



California ISO
Shaping a Renewed Future

Pay for Performance Regulation Year 1 Design Changes

Draft Final Proposal

September 26, 2014

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Draft Final Proposal**

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1 Introduction

In October 2011, the Commission issued Order 755, which adopted a final rule for compensation of frequency regulation in organized wholesale power markets. The Commission's final rule required organized markets to compensate regulation resources based on the actual service provided, including a capacity payment that reflects the marginal unit's opportunity costs and a performance payment that reflects the quantity of regulation service actually provided by a resource when the resource accurately follows a dispatch signal.

In response to the final rule, the ISO developed an Order 755-compliant market design, which the Commission accepted effective June 1, 2013. The design uses a two-part structure to establish capacity and mileage clearing prices for bid-in and self-provided regulation. As part of this structure, the ISO estimates the expected mileage from the capacity a resource bids-in or self-provides based on that resource's specific mileage multiplier. This expected mileage allows the ISO to optimize capacity offered to satisfy regulation requirements and to establish a market clearing price for performance payments as adjusted for accuracy. Under the ISO's market design, a resource responding to the ISO's control signal receives a performance payment based on the resource's actual movement in response to the control signal. In other words, the ISO adjusts a resource's performance payment based on how accurately it responds to the ISO's control signal.

As part of its design, the ISO also implemented a minimum performance threshold for resources providing regulation up or regulation down. Many resources certified to provide regulation in the ISO's market have not met this minimum performance threshold and, on January 10, 2014, the ISO requested a limited waiver and the Commission approved of these tariff provisions until December 31, 2014. The ISO requested the waiver to avoid the market disruption that might occur if it required all resources that did not meet the minimum performance threshold to recertify to provide regulation service.

During the stakeholder process to develop the ISO's pay for performance regulation market design, it was anticipated that potential changes may be needed based upon operational experience under the new regulation paradigm. The ISO believes that significant redesign of the pay for performance regulation market design is unwarranted at this time. However, the ISO does believe that two changes are warranted: (1) modification of the monthly accuracy calculation from a simple average to a weighted average and (2) reduction of the minimum performance threshold to 25%.

2 Plan for Stakeholder Engagement

Item	Date
Post Draft Final Proposal	September 26, 2014
Stakeholder Conference Call	October 3, 2014
Stakeholder Comments Due	October 10, 2014
Board of Governors Decision	November 13-14, 2014

3 Changes from straw proposal

- Added additional analysis of monthly accuracy calculation to show the difference between using the simple average versus the weighted average.

4 Background

In October 2011, the Commission issued Order 755, which adopted a final rule for compensation of frequency regulation in organized wholesale power markets. The Commission determined that the then-effective compensation methods for regulation service in organized markets failed to acknowledge the inherently greater amount of regulation service provided by faster-ramping resources and that certain practices result in economically inefficient dispatch of resources providing regulation service. To remedy these issues, the Commission's final rule required organized markets to compensate regulation resources based on the actual service provided, including a capacity payment that reflects the marginal unit's opportunity costs and a performance payment that reflects the quantity of regulation service actually provided by a resource when the resource accurately follows a dispatch signal. Order 755 required the use of a market-based price rather than an administrative price on which to base performance payments.

In response to the final rule, the ISO developed an Order 755-compliant market design, which the Commission accepted effective June 1, 2013. The design uses a two-part structure to establish capacity and mileage clearing prices for bid-in and self-provided regulation. As part of this structure, the ISO estimates the expected mileage from the capacity a resource bids-in or self-provides based on that resource's specific mileage multiplier. This expected mileage allows the ISO to optimize capacity offered to satisfy regulation requirements and to establish a market clearing price for performance payments as adjusted for accuracy. Under the ISO's market design, a resource responding to the ISO's control signal receives a performance payment based on the resource's actual movement in response to the control signal. In other words, the ISO adjusts a resource's performance payment based on how accurately it responds to the ISO's control signal.

As part of its approval of the ISO's market design, the Commission directed the ISO to conduct an operational review¹ of its Order 755 market design based on one year of experience and submit an informational report within 14 months of the effective date of its tariff revisions. The Commission specified that the ISO's operational review should include the following:

- (1) the appropriateness of the minimum performance threshold level;
- (2) the historical data used to calculate the mileage multiplier;
- (3) whether the regulation capacity procurement target should reflect historical accuracy of resources;
- (4) the level of the mileage maximum bid price and mileage scarcity price; and
- (5) any other analysis the ISO considers appropriate.

