

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

**Frequency Regulation Compensation in the)
Organized Wholesale Power Markets)**

**Docket Nos. RM11-7-000
AD10-11-000**

**COMMENTS OF
THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
TO NOTICE OF PROPOSED RULEMAKING**

I. Introduction and recommendations

The California Independent System Operator Corporation submits these comments in response to the Federal Energy Regulatory Commission's notice of proposed rulemaking (NOPR) concerning compensation of frequency regulation service in organized wholesale electricity markets. If the Commission ultimately determines undue discrimination exists against emerging technologies and faster-ramping resources, it proposes to establish a two part payment approach for regulating resources: (1) a capacity payment for all resources with cleared regulation bids and (2) a performance payment for the provision of frequency regulation service.

The ISO operates a wholesale energy and ancillary services market, through which regulation up and regulation down are procured as two separate ancillary service products. Resources participating in its current regulation market receive just compensation and are not subject to undue discrimination. Nor does the evidence included in the NOPR support a contrary conclusion. Nevertheless, the ISO acknowledges that the anticipated increase in the variability of supply resources warrants consideration of the value of a payment mechanism that compensates regulation resources for the accuracy of their response to control signals. The ISO is

already scheduled to assess alternative compensation arrangements to accomplish this objective as part of its pending renewable integration market and product review stakeholder initiative. The Commission, therefore, should not take prescriptive action in this proceeding that would preclude the ISO, and other independent system operators and regional transmission organizations, from comprehensively evaluating alternatives in their stakeholder processes that will most effectively achieve the Commission's policy goals and the needs of the balancing area.

The Commission's proposed rule could potentially encourage existing facilities to provide faster-ramping service and new facilities to enter organized wholesale electricity markets. There is not, however, a single approach to incentivize resources to provide faster-ramping service, nor a single compensation scheme that fits all markets to achieve the goals articulated in the NOPR. Accordingly, the Commission should direct independent system operators and regional transmission operators to examine in their stakeholder processes potential payment mechanisms that will adequately compensate regulation resources for their ability to respond accurately to control signals, effectively allow all resource types to participate in the ancillary services markets, and best support efficient procurement of ancillary services. In particular, the Commission should allow independent system operators and regional transmission operators to first explore with their stakeholders the benefits of a performance payment for regulation resources and allow alternative approaches to compensate resources for accurate responses to control signals as part of any final rule. This approach will permit the most effective and efficient means to obtain fast-ramping capability based on the design of individual organized wholesale electricity markets. In contrast, the proposed rule may give rise to unnecessary disputes concerning how individual resources contribute or do not

contribute to correcting Area Control Error and also presents implementation challenges.

In the event the Commission adopts the proposed rule, the Commission should recognize that this action will require the ISO to make significant changes to its market systems, especially its settlement systems. These changes will require the ISO to consult with its stakeholders and will take at least 18 months to design, test and implement from the date of any order requiring implementation of the proposed rule.

II. Summary of regulation service in the ISO market

In the ISO's market, regulation is a service provided by resources certified to automatically respond to control signals in an upward or downward direction to balance demand and resources in real-time.¹ The ISO market procures regulation for many reasons including frequency response and market imbalances that occur between dispatch intervals for reasons of forecast inaccuracies or supply deviations. The ISO uses a regulation forecasting procurement tool that adjusts the procurement of regulation in the integrated forward market throughout the operating day based on varying operational needs arising from anticipated demand levels as well as potential

¹ Appendix A of the ISO tariff, Master Definition Supplement, defines the term *regulation* to mean:

The service provided either by resources certified by the CAISO as equipped and capable of responding to the CAISO's direct digital control signals, or by System Resources that have been certified by the CAISO as capable of delivering such service to the CAISO Balancing Authority Area, in an upward and downward direction to match, on a Real-Time basis, Demand and resources, consistent with established NERC and WECC reliability standards, including any requirements of the NRC. Regulation is used to control the operating level of a resource within a prescribed area in response to a change in system frequency, tie line loading, or the relation of these to each other so as to maintain the target system frequency and/or the established Interchange with other Balancing Authority Areas within the predetermined Regulation Limits. Regulation includes both an increase in Energy production by a resource or decrease in Energy consumption by a resource (Regulation Up) and a decrease in Energy production by a resource or increase in Energy consumption by a resource (Regulation Down). Regulation Up and Regulation Down are distinct capacity products, with separately stated requirements and ASMPs in each Settlement Period.

