

August 22, 2011

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

**Re: California Independent System Operator Corporation
Docket No. ER11-_____ -000
Regulation Energy Management for Non-Generator Resources**

Dear Secretary Bose:

The California Independent System Operator Corporation (ISO) submits this filing to modify provisions in the ISO tariff to allow greater participation by non-generator resources in the ISO's ancillary services market.¹ Non-generator resources are resources that can operate as generation or load, or both. These resources have the capability to be dispatched to any operating level within their operating range but are subject to constraints with respect to the amount of energy they can generate or curtail. Examples of non-generator resources include, but are not limited to, battery storage, flywheels and dispatchable demand response. These resources can help balance supply and demand on the ISO system as increasing numbers of intermittent resources such as wind and solar interconnect to the ISO grid.

Specifically, the ISO proposes to implement a market enhancement known as regulation energy management. This enhancement will allow non-generator resources to bid their capacity more effectively into the ISO's regulation markets. The ISO is also proposing tariff changes to ensure that its market appropriately recognizes the operating constraints of non-generator resources that elect not to use regulation energy management. The Commission should accept these proposed tariff changes as just and reasonable because

¹ The ISO submits this filing pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, and Section 35.13 of the Commission's regulations, 18 C.F.R. § 35.13. The ISO is also sometimes referred to as the CAISO. Capitalized terms not otherwise defined herein have the meanings set forth in Appendix A to the ISO tariff and in this dynamic transfers tariff amendment, and except where otherwise noted herein, references to section numbers are references to sections of the tariff

they will advance the participation of energy storage and demand response resources in the ISO's market.

Except for the proposed tariff changes to Appendix K to the ISO tariff, the ISO requests that the Commission make the tariff revisions contained in this filing effective as of April 10, 2012, and therefore respectfully 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. The ISO requests a December 1, 2011 effective date for the proposed changes to Appendix K to the ISO tariff. Accordingly, the ISO requests that the Commission issue an order on its proposed tariff revisions no later than November 30, 2011. A November 30 will also have the benefit of providing the ISO sufficient time to work with non-generator resource owners and scheduling coordinators for testing and other readiness activities that will allow non-generator resource owners to participate beginning as of April 10, 2012.

I. Background

The ISO has taken steps over the last several years to examine how to facilitate the participation of non-generator resources in the ISO's market. These efforts have included tariff amendments to reduce barriers for resources to provide ancillary services² as well as pilot programs to assess operational and technical issues associated with non-generator resources.³ Through these efforts, the ISO has sought to encourage deployment of resources that may help the ISO to address future system needs, especially as increasing volumes of intermittent resources interconnect to the ISO grid and participate in its markets. The ISO has projected that intermittent resources will increase the need for regulation capacity.⁴

In 2009, the ISO first examined regulation energy management to facilitate limited energy storage resources to participate in the regulation market but deferred consideration of this market enhancement. As the Commission is aware, some stakeholders requested that the Commission direct the ISO to implement regulation energy management but the Commission permitted the ISO to work through its existing stakeholder processes to finalize design elements

² *California Independent System Operator Corporation*, 132 FERC ¶ 61,211 (September 2010)

³ See e.g. *California Independent System Operator Corporation*, 130 FERC ¶ 61,242 (March 2010).

⁴ Regulation Energy Management Draft Final Proposal dated January 13, 2011 at pp. 5-7. http://www.caiso.com/Documents/RevisedDraftFinalProposal-RegulationEnergyManagement-Jan13_2011.pdf

associated with regulation energy management.⁵ The ISO revisited this proposal as part of phase 1 of its renewable integration market and product review initiative and, in February 2011, the ISO's Board of Governors authorized the ISO to design and implement regulation energy management.⁶

Regulation energy management will allow non-generator resources to bid their capacity into the ISO's regulation markets more effectively and consistent with the continuous energy requirements for regulation service set forth in the ISO's tariff. Under this proposal, a non-generator resource may bid or self-schedule capacity equal to four times the maximum energy it can generate or curtail for 15 minutes. The ISO will manage the resource's operating set point. For limited energy storage resources, the ISO will discharge the resource for regulation energy associated with regulation up and will charge the resource for regulation energy associated with regulation down. The ISO will use offsetting dispatches of energy from the real-time energy market, if necessary, so that the resource can satisfy its regulation capacity award. For a demand response resource, the ISO will also manage the resources' operating set point within its capacity range to provide regulation service. The ISO will adjust its forecast of demand for the next real-time dispatch interval (7.5 minutes before real-time dispatch) to offset the energy generated or curtailed during the previous interval's regulation energy dispatch.

II. Proposed Tariff Amendments

A. Overview

In this section, the ISO discusses its proposed tariff amendments. The tariff amendments encompass three general categories: (1) amendments to implement regulation energy management; (2) amendments that apply generally to non-generator resources, including how the ISO market will recognize the operational constraints of non-generator resources that do not use regulation energy management; and (3) clarifications to the voice communications requirements of Appendix K to make them consistent with the ISO's current business practices. The ISO also proposes minor grammatical changes to tariff sections affected by these amendments.

⁵ *California Independent System Operator Corporation*, 132 FERC ¶ 61,211 at PP 13-34 (September 2010).

⁶ A copy of the ISO's memorandum to its Governing Board, supporting materials and vote are provided as Attachment C to this transmittal letter.

B. Tariff Amendments to Implement Regulation Energy Management

The ISO's proposed tariff amendments to implement regulation energy management include provisions to address the following:

- Eligibility of resources to elect to use regulation energy management;
- Eligible capacity that resources using regulation energy management may bid or self-schedule as regulation up or regulation down;
- Requirements to enter into a participating generator agreement and/or participating load agreement;
- Applicable technical and operational requirements for non-generator resources using regulation energy management to provide regulation;
- Bidding rules for resources using regulation energy management;
- Settlement of regulation energy dispatched from resources using regulation energy management;
- ISO control of resources using regulation energy management; and
- Reasons the ISO may disqualify resources using regulation energy management from providing regulation capacity.

The ISO proposes to amend tariff section 8.4.1.1(g) to state that scheduling coordinators for non-generator resources within the ISO's balancing authority area may request the use of regulation energy management, if they require the functionality to bid or self-schedule their full capacity as regulation. Some non-generator resources cannot offer their full capacity to generate or curtail energy as regulation because of the requirement that regulation capacity must be dispatchable on a continuous basis for at least 60 minutes for purposes of the ISO's day-ahead market and at least 30 minutes for purposes of the ISO's real-time market.⁷ Only those resources that cannot offer their full capacity as regulation because of these continuous energy requirements are eligible to use regulation energy management. The ISO does not intend to make this functionality available to conventional generation resources or pumped storage hydro resources that already meet the continuous energy requirements for regulation service. The ISO also does not intend to make this market

⁷ See ISO tariff section 8.4.1.1(g).

enhancement available to resources outside the ISO balancing authority area because the ISO will need to manage the resource both as a generator and a load. Finally, the ISO proposes to make non-substantive grammatical changes to section 8.4.1.1 as part of this tariff amendment.

The ISO proposes to add a new section 8.4.1.2 to its tariff to describe regulation energy management.⁸ This new section provides that the ISO will make regulation energy management functionality available to scheduling coordinators for non-generator resources that require energy from the real-time market to offer their full capacity as regulation. This requirement ensures that all non-generator resources that require regulation energy management will have access to the market enhancement on a non-discriminatory basis. As described in proposed section 8.4.1.2, a scheduling coordinator for a resource using regulation energy management may submit a regulation capacity bid of up to four times the maximum energy the resource can generate or curtail for 15 minutes after a dispatch instruction.⁹ To meet the existing continuous energy requirements of regulation, the scheduling coordinator will procure imbalance energy from the real-time market as necessary. With the use of regulation energy management, a resource may submit both a regulation up and regulation down bid for this capacity, but there is no requirement that the scheduling coordinator submit a symmetrical regulation up and regulation down bid. The following table reflects the ISO's current tariff provisions for regulation service and the impact of deploying regulation energy management for a non-generator resource that is capable of generating 20 MW of energy but only for 15 minutes.

Tariff rules	Day-ahead market	Real-time market
Current tariff	Resource may only bid or self-schedule 5 MW as regulation because it must satisfy 60 minute continuous energy requirement.	Resource may only bid or self-schedule 10 MW as regulation because it must satisfy 30 minute continuous energy requirement.
Regulation energy management	Resource may bid or self-schedule 20 MW as regulation.	Resource may bid or self-schedule 20 MW as regulation.

⁸ The ISO's existing tariff section 8.4.1.2 addresses voltage support. The ISO proposes to renumber this tariff section as section 8.4.1.3. The ISO also proposes to include a definition for regulation energy management to include in Appendix A of its tariff. This definition mirrors the requirements of proposed section 8.4.1.2.

⁹ The ISO has proposed corresponding modifications to Part A 1.1.4 of Appendix K of the ISO tariff.

The use of regulation energy management by non-generator resources is voluntary and proposed section 8.4.1.2 provides that a scheduling coordinator must request the use of this functionality. The scheduling coordinator must also enter into a participating generator agreement and/or participating load agreement on behalf of the non-generator resource. This provision is necessary to bind the scheduling coordinator to all applicable provisions of the ISO tariff. The ISO will consider developing a separate *pro forma* agreement for non-generator resources as it gains additional operational experience with these resources. But the ISO believes that participating generator and participating load *pro forma* agreements suffice for purposes of initial implementation of this market enhancement. Similar to the registration requirements for conventional generators, scheduling coordinators must register resources using regulation energy management in the ISO's master file using the ISO's resource data template.

Non-generator resources using regulation energy management may provide only regulation in the ISO's market through the submission of regulation up and regulation down bids or self-schedules. Non-generator resources using regulation energy management may not provide energy other than energy associated with regulation. The rationale for this rule is that while using regulation energy management, the ISO will continuously manage the resource's operating set point through the energy management system. The ISO also proposes tariff revisions to describe that the ISO will use offsetting dispatches of energy from the real-time energy market, if necessary, so that the resource can satisfy its regulation capacity award.

Under the ISO's proposal, non-generator resources must comply with the requirements to provide regulation as specified in section 8 and Appendix K of the ISO's tariff and the ISO's operating procedures. The ISO proposes to require that non-generator resources requesting the use of regulation energy management undergo a market simulation.¹⁰ Once the ISO has moved regulation energy management into production, the ISO expects this market simulation will occur as part of the normal timeframe for regulation certification testing. These requirements will ensure that the resources using regulation energy management can provide regulation service as opposed to another, distinguishable ancillary service.

