140 FERC ¶ 61,206
FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

Before Commissioners: Jon Wellinghoff, Chairman;
Philip D. Moeller, John R. Norris,
Cheryl A. LaFleur, and Tony T. Clark.

California Independent System Operator Corporation   Docket No. ER12-1630-000

ORDER ON COMPLIANCE FILING

(Issued September 20, 2012)

1. On April 27, 2012, the California Independent System Operator Corporation (CAISO) submitted a compliance filing and proposed tariff changes to establish a revised compensation methodology governing the provision of frequency regulation service, as required by Order No. 755.[1] As discussed below, we accept CAISO's compliance filing, subject to conditions, to become effective January 1, 2013. We also require CAISO to make an additional compliance filing within thirty (30) days of the date of this order and an informational report within 14 months of the effective date of the proposed tariff revisions, as discussed herein.

I. Background

A. Frequency Regulation Service

2. Frequency regulation is an ancillary service, as required by the Commission's Orders No. 888 and 890, under the Commission's *pro forma* open access transmission tariff (*pro forma* OATT).[2] It is relied upon by system operators to control both actual and

[1] *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Order No. 755, 76 FR 67,260 (Oct. 31, 2011), FERC Stats. & Regs. ¶ 31,324 (2011), *order denying reh'g*, Order No. 755-A, 138 FERC ¶ 61,123 (2012).

[2] *See Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Pubic Utilities and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, FERC Stats. & Regs. ¶ 31,036 at 31,705 (1996), *order on reh'g*, Order No. 888-A, FERC Stats. & Regs. ¶ 31,048 (1997), *order on reh'g*, Order No. 888-B, 81 FERC ¶ 61,248 (1997), *order on reh'g*, Order No. 888-C, 82 FERC ¶ 61,046 (1998), *aff'd in part and rev'd in part sub nom. Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom. New York v. FERC*, 535

(continued…)

anticipated frequency deviations. A frequency deviation is caused when the supply of dispatched generation, or demand response resources, as measured in Hertz, fails to equal the amount of electricity actually consumed (i.e., load, plus losses), at a given moment. When such a deviation exceeds an acceptable range, the system can be impaired, with major deviations causing generation and transmission equipment to disconnect from the grid.

B. <u>Order No. 755</u>

3. In Order No. 755, the Commission found that the resources relied upon by regional transmission operators (RTO) and independent system operators (ISO) to provide frequency regulation service differ in both their ramping ability, which is their ability to increase or decrease their provision of frequency regulation service, and the accuracy with which these resources can respond to the system operator's dispatch signal.[3] Order No. 755 further found that current compensation policies fail to acknowledge these operational differences. Specifically, Order No. 755 found that existing RTO/ISO compensation methods result in rates that are unjust, unreasonable, and unduly discriminatory or preferential, given that resources are compensated at the same level even when providing different amounts of frequency regulation service.[4] Order No. 755 further found that paying a uniform clearing price that includes opportunity costs would send efficient price signals reflecting the true cost of providing frequency regulation service.[5]

4. To accomplish this objective, Order No. 755 required each RTO/ISO to use market-based mechanisms to select and compensate frequency regulation resources based on a two-part payment methodology. First, Order No. 755 required that a capacity payment be made to a resource to keep its capacity in reserve in the event that it is needed to provide real-time frequency regulation service.[6] Second, Order No. 755 required that performance payments be made, that reflect the amount of work each resource performs in real-time in response to

U.S. 1 (2002). *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, FERC Stats. & Regs. ¶ 31,241, at P 135, *order on reh'g*, Order No. 890-A, FERC Stats. & Regs. ¶ 31,261 (2007), *order on reh'g*, Order No. 890-B, 123 FERC ¶ 61,299 (2008), *order on reh'g*, Order No. 890-C, 126 FERC ¶ 61,228 (2009), *order on clarification*, Order No. 890-D, 129 FERC ¶ 61,126 (2009).

[3] Order No. 755, FERC Stats. & Regs. ¶ 31,324 at P 1.

[4] *Id*. P 64.

[5] *Id*. P 99.

[6] *Id*. P 198.

the system operator's dispatch signal.[7] Order No. 755, however, gave each RTO and ISO discretion in identifying the manner by which it would implement Order No. 755's required two-part payment methodology.[8] Order No. 755 also acknowledged that the market rule revisions required by Order No. 755 contemplate fundamental changes to the way RTOs and ISOs procure and compensate frequency regulation services and that these rule changes may render existing RTO and ISO market power mitigation provisions insufficient to address market power concerns.[9] Accordingly, Order No. 755 required each RTO/ISO to submit revised market power mitigation provisions, as appropriate to their redesigned frequency regulation markets, or explain how their current mitigation methods are sufficient to address market power concerns.

C. CAISO's Existing Rules

5. In its tariff compliance filing, CAISO explains that in its existing market, regulation is a service provided by resources certified to respond automatically to control signals in an upward or downward direction to balance demand and resources in real-time.[10] The CAISO market procures regulation for many reasons including frequency response and market imbalances that occur between 5 minute dispatch intervals as well as for forecast inaccuracies or supply deviations. CAISO uses a regulation forecasting procurement tool to help manage the procurement of regulation in the day-ahead market throughout the operating day based on varying operational needs arising from anticipated demand levels as well as potential changes in generator and intertie schedules.[11] The CAISO market also procures incremental regulation requirements in the real time unit commitment process.[12]

6. As part of its energy management system, CAISO uses regulation resources on automatic generation control to manage the difference between its scheduled and actual

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[7] *Id*. P 199.

[8] *Id*. P 185.

[9] *Id*. P 136.

[10] CAISO April 27, 2012 Tariff Filing (CAISO Tariff Filing) at 3 (citing Appendix A of the CAISO tariff).

[11] *Id*. at 3 (citing CAISO tariff section 8.3.1; CAISO Technical Bulletin 2009-12-02 AS Procurement Regulation dated December 30, 2009. http://www.caiso.com/2494/2494c16876b0.pdf).

[12] *Id*. at 3 (citing CAISO tariff section 8.3.1).

interchange, as well as its share of correcting the frequency of the Western interconnection. Resources qualified for regulation must respond to a control set point.

7. According to CAISO, its market pays resources with regulation awards an ancillary service marginal capacity price established for the ancillary service region in which the resource is located.[13] 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 market interval.[14] For instance, regulation up can substitute for spinning reserve and non-spinning reserve in CAISO's market.[15] CAISO notes that regulation down is the only downward ancillary service and does not substitute for other ancillary services in the CAISO market.

8. Additionally, for resources with a regulation up award that receive a signal from CAISO's energy management system to move from their set point, the CAISO 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. CAISO 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. CAISO states that it is not proposing to change this practice as part of this tariff amendment.[16]

9. CAISO asserts that its current practices satisfy the Commission's requirement that resources providing regulation receive a capacity payment that reflects the marginal unit's opportunity costs.[17]

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[13] *Id*. at 3-4 (citing CAISO tariff section 27.1.2).

[14] *Id*. at 4 (citing CAISO tariff section 27.1.2.2).

[15] *Id*. at 4 (citing CAISO tariff section 8.2.3.5).