changes in generator and intertie schedules.² The ISO is also pursuing development of more enhanced tools that will consider statistical variability and uncertainty in determining regulation requirements. Additionally, the ISO market procures incremental regulation requirements in the real time unit commitment process.³

As part of its energy management system, the ISO uses regulation resources on automatic generation control to manage the difference between its scheduled and actual interchange, as well as its share of correcting the frequency of the Western interconnection. Automatic generation control sends signals to resources to minimize Area Control Error. In order to keep Area Control Error within acceptable ranges, resources qualified for regulation respond to a control set point. If resources are not able to respond within 8 seconds (the round trip of the ISO's 4 second control signal to and from the resource) then the ISO moves other units to fulfill its regulation requirements. If resources do not respond accurately, then overall interconnection frequency correction takes longer, and inadvertent interchange occurs with neighboring balancing authority areas. To address these results the ISO must continue to instruct resources between each 5 minute real time dispatch interval. If the majority of regulation resources fail to respond accurately to the ISO control signal, the ISO must dispatch other units to provide additional regulation to stay within Area Control Error limits. Failure of resources to respond accurately during a frequency deviation obviously increases the challenge of returning the market to operating within acceptable limits.

² ISO tariff section 8.3.1. See *also*, ISO Technical Bulletin 2009-12-02 AS Procurement Regulation dated December 30, 2009. <http://www.caiso.com/2494/2494c16876b0.pdf>.

³ ISO tariff section 8.3.1.

The ISO market pays resources with regulation awards an ancillary service marginal price for that ancillary service region.⁴ Regulation up and regulation down have separate ancillary service marginal prices. These capacity prices include the foregone opportunity cost, if any, of the marginal resource in an ancillary service region for not providing energy or other types of ancillary services the marginal resource is capable of providing in the relevant ISO market interval.⁵ For instance, regulation up can substitute for spinning reserve and non-spinning reserve in the ISO's market.⁶ Regulation down is the only downward ancillary service and does not substitute for other ancillary services in the ISO's market.

For resources with a regulation up award that receive an automatic generation control signal from the ISO's energy management system to move from their set point, the ISO market pays those resources the applicable locational marginal price for the instructed imbalance energy generated by the resource. Resources providing regulation down are effectively charged the locational marginal price for dispatches of regulation down energy, which is then settled as real time instructed imbalance energy based on a 10 minute meter read. The ISO nets energy from regulation up and regulation down dispatches over a 10 minute settlement interval, settling the energy as real time instructed imbalance energy at the applicable locational marginal price.

III. The Commission cannot conclude at this time that the ISO's rates are unjust and unreasonable or unduly discriminatory

A. The Commission's conclusion in the NOPR that faster-ramping resources face undue discrimination relies on the erroneous premise that Area Control Error correction is the sole regulation objective, and

⁴ ISO tariff section 27.1.2.

⁵ ISO tariff section 27.1.2.2.

⁶ ISO tariff section 8.2.3.5.

further, that faster-ramping resources are the solution to meeting this objective

The Commission's proposed rule arises from a concern that regulation compensation practices may currently result in rates that are unjust and unreasonable and unduly discriminatory or preferential.⁷ The NOPR also suggests that current compensation for regulation may create barriers to entry for new market participants.⁸ The Commission explains that faster-ramping resources provide more Area Control Error correction to system operators than slower ramping resources and, in some organized wholesale electricity markets, faster-ramping resources that provide regulation receive priority in the dispatch order but do not receive compensation for all of the service they provide.⁹ The Commission's premise is that while faster-ramping resources can respond more quickly and provide more ACE correction, they may be unduly discriminated against because they are compensated at the same level as slower ramping resources.¹⁰ The NOPR asserts that electricity markets will benefit from efficient price signals for regulation resources when those resources forego the opportunity to earn revenues in the energy market by setting aside capacity to provide regulation.¹¹

These concerns expressed in the NOPR alone cannot serve as a basis for a finding that the rates in the California ISO's market for regulation are unduly discriminatory or unjust and unreasonable. While the ISO recognizes the potential operational advantages of faster-ramping resources in its markets, especially with the increased penetration of variable energy resources in the ISO market, it is not a

⁷ NOPR at P 3.