Scheduling coordinators for resources using regulation energy management shall be subject to the bidding rules applicable to all other resources, except scheduling coordinators may not recover commitment costs for these resources. As explained, the ISO will manage the resources' operating set

¹⁰ The ISO has also proposed corresponding language in Part A10.1 in Appendix K. As part of this tariff amendment, the ISO is also proposing to make non-substantive grammatical changes to Appendix K, Parts A 1.1.2, A 5, A 9, and C 1.1.

point and treat the resources as if they are online. Accordingly, scheduling coordinators for these resources should not face decisions that would result in commitment costs such as start-up or minimum load costs.

The ISO will settle regulation capacity awarded to or self-scheduled by resources using regulation energy management as it does for all other resources. For purposes of settling dispatches of regulation capacity, the ISO is proposing to settle all dispatches from resources using regulation energy management as instructed imbalance energy. This approach is the same approach the ISO uses to settle dispatches of regulation from conventional resources providing regulation energy. The ISO also proposes to exempt that portion of demand of non-generator resources using regulation energy management that it dispatches as regulation from any charges or payments applicable to measured demand under the ISO's tariff.¹¹ The rationale for this treatment is that a non-generator resource using regulation energy management consumes energy during a settlement interval only to return it to the market as output at a later interval.

Finally, proposed section 8.4.1.2 describes how the ISO will manage a resource using regulation energy management and the reasons that the ISO may disqualify capacity of a resource using regulation energy management from receiving regulation awards or submitting self-schedules. The ISO will control the resource's operating set point through the ISO's energy management system with the objective of maintaining the resource's preferred operating point. When a resource has a physical MWh limit, the ISO will observe this constraint during real-time dispatch to ensure it can continue to support the resource's regulation capacity award or self-schedule through dispatches of energy from the real-time energy market. The ISO will also consider the resource's MWh constraint when dispatching regulation energy during real-time dispatch. For purposes of the integrated forward market and real-time unit commitment, the ISO will assume that imbalance energy from the real-time market will support the resource's regulation capacity award or self-schedule. The ISO, however, is also proposing tariff language to disqualify non-generator resources using regulation energy management on a pro-rata basis from providing regulation capacity, if the ISO determines during the integrated forward market or real-time unit commitment that the ISO will not have sufficient energy available in the real-time market to support the resource's award or self-schedule. The ISO expects that any such disqualification will be extremely rare and only relied upon when the ISO believes that insufficient energy will be available to serve ISO demand in real-time. Disqualification of capacity award or self-schedules shall result in a rescission of regulation capacity payments.

¹¹ The ISO also proposes to modify the definition of measured demand in Appendix A of its tariff to clarify that it excludes that portion of demand of non-generator resources dispatched as regulation through regulation energy management.

C. Tariff Modifications to Address Non-Generator Resources Generally

The use of regulation energy management by non-generator resources that require the functionality to provide regulation is voluntary. And in some cases, non-generator resources with MWh capability that meet or exceed the continuous energy requirements for regulation will not qualify to use regulation energy management. Non-generator resources that do not elect to use regulation energy management may submit bids for energy and ancillary services (regulation, spinning reserve and non-spinning reserve) for which they are certified under the ISO's applicable technical and operating requirements. For these reasons, the ISO must also ensure that it can manage non-generator resources that elect not to use regulation energy management, decide to change their master file status to remove their regulation energy management designation, or are not eligible to use regulation energy management. The ISO's proposed tariff amendments therefore address non-generator resources generally, some of which apply whether or not the resource elects to use regulation energy management. These amendments include:

- Requirements to enter into a participating generator agreement and/or a participating load agreement;
- Reasons that the ISO may rescind payments for regulation up and regulation down capacity payments;
- Bidding rules for non-generator resources;
- Whether the ISO market will observe non-generator MWh operating constraints; and
- Technical and monitoring requirements to obtain certification to provide regulation.

The ISO proposes to amend sections 4.6 and 4.7 of its tariff to require resource owners or operators for non-generator resources to enter into a participating generator agreement and/or a participating load agreement.¹² These provisions require resource owners and operators for non-generator resources, whether or not they elect to use regulation energy management, to agree to comply with all applicable provisions of the ISO tariff. Similar tariff requirements apply to participating generators and participating load in the ISO's market.

¹² Non-generator resources that are dispatchable demand response need only enter into a participating load agreement.

The ISO has proposed to include a new section 8.10.8.4 to provide that payment to a non-generator resource for ancillary service capacity will be rescinded if the resource is unable, as a result of its MWh constraint, to generate energy or consume energy to support the level of the resource's self provision or award of ancillary services. This provision mirrors existing tariff language applicable to conventional generators.¹³ The ISO has also included new language to section 8.10.8.6 to provide that payment to a non-generator resource for regulation capacity will be rescinded, in addition to the reasons already stated in section 8.10.8.6, to the extent the resource is unable, as a result of its MWh constraint, to generate energy (or curtail energy consumption) continuously to support its self-provision or award of regulation up or consume energy (or increase energy consumption) continuously to support the level of the resource's self provision or award of regulation down. These latter provisions apply whether or not the non-generator resource is using regulation energy management. These provisions are necessary to recognize that non-generator resources have MWh constraints that may preclude them from providing regulation service that the ISO market has procured. In such cases, it is reasonable to rescind regulation capacity payments to these resources. The ISO has also proposed a minor grammatical change to section 8.10.8.6 by using the lower case form of the word *capacity* in the first sentence of this section.

In tariff section 11.8 of its tariff, the ISO is proposing to add language that specifies that non-generator resources are not eligible to recover specific commitment costs. The ISO expects non-generator resources to remain online. Accordingly, scheduling coordinators for these resources should not face decisions that would result in commitment costs such as start-up or minimum load costs. These resources remain eligible to recover other bid costs, including energy bid costs, residual unit commitment availability payments and ancillary service bid costs.

The ISO is also proposing to include language in section 27.9 to describe the market intervals in which the ISO will recognize non-generator resources MWh constraints as part of the co-optimization of energy and ancillary services. The ISO intends to recognize the MWh constraint of non-generator resources in all market intervals unless the resource is using regulation energy management. For non-generator resources using regulation energy management, the ISO will recognize their MWh constraint only during real-time dispatch. The ISO believes it is necessary to recognize the operational and technical constraints of non-generator resources in a manner comparable to generators.

The ISO is proposing revisions to Appendix K, Part A to allow non-generator resources using regulation energy management to define a ramp-rate for operating as generation and a ramp rate for operating as load, respectively.

¹³ See, ISO tariff section 8.10.8.

This provision applies whether or not a non-generator resource is using regulation energy management and will allow the ISO to certify the resource's capacity to provide regulation and optimize awards across the fleet of resources providing regulation. In addition, the ISO is proposing to modify the monitoring requirements set forth in Appendix K, Part A to describe the telemetry data necessary for non-generator resources to provide regulation. These requirements apply, whether or not the non-generator resource uses regulation energy management, and will provide the ISO with visibility of the non-generator resource's ramp rates, MW capability to generate or consume energy, and MWh capability at any point in time.

D. Clarifications to Appendix K, Part A of the ISO Tariff

As part of this tariff amendment, the ISO is proposing to clarify the voice communication requirements for regulation service set forth in Appendix K, Part A. Specifically, the ISO proposes to modify the requirements in Part A 1.2.3, Part A 1.3 and Part A 10.2 that require voice communication circuits between operators of resources providing regulation, the ISO control center and the resource's scheduling coordinator. The ISO has recently issued its business practice manual for direct telemetry.¹⁴ This business practice manual specifies that resource owners need to provide a dedicated voice communication circuit that is available at all times for communication purposes between the ISO's dispatchers and the resource.¹⁵ The ISO is requesting a December 1, 2011 effective date for all the changes to Appendix K due to the need to harmonize the ISO tariff and business practice manual with regard to voice communication requirements as soon as possible.¹⁶

III. Stakeholder Process

As referenced above, the ISO has examined market participation by non-generator resources in various stakeholder processes. The ISO first discussed regulation energy management as part of its initiative addressing participation of non-generator resources in ancillary service markets.¹⁷ The ISO, however, deferred its assessment of regulation energy management to phase 1 of its

¹⁴ Direct Telemetry Business Practice Manual
<https://bpm.caiso.com/bpm/bpm/version/000000000000142>

¹⁵ *Id.*, Section 5.7 at 20.

¹⁶ Due to e-tariff requirements and the fact that Appendix K is a single record, the ISO is proposing that all the changes to Appendix K be made effective as of December 1, 2011.

¹⁷ Information about this initiative is available on the ISO's Web site at the following link:
<http://www.caiso.com/informed/Pages/StakeholderProcesses/NonGeneratorResourcesAncillaryServicesMarket.aspx>

renewable integration market and product review. That process ultimately resulted in the ISO Board of Governors approving this market enhancement in February 2011.¹⁸ During phase 1 of the ISO's renewable integration market and product review initiative, the ISO worked with stakeholders to refine the proposed design for regulation energy management. The ISO believes the design of regulation energy management strikes the appropriate balance between facilitating participation by non-generator energy resources in the ISO's regulation market while not creating potential risks to system reliability.

After the Board of Governors authorized the ISO to implement regulation energy management, the ISO issued draft tariff language for stakeholder comment and held two conference calls to respond to questions and discuss the purpose of its proposed tariff provisions. The ISO has also conducted discussions as part of the ISO's market forum regarding operational and technical requirements for non-generator resources. Throughout these processes, the ISO has received input from current and potential market participants, including generators, load serving entities and representatives of storage and demand response technologies. This input has helped refine the instant proposal. The ISO has also received feedback from its Department of Market Monitoring and Market Surveillance Committee.¹⁹ The ISO greatly appreciates stakeholder involvement in the development of the instant proposal. The ISO addresses selected issues raised during its stakeholder processes below. Additional information regarding the ISO's stakeholder process is available in the Board of Governors' materials included as an attachment to this filing.

A. Regulation energy management is not a new service.

Some stakeholders expressed concern that regulation energy management is a new service that the ISO market should procure and price separately from regulation. But other stakeholders advocated that regulation energy management is similar to other software enhancements, such as multi-stage generation, which enable a resource to make its full capability available to the market. The ISO views regulation energy management as an enhancement that will allow the ISO market to utilize the full range of regulation capacity available from non-generator energy resources with a limited MWh constraint. Resources using regulation energy management must comply with the technical

¹⁸ Information about this initiative is available on the ISO's Web site at the following link: <http://www.caiso.com/informed/Pages/StakeholderProcesses/RenewablesIntegrationMarketProductReviewPhase1.aspx>

¹⁹ The Market Surveillance Committee's Final Opinion addressing regulation energy management is available on the ISO's Web site at the following link: <http://www.caiso.com/Documents/110203MSCFinalOpiniononRegulationEnergyManagement.pdf>

and operating requirements to provide regulation. During any dispatch interval, these resources will provide regulation service in a manner comparable to all other resources certified to provide regulation.

