scheduled Energy is settled as described in Section 11.2.1.1, and, as indicated in Section 11.8.2.1.5, it is not included in BCR.

****

- FMM Derate Energy

Extra-marginal FMM IIE, exclusive of FMM Minimum Load Energy, ~~produced or~~ consumed due to ~~Minimum Load overrates or~~ PMax derates~~. FMM Derate Energy is~~, that is ~~produced above the higher of the Day-Ahead Schedule or the registered Minimum Load and below the lower of the overrated Minimum Load and the FMM Schedule, or~~ consumed below the Day-Ahead Schedule and above the higher of the derated PMax or the FMM Schedule. ~~There could be two FMM Derate Energy slices, one for the Minimum Load overrate, and one for the PMax derate.~~ FMM Derate Energy does not overlap with FMM Minimum Load Energy, FMM Exceptional Dispatch Energy, or FMM Optimal Energy, but it may overlap with Day-Ahead Scheduled Energy and MSS Load Following Energy. FMM Derate Energy is settled as described in Section 11.5.1, and it is not included in BCR as described in Section 11.8.4. FMM Derate Energy also includes Residual Imbalance Energy incurred due to the Ramping up towards or Ramping down from a Minimum Load rerated pursuant to Section 9.3.3 as specified in Section 11.5.5.

****

- FMM Minimum Load Energy

FMM IIE produced due to the Minimum Load of a Generating Unit that is committed in the RUC or the FMM and does not have a Day-Ahead Schedule, or of a Constrained Output Generator (COG) that is committed in the IFM with a Day-Ahead Schedule

below the ~~registered~~ Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. If the resource is committed in the FMM for Load following by an MSS Operator, the FMM Minimum Load Energy is accounted as MSS Load Following Energy instead. FMM Minimum Load Energy is FMM IIE above the Day-Ahead Schedule (or zero if there is no Day-Ahead Schedule of Energy) and equal to or below the ~~registered~~ Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. FMM Minimum Load Energy does not overlap with any other Expected Energy type. FMM Minimum Load Energy is settled as described in Section 11.5.1, and it is included in BCR as described in Section 11.8.4.1.2. FMM IIE that is consumed when a resource that is scheduled in the DAM is shut down in the FMM is accounted as FMM Optimal Energy and not as FMM Minimum Load Energy.

****

- Minimum Load

For a Generating Unit, the minimum sustained operating level at which it can operate at a continuous sustained level, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. For a Participating Load, the operating level at reduced consumption pursuant to a Dispatch Instruction. For a Proxy Demand Resource, the smallest discrete load reduction possible for the Proxy Demand Resource.

****

- Minimum Load Costs

The costs a Generating Unit, Participating Load, Reliability Demand Response Resource, or Proxy Demand Resource incurs operating at Minimum Load, which in the

case of Participating Load, Reliability Demand Response Resource, or Proxy Demand Resource may not be negative. Minimum Load Costs may be adjusted pursuant to Section 30.7.10.2, if applicable.

- Minimum Load Energy

The product of the relevant Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3, and the duration of the Settlement Interval. The CAISO will determine the Minimum Load Energy for Multi-Stage Generating Resources based on the applicable MSG Configuration.

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- PMin

~~The minimum normal capability of the Generating Unit.~~ Equivalent to Minimum Load.

****

- RTD Derate Energy

Extra-marginal RTD IIE, exclusive of FMM IIE, Standard Ramping Energy, Ramping Energy Deviation, Residual Imbalance Energy, MSS Load Following Energy, and RTD Minimum Load Energy consumed due to ~~produced or consumed due to Minimum Load overrates or~~ PMax derates. RTD Derate Energy is ~~produced above the higher of the FMM Schedule or the registered Minimum Load, and below the lower of the overrated Minimum Load and the Dispatch Operating Point, or~~ consumed below the lower of the FMM Schedule or the Dispatch Operating Point~~,~~ and above the higher of the derated PMax or the Dispatch Operating Point. ~~There could be two RTD Derate Energy slices,~~

~~one for the Minimum Load overrate, and one for the PMax derate.~~ RTD Derate Energy does not overlap with FMM IIE, Standard Ramping Energy, Ramping Energy Deviation, Residual Imbalance Energy, RTD Minimum Load Energy, RTD Exceptional Dispatch Energy, or RTD Optimal Energy, but it may overlap with Day-Ahead Scheduled Energy and MSS Load Following Energy. RTD Derate Energy is settled as described in Section 11.5.1, and it is not included in BCR as described in Section 11.8.4. RTD Derate Energy also includes the Residual Imbalance Energy incurred due to the ramping up towards or ramping down from a Minimum Load rerated pursuant to Section 9.3.3 as specified in Section 11.5.5.

