

July 12, 2010

**VIA ELECTRONIC FILING**

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

**Re: California Independent System Operator Corporation  
Tariff Amendment to Facilitate Provision of Ancillary Services by Non-  
Generator Resources  
Docket No. ER10-\_\_\_\_-000**

Dear Secretary Bose:

The California Independent system Operator Corporation (ISO)<sup>1</sup> requests approval of amendments to its tariff to facilitate the provision of ancillary services by non-generator resources.<sup>2</sup> These tariff amendments establish a foundation for both generation and non-generation resources to provide existing ancillary services on a comparable basis in the ISO's market. The ISO is planning to examine additional ancillary services products to support the integration of variable energy resources and intends to rely on both generator and non-generator resources to provide such products. The ISO requests an effective date for the changes to its tariff of September 10, 2010.

**I. Background and Summary**

Through this tariff amendment, the ISO seeks to modify its operating characteristics and technical requirements for existing ancillary services products. In September 2009, the ISO commenced an initiative to ensure non-generator resources can participate in its ancillary services market consistent with the requirements of

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<sup>1</sup> The ISO is sometimes referred to CAISO. Capitalized terms not otherwise defined herein have the meanings set forth in the Master Definitions Supplement, Appendix A to the ISO tariff.

<sup>2</sup> The ISO submits this filing pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, Part 35 of the Commission's regulations, 18 C.F.R. § 35 and in compliance with Order No. 714, *Electronic Tariff Filings*, FERC Stats. & Regs. ¶ 31,276 (2009).

Commission Orders 719<sup>3</sup> and 890.<sup>4</sup> Based on stakeholder input, the ISO recommended and obtained approval from its Governing Board to seek changes to its tariff. As specified in the ISO's March 17, 2010 memorandum to its Governing Board, these changes include the following:

- Reduce the minimum rated capacity requirement to 500 kilowatt (kW) from the existing 1 megawatt (MW) requirement;
- Clarify that the measurement of the continuous energy requirement will start from the point a resource reaches its award capacity rather than the existing measurement starting after the 10 minute ramp requirement;
- Reduce the continuous energy requirement for ancillary services from the existing 2 hour requirement to 30 minutes for spinning and non-spinning reserves, 60 minutes for day-ahead regulation, and 30 minutes for real-time regulation.<sup>5</sup>

The intent of these changes is to expand the pool of resources that can participate in the ISO's ancillary services market. In addition to these changes, the ISO has proposed conforming changes throughout Section 8 and Appendices A and K of its tariff to modify language that may preclude non-generator resources from providing regulation, spinning reserve or non-spinning reserve.

## **II. Proposed Changes to the ISO Tariff**

The ISO is proposing to modify provisions of its tariff to facilitate the participation of non-generator resources in its ancillary service market on a comparable basis with generators. As part of these modifications, the ISO seeks to reduce the minimum rated capacity for a generator or non-generator resource to provide ancillary services from 1MW in size to 500 kW in size.<sup>6</sup> The minimum rated capacity is the lowest MW level a resource must be capable of providing in order to receive a certification to provide ancillary services. All else being equal, the ISO believes this change will create opportunities for more demand response as well as a broader spectrum of resource types to participate in the ISO ancillary services markets.

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<sup>3</sup> *Wholesale Competition in Regions with Organized Electric Markets*, FERC Stats. & Regs. ¶ 31,281 (2008) ("Order 719") at P 49.

<sup>4</sup> *Preventing Undue Discrimination and Preference in Transmission Service* FERC Stats. & Regs. ¶ 31,241 (2007) ("Order 890") at P 888.

<sup>5</sup> A copy of the ISO's March 17, 2010 memorandum to its Governing Board and supporting materials is provided as Attachment C to this transmittal letter.

<sup>6</sup> Proposed revisions to Appendix K, Part A.1.1.1; Part B.1.1, and Part C.1.1.

This tariff amendment also proposes to change how the ISO measures the continuous energy requirements associated with ancillary services. The continuous energy requirement for regulation, spinning reserve and non-spinning reserve is the amount of energy a resource must deliver at a sustained level for a determined interval. Currently, the ISO tariff requirement is two hours of continuous energy for these ancillary services. The current two hour requirement is a historical legacy given the operational characteristics of traditional generators that comprised the bulk of supply resources in the ISO market. Non-generator resources have the potential to provide ancillary services but may not have the ability to meet the current two hour continuous energy requirement. The proposed amendment should provide increased opportunities for non-generator resources to provide ancillary services while still maintaining the reliability services required from these services.

The ISO proposes to reduce the continuous energy requirement for spinning and non-spinning reserves from two hours to 30 minutes.<sup>7</sup> This 30 minute time period meets ISO requirement to recover from a contingency within 15 minutes and allows another 15 minutes for the real time market to return to a normal state. As part of its stakeholder initiative, the ISO presented disturbance control data from September 2009 that reflects that the ISO recovered from frequency and Area Control Error within a 15 minute period and returned contingency resources to their pre-contingency point within 15 minutes.<sup>8</sup> The data also reflects the ISO resolved conditions in which a transmission or generation contingency occurred within 15 minutes.<sup>9</sup> For these reasons, the ISO believes the proposed reduction in its continuous energy requirement is reasonable.

The ISO proposes to reduce the continuous energy requirement for regulation from two hours to 60 minutes for the day-ahead market and to 30 minutes for the real-time market.<sup>10</sup> In the day-ahead market, the ISO procures 100 percent of the forecasted regulation requirements for each hour.<sup>11</sup> The ISO's proposal for regulation mimics this procurement interval. In the real-time market, the ISO procures incremental regulation requirements in 15 minute intervals.<sup>12</sup> But to allow bids for regulation to

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<sup>7</sup> Proposed tariff section 8.4.3(a).

<sup>8</sup> Revised Draft Final Proposal for participation of Non-Generator Resources in California ISO Ancillary Services Market at 8. <http://www.caiso.com/2753/275383f257220.pdf>

<sup>9</sup> *Id.* at 8- 9.

<sup>10</sup> Proposed tariff section 8.4.1.1 (g).

<sup>11</sup> ISO tariff section 8.3.1.

<sup>12</sup> ISO tariff section 8.3.1.

qualify for spinning reserves the continuous energy requirement for regulation capacity aligns with the longer time requirement of 30 minutes for spinning reserves.<sup>13</sup>

The ISO also proposes to measure continuous energy from the time that a resource reaches its award capacity.<sup>14</sup> This change recognizes that some resources may reach their award capacity in less than 10 minutes, which is when the ISO currently commences measuring continuous energy.

In Section 8 of its tariff, the ISO proposes to modify references to specific types of resources such as Generating Units, System Units, Non-Dynamic System Resources, Dynamic System Resources and Participating Load. The ISO proposes to replace these terms with a more generic reference to the term resources.<sup>15</sup> The ISO also proposes to replace references to entities that operate resources certified to provide ancillary services with the term Ancillary Service Providers. The ISO has modified its definition of Ancillary Services Provider in Appendix A of its tariff to reflect a broader range of resources.<sup>16</sup> The ISO has proposed other conforming changes throughout Section 8 and has also modified the definitions for related terms in Appendix A to conform those terms to the proposed changes in Section 8.

The ISO's proposed modifications also apply to Appendix K of the ISO tariff. In addition to conforming Appendix K, the ISO has included proposed language to address the performance of frequency responsive devices for non-generator resources requesting certification to provide spinning reserve in lieu of governor performance requirements applicable to generators.<sup>17</sup> As described in Attachment D hereto, this language applies a comparable requirement for resources without governors to respond to under-frequency events. The ISO is not proposing a requirement for these resources to respond to over-frequency events. Finally, the ISO has made minor modifications in appendix K to reflect current ISO business practices. Attachment E hereto provides a key to the ISO's proposed tariff changes by tariff section.

### **III. The Proposed Tariff Changes Allow for Increased Participation in the ISO's Market and are the Foundation for Future Market Enhancements**

In Order 719, the Commission directed each regional transmission operator or independent system operator "to accept bids from demand response resources, on a basis comparable to any other resources, for ancillary services that are acquired in a

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<sup>13</sup> ISO tariff section 8.2.3.5 allows regulation to substitute for spinning reserve or non-spinning reserve. Regulation and spinning reserve may substitute for non-spinning reserve.

<sup>14</sup> Proposed tariff section 8.4.1.1(g) and proposed tariff section 8.4.3(a).

<sup>15</sup> See e.g., proposed ISO tariff sections 8.1, 8.3.1, 8.4.1.

<sup>16</sup> Proposed definition of Ancillary Service Provider in Appendix A of the ISO tariff.

<sup>17</sup> Proposed ISO tariff, Appendix K at Section B 1.2.

competitive bidding process, if the demand response resources: (1) are technically capable of providing the ancillary service and meet the necessary technical requirements; and (2) submit a bid under the generally-applicable bidding rules at or below the market-clearing price, unless the laws or regulations of the relevant electric retail regulatory authority do not permit a retail customer to participate.”<sup>18</sup> The ISO’s proposed tariff amendments advance this directive. In addition to reducing the minimum capacity requirement necessary to obtain a certification to provide ancillary services, the proposed tariff amendments eliminate language that presupposes that only generator resources can meet the technical requirements to provide regulation and spinning reserve. If accepted, the ISO’s tariff will allow non-generator resources to be treated on a comparable basis if they meet the technical requirements to provide these ancillary services and their bids clear the ISO’s market. These changes will facilitate greater participation by demand response resources in the ISO’s market.

As part of Order No. 890, the Commission directed regional transmission operators and independent system operators to evaluate non-generation resources, such as demand response and storage, on a comparable basis to services provided by generation resources.<sup>19</sup> The ISO’s proposed tariff amendments also advance this directive by establishing as a definitional matter that the ISO will evaluate both generator and non-generator resources to provide ancillary services.

The ISO acknowledges that the Commission is currently considering a notice of proposed rulemaking to remand to the North American Electric Reliability Corporation Standard BAL-002-WECC-1 -Contingency Reserves to clarify that demand side management may provide spinning reserve.<sup>20</sup> Once the Commission and NERC have resolved this issue, the ISO’s proposed tariff amendments will allow the ISO to certify resources and accept bids from demand side management resources for regulation and spinning reserve to meet this reliability standard. The North American Electric Reliability Corporation is also examining whether to modify definitional terms set forth in NERC Standard BAL-002 - Disturbance Control Performance to make explicit that demand side management resources may provide spinning reserves.<sup>21</sup> The ISO recognizes that the time required to resolve these matters may delay some non-generator resources providing regulation and spinning reserve in the ISO market but the ISO does not believe that its proposed tariff amendments need wait for resolution of these issues. Instead, the Commission should approve the ISO amendments to establish a framework in the ISO tariff for comparable treatment between generator and

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<sup>18</sup> Order 719 at P 49.

<sup>19</sup> *Order 890* at P 888.

<sup>20</sup> *Version One Regional Reliability Standard for Resource and Demand Balancing*, Docket RM 09-15-000, 130 FERC ¶ 61,202 (2010).

<sup>21</sup> [http://www.nerc.com/filez/standards/Project2010-12\\_Order-693\\_Directives.html](http://www.nerc.com/filez/standards/Project2010-12_Order-693_Directives.html) See, proposed redline changes to BAL-002-1.

non-generator resources to provide regulation, spinning reserve and non-spinning reserve. By eliminating generator-centric terminology in the ISO tariff concerning which resources may receive certification to offer ancillary services, the ISO is taking a necessary step to provide all resources with comparable treatment.

The ISO's proposed tariff amendments, moreover, provide the foundation for market enhancements that will ultimately allow greater participation by non-generator resources. As part of the ISO's efforts to integrate variable energy resources, it is initiating a stakeholder process to examine, among other things, whether the ISO market should increase procurement of existing ancillary service products or procure new ancillary services products.<sup>22</sup> As such, the ISO's tariff amendments will provide the framework for both generator and non-generator resources to support the integration of variable energy resources through participation in the ISO's market.

#### **IV. Summary of Stakeholder Process and Department of Market Monitoring Input**

The ISO's stakeholder process for this initiative began in September 2009 in large part to determine if the ISO's tariff includes technical requirements that create barriers for demand response and other non-generator resources participating in the ISO's ancillary services market. The ISO held several conference calls with stakeholders and solicited several rounds of comments regarding the ISO's proposal.<sup>23</sup> Market participants generally support the proposed changes to ISO operating requirements to allow participation by all resource types. The ISO recognizes, however, that some stakeholders believe that limited energy storage resources are not fully able to participate in the ISO day-ahead market for regulation without a regulation energy management feature. The ISO did not adopt this feature as part of its proposal because some market participants as well as the ISO's own Department of Market Monitoring argued that regulation energy management warrants further discussion. As explained above, the ISO intends to examine market enhancements as part of its renewable integration market product review initiative that the ISO recently commenced.

#### **V. Effective Date**

The ISO requests that the Commission approve the proposed tariff changes to be effective as of September 10, 2010.

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<sup>22</sup> See, June 8, 2009 ISO Discussion Paper: Renewable Integration Market and Product Review. <http://www.caiso.com/27cd/27cdeb8548450.pdf>

<sup>23</sup> See stakeholder matrix included as part of Attachment C hereto.

## VI. Communications

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

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\* Individuals designated for service pursuant to Rule 203(b)(3),  
18 C.F.R. § 385.203(b)(3).

## VII. Service

The ISO has served copies of this transmittal letter, and all attachments the California Public Utilities Commission, the California Energy Commission, and all parties with effective Scheduling Coordinator Service Agreements. In addition, the ISO is posting this transmittal letter and all attachments on the ISO website.

## VIII. Attachments

The following documents, in addition to this transmittal letter, support this filing:

Attachment A	Clean tariff sheets showing the revisions described in this amendment
Attachment B	Sheets showing, in black-line format, the tariff changes described in this amendment Section by section key to proposed tariff amendments.
Attachment C	March 17, 2010 memorandum to ISO Governing Board and supporting materials.
Attachment D	Description of minimum frequency responsive device performance requirements to obtain certification for spinning reserve.
Attachment E	Key to proposed modifications by tariff section.

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## **IX. Conclusion**

The Commission should approve this tariff amendment as just and reasonable because it advances an important policy goal to increase participation of demand response and other non-generator resources in the ISO's market on a non-discriminatory basis. The tariff amendments will serve as the foundation for future enhancements to the the ISO's market that will expand the opportunities for participation by these resources.

Please do not hesitate to contact the undersigned if you have any questions.

Respectfully submitted,

**/s/ Andrew Ulmer**

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July 12, 2009

## **CERTIFICATE OF SERVICE**

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 12th day of July, 2010.

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Jane Ostapovich

**Attachment A – Clean Sheets**  
**Non Generating Resource Tariff Amendment**  
**California Independent System Operator Corporation**  
**Fifth Replacement FERC Electric Tariff**

## **8.1 Scope**

The CAISO shall be responsible for ensuring that there are sufficient Ancillary Services available to maintain the reliability of the CAISO Controlled Grid consistent with NERC and WECC reliability standards, including any requirements of the NRC. The CAISO's Ancillary Services requirements may be self-provided by Scheduling Coordinators as further provided in the Business Practice Manuals. Those Ancillary Services which the CAISO requires to be available but which are not being self-provided will be competitively procured by the CAISO from Scheduling Coordinators in the Day-Ahead Market, the HASP, and the RTM consistent with Section 8.3. The provision of Ancillary Services from the Interties with interconnected Balancing Authority Areas is limited to Ancillary Services bid into the competitive procurement processes in the IFM , HASP, and RTM. The CAISO will not accept Submissions to Self-Provide Ancillary Services that are imports to the CAISO Balancing Authority Area over the Interties with interconnected Balancing Authority Areas, except from Dynamic System Resources certified to provide Ancillary Services or if provided pursuant to ETCs, TORs or Converted Rights. The CAISO will calculate payments for Ancillary Services supplied by Scheduling Coordinators and charge the cost of Ancillary Services to Scheduling Coordinators based on their Ancillary Service Obligations.