⁸ NOPR at P 2, fn 7.

⁹ NOPR at P 26.

¹⁰ NOPR at P 27.

¹¹ NOPR at P 26.

foregone conclusion, as suggested by the Commission, that all markets require faster-ramping resources for increased Area Control Error correction.

The Commission's consideration of the ISO's market requirements in the NOPR is missing an important analytical step that must be conducted prior to dictating any prescriptive rate change regarding the ISO's compensation for regulation service. The Commission has correctly identified that in certain instances and under certain conditions, faster-ramping resources contribute more to the recovery of Area Control Error correction. The Commission has also properly concluded that to the extent that such service is singularly necessary for the ISO's operational requirements, then the regulation service should compensate for such service. What the Commission has not done yet, however, is establish that the ISO's rates do not adequately compensate for the ancillary services it needs to operate its system reliably.

The Commission points to the Pacific Northwest Laboratory study in support to illustrate the efficiency of faster-ramping resources and points to the author's conclusion that a faster responding resource is able to provide more effective regulation capacity than most other resources, including the current generation fleet mix in the ISO.¹² While the Commission does not explicitly state this to be the case, the NOPR suggests that this conclusion should be read as support for a compensation scheme that is specifically targeted to faster-ramping resources. The problem with reaching such a conclusion through the NOPR alone is that it overlooks the fact that the system operators, including the ISO, use a large set of regulation resources with varying characteristics to meet their operational requirements. These characteristics include but are not solely limited to the response rate of the resource.

¹² NOPR at P 24.

The Pacific Northwest National Laboratory study highlighted the benefits provided by faster-ramping resources, but did not negate the need for diversity of operational characteristics in the ISO's fleet. Moreover, the study listed a series of conclusions and recommendations that as discussed further below require the consideration of a more holistic consideration of the ISO's fleet capabilities and requirements. In fact, the study's focused "the value of fast responsive resources depending on their ramping capability" and its conclusion for next steps was to "[d]etermine if changes may be needed in the California ISO AGC system to effectively accommodate new types of fast regulation resources and minimize the California ISO regulation." While the Commission has not included the complete set of the study's conclusions and recommendations in its NOPR, should the Commission rely on this study to fashion any prescriptive rate change, the complete set of conclusions and recommendations should be considered more carefully by the Commission. To that end, as discussed further below, the study alone does not lend support that the current ISO rates are not just and reasonable compensation for its ramping requirements.

The Commission further questions whether the ISO's compensation approach specifically discriminates against faster-ramping resources.¹³ The Commission cannot conclude that the ISO's rates are unjust and unreasonable or unduly discriminatory based on a presumption of what the ISO market needs. In fact, the ISO's current rates are just and reasonable and not unduly discriminatory because the ISO's operational and reliability requirements, and even its ability to correct Area Control Error, have been, and are anticipated for the foreseeable future to be,

¹³ NOPR at P 28.

adequately met by available existing regulation services and resources. The Commission does not raise any evidence of supports a contrary conclusion.

Central to any inquiry concerning whether a rate or practice is unduly discriminatory is whether the rate or practice gives rise to “substantially different treatment to similarly situated entities without good reasons.”¹⁴ In this instance, the ISO’s rates for regulation apply to all resources equally so long as the resource meets the minimum operating and technical requirements to provide regulation. The amount of capacity a resource may bid for regulation is based upon the resource’s certified ramp rate over a ten minute interval.¹⁵ Thus, a faster-ramping resource can sell more regulation capacity than a slower ramping resource. These terms and conditions of service provide comparable treatment for all resources certified to provide regulation. Moreover, the ISO does not believe that its rates for regulation service create a barrier to entry. Regulation up and regulation down are two ancillary service products in the ISO’s market and resources meeting minimum operating and technical requirements may also bid and receive awards to provide other ancillary services and energy.

