California Independent
System Operator Corporation

January 15, 2014

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

Re: California Independent System Operator Corporation
Docket No. ER13-2063-000

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

Dear Secretary Bose:

On July 30, 2013, the California Independent System Operator Corporation ("ISO" or "CAISO") submitted in this docket proposed amendments to its Fifth Replacement FERC Electric Tariff. The ISO subsequently amended the filing on October 17, 2013. On October 22, 2013, Commission Staff requested the ISO to provide additional information by November 21, 2013, in order to process the ISO's July 30 filing.[1] The deadline subsequently was extended to January 15, 2014.[2] Staff additionally requested that the response be filed as an amendment filing pursuant to the Commission's electronic tariff requirements.

This filing responds to Staff's October 22 request. The ISO continues to believe that the tariff amendments proposed in this docket would yield important benefits for the ISO markets. The ISO respectfully requests that, with the support of the additional included information, the Commission accept the July 30 filing (as amended on October 17). In the alternative, the ISO proposes that the concerns raised by Commission Staff in their letter can be addressed by a minor amendment to the ISO proposal that would enable the ISO market to still benefit

[1] *Cal. Indep. Sys. Operator Corp.*, Deficiency Letter, FERC Docket No. ER13-2063-000 (Oct. 22, 2013).

[2] *Cal. Indep. Sys. Operator Corp.*, Notice of Extension of Time, FERC Docket No. ER13-2063-000 (Nov. 21, 2013).

from the amendments proposed in the initial filing in this proceeding, without raising potential market efficiency concerns. Specifically, the ISO proposes that, if so ordered by the Commission, it would submit modified tariff language to remove the requirement that a resource that "has multiple operating modes, including Regulating Ranges associated with different Ancillary Services capability" be required to register as a multi-stage generating resource solely because it has such differing ancillary services capabilities in different operating modes.

The ISO continues to intend to implement the proposed tariff amendments on April 1, 2014. An order by March 21, 2014, would enable the ISO and market participants to ensure their readiness with these requirements by that date.

I. RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION

The ISO responds to each of the requests for additional information as follows:

A. Request No. 1

1. Staff Request

CAISO states that a "basic challenge in operating a centralized unit dispatch is how to handle the unique operational and economic parameters of combined-cycle generating units and other resources that have multiple operating or regulating ranges that limit the resource to operating in only one of its configuration ranges at any particular point in time." Please clarify how CAISO's commitment and dispatch processes allow transitions from one configuration to another. In particular:

a) Which commitment processes (e.g., Day-Ahead Market Unit Commitment, Residual Unit Commitment, Short-Term Unit Commitment, or Real-Time Unit Commitment) allow an MSG resource to be reconfigured from one stage to another?

b) How frequently do CAISO's current commitment and dispatch processes allow such reconfigurations to take place (daily, hourly, every 15 minutes, etc.)?

2. ISO Response

Since the ISO implemented the multi-stage functionality on December 7, 2010, all of the ISO commitment processes (*i.e.*, the integrated forward market unit commitment, the residual unit commitment, the short-term unit commitment and the real-time unit commitment) have permitted the ISO to commit or dispatch a resource that is registered as a multi-stage generating resource into, or out of, a particular configuration. As the Commission explained in the order approving the multi-stage functionality, "each configuration is treated as a distinct

generating plant whose operation is mutually exclusive of the other configurations. Scheduling coordinators may bid-in these different configurations simultaneously, and the CAISO's market clearing process would dispatch the optimal configuration and operating level for the resource . . . ."[3] The transition from one configuration to another is thus based primarily on the unit's registered physical characteristics (including the transition times necessary to move from one configuration to another) and the economic dispatch (*i.e.*, consideration of a unit's economic bids or self-schedules). If economic to do so, a unit could, in theory, be transitioned to a new configuration every 15 minutes (*i.e.*, the length of the real-time unit commitment).