For purposes of this CAISO Tariff, Ancillary Services are: (i) Regulation Up and Regulation Down, (ii) Spinning Reserve, (iii) Non-Spinning Reserve, (iv) Voltage Support, and (v) Black Start capability.

These services will be procured as stated in Section 8.3.5. Bids for these services may be submitted by a Scheduling Coordinator for resources that are capable of providing the specific service and that meet applicable Ancillary Service standards and technical requirements, as set forth in Sections 8.1 through 8.4, and are certified by the CAISO to provide Ancillary Services. Identification of specific services in this CAISO Tariff shall not preclude development of additional interconnected operation services over time. The CAISO and Market Participants will seek to develop additional categories of these unbundled services over time as the operation of the CAISO Controlled Grid matures or as required by regulatory authorities.

### **8.2.2 Time-Frame For Revising Ancillary Service Standards**

The CAISO shall periodically undertake a review of the CAISO Controlled Grid operation to determine any revision to the Ancillary Services standards to be used in the CAISO Balancing Authority Area. At a minimum the CAISO shall conduct such reviews to accommodate revisions to NERC and WECC reliability standards, including any requirements of the NRC. The CAISO may adjust the Ancillary Services standards temporarily to take into account, among other things, variations in system conditions, Real-Time Dispatch constraints, contingencies, and voltage and dynamic stability assessments. Where practicable, the CAISO will provide notice, via the CAISO Website, of any temporary adjustments to Ancillary Service standards by 6:00 p.m. two (2) days ahead of the Operating Day to which the adjustment will apply. Periodic reviews by the CAISO may include, but are not limited to: (a) analysis of the deviation between actual and forecast Demand; (b) analysis of patterns of unplanned resource Outages; (c) analysis of compliance with NERC and WECC reliability standards, including any requirements of the NRC; (d) analysis of operation during system disturbances; (e) analysis of patterns of shortfalls between Day-Ahead Schedules and actual Generation and Demand; and (f) analysis of patterns of unplanned transmission Outages.

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### **8.2.3.1 Regulation Service**

The CAISO shall maintain sufficient resources immediately responsive to the CAISO's EMS control in order to provide sufficient Regulation service to allow the CAISO Balancing Authority Area to meet NERC and WECC reliability standards, including any requirements of the NRC by continuously balancing resources to meet deviations between actual and scheduled Demand and to maintain Interchange Schedules. The quantity of Regulation Down and Regulation Up capacity needed for each Settlement Period of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time shall be determined by the CAISO as a percentage of the applicable CAISO Forecast of CAISO Demand for the Day-Ahead and Real-Time Markets. In HASP, the amount of advisory Regulation from Dynamic System Resources required for each Settlement Period in the next Trading Hour is also determined based on the CAISO Forecast of CAISO Demand. The advisory awards of Regulation from Dynamic System Resources in HASP are not binding and are re-optimized through the RTUC and RTD processes in the Real-Time

Market. The CAISO's determination is based upon its need to meet the NERC and WECC reliability standards, including any requirements of the NRC.

The CAISO will publish on OASIS the estimated quantity, or the percentage used to determine the estimated quantity, of Regulation Reserves required for each hour of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time for the Trading Day.

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#### **8.2.3.5 Ancillary Service Substitution**

The CAISO, whenever possible, will increase its purchases of an Ancillary Service that can substitute for another Ancillary Service, when doing so is expected to reduce its total cost of procuring Ancillary Services while meeting reliability requirements. The substitution described in this section can only occur with the purchase of bid-in Ancillary Services; substitution may not involve Self-Provided Ancillary Services. The CAISO will make such adjustments in accordance with the following principles:

- (a) The Regulation requirement must be satisfied only by Regulation Bids for resources qualified to provide Regulation;
- (b) Additional Regulation Up capacity can be used to satisfy requirements for Spinning Reserve, or Non-Spinning Reserve;
- (c) Regulation Up and Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up and Spinning Reserve Bids. Spinning Reserve and Regulation may be provided as separate services from the same resource, provided that the sum of Spinning Reserve and Regulation Up provided is not greater than the maximum Ramp Rate of the resource (MW/minute) times ten (10);
- (d) Additional Regulation Up and Spinning Reserve capacity can be used to satisfy requirements for Non-Spinning Reserve.
- (e) Regulation Up, Spinning Reserve, and Non-Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up, Spinning Reserve and Non-Spinning Reserve Bids;

- (f) Total MW purchased from the Regulation Up, Spinning Reserve, and Non-Spinning Reserve markets will not be changed by this Section 8.2.3.5; and
- (g) Regulation Energy resulting from Regulation that substituted for another Ancillary Service continues to be treated as Regulation Energy regardless of what service it substituted.

### **8.3.1 Procurement Of Ancillary Services**

The CAISO shall operate a competitive Day-Ahead Market, HASP, and Real-Time Markets to procure Ancillary Services. The Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) applications used in the Integrated Forward Market (IFM), HASP, and the Real-Time Market (RTM) shall calculate optimal resource commitment, Energy, and Ancillary Services Awards and Schedules at least cost to End-Use Customers consistent with maintaining System Reliability. Any Scheduling Coordinator representing resources, System Units, Participating Loads or imports of System Resources may submit Bids into the CAISO's Ancillary Services markets provided that it is in possession of a current certificate for the resources concerned. Regulation Up, Regulation Down, and Operating Reserves necessary to meet CAISO requirements not met by self-provision will be procured by the CAISO as described in this CAISO Tariff. The amount of Ancillary Services procured in the IFM is based on the CAISO Forecast of CAISO Demand and the forecasted intertie schedules in HASP for the Operating Hour net of (i) Self-Provided Ancillary Services from resources internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services and (ii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The amount of additional Ancillary Services procured in the HASP is based on the CAISO Forecast of CAISO Demand, the Day-Ahead Schedules established net interchange, and the forecast of the intertie schedules for the Operating Hour in the HASP net of (i) available awarded Day-Ahead Ancillary Services, (ii) Self-Provided Ancillary Services from resources internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services, and (iii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The amount of Ancillary Services procured in the Real-Time Market is based upon the CAISO Forecast of CAISO Demand and the HASP Intertie Schedule established net interchange for the Operating Hour net of (i) available awarded Day-Ahead Ancillary Services, (ii) Self-

Provided Ancillary Services from resources internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services, (iii) additional Operating Reserves procured in HASP, and (iv) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The CAISO will manage the Energy from both CAISO procured and Self-Provided Ancillary Services as part of the Real-Time Dispatch. In the Day-Ahead Market, the CAISO procures one-hundred (100) percent of its Ancillary Service requirements based on the Day-Ahead Demand Forecast net of Self-Provided Ancillary Services. After the Day-Ahead Market, the CAISO procures additional Ancillary Services needed to meet system requirements from all resources in the Real-Time Market. The amount of Ancillary Services procured in the HASP and Real-Time Market is based upon the CAISO Forecast of CAISO Demand for the Operating Hour and RTUC Time Horizon, respectively, net of Self-Provided Ancillary Services. The CAISO procurement of Ancillary Services from Non-Dynamic System Resources in the HASP is for the entire next Operating Hour. The CAISO procurement of Ancillary Services from all other resources in the Real-Time Market is for a fifteen (15) minute RTUC Time Horizon. The CAISO's procurement of Ancillary Services from Non-Dynamic System Resources in HASP and from Dynamic System Resources and internal Generation in the Real-Time Market is based on the Ancillary Service Bids submitted or generated in the HASP consistent with the requirements in Section 30. The CAISO may also procure Ancillary Services pursuant to the requirements in Section 42.1 and as permitted under the terms and conditions of a Reliability Must-Run Contract.

As of the CAISO Operations Date, the CAISO will contract for long-term Voltage Support service with owners of Reliability Must-Run Units under Reliability Must-Run Contracts. Black Start capability will initially be procured by the CAISO through individual contracts with Scheduling Coordinators for Reliability Must-Run Units and other Generating Units which have Black Start capability. These requirements and standards apply to all Ancillary Services whether self-provided or procured by the CAISO.

### **8.3.2 Procurement Internal And External Resources**

The CAISO will procure Spinning Reserves and Non-Spinning Reserves from resources operating within the CAISO Balancing Authority Area and from imports of System Resources. Scheduling Coordinators are allowed to bid Regulation from resources located outside the CAISO Balancing Authority Area by dynamically scheduling such System Resources certified to provide Regulation. Each System Resource

used to bid Regulation must comply with the Dynamic Scheduling Protocol in Appendix X. Scheduling Coordinators may submit Bids for Operating Reserves from Non-Dynamic System Resources but they may not submit Bids for Regulation from such resources because these resources cannot be dynamically scheduled consistent with Appendix X. When bidding to supply Ancillary Services in the IFM, HASP, or RTM, imports compete for use of Intertie transmission capacity when the requested use is in the same direction, e.g., imports of Ancillary Services compete with Energy on Interties in the import direction and exports of Ancillary Services (i.e., on demand obligations) compete with Energy on Interties in the export direction. To the extent there is Congestion, imports of Ancillary Services will pay Congestion costs in the IFM, HASP, and RTM markets pursuant to Section 11.

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#### **8.3.3.1 Use of Ancillary Service Regions and Ancillary Service Regional Limits**

Within the Expanded System Region, the System Region, and the Sub-Regions, the CAISO may establish limits on the amount of Ancillary Services that can be provided from each region or must be provided within each region. When used, these Ancillary Service Regional Limits identify either a maximum or a minimum (or both a maximum and a minimum) amount of Ancillary Services to be obtained within the region. The minimum Ancillary Service limit in the Expanded System Region shall be the quantities of each Ancillary Service required to meet NERC and WECC reliability standards, including any requirements of the NRC for the CAISO Balancing Authority Area. The CAISO may establish a restriction on the amount of Ancillary Services to be procured from outside the CAISO Balancing Authority Area by establishing a minimum limit for the System Region.

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#### **8.3.4 Certification And Testing Requirements**

The owner of and Scheduling Coordinator for each resource for which a Bid to provide Ancillary Services or Submission to Self-Provide Ancillary Services is allowed under the CAISO Tariff, and all other System Resources that are allowed to submit a Bid to provide Ancillary Services under this CAISO Tariff, must comply with the CAISO's certification and testing requirements as contained in Appendix K and the CAISO's Operating Procedures. Each resource used to bid Regulation or used to self-provide Regulation

must have been certified and tested by the CAISO using the process defined in Part A of Appendix K. Each Dynamic System Resource offering Regulation must comply with the Dynamic Scheduling Protocol in Appendix X. Spinning Reserve may be provided only from resources that have been certified and tested by the CAISO using the process defined in Part B of Appendix K. Non-Spinning Reserve may be provided from resources that have been certified and tested by the CAISO using the process defined in Part C of Appendix K. Voltage Support may only be provided from resources that have been certified and tested by the CAISO using the process defined in Part D of Appendix K. Black Start capability may only be provided from Generating Units that have been certified and tested by the CAISO using the process defined in Part E of Appendix K. CAISO certification to provide Ancillary Services may be revoked by the CAISO under the provisions of this CAISO Tariff, including Appendix K.

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### **8.3.7 AS Bidding Requirements**

Scheduling Coordinators may submit Bids or Submissions to Self-Provide an Ancillary Service consistent with the rules specified in Section 30 and any further requirements in this Section 8.3.7. Scheduling Coordinators may (i) submit Bids or Submissions to Self-Provide an Ancillary Service from resources located within the CAISO Balancing Authority Area or Dynamic System Resources certified to provide Ancillary Services, (ii) submit Submissions to Self-Provide an Ancillary Service from System Resources located outside the CAISO Balancing Authority Area if provided pursuant to ETCs, TORs, or Converted Rights, (iii) submit Bids for Ancillary Services from Dynamic and Non-Dynamic System Resources located outside the CAISO Balancing Authority Area certified to provide Ancillary Services, or (iv) submit Inter-SC Trades of Ancillary Services. Ancillary Services procured in the IFM and in the Real-Time Market are comprised of the following: Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve. The HASP process evaluates the need for Energy, Regulation and Operating Reserves from System Resources and internal resources and issues binding Ancillary Services awards only for Operating Reserves Ancillary Services from Non-Dynamic System Resources. Each resource for which a Scheduling Coordinator wishes to submit Ancillary Service Bids must meet the requirements set forth in this CAISO Tariff. The same resource capacity may be simultaneously offered to the same CAISO Market for multiple Ancillary Services types. Ancillary Services Bids and Submissions to Self-Provide an

Ancillary Service can be submitted up to seven (7) days in advance. The CAISO will only use Operating Reserve Ramp Rates for procuring capacity associated with the specific Ancillary Services. The CAISO will issue Real-Time Dispatch Instructions in the Real-Time Market for the Energy associated with the awarded capacity based upon the applicable Operational Ramp Rate submitted with the single Energy Bid Curve in accordance with Section 30.7.7. There is no ability to procure Ancillary Services for export. To the extent a Scheduling Coordinator has an on-demand obligation to serve loads outside the CAISO Balancing Authority Area, it can do so provided that (1) it is using export transmission capacity available in Real-Time, and (2) the resource capacity providing Energy to satisfy the on-demand obligation is not under an RMR Contract or Resource Adequacy Capacity obligation, and has not been paid a RUC Availability Payment for the Trading Hour. All resources subject to the Ancillary Services must offer requirements, as specified in Section 40.6, must submit Bids consistent with the requirements specified therein and in Section 30.

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#### **8.4 Technical Requirements For Providing Ancillary Services**

All resources providing Ancillary Services shall comply with the technical requirements set out in Sections 8.4.1 to 8.4.3 below relating to their operating capabilities, communication capabilities and metering infrastructure. No Scheduling Coordinator shall be permitted to submit a Bid to the CAISO for the provision of an Ancillary Service from resource or to provide a Submission to Self-Provide an Ancillary Service from a resource, unless the Scheduling Coordinator is in possession of a current certificate issued by the CAISO confirming that the resource complies with the CAISO's technical requirements for providing the Ancillary Service concerned. Scheduling Coordinators can apply for Ancillary Services certificates in accordance with the requirements for considering and processing such applications in Appendix K and the CAISO's Operating Procedures. The CAISO shall have the right to inspect resources and other equipment for the purposes of the issue of a certificate and periodically thereafter to satisfy itself that its technical requirements continue to be met. If at any time the CAISO's technical requirements are not being met, the CAISO may withdraw the certificate for the resource concerned.

#### **8.4.1 Operating Characteristics Required To Provide AS**

Each resource for which a Scheduling Coordinator wishes to submit a Bid to provide Ancillary Services must comply with the requirements for the specific Ancillary Service as set forth in Appendix K and the Business Practice Manual. The

requirements in Appendix K and the Business Practice Manuals include Ancillary Service control, capability and availability standards. The requirements also involve the following operating characteristics:

- (a) Ramp Rate increase and decrease (MW/minute);
- (b) power factor (leading and lagging) as required by Section 8.2.3.3;
- (c) maximum output (real and reactive), except that System Resources shall be required to comply only with the requirement for maximum real power;
- (d) minimum output (real and reactive), except that System Resources shall be required to comply only with the requirement for minimum real power;
- (e) Capability to respond immediately to the CAISO's EMS control, control scheme, and range; and
- (f) minimum length of time the resource can be available to provide the relevant Ancillary Service.

In Appendix K and the Business Practice Manuals the CAISO will differentiate the operating characteristics according to the Ancillary Service being provided.