[16] *Id*. at 4 (citing Order No. 755, FERC Stats & Regs ¶ 31,324 at P 161, wherein the Commission stated it will take no action on net energy balancing and that ISOs and RTOs may retain their current rules.).

[17] *Id*. at 2.

D. CAISO's Compliance Proposal

10. CAISO states that its tariff amendments encompass three general categories: (1) amendments to implement a uniform capacity payment for resources providing regulation that includes the marginal unit's opportunity costs; (2) amendments to establish a performance payment that reflects the quantity of regulation service provided by a resource when the resource accurately follows a dispatch signal; and (3) amendments to address ramp-rate certification requirements and a minimum performance threshold for resources providing regulation. Beyond proposed maximum and minimum bid prices for mileage bids, CAISO states that it does not believe any additional mitigation measures are necessary at this time to implement the compensation approach directed by Order No. 755 for resources providing regulation.

1. Two-Part Compensation for Regulation Service

11. Under CAISO's proposal, regulation resources will be required to submit a two-part offer, consisting of a capacity offer and a mileage offer. That is, CAISO proposes to accept separate capacity and mileage bids for resources bidding to provide regulation service.

a. Uniform Capacity Payment Including Opportunity Costs

12. For the capacity component, CAISO indicates that under its two-part offer proposal regulation up and regulation down will continue to have separate ancillary service marginal prices, and that those capacity prices will continue to include the opportunity cost, if any, of the marginal resource in the ancillary service region for not providing energy or other types of ancillary services that it is capable of providing in the relevant CAISO market interval. CAISO indicates that continuing to use the established ancillary service regions within its system to price capacity ensures that resources receive a uniform market clearing price and that CAISO procures sufficient regulation distributed across its system to operate the grid reliably.[18] CAISO also indicates that the current ancillary service bid cap of $250 will continue to apply to regulation capacity bids.[19]

13. CAISO adds that its existing regulation market provides for a uniform capacity payment, and that it is amending its tariff to allow resources to calculate and submit their own inter-temporal opportunity costs with their regulation up and regulation down capacity bids, subject to the requirement that the inter-temporal opportunity costs be verifiable. With this tariff change, CAISO states that its practices satisfy the Commission's requirement that

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[18] *Id*. at 5-6.

[19] *Id*. at 6.

resources providing regulation service receive a uniform capacity payment that reflects the marginal unit's opportunity costs.

b. Mileage & Performance Payment

14. CAISO states that its proposed tariff amendments include several provisions to implement a performance payment for regulation up and regulation down. These provisions include: (1) establishing a mileage requirement in order to calculate uniform market clearing prices for performance payments to resources providing regulation; (2) measuring regulation performance, including the accuracy of a resource's response to CAISO's dispatch signal; (3) modifying bidding rules for resources using regulation energy management; (4) calculating mileage bids costs; (5) calculating regulation performance payments; (6) allocating costs for performance payments; (7) calculating mileage market clearing prices for regulation up and down based on mileage awards; and (8) adopting parameters for mileage bids.

i. Establishing a mileage requirement

15. CAISO indicates that it will establish a mileage procurement requirement in order to calculate a uniform market clearing price based on mileage bids for performance payments to resources providing regulation. The mileage requirements for either regulation up or regulation down will reflect the smallest of: (a) the product of the respective regulation capacity requirement and the system mileage multiplier; or (b) the average instructed mileage for the applicable trading hour from the prior calendar week; or (c) the product of a resource's resource-specific mileage multiplier and a resource's self-provided or bid-in regulation capacity, which number is then summed for all resources. The mileage requirement is subject to operator adjustment to reflect system needs. CAISO adds that the term "mileage" refers to the service provided by a resource with a regulation up and regulation down capacity award in response to CAISO's energy management system signal. The term "system mileage" multiplier refers to a quantity reflecting expected mileage from 1 MW of regulation up and regulation down capacity in a given hour.

16. CAISO also indicates that it will calculate a resource-specific mileage multiplier based on the historic accuracy of the particular resource and its certified 10-minute ramp capability. For any settlement period in which it is necessary to procure regulation capacity, CAISO will establish an explicit mileage requirement. Currently, the CAISO market implicitly purchases mileage (or the ability of a resource to move in response to a control signal) through regulation capacity awards. This attribute is implicit in regulation capacity, and CAISO is not proposing to change how it establishes regulation capacity procurement requirements. CAISO states that its method for calculating a mileage requirement ensures that the market price for a performance payment reflects the capability of resources to supply sufficient mileage.

ii. Bidding Rules Modification

17. According to CAISO, the proposed tariff revisions related to regulation energy management allow greater participation by non-generator resources in CAISO's ancillary services market. CAISO explains that these resources have the capability to be dispatched to any operating level within their operating range, but they are subject to constraints with respect to the amount of energy they can generate or curtail. This type of resource can include, but is not limited to, battery storage, flywheel storage, and dispatchable demand response. CAISO adds that these tariff proposals clarify that resources using this market enhancement may submit both regulation capacity and regulation mileage bids.

iii. Adopting Parameters for Mileage Bids

18. CAISO proposes to revise tariff section 30.5.2.6.1 to indicate that scheduling coordinators submitting mileage bids must state a bid price in dollars separately for regulation up and regulation down. CAISO also proposes to modify tariff section 30.7.3.1 to state that if scheduling coordinators with self–provided or bid-in regulation capacity do not submit a mileage bid, CAISO will generate a $0 mileage bid on their behalf. CAISO also proposes to establish a maximum mileage bid price of $50 and minimum mileage bid price of $0. CAISO's current maximum ancillary service bid price is $250. For purposes of establishing the maximum mileage bid price, CAISO assumed a mileage multiplier of 5 and divided the current $250 regulation capacity maximum bid price accordingly.

iv. Calculating Mileage Bid Costs

19. CAISO proposes tariff revisions to describe the calculation of mileage bid costs in the day-ahead market and real-time market for purposes of any bid cost recovery. Bid cost recovery is CAISO's settlement process by which resources recover their bid costs. CAISO proposes to treat mileage bids in the same manner as regulation up and regulation down capacity bids for purposes of calculating bid cost recovery. CAISO states that revisions to tariff sections 11.8.2.1.6 and 11.8.4.1.6 specify that ancillary services bid costs shall include mileage bid costs.

v. Calculating Uniform Mileage Market Clearing Prices

20. CAISO proposes a new tariff section 27.1.3 to describe the calculation of uniform mileage market clearing prices for regulation up and regulation down across CAISO's system. These prices will serve as the basis for performance payments that will reflect instructed mileage as adjusted by a resource's accuracy in responding to CAISO's dispatch signal. This new tariff section provides that CAISO will calculate market clearing prices across its expanded system region based on the intersection of the demand curve for mileage requirements and supply curve for bid-in mileage. CAISO will publish on its open access same-time information system the market clearing prices for each hour of the day-ahead market and each fifteen (15) minute period in real-time for each trading day.

vi. Measuring Regulation Performance

21. CAISO indicates that it will measure regulation performance, which includes the accuracy of a resource's response to CAISO's energy management system, as well as CAISO's adjustment to a resource's under-response to CAISO's set point instructions. CAISO adds that it will use automatic generation control data based on actual telemetered data to determine a resource's accuracy and will calculate an accuracy percentage based on actual telemetered data for each 15 minute interval. CAISO will apply the resource's accuracy percentage to the instructed mileage to calculate performance payments to a resource. To the extent a resource does not receive a regulation capacity award or if its capacity award or self-provided capacity is rescinded, the resource cannot receive a performance payment. CAISO indicates that to receive a performance payment, a resource must provide regulation service in response to CAISO's dispatch signal.