As part of its design, the ISO also implemented a minimum performance threshold for resources providing regulation up or regulation down. Under this tariff revision, the ISO applies a minimum performance threshold of 50 percent accuracy during a calendar month in order for a resource to offer regulation up or regulation down capacity. Many resources certified to provide regulation in the ISO's market have not met this minimum performance threshold and, on January 10, 2014, the ISO requested a limited waiver of these tariff provisions until December 31, 2014. The ISO requested the waiver to avoid the market disruption that might occur if it required all resources that did not meet the minimum performance threshold to recertify to provide regulation service. The ISO also requested the waiver to allow it time to assess the

¹ The informational report is available at http://www.caiso.com/Documents/Jul31_2014_Order755MarketDesignReport_ER12-1630_ER14-971.pdf

design of the minimum performance threshold. The Commission granted the ISO's waiver. In its Order, however, the Commission directed the ISO to include additional information in this informational report regarding the minimum performance threshold. Specifically, the Commission directed the ISO to include:

- a discussion of the reliability impacts of resources that would be disqualified absent the waiver (e.g., evidence that insufficient regulation would qualify);
- an analysis of whether ISO's current tariff mechanism of adjusting a resource's mileage multiplier based on historic regulation performance accuracy is effective in incenting more accurate performance; and
- an analysis of different methods for accounting for accuracy in compensation, including a comparison of its accuracy accounting to other RTO/ISOs' methods, that could incent more accurate performance.

During the stakeholder process to develop the ISO's pay for performance regulation market design, it was anticipated that potential changes may be needed based upon operational experience under the new regulation paradigm. The current fleet of resources providing regulation is relatively unchanged since the implementation of Order 755 market design changes. New regulation resources that prioritize mileage payments over capacity payments have not begun to actively participate in the regulation market. This is not a surprise given the lead time for interconnecting new resources. However, during this period, the CPUC has established procurement targets for storage resources. The ISO has seen a significant number of fast responding storage resources enter the interconnection queue. This will potentially change the mix of resources providing regulation. The ISO anticipates that fast responding and highly accurate resources will prioritize regulation compensation through mileage payments rather than the traditional capacity payments. As a result, the ISO believes that significant redesign of the pay for performance regulation market design is unwarranted at this time. However, the ISO does believe that two changes are warranted as the regulation fleet changes over the next few years. This does not preclude future market enhancement to the pay for performance regulation design. As with all market design elements the ISO considers enhancements through its annual market initiatives catalog process to prioritize initiatives with stakeholders.

5 Proposed Modification to Monthly Accuracy Calculation

The ISO defined mileage as the absolute change in Automatic Generation Control (AGC) set points between 4 second intervals. Accuracy is the absolute value of actual telemetry compared to the AGC set point in a given regulation interval. Thus, the ISO considers positive and negative deviations equally in assessing the accuracy of the resource's response to AGC. To account for latency, the ISO compares the AGC set point to the actual telemetry eight seconds after the AGC set point is communicated to the resource.

The ISO determines the accuracy adjustment for each 15 minute interval. The ISO calculates the accuracy adjustment as the sum of AGC set points less the 15 minute sum of deviations from the AGC set point, and then divides that sum by the sum of the AGC set points. This percentage value is the accuracy of the resource's performance as compared to AGC set points. The ISO applies this percentage to reduce any mileage payment for the 15 minute interval. The ISO also calculates a monthly average to evaluate the performance of resources to determine if the resource should be required to recertify. To calculate the monthly average, the ISO currently takes the simple average of all 15 minute accuracy calculations for intervals the resource provided regulation service over the calendar month.

The ISO is proposing to use the weighted average of the 15 minute accuracy calculation over the calendar month. For example, assume the resource provided regulation for two intervals. In interval 1, the resources total AGC set points was 50MW and its accuracy was 10%. In interval 2, the resources total AGC set points was 250MW and its accuracy was 80%. The simple average accuracy would be 45%; however, the weighted average accuracy would be 68%. This change is appropriate because the simple average assumes the same potential reliability impact for poor performance in intervals with limited mileage as poor performance in intervals with high mileage. However, when high mileage occurs in a 15 minute interval this is evidence of greater reliability concerns since regulation resources are moved farther from the regulation set point. This occurs because of larger differences between system conditions assumed in the real-time dispatch and actually observed requiring more movement.

Table 1 below compares the average monthly accuracy of resources when calculation using the weighted average and simple average. The weighted average monthly accuracy is approximately 7 percentage points higher than when calculated using the simple average.