The ISO market developed its regulation procurement rules to obtain the service required to balance its system between each five minute real time dispatch interval and satisfy applicable control performance standards. Resources with faster-ramping capability and slower ramping capability both support this need. The ISO’s capacity payments for regulation reflect the marginal unit’s opportunity costs for both foregoing expected energy revenues as well as other ancillary services for which regulation can substitute. In addition, the ISO’s day-ahead market

¹⁴ *ANR Pipeline Co. v. Transcontinental Gas Pipe Line Corp.*, 91 FERC ¶ 61,066 (2000), citing *Pacific Gas & Electric Co.*, 38 FERC ¶ 61,242 (1987).

¹⁵ ISO tariff section 8.4.1.1.

procurement optimizes bids for regulation over the course of a trading day, thereby reflecting inter-temporal constraints for provision of capacity for regulation service. The ISO's energy management system does not include a priority dispatch for resources with faster-ramping capability, but it will send control signals to faster-ramping resources if it requires a fast response to correct Area Control Error. Control signals are sent in part based on a resource's operating range and ramping capability. In addition, resources receive capacity awards based on their certified ramp rate. Accordingly, compensation for regulation in the ISO market already recognizes performance albeit implicitly.

While the ISO believes that its market does not currently create undue discriminatory or unjust and unreasonable rates for faster-ramping resources, the ISO recognizes that with the influx of variable energy resources, there is a need to consider whether alternative compensation is required to incentivize specific ramping capability in resources. But contrary to the NOPR,¹⁶ the ISO has not concluded, in any of its studies that it is necessary to measure the benefit provided by a regulation resource to Area Control Error correction.¹⁷

The ISO is in the midst of a close examination of its market design and whether it is adequate for the purpose of integrating substantial variable energy resources. As part of phase 2 of its renewable integration market and product review, the ISO has initiated a review of whether to adopt a pay for performance mechanism for regulation service in the ISO market.¹⁸ At its initial stakeholder meeting, the ISO invited a representative from PJM Interconnection to discuss its

¹⁶ NOPR at P 37.

¹⁷ See e.g., the ISO's 20 percent Renewable Portfolio Standard integration study, available at the following website: <http://www.caiso.com/2804/2804d036401f0.pdf>.

¹⁸ See, ISO discussion and scoping paper dated April 5, 2011 at the following website: <http://www.caiso.com/2b57/2b57efa839d50.pdf>.

proposed pay for performance mechanism for frequency regulation.¹⁹ The ISO has solicited stakeholder comments and intends to release an issue paper and a roadmap this summer to address phase 2 issues, including a plan to address high priority items.

As part of this process, the ISO will identify whether its existing regulation product suffices and, if not, what product or products are required to ensure it continues to meet NERC requirements in the most efficient manner possible. In this context, the ISO intends to examine a performance payment that compensates resources that respond accurately to both upward and downward control signals. This mechanism may make additional ramping capability available to the ISO, which will assist the ISO in integrating greater numbers of renewable resources over the next decade. Thus, the ISO is considering a compensation mechanism that reflects a “mileage payment.” The ISO is also conducting additional renewable integration studies to determine the actual products needed under California’s Renewable Portfolio Standard requirements. This study will provide an actual analytical assessment of the ISO’s market needs and will serve as a platform for the appropriate compensation scheme to incentivize such services.

The ISO requests, therefore, that the Commission not conclude *a priori* that faster-ramping resources are required for Area Control Error correction in all markets and allow system operators to continue to examine their actual need and then to consider the Commission’s own proposed rule, or other approaches through a stakeholder process to determine the appropriate means to address system reliability needs. Absent a finding supported by substantial evidence on the record

¹⁹ See PJM presentation on Frequency Regulation Market Pay for Performance dated April 12, 2011, a copy of which is available at the following website: <http://www.caiso.com/2b5d/2b5db2466f0f0.pdf>

that the ISO's tariff rates for regulation are unduly discriminatory or unjust and unreasonable under Section 206 of the Federal Power Act, the Commission should not require the ISO to adopt a specific performance payment for regulation.²⁰ The minimal statements in the NOPR do not constitute a sufficient showing for the Commission to carry its burden under Section 206.