22. CAISO explains that to the extent a resource under-responds to an initial dispatch instruction and the next signal that the CAISO energy management system sends to the resource changes direction, CAISO will adjust the resource's set point deviation to prevent a resource from benefitting from its under-response in the prior interval. The adjusted automatic generation control set point will reflect the automatic generation control set point to which the energy management system signal directed the resource to move in the prior interval.

23. CAISO also proposes to use the measurements of a resource's historical accuracy as well as a resource's certified ramp rate to determine resource specific expected mileage. In other words, these parameters provide the basis for an estimate of the maximum of mileage that the resource can provide from each MW of awarded regulation capacity and therefore sets the maximum mileage the resource can provide for purposes of the optimization. According to CAISO, doing so allows CAISO to assess a resource's capability to respond accurately to a dispatch signal in awarding capacity as well as in a performance payment. CAISO proposes to calculate this accuracy factor each month on a thirty (30) day simple average of 15 minute accuracy measurements.

vii. Calculating Regulation Performance Payments

24. CAISO proposes to add a new tariff section 11.10.17 to describe performance payments to resources providing regulation. This tariff language provides that resources supplying mileage from contracted or self-provided regulation capacity in the day-ahead market will be paid a mileage clearing price for each MW of instructed mileage during the settlement period. Instructed mileage is the absolute change in automatic generation control set points between each four (4) second interval. CAISO will adjust a resource's mileage payments by applying accuracy percentages calculated for each resource based on the resource's response to energy management system signals.

viii. Allocating Costs for Performance Payments

25. CAISO proposes to add new tariff sections 11.10.2.1.5 and 11.10.2.2.4 to address the allocation of performance payments for regulation down and regulation up, respectively. In short, CAISO proposes to allocate these costs in the same manner that it allocates the costs of regulation up and down capacity payments. Similar to regulation capacity, CAISO will allocate performance payments made to resources based on a scheduling coordinator's ancillary service obligations. Performance payments for resources with regulation up awards will be allocated to scheduling coordinators with regulation up ancillary service obligations. Performance payments for resources with regulation down awards will be allocated to scheduling coordinators with regulation down ancillary service obligations.

c. Ramp-rate Certification Requirements and a Minimum Performance Threshold

26. CAISO proposes to modify its tariff to specify the maximum regulation capacity that a resource may offer in either the day-ahead market or real-time market. CAISO explains that currently the CAISO tariff sets the maximum regulation capacity that a resource may offer as the amount reached within a period that may range from a minimum of 10 minutes to a maximum of 30 minutes, as such period may be specified by CAISO. CAISO proposes to modify tariff section 8.4.1.1(c) to standardize the duration of the ramping interval to 10 minutes. CAISO explains that by using the 10 minute ramp, the certification process will use the same ramp measurement interval for regulation, spinning reserves and non-spinning reserves.

27. CAISO also proposes to establish a minimum performance threshold for resources providing regulation. In order to calculate payments to regulation resources based on the accuracy of their response to CAISO's dispatch signal, CAISO will collect data on individual resource performance. CAISO proposes to include language within new tariff section 8.2.3.1.1 to establish this minimum performance threshold at 50 percent accuracy for both regulation up and regulation down as measured over a calendar month.[20] If a resource violates the minimum performance threshold, the resource will have ninety days to re-certify to provide regulation from the date CAISO provides notice to the scheduling coordinator. If the resource does not re-certify within the ninety days, CAISO will change the master file to reflect that the resource is no longer certified to provide regulation. CAISO also proposes to amend tariff sections 8.4.1.1 and Appendix K, Part A of its tariff to reference the minimum performance threshold as a requirement for providing regulation services. In the event a resource falls below the minimum performance threshold for one regulation service (e.g. regulation down), the resource will only be required to re-certify to

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[20] Accuracy is the absolute value of a resource's actual telemetered data compared to the resource's automatic generation control set point in a given regulation interval.

provide that regulation service. CAISO may request changes to the minimum performance threshold as it gains more experience with performance payment for regulation services.

2. Mitigation and Potential Market Manipulation

28. CAISO explains that Order No. 755 requires that RTOs and ISOs either submit tariff provisions for market power mitigation methods appropriate to their redesigned regulation markets or explain how their current mitigation methods are sufficient to address market power concerns. In response to that requirement, CAISO indicates that it is proposing to co-optimize mileage awards with regulation capacity and energy. CAISO also adds that it is proposing a minimum and maximum mileage bid price. By co-optimizing mileage awards with regulation capacity and energy bids, CAISO seeks to ensure that resources that receive awards to provide regulation capacity will also meet mileage requirements at just and reasonable prices. For these reasons, CAISO believes that this design sufficiently addresses any market power concerns.[21]

29. CAISO explains that its Department of Market Monitoring issued a memorandum supporting CAISO's proposal.[22] According to CAISO, the Department of Market Monitoring does not recommend pursuing mitigation options to bid cost recovery or to limit mileage bids beyond constraining the mileage maximum bid price to $50. CAISO states that the Department of Market Monitoring has determined that the market for regulation is highly competitive due to a large amount of overall supply relative to regulation capacity requirements. In the near future, it is likely that competition from these existing resources will ensure that regulation capacity prices continue to be low, and that there will be a similar impact on mileage prices. In addition, the Department of Market Monitoring observes that there are currently few, if any, very fast ramping resources providing regulation in CAISO's market that have the opportunity and incentive to employ a bidding strategy aimed at increasing bid cost recovery payments. Fast ramping resources providing regulation in the current market are typically hydro-electric resources, which are owned by the regulated load serving entities. CAISO adds that the Department of Market Monitoring expects that participation by substantial amounts of new merchant resources capable of providing very fast ramping regulation − such as battery storage or flywheels – may only occur over a much longer time horizon and, accordingly, recommends that CAISO monitor market performance after implementation and be prepared to modify software or market rules as appropriate.[23]

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[21] *Id*. at 13-14.

[22] *Id*. n.31.

[23] *Id*. at 15.

30. CAISO also indicates that its Market Surveillance Committee issued an opinion supporting CAISO's approach to implement Order No. 755. However, the Market Surveillance Committee raised market efficiency concerns that may result from the difference between the actual mileage provided by resources that receive compensation and the expected mileage from resources CAISO calculates for purposes of conducting its market optimization. The Market Surveillance Committee also identified concerns that fast ramping resources may employ a bidding strategy to extract excessive bid cost recovery payments when such resources submit low capacity bids accompanied by high mileage bids. CAISO intends to monitor market outcomes and will propose adjustments to its market design as necessary, if these issues materialize.[24]

31. Finally, because many design elements of this proposal are based upon historical data, CAISO believes it is prudent to evaluate the design and determine if any modifications are necessary. Therefore, CAISO proposes to conduct an operational review based on one year of data after this enhancement reaches production to evaluate CAISO's design, including, but not limited to, the appropriateness of the minimum performance threshold level, the historical data used to calculate the mileage multiplier, whether the regulation capacity procurement target should reflect historical accuracy of resources, the level of the mileage maximum bid price and mileage scarcity price, and the change in resource participation in regulation under the new compensation mechanism. Thereafter, CAISO will continue to monitor its market design and will propose software or market rule changes as appropriate.