In practice, however, it is unlikely that the ISO dispatch processes would transition a unit to a new configuration every 15 minutes. This is because transitions are also governed by a multi-stage unit's registered configuration-specific operating constraints. When it approved the functionality the Commission noted that it is designed so "that the dispatch of Multi-Stage Generating Resources is consistent with their operating characteristics and that resources are not dispatched at infeasible levels."[4] For example, a multi-stage unit can register a transition time of two hours for a particular configuration. If the unit were moved into that configuration, it would take two hours before it could complete the transition and be ready to then be redispatched to yet another configuration. Another example is that a multi-stage unit can register a minimum up-time for a particular configuration. If a unit were transitioned to a configuration with such a minimum up-time, then the ISO must maintain the unit in that configuration for the specified time before a market process has the ability to transition the unit to a different configuration. The decision as to whether or not a unit will be transitioned to a new configuration also accounts for such unit parameters (*i.e.*, if the target configuration has a minimum up-time of four hours, the software accounts for the fact that moving the unit into that target configuration means that the ISO is committing to that specific configuration not just for the next dispatch interval but for the next four hours). The configuration-specific operating constraints are considered and accounted for throughout all of the commitment processes. Doing so helps ensure that the ISO does not dispatch a unit to transition to a configuration where doing so would exceed the unit's physical capabilities. Because of these unit- and configuration-specific parameters, it is not possible to give a general answer as to how frequently the ISO dispatch processes permit transitions from one configuration to another.

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[3] *Cal. Indep. Sys. Operator Corp.*, 132 FERC ¶ 61,087, P 8 (2010).

[4] *Id.* at P 9.

B. Request No. 2

1. Staff Request

CAISO states that there are four categories of multi-stage units that will be subject to MSG registration: (i) a combined-cycle unit, except for one-by-one combined cycles that can operate in a single operating mode; (ii) a unit that has more than one forbidden operating region; (iii) a unit that has different operating ranges, each of which has different ancillary services capabilities; or (iv) a unit that has a hold time before or after a transition through a forbidden region. How many units and how many MWs are represented in each of these four categories?

2. ISO Response

	Existing MSG		Potential MSG		Total	
Category	**Total MWs**	**No. of Units**	**Total MWs**	**No. of Units**	**Total MWs**	**No. of Units**
Category i only	2,450	5	5,079	16	7,529	21
Categories i & ii	0	0	0	0	0	0
Categories i & iii	4,757	10	3,191	7	7,947	17
Categories i, ii & iii	1,631	2	0	0	1,631	2
Category ii only	120	1	120	2	240	3
Categories ii & iii	0	0	0	0	0	0
Category iii only	1,510	2	7,481	22	8,991	24
Category iv	N/A	N/A	N/A	N/A	N/A	N/A
Total Existing MSG	10,467	20				
Total Potential MSG			15,870	47		
Total Existing and Potential MSG					26,338	67
Note: 16 units accounting for 5,731 MW are currently registered as MSG but do not fall within Category i, ii, or iii.						

The response is drawn from registered ISO Master File values. The Master File is the system in which the ISO stores all resource characteristics utilized in the market. For example, operational requirements such as minimum operating level (*i.e.*, minimum load), maximum operating values, ramp rates, etc., are catalogued in the Master File. These elements are registered by the entity responsible for the resource and may be modified over time.

The active Master File values for a unit reflect its current participation in the ISO markets. Many units that would be required under the ISO proposal to register as multi-stage already are using the multi-stage functionality. The response includes separate data for: units that would be required to register as multi-stage but for the fact that they already have done so voluntarily (left column); units that have not yet registered as multi-stage but would be required to do so under the ISO proposal (middle column); and fleet-wide data combining the two (right column).

While Master File is the most appropriate and reliable source of data, it nevertheless poses several limitations in the data for each of the categories.

- **Category i.** – The information provided in the above table includes combined cycles that can operate in a single operating mode as well as those that operate in multiple modes because the Master File does not distinguish between sub-classes of combined cycles.

- **Category ii.** – Based on Master File data, the ISO only has five units fleet-wide that contain multiple forbidden regions. To the extent a resource does not participate in the market by registering their forbidden operating ranges, the ISO cannot report on their existence.

- **Category iii.** – Among the four types of ancillary services, Master File only records different operating ranges for regulation. There may be some units that have a single operating range for regulation but multiple operating ranges for other ancillary services. The ISO does not have this information from the data available in the Master File and therefore units falling into this category are not captured in the ISO response for category iii.

