Memorandum

To: ISO Board of Governors

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

Date: November 6, 2014

Re: **Decision on Pay for Performance Regulation Year 1 Design Changes**

This memorandum requires Board action.

EXECUTIVE SUMMARY

In 2011 the Federal Energy Regulatory Commission adopted Order 755 to remedy what the Commission identified as undue discrimination in the procurement of frequency regulation in the organized wholesale electric markets. The final rule required ISOs to adopt a two part payment for frequency regulation: (1) a payment for regulation capacity and (2) a payment for performance of the resource in response to a regulation signal. In response to the final rule, the ISO developed and implemented a two-part bid structure to establish capacity and mileage clearing prices for bid-in and self-provided regulation. Under the market design that went into effect on June 1, 2013, in addition to a regulation capacity payment, compensation includes a payment based upon a resource's actual movement in response to the regulation signal. This payment is adjusted based upon the accuracy of the resource's response to the regulation signal.

The ISO's design includes a minimum performance threshold for resources providing regulation. The threshold was included to ensure that resources providing regulation service accurately followed ISO regulation signals. Under this threshold, the ISO calculates a simple average of how accurately resources respond to regulation control signals every 15 minutes over a calendar month. Resources must achieve a monthly accuracy score of at least 50 percent. Resources that do not meet this minimum requirement must be recertified to provide regulation service. The 50 percent threshold was expected to be reasonable to ensure a high performing regulation fleet that would include new resource technologies that could very accurately follow regulation signals. However the entrance of such new resources into the ISO's regulation market, although still expected, has yet to occur. A limited analysis that was conducted prior to implementation of the new design showed that the current regulation fleet was expected to meet the minimum threshold, however once the new design was implemented and the monthly accuracy metric was calculated, many of these resources fell below the minimum accuracy threshold. As a result, on January 10, 2014 the ISO requested a limited waiver of these tariff provisions from FERC to avoid the market disruption that might occur due to the recertification requirements. FERC approved the waiver through December 31, 2014.

To provide for additional time for higher performing resources to enter the market and more accurately account for resource performance, Management proposes two changes to its Order 755 market design: (1) modify the monthly accuracy calculation from a simple average to a weighted average which will better account for resource performance; and (2) reduce the minimum performance threshold from 50 to 25 percent accuracy to avoid the potentially frequent recertification of older resource technologies that are currently providing most of the ISO's regulation needs. Notably, these changes will not alter the performance incentives built into the pay for performance regulation for higher performing regulation resources to enter the market. Management is seeking to make these changes effective January 1, 2015, when the current tariff waiver expires. Management plans to revisit the minimum performance threshold in three years when it can evaluate the performance of new technologies that can provide regulation, such as energy storage, that will be added to the regulation fleet over the next few years.

Moved, that the ISO Board of Governors approves the pay for performance regulation market design proposal, as described in the memorandum dated November 6, 2014; 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

The ISO uses frequency regulation for system balancing to manage the differences between resources' responses to dispatch instructions and actual load within a 5-minute period. The ISO procures regulation up and regulation down as separate products. Regulation up is used to balance the system when actual load is higher than the dispatch of resources. Regulation down balances the system when actual load is lower than the dispatch of resources.

As the ISO works to integrate increasing volumes of variable energy resources, regulation services are increasing in importance. The ISO has forecast a substantial increase in hourly regulation capacity requirements in some hours due to a more variable generation fleet.

Background

In October 2011, FERC 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 a market design that 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. In determining the minimum performance threshold, the ISO performed a high level analysis of a few resources over a limited number of hours. The analysis indicated that most resources currently providing regulation service could meet the 50% performance threshold. However, once the design was implemented and resource performance was measured over a monthly period, many resources certified to provide regulation in the ISO's market did not meet this minimum performance threshold. On January 10, 2014, the ISO requested a limited waiver from enforcing 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.

Management does not believe that a significant redesign of the regulation market design is necessary at this time. Management is not proposing any changes to the settlement of resources providing regulation or the market optimization rules to award regulation capacity and mileage. However, to address the potential market disruption from requiring broad recertification of existing regulation resources, Management proposes two changes: (1) modify the monthly accuracy calculation from a simple average to a weighted average; and (2) reduce the minimum performance threshold from 50 percent to 25 percent accuracy.