##### **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.
- (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.

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#### **8.4.2 Ancillary Service Control Standards**

The providers of Ancillary Services under this Tariff must comply with the following control standards:

- (a) Regulation. The Area Control Error will be calculated by the CAISO Energy Management System. Control signals will be sent from the CAISO EMS to raise or lower the output of resources providing Regulation when ACE exceeds the allowable CAISO Balancing Authority Area dead band for ACE;
- (b) Spinning Reserve and Non-Spinning Reserve. Each provider of Spinning Reserve or Non-Spinning Reserve must be capable of receiving a Dispatch

Instruction within one (1) minute from the time the CAISO Control Center elects to Dispatch the Spinning Reserve resource or Non-Spinning Reserve resource and must ensure that its resource can be at the Dispatched operating level within ten (10) minutes after issuance of the Dispatch Instruction;

- (c) Voltage Support. Generating Units providing Voltage Support must have automatic voltage regulators which can correct the bus voltages to be within the prescribed Voltage Limits and within the machine capability in less than one (1) minute; and
- (d) Black Start. (i) Voice Communications: each supplier of Black Start capability must ensure that normal and emergency voice communications are available to permit effective Dispatch of the Black Start capability; (ii) CAISO Confirmation: No Load served by the Black Start Generating Unit or by any designated Generating Unit or by any transmission facility used for Black Start service may be restored until the CAISO has confirmed that the need for such service has passed.

#### **8.4.3 Ancillary Service Capability Standards**

The providers of Ancillary Services under this CAISO Tariff must comply with the following capability standards:

- (a) Spinning Reserve and Non-Spinning Reserve Capability. Each resource or external import of a System Resource scheduled to provide Spinning Reserve and each resource providing Non-Spinning Reserve must be capable of converting the full capacity reserved to Energy production within ten (10) minutes after the issue of the Dispatch Instruction by the CAISO . Each resource scheduled to provide Spinning Reserve and each resource scheduled to provide Non-Spinning Reserve must be capable of maintaining that output or scheduled Interchange for at least thirty (30) minutes from the point at which the resources reaches its award capacity.

- (b) Black Start. Each Black Start Generating Unit must be able to start up with a dead primary and station service bus within ten (10) minutes of issue of a Dispatch Instruction by the CAISO requiring a Black Start. Each Black Start Generating Unit must provide sufficient reactive capability to keep the energized transmission bus voltages within emergency Voltage Limits over the range of no load to full load. Each Black Start Generating Unit must be capable of sustaining its output for a minimum period of twelve (12) hours from the time when it first starts delivering Energy.

#### **8.4.4 Ancillary Service Availability Standards**

The providers of Spinning Reserve and Non-Spinning Reserve under this CAISO Tariff must comply with the following availability standards. Each Ancillary Service Provider shall ensure: (i) that its resources scheduled to provide Spinning Reserve and Non-Spinning Reserve are available for Dispatch throughout the Settlement Period for which they have been scheduled; and (ii) that its resources scheduled to provide Spinning Reserve are responsive to frequency deviations throughout the Settlement Period for which they have been scheduled.

#### **8.4.5 Communication Equipment**

Unless otherwise authorized by the CAISO, all Scheduling Coordinators wishing to submit an Ancillary Service Bid must have the capability to submit to and receive information from the CAISO's secure communication system. In addition, they must be capable of receiving Dispatch Instructions electronically and they must provide the CAISO with a telephone number, or fax number through which Dispatch Instructions for each resource may be given if necessary. The CAISO will determine which method of communication is appropriate; provided that the CAISO will consult with the Scheduling Coordinator, if time permits, and will consider the method of communication then utilized by such Scheduling Coordinator; provided further, that the CAISO shall make the final determination as to the additional communication methods. Ancillary Service Providers whose resources are scheduled, bid in or under contract, shall ensure that there is a twenty-four (24) hour personal point of contact with the CAISO for the resource. An Ancillary Service Provider wishing to offer any Ancillary Service must provide a direct ring down voice communications circuit (or a dedicated telephone line available twenty-four (24) hours a

day every day of the year) between the control room operator for the resource providing the Ancillary Service and the CAISO Control Center. Each Ancillary Service Provider must also provide an alternate method of voice communications with the CAISO from the control room in addition to the direct communication link required above. Operators of Dynamic System Resources from which Dynamic Schedules or Bids are submitted to the CAISO shall provide communications links meeting CAISO standards for dynamic imports from System Resources. Ancillary Service Providers whose resources provide Regulation shall also provide communication links meeting CAISO standards for direct digital control. Operators of System Resources providing Regulation shall provide communications links meeting CAISO standards for imports of Regulation. If any communication system becomes unavailable, the relevant Ancillary Service Provider and the CAISO shall take immediate action to identify the cause of the interruption and to restore the communication system. A Scheduling Coordinator that has provided a Submission to Self-Provide an Ancillary Service, or has submitted a Bid to provide or contracted for Ancillary Services, shall ensure that the resource concerned is able to receive and implement Dispatch Instructions.

#### **8.4.6 Metering Infrastructure**

All Ancillary Service Providers that wish to bid to provide Ancillary Services shall maintain metering infrastructure for the resources concerned which complies with requirements to be established by the CAISO relating to:

- (a) meter type;
- (b) meter location;
- (c) meter reading responsibility;
- (d) meter capability in regard to response to CAISO EMS control; and
- (e) any other aspect of metering infrastructure required by the CAISO under this CAISO Tariff.

\* \* \*

### **8.6.2 Right To Self-Provide**

Each Scheduling Coordinator may choose to self-provide all, or a portion, of its Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve obligations in the IFM, and, to the extent needed to satisfy the CAISO's additional requirement, HASP and the Real-Time Market, from resources eligible for self-provision, as may be permissible for any given Ancillary Service in these respective markets. The right to self-provide Ancillary Services from capacity that is under a contractual obligation to provide Energy, including but not limited to capacity subject to an RMR Contract and local Resource Adequacy Resources, shall be conditional; self-provision of Ancillary Services from such capacity will only be permitted to the extent that capacity is not needed for Energy as a result of the MPM-RRD process described in this CAISO Tariff. To self-provide Ancillary Services a Scheduling Coordinator must provide the CAISO with a Submission to Self-Provide an Ancillary Service. Both Ancillary Service Bids and Submissions to Self-Provide an Ancillary Service can be provided to the CAISO for the same Ancillary Service and for the same hour in the same market. To the extent the Submission to Self-Provide an Ancillary Service is from a resource that is a Partial Resource Adequacy Resource, and Energy is needed, including for purposes under Section 31.3.1.3, from that resource the CAISO shall only disqualify the self-provision of Ancillary Services from the portion of the resource's capacity that has must-offer obligation, provided that the Scheduling Coordinator has not submitted an Energy Bid for the capacity that is not subject to a must-offer obligation. The CAISO will treat resources subject to Resource Adequacy requirements consistently with and such resources must comply with the bidding requirements in Section 40.6. If there is an Energy Bid submitted for the capacity of a Partial Resource Adequacy Resource that is not subject to a must-offer obligation the CAISO may disqualify the Submission to Self-Provide an Ancillary Service for the portion of the resources capacity that is not under a must-offer obligation consistent with the principles of co-optimization under the CAISO Tariff.

Prior to evaluating Ancillary Service Bids, the CAISO will determine whether Submissions to Self-Provide Ancillary Services are feasible with regard to resource operating characteristics and regional constraints and are qualified to provide the Ancillary Services in the markets for which they were submitted.

If the total Submissions to Self-Provide Ancillary Services exceed the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region, the submissions that would otherwise be accepted by the CAISO as feasible and qualified will be awarded on a pro-rata basis among the suppliers offering to self-provide the Ancillary Service up to the amount of the Ancillary Services requirement. If a regional constraint imposes a limit on the total amount of Regulation Up, Spinning Reserve, and Non-Spinning Reserve, and the total self-provision of these Ancillary Services in that region exceeds that limit, Self-Provided AS are qualified pro rata from higher to lower quality service in three tiers: Regulation Up first, followed by Spinning Reserve, and then by Non-Spinning Reserve. Submissions to Self-Provide Ancillary Services in excess of the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region will not be accepted and qualified by the CAISO as Self-Provided Ancillary Services.

The CAISO shall schedule Self-Provided Ancillary Services to the extent qualified in the IFM, HASP, and the RTM and Dispatch Self-Provided Ancillary Services in the Real-Time. To the extent that a Scheduling Coordinator self-provides Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve, the CAISO shall correspondingly reduce the quantity of the Ancillary Services it procures from Bids submitted in the IFM, HASP, and the Real-Time Market. To the extent a Scheduling Coordinator's Self-Provided Ancillary Service for a particular Ancillary Service is greater than the Scheduling Coordinator's obligation for that particular Ancillary Service in a Settlement Interval, the Scheduling Coordinator will receive the user rate for the Self-Provided Ancillary Service for the amount of the Self-Provided Ancillary Service in excess of the Scheduling Coordinator's obligation.

Scheduling Coordinators may trade Ancillary Services so that any Scheduling Coordinator may reduce its Ancillary Services Obligation through purchase of Ancillary Services capacity from another Scheduling Coordinator, or self-provide in excess of its obligation to sell Ancillary Services to another Scheduling Coordinator.

#### **8.6.4.4 Acceptance of Self-Provided Ancillary Service Submissions**

The CAISO will refuse to accept a Submission to Self-Provide an Ancillary Service to the extent it fails to meet the requirements contained in this CAISO Tariff. In particular, Self-Provided Ancillary Services must satisfy the following conditions:

- (a) the Scheduling Coordinator has a current certificate of technical eligibility for the resource selected for the Ancillary Services in question;
- (b) to the extent not provided under (a), the resources have the instrumentation, communication and metering equipment necessary to permit the CAISO to dispatch the offered Ancillary Services and verify that the services have been provided;
- (c) the Bid information provided by the Scheduling Coordinator is deemed to be valid in accordance with Appendix E and other provisions of the CAISO Tariff; and
- (d) the resources meet the CAISO's locational requirements for the Ancillary Services.

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#### **8.9 Verification, Compliance Testing, And Auditing**

Availability of contracted and Self-Provided Ancillary Services and RUC Capacity shall be verified by the CAISO by unannounced testing of resources by auditing of response to CAISO Dispatch Instructions, and by analysis of the appropriate Meter Data, or Interchange Schedules. The CAISO may test the capability of any resource providing Ancillary Services or RUC Capacity. Participating Generators, owners or operators of Participating Loads, operators of System Units or System Resources, owners or operators of reactive devices and Scheduling Coordinators shall notify the CAISO immediately whenever they become aware that an Ancillary Service or RUC Capacity is not available in any way. All Ancillary Service Providers shall check, monitor and/or test their system and related equipment routinely to assure availability of the committed Ancillary Services and RUC Capacity. These requirements apply to Ancillary Services whether the Ancillary Services are contracted or self-provided. For a duration specified by the CAISO, the CAISO may suspend the technical eligibility certificate of a Scheduling Coordinator for a

resource which repeatedly fails to perform. The CAISO shall develop measures to discourage repeated non-performance on the part of both bidders and self-providers.

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### **8.9.2 Compliance Testing For Regulation**

The CAISO may test the capability of any resource providing Regulation by using the CAISO EMS to move that resource's output over the full range of its Regulation capacity within a ten (10)-minute period.

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#### **8.9.3.1 Compliance Testing of a Resource**

The CAISO may test the Non-Spinning Reserve capability of a resource that is not Curtailable Demand by issuing unannounced Dispatch Instructions requiring the resource to come on line and ramp up or, in the case of a System Resource, to affirmatively respond to Real-Time interchange schedule adjustment; all in accordance with the Scheduling Coordinator's Bid. Such tests may not necessarily occur on the hour. The CAISO shall measure the response of the resource to determine compliance with its stated capabilities.

#### **8.9.3.2 Compliance Testing of Curtailable Demand**

The CAISO may test the Non-Spinning Reserve capability of a resource providing Curtailable Demand by issuing unannounced Dispatch Instructions requiring the operator of the Load to report the Curtailable Demand of that Load actually being served by the operator at the time of the instruction. No Load will be disconnected as part of the test.

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### **8.9.6 Compliance Testing For RUC Capacity**

The CAISO may test the capability of a resource to provide RUC Capacity by issuing unannounced Dispatch Instructions requiring the resource to come on line and ramp up or, in the case of a System Resource, to affirmatively respond to a Real-Time Interchange Schedule adjustment; all in accordance with the Scheduling Coordinator's Bid. Such tests may not necessarily occur on the hour. The CAISO shall measure the response of the resource to determine compliance with its stated capabilities.

## **8.9.7 Consequences Of Failure To Pass Compliance Testing**

### **8.9.7.1 Notification of Compliance Testing Results**

If a resource fails a compliance test, the CAISO shall notify the Scheduling Coordinator whose resource was the subject of the test and the provider or owner or operator of the resource providing Ancillary Services or RUC Capacity of such failure by any means as soon as reasonably practicable after the completion of the test. In addition, regardless of the outcome of the test, the CAISO shall provide the Scheduling Coordinator whose resource was subject to a compliance test written notice of the results of such test. The CAISO shall at the same time send a copy of the notice to the provider or owner or operator of the resource providing Ancillary Services or RUC Capacity. For any Resource Adequacy Resource failing a compliance test, the CAISO also will provide notification of the failure to the California Public Utilities Commission, Local Regulatory Authority, or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and FERC.

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### **8.9.10 Performance Audit For Spinning Reserve**

The CAISO will audit the performance of a resource providing Spinning Reserve by auditing its response to Dispatch Instructions and by analysis of Meter Data associated with the resource. Such audits may not necessarily occur on the hour. A resource providing Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move at the MW/minute capability stated in its Bid, reach the amount of Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO, and respond to system frequency deviations as specified in Appendix K. An external import of a System Resource providing Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move at the MW/minute capability stated in its Bid, reach the amount of Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO.

### **8.9.11 Performance Audit For Non-Spinning Reserve**

The CAISO will audit the performance of a resource providing Non-Spinning Reserve by auditing its response to Dispatch Instructions, and by analysis of Meter Data associated with the resource. Such

audits may not necessarily occur on the hour. A resource providing Non-Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move in accordance with the time delay and MW/minute capability stated in its Bid, and reach the amount of Non-Spinning Reserve capacity under the control of the CAISO scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO.

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#### **8.9.14 Performance Audit For RUC Capacity**

The CAISO will audit the performance of a resource providing RUC Capacity by auditing its response to Dispatch Instructions, and by analysis of Meter Data associated with the resource. Such audits may not necessarily occur on the hour. A resource providing RUC Capacity shall be evaluated on its ability to respond to a Dispatch Instruction, start within the designated time delay, move at the MW/minute capability stated in its Bid, reach the amount of RUC Capacity scheduled for the Settlement Period concerned and sustain operation at this level for a sufficient time to assure availability over the specified period.

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#### **8.9.16.4 Second failure**

A RUC Capacity or Ancillary Service resource which fails a compliance test or a performance audit conducted during the period when a warning notice for that resource is in effect shall be disqualified immediately from providing the RUC Capacity or the Ancillary Service concerned (whether the Ancillary Service is part of the CAISO's auction or is part of a self-provision arrangement), and in the case of Ancillary Services, shall not be permitted to submit a Bid to the CAISO to provide the Ancillary Service concerned (or be part of an Ancillary Service self-provision arrangement) until such time as it has successfully re-passed the approval and certification procedure described in the relevant Part of Appendix K. For any Resource Adequacy Resource failing a compliance test or performance audit during the periods when a warning notice for that resource is in effect, the CAISO will notify the California Public Utilities Commission or the relevant Local Regulatory Authority of the failure and disqualification or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and FERC.