B. The Commission must consider alternatives to the proposed rule to allow for parties to adequately address operational and market needs

In its NOPR, the Commission solicits comments on whether there are alternative payments for performance that can address the Commission's concern that potential undue discrimination exists.²¹ In the NOPR, the Commission proposes to measure a regulation resource's performance by the resource's contribution to Area Control Error correction.²² The Commission cannot conclude that zero Area Control Error correction is the only operational requirement. Indeed, NERC requirements for Control Performance Standards 1 and 2 do not require zero frequency error, but rather create Area Control Error correction limits based upon a range of system frequency over a time period in which a balancing authority operates. Balancing authority areas use resources under automatic generation control to ensure that the system frequency stays within an acceptable range. While contribution to Area Control Error correction is one potential measure of automatic generation control response, the Commission should also consider other measures to compensate performance of regulating resources. One alternative is to pay for the accuracy of a resource's response to a control signal as opposed to how much of that response corrects Area Control Error. This approach may be easier to

²⁰ *Federal Power Comm'n v. Sierra Pacific Power Co.*, 350 U.S. 348, 353 (1956); *Transcontinental Gas Pipe Line Corp. v. FERC*, 518 F.3d 916, 921 (D.C. Cir. 2008); *Atlantic City Electric Co. v. FERC*, 295 F.3d 1, 10 (D.C. Cir. 2002).

²¹ NOPR at P 37.

²² NOPR at P 37.

implement from a settlements perspective and could avoid possible adverse impacts to resources with slower ramp rates.²³ Moreover, this approach does not tie compensation to one measure of Area Control Error such as frequency or the difference between scheduled and actual interchanges.

Another alternative to the Commission's proposed performance payment is to create a fast-ramping ancillary service product that system operators define with a ramp requirement based upon the change a resource could make over a period of time (e.g. four seconds). System operators could use fast-ramping resources as primary responders to changes in Area Control Error. For example, if an aggregate regulation set point is 150 MW in an upward direction in one interval and the requirement in the following interval is 145 MW (for an incremental reduction of 5 MW) in the upward direction, a system operator could dispatch fast regulation resources down to provide 5 MW and conventional resources with slower ramp-rates would not need to move from their operating points. By segmenting regulation into two types, fast and conventional, system operators would need to establish substitution criteria between fast and conventional regulation. For example, if 10 MWs of conventional regulation capacity was equivalent to 1 MW of fast regulation capacity, then if the bid price of conventional regulation was \$3.00 MW and the bid price of fast regulation was \$50.00 MW, the lowest cost to meet total regulation needs would be to procure 10 MW of conventional regulation capacity. Thus, even though the total MW of capacity procured is higher, the total cost of meeting regulation requirements is lower. The advantage of a separate fast regulation requirement is that system operators could design the product to address its specific

²³ See e.g., NOPR at P 40, which recognizes that a performance payment based on MWh that actually correct Area Control Error may create adverse impacts on resources that have lower measured Area Control Error correction even when the resource is following a system operator's dispatch signal.

use, addressing changes in Area Control Error from one dispatch to the next. If system operators cannot develop substitution criteria then the resources that could provide fast regulation may not be sufficient to support an efficient market for the fast regulation product because there will only be a few providers of this product at first. The Commission should consider these and other alternatives as part of any action in this matter and, ensure that any final rule provides organized wholesale electricity markets the latitude to develop a range of acceptable approaches to performance payments for regulating resources that address the particular issues in their region in the most effective, efficient, and comprehensive manner.