****

- RTD Minimum Load Energy

RTD IIE, exclusive of Standard Ramping Energy, Ramping Energy Deviation, and Residual Imbalance Energy, produced due to the Minimum Load of a Generating Unit that is committed in the RUC or the RTM and does not have a Day-Ahead Schedule or a Constrained Output Generator (COG) that is committed in the IFM with a Day-Ahead Schedule below the ~~registered~~ Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. If the resource is committed in RTM for Load following by an MSS Operator, the RTD Minimum Load Energy is accounted as MSS Load Following Energy instead. RTD Minimum Load Energy is RTD IIE above the Day-Ahead Schedule (or zero if there is no Day-Ahead Schedule of Energy) and below the ~~registered~~ Minimum Load, as defined in the Master File, or if applicable, as modified pursuant to Section 9.3.3. RTD Minimum Load Energy does not overlap with any other Expected Energy type. RTD Minimum Load Energy is settled as described in

Section 11.5.1, and it is included in BCR as described in Section 11.8.4.1.2. RTD IIE that is consumed when a resource that is scheduled in the DAM is shut down in the RTM is accounted as RTD Optimal Energy and not as RTD Minimum Load Energy.

****

~~**- SLIC**~~

~~Scheduling and Logging system for the CAISO~~

****

~~**Scheduling and Logging system for the CAISO (SLIC)**~~

~~A logging application that allows Market Participants to notify the CAISO when a Generating Unit's properties change due to physical problems. Users can modify the maximum and minimum output of a unit, as well as the Ramping capability of the unit.~~

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Appendix L Method To Assess Available Transfer Capability

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L.1.5 Transmission Reliability Margin (TRM) is an amount of transmission transfer capability reserved at a CAISO Intertie point that is necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change.

The CAISO uses TRM at Intertie points to account for the following NERC-approved components of uncertainty:

- Forecast uncertainty in transmission system topology, including forced or unplanned outages or maintenance outages.
- Allowances for parallel path (loop flow) impacts, including unscheduled loop flow.
- Allowances for simultaneous path interactions.

The CAISO establishes hourly TRM values for each of the applicable components of

uncertainty prior to the Market Close of the RTM. The CAISO does not use TRM (i.e., TRM values for Intertie points are set at zero) during the beyond day-ahead and pre-schedule (i.e., planning) time frame identified in R.1.3.3 of NERC Reliability Standard MOD-008-1. A positive TRM value for a given hour is set only if one or more of the conditions set forth below exists for a particular Intertie point. Where none of these conditions exist, the TRM value for a given hour is set at zero.

The methodology the CAISO uses to establish each component of uncertainty is as follows:

The CAISO uses the transmission system topology component of uncertainty to address a potential ATC path limit reduction at an Intertie resulting from an emerging event, such as an approaching wildfire, that is expected to cause a derate of one or more transmission facilities comprising the ATC path. When the CAISO, based on existing circumstances, forecasts that such a derate is expected to occur, the CAISO may establish a TRM value for the affected ATC path in an amount up to, but no greater than, the amount of the expected derate.

The CAISO uses the parallel path component of uncertainty to address the impact of unscheduled flow (USF) over an ATC path that is expected, in the absence of the TRM, to result in curtailment of Intertie Schedules in Real Time as a result of the requirements established in WECC's applicable USF mitigation policies and procedures (WECC USF Policy). When the CAISO forecasts, based on currently observed USF conditions and projected scheduled flow for an upcoming Operating Hour(s), that in the absence of a TRM, scheduled flow will need to be curtailed in Real Time under the applicable WECC USF Policy, the CAISO may establish a TRM for the ATC path for the applicable hour(s) in an amount up to, but no greater than, the forecasted amount that is expected to be curtailed in Real Time pursuant to the WECC USF Policy.
The CAISO uses the simultaneous path interactions component of uncertainty to address the impact that transmission flows on an ATC path located outside the CAISO's Balancing Authority Area may have on the transmission transfer capability of an ATC path located at an Intertie. In the event of such path interactions, the CAISO uses a TRM value to prevent the risk of a system operating limit violation in Real Time for the CAISO ATC path. The amount of the TRM value may be set at a level up to, but not greater than, the forecasted impact on the CAISO ATC path's capacity imposed by expected flow on the non-CAISO ATC path.

The CAISO uses the following databases or information systems, or their successors, in connection with establishing TRM values: ~~SLIC~~ the CAISO's outage management system pursuant to Section 9, Existing Transmission Contract Calculator (ETCC), PI, EMS, and CAS.