### **8.10 Periodic Testing Of Units**

The CAISO shall periodically conduct unannounced tests of resources providing RUC Capacity or Ancillary Services. For RUC Capacity the unannounced tests will confirm the ability of the resource to respond to a Dispatch Instruction, start within the designated time delay, move at the MW/minute capability stated in its Bid, reach the amount of RUC Capacity scheduled for the Settlement Period concerned and sustain operation at this level for a sufficient time to assure availability over the specified period. For Ancillary Services the unannounced tests will confirm the ability of such resources to meet the applicable Ancillary Service standard for performance and control. The CAISO may test resources in the manner described herein. The frequency of testing shall be within such time frames as are reasonable under all the circumstances. Scheduling Coordinators shall manage the resulting Energy output if notification of testing permits the Energy to be included in a Bid. If a resource fails to meet requirements in a test under this section, the CAISO shall notify the relevant Ancillary Service Provider or Scheduling Coordinator for the resource of such failure as soon as reasonably practicable after the completion of the test. Failure to meet requirements shall lead to the penalties described in Section 8.10.7.

#### **8.10.1 Regulation Up And Regulation Down Reserves**

The CAISO shall continuously monitor the response of a resource to the CAISO's Regulation instructions in order to determine the resource is under direct control of CAISO's Automatic Generation Control system and complies with CAISO's Dispatch Instructions.

#### **8.10.2 Spinning Reserve**

The CAISO shall test the Spinning Reserve capability of a resource by issuing unannounced Dispatch Instructions requiring the resource to ramp up to its ten (10) minute capability. The CAISO shall measure the response of the resource to determine compliance with requirements. Such tests may not necessarily occur on the hour. The Scheduling Coordinator for the resource shall be paid pursuant to Section 11.5.6.

#### **8.10.3 Non-Spinning Reserve**

The CAISO may test the Non-Spinning Reserve capability of a resource by issuing unannounced Dispatch Instructions requiring the resource to ramp to its certified capacity within ten (10) minutes. The

CAISO shall measure the response of the resource or Load to determine compliance with requirements.

The Scheduling Coordinator for the resource shall be paid pursuant to Section 11.5.6.

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#### **8.10.6 RUC Capacity**

The CAISO may test the capability of a resource to provide RUC Capacity by issuing unannounced Dispatch Instructions requiring the resource to follow the Dispatch Instruction. The CAISO shall measure the response of the resource to determine compliance with requirements. Such tests may not necessarily occur on the hour. The Scheduling Coordinator for the resource shall be paid the Energy Bid price of the resource for the output under the RUC test.

#### **8.10.7 Penalties For Failure To Pass Tests**

A resource that fails an availability test, as determined under criteria to be established by the CAISO, shall be deemed not to have been available to provide the RUC Capacity or Ancillary Service concerned or the relevant portion of that service for the entire period the resource was committed to provide the service, unless appropriate documentation (i.e., daily test records) confirming the availability of that service during the committed period(s) is presented to the CAISO. The "committed period" is defined as the total of all the hours/days the resource was scheduled by the CAISO to provide the RUC Capacity or Ancillary Service beginning from: (i) the last successful availability test; or (ii) the last time the resource actually provided Energy or reduced Demand to provide RUC Capacity or provided Energy or reduced Demand as part of the Ancillary Service; whichever results in a shorter committed period. The Scheduling Coordinator for a resource that fails an availability test shall not be entitled to a RUC Availability Payment or payment for the Ancillary Service concerned for the committed period and adjustments to reflect this shall be made in the calculation of payments to the Scheduling Coordinator, provided that any such penalty shall be reduced to reflect any adjustment made over the duration of the committed period under Section 8.10.8 or Section 31.5.7.

System Units providing RUC Capacity or providing Ancillary Services to the CAISO are subject to the same testing, compensation, and penalties as are applied to individual resources providing RUC Capacity or provision of Ancillary Services.

If payments for RUC Capacity or for a particular Ancillary Service in a particular Settlement Period would be rescinded under more than one provision of this Section 8.10.7, the total amount to be rescinded for a particular Ancillary Service in a particular Settlement Period shall not exceed the total payment due in that Settlement Period.

#### **8.10.8 Rescission Of Payments For Ancillary Service Capacity**

If Ancillary Services capacity that receives an AS Award or Self-Provided Ancillary Services capacity provided from a resource is Undispatchable Capacity, Unavailable Capacity, or Undelivered Capacity during the relevant Settlement Interval, then payments will be rescinded as described in this Section 8.10.8 and settled in accordance with Section 11.10.9. If the CAISO determines that non-compliance of a resource, with an operating order or Dispatch Instruction from the CAISO, or with any other applicable technical standard under the CAISO Tariff, causes or exacerbates system conditions for which the WECC imposes a penalty on the CAISO, then the Scheduling Coordinator of such resource shall be assigned that portion of the WECC penalty which the CAISO reasonably determines is attributable to such non-compliance, in addition to any other penalties or sanctions applicable under the CAISO Tariff.

##### **8.10.8.1 Rescission of Payments for Undispatchable Ancillary Service Capacity**

The CAISO shall calculate the Real-Time ability of each resource to deliver Energy from Ancillary Services capacity or Self-Provided Ancillary Services capacity for each Settlement Interval based on its maximum operating capability, actual telemetered output, and Operational Ramp Rate as described in Section 30.10. System Resources that are awarded Ancillary Services capacity in the Day-Ahead Market are required to electronically tag (E-Tag as prescribed by the WECC) the Ancillary Services capacity. If the amounts of Ancillary Services capacity in an electronic tag differ from the amounts of Ancillary Services capacity for the System Resource, the Undispatchable Capacity will equal the amount of the difference, and will be settled in accordance with the provisions of Section 11.10.9.1.

##### **8.10.8.2 Rescission of Payments for Unavailable Ancillary Service Capacity**

If the CAISO determines that a Scheduling Coordinator has supplied Uninstructed Imbalance Energy to the CAISO during a Settlement Interval from the capacity of a resource that is obligated to supply Spinning Reserve or Non-Spinning Reserve to the CAISO, payments to the Scheduling Coordinator for

the Ancillary Service capacity used to supply Uninstructed Imbalance Energy shall be eliminated to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.2.

### **8.10.8.3 Rescission of Payments for Undelivered Ancillary Service Capacity**

For each Settlement Interval in which a resource fails to supply Energy from Spinning Reserve or Non-Spinning Reserve capacity in accordance with a Dispatch Instruction, or supplies only a portion of the Energy specified in the Dispatch Instruction, the capacity payment will be reduced to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.3.

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## **CAISO Appendix A Master Definition Supplement**

### **- Ancillary Service Provider**

A Participating Generator, System Resource operator, Participating Load, Proxy Demand Resource operator or other resource operator that is certified to provide an Ancillary Service.

### **- Non-Spinning Reserve**

The portion of resource capacity that is capable of being synchronized and Ramping to a specified load in ten minutes (or that is capable of being interrupted in ten (10) minutes) and that is capable of running (or being interrupted) for at least thirty (30) minutes from the time it reaches its award capacity.

### **- Regulating Range**

The operating level range within which a resource may provide Regulation.

### **- Regulation**

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

Regulation Up and Regulation Down are distinct capacity products, with separately stated requirements and ASMPs in each Settlement Period.

**- Regulation Down Or Regulation Down Reserve**

Regulation reserve provided by a resource under CAISO EMS control that can decrease its Energy production or increase its Energy consumption in response to a direct electronic signal from the CAISO to maintain standard frequency in accordance with established Reliability Criteria.

**- Regulation Limits**

The MW limits, up and down, set by a resource's operation under CAISO EMS control.

**- Regulation Up Or Regulation Up Reserve**

Regulation provided by a resource under CAISO EMS control that can increase its Energy production or decrease its Energy consumption in response to a direct electronic signal from the CAISO to maintain standard frequency in accordance with established Reliability Criteria.

**- Spinning Reserve**

The portion of unloaded synchronized resource capacity that is immediately responsive to system frequency and that is capable of being loaded in ten (10) minutes, and that is capable of running for at least thirty (30) minutes from the time it reaches its award capacity.

# Appendix K Ancillary Service Requirements Protocol (ASRP)

## PART A

### CERTIFICATION FOR REGULATION

- A 1** An Ancillary Service Provider wishing to provide Regulation as an Ancillary Service from a resource whether pursuant to a CAISO award or as part of a self-provision arrangement must meet the following operating characteristics and technical requirements in order to be certified by the CAISO to provide Regulation service unless granted a temporary exemption by the CAISO in accordance with criteria which the CAISO shall publish on the CAISO Website;
- A 1.1** **Operating Characteristics**
- A 1.1.1** 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 Regulation) unless the resource is participating in an aggregation arrangement approved by the CAISO;
- 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 10 minutes to a maximum of 30 minutes, as such period may be specified by the CAISO and published on the CAISO Website;
- A 1.1.3** the resource must be able to increase or decrease real power levels immediately in response to signals from the CAISO's EMS control;
- 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.
- A 1.2** **Technical Requirements**
- A 1.2.1** **Control**
- A 1.2.1.1** a direct, digital, unfiltered control signal generated from the CAISO EMS through a standard CAISO direct communication and direct control system, must meet the minimum performance standards for communications and control which will be developed and posted by the CAISO on the CAISO Website;
- A 1.2.1.2** the resource response (in MW) to a control signal must meet the minimum performance standards for control and response which will be developed and posted by the CAISO on the CAISO Website. As indicated by the resource response (in MW), the resource must respond immediately, without manual operator intervention, to control signals and must sustain its specified Ramp Rate, within specified Regulation Limits, for each minute of control response (MW/minute);
- A 1.2.2** **Monitoring:**
- the resource must have a standard CAISO direct communication and direct control system to send signals to the CAISO EMS to dynamically monitor, at a minimum the following:

- A 1.2.2.1 actual real power level (MW);
- A 1.2.2.2 high limit, low limit and rate limit values as selected by the resource operator; and
- A 1.2.2.3 in-service status indication confirming availability of Regulation service.

**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 2 An Ancillary Service Provider wishing to be considered for certification for Regulation service by the CAISO must make a written request to the CAISO, giving details of the technical capability of the resource concerned and identifying the Scheduling Coordinator through whom the Ancillary Service Provider intends to offer Regulation service. The Ancillary Service Provider shall at the same time send a copy of its request to that Scheduling Coordinator. Technical review request forms will be available from the CAISO.
- A 3 No later than one week after receipt of the Ancillary Service Provider's request, the CAISO shall provide the Ancillary Service Provider with a listing of required interface equipment for Regulation, including a standard CAISO direct communication and direct control system. The CAISO shall send a copy of the listing to the resource's Scheduling Coordinator.
- A 4 The Ancillary Service Provider may propose alternatives that it believes may provide an equivalent level of communication and control for consideration by the CAISO. Such proposals shall be in writing and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.
- 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 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 7 Design, acquisition, and installation of the CAISO-approved communication and control equipment shall be under the control of the CAISO. The CAISO shall bear no cost

responsibility or functional responsibility for such equipment, except that the CAISO shall arrange for and monitor the maintenance of the communication and control system at the Ancillary Service Provider's expense, unless otherwise agreed by the CAISO and the Ancillary Service Provider. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to the CAISO EMS at its own cost.

- A 8** The CAISO, in cooperation with the Ancillary Service Provider shall perform testing of the communication and control equipment to ensure that the communication and control system performs to meet the CAISO requirements.
- 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 alternative dates and times. The CAISO shall, within two Business Days of receipt of the Ancillary Service Provider's request, accept a proposed time if possible or suggest at least three alternatives to the Ancillary Service Provider. If the CAISO responds by suggesting alternatives, the Ancillary Service Provider shall, within two Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three 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 10.1** confirmation of control communication path performance;
- A 10.2** confirmation of primary and secondary voice circuits for receipt of Dispatch Instructions;
- A 10.3** confirmation of the resource's control performance; and
- 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 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 11** Upon successful completion of the test, the CAISO shall certify the resource as being permitted to provide Regulation as an Ancillary Service Provider and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The Scheduling Coordinator shall request the CAISO to update its database to reflect the ability of the resource to provide Regulation.
- A 12** The Scheduling Coordinator may submit Bids for Regulation service from the certified resource into the CAISO Markets starting with the Day-Ahead Market for the hour ending 0100 on the second Trading Day after the CAISO's database reflects the resource's certificate.
- A 13** **The certification to provide Regulation shall remain in force until:**
- (a) withdrawn by the Scheduling Coordinator or the Ancillary Service Provider by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day; or
  - (b) if the resource obtained CAISO certification on the basis of a prior communication and control technology, until revoked by the CAISO for

failure to comply with the requirement set forth in A 13.1 that the resource install a CAISO-specified standard CAISO direct communication and direct control system (unless exempted by the CAISO).

**A 13.1** Unless exempted by the CAISO, if the resource obtained CAISO certification on the basis of a prior communication and control technology, the CAISO shall provide written notice to the Ancillary Service Provider of the Ancillary Service Provider's obligation to install a CAISO-specified standard direct communication and direct control system along with a required date for said work to be completed as mutually agreed upon by the CAISO and the Ancillary Service Provider. Failure to meet the completion date shall be grounds for the revocation of certification, provided that the CAISO must provide the Ancillary Service Provider with at least ninety (90) days advance notice of the proposed revocation.

**A 14** **THE CERTIFICATION MAY BE REVOKED BY THE CAISO ONLY UNDER PROVISIONS OF THE CAISO TARIFF.**

**PART B**  
**CERTIFICATION FOR SPINNING RESERVE**

**B 1** An Ancillary Service Provider wishing to provide Spinning Reserve as an Ancillary Service from a resource whether pursuant to a CAISO award or as part of a self-provision arrangement must meet the following requirements in order to be certified by the CAISO to provide Spinning Reserve service:

**B 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 Spinning Reserve) unless the resource is participating in an aggregation arrangement approved by the CAISO;

**B 1.2** the resource must respond immediately and automatically in proportion to frequency deviations through the action of a governor or other control system in accordance with the following requirements:

Minimum Governor Performance:

- a. 5 percent droop;
- b. +/- 0.036 Hz deadband; and
- c. Power output changes in one second for any frequency deviation outside of the deadband

Minimum Frequency Responsive Device Performance:

- a. If frequency is less than or equal to 59.92 Hz, the resource must reach ten (10) percent of its awarded spinning capacity within eight (8) seconds; and
- b. The resources must change the power it delivers or consumes in one (1) second for any frequency deviation less than or equal to 59.92 Hz

**B 1.3** the operator of the resource must have a means of receiving Dispatch Instructions to initiate an increase or decrease in real power (MW) within one (1) minute of the CAISO Control Center determination that Energy from Spinning Reserve capacity must be dispatched;

**B 1.4** the resource must be able to increase or decrease its real power (MW) by the maximum amount of Spinning Reserve to be offered within ten (10) minutes and be capable of maintaining its real power for thirty (30) minutes;

**B 1.5** CAISO approved voice communications services must be in place to provide both primary and alternate voice communication between the CAISO Control Center and the operator controlling the resource; and

- B 1.6** The communication system and the resource must pass a qualification test to demonstrate the overall ability to meet the performance requirements of the ASRP for Spinning Reserve.
- B 2** An Ancillary Service Provider wishing to be considered for certification for Spinning Reserve service by the CAISO must make a written request to the CAISO, giving details of the technical capability of the resource concerned and identifying the Scheduling Coordinator through whom the Ancillary Service Provider intends to offer Spinning Reserve service. The Ancillary Service Provider shall at the same time send a copy of its request to that Scheduling Coordinator. Technical review request forms will be available from the CAISO.
- B 3** No later than one week after receipt of the request, the CAISO shall provide the Ancillary Service Provider with a listing of acceptable communication options and interface equipment options for Spinning Reserve. The CAISO shall send a copy of the listing to the Ancillary Service Provider's Scheduling Coordinator.
- B 4** The Ancillary Service Provider may elect to implement any of the approved options defined by the CAISO, and, if it wishes to proceed with its request for certification, shall give written notice to the CAISO of its selected communication option, with a copy to its Scheduling Coordinator.
- B 5** When it receives the Ancillary Service Provider's notice, the CAISO shall notify the Ancillary Service Provider and the Scheduling Coordinator in writing no later than two weeks after receipt of the notice confirming receipt of the notice and issuing provisional approval of the selected options. Upon receipt of the CAISO acknowledgment, the Ancillary Service Provider may proceed as indicated below to secure the necessary facilities and capabilities required.
- B 6** The Ancillary Service Provider may also propose alternatives that it believes may provide an equivalent level of control for consideration by the CAISO. Such proposals shall be in writing and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.
- B 7** 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 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.
- B 8** Upon agreement as to the method of communication and control to be used by the resource, the CAISO shall provisionally approve the Ancillary Service Provider's proposal in writing providing a copy to the resource's Scheduling Coordinator at the same time. The Ancillary Service Provider may then proceed to procure and install the equipment and make arrangements for the required communication.
- B 9** Design, acquisition, and installation of the resource's equipment shall be under the control of the respective Ancillary Service Provider. The CAISO shall bear no cost responsibility or functional responsibility for such equipment. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to its own equipment at its own cost.
- B 10** The Ancillary Service Provider shall perform its own testing of its equipment to ensure that the control system performs to meet the CAISO requirements.
- B 11** When it is satisfied that its plant, equipment and communication 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 alternative dates and times. The CAISO shall, within two Business Days of receipt of the request, accept a proposed time if possible or suggest at least three alternatives to