B. The ISO intends to review the design of regulation energy management.

During its stakeholder process, the ISO discussed the need to review the design of regulation energy management based on the quantity of resources that register to use regulation energy management. In addition, as part of its memorandum to the ISO's Board of Governors addressing regulation energy management, the Department of Market Monitoring raised concerns that the operating characteristics of non-generator resources are different from those of conventional generating resources around which the current ancillary services market has been designed and operated.²⁰ The Department of Market Monitoring, however, advised that the ISO's proposal provides an adequate framework for integration of the relatively small quantity of capacity expected to participate in the regulation market using regulation energy management.

The ISO acknowledges that additional operating experience with non-generator resources in production may give rise to the need for refinements to its market design. But the ISO decided that setting an arbitrary penetration threshold to review the design of regulation energy management was not practical. Instead, the ISO plans to monitor the design of regulation energy management on an ongoing basis similar to how it monitors other elements of its market. If operational issues arise, the ISO will engage with stakeholders to discuss whether design changes are necessary based on actual operating experience.

C. The ISO rejected imposing a limit on the amount of regulation it will procure from resources using regulation energy management.

Initially, the ISO proposed imposing a limit on the amount of regulation the market would procure from resources using regulation energy management equal to 10 percent of the ISO's total regulation requirement. The purpose of this limit was to give the ISO market an opportunity to gain operational experience with non-generator resources. Several stakeholders argued against this limit on the grounds that it would hinder the development of commercial-scale limited energy storage in California. The Department of Market Monitoring also raised concerns with a proposed procurement limit, in part, on the grounds that a

²⁰ January 27, 2011 memorandum to ISO Board of Governors from Eric Hildebrandt, Director of Market Monitoring available on the ISO Web site at the following link: <http://www.caiso.com/Documents/110203Department-MarketMonitoringReport.pdf>

significant level of resources using regulation energy management is unlikely to materialize over the next few years. Based on feedback from stakeholders and the Department of Market Monitoring, the ISO removed this procurement limit from its design of regulation energy management.

D. This proposal does not change ancillary services substitution rules.

Under the ISO's current market, regulation up may substitute for spinning and non-spinning reserves, when it is economic to do so.²¹ Stakeholders expressed concern with allowing resources using regulation energy management to substitute for spinning reserve requirements given these resources inherent energy limitations. The ISO rejected the proposal to prohibit regulation up procured from resources using regulation energy management from satisfying spinning reserve requirements. The ISO market procures regulation from a pool of resources and does not specify from which resource it is procuring regulation that may substitute for spinning reserve. In addition, the ISO does not anticipate that resources using regulation energy management will comprise a significant percentage of the fleet of resources providing regulation over the next several years. The ISO believes that, at this time, a separate constraint to prevent regulation up capacity provided by resources using regulation energy management from substituting for spinning reserve is unwarranted.

A related concern is whether non-generator resources can satisfy the requirements for spinning reserve as set forth in the Western Electricity Coordinating Council's current Standard BAL-STD-002-0 – Operating Reserves, which defines spinning reserve as unloaded generation and regulating reserve as spinning reserve on automatic generation control. The Commission has remanded a proposed revision to this standard - BAL-002-WECC-1 - to the North American Electric Reliability Corporation in part to clarify that demand side management resources may provide spinning reserve.²² The ISO's tariff amendment is consistent with the Commission's direction to the North American Electric Reliability Corporation. Under the ISO's proposal, non-generator resources may provide regulation as both generation and load. To the extent the ISO market procures regulation from these resources while the issues involving WECC's proposed standard remain unresolved, the ISO will ensure that its market procures sufficient contingency reserves to meet all applicable reliability criteria.

²¹ ISO tariff at section 8.2.3.5.

²² *Version One Regional Reliability Standard for Resource and Demand Balancing* in Docket RM09-15-000 (Order No. 740) 133 FERC ¶ 61,063 (2010) at PP50-62.

E. The ISO will recognize non-generator resources' MWh constraint as part of its market processes.

During the development of the ISO's proposed tariff revisions, stakeholders expressed concern that the ISO's tariff proposal should not address operating constraints of non-generator resources that do not use regulation energy management. Throughout the ISO's stakeholder processes addressing regulation energy management, the ISO has explained that the software logic associated with regulation energy management is a functionality that will generally support non-generator resources that have the capability to inject and withdraw energy. A necessary predicate to allow non-generator resources to use regulation energy management is to explain that the ISO market will observe the MWh operating constraints of non-generator resources that do not use regulation energy management. The ISO believes these tariff provisions are appropriate and treat non-generator resources in a manner comparable to generators. The ISO's tariff amendment, moreover, does not foreclose future refinements or additional stakeholder activities regarding how non-generator resources will participate in the ISO market.

F. The ISO intends to examine a mileage payment in phase 2 of its renewable integration market and product review stakeholder initiative.

During the stakeholder process, some stakeholders advocated that the ISO should provide an additional payment to regulation resources based upon their movement from the preferred operating point. The ISO agrees that there is merit to examine this approach and intends to do so as part of phase 2 of its renewable integration market and product review stakeholder initiative.²³ In addition, the ISO will need to comply with any requirement to develop a mileage payment arising from the Commission's proposed rulemaking into frequency regulation compensation in organized wholesale power markets.²⁴ The development of a mileage payment for resources providing regulation, however, does not obviate the need to implement the regulation energy management enhancement proposed by this tariff amendment to allow non-generator resources with a physical MWh constraint to bid or self-schedule their full capacity as regulation.

²³ See, Renewable Integration Market Vision and Roadmap Day-of Market, Initial Straw Proposal dated July 6, 2011 at 18-20.
http://www.caiso.com/Documents/StrawProposalRenewablesIntegrationMarketVision_RoadmapDay-ofMarket.pdf

²⁴ *Order on Notice of Proposed Rulemaking re Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Docket Nos. RM11-7-000; AD10-11-000, 134 FERC ¶ 61,124 (October 2011).

IV. Effective Date

Except for the changes to Appendix K, the ISO requests that the Commission make the tariff revisions contained in this filing effective April 10, 2012 and requests waiver of the requirements of section 205 of the Federal Power Act and of 18 C.F.R. § 35.3 as necessary for this purpose. The ISO requests an effective date of December 1, 2011 for the changes to Appendix K. Accordingly, the ISO requests that the Commission issue an order on the tariff revisions no later than November 30, 2011..

V. Communications

Communications regarding this filing should be addressed to the following individuals, whose names should be put on the official service list established by the Commission with respect to this submittal:

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18 C.F.R. § 385.203(b)(3).

VI. Service

The ISO has served copies of this transmittal letter, and all attachments, on the California Public Utilities Commission, the California Energy Commission, and all parties with effective scheduling coordinator service agreements under the ISO tariff. In addition, the ISO is posting this transmittal letter and all attachments on the ISO Web site.

VII. Attachments

The following attachments, in addition to this transmittal letter, support the instant filing:

Attachment A	Revised ISO tariff sheets that incorporate the proposed changes described above
Attachment B	The proposed changes to the ISO tariff shown in black-line format
Attachment C	February 2011 Board of Governors' Materials

VIII. Conclusion

The ISO requests that the Commission accept the proposed tariff amendments without modification. These amendments will enhance the ability of non-generator resources, including limited energy storage and demand response resources, to participate in the ISO's markets. In addition, the ISO's proposed amendments will help ensure the tariff requirements for regulation service are consistent with the ISO's current business practices.

Please contact the undersigned if you have any questions regarding this matter.

Dated: August 22, 2011

Respectfully submitted,

/s/ Andrew Ulmer

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California Independent System Operator Corporation

Fifth Replacement FERC Electric Tariff

Attachment A – Clean Tariff

Regulation Energy Management Amendment

August 22, 2011

4.6 Relationship Between CAISO And Generators

The CAISO shall not accept Bids for any Generating Unit interconnected to the electric grid within the CAISO Balancing Authority Area otherwise than through a Scheduling Coordinator. The CAISO shall further not be obligated to accept Bids from Scheduling Coordinators relating to Generation from any Generating Unit interconnected to the electric grid within the CAISO Balancing Authority Area unless the relevant Generator undertakes in writing, by entering into a Participating Generator Agreement, QF PGA, or Metered Subsystem Agreement with the CAISO, to comply with all applicable provisions of this CAISO Tariff as they may be amended from time to time, including, without limitation, the applicable provisions of this Section 4.6 and Section 7.7. The CAISO shall not accept Bids from Scheduling Coordinators relating to Generation from a Non-Generator Resource unless the resource owner or operator undertakes in writing, by entering into a Participating Generator Agreement and Participating Load Agreement, to comply with all applicable provisions of this CAISO Tariff as they may be amended from time to time including, without limitation, the applicable provisions of this Section 4.6 and Section 7.7.

* * *

4.7 Relationship Between CAISO And Participating Loads

The CAISO shall only accept Bids for Supply of Energy or Ancillary Services or Submissions to Self-Provide Ancillary Services from Loads if such Loads are those of a Participating Load that has entered into a Participating Load Agreement with the CAISO and which meet standards adopted by the CAISO and published on the CAISO Website. The CAISO shall not accept submitted Bids for Supply of Energy or Ancillary Services from a Participating Load other than through a Scheduling Coordinator. The CAISO shall not accept Bids from Scheduling Coordinators relating to Load from any Non-Generator Resource unless the resource owner or operator undertakes in writing, by entering into a Participating Load Agreement, to comply with all applicable provisions of this CAISO Tariff as they may be amended from time to time.

* * *

8.4.1.1 Regulation

A resource offering Regulation must have the following operating characteristics and technical capabilities:

- (a) it must be capable of being controlled and monitored by the CAISO EMS by means of the installation and use of a standard CAISO direct communication and direct control system, a description of which and criteria for any temporary exemption from which, the CAISO shall publish on the CAISO Website;
- (b) it must be capable of achieving at least the Ramp Rates (increase and decrease in MW/minute) stated in its Bid for the full amount of Regulation capacity offered;
- (c) the Regulation capacity offered must not exceed the maximum Ramp Rate (MW/minute) of that resource times a value within a range from a minimum of ten (10) minutes to a maximum of thirty (30) minutes, which value shall be specified by the CAISO and published on the CAISO Website;
- (d) the resource to CAISO Control Center telemetry must, in a manner meeting CAISO standards, include indications of whether the resource is on or off CAISO EMS control at the resource terminal equipment;
- (e) the resource must be capable of the full range of movement within the amount of Regulation capability offered without manual resource operator intervention of any kind;
- (f) each Ancillary Service Provider must ensure that its CAISO EMS control and related SCADA equipment for its resource are operational throughout the time period during which Regulation is required to be provided; and
- (g) Regulation capacity offered must be dispatchable on a continuous basis for at least sixty (60) minutes in the Day-Ahead Market and at least thirty (30) minutes in the Real-Time Market after issuance of the Dispatch Instruction. The CAISO will measure continuous Energy from the time a resource reaches its award capacity. Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time

Market to offer their full capacity as Regulation may request the use of Regulation Energy Management as described in Section 8.4.1.2.