- **Category iv.** – The ISO is unable to provide reliable data because information regarding hold times is not maintained in Master File. One limitation of the forbidden region functionality, as compared to the multi-stage functionality, is that a hold time is enforced by the scheduling coordinator through entries to the Scheduling and Logging system for the CAISO (*i.e.*, SLIC).[5] Through the registration of configuration-based minimum up times and minimum down times, the multi-stage functionality explicitly models hold times. In SLIC, units currently can log a temporary outage as being due to hold time limitations. Obtaining this information would require a comprehensive review of historical SLIC records as to how many units have used SLIC for purposes of managing their hold times. Such comprehensive review would be a burdensome manual process and thus the ISO did not engage in it.

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[5] *See* ISO Operating Procedure, *Scheduled and Forced* Outages, # 3210, http://www.caiso.com/Documents/3210.pdf. As indicated in the procedure, resources use the outage procedure to indicate operational restrictions on a resource's actual hold times. These permissions are indicated in SLIC Cause Codes 10003, 10004, 10006 and 10007. For example, Code 10004 allows resources to use this code when a resource is required to hold at a maximum load point to minimize thermal stress on plant equipment such as critical piping, boiler feed water pump, turbine etc. These operational limitations can be managed more efficiently by the multi-stage functionality, which enables the resource to register the operable ranges and enables the ISO to optimize the resource in the market run.

None of the intervening parties raised any concerns with extending the requirement that resources register as a multi-stage resources to resources in categories i, ii, and iv. One party raised concerns with extending the mandatory registration to resources that appear to fall in category iii. As the ISO understands it, the sole protest pertains only to requiring multi-stage participation for resources that do not have other physical operating restrictions but would be required to register as multi-stage generating resources *only* because they have multiple operating modes associated with different ancillary services capability. The relevant subset of units to which the mandatory registration would extend under the ISO proposal solely for this reason is the 22 units (accounting for 7,481 MW) that fall into category iii. and that are not currently participating in the multi-stage functionality. However, not all of the resources in that category are free of actual physical restrictions. For example, based on a review of SLIC entries, 10 of the units, accounting for 4,393 MWs, have utilized SLIC to manage a hold time. These hold times are actual physical constraints that are currently managed through the outage functionality. These units would thus be required to appropriately register as multi-stage under category iv. As a result, the core of the protest covers only approximately 12 units, accounting for 3,088 MWs.

Therefore, there appears to be no objections in this docket to requiring participation in the multi-stage functionality for combined cycle units under category i., and other units that have physical limitations that require their participation under categories ii. and iv. Any further consideration of the ISO proposal and the protest of that proposal should bear in mind the limited sub-set of units covered by the protest.

It is also important to note that the information requested in category iii. does not match exactly the corresponding provision in the proposed tariff definition of "Multi-Stage Generating Resources." The proposed tariff amendments included in both the July 30 filing and the October 17 amendment state in relevant part: "the following technical characteristics qualify a Generating Unit as a Multi-Stage Generating Resource if the resource . . . has multiple operating modes, including Regulating Ranges associated with different Ancillary Services capability . . . ." Request no. 2, in contrast, asks for data regarding "a unit that has different operating ranges, each of which has different ancillary services capabilities." The transmittal letter accompanying the July 30 filing paraphrased the tariff definition as covering units with "different operating ranges, each of which has different ancillary services capabilities . . . ." The focus of the Commission's inquiry, however, should be placed on the proposed tariff language, as that is what the ISO is requesting authority to implement. The critical factor for category iii. is that the different configurations must have different ancillary services capabilities. As discussed above and further below, the ISO understands that there may be a small category of resources that

arguably do not have any other physical restrictions but could be captured by this category.

C. Request No. 3

1. Staff Request

CAISO states that "requiring all resources with the ability to operate in multiple operating modes to be modeled as multi-stage generating resources is optimal for the market as a whole."

a) Will the proposed requirement that some non-combined-cycle resources be modeled as MSG decrease resource flexibility that is available to the market and system operators by limiting certain resources to potentially narrow ranges of output during operation? To what extent?

b) Clarify the potential impacts on reliability associated with the proposal of modeling certain generators as multi-stage generating resources.

c) Explain in detail whether CAISO expects negative impacts on reliability if its proposal is not implemented or it is delayed. Address any NERC reliability standard that could be violated if the proposal is not implemented or if it is delayed.