Recertification of resources based on monthly performance

As part of its market design, the ISO implemented a minimum performance threshold for resources providing regulation. The ISO set the threshold at 50 percent accuracy over a calendar month. For purposes of this threshold, the ISO measures a resource's accuracy in responding to a 4-second control signal based on a simple average of 15-minute intervals during a calendar month. If the resource fails to meet the minimum performance threshold over the month, the tariff requires the resource to recertify to offer regulation within 90 days. The resource will not be able to provide regulation unless it recertifies. The intent of the minimum performance threshold was not to disqualify a large portion of the existing regulation fleet, but rather as another mechanism to incentivize accuracy improvements.

Based on measured performance of resources providing regulation, the ISO would have had to disqualify a significant amount of its certified regulation capacity if it had applied the 50 percent minimum performance threshold. The performance of various resource types on average reflects that each category of resource offering regulation has experienced difficulty in meeting the minimum performance threshold. There is no evidence that more accurate resources would necessarily be available to supply the ISO's regulation requirements if the ISO required less accurate resources to complete a recertification process. If large numbers of resources cease to provide regulation, this outcome could lead to market and operational instability. In addition, even if resources that fail to meet the minimum performance threshold did recertify to provide regulation, a large number of these resources may immediately fail to meet the minimum performance threshold in the next calendar month. Undertaking a continual re-testing process for regulation when no apparent reliability concerns exist to justify
re-testing is not a reasonable use of the ISO's or market participants' resources.

Calculation of the monthly performance accuracy metric

The ISO considers positive and negative deviations equally in assessing the accuracy of the resource's response to the regulation signal over each 15 minute operating interval. The ISO calculates accuracy as the sum of instructed mileage over each 15 minute interval less the 15 minute sum of deviations from the regulation signal, and then divides that amount by the sum of the instructed mileage. This percentage value is the accuracy of the resource's performance as compared to regulation signals. The ISO then applies this percentage to reduce any mileage payment for the 15 minute interval. Management is not proposing to change the compensation of resources.

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 all intervals the resource provided regulation service over the calendar month.

Management is proposing to change the calculation to use instructed mileage to calculate a 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 resource's total instructed mileage was 50 MW and its accuracy was 10%. In interval 2, the resource's instructed mileage was 250 MW and its accuracy was 80%. The simple average accuracy would be 45%; however, the weighted average accuracy would be 68%.

The weighted average is more appropriate because the simple average assumes the same potential reliability impact for performance in intervals with lower mileage as performance in intervals with higher mileage. However, when higher mileage occurs in a 15 minute interval there is a greater potential reliability impact since regulation resources are moved farther and more frequently from the initial regulation set point.

Minimum performance threshold percentage

Management also proposes to lower the minimum performance threshold from 50 to 25 percent. Based on historical performance, the majority of resources offering regulation capacity into the ISO market will not need to recertify at this level. As a result, the ISO will maintain sufficient regulation capacity to meet reliability. Management considered removing the minimum performance threshold entirely, but decided against this approach. As the regulation fleet changes over time, it may be appropriate to raise the minimum performance threshold because emerging resources providing regulation, such as energy storage, could address the reliability concerns that exist today.

The ISO currently provides market participants with data regarding the accuracy of resources providing regulation in the ISO's Market Performance and Planning Forum and will continue to do so. This information will allow market participants to observe changes in regulation performance as the regulation fleet changes over time as new resources, such as energy storage, begin providing regulation.

As with any market design, Management will continue to monitor the performance of the regulation market to determine if further design enhancements are needed. In addition, stakeholders can also request modifications through the annual stakeholder initiatives catalog process. This process allows all stakeholders to provide input on the priority of future stakeholder initiatives.

POSITIONS OF THE PARTIES

Stakeholders support the narrow market design changes necessary to address the minimum performance threshold. Stakeholders broadly support changing the monthly accuracy calculation from a simple average to a weighted average based upon a resource's instructed mileage. However, the California Energy Storage Alliance (CESA) has requested that the ISO assess the minimum performance threshold percentage no later than three years from January 1, 2015. CESA believes that this will allow sufficient time for the evaluation of the performance of new technologies that will be added to the regulation fleet over the next few years. Management supports CESA's request and commits to evaluating the appropriateness of the minimum performance threshold percentage as well as the potential need for more substantive changes to other market design elements prior to January 1, 2018.

CONCLUSION

Management requests Board approval for the changes to the pay for performance regulation market design. The proposed changes address a narrow issue with the need for recertification of the existing regulation fleet and will be reevaluated in three years as the regulation fleet changes with increased penetration of storage and other new technologies able to meet regulation needs.