8.4.1.2 Regulation Energy Management

The CAISO will make Regulation Energy Management available to Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation. A Scheduling Coordinator for a resource using Regulation Energy Management may submit a Regulation Bid for capacity (MW) of up to four (4) times the maximum Energy (MWh) the resource can generate or curtail for fifteen (15) minutes after issuance of a Dispatch Instruction. In the Real-Time Market, a Scheduling Coordinator for a resource using Regulation Energy Management will procure Imbalance Energy as needed to satisfy the sixty (60) minute continuous Energy requirement for Regulation Awards in the Day-Ahead Market.

Scheduling Coordinators may request to use Regulation Energy Management for these Non-Generator Resources by submitting a request to certify such a resource to provide Regulation using Regulation Energy Management. The owner or operator of a Resource using Regulation Energy Management must execute both a Participating Generator Agreement and/or Participating Load Agreement and may provide only Regulation in the CAISO Market. A resource using Regulation Energy Management may not provide Energy other than Energy associated with Regulation. Scheduling Coordinators for Resources using Regulation Energy Management may define a Ramp Rate for operating as Generation and a Ramp Rate for operating as Load, respectively. These resources shall comply with the requirements to provide Regulation as specified in this Section 8, Appendix K, and the CAISO's Operating Procedures, including the requirement to undergo a market simulation using Regulation Energy Management as part of the certification procedure.

Scheduling Coordinators for resources using Regulation Energy Management shall register these resources in the Master File. Scheduling Coordinators may only submit Bids for Regulation Up and Regulation Down for these resources. Scheduling Coordinators may not submit Energy Bids, Energy Self-Schedules, Residual Unit Commitment Bids, or Ancillary Service Bids other than Regulation for these resources. Scheduling Coordinators may not submit any type of commitment costs as part of their Regulation Up and Regulation Down Bids for resources using Regulation Energy Management, including

Start-Up Cost, Minimum Load Costs, Pumping Cost or Pump Shut-Down Costs, or Transition Cost. All other bidding rules for Regulation set forth in Section 30 shall apply to resources using Regulation Energy Management.

The CAISO will settle Dispatches from resources using Regulation Energy Management as Instructed Imbalance Energy. The portion of Demand of Non-Generator Resources using Regulation Energy Management that is dispatched as Regulation in any Settlement Interval shall not be considered Measured Demand for purposes of allocating payments and charges pursuant to Section 11 during that Settlement Interval.

The CAISO shall control the resource's operating set point through its Energy Management System with the objective of maintaining the resource's operating set point at its preferred operating point. In the Day-Ahead Market and Real-Time Unit Commitment, the procurement of Regulation from resources using Regulation Energy Management will not be constrained by the resource's MWh limit to generate, curtail the consumption of, or consume Energy continuously. In the Real-Time Dispatch, the CAISO will base the Dispatches on the resource's capability to provide Regulation. When the resource has a physical MWh limit, the CAISO will observe the resource's MWh constraint during Real-Time Dispatch and will assess whether the CAISO can support the resource's self-provided Regulation capacity or Regulation award with Real-Time Market Dispatches. To the extent the CAISO determines in the Integrated Forward Market or Real-Time Unit Commitment processes that the MWh constraint of resources using Regulation Energy Management limits the capability of the CAISO, through Real-time Dispatch, to support these resources' self-provided Regulation capacity or Regulation awards, the CAISO may disqualify resources using Regulation Energy Management on a pro rata basis across the System Region from providing Regulation, which shall result in the rescission of the disqualified portion of the resources' self-provided or awarded Regulation capacity payments.

8.4.1.3 Voltage Support

A Generating Unit providing Voltage Support must be under the control of generator automatic voltage regulators throughout the time period during which Voltage Support is required to be provided. A Generating Unit may be required to operate underexcited (absorb reactive power) at periods of light

system Demand to avoid potential high voltage conditions, or overexcited (produce reactive power) at periods of heavy system Demand to avoid potential low voltage conditions.

* * *

8.10.8.4 Rescission of Ancillary Service Capacity Payments for Non-Generator Resources

For Non-Generator Resources, payment for Ancillary Service capacity will be rescinded, in accordance with the provisions of Section 11.10.9, to the extent the resource is unable as a result of its MWh constraint to generate Energy or consume Energy continuously to support its self-provision or award of Ancillary Services.

* * *

8.10.8.6 Rescission of Payments for Regulation Up and Regulation Down Capacity

Payment for Regulation Up and Regulation Down capacity will be rescinded, in accordance with the provisions of Section 11.10.9, if the resource providing Regulation Up and Regulation Down capacity: (i) is off Regulation or off Automatic Generation Control, (ii) is not running, (iii) is not providing sufficient Regulating Range, (iv) is generating outside the Regulating Range, (v) has a Regulating Range that overlaps with its Forbidden Operating Regions, or (vi) has telemetry equipment that is not available. In addition to these criteria, payment for Regulation Up and Regulation Down capacity to Non-Generator Resources will be rescinded, in accordance with the provisions of Section 11.10.9, to the extent the resource is unable as a result of its MWh constraint to generate Energy (or curtail Energy consumption) continuously to support its self-provision or award of Regulation Up or unable as a result of its MWh constraint to consume Energy (or increase Energy consumption) continuously to support its self-provision or award of Regulation Down, whether or not the resources use Regulation Energy Management.

* * *

11.8 Bid Cost Recovery

For purposes of determining the Unrecovered Bid Cost Uplift Payments for each Bid Cost Recovery Eligible Resource as determined in Section 11.8.5 and the allocation of Unrecovered Bid Cost Uplift Payments for each Settlement Interval, the CAISO shall sequentially calculate the Bid Costs, which can be positive (IFM, RUC or RTM Bid Cost Shortfall) or negative (IFM, RUC or RTM Bid Cost Surplus) in the IFM, RUC and the Real-Time Market, as the algebraic difference between the respective IFM, RUC or RTM Bid Cost and the IFM, RUC or RTM Market Revenues, which is netted across the CAISO Markets.

In any Settlement Interval a resource is eligible for Bid Cost Recovery payments only if it is On, or in the case of a Participating Load or a Proxy Demand Resource, only if the resource has actually stopped or started consuming pursuant to the Dispatch Instruction. BCR Eligible Resources for different MSS Operators are supply resources listed in the applicable MSS Agreement. All Bid Costs shall be based on mitigated Bids as specified in Section 39.7. Virtual Awards are not eligible for Bid Cost Recovery. Virtual Awards are eligible for make-whole payments due to price corrections pursuant to Section 11.21.2. In order to be eligible for Bid Cost Recovery, Non-Dynamic Resource-Specific System Resources must provide to the CAISO SCADA data by telemetry to the CAISO's EMS in accordance with Section 4.12.3 demonstrating that they have performed in accordance with their CAISO commitments. Scheduling Coordinators for Non-Generator Resources are not eligible to recover Start-Up Costs, Minimum Load Costs, Pumping Costs, Pump Shut-Down Costs, or Transition Costs but are eligible to recover Energy Bid Costs, RUC Availability Payments and Ancillary Service Bid Costs.

27.9 Non-Generator Resources MWh Constraints

The CAISO will observe Non-Generator Resources' MWh constraints in the IFM as part of the co-optimization unless the resources are using Regulation Energy Management. The CAISO will observe Non-Generator Resources' MWh constraints in RUC as part of the co-optimization unless the resources are using Regulation Energy Management. The CAISO will observe Non-Generator Resources' MWh constraints in Real-Time Unit Commitment as part of the co-optimization unless the resources are using Regulation Energy Management. The CAISO will observe Non-Generator Resources' MWh constraints in Real-Time Dispatch, including constraints of resources using Regulatory Energy Management.

* * *

Appendix A Master Definitions Supplement

* * *

- Measured Demand

The metered CAISO Demand plus Real-Time Interchange Export Schedules, excluding that portion of Demand of Non-Generator Resources dispatched as Regulation through Regulation Energy Management.

* * *

- Non-Generator Resources

Resources that operate as either Generation or Load and that can be dispatched to any operating level within their entire capacity range but are also constrained by a MWh limit to (1) generate Energy, (2) curtail the consumption of Energy in the case of demand response, or (3) consume Energy.

* * *

- Regulation Energy Management

A market feature for resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation, as described in Section 8.4.1.2.

* * *

Appendix K Ancillary Service Requirements Protocol (ASRP)

PART A CERTIFICATION FOR REGULATION

* * *

A 1.1.2 the maximum amount of Regulation to be offered must be reached within a period that may range from a minimum of ten (10) minutes to a maximum of thirty (30) minutes, as such period may be specified by the CAISO and published on the CAISO Website;

* * *

A 1.1.4 Regulation capacity offered by a resource must be dispatchable on a continuous basis for at least sixty (60) minutes in the Day Ahead Market and at least thirty (30) minutes in the Real Time Market after issuance of the Dispatch Instruction, including (if necessary) attaining this capability using Regulation Energy Management. The CAISO will measure continuous Energy from the time a resource reaches its award capacity. Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation Energy Management may request the use of Regulation Energy Management as described in Section 8.4.1.2. The Scheduling Coordinators for a resource using

Regulation Energy Management may submit a Regulation Bid for capacity (MW) of up to four (4) times the maximum Energy (MWh) the resource can generate or curtail for fifteen (15) minutes after issuance of the Dispatch Instruction.

* * *

A 1.2.1.3 Ancillary Service Providers for Non-Generator Resources may define a Ramp Rate for operating as Generation and a Ramp Rate for operating as Load, respectively.

* * *

A 1.2.2.4 Ancillary Service Providers for Non-Generator Resources (whether or not the resource uses Regulation Energy Management) shall provide CAISO the following additional telemetry data:

- (a) Resource Ramp Rate when operating as Generation (MW/min);
- (b) Resource Ramp Rate when operating as Load (MW/min);
- (c) The maximum instantaneous ability to produce or consume Energy in MW; and
- (d) The maximum capability to provide Energy as expressed in MWh over a fifteen (15) minute interval.

* * *

A 1.2.3 **Voice Communications:**

CAISO approved communication must be in place between the CAISO Control Center and the operator controlling the resource.

* * *

A 5 The CAISO shall respond by accepting the alternative proposal, rejecting the alternative proposal, or suggesting modifications to the alternative proposal. Such acceptance, rejection, or suggested revision must be provided not later than six (6) weeks after the proposal is received by the CAISO. The Ancillary Service Provider and the CAISO shall keep the Scheduling Coordinator informed of this process by each sending to the Scheduling Coordinator a copy of any written communication which it sends to the other.