3. CAISO's Response to Staff Deficiency Letter

32. In response to a Commission staff issued deficiency letter, CAISO provided an expanded explanation of its proposal. CAISO states that its proposed amendments start with the calculation of resource-specific mileage multipliers and end with settling transactions in which resources provide regulation capacity and respond to CAISO's control signal. CAISO states it will adjust a resource's performance payment based on the accuracy with which the resource responded to CAISO's control signal.[25]

33. For purposes of establishing marginal clearing prices for capacity and mileage, CAISO states it will adopt a methodology that clears self-provided and bid-in capacity and mileage against the requirements for each component of regulation service. CAISO states that separate constraints in its co-optimization meet the requirements for regulation capacity and mileage. The shadow prices of the capacity requirement constraint and the mileage

[24] *Id*. at 14, n.30.

[25] CAISO July 6, 2012 response (CAISO Response) to June 8, 2012 Commission Deficiency Notice at 4.

requirement constraint represent the market-based clearing prices for each attribute of regulation service. CAISO states that its optimization also models known transmission and resource constraints as part of the day-ahead and real-time residual unit commitment market runs.[26]

34. CAISO states that the market co-optimization determines the most efficient solution to meet the CAISO system's energy, ancillary services, and regulation mileage requirements. Further, CAISO states the co-optimization also enforces a minimum and maximum mileage award constraint for each of the resources with self-provided or submitted bids to provide regulation service. CAISO states that a resource must receive a regulation mileage award no less than its regulation capacity award and its mileage award may not exceed the product of the resource-specific mileage multiplier and awarded regulation capacity. CAISO states that these constraints establish a link between individual resource's mileage awards and capacity awards, but still allow for resources to set marginal prices for mileage and capacity separately. CAISO asserts that this design is consistent with the principle of establishing a uniform clearing price for mileage that takes into consideration expected resource performance.[27]

35. CAISO indicates that it has developed the following ten step process that explains its bid to payment process with respect to two part compensation for regulation service.[28]

36. The first step requires CAISO to calculate resource-specific mileage multipliers to identify the maximum mileage award that a resource can receive through the market optimization. This resource-specific mileage multiplier reflects an individual resource's historical performance accuracy and certified ramp capability. Because CAISO expects that regulation resources receiving capacity awards will be dispatched, CAISO has adopted a minimum resource-specific multiplier of 1 which reflects that a resource will move 1 MW per hour for every MW of awarded capacity. This step also includes the calculation of an hourly system mileage multiplier by summing the total mileage from all resources over the prior week for the given hour and dividing that number by the regulation capacity procured for the week for that hour.

37. The second step requires that CAISO determine a regulation capacity and mileage requirement. CAISO states that it procures 100 percent of its day-ahead forecasted ancillary services requirements in the day-ahead market. This procurement is based on a forecasting tool that calculates the amount of regulation up and regulation down capacity needed for

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[26] *Id*.

[27] *Id*. at 6.

[28] *Id*. at Exhibit A.

each hour based on changes in the demand forecast, generation self-schedules, and hourly intertie fluctuation. CAISO indicates that it is not proposing to change how it calculates the regulation capacity requirement in this tariff amendment. The mileage requirements for either regulation up or regulation down will reflect the minimum of: (a) the product of the respective regulation capacity requirement and the system mileage multiplier; (b) the average instructed mileage for the applicable trading hour from the prior calendar week; or (c) the product of a resource's resource-specific mileage multiplier and a resource's self-provided or bid-in regulation capacity, which number is then summed for all resources.

38. The third step requires that CAISO accept bids and submissions to self-provide from market participants. CAISO states that market participants will submit economic bids and quantities for regulation capacity and may also submit self-provision of regulation capacity. According to CAISO, the market optimization considers cross-product opportunity costs as well as opportunity costs of providing the capacity in one interval as opposed to another across the time horizon of the optimization. The horizon for the day-ahead market is 24 hours. In the real-time unit commitment process, the time horizon is up to 4 hours. CAISO also indicates that it will permit a resource to include additional inter-temporal opportunity costs as part of the resource's capacity bid in either the day-ahead or real-time market.

39. With respect to mileage, market participants may submit economic bids but no quantities. Similarly, market participants may also self-provide mileage, which CAISO will treat as a $0 bid. The quantity of a mileage award that a resource may receive is based upon the minimum and maximum resource-specific mileage multipliers calculated in Step 1. Mileage awarded through the market optimization is not financially binding. Instead, resources are compensated for their actual response to CAISO's control signal at the mileage marginal clearing price, subject to an accuracy adjustment.

40. According to CAISO, resources with faster ramp capability may receive greater mileage awards than resources with slower ramp capability. Similarly, resources with historic accuracy measurements that are higher than the system wide accuracy may also receive greater mileage awards. According to CAISO, if a resource can ramp within one minute to its full regulation capacity it will be awarded ten times the mileage of a resource that requires 10 minutes to reach its full regulation capacity. If resources have similar ramp capability, then a resource with 100 percent accuracy could receive an award that is twice that of a resource with 50 percent accuracy.

41. The fourth step requires that CAISO co-optimize energy, regulation capacity, mileage and ancillary services in both the day-ahead and real-time markets. CAISO indicates that its proposed changes to the market optimization follow two guiding principles: (1) avoid disruptions to the current regulation capacity market design, including allowing regulation up to substitute for spinning reserve and non-spinning reserve when it is economic for CAISO's market optimization to make such substitutions; and (2) determine a uniform clearing price for mileage that takes into consideration expected performance even though CAISO will only compensate resources for actual performance. CAISO's proposed

optimization formulation applies two constraints (regulation capacity and mileage) for each resource. This formulation allows a resource to receive an award for regulation capacity, while potentially not being awarded mileage that is in a fixed proportion to the awarded regulation capacity. This approach also ensures that independent shadow prices are calculated for regulation capacity and mileage. If a resource receives a mileage award below its mileage bid the resource will be eligible for bid cost recovery.

42. The fifth step requires that CAISO issue financially binding energy and ancillary service capacity awards. All cleared resources receive a capacity payment at the regulation capacity marginal clearing price for its region for each MW of awarded capacity. Unlike capacity awards, CAISO does not pay participants for self-provided capacity. Instead, self-provided regulation capacity reduces a market participant's ancillary services obligation by the value of the self-provided capacity. In the event the market clearing price is below a resource's regulation capacity bid, the resource is eligible for bid cost recovery as outlined in the ninth step described below.

43. The sixth step requires that CAISO issue non-financially binding mileage awards. While a resource is awarded mileage in the market optimization, awarded mileage is not financially binding. Instead, the market optimization establishes the uniform marginal clearing price that CAISO uses to compensate resources based on instructed mileage as adjusted for accuracy.

44. The seventh step requires that CAISO calculate instructed mileage, under-response adjustment, and accuracy to determine resource performance. CAISO defines instructed mileage as the absolute change in automatic generation control set points between 4 second intervals. Accuracy is the absolute value of a resource's actual telemetered data compared to the resource's automatic generation control set point in a given regulation interval. CAISO considers positive and negative deviations equally in assessing the accuracy of the resource's response to a control signal.