2. ISO Response

a. The ISO proposal is not intended to decrease resource flexibility and is not intended to limit participation of resources to narrow ranges of output during operation

The multi-stage functionality was not intended to limit resource flexibility or participation of resources in the ISO's markets. Instead it was created and intended to transparently account for and consider existing physical resource inflexibility. The ISO fleet includes resources that are not combined cycle units but nevertheless have physical limitations on their operational ranges. For example, certain units may have inherent characteristics that require certain parts of the facility to be shut down for some time in order to transition the resource into higher or lower output ranges. While these units can function without being registered under the multi-stage functionality and in doing so may offer their output into the ISO market in a continuous range and not even register a forbidden operating range for their operation, they may nonetheless have non-operable ranges as characterized by their ramping requirements and if dispatched in those non-operable ranges are not effectively providing actual energy. The ISO proposal was intended to require resources that have physical characteristics that limit their operation to register their characteristics under the multi-stage functionality.

The multi-stage functionality allows the resource operator and the ISO to appropriately capture the operational restrictions of these resources so that they may be optimally dispatched and their contribution to relieving congestion may be appropriately captured by the market optimization. As explained in the ISO's original filing requesting authority to adopt the multi-stage functionality, the management of such constraints through the forbidden region functionality is not transparent and requires manual interventions.[6]

As designed and implemented, if a multi-stage unit is limited to a narrow range of output, it would be so limited based on its registered unit physical and operational characteristics. If a unit were dispatched in a configuration that includes a narrow range, it only would be limited to that range for as long as necessary to satisfy the registered constraints of that configuration. For example, if such a configuration had minimal transition time, minimum up time, and minimum down time associated with it, there is no reason to expect that the unit would be artificially limited to that configuration if it were economic to dispatch the unit to a different configuration.

The ISO recognizes, however, that there may be resources that do not have physical characteristics that limit their participation in the ISO energy market and can offer energy along a continuous output curve with only ramping limitations, but that may also have the ability to provide ancillary services in differing operating modes for part of their total range. The ISO market can optimize these resources for energy optimally, but such resources may intend to provide ancillary services in different operating modes and intend to offer them as such to the ISO markets. The ISO can only recognize and efficiently optimize the multiple operating ancillary services modes if those are clearly defined characteristics in the Master File. At this time, the only ability to effectuate this efficiently is through the multi-stage functionality. Today resources use SLIC to manage their operational limitations if they are awarded energy when dispatched for ancillary services in operating modes for which they cannot provide energy. If they instead transition to multi-stage functionality, while it would create the need to specify configurations that would create boundary points for consideration in the ISO market, it would avoid the need to manage such restrictions through the outage process.

If a resource is awarded ancillary services in a particular mode and cannot provide energy in that mode, there is an ISO operational risk. The risk is that if the ancillary services availability range is not recognized, the ISO could inadvertently slip into operating a resource in a range in which it is no longer able to provide ancillary services. This would aggravate the ISO's ability to meet its reserve requirements. Although Operating Procedure 3210 is available to

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[6] 132 FERC ¶ 61,087 at P 6; *Cal. Indep. Sys. Operator Corp.*, Transmittal Letter, at 2, 8 & 9, FERC Docket No. ER14-480-000 (May 27, 2010).

manually manage this issue it does not cover all situations that can be captured in an automated process.

While the ISO's multi-stage functionality is robust in considering these requirements in the optimization, the ISO submits that there is a small number of units that may not otherwise be constrained but for the need to consider the multiple ancillary services operating ranges. It is possible that some of the resources that can provide ancillary services in different operating modes do not have restrictions in the corresponding energy ranges, and forcing the configurations may constrain them unnecessarily.

b. <u>The ISO proposal to require multi-stage registration for resources that are limited in their operational operating ranges enhances the ISO's ability to operate its system reliably</u>

The anticipated benefits of the multi-stage functionality were recognized by the Commission when it initially approved the approach in 2010.[7] Expanding the scope of participation in the functionality will broaden those benefits.

By expanding the modeling of units' physical limitations, implementation of mandatory participation in the multi-stage functionality will allow the ISO to consider actual physical characteristics of resources in committing and dispatching resources through its market. This enables the ISO to ensure resources dispatched through its market optimization runs are capable of performing as dispatched. If the ISO market dispatch fails to dispatch energy or commit ancillary services consistent with their operating characteristics or limitations, the ISO must take manual actions to ensure resources are moved consist with those requirements to ensure it operates the system reliably. Therefore, the ISO's investment in the multi-stage functionality has been a contributing factor in reducing the need for exceptional dispatches.