C. The ISO agrees that resources should receive compensation for accurately responding to control signals but requires additional analysis before concluding that compensation scheme to best meet its needs

In its NOPR, the Commission solicits comments on the benefits that faster-ramping resources bring to organized wholesale electricity markets.²⁴ As referenced in the NOPR, Pacific Northwest National Laboratory completed a study in 2008 for the Californian Energy Commission on the value of regulation resources based on their time response characteristics.²⁵ The study analyzed regulation resources in the ISO's balancing authority area and reached a number of findings, including that faster-ramping resources can help the ISO market reduce the amount of regulation it procures.²⁶ This finding is consistent with the findings of the Commission in its NOPR regarding potential efficiencies of faster-ramping resources.²⁷

²⁴ NOPR at P 33.

²⁵ NOPR at P 24, fn 34. Pacific Northwest National Laboratory's study report is available at the following website:
<http://www.storagealliance.org/whystorage/52182%20Value%20of%20regulation%20resources-Report%20final-1.pdf>

²⁶ Pacific Northwest National Laboratory study report at xii.

²⁷ NOPR at P 32.

Although resources with faster-ramping capability can help the ISO balance supply and demand as part of a larger fleet, the ISO believes that additional studies are necessary to identify ramping needs and specifically the value that fast ramping resources provide to the grid, especially in the context of a 33 percent Renewable Portfolio Standard. Without a clear and quantifiable benefit to the market that outweighs the cost to the market of making additional performance payments to regulation resources, the Commission should refrain from requiring any specific payment mechanism for faster-ramping resources.

While the ISO has conducted a number of studies that have led to preliminary indication of the need for additional ramping capability, it has not yet completed the complete scope of its intended studies and these benefits have not been specifically quantified for the ISO.

The ISO has completed a study of the operational requirements and generation fleet capabilities to facilitate a 20 percent Renewable Portfolio Standard.²⁸ A critical finding of this study is that “the [ISO] system has enough capability to meet load when there is a sudden decrease in variable energy resource generation.”²⁹ As a result of the large quantity of self-schedules submitted by scheduling coordinators, however, the ISO identified a potential need for dispatchable downward ramping capability.³⁰ The ISO is now undertaking additional studies to examine operational needs at a 33 percent Renewable Portfolio Standard in 2020. In addition, the ISO is undertaking an additional study of the ramping requirements and the ability to meet these requirements. Based on a range of assumptions, the results of these studies

²⁸ The ISO's 20 percent Renewable Portfolio Standard integration study is available at the following website: <http://www.caiso.com/2804/2804d036401f0.pdf>.

²⁹ ISO 20 percent Renewable Portfolio Standard integration study at 81.

³⁰ ISO 20 percent Renewable Portfolio Standard integration study at 92.

will help identify the need for additional ramping and load following requirements for capacity offered into the ISO market.³¹ The ISO has engaged KEMA to help develop control, scheduling, and dispatch solutions applicable to a 2020 grid that includes renewable resources and electricity storage. This effort will include the development of automatic generation control functionality to account for renewable and energy storage resources. The ISO expects the results of that effort may inform the need to modify energy management system algorithms to manage Area Control Error. Until these efforts are complete, the ISO believes the Commission's policies should promote accurate responses to control signals from dispatchable resources in both up and down directions. The Commission should forbear from imposing a specific compensation model for regulation resources without quantifying the need for and benefits of such a model in organized wholesale electricity markets.

All things being equal, faster-ramping resources provide value to system operators. But the critical point that seems to be ignored in the NOPR is that while faster-ramping resources can help system operators, a fleet of resources that accurately respond to control signals and can maintain their ramping over a required duration is of even greater importance. The Commission has not demonstrated that its proposed pricing scheme will achieve this particular goal, a goal that is vital to the ISO's maintaining reliable and efficient operations. The ISO therefore supports the development of rules to compensate regulating resources that respond accurately to control signals, as opposed to simply developing compensation rules to support only faster-ramping resources, which appears to be the goal of the NOPR.