Attachment C – Draft Final Proposal

Tariff Amendment to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate of a Generating Resource's Minimum Operating Level for Operational Reasons

California Independent System Operator Corporation

March 23, 2016

Bidding Rules Enhancements

Correct Inefficient Accounting of Minimum Load Costs after Pmin Re-rate

Draft Final Proposal

January 8, 2016

Table of Contents

1. Executive Summary

The *Bidding Rules Enhancements* stakeholder process combines consideration of energy and commitment cost bidding rules to refine and improve alignment between these rules. Through this process, the ISO and stakeholders have been reviewing the rules for energy and commitment cost bidding flexibility and resource characteristics definitions.

A portion of the *Bidding Rules Enhancements* stakeholder process explored the ISO's bidding flexibility rules for both energy and commitment cost bids. Section 7.2.1 of the *Bidding Rules Enhancements* Revised Straw Proposal addressed an inefficient accounting of minimum load costs when the minimum output of a generating unit or multi-stage generator (MSG) configuration is temporarily increased (*i.e.*, Pmin "re-rate").[1]

The ISO's Revised Straw Proposal proposed to resolve the inefficient accounting of minimum load costs after a Pmin re-rate by calculating the actual commitment costs based on the Default Energy Bid (DEB) associated with the capacity range between the Master File (MF) Pmin and the re-rated Pmin where the incremental DEB costs associated with the actual cost of the re-rated Pmin level are added to the bid-in minimum load costs. The ISO proposes this option rather than the alternative of scaling the bid-in minimum load costs for two reasons:

- The DEB most accurately reflects the cost of incremental energy above minimum load which can vary substantially from minimum load costs.

- The 25% headroom provided for bidding minimum load costs is not appropriate to provide for incremental energy above the registered Pmin due to a re-rated Pmin because the costs for this incremental energy do not include the uncertainty associated with risk management costs, major maintenance costs and other hourly fixed costs that the 25% headroom accommodates.

The purpose of this proposal is to ensure efficient market generators are adequately modelled and therefore compensated for their minimum load costs when there are environmental or physical circumstances that change the operating conditions of the facility due to mechanical or physical attributes or limitations. Therefore, the ISO reiterates its expectation that any re-rate of the Pmin should be for operational or physical considerations and not for purposes of expanding uplift payments or avoiding appropriate economic consequences of their energy bidding practices.

[1] http://www.caiso.com/Documents/RevisedStrawProposal_BiddingRulesEnhancements.pdf

2. Changes to Revised Straw Proposal

Section 3 summarizes stakeholder positions on the ISO's Revised Straw Proposal to correct the inefficient accounting of minimum load costs (MLC) after a Pmin re-rate. This section also contains ISO responses to stakeholder comments regarding the ISO's proposal.

Section 4 shows the plan for the *Bidding Rules Enhancements* initiative stakeholder engagement portion related to the inefficient accounting of minimum load costs after Pmin re-rate. The ISO's proposal will go to the February 2016 Board of Governors meeting.

Section 5 provides background material related to this Draft Final Proposal. Found in Section 5.1, the ISO revised its example of its minimum load cost accounting after a Pmin re-rate to reflect the principle that DEB costs above the Pmin usually have a lower $/MWh cost than the minimum load costs expressed in $/MWh. Under Section 5.2, the ISO adds to its proposal a tariff revision to define the acceptable uses for submitting Pmin re-rates through the ISO's outage management system. Additionally, the ISO adds to the dialogue a discussion of the operational considerations of MSG resources (Section 5.3).

Section 6 provides the ISO's proposal to resolve the inefficient accounting of minimum load costs after a Pmin re-rate by calculating the actual commitment costs based on the DEB associated with the capacity range between the MF Pmin and the re-rated Pmin where the incremental DEB costs are added to the bid-in minimum load costs at the re-rated Pmin level.

3. Stakeholder Comments

Appendix A contains a summary of the stakeholder comments received on Section 7.2.1 of the Revised Straw Proposal.

4. Plan for Stakeholder Engagement

The schedule for this initiative is shown below.

Date	Event
December 3, 2014	Issue paper posted
December 10, 2014	Stakeholder call
December 30, 2014	Stakeholder comments due
April 22, 2015	Straw proposal posted
April 29, 2015	Stakeholder meeting
May 13, 2015	Stakeholder comments due
November 23, 2015	Revised straw proposal posted
December 03, 2015	Stakeholder meeting
December 17, 2015	Stakeholder comments due

January 08, 2016	Draft final proposal
January 14, 2016	Stakeholder call
January 20, 2016	Comments due
February 03, 2016	Board of Governors Meeting
February 04, 2016	

5. Background

5.1. Problem Statement

The ISO market treats the minimum load cost as a fixed dollar amount representing the bid cost under the minimum load (Pmin). An inefficiency arises if the Pmin of a resource or the Pmin of an MSG configuration is re-rated to a higher MW level than registered in the Master File. The ISO market systems consider the energy cost under the re-rated Pmin the fixed bid-in minimum load cost and does not recognize the costs of rerated minimum load energy. This can lead to an unintended change in the economics of the resource and inefficient market outcome because the market does not optimize the resource based on the increased cost of the re-rated Pmin energy.