The multi-stage functionality also enables the ISO to consider and categorize costs associated with commitment and dispatch more accurately, for all resources with operating range limitations, including non-combined cycle resources that have ranges in which they are inoperable and require the ISO to move the resources through those ranges to reach lower or higher operable ranges. The multi-stage functionality is capable of considering not only the operational limitations but also is able to consider the costs associated with transitioning those units through the minimum load levels of each range specifically as well as the energy bid costs.

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[7] 132 FERC ¶ 61,087 at P 6.

Finally the ISO proposal to require multi-stage participation for resources that have limiting operating ranges and multiple operating modes in which they can provide varying ancillary services enables the ISO to optimize the resources' capability to provide ancillary services without the need to redispatch other resources or manually commit resources. To the extent a non-combined cycle resource has operational limitations that cannot be considered in the non-multi-stage functionality, and can provide ancillary services in multiple operating modes, the ISO is not capable of optimizing the co-optimization for ancillary services and energy of such resources.

c. <u>The ISO cannot identify any specific reliability standard that would be violated if the ISO proposal were rejected</u>

The ISO did not submit its proposal to require resources with multiple operating ranges to register under the multi-stage functionality because it was at risk of failing to comply with any specific reliability standard. Rather, the ISO recognized that to the extent resources that continue to have limitations in operating ranges are not fully recognized in the market clearing process, the ISO will continue to be faced with the need to take manual actions to address their limitations to the extent their limitations encroach upon its ability to meet all reliability standards and requirements. The increased accuracy and gains in efficiency by having all resources with such limitations registered under the multi-stage functionality will enhance the ISO's ability to operate the system reliably.

Rejection of the ISO proposal in its entirety, however, would unjustly and unreasonably constrain the ISO's ability to enhance its ability to operate its system reliably. As discussed above, to the extent resources face operational limitations already, the multi-stage functionality does not artificially constrain the ISO's ability to consider the resource optimally in the market clearing process. After reviewing concerns raised by NRG/Dynegy further, the ISO recognizes that there may have been a misunderstanding that the ISO's proposal would artificially constrain resources and the ISO's ability to dispatch those resources optimally. If ordered by the Commission, this unintended consequence can be remedied by clarifying in the tariff to specify that only resources with operational limitations that require them to operate in specific modes must register under the multi-stage functionality. This would be accomplished by eliminating category iii. as a category of resources that are required to register as multi-stage resources, recognizing that some have already done so and other may continue to do so voluntarily. Based on the data provided in response to request number 2 above, this would account for approximately 3000 MWs of capacity. The ISO believes allowing these units to operate under the current functionality would not pose a reliability issue.

The ISO also notes that during the stakeholder process preceding this filing, the ISO committed to providing exceptions to mandatory registration to the extent specific resources required special consideration.[8] Having not been posed with specific resource requirements, the ISO has not proposed any exceptions. To the extent participants provide evidence that registering under the multi-stage functionality adversely impacts the operations of their resource, the ISO believes those exceptions should be considered as possible exceptions. The possibility that such exceptions may exist does not warrant a complete rejection of the ISO proposal, which was unopposed other than by NRG/Dynegy.

D. Request No. 4

1. Staff Request

Will the inclusion of non-combined-cycle resources in the mandatory MSG registration artificially constrain resources in real-time, such that the most efficient operating point will sometimes not be selected?

a) *If so, would the inclusion of non-combined-cycle resources in the mandatory MSG registration prevent such artificially constrained generators from setting the market price, even when it would be efficient for them to do so?*
b) *Has CAISO done any studies on how a potential loss of system efficiency through the adoption of this proposal (as contemplated above) would compare to the current loss of system efficiency being experienced due to the problems that CAISO says it is facing with the current forbidden region functionality? If so, please provide a copy of all such studies.*
c) *Has CAISO considered whether it could make adjustments to its current system to allow for non-combined-cycle resources to be dispatched in real-time across the entire physical range of their output, instead of being artificially constrained to administratively set "Pmin" or "Pmax" limits, as some have alleged? If so, has CAISO compared the costs of addressing the problem between these two approaches? If it has, please provide a copy of all such analyses.*
d) *In particular, for resources that have sufficiently fast configuration transitions to make such real-time transitions feasible, has CAISO considered whether it can make adjustments to its current system to either (i) "commit" MSG resources to different configurations between adjacent real-time market intervals when economic to do so, or (ii) otherwise model an MSG resource as having available its full range of*