45. Under this proposal, CAISO calculates resource-specific performance based on instructed mileage as adjusted for accuracy. CAISO will measure the accuracy of a resource's response to CAISO's control signal as the absolute value of the difference between the set point and actual telemetered data for each 4 second regulation interval. On a 15 minute basis, CAISO will sum a resource's automatic generation control set points for each 4 second regulation interval. CAISO will then sum the total deviations from the set point for each 4 second regulation interval. The sum of the resource's set points less the sum of total deviations bounded by zero will then be divided by the resource's sum of set points. The resulting performance percentage will reflect the accuracy of the resource in responding to CAISO's control signal for each fifteen minute interval. The accuracy percentage value can range from 0 to 100 percent. According to CAISO, because a resource's mileage is based on changes in automatic generation control set points, CAISO will also adjust a resource's mileage when the resource under-responds in an interval prior to a change in the direction of a control signal to avoid overpayments and underpayments for mileage.

46. The eighth step requires that CAISO perform the settlement of the mileage with a performance adjustment. CAISO will reduce the resource's instructed mileage in the 15 minute interval by the sum of under response adjustments to determine the quantity of mileage, subject to an accuracy adjustment. CAISO will then apply a percentage to the resource's mileage to calculate a performance payment for the 15 minute interval.

47. The ninth step requires that CAISO examine mileage revenue and costs for bid cost recovery. Because CAISO uses two constraints to establish the market clearing price for mileage, there may be instances in which a resource receives a mileage award when the market clearing price of mileage is below the resource's mileage bid. As a result, CAISO proposes to include mileage revenue and costs as part of bid cost recovery calculations. For each market process, CAISO will include mileage revenue and costs based upon actual compensated mileage (i.e. instructed mileage less the under-response adjustment and multiplied by the resources accuracy adjustment). CAISO indicates that its current tariff already provides for bid cost recovery for regulation capacity and through this amendment bid cost recovery will also apply to mileage. CAISO's bid cost recovery rules include day-ahead, residual unit commitment and real-time transactions. In each market process, CAISO compares market revenue to bid costs to evaluate a resource's revenue shortfall or surplus. CAISO then nets the shortfall or surplus across all market processes. In the event of a shortfall, CAISO provides for a payment to compensate a resource for the shortfall. CAISO evaluates bid cost recovery for each resource on each trading day.

48. The tenth step requires that CAISO include historical performance tracked for establishing resources specific mileage multipliers in the first step and mileage requirement in the second step. CAISO proposes to incorporate resources' historical performance into future market optimizations. It will use a historical system-wide mileage multiplier as a variable to determine the mileage procurement target. A resource's accuracy is used to determine the resource's maximum resource specific mileage multiplier. The use of historical performance information will help CAISO select the optimal portfolio of resources to meet regulation capacity and mileage requirements.

49. In addition, CAISO indicates that the assumed mileage multiplier of 5 used to establish the maximum mileage bid price of $50 was established based upon historical operating information. The actual data yielded a multiplier of 4.55 which was rounded up to 5.

50. CAISO also states that its energy management system receives information on regulation awards from its market systems every fifteen minutes. Once the energy management system receives updates on self-provided or awarded regulation capacity, the system calculates regulation high and low limits based on resources' dispatch operating targets and real-time availability, which is informed in part by resource and transmission outages and de-rates. The energy management system then issues control set points to resources on automatic generation control within the calculated regulation limits. CAISO's software calculates participation factors for resources with self-provided or awarded regulation capacity based on each resource's *pro rata* share of regulation awards. For

example, if there are ten regulation units, each unit will have a 10 percent participation factor; and the participation factors of all resources providing regulation capacity will sum to 100 percent. If resources are not able to respond to control signals within 8 seconds (the time required for a round trip of CAISO's 4 second control signal to and from the resource), then CAISO will move other units to fulfill CAISO's regulation requirements. Thus, CAISO's energy management system does not include a priority dispatch for resources with faster-ramping capability. However, CAISO can configure the system to send control signals to faster ramping resources to the extent CAISO requires a fast response to correct area control error.

4. **Effective Date**

51. CAISO requests that the Commission make the tariff revisions contained in its filing effective as of April 9, 2013. In order to establish this requested effective date, CAISO requests that the Commission waive the requirement of 18 C.F.R. § 35.3 that a rate schedule be filed not more than 120 days from the effective date. CAISO acknowledges that the Commission directed ISOs and RTOs to file tariff changes to implement Order No. 755 within 120 days of its effective date, or by April 30, 2012.[29] However, CAISO also notes that Order No. 755 indicated that the Commission would allow an additional 180 days from April 30, 2012 for ISOs and RTOs to implement the final rule.[30] CAISO bases its request for additional compliance time on language in a Commission notice denying ISO-New England's November 21, 2011 request for an extension of time to develop necessary software changes and associated business procedures necessary to implement Order No. 755. In denying the request, the Commission stated that that ISO-New England could reassert arguments pertaining to the implementation deadline of Order No. 755 when it submits its compliance filing.[31] CAISO states that granting its request for extension of time to implement Order No. 755 until April 9, 2013 would be consistent with the Commission's notice addressing ISO-New England's request.[32]

52. CAISO asserts that good cause exists to accept this implementation date. CAISO states it has already committed and will continue to commit significant resources to develop and implement a market design for a regulation performance payment. Further, CAISO states that implementing this functionality is a bid-to-bill endeavor and requires changes to

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[29] Order No. 755, FERC Stats. & Regs. ¶ 31,324 at P 201.

[30] *Id*.

[31] Notice Denying Extension of Time in Commission Docket RM11-7, dated December 13, 2011.

[32] CAISO Tariff Filing at 17, 18.

software across CAISO's market systems. CAISO notes that existing market participants also require the opportunity to test their own systems and validate that the functionality is working through a market simulation. Coincident with these efforts, CAISO states that its release planning process anticipates significant new functionality in the fall of 2012. CAISO explains that it must coordinate a performance payment for regulation with these other enhancements, some of which the Commission has directed CAISO to implement. Finally, CAISO contends that emerging resources need to take steps to interconnect to the grid to take advantage of a regulation performance payment. According to CAISO, extending implementation until the spring of 2013 will not prejudice any market participants and will promote greater assurance of a successful market launch of this functionality.[33]

II. Notice of Filing and Responsive Pleadings

53. Notice of CAISO's compliance filing was published in the *Federal Register*, 77 Fed. Reg. 27,041 (2012), with interventions and protests due on or before May 18, 2012. ENBALA Power Networks (USA), Inc. and the NRG Companies[34] filed timely motions to intervene. Pacific Gas and Electric Company (PG&E), California Department of Water Resources State Water Project (SWP), Southern California Edison Company (SoCal Edison), the California Energy Storage Alliance (CESA), Beacon Power, LLC (Beacon Power), and the Energy Storage Association filed timely motions to intervene and comments.