An example is provided below in Table 1. Resource A and B are the same resource except that Resource B has higher energy bid costs of $50/MWh versus $30/MWh (shown in row [E]). Resource B increases its Pmin from 100 MW to 185 MW. Under the ISO's current process, the minimum load cost per MWh (shown in row [F]) decreases from $70/MWh to only ~$38/MWh for Resource B. There is a market inefficiency since the total cost of Resource B with a re-rated Pmin seen by the market is now $12,750 which is below its actual total cost of $17,000 (shown in row [I]) and could displace Resource A since it falsely appears to be more economic.

The ISO explored two alternatives to correct for this inefficiency:

- Scale the MLC based on the original MLC per original Pmin MW as calculated in Table 1.

- Calculate the actual commitment costs based on the DEB associated with the capacity range between the Master File Pmin and the re-rated Pmin where the incremental DEB costs are added to the bid-in MLC at the re-rated Pmin level.

Table 1 illustrates the impact on total cost for the resource with the Pmin re-rate, Resource B, after applying the two proposed approaches. The approach scaling the MLC is shown in the column titled 'Scale MLC' where a $70/MWh minimum cost (row [F]) is applied to the new re-rated Pmin of 185 MW (row [A]) to produce a new minimum load cost of $12,950 per hour (row [D]). The approach integrating the DEB cost is shown in the column titled 'Use DEB' where the DEB costs associated with the re-rated energy is applied in the manner in Table 1 to produce a new minimum load cost of $11,250 per hour (row [D]).

Table 1: Illustration of Pmin re-rate and minimum load cost

In this example, we assume the energy bid curve is the same as the default energy bid curve.

	Data	Units	Formula	Resource A	Resource B	Resource B w/ Pmin rerate		
						Current	Scale MLC	Use DEB
[A]	Pmin	MW		100	100	185	185	185
[B]	Pmax	MW		300	300	300	300	300
[C]	Capacity above Pmin	MW	*[B] - [A]*	200	200	115	115	115
[D]	Min load cost	per hour		$7,000	$7,000	$7,000	$12,950	$11,250
[E]	Bid cost	per MWh		$30	$50	$50	$50	$50
[F]	Min load cost / MWh	per MWh	*[D / [A]*	$70	$70	$37.84	$70	$60.81
[G]	Min load cost / hour			$7,000	$7,000	$7,000	$12,950	$11,250
[H]	Total bid cost / hour		*[C] x [E]*	$6,000	$10,000	$5,750	$5,750	$5,750
[I]	Total cost		*[G] + [H]*	$13,000	$17,000	$12,750	$18,700	$17,000

5.2. Discussion of ISO guidance on Pmin re-rates

In coordination with the implementation of these market changes the ISO will provide further definition in the tariff for the acceptable uses for submitting Pmin rerates through the ISO's outage management system. These will include:

- Changes due to ambient temperature
- Outages of mechanical equipment
- Managing of environmental limitations

Furthermore, the ISO tariff defines Pmin as the minimum operating capability of a generator. The ISO requires resources to register its characteristics in the Resource Data Template (RDT) which is contained in the resource's Master File for the ISO's optimization. According to Section 4.6.4 of the tariff, Pmin values as are all values contained in the Master File, should be based on physical characteristics and not other factors such as a resource's economic interests[2]. The ISO notes this Draft Final Proposal changes none of the Tariff guidance on re-rates to reflect changes due to physical or operational problems and not changes for economic reasons. The ISO tariff also specifies in Appendix A in the definition of the scheduling and logging system that the ISO makes that system available for the purpose of allowing market participants to notify the ISO when a generating unit's properties change due to physical problems. This continues to be a necessary principle in the ISO market and the ISO will clarify this in the main part of its tariff by clarifying in section 4 or 9 that information reported in the ISO's outage management system in addition to that provided in the ISO's master file. Consequently, a Pmin re-rate submitted through the outage management system must be operationally based.

[2] Proposed changes to the language in Section 4.6.4 regarding these values is still being discussed under the Resource Characteristics issue under the *Bidding Rules Enhancements* initiative.