[8] *Cal. Indep. Sys. Operator Corp.*, Transmittal Letter, at 9, FERC Docket No. ER14-480-000 (Jul. 30, 2013) ("During the stakeholder process, the ISO agreed that it would consider other exemptions . . . not specifically identified and reflected in the instant tariff amendment. If the ISO becomes aware of such limitations, then the ISO will make the appropriate filings with the Commission . . .").

output in real-time, even if it were committed to only a particular range of output?

2. ISO Response

As discussed above, the inclusion of non-combined-cycle resources in the mandatory MSG registration will not artificially constrain resources in real-time, such that the most efficient operating point will sometimes not be selected. By having the actual physical characteristics to consider, the market software will be capable of selecting the most efficient operating point for the resource.

These parameters appropriately include requirements to ensure the physical resource constraints are honored such as the minimal load of each specific configuration, the transition times from one configuration to another and the upper MW boundary of that configuration. Modeling such parameters is not an artificial constraint but instead recognizes actual physical operating constraints. Where such units are dispatched to the minimum output level of a particular configuration the unit will not be eligible to set the LMP. In this case, such a limitation is appropriate because at the time the resource is not actually providing energy and instead the resource is at its minimum operating mode for that configuration. The ISO's FERC-approved tariff mandates that resources that are at or below their minimum operating limits are not eligible to set the price. This restriction applies equally to multi-stage resources.[9]

The notion that the ISO proposal will place artificial constraints on price formation in the real-time market is only a concern if the resource *does not* actually have any operational limitations that must be considered in the energy market. Units that will be required to register as multi-stage will have a separate minimum load level for each separate configuration. Those configurations will reflect actual physical limitations on the unit's performance. The multi-stage functionality in turn recognizes and accounts for such configuration-specific parameters. But for some resources that only intend to provide ancillary services in multiple operating modes, this could cause artificial limitations in cases where the resource can provide ancillary services in the lower configuration but not in the upper configuration. In this case the resource remains dispatchable from Pmin to Pmax absent the configuration but could be artificially constrained if the ISO were to require the resource to use the multi-stage functionality to declare that the upper configuration is not able to provide ancillary services.

[9] *See* CAISO Tariff Section 34.19.2.

a. The inclusion of non-combined-cycle resources in the mandatory MSG registration does not prevent generators from appropriately setting the market price in operable ranges

For the reasons delineated above, the multi-stage functionality does not include artificial constraints on resources. Including generation technologies other than combined cycle units within the scope of the required participation in the multi-stage functionality would thus not impact efficient price formation through artificial constraints. The multi-stage functionality allows resources to provide explicit different ramp rates within different MWh ranges that correspond to an individual configuration. The optimization software utilizing a mixed integer program determines the commitment of a specific configuration and dispatches the resource within the MWh range of the configuration by utilizing linear programming. Accordingly, it is correct that if the resource is dispatched at the end point of the MWh range of the configuration the market clearing price will not be set by the generator.

The multi-stage functionality provides an elegant solution to ensuring that a resource that is truly output constrained because of the need to consider varying operational cycles are not eligible to set the price when they are indeed not capable of providing energy in specific operating modes. The multi-stage functionality provides the resource the ability to register explicit physical operational limitations and allows the ISO market clearing process to appropriately optimize the resource's energy bid and minimum load costs along the various ranges along with other resources' bids and costs. Mapping resources' operating requirements in the multi-stage functionality though their energy bid curves and minimum load costs for each operating range is done through straightforward and simple processes as would be done for any resource. Participating as a multi-stage resource, in fact, provides the resource more flexibility in eliminating complications that exist for resources with actual operational limitations and needing to ignore the varying operating range limitations through the non-multi-stage functionality.

b. The ISO did not conduct studies on potential losses of system efficiency because they were not necessary

The ISO has not conducted studies to evaluate the potential loss of system efficiency because to the extent a resource has limitations in ranges in which it can operate, the ISO does not anticipate a reduction in efficiency through the adoption of the ISO proposal as compared to the current loss of system efficiency being experienced due to current use of forbidden region functionality to address system limitations. For this reason, the ISO has not completed any studies comparing the current efficiency losses under existing market rules as compared to the postulated hypothetical efficiency losses that the ISO proposal would create.