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

- B 12** Testing shall be performed under the direction of the CAISO. Such tests shall include, but not be limited to, the following:
  - B 12.1** confirmation of control communication path performance for Dispatch Instruction;
  - B 12.2** confirmation of primary and secondary voice circuits for receipt of Dispatch Instructions;
  - B 12.3** confirmation of the resource performance to include changing the resource's real power over the range of Spinning Reserve proposed from minimum to maximum, and at different rates of change from the minimum to the maximum permitted by the design of the resource; and
  - B 12.4** testing the resource's governor or other control system performance characteristics by simulating frequency excursions outside the allowed deadband and measuring the response of the resource.
- B 13** Upon successful completion of the test the CAISO shall certify the resource as being permitted to provide Spinning Reserve as an Ancillary Service Provider and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The Scheduling Coordinator shall request the CAISO to update its database to reflect the ability of the resource to provide Spinning Reserve.
- B 14** The Scheduling Coordinator may bid Spinning Reserve from the certified resource into the CAISO Markets starting with the Day-Ahead Market for the hour ending 0100 on the Second Trading Day after the CAISO's database reflects the resource's certificate.
- B 15** The certification to provide Spinning Reserve shall remain in force until withdrawn by the Scheduling Coordinator or the Ancillary Service Provider by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day.
- B 16** The certification may be revoked by the CAISO only under provisions of the CAISO Tariff.

### **PART C**

#### **CERTIFICATION FOR NON-SPINNING RESERVE**

- C 1** An Ancillary Service Provider wishing to provide Non-Spinning Reserve as an Ancillary Service from a resource whether pursuant to the CAISO's auction or as part of a self-provision arrangement must meet the following requirements in order to be certified by the CAISO to provide Non-Spinning Reserve service:
  - 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 Spinning Reserve) unless the resource is participating in an aggregation arrangement approved by the CAISO;
  - C 1.2** the resource must be able to increase or decrease its real power (MW) as soon as possible to the value indicated in a Dispatch Instruction, reaching the indicated value within ten (10) minutes after issue of the instruction and be capable of maintaining output for thirty (30) minutes.
- C 2** An Ancillary Service Provider wishing to provide Non-Spinning Reserve as an Ancillary Service, whether pursuant to a CAISO award or as part of a self-provision arrangement, must also meet the following requirements in order to be certified by the CAISO to provide Non-Spinning Reserve service:
  - C 2.1** the operator of the resource must have a means of receiving a Dispatch Instruction to initiate an increase or decrease in its real power (MW) within one (1) minute of the CAISO Control Center's determination that Non-Spinning Reserve capacity must be dispatched; and

- C 2.2** the communication system and the resource must pass a qualification test to demonstrate the overall ability to meet the performance requirements for Non-Spinning Reserve.
- C 3** An Ancillary Service Provider wishing to be considered for certification for Non-Spinning Reserve service must make a written request to the CAISO, giving details of the technical capability of the resource concerned and identifying the Scheduling Coordinator through whom the Ancillary Service Provider intends to offer Non-Spinning Reserve. The Ancillary Service Provider shall at the same time send a copy of the request to that Scheduling Coordinator. Technical review request forms will be available from the CAISO.
- C 4** No later than one week after receipt of the Ancillary Service Provider's request, the CAISO shall provide the Ancillary Service Provider with a listing of acceptable communication options and interface equipment options for Non-Spinning Reserve. The CAISO shall send a copy of the listing to the Ancillary Service Provider's Scheduling Coordinator.
- C 5** The Ancillary Service Provider may elect to implement any of the acceptable communication options and interface equipment options. The Ancillary Service Provider shall give written notice to the CAISO of its selected communication option and interface equipment option, with a copy to its Scheduling Coordinator.
- C 6** When it receives the Ancillary Service Provider's notice, the CAISO shall notify the Ancillary Service Provider and the Scheduling Coordinator in writing no later than two weeks after receipt of the notice confirming receipt of the notice and issuing provisional approval of the selected options. Upon receipt of the CAISO acknowledgment the Ancillary Service Provider may proceed as indicated below to secure the necessary facilities and capabilities required.
- C 7** The Ancillary Service Provider may also propose alternatives that it believes may provide an equivalent level of control for consideration by the CAISO. Such proposals shall be in writing and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.
- C 8** 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 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.
- C 9** Upon agreement as to the 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. The Ancillary Service Provider may then proceed to procure and install the equipment and make arrangements for the required communication.
- C 10** Design, acquisition, and installation of the Ancillary Service Provider's equipment shall be under the control of the Ancillary Service Provider. The CAISO shall bear no cost responsibility or functional responsibility for such equipment. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to the CAISO's equipment at its own cost.
- C 11** The Ancillary Service Provider shall perform its own testing of its equipment to ensure that the control system performs to meet the CAISO requirements.
- C 12** When it is satisfied that its plant, equipment and communication 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 alternative dates and times. The CAISO shall, within two Business Days of receipt of the Ancillary Service Provider's request, accept a proposed time if possible or suggest at

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

- C 13** Testing shall be performed under the direction of the CAISO. Such tests shall include, but not be limited to, the following:
  - C 13.1** confirmation of control communication path performance;
  - C 13.2** confirmation of primary and secondary voice circuits for receipt of Dispatch Instructions;
  - C 13.3** confirmation of the resource control performance; and
  - C 13.4** confirmation of the range of resource control to include changing the real power (MW) over the range of Non-Spinning Reserve proposed.
- C 14** Upon successful completion of the test, the CAISO shall certify the resource as being permitted to provide Non-Spinning Reserve as an Ancillary Service and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The Scheduling Coordinator shall request the CAISO to update its database to reflect the permission for the resource to provide Non-Spinning Reserve.
- C 15** The Scheduling Coordinator may bid Non-Spinning Reserve service from the certified resource into the CAISO Markets starting with the Day-Ahead Market for the hour ending 0100 on the second Trading Day after the CAISO database reflects the resource's certificate.
- C 16** The certification to provide Non-Spinning Reserve shall remain in force until withdrawn by the Scheduling Coordinator or the Ancillary Service Provider by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day.
- C 17** The certification may be revoked by the CAISO only under provisions of the CAISO Tariff.

#### **PART D**

#### **CERTIFICATION FOR VOLTAGE SUPPORT**

- D 1** A Generator wishing to provide Voltage Support as an Ancillary Service from a Generating Unit must meet the following requirements in order to be certified by the CAISO to provide Voltage Support service:
  - D 1.1** the rated capacity of the Generating Unit must be 1 MW or greater unless the Generating Unit is participating in an aggregation arrangement approved by the CAISO;
  - D 1.2** the Generating Unit must be able to produce VARs at lagging power factors less than 0.90 and absorb VARs at leading power factors more than 0.95 within the safe operating parameters for the Generating Unit;
  - D 1.3** the Generating Unit must be able to produce or absorb VARs outside the 0.90 lag to 0.95 lead bandwidth over a range of real power outputs which the Generator expects to produce when offering Voltage Support;
  - D 1.4** the Generating Unit must be able to produce or absorb VARs at the boundary of the Generating Unit's capability curve by reducing real power output to either absorb or produce additional VARs within the safe operating parameters for the Generating Unit; and

- D 1.5** metering and SCADA equipment must be in place to provide both real and reactive power data from the Generating Unit providing Voltage Support to the CAISO Control Center.
- D 2** A Generator wishing to be considered for certification for Voltage Support service by the CAISO must make a written request to the CAISO, giving details of the technical capability of the Generating Unit concerned and identifying the Scheduling Coordinator through whom the Generator intends to offer Voltage Support service. The Generator shall at the same time send a copy of its request to that Scheduling Coordinator. The details of the Generating Unit's technical capability must include the Generating Unit name plate data, performance limits, and capability curve. The Generator must also define the operating limitations in both real and reactive power (lead and lag) to be observed when Voltage Support is being provided to the CAISO for both normal and reduced real power output conditions. Technical review request forms will be available from the CAISO.
- D 3** No later than one week after receipt of the Generator's request, the CAISO shall provide the Generator with a listing of acceptable communication options and interface equipment options for Voltage Support. The CAISO shall send a copy of the listing to the Generator's Scheduling Coordinator.
- D 4** The Generator may elect to implement any of the approved options defined by the CAISO, and, if it wishes to proceed with its request for certification, the Generator shall give written notice to the CAISO of its selected communication option and interface equipment option, with a copy to its Scheduling Coordinator.
- D 5** When it receives the Generator's notice the CAISO shall notify the Generator and the Scheduling Coordinator in writing no later than two weeks after receipt of the notice confirming receipt of the notice and issuing provisional approval of the selected options. Upon receipt of the CAISO acknowledgment the Generator may proceed as indicated below to secure the necessary facilities and capabilities required.
- D 6** The Generator may also propose alternatives that the Generator believes may provide an equivalent level of control for consideration by the CAISO. Such proposals shall be in writing no later than two weeks after receipt of the notice and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.
- D 7** 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 shall be provided not later than six weeks after the proposal is received by the CAISO. The Generator 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.
- D 8** Upon agreement as to the method of communication and control to be used by the Generator, the CAISO shall provisionally approve the proposal in writing providing a copy to the Generator's Scheduling Coordinator at the same time. The Generator may then proceed to procure and install the equipment and make arrangements for the required communication.
- D 9** Design, acquisition, and installation of the Generator's equipment are under the control of the Generator. The CAISO shall bear no cost responsibility or functional responsibility for such equipment.

- D 10** The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to the CAISO's equipment at its own cost.
- D 11** The Generator shall perform its own testing of its equipment to ensure that the control system performs to meet the CAISO requirements.
- D 12** When it is satisfied that its plant, equipment and communication systems meet the CAISO's requirements, the Generator shall request in writing that the CAISO conduct a certification test with a suggested primary date and time and at least two alternative dates and times. The CAISO shall, within two Business Days of receipt of the Generator's request, accept a proposed time if possible or suggest at least three alternatives to the Generator. If the CAISO responds by suggesting alternatives, the Generator shall, within two Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three 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.
- D 13** Testing shall be performed under the direction of the CAISO. Such tests shall include, but not be limited to, the following:
- D 13.1** confirmation of control communication path performance;
- D 13.2** confirmation of primary and secondary voice circuits for receipt of Dispatch Instructions;
- D 13.3** confirmation of the Generating Unit automatic voltage regulator performance; and
- D 13.4** confirmation of the range of Voltage Support service over a range of Generating Unit real power outputs to verify the ability to both produce and absorb reactive power at different operating levels including minimum and maximum real power output.
- D 14** Upon successful completion of the test, the CAISO shall certify the Generating Unit as being permitted to provide Voltage Support as an Ancillary Service and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The CAISO shall change the Generating Unit data base to reflect the permission for the Generating Unit to provide Voltage Support.
- D 15** The Scheduling Coordinator may bid Energy for Voltage Support from the certified Generating Unit into the market starting with the market for the hour ending 0100 on the first Trading Day after the CAISO issues the certificate.
- D 16** The certification to provide Voltage Support shall remain in force until withdrawn by the Scheduling Coordinator or the Generator by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day.
- D 17** The certification may be revoked by the CAISO only under provisions of the ASRP or other provisions of the CAISO Tariff.

**PART E**  
**CERTIFICATION FOR BLACK START**

- E 1** A Generator wishing to provide Black Start capacity from a Generating Unit as an Ancillary Service must meet the requirements stated in Appendix D of the CAISO Tariff in order to be certified by the CAISO to provide Black Start capacity. In addition, the

Generating Unit must have a rated capacity 1 MW or greater unless the Generating Unit is participating in an aggregation arrangement approved by the CAISO.

- E 2** A Generator wishing to be considered for certification for Black Start service by the CAISO must make a written request to the CAISO. Such request must clearly identify the facilities related to the Generating Unit from which the Generator wishes to provide Black Start and shall identify the Scheduling Coordinator through whom the Generator wishes to offer Black Start service. The Generator shall send a copy of its request to its Scheduling Coordinator at the same time as it sends it to the CAISO. The Generator's written request must include at least the following:
  - E 2.1** identification of the Generating Unit including Location Code;
  - E 2.2** a single-line electrical diagram of the Generating Unit connections including auxiliary power busses and the connection to the station switchyard;
  - E 2.3** a description of the fuel supply used for Black Start including on-site storage and resupply requirements;
  - E 2.4** a single-line electrical diagram showing the transmission connection from the Generating Unit station switchyard to a connection point on the CAISO Controlled Grid;
  - E 2.5** a description of the Generating Unit capability to provide both real and reactive power, any Start-Up and Shut-Down requirements, any staffing limitations; and
  - E 2.6** a description of the primary, alternate and emergency back-up communications systems currently available to the Generator for communications to the CAISO Control Center.
- E 3** Upon receipt of the Generator's written request the CAISO shall review the information provided and respond in writing within two weeks of receipt of the request, providing a copy of its response to the Generator's Scheduling Coordinator. The CAISO response may be any of the following:
  - E 3.1** acceptance of the proposal as presented;
  - E 3.2** rejection of the proposal as presented with a rationale for such rejection; or
  - E 3.3** a request for additional information needed by the CAISO to properly evaluate the request.
- E 4** A Generator receiving a rejection may submit a written request for reconsideration by the CAISO within 60 days of the date of the rejection notice. A request for reconsideration must address the rationale provided by the CAISO. The CAISO shall respond to a request for reconsideration within 60 days of the date of that request.
- E 5** A Generator receiving a request for additional information shall provide such information within 60 days of such request providing a copy at the same time to its Scheduling Coordinator. The CAISO shall review the information and respond within 120 days of the date of the CAISO's request for additional information providing a copy at the same time to the Generator's Scheduling Coordinator.
- E 6** Upon acceptance by the CAISO of the Generator's request and agreement as to the method of communication and control to be used by the Generator, the CAISO shall provisionally approve the proposal in writing providing a copy at the same time to the

Generator's Scheduling Coordinator. The Generator may then proceed to procure and install the equipment and make arrangements for the required communication.