³¹ Initial results from the ISO's Renewable Portfolio Standard 33 percent studies are available at the following website: <http://www.caiso.com/23bb/23bbc01d7bd0.html>

IV. The ISO's existing capacity payment for regulation compensates resources for opportunity costs

In its NOPR, the Commission solicits comments on its proposal to compensate regulating resources with a uniform capacity payment that includes the opportunity cost of the marginal regulating resource.³² Under its market, the ISO co-optimizes energy and reserve procurements in both the day-ahead market and the real-time market allowing a regulating resource within an ancillary services region to earn the marginal resource's opportunity cost, which also reflects cross-product opportunity costs.³³

The Commission also solicits comment on whether resources should have the ability to include inter-temporal opportunity costs in their bids. While the ISO co-optimizes energy and ancillary service bids over a trading day for purposes of day-ahead energy and ancillary service awards and takes account of ramping and other constraints as part of that co-optimization, ancillary service marginal prices in the ISO market for regulation do not explicitly reflect inter-temporal opportunity costs. But there is nothing in the ISO's bidding rules to prevent scheduling coordinators from including inter-temporal opportunity costs as part of their bids to supply regulation. As suggested by the Commission's NOPR, inter-temporal opportunity costs may reflect the lost opportunity of generating energy in one interval to provide a capacity product in another market interval. For storage, inter-temporal opportunity costs may involve discharging in one interval and thereby missing the opportunity to discharge in another interval when energy prices are higher, or alternatively, incurring costs by charging during an interval when energy prices are higher. The

³² NOPR at PP 33-36.

³³ ISO tariff section 27.1.2.2. The ISO also recognizes the opportunity cost for regulation procured in its real-time unit commitment process that reflects the opportunity cost of the expected real-time energy and not the actual energy.

Final Rule in this proceeding should not preclude use of a pricing scheme like the ISO's, which although it does not include a formal mechanism to recognize inter-temporal opportunity costs explicitly, also does not preclude scheduling coordinators from including inter-temporal opportunity costs in their bids.

V. The NOPR's proposed performance payment may not reflect the optimum approach for all markets.

In its NOPR, the Commission solicits comments on its pay for performance proposal for regulation resources under which each independent system operator or regional transmission operator would determine the total movement of a resource up and down and then multiply that sum by a price per MW of Area Control Error correction.³⁴ This compensation proposal would pay resources for movement in both the up and down direction and reflect the accuracy of that movement in response to a control signal.

The proposed rule may not reflect the optimum compensation approach. For instance, linking a performance payment to Area Control Error correction may give rise to unintended disputes involving resource performance and its contribution or lack thereof to Area Control Error correction. For example, a resource might challenge its performance payment based on the level of contribution it believes it made to Area Control Error correction. Second, balancing authorities do not necessarily target zero Area Control Error but instead seek to maintain Area Control Error within a specified range.³⁵ Establishing a performance payment incentive based on Area Control Error correction as opposed to accurately responding to a control signal appears to add a level of unnecessary complexity to settle regulation

³⁴ NOPR at P 37.

³⁵ Standard BAL-001-0.1a - Real Power Balancing Control Performance
http://www.nerc.com/files/BAL-001-0_1a.pdf

transactions. System operators would need to tie settlement systems not only to a resource's response to a control signal but also to how that response is measured against correcting Area Control Error. This approach may not be entirely consistent with or necessitated by the balancing authority's needs and specifications. Of particular importance to the instant NOPR is the fact that balancing authorities throughout North America, including the ISO, are participating in a field trial concerning Area Control Error limits.³⁶ The field trial is serving as a proof of concept for draft reliability standard BAL-007 that would change how balancing authorities measure Area Control Error by allowing greater flexibility for deviations between scheduled and actual interchanges when system frequency is stable. In time, it may make sense to design market products and payment streams based on resources' contribution to Area Control Error correction but the ISO believes it is premature to do so while the components of Area Control Error are under review and balancing authorities seek to maintain Area Control Area in a specified range, not simply at zero.