A 6 Upon agreement as to any alternative method of communication and control to be used by the Ancillary Service Provider, the CAISO shall provisionally approve the proposal in writing providing a copy to the Ancillary Service Provider's Scheduling Coordinator at the same time. If agreed by the CAISO, the Ancillary Service Provider may then proceed to procure and install the equipment and make arrangements for the required communication and control.

* * *

A 9 When the CAISO is satisfied that the communication and control systems meet the CAISO's requirements, the Ancillary Service Provider shall request in writing that the CAISO conduct a certification test with a suggested primary date and time and at least

two (2) alternative dates and times. The CAISO shall, within two (2) Business Days of receipt of the Ancillary Service Provider's request, accept a proposed time if possible or suggest at least three (3) alternatives to the Ancillary Service Provider. If the CAISO responds by suggesting alternatives, the Ancillary Service Provider shall, within two (2) Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three (3) alternatives, and this procedure shall continue until agreement is reached on the date and time of the test. The Generator shall inform its Scheduling Coordinator of the agreed date and time of the test.

A 10 Testing shall be performed by the CAISO, with the cooperation of the Ancillary Service Provider. Such tests shall include, but not be limited to, the following:

- (a) confirmation of control communication path performance;
- (b) confirmation of voice circuit for receipt of Dispatch Instructions;
- (c) confirmation of the resource's control performance; and
- (d) confirmation of the CAISO EMS control to include changing the resource operating level over the range of Regulation proposed at different set points, from minimum to maximum, and at different rates of change from the minimum to the maximum permitted by the design of the resource.

A 10.1 Testing for Non-Generator Resources requesting the use of Regulation Energy Management shall include a market simulation as described in the CAISO's Operating Procedures.

* * *

C 1.1 the rated capacity of the resource must be 500 KW or greater (i.e. the resource must be capable of providing at least 500 KW of Non-Spinning Reserve) unless the resource is participating in an aggregation arrangement approved by the CAISO;

* * *

California Independent System Operator Corporation

Fifth Replacement FERC Electric Tariff

Attachment B – Marked Tariff

Regulation Energy Management Amendment

August 22, 2011

4.6 Relationship Between CAISO And Generators

The CAISO shall not accept Bids for any Generating Unit interconnected to the electric grid within the CAISO Balancing Authority Area otherwise than through a Scheduling Coordinator. The CAISO shall further not be obligated to accept Bids from Scheduling Coordinators relating to Generation from any Generating Unit interconnected to the electric grid within the CAISO Balancing Authority Area unless the relevant Generator undertakes in writing, by entering into a Participating Generator Agreement, QF PGA, or Metered Subsystem Agreement with the CAISO, to comply with all applicable provisions of this CAISO Tariff as they may be amended from time to time, including, without limitation, the applicable provisions of this Section 4.6 and Section 7.7. [The CAISO shall not accept Bids from Scheduling Coordinators relating to Generation from a Non-Generator Resource unless the resource owner or operator undertakes in writing, by entering into a Participating Generator Agreement and Participating Load Agreement, to comply with all applicable provisions of this CAISO Tariff as they may be amended from time to time including, without limitation, the applicable provisions of this Section 4.6 and Section 7.7.](#)

* * *

4.7 Relationship Between CAISO And Participating Loads

The CAISO shall only accept Bids for Supply of Energy or Ancillary Services or Submissions to Self-Provide Ancillary Services from Loads if such Loads are those of a Participating Load that has entered into a Participating Load Agreement with the CAISO and which meet standards adopted by the CAISO and published on the CAISO Website. The CAISO shall not accept submitted Bids for Supply of Energy or Ancillary Services from a Participating Load other than through a Scheduling Coordinator. [The CAISO shall not accept Bids from Scheduling Coordinators relating to Load from any Non-Generator Resource unless the resource owner or operator undertakes in writing, by entering into a Participating Load Agreement, to comply with all applicable provisions of this CAISO Tariff as they may be amended from time to time.](#)

* * *

8.4.1.1 Regulation

A resource offering Regulation must have the following operating characteristics and technical capabilities:

- (a) it must be capable of being controlled and monitored by the CAISO EMS by means of the installation and use of a standard CAISO direct communication and direct control system, a description of which and criteria for any temporary exemption from which, the CAISO shall publish on the CAISO Website;
- (b) it must be capable of achieving at least the Ramp Rates (increase and decrease in MW/minute) stated in its Bid for the full amount of Regulation capacity offered;
- (c) the Regulation capacity offered must not exceed the maximum Ramp Rate (MW/minute) of that resource times a value within a range from a minimum of ten (10) minutes to a maximum of thirty (30) minutes, which value shall be specified by the CAISO and published on the CAISO Website;
- (d) the resource to CAISO Control Center telemetry must, in a manner meeting CAISO standards, include indications of whether the resource is on or off CAISO EMS control at the resource terminal equipment;
- (e) the resource must be capable of the full range of movement within the amount of Regulation capability offered without manual resource operator intervention of any kind; ~~and~~
- (f) each Ancillary Service Provider must ensure that its CAISO EMS control and related SCADA equipment for its resource are operational throughout the time period during which Regulation is required to be provided; ~~and~~
- (g) Regulation capacity offered must be dispatchable on a continuous basis for at least sixty (60) minutes in the Day-Ahead Market and at least thirty (30) minutes in the Real-Time Market after issuance of the Dispatch Instruction. The ~~CAISO~~ will measure continuous ~~Energy~~ from the time a resource reaches its award capacity. Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require

Energy from the Real-Time Market to offer their full capacity as Regulation may request the use of Regulation Energy Management as described in Section 8.4.1.2.

8.4.1.2 Regulation Energy Management

The CAISO will make Regulation Energy Management available to Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation. A Scheduling Coordinator for a resource using Regulation Energy Management may submit a Regulation Bid for capacity (MW) of up to four (4) times the maximum Energy (MWh) the resource can generate or curtail for fifteen (15) minutes after issuance of a Dispatch Instruction. In the Real-Time Market, a Scheduling Coordinator for a resource using Regulation Energy Management will procure Imbalance Energy as needed to satisfy the sixty (60) minute continuous Energy requirement for Regulation Awards in the Day-Ahead Market.

Scheduling Coordinators may request to use Regulation Energy Management for these Non-Generator Resources by submitting a request to certify such a resource to provide Regulation using Regulation Energy Management. The owner or operator of a Resource using Regulation Energy Management must execute both a Participating Generator Agreement and/or Participating Load Agreement and may provide only Regulation in the CAISO Market. A resource using Regulation Energy Management may not provide Energy other than Energy associated with Regulation. Scheduling Coordinators for Resources using Regulation Energy Management may define a Ramp Rate for operating as Generation and a Ramp Rate for operating as Load, respectively. These resources shall comply with the requirements to provide Regulation as specified in this Section 8, Appendix K, and the CAISO's Operating Procedures, including the requirement to undergo a market simulation using Regulation Energy Management as part of the certification procedure.

Scheduling Coordinators for resources using Regulation Energy Management shall register these resources in the Master File. Scheduling Coordinators may only submit Bids for Regulation Up and Regulation Down for these resources. Scheduling Coordinators may not submit Energy Bids, Energy Self-Schedules, Residual Unit Commitment Bids, or Ancillary Service Bids other than Regulation for these

resources. Scheduling Coordinators may not submit any type of commitment costs as part of their Regulation Up and Regulation Down Bids for resources using Regulation Energy Management, including Start-Up Cost, Minimum Load Costs, Pumping Cost or Pump Shut-Down Costs, or Transition Cost. All other bidding rules for Regulation set forth in Section 30 shall apply to resources using Regulation Energy Management.

The CAISO will settle Dispatches from resources using Regulation Energy Management as Instructed Imbalance Energy. The portion of Demand of Non-Generator Resources using Regulation Energy Management that is dispatched as Regulation in any Settlement Interval shall not be considered Measured Demand for purposes of allocating payments and charges pursuant to Section 11 during that Settlement Interval.

The CAISO shall control the resource's operating set point through its Energy Management System with the objective of maintaining the resource's operating set point at its preferred operating point. In the Day-Ahead Market and Real-Time Unit Commitment, the procurement of Regulation from resources using Regulation Energy Management will not be constrained by the resource's MWh limit to generate, curtail the consumption of, or consume Energy continuously. In the Real-Time Dispatch, the CAISO will base the Dispatches on the resource's capability to provide Regulation. When the resource has a physical MWh limit, the CAISO will observe the resource's MWh constraint during Real-Time Dispatch and will assess whether the CAISO can support the resource's self-provided Regulation capacity or Regulation award with Real-Time Market Dispatches. To the extent the CAISO determines in the Integrated Forward Market or Real-Time Unit Commitment processes that the MWh constraint of resources using Regulation Energy Management limits the capability of the CAISO, through Real-time Dispatch, to support these resources' self-provided Regulation capacity or Regulation awards, the CAISO may disqualify resources using Regulation Energy Management on a pro rata basis across the System Region from providing Regulation, which shall result in the rescission of the disqualified portion of the resources' self-provided or awarded Regulation capacity payments.

8.4.1.3 Voltage Support

A Generating Unit providing Voltage Support must be under the control of generator automatic voltage regulators throughout the time period during which Voltage Support is required to be provided. A

Generating Unit may be required to operate underexcited (absorb reactive power) at periods of light system Demand to avoid potential high voltage conditions, or overexcited (produce reactive power) at periods of heavy system Demand to avoid potential low voltage conditions.

* * *

8.10.8.4 [NOT USED] Rescission of Ancillary Service Capacity Payments for Non-Generator Resources

For Non-Generator Resources, payment for Ancillary Service capacity will be rescinded, in accordance with the provisions of Section 11.10.9, to the extent the resource is unable as a result of its MWh constraint to generate Energy or consume Energy continuously to support its self-provision or award of Ancillary Services.

* * *

8.10.8.6 Rescission of Payments for Regulation Up and Regulation Down Capacity

Payment for Regulation Up and Regulation Down ~~capacity~~Capacity will be rescinded, in accordance with the provisions of Section 11.10.9, if the resource providing Regulation Up and Regulation Down capacity: (i) is off Regulation or off Automatic Generation Control, (ii) is not running, (iii) is not providing sufficient Regulating Range, (iv) is generating outside the Regulating Range, (v) has a Regulating Range that overlaps with its Forbidden Operating Regions, or (vi) has telemetry equipment that is not available. In addition to these criteria, payment for Regulation Up and Regulation Down capacity to Non-Generator Resources will be rescinded, in accordance with the provisions of Section 11.10.9, to the extent the resource is unable as a result of its MWh constraint to generate Energy (or curtail Energy consumption) continuously to support its self-provision or award of Regulation Up or unable as a result of its MWh constraint to consume Energy (or increase Energy consumption) continuously to support its self-provision or award of Regulation Down, whether or not the resources use Regulation Energy Management.