5.3. Operational Considerations of MSG Resources

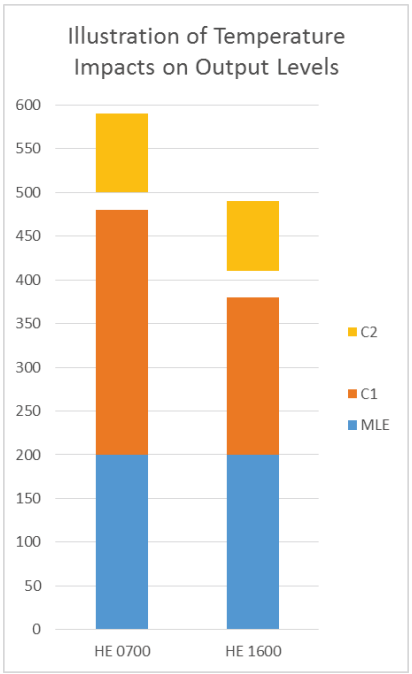
While the Pmin of a combustion turbine MSG resource remains fairly constant, its Pmax is highly influenced by the inlet temperature of the combustion air to the turbine. Through conversations with stakeholders, the ISO understands some of the factors influencing the output level of a MSG resource:

- Air quality or emissions control
- Changes in ambient temperature
- Failure of inlet cooling system, if applicable
- Steam leaks in the Heat Recovery Steam Generator (HRSG)
- Vacuum leaks in the condenser
- Sense low revolutions per minute

The ISO's understanding is that the first two factors have the highest impact on plant output levels. Environmental compliance such as managing air quality or emissions concerns can be a main factor to a generator submitting a Pmin rerate for its combustion turbine. The re-rate would manage the minimum load level since a higher output would reach a more efficient combustion which can help manage air quality or emissions requirements placed on the plant.

As the temperature variation between hours within a 24 hour period increases, changes in ambient temperature exacerbate the impact to the Pmax level. In the desert southwest it is not unexpected for the temperate to vary by 40 degrees within a single 24 hour period which could reduce Pmax by 15% or more at the higher temperature points of the day. Figure 1 below illustrates how the lower configuration's (C1) Pmax level fluctuates based on temperature and shows the simultaneous changes to higher configuration's (C2) Pmin and Pmax levels.

Figure 1: Illustration of Temperature Impacts on Output Levels



The ISO requires a resource to register a single value for the maximum and minimum MW output levels in the Master File. Given this practice, MSG resources registered Pmin and Pmax values for a configuration represent the lowest minimum output level and highest maximum output level over the highest and lowest ambient temperature condition ranges for a plant. There is an expectation that daily OMS outage cards with hourly changes to Pmin and Pmax values would be the tool used to reflect actual operating conditions for a hour based on temperature forecasts.

6. Draft Final Proposal

The ISO proposes implementing the market solution modifying the MLC based on DEB costs because this approach will resolve the current market inefficiency as shown by the total cost of Resource B with Pmin re-rate and without a Pmin re-rate both being $11,000 (shown in row [I]). By adjusting the MLC to reflect the cost of commitment under the re-rated Pmin level, the market can use the actual cost of commitment when solving for the most efficient commitment solution possible while ensuring market participants will recover the incremental costs associated with the rerated Pmin energy through ISO market revenue and bid cost recovery settlement.

The ISO's goal is to calculate the most efficient operating point to resolve the ISO's concern for inefficient market commitments. Because the ISO unit commitment process optimizes MSG resources by evaluating characteristics of each configuration, the ISO must use the DEB associated with the actual cost of re-rating a configuration's Pmin with a Pmin re-rate in order to accurately model the MSG resource's re-rated configuration. Figure 2 shows the formula used to calculate the MLC' using the DEB integration method. The DEB costs used in this formula will be the costs associated with the change in actual costs of a resource or MSG configuration's re-rated Pmin.

Figure 2: DEB Integration Formula

$$MLC' = MLC + \int_{P_{min}}^{P_{min}'} DEB(p)dp$$

MLC'	Minimum load cost of the re-rated Pmin level
MLC	Minimum load cost of the original bid-in minimum load cost
$DEB(p)$	Default energy bid cost associated with the actual cost of re-rating a resource or MSG configuration's Pmin
dp	Change in energy

7. Next Steps

The ISO will discuss this Draft Final Proposal with stakeholders during a call on January 14, 2016. Stakeholders are asked to submit written comments by January 20, 2016 to InitiativeComments@caiso.com.

These comments will be reflected in the memo submitted as a part of the board memo for the February 2016 Board of Governors meeting.