The Commission also solicits comments on whether a pay for performance price should be market based (*i.e.* bid into the market at a price per MWh of ramping capability and a price per MW of ACE correction) or set administratively and whether netting of regulation energy payments remains necessary.³⁷ The ISO believes the design of any performance payment for accurately responding to control signals should reflect a market bid. It is not clear, however, whether the ISO's bid optimization and ultimate performance payment should reflect a resource's pre-

³⁶ http://www.nerc.com/filez/standards/Reliability_Based_Control_FieldTrial_Tools_2007-18-RF.html

³⁷ NOPR at PP 37.

certified ramping capability or a resource's actual performance for which a resource would receive a payment for moving in both the up or down direction. If the ISO develops a performance payment based on the real-time locational marginal price for energy, it will need to address the netting of regulation energy that occurs as part of its existing settlement process. Alternatively, the ISO could continue to net regulation energy payment as real-time imbalance instructed energy based on settlement interval meter data and develop a separate payment for the accuracy of a resource's response to control signals. As referenced above, the ISO has recently initiated a stakeholder process to examine these and other questions pertaining to a pay for performance payment. The ISO strongly urges the Commission to provide sufficient flexibility in any final rule to allow those processes to develop performance payment proposals that match the market characteristics and needs of individual organized wholesale electricity markets.

VI. The proposed rule presents implementation challenges that will take at least 18 months to resolve

The ISO recognizes that the Commission may adopt the proposed rule to apply to all organized wholesale electricity markets. While the ISO does not recommend this approach, if the Commission does proceed to adopt the proposed rule it must allow system operators adequate time to design and implement necessary systems. The ISO will need to ensure its dispatch algorithms in its energy management system function so that the ISO can measure the level of Area Control Error correction provided by regulation resources. This effort will require an assessment of the resources set point before and after a dispatch and some interface between the movement of the regulation resource and Area Control Error correction. As the Commission recognizes in its NOPR, if a system operator receives telemetry data every 10 seconds, "it would be able to measure over the

course of 5 minutes how often the resource was delivering the megawatts requested.”³⁸ The ISO’s energy management system and telemetry readings can largely accommodate this measurement, but the ISO’s downstream systems, including its settlement system, cannot.

As part of system changes, the ISO would need to create a new set charge codes to pay generators for regulation dispatch and allocate those costs to the market. But this administrative work is overshadowed by the need to design, test and implement a settlements system based on the dispatch interval for regulation resources. The changes would require calculating regulation energy on a dispatch interval level, count the number of intervals, and then pay the generator accordingly. Currently, the ISO calculates regulation energy from meter data based on a settlement interval every 10 minutes, which results in netting of regulation energy from dispatches of regulation up and regulation down capacity awards. Obtaining meter generation values every 10 seconds, for instance, in order to calculate regulation energy on a dispatch interval will necessarily create additional implementation work and costs. If the final rule requires the ISO to assess a regulation resource’s actual response to ISO control signals as well as the effect of that response on Area control Error, the ISO will need to build settlement systems based on more granular telemetry. If the settlement of regulation energy occurs on a dispatch interval or more granular settlement interval than that applicable to real-time imbalance instructed energy, the ISO will also need to make changes in real time instructed imbalance energy calculations. The ISO estimates that this effort will require at least 12 months for the ISO to design, test and implement a performance payment mechanism for regulation resources as contemplated by the proposed rule.

³⁸ NOPR at 39.

If the Commission adopts its proposed approach in the Final, it must provide the ISO with a minimum of 18 months after issuance of the Final Rule to implement the necessary systems and processes.

VII. Conclusion

The ISO urges the Commission to provide system operators in organized wholesale electricity markets with the latitude to develop compensation structures for regulation resources, including fast-ramping resources, that meet the characteristics and needs of their individual markets and balancing areas. In this regard, the Commission should allow the ISO to continue to work with its stakeholders to develop a performance payment that rewards accurate response to control signals as part of any final rule in this proceeding. The ISO would ultimately submit any such proposal to the Commission for review and approval under section 205 of the Federal Power Act.

Respectfully submitted,

By: /s/ Anna McKenna

Nancy Saracino

General Counsel

Anthony Ivancovich

Assistant General Counsel

Anna A. McKenna

Senior Counsel

Grant Rosenblum

Senior Counsel

California Independent System

Operator Corporation

250 Outcropping Way

Folsom, CA 95630

Tel: (916) 351-4400

Fax: (916) 608-7296

amckenna@caiso.com

Attorneys for the California Independent
System Operator Corporation

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