* * *

11.8 Bid Cost Recovery

For purposes of determining the Unrecovered Bid Cost Uplift Payments for each Bid Cost Recovery Eligible Resource as determined in Section 11.8.5 and the allocation of Unrecovered Bid Cost Uplift

Payments for each Settlement Interval, the CAISO shall sequentially calculate the Bid Costs, which can be positive (IFM, RUC or RTM Bid Cost Shortfall) or negative (IFM, RUC or RTM Bid Cost Surplus) in the IFM, RUC and the Real-Time Market, as the algebraic difference between the respective IFM, RUC or RTM Bid Cost and the IFM, RUC or RTM Market Revenues, which is netted across the CAISO Markets. In any Settlement Interval a resource is eligible for Bid Cost Recovery payments only if it is On, or in the case of a Participating Load or a Proxy Demand Resource, only if the resource has actually stopped or started consuming pursuant to the Dispatch Instruction. BCR Eligible Resources for different MSS Operators are supply resources listed in the applicable MSS Agreement. All Bid Costs shall be based on mitigated Bids as specified in Section 39.7. Virtual Awards are not eligible for Bid Cost Recovery. Virtual Awards are eligible for make-whole payments due to price corrections pursuant to Section 11.-21.2. In order to be eligible for Bid Cost Recovery, Non-Dynamic Resource-Specific System Resources must provide to the CAISO SCADA data by telemetry to the CAISO's EMS in accordance with Section 4.12.3 demonstrating that they have performed in accordance with their CAISO commitments. [Scheduling Coordinators for Non-Generator Resources are not eligible to recover Start-Up Costs, Minimum Load Costs, Pumping Costs, Pump Shut-Down Costs, or Transition Costs but are eligible to recover Energy Bid Costs, RUC Availability Payments and Ancillary Service Bid Costs.](#)

27.9 Non-Generator Resources MWh Constraints

[The CAISO will observe Non-Generator Resources' MWh constraints in the IFM as part of the co-optimization unless the resources are using Regulation Energy Management. The CAISO will observe Non-Generator Resources' MWh constraints in RUC as part of the co-optimization unless the resources are using Regulation Energy Management. The CAISO will observe Non-Generator Resources' MWh constraints in Real-Time Unit Commitment as part of the co-optimization unless the resources are using Regulation Energy Management. The CAISO will observe Non-Generator Resources' MWh constraints in Real-Time Dispatch, including constraints of resources using Regulatory Energy Management.](#)

* * *

**Appendix A
Master Definitions Supplement**

* * *

- Measured Demand

The metered CAISO Demand plus Real-Time Interchange Export Schedules, excluding that portion of Demand of Non-Generator Resources dispatched as Regulation through Regulation Energy Management.

* * *

- Non-Generator Resources

Resources that operate as either Generation or Load and that can be dispatched to any operating level within their entire capacity range but are also constrained by a MWh limit to (1) generate Energy, (2) curtail the consumption of Energy in the case of demand response, or (3) consume Energy.

* * *

- Regulation Energy Management

A market feature for resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation, as described in Section 8.4.1.2.

* * *

**Appendix K
Ancillary Service Requirements Protocol (ASRP)**

PART A
CERTIFICATION FOR REGULATION

* * *

A 1.1.2 the maximum amount of Regulation to be offered must be reached within a period that may range from a minimum of ten (10) minutes to a maximum of thirty (30) minutes, as such period may be specified by the CAISO and published on the CAISO Website;

* * *

A 1.1.4 Regulation capacity offered by a resource must be dispatchable on a continuous basis for at least sixty (60) minutes in the Day Ahead Market and at least thirty (30) minutes in the Real Time Market after issuance of the Dispatch Instruction, including (if necessary) attaining this capability using Regulation Energy Management. The CAISO will measure continuous Energy from the time a resource reaches its award capacity. Scheduling Coordinators for Non-Generator Resources located within the CAISO Balancing Authority Area that require Energy from the Real-Time Market to offer their full capacity as Regulation Energy Management may request the use of Regulation Energy Management

as described in Section 8.4.1.2. The Scheduling Coordinators for a resource using Regulation Energy Management may submit a Regulation Bid for capacity (MW) of up to four (4) times the maximum Energy (MWh) the resource can generate or curtail for fifteen (15) minutes after issuance of the Dispatch Instruction. The ISO will measure continuous energy from the time a resource reaches its award capacity.

* * *

A 1.2.1.3 Ancillary Service Providers for Non-Generator Resources may define a Ramp Rate for operating as Generation and a Ramp Rate for operating as Load, respectively.

* * *

A 1.2.2.4 Ancillary Service Providers for Non-Generator Resources (whether or not the resource uses Regulation Energy Management) shall provide CAISO the following additional telemetry data:

(a) Resource Ramp Rate when operating as Generation (MW/min);

(b) Resource Ramp Rate when operating as Load (MW/min);

(c) The maximum instantaneous ability to produce or consume Energy in MW; and

(d) The maximum capability to provide Energy as expressed in MWh over a fifteen (15) minute interval.

* * *

A 1.2.3 Voice Communications:

~~CAISO approved primary and back-up voice communication must be in place between the CAISO Control Center and the operator controlling the resource, at the resource site and between the Scheduling Coordinator and the operator. The primary dedicated voice communication between the CAISO Control Center and the operator controlling the resource at the resource site must be digital voice communication, as provided by a standard CAISO direct communication and direct control system; and~~

~~**A 1.3** the communication and control system and the resource must pass a qualification test to demonstrate the overall ability to provide Regulation meeting the performance requirements of the ASRP for Regulation.~~

* * *

A 5 The CAISO shall respond by accepting the alternative proposal, rejecting the alternative proposal, or suggesting modifications to the alternative proposal. Such acceptance, rejection, or suggested revision must be provided not later than six (6) weeks after the proposal is received by the CAISO. The Ancillary Service Provider and the CAISO shall keep the Scheduling Coordinator informed of this process by each sending to the Scheduling Coordinator a copy of any written communication which it sends to the other.

A 6 Upon agreement as to any alternative method of communication and control to be used by the Ancillary Service Provider, the CAISO shall provisionally approve the proposal in

writing providing a copy to the Ancillary Service Provider's Scheduling Coordinator at the same time. If agreed by the CAISO, the Ancillary Service Provider may then proceed to procure and install the equipment and make arrangements for the required communication and control.

* * *

A 9 When the CAISO is satisfied that the communication and control systems meet the CAISO's requirements, the Ancillary Service Provider shall request in writing that the CAISO conduct a certification test with a suggested primary date and time and at least two (2) alternative dates and times. The CAISO shall, within two (2) Business Days of receipt of the Ancillary Service Provider's request, accept a proposed time if possible or suggest at least three (3) alternatives to the Ancillary Service Provider. If the CAISO responds by suggesting alternatives, the Ancillary Service Provider shall, within two (2) Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three (3) alternatives, and this procedure shall continue until agreement is reached on the date and time of the test. The Generator shall inform its Scheduling Coordinator of the agreed date and time of the test.

A 10 Testing shall be performed by the CAISO, with the cooperation of the Ancillary Service Provider. Such tests shall include, but not be limited to, the following:

- (a) ~~A 10.1~~ confirmation of control communication path performance;
- (b) ~~A 10.2~~ confirmation of ~~primary and secondary~~ voice ~~circuit~~circuits for receipt of Dispatch Instructions;
- (c) ~~A 10.3~~ confirmation of the resource's control performance; and
- (d) ~~A 10.4~~ confirmation of the CAISO EMS control to include changing the resource operating level over the range of Regulation proposed at different ~~Set P~~points, from minimum to maximum, and at different rates of change from the minimum to the maximum permitted by the design of the resource.

A 10.1 Testing for Non-Generator Resources requesting the use of Regulation Energy Management shall include a market simulation as described in the CAISO's Operating Procedures.

* * *

C 1.1 the rated capacity of the resource must be 500 KW or greater (i.e. the resource must be capable of providing at least 500 KW of Non-Spinning Reserve) unless the resource is participating in an aggregation arrangement approved by the CAISO;

* * *

California Independent System Operator Corporation

Fifth Replacement FERC Electric Tariff

Attachment C – Board Documents

Regulation Energy Management Amendment

August 18, 2011

Memorandum

To: ISO Board of Governors
From: Keith Casey, Vice President, Market and Infrastructure Development
Date: January 27, 2011
Re: **Decision on Regulation Energy Management**

This memorandum requires Board action.

EXECUTIVE SUMMARY

Regulation energy management is a proposed market enhancement to the rules the California Independent System Operator Corporation uses for procuring regulation services. This enhancement will allow new types of storage resources, such as batteries and flywheels, to provide regulation service. The extremely fast ramping ability of these resources can provide significant operational benefits to the ISO. However, these resources also have limitations in the amount of energy they can produce for a sustained period of time. Without regulation energy management, these resources are limited to providing only a portion of their available capacity to the regulation market. Management believes that implementing regulation energy management will lead to increased participation in the ancillary service market by energy storage and demand response resources and will support the integration of additional renewable resources.

Regulation energy management also allows new storage technologies to provide regulation energy over a continued sustained period. The ISO maintains the resource's state of charge by balancing the energy dispatched from the resource providing regulation service with offsetting dispatches through the real-time energy market in subsequent periods. By ensuring that the energy offset is met by the real-time energy market, the ISO is assured that the resource will provide the regulation capacity the ISO procured.

The integration of renewable resources introduces new requirements to reliably manage the grid, and new market solutions and technologies will be needed to meet the emerging challenges. This enhancement will allow the ISO to gain valuable operational experience with new technologies that provide more varied capabilities for ISO grid operations. Management proposes the following motion:

Moved, that the ISO Board of Governors approves the proposed regulation energy management software enhancement, as described in the memorandum dated January 27, 2011; and

Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

BACKGROUND

The ISO originally commenced this initiative in connection with FERC Order Nos. 719 and 890. Order 719 directs regional transmission organizations and independent system operators to allow demand response resources to participate in ancillary services markets, assuming the demand response resources are technically capable. Order 890 requires RTOs and ISOs to evaluate non-generation resources, such as demand response and storage, on a comparable basis to services provided by generation resources in meeting mandatory reliability standards, providing ancillary services and planning the expansion of the transmission grid.