- E 7** Design, acquisition, and installation of the Generator's equipment shall be under the control of the Generator. The CAISO shall bear no cost responsibility or functional responsibility for such equipment. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to its own equipment at its own cost.
- E 8** The Generator shall perform its own testing of its equipment to ensure that the Black Start system performs to meet the CAISO requirements.
- E 9** When it is satisfied that its plant, equipment and communication systems meet the CAISO's requirements, the Generator shall request in writing that the CAISO conduct a certification test with a suggested primary date and time and at least two alternative dates and times. The CAISO shall, within two Business Days of receipt of the Generator's request, accept a proposed time if possible or suggest at least three alternatives to the Generator. If the CAISO responds by suggesting alternatives, the Generator shall, within two Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three 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.
- E 10** Testing shall be performed under the direction of the CAISO. Such tests shall include, but not be limited to, the following:
  - E 10.1** confirmation of control communication path performance;
  - E 10.2** confirmation of primary, secondary, and emergency voice circuits for receipt of Dispatch Instructions;
  - E 10.3** confirmation of the Generating Unit performance; and
  - E 10.4** simulation of a Black Start event.
- E 11** Upon successful completion of the test, the CAISO shall certify the Generating Unit as being permitted to provide Black Start capacity as an Ancillary Service and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The CAISO shall change its Generating Unit data base to reflect the permission for the Generating Unit to provide Black Start service.
- E 12** The certification to provide Black Start shall remain in force until withdrawn by the Scheduling Coordinator or the Generator by written notice to the CAISO to take effect at the time noticed in the notice, which must be the end of a Trading Day.
- E 13** The certification may be revoked by the CAISO only under provisions of the ASRP or other provisions of the CAISO Tariff.

**Attachment B – Blacklines**  
**Non Generating Resource Tariff Amendment**  
**California Independent System Operator Corporation**  
**Fifth Replacement FERC Electric Tariff**

## 8.1 Scope

The CAISO shall be responsible for ensuring that there are sufficient Ancillary Services available to maintain the reliability of the CAISO Controlled Grid consistent with NERC and WECC reliability standards, including any requirements of the NRC. The CAISO's Ancillary Services requirements may be self-provided by Scheduling Coordinators as further provided in the Business Practice Manuals. Those Ancillary Services which the CAISO requires to be available but which are not being self-provided will be competitively procured by the CAISO from Scheduling Coordinators in the Day-Ahead Market, the HASP, and the RTM consistent with Section 8.3. The provision of Ancillary Services from the Interties with interconnected Balancing Authority Areas is limited to Ancillary Services bid into the competitive procurement processes in the IFM, HASP, and RTM. The CAISO will not accept Submissions to Self-Provide Ancillary Services that are imports to the CAISO Balancing Authority Area over the Interties with interconnected Balancing Authority Areas, except from Dynamic System Resources certified to provide Ancillary Services or if provided pursuant to ETCs, TORs or Converted Rights. The CAISO will calculate payments for Ancillary Services supplied by Scheduling Coordinators and charge the cost of Ancillary Services to Scheduling Coordinators based on their Ancillary Service Obligations.

For purposes of this CAISO Tariff, Ancillary Services are: (i) Regulation Up and Regulation Down, (ii) Spinning Reserve, (iii) Non-Spinning Reserve, (iv) Voltage Support, and (v) Black Start capability.

These services will be procured as stated in Section 8.3.5. ~~Bids for these services Non-Spinning Reserve may be submitted by Scheduling Coordinators for Curtailable Demand as well as for Generation. Bids for Regulation, Spinning Reserve, Non-Spinning Reserve, and Voltage Support~~ may be submitted by a Scheduling Coordinator for ~~other non-generation~~ resources that are capable of providing the specific service and that meet applicable Ancillary Service standards and technical requirements, as set forth in Sections 8.1 through 8.4, and are certified by the CAISO to provide Ancillary Services. ~~The provision of Regulation, Spinning Reserve, Non-Spinning Reserve, and Voltage Support by other non-generation resources is subject to the same requirements applicable to other providers of these Ancillary Services, as set forth in Sections 8.5 through 8.11.~~ Identification of specific services in this CAISO Tariff shall not preclude development of additional interconnected operation services over time. The CAISO and Market

Participants will seek to develop additional categories of these unbundled services over time as the operation of the CAISO Controlled Grid matures or as required by regulatory authorities.

### **8.2.2 Time-Frame For Revising Ancillary Service Standards**

The CAISO shall periodically undertake a review of the CAISO Controlled Grid operation to determine any revision to the Ancillary Services standards to be used in the CAISO Balancing Authority Area. At a minimum the CAISO shall conduct such reviews to accommodate revisions to NERC and WECC reliability standards, including any requirements of the NRC. The CAISO may adjust the Ancillary Services standards temporarily to take into account, among other things, variations in system conditions, Real-Time Dispatch constraints, contingencies, and voltage and dynamic stability assessments. Where practicable, the CAISO will provide notice, via the CAISO Website, of any temporary adjustments to Ancillary Service standards by 6:00 p.m. two (2) days ahead of the Operating Day to which the adjustment will apply. Periodic reviews by the CAISO may include, but are not limited to: (a) analysis of the deviation between actual and forecast Demand; (b) analysis of patterns of unplanned ~~resourceGenerating Unit~~ Outages; (c) analysis of compliance with NERC and WECC reliability standards, including any requirements of the NRC; (d) analysis of operation during system disturbances; (e) analysis of patterns of shortfalls between Day-Ahead Schedules and actual Generation and Demand; and (f) analysis of patterns of unplanned transmission Outages.

\* \* \*

#### **8.2.3.1 Regulation Service**

The CAISO shall maintain sufficient ~~resourcesGenerating Units~~ immediately responsive to ~~the CAISO's EMS control~~AGC in order to provide sufficient Regulation service to allow the CAISO Balancing Authority Area to meet NERC and WECC reliability standards, including any requirements of the NRC by continuously balancing ~~resourcesGeneration~~ to meet deviations between actual and scheduled Demand and to maintain Interchange Schedules. The quantity of Regulation Down and Regulation Up capacity needed for each Settlement Period of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time shall be determined by the CAISO as a percentage of the applicable CAISO Forecast of CAISO Demand for the Day-Ahead and Real-Time Markets. In HASP, the amount of advisory Regulation

from Dynamic System Resources required for each Settlement Period in the next Trading Hour is also determined based on the CAISO Forecast of CAISO Demand. The advisory awards of Regulation from Dynamic System Resources in HASP are not binding and are re-optimized through the RTUC and RTD processes in the Real-Time Market. The CAISO's determination is based upon its need to meet the NERC and WECC reliability standards, including any requirements of the NRC.

The CAISO will publish on OASIS the estimated quantity, or the percentage used to determine the estimated quantity, of Regulation Reserves required for each hour of the Day-Ahead Market and in each fifteen (15) minute period in Real-Time for the Trading Day.

\* \* \*

#### **8.2.3.5 Ancillary Service Substitution**

The CAISO, whenever possible, will increase its purchases of an Ancillary Service that can substitute for another Ancillary Service, when doing so is expected to reduce its total cost of procuring Ancillary Services while meeting reliability requirements. The substitution described in this section can only occur with the purchase of bid-in Ancillary Services; substitution may not involve Self-Provided Ancillary Services. The CAISO will make such adjustments in accordance with the following principles:

- (a)- The Regulation requirement must be satisfied only by Regulation Bids for resources qualified to provide Regulation;
- (b)- Additional Regulation Up capacity can be used to satisfy requirements for Spinning Reserve, or Non-Spinning Reserve;
- (c)- Regulation Up and Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up and Spinning Reserve Bids. Spinning Reserve and Regulation may be provided as separate services from the same resourceGenerating-Unit, provided that the sum of Spinning Reserve and Regulation Up provided is not greater than the maximum Ramp Rate of the resourceGenerating-Unit (MW/minute) times ten (10);
- (d)- Additional Regulation Up and Spinning Reserve capacity can be used to satisfy requirements for Non-Spinning Reserve.

- (e)- Regulation Up, Spinning Reserve, and Non-Spinning Reserve requirements must be collectively satisfied by the combination of Regulation Up, Spinning Reserve and Non-Spinning Reserve Bids;
- (f)- Total MW purchased from the Regulation Up, Spinning Reserve, and Non-Spinning Reserve markets will not be changed by this Section 8.2.3.5; and
- (g)- Regulation Energy resulting from Regulation that substituted for another Ancillary Service continues to be treated as Regulation Energy regardless of ~~for~~ what service it substituted.

### 8.3.1 Procurement Of Ancillary Services

The CAISO shall operate a competitive Day-Ahead Market, HASP, and Real-Time Markets to procure Ancillary Services. The Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) applications used in the Integrated Forward Market (IFM), HASP, and the Real-Time Market (RTM) shall calculate optimal resource commitment, Energy, and Ancillary Services Awards and Schedules at least cost to End-Use Customers consistent with maintaining System Reliability. Any Scheduling Coordinator representing ~~resources~~Generating Units, System Units, Participating Loads or imports of System Resources may submit Bids into the CAISO's Ancillary Services markets provided that it is in possession of a current certificate for the ~~resources~~Generating Units, System Units, imports of System Resources or Participating Loads concerned. Regulation Up, Regulation Down, and Operating Reserves necessary to meet CAISO requirements not met by self-provision will be procured by the CAISO as described in this CAISO Tariff. The amount of Ancillary Services procured in the IFM is based on the CAISO Forecast of CAISO Demand and the forecasted intertie schedules in HASP for the Operating Hour net of (i) Self-Provided Ancillary Services from ~~resources~~Generating Units internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services and (ii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The amount of additional Ancillary Services procured in the HASP is based on the CAISO Forecast of CAISO Demand, the Day-Ahead Schedules established net interchange, and the forecast of the intertie schedules for the Operating Hour in the HASP net of (i) available awarded Day-Ahead Ancillary Services, (ii) Self-Provided Ancillary Services from ~~resources~~Generating Units internal to the CAISO Balancing

Authority Area and Dynamic System Resources certified to provide Ancillary Services, and (iii) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The amount of Ancillary Services procured in the Real-Time Market is based upon the CAISO Forecast of CAISO Demand and the HASP Intertie Schedule established net interchange for the Operating Hour net of (i) available awarded Day-Ahead Ancillary Services, (ii) Self-Provided Ancillary Services from ~~resources~~Generating Units internal to the CAISO Balancing Authority Area and Dynamic System Resources certified to provide Ancillary Services, (iii) additional Operating Reserves procured in HASP, and (iv) Ancillary Services self-provided pursuant to an ETC, TOR or Converted Right. The CAISO will manage the Energy from both CAISO procured and Self-Provided Ancillary Services as part of the Real-Time Dispatch. In the Day-Ahead Market, the CAISO procures one-hundred (100) percent ~~(100%)~~ of its Ancillary Service requirements based on the Day-Ahead Demand Forecast net of Self-Provided Ancillary Services. After the Day-Ahead Market, the CAISO procures additional Ancillary Services needed to meet system requirements from all resources, ~~including imports from Non-Dynamic System Resources in the HASP, and Dynamic System Resources and Generation from internal resources~~ in the Real-Time Market. The amount of Ancillary Services procured in the HASP and Real-Time Market is based upon the CAISO Forecast of CAISO Demand for the Operating Hour and RTUC Time Horizon, respectively, net of Self-Provided Ancillary Services.

The CAISO procurement of Ancillary Services from Non-Dynamic System Resources in the HASP is for the entire next Operating Hour. The CAISO procurement of Ancillary Services from all other ~~resources~~Dynamic System Resources and internal Generation in the Real-Time Market is for a fifteen (15) minute RTUC Time Horizon. The CAISO's procurement of Ancillary Services from Non-Dynamic System Resources in HASP and from Dynamic System Resources and internal Generation in the Real-Time Market is based on the Ancillary Service Bids submitted or generated in the HASP consistent with the requirements in Section 30. The CAISO may also procure Ancillary Services pursuant to the requirements in Section 42.1 and as permitted under the terms and conditions of a Reliability Must-Run Contract.

As of the CAISO Operations Date, the CAISO will contract for long-term Voltage Support service with owners of Reliability Must-Run Units under Reliability Must-Run Contracts. Black Start capability will

initially be procured by the CAISO through individual contracts with Scheduling Coordinators for Reliability Must-Run Units and other Generating Units which have Black Start capability. These requirements and standards apply to all Ancillary Services whether self-provided or procured by the CAISO.

### **8.3.2 Procurement Internal And External Resources**

-The CAISO will procure Spinning Reserves and Non-Spinning Reserves from ~~resources~~Generating Units operating within the CAISO Balancing Authority Area and from imports of System Resources. Scheduling Coordinators are allowed to bid Regulation from resources located outside the CAISO Balancing Authority Area by dynamically scheduling such System Resources certified to provide Regulation. Each System Resource used to bid Regulation must comply with the Dynamic Scheduling Protocol in Appendix X. Scheduling Coordinators may submit Bids for Operating Reserves from Non-Dynamic System Resources but they may not submit Bids for Regulation from such resources because these resources cannot be dynamically scheduled consistent with Appendix X. When bidding to supply Ancillary Services in the IFM, HASP, or RTM, imports compete for use of Intertie transmission capacity when the requested use is in the same direction, e.g., imports of Ancillary Services compete with Energy on Interties in the import direction and exports of Ancillary Services (i.e., on demand obligations) compete with Energy on Interties in the export direction. To the extent there is Congestion, imports of Ancillary Services will pay Congestion costs in the IFM, HASP, and RTM markets pursuant to Section 11.

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#### **8.3.3.1 Use of Ancillary Service Regions and Ancillary Service Regional Limits**

Within the Expanded System Region, the System Region, and the Sub-Regions, the CAISO may establish limits on the amount of Ancillary Services that can be provided from each region or ~~must~~can be provided within each region. When used, these Ancillary Service Regional Limits identify either a maximum or a minimum (or both a maximum and a minimum) amount of Ancillary Services to be obtained within the region. The minimum Ancillary Service limit in the Expanded System Region shall be the quantities of each Ancillary Service required to meet NERC and WECC reliability standards, including any requirements of the NRC for the CAISO Balancing Authority Area. The CAISO may establish a restriction on the amount of Ancillary Services to be procured from outside the CAISO Balancing Authority Area by establishing a minimum limit for the System Region.

\* \* \*

### 8.3.4 Certification And Testing Requirements

The owner of and Scheduling Coordinator for each ~~resource~~Generating Unit, System Unit, Dynamic System Resource, or Participating Load for which a Bid to provide Ancillary Services or Submission to Self-Provide Ancillary Services is allowed under the CAISO Tariff, and all other System Resources that are allowed to submit a Bid to provide Ancillary Services under this CAISO Tariff, must comply with the CAISO's certification and testing requirements as contained in Appendix K and the CAISO's Operating Procedures. Each ~~resource~~Generating Unit, Dynamic System Resource, and System Unit used to bid Regulation or used to self-provide Regulation must have been certified and tested by the CAISO using the process defined in Part A of Appendix K. Each Dynamic System Resource offering Regulation must comply with the Dynamic Scheduling Protocol in Appendix X. Spinning Reserve may be provided only from ~~resources that~~Generating Units, System Resources that submit Bids to provide Spinning Reserve from imports, or System Units, which have been certified and tested by the CAISO using the process defined in Part B of Appendix K. Non-Spinning Reserve may be provided from ~~resources that~~Curtable Demand, on-demand rights from other entities or Balancing Authority Areas, Generating Units, System Resources that submit Bids to provide Non-Spinning Reserve from imports, or System Units, which have been certified and tested by the CAISO using the process defined in Part C of Appendix K. Voltage Support may only be provided from resources ~~that including~~Loads, Generating Units, and System Units, which have been certified and tested by the CAISO using the process defined in Part D of Appendix K. Black Start capability may only be provided from Generating Units ~~that~~which have been certified and tested by the CAISO using the process defined in Part E of Appendix K. CAISO certification to provide Ancillary Services may be revoked by the CAISO under the provisions of this CAISO Tariff, including Appendix K.