54. On June 4, 2012, CAISO filed an answer (CAISO Answer) responding to the comments and protests.

55. On June 8, 2012, Commission staff issued a deficiency letter identifying specific issues that required additional information. CAISO filed a response (CAISO Response) to the deficiency letter on July 6, 2012. Notice of CAISO's response was published in the *Federal Register*, 77 Fed. Reg. 43,071 (2012) with comments due on or before July 30, 2012. None was filed.

[33] CAISO Tariff Filing at 17-18.

[34] For the purposes of this proceeding, the NRG Companies are NRG Power Marketing LLC, Avenal Solar Holdings LLC, Cabrillo Power I LLC, Cabrillo Power II LLC, El Segundo Power LLC, Long Beach Generation LLC, NRG Solar Blythe LLC, and NRG Solar Roadrunner LLC.

III. Discussion

A. Procedural Matters

56. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2012), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

57. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2012), prohibits an answer to a protest unless otherwise ordered by the decisional authority. We will accept CAISO's answer because it has provided information that assisted us in our decision-making process.

B. Comments, Protests, and CAISO Answer

58. PG&E supports CAISO's proposed implementation date and agrees with CAISO's description of the effort needed to implement a performance payment for regulation. PG&E also agrees with CAISO's assessment that extending implementation until the spring of 2013 will promote greater assurance of a successful market launch.[35]

59. CESA states that it supports the substance of CAISO's proposed tariff revisions; however, CESA encourages CAISO to accelerate its implementation process to the maximum extent possible consistent with direction given by the Commission.[36] Similarly, Beacon Power and the Energy Storage Association express overall support for CAISO's proposed tariff revisions and are pleased with the approach CAISO is using to comply with Order No. 755.[37] However, Beacon Power asserts that CAISO's proposal to delay implementation until spring 2013 could have a detrimental impact on Beacon Power. According to Beacon Power, it submitted a request to interconnect a 20 MW flywheel-based regulation plant with a proposed commercial operation date of September 30, 2014, and that the procurement of major equipment must commence 18 to 24 months in advance or fall 2012 to Spring 2013 in order to achieve the proposed commercial operation date.[38] Beacon asserts that its investors assumed they would have adequate time to analyze the new market design prior to commencing procurement of major equipment because the revisions required by Order No. 755 would be implemented in October 2012. If CAISO is permitted

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[35] PG&E Comments at 3-4.

[36] CESA Comments at 3, 5.

[37] Beacon Power Comments at 4; Energy Storage Association Comments at 3.

[38] Beacon Power Comments at 7.

to delay the implementation of its tariff revisions until April 2013, Beacon Power claims that it will most likely delay the development and construction of its 20 MW flywheel project, and this delay will cause financial harm to Beacon Power.[39]

60. Similarly, the Energy Storage Association asserts that CAISO cannot attract significant investment if it delays implementing the tariff changes necessary to permit fast-acting and accurate resources to be paid on a comparable basis to other resources.[40] Therefore, Beacon Power and the Energy Storage Association request that the Commission direct CAISO to implement its tariff changes by October 27, 2012, in accordance with the mandates in Order No. 755.[41]

61. PG&E and SoCal Edison argue that CAISO's proposal to allocate performance payments for regulation up and regulation down service to load is not just and reasonable.[42] PG&E and SWP assert that performance payments for regulation will not be driven solely by load, and that these costs should be allocated based on cost causation principles.[43]

62. SoCal Edison argues that there is a disconnect between the day-ahead optimization and the physical dispatch system, and this disconnect may yield a bid cost recovery discrepancy when participants have low capacity bids but high mileage bids.[44] SoCal Edison contends that because revenues and costs are calculated for bid cost recovery purposes using instructed mileage, unduly high bid cost recovery may be allowed in certain cases where a party receives instructions but does not follow them accurately.[45] To remedy this, SoCal Edison states that the bid cost recovery formulas instead should work off of accuracy-adjusted actual mileage. SoCal Edison asserts that accuracy-adjusted actual mileage within a period should be defined as the sum of the absolute value of incremental instructed movement less any under-response adjustment, with all subject to an accuracy adjustment.[46] SoCal Edison contends that by calculating bid cost recovery based on actual

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[39] *Id.* at 7-8.

[40] Energy Storage Association Comments at 8-9.

[41] Beacon Power Comments at 9; Energy Storage Association Comments at 9.

[42] PG&E Comments at 4; SoCal Edison Comments at 2.

[43] PG&E Comments at 4; SWP Comments at 2.

[44] SoCal Edison Comments at 3.

[45] *Id.* at 4.

[46] *Id.*

performance adjusted for accuracy, bid cost recovery will not create a windfall for poor performers and at the same time will ensure full compensation for units that follow dispatch signals.[47]

63. SoCal Edison asserts that CAISO's formulation for mileage awards in the optimization may result in awarding as few miles as possible to units with expensive mileage bids, but during actual dispatch, using many more miles than the optimization assumed would be used. SoCal Edison argues that due to the constraints for pay for performance regulation, the clearing prices for capacity or mileage may be lower than an awardee's individual bids for either capacity or mileage.[48] However, according to SoCal Edison, the total combined payment of capacity and mileage will always cover the combined bid cost if the actual mileage dispatched is the same number of miles selected by the optimization. SoCal Edison asserts that it is highly unlikely that the dispatched and selected miles will be the same, and thus the potential for unanticipated bid cost recovery can occur. SoCal Edison argues that the Commission should direct CAISO to include a tunable parameter that can limit the lower range of the mileage award in the day ahead optimization to address this bid cost recovery issue.[49]

64. Additionally, SoCal Edison seeks clarification that any self-provided regulation will be treated so that the associated capacity bid is $0/MWh and the associated mileage bid is $0. SoCal Edison also asks that the Commission direct CAISO to clarify that the $0 values will be used both in determining clearing prices and in calculating bid cost recovery for the portion of the unit self-providing regulation.[50]

65. In its Answer, CAISO argues that the Commission should not require CAISO to modify its cost allocation rules for regulation services in this proceeding. CAISO posits that such a requirement exceeds the scope of the compliance directive of Order No. 755.[51] CAISO states that in Order No. 755, the Commission did not direct independent system operators or regional transmission operators to revise the manner in which they allocate costs for regulation service to market participants. CAISO states that in its tariff amendment, it proposes to allocate the cost of regulation performance payments to

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[47] *Id*. at 5.

[48] *Id*. at 6.

[49] *Id*. at 8.

[50] *Id*.

[51] CAISO Answer at 3.

scheduling coordinators with ancillary service obligations.[52] CAISO states that this approach is identical to manner in which CAISO currently allocates the cost of regulation capacity payments.[53]

66. In its Answer, CAISO requests that the Commission not direct CAISO to modify its cost allocation rules for regulation services in this proceeding by a date certain.[54] CAISO concedes that the comments filed by PG&E, SoCal Edison and SWP underscore that it is important to reexamine cost allocation issues in an environment in which load as well as supply contribute to variability on the electric system.[55] CAISO explains that it has commenced this effort by identifying cost allocation principles to help guide a dialogue with stakeholders. According to CAISO, it briefed its Board of Governors on these principles in May, explaining that initially CAISO intends to apply these principles to its flexible ramping product that CAISO is currently developing.[56] As part of that briefing, CAISO explained that it intends to commence a stakeholder initiative later this year to review cost allocation for existing market products to ensure CAISO is allocating the costs of those products consistent with the identified cost allocation principles. However, CAISO states that this process will require a significant amount of resources and stakeholder input and, as of the time of the filing the CAISO Answer, it has not established a schedule to address the allocation of regulation costs under these cost allocation principles.