In March 2010, the Board approved modifications to existing operating characteristics and technical requirements for ancillary services to remove barriers for non-generation resource participation in the ISO's regulation markets. Specifically, the Board approved a proposal that reduced the minimum rated capacity and continuous energy requirements for providing ancillary services. With these modifications, limited energy resources such as flywheels and batteries are now able to participate in the day-ahead and real-time regulation market. However, the amount of day-ahead capacity for providing regulation service from these resources is significantly limited by a one hour continuous energy requirement. The ISO tariff requires that regulation capacity offered must be dispatchable on a continuous basis for at least sixty minutes in the day-ahead market and at least thirty minutes in the real-time market after issuance of a dispatch instruction.

Management planned to include a regulation energy management feature as part of the March 2010 proposal but removed it prior to the Board meeting based on stakeholder concerns that outstanding issues with the design were not adequately resolved. Management committed to the Board and to stakeholders to revisit regulation energy management in Phase 1 of the Renewable Integration –Market & Product Review stakeholder process. As described further in this memo, we believe the proposed design addresses issues raised in both the prior and current stakeholder processes.

Barriers for limited energy resources providing regulation

There are existing barriers in the current regulation market design to limited energy resources for providing regulation services. In the day-ahead market, the ISO procures regulation in one hour intervals. In order to receive the capacity payment for regulation (\$/MW), a resource must certify that it can produce energy to satisfy a regulation up award and reduce energy production or consume energy to satisfy a regulation down award over the entire hour. Since the ISO procures 100% of the forecasted regulation needs in the day-ahead market, the 60 minute requirement for regulation sold in that market creates a barrier for resources that can provide regulation, but only produce or consume energy for a limited duration (i.e., “limited energy resources”).

By implementing measures that utilize the real-time market more dynamically to manage the resources state of charge, limited energy resources are able to meet the continuous energy requirement for providing regulation services.

Comparison with other ISOs

The ISO's proposed approach to implement software functionality to maintain a limited energy resource's regulating range through the real-time market is similar to the approaches developed by the Midwest ISO, PJM Interconnection, ISO New England and the New York ISO. As in this

proposal, these ISOs/RTOs enable limited energy resources like small batteries and flywheels to provide regulation service by managing their state of charge on behalf of the resource.

Regulation energy management is consistent with future market software needs

The proposed functionality, while initially applied to limited energy resources providing regulation, will also be used in the future to support other expected software enhancements to integrate storage and to allow demand response resources to provide regulation service. The software logic used to accommodate a resource with 15 minutes duration is the same as the logic needed to handle any length of duration less than 24 hours, such as a 2 hour or 8 hour storage resource. The cost of this software functionality is estimated to be around one million dollars.

PROPOSAL

Operation of resources using regulation energy management

Under regulation energy management, a resource's scheduling coordinator agrees to allow the ISO to maintain the resource's state of charge by balancing the energy dispatched from the resource in providing regulation service with offsetting dispatches from the real-time energy imbalance market in subsequent intervals. By ensuring that the energy offset is met by the real-time energy market, a resource which has selected regulation energy management can satisfy the 60 minute continuous energy requirement for regulation in the day-ahead market.

Bidding

Regulation energy management resources will submit separate bids for regulation up and regulation down capacity the same as conventional generation. Bids to provide regulation may be submitted into the day-ahead and/or real-time market. In contrast to conventional generation resources that must have a day-ahead energy schedule to provide regulation, limited energy resources have a set point of zero and will only provide regulation energy through the use of regulation energy management. Therefore, these resources will not submit day-ahead energy bids and are not required to have a day-ahead schedule.

Settlement of regulation energy and energy offset

Management proposes to settle resources using regulation energy management the same as conventional generation providing regulation. Resources that utilize regulation energy management will receive regulation capacity payments from the market and will be paid the locational marginal price for providing regulation up and charged the locational marginal price for providing regulation down. The real-time energy produced and/consumed by a resource to maintain the resource's state of charge, including losses, will be settled at the real-time locational marginal price.

Monitoring of regulation energy management design

Management intends to monitor the operational performance of resources using regulation energy management on an ongoing basis and will determine if modifications are needed based on actual operating experience. We plan to monitor the resources state of charge while providing regulation, the regulation dispatch received, frequency and duration of regulation awarded, and performance

under various grid system conditions. The ISO likely will develop additional monitoring metrics in the future as more experience is gained with these storage resources.

Disqualification and rescission of payment

Management proposes to disqualify, on a pro-rata basis, resources using regulation energy management from providing regulation in the event that the real-time energy market cannot meet the ISO forecast of ISO demand plus the regulation energy management energy offset. This rule recognizes that the combination of the resource's discharge/charge rate and the real-time market are needed to meet ISO regulation requirements. This pro-rata allocation will result in a rescission of the regulation capacity payment for the allocated shortfall.

In addition, whenever a resource using regulation energy management fails to respond to automatic generation control, the ISO will rescind the regulation capacity payments. This rescission of payment is similar to the provisions in place for conventional generators.

Eligibility to participate in regulation energy management

Management proposes that a resource can select regulation energy management only if its technical characteristics require a real-time energy offset to provide regulation (i.e., it cannot meet the 60-minute continuous energy requirement for its full capacity). Resources such as flywheels, batteries, and some demand response resources may require a real-time energy offset; whereas, a traditional hydro or thermal unit does not.

POSITIONS OF THE PARTIES

Stakeholder Process

The ISO examined a proposal to implement regulation energy management as part of the modifications to ancillary services to support non-generation resources initiative that was approved by the Board in March 2010. Management deferred bringing regulation energy management to the Board so that we could address several outstanding issues related to the functionality, including whether regulation energy management created a separate ancillary service product, whether or not to implement a procurement limit, and whether or not to settle regulation energy dispatched from these resources.

In the current stakeholder process, Management has worked to resolve each of these issues so that the regulation service provided by resources using regulation energy management is comparable to that of a conventional generator. Specifically, the proposal differs from the previous proposal in that it removes the limit on the amount of regulation energy management capacity that could be procured by the ISO and settles the energy provided and consumed by these resources at the real-time locational marginal price.

Most stakeholders have expressed support or at least acceptance of the proposal, subject to a review of regulation energy management based on actual operating experience. The proposal has received strong support from limited energy storage interests. Some stakeholders remain neutral, but continue to express concerns about potential operational issues given the energy limitations of these resources. The ISO Department of Market Monitoring (DMM) expressed concerns and proposed potential modifications to the design. These concerns were resolved through

modification to the design and a commitment to monitor the effectiveness of the regulation energy management design after implementation. For additional information on DMM's concerns, please refer to their separate Board memo, provided in the Board materials for this meeting and posted on the ISO website. PG&E continues to oppose the design and requests additional analysis and modeling prior to implementation. The Market Surveillance Committee (MSC) has also raised concerns and recommends the ISO place three different caps on participation by limited energy storage resources. Their concerns are described in the MSC Opinion on regulation energy management. The Opinion is attached to the MSC Board memo which was also provided in the Board materials for this meeting.

In response to the MSC opinion, Management believes that the volume of energy limited storage resources participating in the ISO's regulation markets over the next several years will be very small. If this is indeed the case, the caps suggested by the MSC are unwarranted and create unnecessary complexity for implementation. As described above, the ISO will be closely monitoring the participation of these resources in the regulation markets and will propose modifications to the design if warranted. Caps on participation can be added later if necessary, after the ISO gains experience with these new resources and has better justification for future design modifications.

The concerns described above expose the ongoing paradox with accommodating new technologies in the ISO markets. If the ISO does not remove existing barriers to allow participation of new technologies, the new resources will not enter the ISO market and we will not gain the operational experience necessary to address stakeholder concerns. Stakeholders expressed similar concerns regarding performance in the market to the proxy demand resource product, as the ISO had no experience with demand response resources and performance of these new resources was not proven.

Below is a discussion of the key issues that staff addressed and the design modifications that were made based on stakeholder feedback. Comments are summarized in more detail in the Stakeholder Matrix, which is *Attachment A* to this memo.

Regulation energy management as a new product

Stakeholders were divided on the issue of whether or not regulation energy management is sufficiently different from traditional regulation to warrant creation of a new product. Some stakeholders advocated that regulation energy management is similar to other software enhancements, such as multi-stage generation, which enable a resource to make its full capabilities available to the ISO market. The opposing view is that regulation energy management is a new and unique product from traditional regulation and should be procured and priced separately. Management views regulation energy management as an enhancement that will allow the ISO to utilize the full range of regulation capability available from limited energy resources and does not at this time require the development of a new product. However, we recognize that a new regulation market product may be warranted in the future.

Settling imbalance energy

Previously, Management proposed not to settle real-time imbalance energy for resources participating in regulation energy management to simplify implementation. However, we modified the proposal in response to stakeholder concerns that this approach may not accurately account for the efficiency losses of a resource using regulation energy management and different energy prices during times of charge and discharge.

Eligibility Limits

This design feature was added to resolve stakeholder concerns that regulation energy management could be used by conventional generators to withhold regulation capacity from the market. Only resources that require an energy offset due to their operational characteristics may participate in regulation energy management.

Review threshold for regulation energy management design

During the stakeholder process, there was discussion of establishing a review threshold based upon the penetration of resources using regulation energy management. Once the threshold is reached, stakeholder review of the design would be initiated. The purpose of the review threshold was to address stakeholder concerns that operational issues could emerge at higher penetration of resources using regulation energy management. Management previously proposed a 40 percent threshold and DMM suggested that if a threshold were to be used, a much lower 5 percent threshold would be more appropriate. Others suggested that ongoing monitoring should allow review if operational issues occur at any penetration level. Management agrees a review threshold is not warranted as we plan to monitor on an ongoing basis. If operational issues arise, the ISO will engage with stakeholders to make appropriate changes to the design.

Procurement limits

Previously, Management proposed an initial procurement limit for regulation energy management equal to 10 percent of the total regulation requirement to allow for operational experience with limited energy resources. A number of stakeholders argued against this limit on the grounds that it would hinder the development of commercial-scale limited energy storage in California. DMM also raised concerns that if the procurement limit was exceeded it would result in differential pricing for resources providing regulation through regulation energy management and resources providing regulation conventionally. On further examination, we removed this design element and believe the ongoing monitoring of the design is preferable to a market constraint.

Ancillary services substitution

Under the ISO's current market rules, regulation up may substitute for spinning and non-spinning reserves, when it is economic to do so. Regulation energy management functionality enables limited energy resources to meet the continuous energy requirement for day-ahead regulation of 60 minutes. This timeframe exceeds the continuous energy requirement for spinning and non-spinning reserves of 30 minutes.

Stakeholders expressed concern with allowing resources using regulation energy management to substitute for spinning reserve requirements given their inherent energy limitations. Given the

anticipated quantity of resources using regulation energy management over the next several years and the current duration of contingency events, the ISO believes that a separate constraint to prevent regulation up capacity provided from resources using regulation energy management from substituting for spinning reserve is unwarranted. The ISO will monitor the design during contingency events and if unforeseen operational issues arise, the ISO will revisit this issue and determine, based upon actual operational data, if design changes are required.