\* \* \*

### 8.3.7 AS Bidding Requirements

Scheduling Coordinators may submit Bids or Submissions to Self-Provide an Ancillary Service consistent with the rules specified in Section 30 and any further requirements in this Section 8.3.7. Scheduling Coordinators may (i) submit Bids or Submissions to Self-Provide an Ancillary Service from resources

located within the CAISO Balancing Authority Area or Dynamic System Resources certified to provide Ancillary Services, (ii) submit Submissions to Self-Provide an Ancillary Service from System Resources located outside the CAISO Balancing Authority Area if provided pursuant to ETCs, TORs, or Converted Rights, (iii) submit Bids for Ancillary Services from Dynamic and Non-Dynamic System Resources located outside the CAISO Balancing Authority Area certified to provide Ancillary Services, or (iv) submit Inter-SC Trades of Ancillary Services. Ancillary Services procured in the IFM and in the Real-Time Market are comprised of the following: Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve. The HASP process evaluates the need for Energy, Regulation and Operating Reserves from System Resources and internal ~~resources~~~~Generating Units~~ and issues binding Ancillary Services awards only for Operating Reserves Ancillary Services from Non-Dynamic System Resources. Each ~~resource~~~~Generating Unit (including Physical Scheduling Plants), System Unit, Participating Load, or System Resource~~ for which a Scheduling Coordinator wishes to submit Ancillary Service Bids must meet the requirements set forth in this CAISO Tariff. The same resource capacity may be simultaneously offered to the same CAISO Market for multiple Ancillary Services types. Ancillary Services Bids and Submissions to Self-Provide an Ancillary Service can be submitted up to seven (7) days in advance. The CAISO will only use Operating Reserve Ramp Rates for procuring capacity associated with the specific Ancillary Services. The CAISO will issue Real-Time Dispatch Instructions in the Real-Time Market for the Energy associated with the awarded capacity based upon the applicable Operational Ramp Rate submitted with the single Energy Bid Curve in accordance with Section 30.7.7. There is no ability to procure Ancillary Services for export.

-To the extent a Scheduling Coordinator has an on-demand obligation to serve loads outside the CAISO Balancing Authority Area, it can do so provided that (1) it is using export transmission capacity available in Real-Time, and (2) the resource capacity providing Energy to satisfy the on-demand obligation is not under an RMR Contract or Resource Adequacy Capacity obligation, and has not been paid a RUC Availability Payment for the Trading Hour. All resources subject to the Ancillary Services must offer requirements, as specified in Section 40.6, must submit Bids consistent with the requirements specified therein and in Section 30.

\* \* \*

## **8.4 Technical Requirements For Providing Ancillary Services**

~~All resources~~~~All Generating Units, System Units, Participating Loads and System Resources~~ providing Ancillary Services shall comply with the technical requirements set out in Sections 8.4.1 to 8.4.3 below relating to their operating capabilities, communication capabilities and metering infrastructure. No Scheduling Coordinator shall be permitted to submit a Bid to the CAISO for the provision of an Ancillary Service from ~~resource~~~~Generating Unit, System Unit, Participating Load or System Resource~~, or to provide a Submission to Self-Provide an Ancillary Service from a ~~resource~~~~Generating Unit, System Unit, Participating Load, or Dynamic System Resource~~, unless the Scheduling Coordinator is in possession of a current certificate issued by the CAISO confirming that the ~~resource~~~~Generating Unit, System Unit, Participating Load or System Resource~~ complies with the CAISO's technical requirements for providing the Ancillary Service concerned. Scheduling Coordinators can apply for Ancillary Services certificates in accordance with the requirements for considering and processing such applications in Appendix K and the CAISO's Operating Procedures. The CAISO shall have the right to inspect ~~resources~~~~Generating Units, Participating Loads or the individual resources comprising System Units~~ and other equipment for the purposes of the issue of a certificate and periodically thereafter to satisfy itself that its technical requirements continue to be met. If at any time the CAISO's technical requirements are not being met, the CAISO may withdraw the certificate for the ~~resource~~~~Generating Unit, System Unit, Participating Load or System Resource~~ concerned.

### **8.4.1 Operating Characteristics Required To Provide AS**

~~Each resource~~~~Each Generating Unit, System Unit, Participating Load or System Resource~~ for which a Scheduling Coordinator wishes to submit a Bid to provide Ancillary Services must comply with the requirements for the specific Ancillary Service as set forth in Appendix K and the Business Practice Manual. The requirements in Appendix K and the Business Practice Manuals include Ancillary Service control, capability and availability standards. The requirements also involve the following operating characteristics:

- (a)- Ramp Rate increase and decrease (MW/minute);

- (b) - power factor (leading and lagging) as required by Section 8.2.3.3;
- (c) - maximum output (real and reactive), except that System Resources shall be required to comply only with the requirement for maximum real power;
- (d) - minimum output (real and reactive), except that System Resources shall be required to comply only with the requirement for minimum real power;
- (e) - ~~Capability to respond immediately to the CAISO's EMS control~~—AGC capability, control scheme, and range; and
- (f) - minimum length of time the resource can be available to provide the relevant Ancillary Service.

- In Appendix K and the Business Practice Manuals the CAISO will differentiate the operating characteristics according to the Ancillary Service being provided.

#### **8.4.1.1 Regulation**

- A ~~resource~~ ~~Generating Unit~~ offering Regulation must have the following operating characteristics and technical capabilities:

- (a) - it must be capable of being controlled and monitored by the CAISO ~~Energy Management System (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~~ ~~unit~~ 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 ~~resourceGenerating Unit~~ to CAISO Control Center telemetry must in a manner meeting CAISO standards include indications of whether the ~~resourceGenerating Unit~~ is on or off ~~CAISO EMS control~~AGC at the ~~resourceGenerating Unit~~ terminal equipment;
- (e) - the ~~resourceGenerating Unit~~ must be capable of the full range of movement within the amount of Regulation capability offered without manual ~~resourceGenerating Unit~~ operator intervention of any kind; and
- (f) - each ~~Ancillary Service Provider~~Participating Generator must ensure that ~~its~~the CAISO EMS control and related SCADA equipment for its ~~resourcegenerating facility~~ are operational throughout the time period during which Regulation is required to be provided.
- (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.

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#### 8.4.2 Ancillary Service Control Standards

-The providers of Ancillary Services under this Tariff must comply with the following control standards:

- (a) - Regulation. The Area Control Error will be calculated by the CAISO Energy Management System. Control signals will be sent from the CAISO EMS to raise or lower the output of ~~resourcesGenerating Units or System Resources~~ providing Regulation when ACE exceeds the allowable CAISO Balancing Authority Area dead band for ACE;
- (b) - Spinning Reserve and Non-Spinning Reserve. Each provider of Spinning Reserve or Non-Spinning Reserve must be capable of receiving a Dispatch Instruction within one (1) minute from the time the CAISO Control Center elects to Dispatch the Spinning Reserve resource or Non-Spinning Reserve resource

and must ensure that its resource can be at the Dispatched operating level within ten (10) minutes after ~~issuance~~issue of the Dispatch Instruction;

- ~~-(c)-~~ Voltage Support. Generating Units providing Voltage Support must have automatic voltage regulators which can correct the bus voltages to be within the prescribed Voltage Limits and within the machine capability in less than one (1) minute; and
- ~~-(d)-~~ Black Start. (i) Voice Communications: each supplier of Black Start capability must ensure that normal and emergency voice communications are available to permit effective Dispatch of the Black Start capability; (ii) CAISO Confirmation: No Load served by the Black Start Generating Unit or by any designated Generating Unit or by any transmission facility used for Black Start service may be restored until the CAISO has confirmed that the need for such service has passed.

### 8.4.3 Ancillary Service Capability Standards

The providers of Ancillary Services under this CAISO Tariff must comply with the following capability standards:

- ~~-(a)-~~ Spinning Reserve and Non-Spinning Reserve Capability. Each ~~resource~~Generating Unit or external import of a System Resource scheduled to provide Spinning Reserve and each resource providing Non-Spinning Reserve must be capable of converting the full capacity reserved to Energy production within ten (10) minutes after the issue of the Dispatch Instruction by the CAISO. Each resource scheduled to provide Spinning Reserve and each resource scheduled to provide Non-Spinning Reserve must be capable, and of maintaining that output or scheduled Interchange for at least thirty (30) minutes from the point at which the resources reaches its award capacity~~two (2) hours~~.
- ~~-(b)-~~ Black Start. Each Black Start Generating Unit must be able to start up with a dead primary and station service bus within ten (10) minutes of issue of a

Dispatch Instruction by the CAISO requiring a Black Start. Each Black Start Generating Unit must provide sufficient reactive capability to keep the energized transmission bus voltages within emergency Voltage Limits over the range of no load to full load. Each Black Start Generating Unit must be capable of sustaining its output for a minimum period of twelve (12) hours from the time when it first starts delivering Energy.

#### **8.4.4 Ancillary Service Availability Standards**

The providers of Spinning Reserve and Non-Spinning Reserve under this CAISO Tariff must comply with the following availability standards. Each ~~Ancillary Service Provider~~~~Participating Generator~~ shall ensure:

- (i) that its ~~resources~~~~Generating Units~~ scheduled to provide Spinning Reserve and Non-Spinning Reserve are available for Dispatch throughout the Settlement Period for which they have been scheduled; and (ii) that its ~~resources~~~~Generating Units~~ scheduled to provide Spinning Reserve are responsive to frequency deviations throughout the Settlement Period for which they have been scheduled.

#### **8.4.5 Communication Equipment**

Unless otherwise authorized by the CAISO, all Scheduling Coordinators wishing to submit an Ancillary Service Bid must have the capability to submit to and receive information from the CAISO's secure communication system. In addition, they must be capable of receiving Dispatch Instructions electronically and they must provide the CAISO with a telephone number, or fax number through which Dispatch Instructions for each ~~resource~~~~Generating Unit, System Unit, Load and System Resource~~ may be given if necessary. The CAISO will determine which method of communication is appropriate; provided that the CAISO will consult with the Scheduling Coordinator, if time permits, and will consider the method of communication then utilized by such Scheduling Coordinator; provided further, that the CAISO shall make the final determination as to the additional communication methods. Ancillary Service Providers~~Participating Generators, owners or operators of Loads, and operators of System Units or System Resources~~ whose resources are scheduled, bid in or under contract, shall ensure that there is a twenty-four (24) hour personal point of contact with the CAISO for the resource. An Ancillary Service Provider~~Generating Unit, System Unit, Load or System Resource. A Participating Generator or provider of Curtailable Demand~~ wishing to offer any Ancillary Service must provide a direct ring down voice

communications circuit (or a dedicated telephone line available twenty-four (24) hours a day every day of the year) between the control room operator for the ~~resource~~Generating Unit or Curtailable Demand providing the Ancillary Service and the CAISO Control Center. Each Ancillary Service Provider~~Participating Generator~~ must also provide an alternate method of voice communications with the CAISO from the control room in addition to the direct communication link required above. Operators of Dynamic System Resources from which Dynamic Schedules or Bids are submitted to the CAISO shall provide communications links meeting CAISO standards for dynamic imports from System Resources. Ancillary Service Providers whose resources provide~~Participating Generators and operators of System Units providing~~ Regulation shall also provide communication links meeting CAISO standards for direct digital control. Operators of System Resources providing Regulation shall provide communications links meeting CAISO standards for imports of Regulation. If any communication system becomes unavailable, the relevant Ancillary Service Provider~~Participating Generators, operators of System Units, Loads and System Resources~~ and the CAISO shall take immediate action to identify the cause of the interruption and to restore the communication system. A Scheduling Coordinator that has provided a Submission to Self-Provide an Ancillary Service, or has submitted a Bid to provide or contracted for Ancillary Services, shall ensure that the ~~resource~~Generating Unit, System Unit, Load or System Resource concerned is able to receive and implement Dispatch Instructions.

#### **8.4.6 Metering Infrastructure**

All Ancillary Service Providers that wish~~Participating Generators, owners or operators of Loads and operators of System Units or System Resources which a Scheduling Coordinator wishes~~ to bid to provide Ancillary Services shall maintain~~have the~~ metering infrastructure for the resources~~Generating Units, System Units, Loads or System Resources~~ concerned which complies with requirements to be established by the CAISO relating to:

- (a)- meter type;
- (b)- meter location;
- (c)- meter reading responsibility;
- (d)- meter capability in regard to ~~AGC~~ response to CAISO EMS control; and

- ~~(e)~~- any other aspect of metering infrastructure required by the CAISO under this CAISO Tariff.

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### **8.6.2 Right To Self-Provide**

Each Scheduling Coordinator may choose to self-provide all, or a portion, of its Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve obligations in the IFM, and, to the extent needed to satisfy the CAISO's additional requirement, HASP and the Real-Time Market, from resources eligible for self-provision, as may be permissible for any given Ancillary Service in these respective markets. The right to self-provide Ancillary Services from capacity that is under a contractual obligation to provide Energy, including but not limited to capacity subject to an RMR Contract and local Resource Adequacy Resources, shall be conditional; self-provision of Ancillary Services from such capacity will only be permitted to the extent that capacity is not needed for Energy as a result of the MPM-RRD process described in this CAISO Tariff. To self-provide Ancillary Services a Scheduling Coordinator must provide the CAISO with a Submission to Self-Provide an Ancillary Service. Both Ancillary Service Bids and Submissions to Self-Provide an Ancillary Service can be provided to the CAISO for the same Ancillary Service and for the same hour in the same market. To the extent the Submission to Self-Provide an Ancillary Service is from a resource that is a Partial Resource Adequacy Resource, and Energy is needed, including for purposes under Section 31.3.1.3, from that resource the CAISO shall only disqualify the self-provision of Ancillary Services from the portion of the resource's capacity that has must-offer obligation, provided that the Scheduling Coordinator has not submitted an Energy Bid for the capacity that is not subject to a must-offer obligation. The CAISO will treat resources subject to Resource Adequacy requirements consistently with and such resources must comply with the bidding requirements in Section 40.6. If there is an Energy Bid submitted for the capacity of a Partial Resource Adequacy Resource that is not subject to a must-offer obligation the CAISO may disqualify the Submission to Self-Provide an Ancillary Service for the portion of the resources capacity that is not under a must-offer obligation consistent with the principles of co-optimization under the CAISO Tariff.

-Prior to evaluating Ancillary Service Bids, the CAISO will determine whether Submissions to Self-Provide Ancillary Services are feasible with regard to resource operating characteristics and regional constraints and are qualified to provide the Ancillary Services in the markets for which they were submitted.

If the total Submissions to Self-Provide Ancillary Services exceed the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region, the submissions that would otherwise be accepted by the CAISO as feasible and qualified will be awarded on a pro-rata basis among the suppliers offering to self-provide the Ancillary Service up to the amount of the Ancillary Services requirement. If a regional constraint imposes a limit on the total amount of Regulation Up, Spinning Reserve, and Non-Spinning Reserve, and the total self-provision of these Ancillary Services in that region exceeds that limit, Self-Provided AS are qualified pro rata from higher to lower quality service in three tiers: Regulation Up first, followed by Spinning Reserve, and then by Non-Spinning Reserve. Submissions to Self-Provide Ancillary Services in excess of the maximum regional requirement for the relevant Ancillary Service in an Ancillary Service Region will not be accepted and qualified by the CAISO as Self-Provided Ancillary Services.

-The CAISO shall schedule Self-Provided Ancillary Services to the extent qualified in the IFM, HASP, and the RTM and Dispatch Self-Provided Ancillary Services in the Real-Time. To the extent that a Scheduling Coordinator self-provides Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve, the CAISO shall correspondingly reduce the quantity of the Ancillary Services it procures from Bids submitted in the IFM, HASP, and the Real-Time Market. To the extent a Scheduling Coordinator's Self-Provided Ancillary Service for a particular Ancillary Service is greater than the Scheduling Coordinator's obligation for that particular Ancillary Service in a Settlement Interval, the Scheduling Coordinator will receive the user rate for the Self-Provided Ancillary Service for the amount of the Self-Provided Ancillary Service in excess of the Scheduling Coordinator's obligation.

Scheduling Coordinators may trade Ancillary Services so that any Scheduling Coordinator may reduce its Ancillary Services Obligation through purchase of Ancillary Services capacity from another Scheduling Coordinator, or self-provide in excess of its obligation to sell Ancillary Services to another Scheduling Coordinator.