As discussed in the ISO's response to request no. 2, based on the data available to the ISO, there is only approximately 3,000 MWs that do not actually have output constraints in providing energy and would be artificially constrained if they were forced to register as multi-stage generating resources only because they are capable of providing ancillary services in multiple modes. Even if the ISO were to require these resources to register, these do not pose a significant loss in efficiency. However, as discussed above, also because this is a limited set, the ISO proposes it can eliminate the mandatory requirement that such resources register as multi-stage generating resources without creating risk for the ISO to operate the system reliably.

c. Consideration of alternatives

Over the years, the ISO considered alternatives to requiring resources with operational limitations as multi-stage functionality. However, such alternatives would require modifications to its systems and the expenditure of additional resources to accomplish those changes.

While the ISO has not conducted a cost analysis of such alternatives, the ISO believes the multi-stage functionality adequately addresses these issues without having to incur any additional costs. Since its inception, the multi-stage functionality has been designed to apply to a wide array of generating technologies. It was never designed solely for modeling combined cycle units. Such adjustments in the real-time market would require significant overhaul of the multi-stage functionality and is beyond the scope of the ISO proposal.

The ISO is currently preparing for significant market enhancements to adopt fifteen minute scheduling[10] and an Energy Imbalance Market[11] that will require both the ISO and market participants to undergo system changes. There is no justification for requiring the ISO to consider alternatives when its current functionality allows the ISO to address the operational issues related to modeling and dispatching resources with operational limitations.

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[10] *Cal. Indep. Sys. Operator Corp.*, Tariff Amendment to Implement Real-Time Market Design Enhancements Related to Order No. 764, FERC Docket No. ER14-480-000 (Nov. 26, 2013).

[11] *Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,298 (2013) (accepting energy imbalance market implementation agreement between ISO and PacifiCorp).

d. There is no need to adopt additional enhancements at this time

The multi-stage functionality is designed to recognize a unit's physical characteristics. If a particular transition is feasible, then the multi-stage functionality will consider the possibility of such a transition. As discussed in c. above, however, modeling a multi-stage unit's entire output as available in real-time is inconsistent with the fundamental design of the functionality. Resources that have fast configuration transitions can register those transition times and the functionality will feasibly move those resources to and through the registered configurations. The ISO does not believe there are any limitations in the market software on such units so long as the resource's characteristics are appropriately registered.

E. Request No. 5

1. Staff Request

With respect to CAISO's proposal to require certain generators to register as MSG resources, CAISO argues that such treatment is necessary in order to both (i) address a potential use of the current "forbidden region functionality" by generators to gain undue bid cost recovery and market payments and (ii) prevent infeasible awards of ancillary services. Aside from the market changes proposed, can CAISO use existing market design tools at its disposal to identify and prohibit the behavior that leads to the "unwarranted" collection of bid cost recovery described in the filing?

2. ISO Response

In a recent order, the Commission approved the ISO's proposal to institute a real-time performance metric.[12] The performance metric, which will become effective April 1, 2014, will help address inappropriate collection of bid cost recovery payments. The ISO expects that implementation of the performance metric, combined with the tariff revisions proposed in this docket, will create an improved bid cost recovery mechanism.

II. COMMUNICATIONS

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

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[12] *Cal. Indep. Sys. Operator Corp.*, 145 FERC ¶ 61,254, P 37 (2013).

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III. SERVICE

The ISO has served copies of this filing on parties in the above-referenced docket and, per the October 22 request, Mr. Franklin Jackson of the Commission's Staff. In addition, the ISO has served the California Public Utilities Commission, the California Energy Commission, and all parties with scheduling coordinator agreements under the ISO tariff. Finally, the ISO has posted a copy of the filing on the ISO website.

IV. CONCLUSION

The ISO respectfully requests that the Commission accept this filing as providing a complete response to Staff's October 22 request for additional information. The ISO additionally requests that the Commission accept the ISO's July 30 filing (as amended on October 17).

Respectfully submitted,

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Dated: January 15, 2014

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the above-referenced proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 15th day of January 2014.

/s/ Sarah Garcia

Sarah Garcia