Month	Jun-13		Jul-13		Aug-13		Sep-13		Oct-13		Nov-13		Dec-13	
Type	Down	Up												
Weighted Average	51%	51%	62%	42%	52%	41%	55%	41%	57%	43%	54%	46%	47%	49%
Simple Average	33%	39%	56%	35%	45%	35%	47%	34%	51%	31%	49%	40%	42%	41%

Month	Jan-14		Feb-14		Mar-14		Apr-14		May-14		Jun-14	
Type	Down	Up										
Weighted Average	49%	44%	49%	43%	43%	45%	56%	43%	50%	46%	56%	41%
Simple Average	44%	37%	43%	36%	38%	37%	50%	35%	45%	38%	49%	37%

Table 1 - Comparison of Weighted Average versus Simple Average

6 Proposed Change to Minimum Performance Threshold

Since the ISO has begun collecting accuracy information for resources providing regulation, the ISO proposed to establish a minimum performance threshold. The threshold was initially set at 50%. If a resource violates the minimum performance threshold, the resource will have ninety days to re-certify to provide regulation. If the resource does not re-certify within the ninety days, the ISO will change the Master File to reflect that the resource is no longer certified to provide regulation. The intent of the minimum performance threshold was not to decertify a large portion of the existing regulation fleet, but rather as another mechanism to incentivize sustained accuracy improvements over time.

Based on measured performance of resources providing regulation up and regulation down, the ISO would have had to disqualify a significant amount of this capacity if it had applied the 50 percent minimum performance threshold. The ISO reviewed the performance of six resources offering the majority of regulation into the ISO market in May and June 2014. These resources provided approximately 78 percent of the ISO's regulation service during these months. Each of these resources failed the minimum performance threshold for either regulation up or regulation down in at least one calendar month between June 1, 2013 and May 31, 2014. Each would have faced the possibility of disqualification under the CAISO tariff. Table 2 reflects the total regulation up and regulation down capacity in MWh provided by these resources in May and June 2014 and the average monthly performance for each service of the six largest suppliers of regulation up and regulation down between June 2013 and May 2014.

Regulation Up/Down total Quantities (MWh) May and June 2014	Regulation Down 12 Month Average Monthly Performance	Regulation Up 12 Month Average Monthly Performance	Resource Fuel Type
1,052,407	0.5300	0.4009	Hydro
346,741	0.4081	0.3343	Hydro
230,214	0.6341	0.5036	Hydro
171,916	0.5440	0.3701	Combined cycle
93,832	0.4078	0.3691	Hydro
50,583	0.5422	0.3352	Hydro

Table 2 - Accuracy for 6 Largest Suppliers of Regulation

Smaller suppliers of regulation capacity also did not meet the minimum performance threshold. Based on this data, had the ISO applied its 50 percent minimum performance threshold, the overwhelming majority of resources providing regulation in the ISO markets from June 2013 through May 2014 would have received a notice that it would need to recertify or face disqualification within 90 days. The ISO does not know which of these resources would have requested to recertify their capacity to provide regulation up or regulation down. The ISO believes that resource adequacy resources would likely have taken steps to recertify their capacity to offer regulation up and regulation down due to terms of their bilateral contract to offer ancillary services. The ISO does not know whether non-resource adequacy resources certified to provide regulation would have offered their capacity in light of the possibility that they might also fail the minimum performance threshold. For these reasons, it is possible that the ISO could have faced a reliability challenge of having insufficient regulation by disqualifying resources from providing regulation that the ISO uses to balance variations in load and supply between each five minute dispatch.

The ISO proposes to lower the minimum performance threshold to 25%. At this level, the existing suppliers of regulation services will not be required to recertify and the ISO will maintain sufficient regulation capacity to meet reliability. The ISO considered removing the minimum performance threshold entirely, but decided against this approach because as the regulation fleet changes over time, it may be appropriate to raise the minimum performance threshold because the reliability concerns are lessened due to new resources providing regulation. As with any market design, the ISO will continue to monitor if enhancements are appropriate. In addition to the ISO, stakeholders can also request modifications through the stakeholder initiatives catalog process. This process allows all stakeholders to provide input on the priority of future stakeholder initiatives.

7 Next Steps

The ISO plans to discuss this draft final proposal with stakeholders during a conference call to be held on October 3. The ISO requests comments from stakeholders on the proposed market design changes described in this straw proposal. Stakeholders should submit written comments by October 10 to PRPRegulation@caiso.com.