Implementation of a mileage payment

Some stakeholders have advocated that the ISO should provide an additional payment to regulation resources based upon their movement from the preferred operating point. A “mileage payment” would be an administrative payment based upon the sum of the absolute value of all deviations from the resources preferred operating point in response to ISO regulation signals. While there may be merit in implementing such a payment, as has been done by ISO New England, this would be a fundamental change in how the ISO procures and pays for regulation. This proposal is more appropriately within the scope of the larger market product discussion in Phase 2 of the Renewable Integration –Market & Product Review. In the future, if a new payment approach were implemented, these limited energy resources will still require the regulation energy management functionality.

MANAGEMENT RECOMMENDATION

Management requests Board approval of regulation energy management as detailed in this memorandum. Regulation energy management will remove barriers to participation in the ISO regulation market by storage and demand response resources that are energy limited and allow the ISO to gain operational experience with new technologies that provide more varied capabilities to ISO markets. If approved, the ISO intends to implement this functionality as part of the ancillary services for non-generation resources project in Spring 2012.



California ISO
Shaping a Renewed Future

Decision on Regulation Energy Management

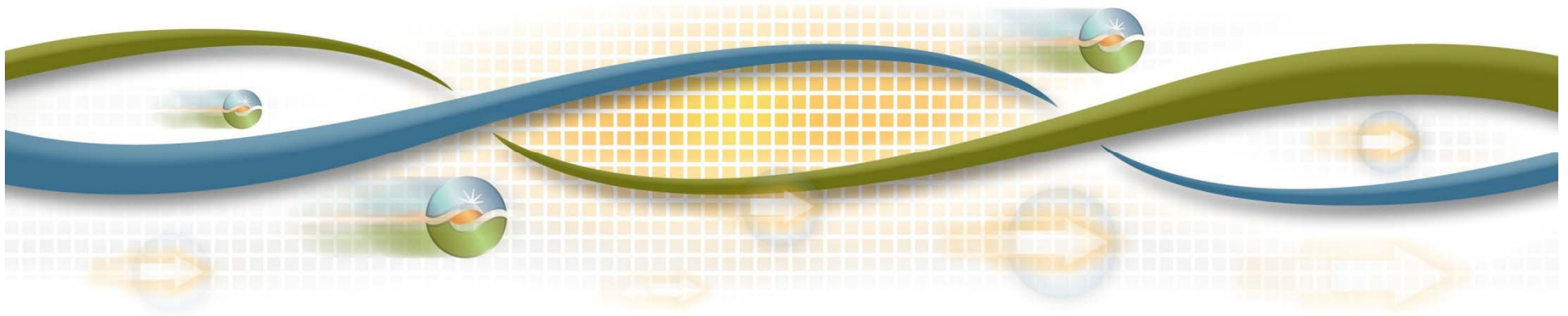
Greg Cook

Director, Market & Infrastructure Policy

Board of Governors Meeting

General Session

February 3, 2011



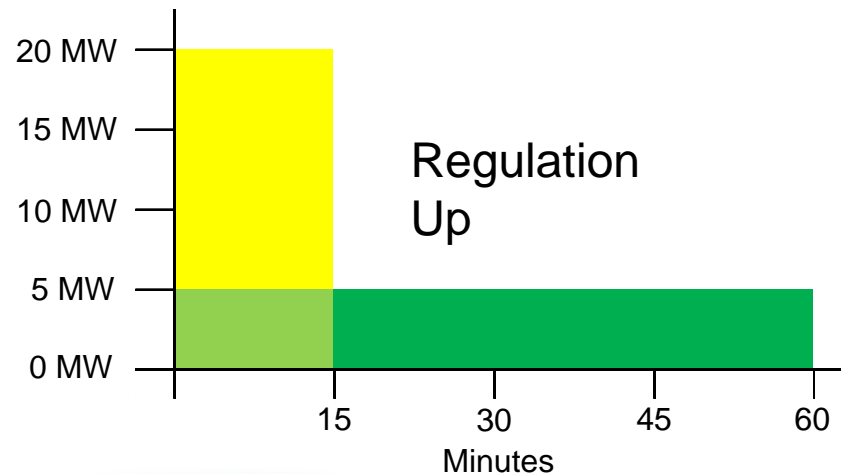
Regulation energy management enables new storage technologies to provide regulation service.


- Due to the limited energy characteristics of storage resources, they are unable to participate in the day-ahead regulation market at full capacity.

Example: 20 MW limited energy resource

Green – current requirement

Yellow – regulation energy management





Proposal addresses stakeholder concerns from prior and current stakeholder process.

- Settles limited energy resources the same as conventional resources providing regulation.
- Eligibility restricted to limited energy resources.
- Pro-rata disqualification in event that real-time energy market cannot meet energy offset.
- No pay applied when resource does not respond to regulation signal.
- Ongoing monitoring of operational performance.



Most stakeholders support or conditionally support the proposal.

- Strong support from storage companies.
- Others conditionally support the proposal subject to review based on actual operating experience.
- PG&E argued for deferring the proposal to allow for more analysis.

Management requests Board approval for regulation energy management.

- Proposal provides reasonable starting point to allow the ISO to gain experience with limited energy resources.
- Safeguards are adequate considering low projected volumes of limited energy resources.
- Consistent with future software needs.
- Meets goals of comparable treatment of non-generation resources.

Stakeholder Process: Regulation Energy Management

Summary of Submitted Comments

Stakeholders submitted four rounds of written comments to the ISO on the following dates:

- Round One: Renewable Integration: Market and Product Review Discussion Paper, 07/30/10
- Round Two: Renewable Integration: Market and Product Review Issue Paper, 10/18/10
- Round Three: Regulation Energy Management Straw Proposal, 12/01/10
- Round Four: Regulation Energy Management Draft Final Proposal, 01/07/11
- Round Five: Response to DMM Comments on Draft Final Proposal, 01/12/11

Parties that submitted written comments: A123 Systems, Beacon Power Corporation, California Energy Storage Alliance, Dynergy, ENBALA Power Networks, Pacific Gas & Electric, Powerex, Southern California Edison, and Western Power Trading Forum

Parties that participated in meetings or conference calls: (All the parties above), California Department of Water Resources, California Public Utility Commission, City of Anaheim, City of Riverside, Customized Energy, Edison Mission, KEMA, Megawatt Storage Farms, Modesto Irrigation District, San Diego Gas & Electric, Turlock Irrigation District, WAPA

Stakeholder comments are posted at: <http://www.aiso.com/27e3/27e3c4fbfbd0.html#28607cd936950>

Other stakeholder efforts included:

- In-person stakeholder meeting to review discussion paper, 07/16/10
- In-person stakeholder meeting to review issue paper, 10/05/10
- In-person Market Surveillance Committee meeting to review straw proposal, 11/19/10
- Stakeholder conference call to review draft final proposal, 12/21/10
- Stakeholder conference call to review revised draft final proposal, 01/20/11

Management Proposal	A123 (LESR)	Beacon (LESR)	CESA (LESR)	Dynegy (Generator)	Powerex (Importer)	PG&E (IOU)	SCE (IOU)	Management Response
Settlement of regulation energy and energy offset	Supports	Strongly Supports	Strongly Supports	Supports	No Comment	Supports	Supports	The settlement of regulation energy is the same for all resources. The energy offset including losses will receive the locational marginal price.
Capacity determined based upon 15 minute duration	Strongly Supports	Strongly Supports	Strongly Supports	No Comment	Does not support Recommends 30 minutes	Does not support Recommends further analysis	Neutral ISO should monitor for sustained events and have explicit tariff authority to simply not purchase REM in hours where it cannot perform the service being sold.	15 minutes is the minimum time necessary for the ISO to manage the resource's state of charge. The capacity determination is similar to market designs approved in other ISOs.
Ongoing monitoring of REM. If operational issues arise the ISO will propose changes to the design.	Supports	Strongly Supports	Strongly Supports	No Comment	Does not support ISO may not be able to acquire a high volume of regulation capacity in the real-time market.	Does not support REM should be a pilot	Supports	The ISO intends to monitor the operational performance of resources using REM and will determine if modifications are needed based on actual operating experience even at low penetration levels.
Eligibility to participate in REM based upon technical characteristics	Supports	Strongly Supports	Strongly Supports	No Comment	No Comment	No Comment	Supports But urges ISO to remain open to expanding to all resources in the future.	The qualification requirement is similar to the rule for multi-stage generation. The rule ensures that REM cannot be used for unintended purposes.
Rescission of regulation capacity payment when resource unable to respond to automatic generation control	Supports	Strongly Supports	Strongly Supports	No Comment	Supports	Neutral Seeks additional analysis	Supports	Comparable treatment between conventional generation and limited energy resources.

Management Proposal	A123 (LESR)	Beacon (LESR)	CESA (LESR)	Dynegy (Generator)	Powerex (Importer)	PG&E (IOU)	SCE (IOU)	Management Response
Pro-rata disqualification when RTD cannot meet energy offset	Supports	Strongly Supports	Strongly Supports	Neutral Concerned resources that could have provided day-ahead regulation were displaced from doing so by resources providing REM	No Comment	Neutral Seeks additional analysis	Supports	Recognizes that the real-time energy market is necessary to maintain the full regulation capacity. The pro-rata approach addresses concerns that scarcity pricing could be triggered if the total capacity from resources using REM had been disqualified.
Allow resources using REM to count towards spinning/non-spinning requirements	Supports	Strongly Supports	Strongly Supports	No Comment	Neutral Seeks confirmation that rule will not impact reliability	Does not support	No Comment	The ISO manages regulation capacity that has counted towards spinning/non-spinning requirements under AGC. The ISO will monitor resources using REM operational performance during contingency events.
Resources using REM are not required to submit symmetrical bids	Supports	Strongly Supports	No Comment	No Comment	No Comment	No Comment	No Comment	The ISO procures different quantities of regulation up and regulation down. The ISO co-optimizes regulation, operating reserves and energy bids and there may be instance where a symmetrical award is not optimal.
Mileage payment is within scope of RI-MPR Phase 2	No Comment	Supports	Supports	No Comment	No Comment	No Comment	No Comment	Changes to overall regulation payment structure is within scope of Phase 2



Board of Governors

February 3, 2011

Decision on Regulation Energy Management

Motion

Moved, that the ISO Board of Governors approves the proposed regulation energy management software enhancement, as described in the memorandum dated January 27, 2011; and

Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

Moved: Habashi Second: Foster

Board Action: Passed Vote Count: 3-0-1	
Doll	Not present
Foster	Y
Habashi	Y
Willrich	Y

Motion Number: 2011-02-G1