67. In its Answer, CAISO states that it is willing to modify its bid cost recovery rules to address the concerns expressed by SoCal Edison, i.e., to require CAISO to calculate bid cost recovery for mileage based on actual performance of a resource rather than instructed mileage.[57] CAISO also agrees in principle with SoCal Edison's proposal to apply a tunable parameter to adjust resource-specific mileage awards to mitigate instances in which CAISO

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[52] *Id*. at 3 (citing CAISO Tariff Filing at 11-2 and proposed tariff sections 11.10.2.1.5 and 11.10.2.2.4).

[53] *Id*. (citing CAISO tariff sections 11.10.2.1.1 and 11.10.2.2).

[54] *Id*. at 4.

[55] *Id*. at 3.

[56] *Id*. (citing May 9, 2012 Memorandum to ISO Board of Governors Briefing on Cost Allocation Guiding Principles. http://www.caiso.com/Documents/BriefingCostAllocationGuidingPrinciples-Memo-May2012.pdf).

[57] *Id*. at 4.

may dispatch resources for more mileage than CAISO estimated the resource would provide as part of the market optimization to determine clearing prices for mileage.[58]

68. Accordingly, CAISO proposes to make the following incremental changes to tariff sections 11.8.2.1.6 and 11.8.4.1.6 on further compliance to address SoCal Edison's concerns. (The underscored language in grey shading reflects incremental proposed additions as compared to the black line version of these sections filed on April 27, 2012):

> **11.8.2.1.6 IFM AS Bid Cost**
>
> For any Settlement Interval, the IFM AS Bid Cost shall be the product of the IFM AS Award from each accepted IFM AS Bid and the relevant AS Bid Price, divided by the number of Settlement Intervals in a Trading Hour. The CAISO will determine and calculate IFM AS Bid Cost for a Multi-Stage Generating Resource at the Generating Unit or Dynamic Resource- Specific System Resource level. The IFM AS Bid Cost shall also include Mileage Bid Costs. For any Settlement Interval, the IFM Mileage Bid Cost shall be the product of Instructed Mileage associated with a Day Ahead Regulation capacity award, as adjusted for accuracy consistent with Section 11.10.1.7, and the relevant Mileage Bid price, divided by the number of Settlement Intervals in a Trading Hour. The CAISO will determine and calculate IFM Mileage Bid Cost for a Multi-Stage Generating Resource at the Generating Unit or Dynamic Resource-Specific System Resource level.[59]
>
> **11.8.4.1.6 RTM AS Bid Cost**
>
> For each Settlement Interval, the Real-Time Market AS Bid Cost shall be the product of the average Real-Time Market AS Award from each accepted AS Bid submitted in the Settlement Interval for the Real-Time Market, reduced by any relevant tier-1 No Pay capacity in that Settlement Interval (but not below zero), with the relevant AS Bid price. The average Real-Time Market AS Award for a given AS in a Settlement Interval is the sum of the 15-minute Real-Time Market AS Awards in that Settlement Interval, each divided by the number of 15-minute

[58] *Id*.

[59] *Id*. at 5.

> Commitment Intervals in a Trading Hour and prorated to the duration of the Settlement Interval (10/15 if the Real-Time Market AS Award spans the entire Settlement Interval, or 5/15 if the Real-Time Market AS Award spans half the Settlement Interval). For a Multi-Stage Generating Resource the CAISO will determine the RTM AS Bid Cost based on the Generating Unit or Dynamic Resource-Specific System Resource level. The Real-Time Market AS Bid Cost shall also include Mileage Bid Costs. For each Settlement Interval, the Real-Time Mileage Bid Cost shall be the product of Instructed Mileage associated with a Real-Time Regulation capacity award, as adjusted for accuracy consistent with Section 11.10.1.7, and the relevant Mileage Bid price divided by the number of Settlement Intervals for the Real-Time Market in a Trading Hour. The CAISO will determine and calculate the Real Time Market Mileage Bid Cost for a Multi-Stage Generating Resource at the Generating Unit or Dynamic Resource- Specific System Resource level.[60]

69. CAISO also accepts that the tunable parameter for the day-ahead optimization proposed by SoCal Edison would allow CAISO to adjust a resource's minimum awarded mileage to reflect the expected actual mileage the resource may provide and, therefore, help ensure the efficient selection of resources to satisfy mileage and regulation capacity requirements.[61] Accordingly, CAISO proposes to make the following incremental changes to the third paragraph of proposed tariff section 27.1.3 on further compliance to address SoCal Edison's concerns. (Underscored language in grey shading reflects incremental proposed additions as compared to the black line version of these sections filed on April 27, 2012):

> The CAISO will calculate resource specific Mileage multipliers and apply these multipliers to resources' Bid-in Regulation Up and Regulation Down capacity. The resource specific Mileage multipliers will reflect resources' Historic Regulation Performance Accuracy and certified 10-minute ramp capability. The CAISO will apply resource specific Mileage multipliers to

[60] *Id*. at 6.

[61] *Id*. at 7, stating that SoCal Edison's comments address a fast ramping resource that submits a high mileage bid and a low capacity bid. CAISO notes that a resource may also submit a low mileage bid and a high capacity bid that could require CAISO to make a downward adjustment to a resource's awarded mileage to reflect the expected actual mileage the resource may provide.

> Bid-in Regulation Up and Regulation Down capacity to determine the expected Mileage. In the event that a resource has not provided Regulation over the prior thirty (30) days, the CAISO will use the simple average Historic Regulation Performance Accuracy for all resources from the prior thirty (30) days as an initial adjustment factor. Upon request, the CAISO will provide a resource with historical data used to derive its Mileage multipliers. A resource will receive a Mileage award that is at least as much as its self-provided or awarded Regulation Up or Regulation Down capacity, but not more than the product of its resource specific mileage multiplier and its self-provided or awarded capacity. The CAISO may adjust a resource's Mileage award to align its awarded Mileage with the resource's expected Mileage. The CAISO will use Mileage awards to determine a uniform clearing mileage price for Regulation Up and Regulation Down, but the Mileage quantity awards will not be financially binding. Resources will receive payments based upon Instructed Mileage as calculated pursuant to Section 11.10.1.7. The CAISO will publish on OASIS the Mileage clearing prices for each hour of the Day-Ahead Market and each fifteen (15) minute period in Real-Time for the Trading Day.[62]

70. In its Answer, CAISO agrees that if the Commission accepts this tariff language, CAISO intends to examine the need to make adjustments to resource-specific mileage awards as part of its commitment to conduct a review of its market design to comply with Order No. 755 based on one year of operation data.[63]

71. CAISO also agrees to clarify that it will treat self-provided regulation as a $0/MWh capacity bid and a $0 mileage bid. CAISO contends that this approach ensures that resources self-providing regulation capacity cannot set a high market clearing price for mileage and also that self-provided capacity and mileage will not earn bid cost recovery payments. To effect this change, CAISO proposes to make the following incremental change to the third paragraph of proposed changes to tariff section 30.5.2.6.1 on further compliance. (Underscored language in grey shading reflects incremental proposed additions as compared to the black line version of these sections filed on April 27, 2012):

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[62] *Id*. at 7-8.