Appendix A: Stakeholder Comments Summary

Market Participant	Stakeholder Comments	ISO's Response
Calpine Response	Supports	Section 6 discusses the ISO's proposal to integrate DEB costs into the minimum load costs of a resource.
Six Cities	Supports	
Pacific Gas & Electric	Supports and requests the ISO clarify calculation for decreased Pmin levels	The proposed DEB integration method would only apply to Pmin re-rates since the ISO does not support Pmin de-rates.
Southern California Edison	Supports and requests the ISO include an adjustment mechanism within the proposal to account for the additional start fuel required to attain the higher Pmin	The ISO does not see a reason a Pmin re-rate would result in additional costs to the minimum load costs than the incremental energy costs associated with the re-rated capacity.
Division of Market Monitoring	Supports and requests the ISO clarify Pmin re-rates can only be used for physical reasons	Section 5.2 adds to the ISO's proposal a proposed tariff revision to define the acceptable uses for submitting Pmin re-rates through the ISO's outage management system.
Western Power Trading Forum	Does not oppose but requests the ISO confirm implementation costs do not exceed benefits	The ISO does not anticipate excessive implementation costs and in combination with assuring improved modelling of resources with Pmin re-rates finds the benefits exceed implementation costs.
Northern California Power Agency	Opposes because the DEB is used to adjust generator's energy bid in event generator is deemed to have market power based on failing dynamic local market power mitigation test therefore inappropriate to use in absence of failing impact test and instead advocates to allow resource to	The ISO proposes the DEB integration method rather than the alternative of scaling the bid-in minimum load costs for two reasons: • The DEB most accurately reflects the cost of incremental

	rebid MLC based on re-rated capacity.	energy above minimum load or Pmin which can vary substantially from minimum load costs. • The 25% headroom provided for bidding minimum load costs is not appropriate to provide for incremental energy above the registered Pmin due to a rerated Pmin because the costs for this incremental energy do not include the uncertainty associated with risk management costs, major maintenance costs and various risks and do not include other hourly fixed costs that the 25% headroom accommodates.
NRG Energy	Opposes for the following reasons: • It decreases the adjusted minimum load costs (MLC') headroom below the bid-in MLC headroom • It precludes submitting a lower MLC than the calculated MLC' when resource may want to bid below DEB Instead advocates the ISO propose option 1 (scaling).	
San Diego Gas & Electric	No Comment	

Attachment D – Board Memorandum

Tariff Amendment to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate of a Generating Resource's Minimum Operating Level for Operational Reasons

California Independent System Operator Corporation

March 23, 2016

Memorandum

To: ISO Board of Governors

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

Date: January 27, 2016

Re: **Decision on accounting of minimum load costs proposal**

This memorandum requires Board action.

EXECUTIVE SUMMARY

In April 2015, Management commenced the bidding rules enhancements initiative to consider enhanced ISO market bidding rules and to refine commitment cost calculations for generator minimum load costs. One issue identified in the initiative is how the ISO accounts for minimum load costs in the event a generator has to change its minimum operating level. Minimum load costs consist of the cost of operating a facility at or below its minimum operating level and are paid for through the bid cost recovery process to the extent energy revenues based on the locational marginal prices do not cover those costs. The market software also considers these costs in creating the optimal dispatch for the system. Currently, minimum load costs are not adjusted when a generator's minimum operating level changes, which can result in the inefficient dispatch of the generator.

One of the primary reasons a generator's minimum operating level changes is changing temperatures throughout the day. This is particularly problematic for generators located in areas that experience wide variations in temperature such as the desert southwest where morning temperatures can be 40 or more degrees cooler than when they peak in the late afternoon. NV Energy, which joined the western energy imbalance market in November, has generators located in these areas. Without new rules to address minimum load costs when ambient conditions result in a significant change to a generator's minimum operating level, there is a risk that the ISO market systems may dispatch these resources inefficiently. This risk is likely to be greatest during the summer months.

As a result, Management has separated this issue from the bidding rules initiative so that the Board can consider the issue earlier and the ISO may implement the proposed enhancements prior to summer 2016 operations. The remaining bidding rules proposal is scheduled to be presented to the Board later in 2016.

To address this risk, Management proposes to adjust a generator's minimum load costs in the event of a temporary increase in the generator's minimum operating level based on the generator's default energy bid cost. The proposed change will increase market efficiency by more accurately reflecting minimum load costs in the market optimization process and ensure generators are adequately compensated for their commitment costs.

Moved, that the ISO Board of Governors approves the improved accounting of minimum load cost proposal, as described in the memorandum dated January 27, 2016; and

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

DISCUSSION AND ANALYSIS

Issue

The ISO market commits generators based on their start-up, minimum load, and energy bids. Minimum load is the lowest energy output at which a generator is capable of operating. The market uses a single minimum load bid cost for each operating day.

Under the current market design, when a generator needs to temporarily increase its minimum load for operational reasons, including ambient temperature, outages of mechanical equipment, or managing environmental limitations, the market dispatches the generator based on the original minimum load costs. This results in the average cost of the generator's minimum load output appear less expensive than it actually is. This results in market inefficiencies because the minimum load energy may displace other less expensive energy. In addition, the market may not fully compensate a generator with a temporary minimum load increase for its costs.