[63] *Id*. at 8 (citing CAISO Tariff Filing at 17).

30.5.2.6.1 Regulation Up or Regulation Down Bid Information

In the case of Regulation Up or Regulation Down, the Ancillary Services Bid or submission to self-provide must also contain: (a) the upward and downward range of generating capacity over which the resource is willing to provide Regulation in~~within a range from a minimum of~~ ten (10) minutes; ~~to a maximum of thirty (30) minutes;~~ and (b) the Bid price of the capacity reservation, stated separately for Regulation Up and Regulation Down ($/MW) and (c) the Bid price ($) of the Mileage stated separately for Regulation Up and Regulation Down.). For submissions to self-provide Regulation Up or Regulation Down, the price for the capacity reservation shall be $0/MWh and the price for Mileage shall be $0. In the case of Regulation Up or Regulation Down from Dynamic System Resources, the Ancillary Services Bid must also contain the Contract Reference Number, if applicable. Scheduling Coordinators may include inter-temporal opportunity costs in their Regulation capacity bids, but these intertemporal opportunity costs must be verifiable. Ancillary Services Bids submitted to the Day-Ahead or Real-Time Market for Regulation need not be accompanied by an Energy Supply Bid that covers the Ancillary Services capacity being offered. A Regulation Down Bid will be erased unless there is an Energy Supply Bid or Energy Self-Schedule at a level that would permit the resource to provide Regulation Down to its lower Regulation Limit. A submission to self-provide Regulation Down will be erased unless there is an Energy Self-Schedule at a level that would permit the resource to provide Regulation Down to its lower Regulation Limit. A Regulation Up Bid will be erased unless there is an Energy Supply Bid or Energy Self-Schedule at a level that would permit the resource to provide Regulation Up within its Regulation Limit. A submission to self-provide Regulation Up will be erased unless there is an Energy Self-Schedule at a level that would permit the resource to provide Regulation Up within its Regulation Limit.[64]

[64] *Id*. at 9.

C. Commission Determination

72. The Commission finds CAISO's proposed tariff revisions to be just and reasonable and in compliance with the Commission's final rule concerning compensation for frequency regulation in organized wholesale power markets, subject to the compliance filing directed below. Consistent with Order No. 755, CAISO's tariff revisions address the requirement that a capacity payment at a uniform clearing price that includes opportunity costs be made to a resource to keep its capacity in reserve in the event that it is needed to provide real-time frequency regulation service. CAISO's tariff revisions also address the requirement that performance payments reflect the amount of work each resource performs in real-time in response to the system operator's dispatch signal.

73. We agree with SoCal Edison's concern regarding bid cost recovery rules and self-provided regulation. The Commission finds that CAISO's proposed revisions in its answer adequately address these concerns. CAISO agrees to modify its proposed tariff language to address SoCal Edison's concerns regarding bid cost recovery rules and self-provided regulation. Our review indicates that CAISO's modifications address SoCal Edison's major concerns that bid cost recovery not create a windfall for poor performers and at the same time ensure full compensation for units that follow dispatch signals. We also find that the proposed tariff modifications adequately address the tunable parameter concerns raised by SoCal Edison. Within 30 days of the date of this order, we direct CAISO to submit those revisions to tariff sections 11.8.2.1.6, 11.8.4.1.6, 27.1.3, and 30.5.2.6.1, as filed in its April 27, 2012 answer. We also direct CAISO to explain in detail in that compliance filing how the tunable parameter will be implemented including the notice to affected resources.

74. The Commission agrees with CAISO and its Market Surveillance Committee and Department of Market Monitoring that CAISO should monitor the market outcomes and propose adjustments to its market design as necessary as it gains experience with the implementation of this new proposal in its market. As the CAISO Market Surveillance Committee and Department of Market Monitoring pointed out, bidding strategies may be employed to extract excessive bid cost recovery payments. While CAISO's proposed tariff revisions, incorporating SoCal Edison's suggestions, reduce the risk that participants may earn excessive bid cost recovery payments, the potential for market manipulation still exists, such as through use of the bidding strategy described in paragraph 30 of this order. The Commission recognizes that bidding strategies to extract excessive bid cost recovery payments are a concern and supports the Department of Market Monitoring's recommendation, and requires that CAISO closely monitor for this outcome and be prepared to modify software or market rules as appropriate, as noted in CAISO's filing.[65]

[65] In addition, the Department of Market Monitoring should refer any participant bidding behavior that may potentially violate section 1 c.2 of the Commission's regulations to the Office of Enforcement for further investigation.

75. In addition, the Commission agrees that CAISO should continue to evaluate other elements of this proposal as it gains experience over time. As CAISO pointed out, many design elements of CAISO's proposal are based upon historical data that may require updating. Thus, the Commission agrees with CAISO that it is prudent to conduct an operational review based on one year of data after this proposal is implemented to evaluate CAISO's design. This review should include the appropriateness of the minimum performance threshold level, the historical data used to calculate the mileage multiplier, whether the regulation capacity procurement target should reflect historical accuracy of resources, the level of the mileage maximum bid price and mileage scarcity price, and any other analysis CAISO considers appropriate. After that operational review, the CAISO should propose software or market rule changes that are appropriate as a result of its operational review. CAISO should continue to monitor its market design to evaluate whether further proposed software or market rule changes are appropriate. Additionally, we will require CAISO to submit, in the informational report directed below, additional information regarding the operational review based on one year of experience with the proposal. CAISO should file the informational report within 14 months of the effective date of the proposed Tariff revisions.[66] We note that CAISO has not provided a definition of "mileage scarcity price" nor has it explained how mileage pricing interacts with its existing scarcity pricing provisions. Accordingly, CAISO is directed to address oversight in the compliance filing

76. The Commission will not require CAISO to modify its cost allocation rules for regulation services in this proceeding as requested by PG&E, SoCal Edison and SWP. The Commission agrees with CAISO that such a requirement exceeds the scope of the compliance directive of Order No. 755. The Commission did not direct independent system operators or regional transmission operators to revise the manner in which they allocate costs for regulation service to market participants.

77. The Commission finds that CAISO's regulation compensation tariff revisions should become effective January 1, 2013. Thus, the Commission grants CAISO a limited extension of time in recognition that CAISO must implement a number of changes to its business processes and software, among other things, to implement its compliance filing. As parties such as Beacon Power and the Energy Storage Association note, the Commission directed CAISO to implement its tariff changes by October 27, 2012, in accordance with the mandates in Order No. 755. Accordingly, we believe a January 1, 2013 effective date is reasonable given our intent to have the findings of Order No. 755 implemented on a timely basis and the CAISO's need for software implementation and testing requirements.

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[66] The Commission does not intend to issue a public notice, accept comments, or issue an order on the informational report.

<u>The Commission orders</u>:

(A) CAISO's compliance filing is hereby accepted, subject to conditions, as discussed in the body to this order.

(B) CAISO is hereby directed to make an additional compliance filing within 30 days of the date of this order, as discussed in the body of this order.

(C) CAISO is hereby directed to make an informational report within 14 months of the effective date of the proposed Tariff revisions, as discussed in the body of this order.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.