Proposed change

Management proposes to address this market inefficiency by changing the calculation of minimum load costs for a generator whose minimum operating level is increased due to conditions that alter the resource's operational capabilities, such as ambient temperature, mechanical equipment failures, or environmental compliance. Management proposes to adjust the bid-in minimum load costs using the generator's default energy bid corresponding to the energy output above the generator's original minimum load. Because the ISO creates default energy bids based on each generator's actual estimated costs plus 10 percent, this adjustment will account for the generator's change in costs due to its increased minimum operating level.

POSITIONS OF THE PARTIES

Stakeholders support enhancing the ISO's market rules to better account for the costs associated with changes in a generator's minimum operating levels. However, some stakeholders prefer accounting for the costs by scaling the bid-in minimum load costs in proportion to the change in minimum load instead of using a generator's default energy bid. They contend that using the default energy bid reduces their flexibility for bidding minimum load costs and prevents generators from potentially bidding lower minimum load costs than costs resulting from using the default energy bid.

Management did not adopt this alternative because the default energy bid more accurately accounts for the incremental energy costs associated with an increased minimum operating level. Simply scaling bid-in minimum load costs could overstate costs because minimum load costs include certain fixed costs, such as major maintenance costs that are not affected by a change in a generator's minimum operating level.

The Department of Market Monitoring has provided comments on Management's proposal in their Market Monitoring Report to the Board.

CONCLUSION

Management requests Board approval of the proposal discussed above. The proposed change will increase market efficiency by more accurately reflecting minimum load costs in the ISO market and ensure generators are adequately compensated for their commitment costs.

Decision on accounting of minimum load costs proposal

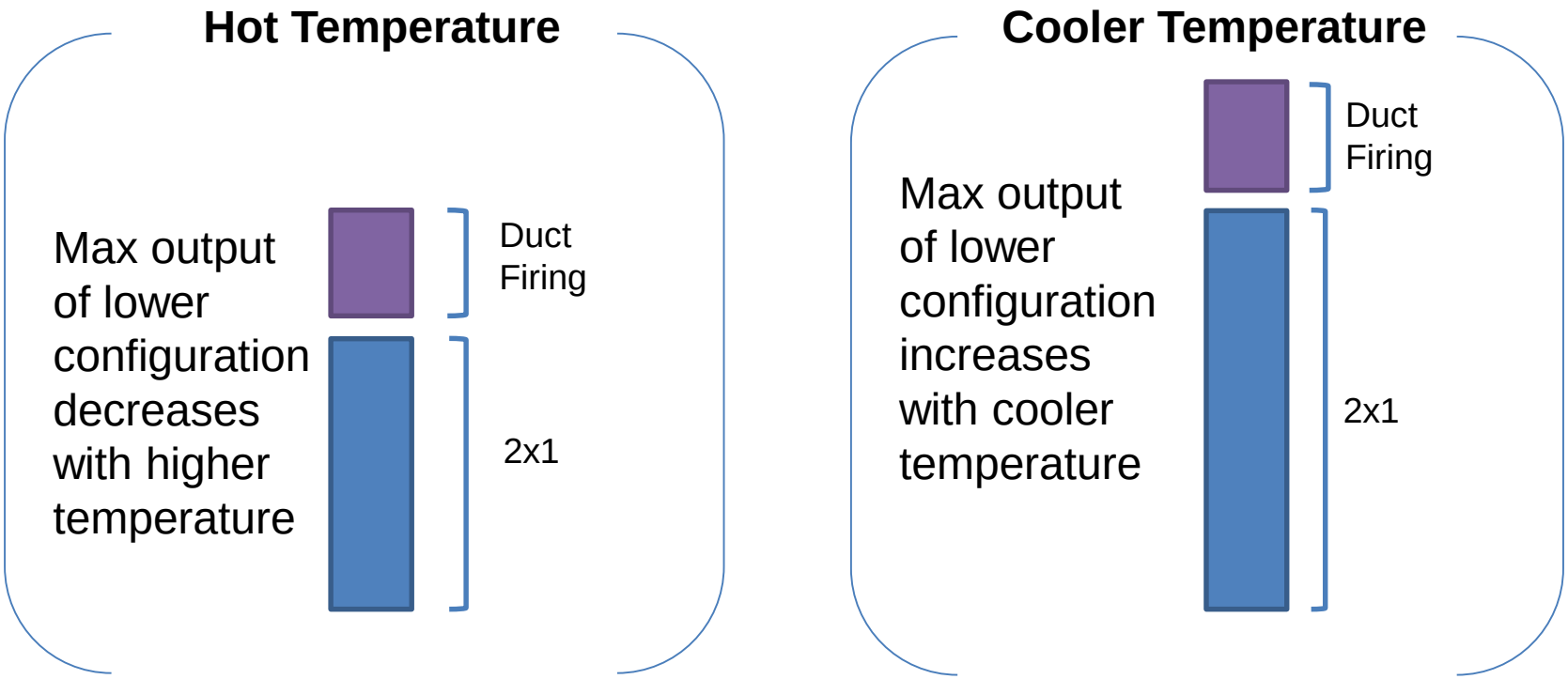
Greg Cook
Director, Market & Infrastructure Policy

Board of Governors Meeting
General Session
February 3, 2016

Current market inefficiency when generator's minimum operating level is increased due to ambient, environmental or mechanical reasons.

- Current methodology to temporarily increase minimum operating level:
  - Generator reports minimum operating level change through ISO's outage management system
  - However, minimum load costs not adjusted
- Results in inefficiencies:
  - Market inefficiently commits generator because $/MWh minimum load costs are too low
  - Generator's actual costs not reflected in bid cost recovery
  - Problematic for NV Energy combined-cycle units because of large daily summer temperature variations

Illustration of outage use for temperature impacts on multi-state generator output levels



Adjusting minimum load costs for minimum operating level changes will improve commitment decisions.

- Propose to adjust minimum load costs using default energy bid corresponding to energy above minimum operating level in master file

- Adjustment accounts for generator's change in costs
  - default energy bids are based on each generator's estimated costs plus 10 percent

- Enables improved commitment decisions by reflecting incremental energy costs associated with higher minimum operating level

Stakeholders support modifying minimum load costs but some prefer alternative methodology

- Broad support for adjusting minimum load costs when minimum operating levels increase
- Some stakeholders prefer scaling minimum load costs as opposed to using default energy bid

Management recommends the Board approve the use of a revised minimum load cost for rerated resources.

- Improves efficiency of commitment decisions by appropriately including incremental energy costs

- As EIM expands in the southwest, ambient conditions drive more frequent minimum operating level updates

Board of Governors February 3, 2016 Decision on accounting of minimum load costs proposal

General Session

Motion

Moved, that the ISO Board of Governors approves the improved accounting of minimum load cost proposal, as described in the memorandum dated January 27, 2016; and

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

Moved: Galiteva Second: Ferron

Board Action: **Passed**	Vote Count: **4-0**
Bhagwat	Y
Ferron	Y
Galiteva	Y
Maullin	Not present
Olsen	Y

Motion Number: 2016-02-G3

Attachment E – List of Key Dates in the Stakeholder Process

Tariff Amendment to Prevent Inefficient Market Treatment of Minimum Load Costs After a Re-rate of a Generating Resource's Minimum Operating Level for Operational Reasons

California Independent System Operator Corporation

March 23, 2016

List of Key Dates in the Stakeholder Process for this Tariff Amendment

Date	Event/Due Date
April 22, 2015	CAISO issues paper entitled "Bidding Rules Enhancements – Straw Proposal"
April 29, 2015	CAISO hosts stakeholder conference call that includes discussion of paper issued on April 22 and presentation entitled "Bidding Rules Enhancements – Straw Proposal Discussion"
May 13, 2015	Due date for written stakeholder comments on paper issued on April 22
November 23, 2015, as revised on December 3, 2015	CAISO issues paper entitled "Bidding Rules Enhancements – Revised Straw Proposal v.2"
December 3, 2015	CAISO hosts stakeholder conference call that includes discussion of paper issued on December 3 and presentation entitled "Bidding Rules – Revised Straw Proposal"
December 17, 2015	Due date for written stakeholder comments on paper issued on December 3
January 8, 2016	CAISO issues paper entitled "Bidding Rules Enhancements, Correct Inefficient Accounting of Minimum Load Costs After PMin Re-Rate – Draft Final Proposal"
January 14, 2016	CAISO hosts stakeholder conference call that includes discussion of paper issued on January 8 and presentation entitled "Bidding Rules Enhancements, Correct Inefficient Accounting of Minimum Load Costs After PMin Re-Rate"
January 20, 2016	Due date for written stakeholder comments on paper issued on January 8
February 19, 2016	CAISO issues draft tariff revisions to correct inefficient accounting of minimum load costs after a PMin re-rate
March 3, 2016	Due date for written stakeholder comments on draft tariff revisions issued on February 19
March 7, 2016	CAISO hosts stakeholder conference call that includes discussion of draft tariff revisions issued on February 19
March 15, 2016	CAISO issues matrix of written stakeholder comments and CAISO responses regarding draft tariff revisions issued on February 19, and issues updated draft tariff revisions to correct inefficient accounting of minimum load costs after a PMin re-rate