#### **8.6.4.4 ~~\_\_\_\_\_~~ Acceptance of Self-Provided Ancillary Service Submissions**

-The CAISO will refuse to accept a Submission to Self-Provide an Ancillary Service to the extent it fails to meet the requirements contained in this CAISO Tariff. In particular, Self-Provided Ancillary Services must satisfy the following conditions:

- ~~(a)~~- the Scheduling Coordinator has a current certificate of technical eligibility for the ~~resource~~~~Generating Units, System Units, Loads or System Resources~~ selected for the Ancillary Services in question;
- ~~(b)~~- to the extent not provided under (a), the ~~resources~~~~Generating Units, System Units, Loads and System Resources~~ have the instrumentation, communication and metering equipment necessary to permit the CAISO to dispatch the offered Ancillary Services and verify that the services have been provided;
- ~~(c)~~- the Bid information provided by the Scheduling Coordinator is deemed to be valid in accordance with Appendix E and other provisions of the CAISO Tariff; and
- ~~(d)~~ ~~the resources~~ ~~(d)~~ ~~the Generating Units, System Units, Loads or System Resources~~ meet the CAISO's locational requirements for the Ancillary Services.

\* \* \*

### **8.9 Verification, Compliance Testing, And Auditing**

Availability of contracted and Self-Provided Ancillary Services and RUC Capacity shall be verified by the CAISO by unannounced testing of ~~resources~~~~Generating Units, Loads and System Resources~~, by auditing of response to CAISO Dispatch Instructions, and by analysis of the appropriate Meter Data, or Interchange Schedules. The CAISO may test the capability of any ~~resource~~~~Generating Unit, System Unit, System Resource, external import of a System Resource, Participating Load, or reactive device~~ providing Ancillary Services or RUC Capacity. Participating Generators, owners or operators of Participating Loads, operators of System Units or System Resources, owners or operators of reactive devices and Scheduling Coordinators shall notify the CAISO immediately whenever they become aware that an Ancillary Service or RUC Capacity is not available in any way. All Ancillary Service Providers~~All Participating Generators, owners or operators of Loads, operators of System Units or System Resources~~

~~and owners or operators of reactive devices~~ shall check, monitor and/or test their system and related equipment routinely to assure availability of the committed Ancillary Services and RUC Capacity. These requirements apply to Ancillary Services whether the Ancillary Services are contracted or self-provided. For a duration specified by the CAISO, the CAISO may suspend the technical eligibility certificate of a Scheduling Coordinator for a ~~resource~~Generating Unit, System Unit, Load or System Resource, which repeatedly fails to perform. The CAISO shall develop measures to discourage repeated non-performance on the part of both bidders and self-providers.

\* \* \*

## 8.9.2 Compliance Testing For Regulation

The CAISO may test the capability of any ~~resource~~Generating Unit or System Resource providing Regulation by using the CAISO EMS to move that ~~resource's~~Generating Unit's or System Resource's output over the full range of its Regulation capacity within a ten ~~(10)~~-minute period.

\* \* \*

### 8.9.3.1 Compliance Testing of a ~~Generating Unit, System Unit or System Resource~~

-The CAISO may test the Non-Spinning Reserve capability of a resource that is not Curtailable Demand~~Generating Unit, System Unit or an external import of a System Resource~~ by issuing unannounced Dispatch Instructions requiring the ~~resource~~Generating Unit or System Unit to come on line and ramp up or, in the case of a System Resource, to affirmatively respond to Real-Time interchange schedule adjustment; all in accordance with the Scheduling Coordinator's Bid. Such tests may not necessarily occur on the hour. The CAISO shall measure the response of the ~~resource~~Generating Unit, System Unit or external import of a System Resource to determine compliance with its stated capabilities.

### 8.9.3.2 Compliance Testing of Curtailable Demand

-The CAISO may test the Non-Spinning Reserve capability of a resource~~Load~~ providing Curtailable Demand by issuing unannounced Dispatch Instructions requiring the operator of the Load to report the Curtailable Demand of that Load actually being served by the operator at the time of the instruction. No Load will be disconnected as part of the test.

\* \* \*

## 8.9.6 Compliance Testing For RUC Capacity

The CAISO may test the capability of a ~~resourceGenerating Unit, System Unit or an external import of a System Resource~~ to provide RUC Capacity by issuing unannounced Dispatch Instructions requiring the ~~resourceGenerating Unit or System Unit~~ to come on line and ramp up or, in the case of a System Resource, to affirmatively respond to a Real-Time Interchange Schedule adjustment; all in accordance with the Scheduling Coordinator's Bid. Such tests may not necessarily occur on the hour. The CAISO shall measure the response of the ~~resourceGenerating Unit, System Unit or external import of a System Resource~~ to determine compliance with its stated capabilities.

\* \* \*

### 8.9.7.1 Notification of Compliance Testing Results

~~If a resource~~ ~~a Generating Unit, Load, or System Resource~~ fails a compliance test, the CAISO shall notify the Scheduling Coordinator whose resource was the subject of the test and the provider or owner or operator of the ~~resourceGenerating Unit, Participating Load, or System Resource~~ providing Ancillary Services or RUC Capacity of such failure by any means as soon as reasonably practicable after the completion of the test. In addition, regardless of the outcome of the test, the CAISO shall provide the Scheduling Coordinator whose resource was subject to a compliance test written notice of the results of such test. The CAISO shall at the same time send a copy of the notice to the provider or owner or operator of the ~~resourceGenerating Unit, Load, or System Resource~~ providing Ancillary Services or RUC Capacity. For any Resource Adequacy Resource failing a compliance test, the CAISO also will provide notification of the failure to the California Public Utilities Commission, Local Regulatory Authority, or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and FERC.

\* \* \*

### 8.9.10 Performance Audit For Spinning Reserve

The CAISO will audit the performance of a ~~resourceGenerating Unit or external import of a System Resource~~ providing Spinning Reserve by auditing its response to Dispatch Instructions and by analysis of Meter Data associated with the ~~resourceGenerating Unit~~. Such audits may not necessarily occur on the hour. A ~~resourceGenerating Unit~~ providing Spinning Reserve shall be evaluated on its ability to respond

to a Dispatch Instruction, move at the MW/minute capability stated in its Bid, reach the amount of Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO, and respond to system frequency deviations as specified in Appendix K. ~~outside the allowed frequency deadband.~~ An external import of a System Resource providing Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move at the MW/minute capability stated in its Bid, reach the amount of Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO.

### 8.9.11 Performance Audit For Non-Spinning Reserve

The CAISO will audit the performance of a resource ~~Generating Unit, Load, or System Resource~~ providing Non-Spinning Reserve by auditing its response to Dispatch Instructions, and by analysis of Meter Data associated with the resource. Such audits may not necessarily occur on the hour. A resource ~~Generating Unit~~ providing Non-Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move in accordance with the time delay and MW/minute capability stated in its Bid, and reach the amount of Non-Spinning Reserve capacity under the control of the CAISO scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO. ~~—An external import of a System Resource providing Non-Spinning Reserve shall be evaluated on its ability to respond to a Dispatch Instruction, move in accordance with the time delay and MW/minute capability stated in its Bid, and reach the amount of Non-Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO. A Load providing Non-Spinning Reserve from Curtailable Demand shall be evaluated on its ability to respond to a Dispatch Instruction, move in accordance with the time delay and MW/minute capability stated in its Bid, and reach the amount of Non-Spinning Reserve capacity scheduled for the current Settlement Period within ten (10) minutes of issue of the Dispatch Instruction by the CAISO.~~

\* \* \*

### 8.9.14 Performance Audit For RUC Capacity

The CAISO will audit the performance of a resource ~~Generating Unit, Participating Load, or System Resource~~ providing RUC Capacity by auditing its response to Dispatch Instructions, and by analysis of Meter Data associated with the resource. Such audits may not necessarily occur on the hour. A

~~resource~~A Generating Unit providing RUC Capacity shall be evaluated on its ability to respond to a Dispatch Instruction, start within the designated time delay, move at the MW/minute capability stated in its Bid, reach the amount of RUC Capacity scheduled for the Settlement Period concerned and sustain operation at this level for a sufficient time to assure availability over the specified period. ~~An external import of a System Resource~~ providing RUC Capacity shall be evaluated on its ability to respond to a Dispatch Instruction, start within the designated time delay, move at the MW/minute capability stated in its Bid, reach the amount of RUC Capacity scheduled for the Settlement Period concerned and sustain operation at this level for a sufficient time to assure availability over the specified period.

\* \* \*

#### **8.9.16.4 \_\_\_\_\_ Second failure**

~~A RUC Capacity or Ancillary Service resource which fails a compliance test or a performance audit conducted during the period when a warning notice for that resource is in effect shall be disqualified immediately from providing the RUC Capacity or the Ancillary Service concerned (whether the Ancillary Service is part of the CAISO's auction or is part of a self-provision arrangement), and in the case of Ancillary Services, shall not be permitted to submit a Bid to the CAISO to provide the Ancillary Service concerned (or be part of an Ancillary Service self-provision arrangement) until such time as it has successfully re-passed the approval and certification procedure described in the relevant Part of Appendix K. For any Resource Adequacy Resource failing a compliance test or performance audit during the periods when a warning notice for that resource is in effect, the CAISO will notify the California Public Utilities Commission or the relevant Local Regulatory Authority of the failure and disqualification or federal agency with jurisdiction over the Load Serving Entity that listed the Resource Adequacy Resource on its Resource Adequacy Plan, and FERC.~~

### **8.10 Periodic Testing Of Units**

The CAISO shall periodically conduct unannounced tests of resources providing RUC Capacity or Ancillary Services. For RUC Capacity the unannounced tests will confirm the ability of the resource to respond to a Dispatch Instruction, start within the designated time delay, move at the MW/minute capability stated in its Bid, reach the amount of RUC Capacity scheduled for the Settlement Period

concerned and sustain operation at this level for a sufficient time to assure availability over the specified period. For Ancillary Services the unannounced tests will confirm the ability of such resources to meet the applicable Ancillary Service standard for performance and control. The CAISO may test ~~resources~~Generating Units, System Units, Loads and System Resources in the manner described herein. The frequency of testing shall be within such ~~time frame~~timeframes as are reasonable under all the circumstances. Scheduling Coordinators shall manage the resulting Energy output if notification of testing permits the Energy to be included in a Bid. ~~If a resource~~If a Generating Unit, System Unit, Load, or System Resource fails to meet requirements in a test under this section, the CAISO shall notify the relevant ~~Ancillary Service Provider~~Participating Generator, owner or operator of Loads, System Units or System Resources, or Scheduling Coordinator for the resource of such failure as soon as reasonably practicable after the completion of the test. Failure to meet requirements shall lead to the penalties described in Section 8.10.7.

### **8.10.1 Regulation Up And Regulation Down Reserves**

The CAISO shall continuously monitor the response of a ~~resource~~Generating Unit, System Unit, or System Resource to the CAISO's Regulation instructions in order to determine the resource is under direct control of CAISO's Automatic Generation Control system and complies with CAISO's Dispatch Instructions.

### **8.10.2 Spinning Reserve**

The CAISO shall test the Spinning Reserve capability of a ~~resource~~Generating Unit, System Unit or System Resource by issuing unannounced Dispatch Instructions requiring the ~~resource~~Generating Unit, System Unit or System Resource to ramp up to its ten (10) minute capability. The CAISO shall measure the response of the ~~resource~~Generating Unit, System Unit or System Resource to determine compliance with requirements. Such tests may not necessarily occur on the hour. The Scheduling Coordinator for the ~~resource~~Generating Unit, System Unit or System Resource shall be paid pursuant to Section 11.5.6.

### **8.10.3 Non-Spinning Reserve**

The CAISO may test the Non-Spinning Reserve capability of a ~~resource~~Generating Unit, Load, System Unit or System Resource by issuing unannounced Dispatch Instructions requiring the ~~resource~~Generating

~~Unit, Load, System Unit or System Resource~~ to ~~come on line and ramp up or to reduce Demand~~ to its ~~certified capacity within~~ ten (10) ~~minutes. minute capability.~~ The CAISO shall measure the response of the ~~resourceGenerating Unit, System Unit, System Resource~~ or Load to determine compliance with requirements. The Scheduling Coordinator for the ~~resourceGenerating Unit, System Unit, Load or System Resource~~ shall be paid pursuant to Section 11.5.6.

\* \* \*

### 8.10.6 RUC Capacity

The CAISO may test the capability of a ~~resourceGenerating Unit, Load, System Unit or System Resource~~ to provide RUC Capacity by issuing unannounced Dispatch Instructions requiring the ~~resourceGenerating Unit, Load, System Unit or System Resource~~ to follow the Dispatch Instruction. The CAISO shall measure the response of the ~~resourceGenerating Unit, System Unit or System Resource~~ to determine compliance with requirements. Such tests may not necessarily occur on the hour. The Scheduling Coordinator for the ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ shall be paid the Energy Bid price of the ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ for the output under the RUC test.

### 8.10.7 Penalties For Failure To Pass Tests

~~A resourceA Generating Unit, Participating Load, System Unit or System Resource~~ that fails an availability test, as determined under criteria to be established by the CAISO, shall be deemed not to have been available to provide the RUC Capacity or Ancillary Service concerned or the relevant portion of that service for the entire period the ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ was committed to provide the service, unless appropriate documentation (i.e., daily test records) confirming the availability of that service during the committed period(s) is presented to the CAISO. The "committed period" is defined as the total of all the hours/days the ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ was scheduled by the CAISO to provide the RUC Capacity or Ancillary Service beginning from: (i) the last successful availability test; or (ii) the last time the ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ actually provided Energy or reduced Demand to provide RUC Capacity or provided Energy or reduced Demand as part of the Ancillary Service; whichever results in a shorter committed period. The Scheduling Coordinator for a

~~resource~~ ~~Generating Unit, Participating Load, System Unit or System Resource~~ that fails an availability test shall not be entitled to a RUC Availability Payment or payment for the Ancillary Service concerned for the committed period and adjustments to reflect this shall be made in the calculation of payments to the Scheduling Coordinator, provided that any such penalty shall be reduced to reflect any adjustment made over the duration of the committed period under Section 8.10.8 or Section 31.5.7.

-System Units providing RUC Capacity or providing Ancillary Services to the CAISO are subject to the same testing, compensation, and penalties as are applied to individual ~~resources~~ ~~Generating Units~~ providing RUC Capacity or provision of Ancillary Services.

-If payments for RUC Capacity or for a particular Ancillary Service in a particular Settlement Period would be rescinded under more than one provision of this Section 8.10.7, the total amount to be rescinded for a particular Ancillary Service in a particular Settlement Period shall not exceed the total payment due in that Settlement Period.

### **8.10.8 Rescission Of Payments For Ancillary Service Capacity**

If Ancillary Services capacity that receives an AS Award or Self-Provided Ancillary Services capacity provided from a ~~resource~~ ~~Generating Unit, Participating Load, System Unit or System Resource~~ is Undispatchable Capacity, Unavailable Capacity, or Undelivered Capacity during the relevant Settlement Interval, then payments will be rescinded as described in this Section 8.10.8 and settled in accordance with Section 11.10.9. If the CAISO determines that non-compliance of a ~~resource~~ ~~Participating Load, Generating Unit, System Unit or System Resource~~, with an operating order or Dispatch Instruction from the CAISO, or with any other applicable technical standard under the CAISO Tariff, causes or exacerbates system conditions for which the WECC imposes a penalty on the CAISO, then the Scheduling Coordinator of such ~~resource~~ ~~Participating Load, Generating Unit, System Unit or System Resource~~ shall be assigned that portion of the WECC penalty which the CAISO reasonably determines is attributable to such non-compliance, in addition to any other penalties or sanctions applicable under the CAISO Tariff.

#### **8.10.8.1 \_\_\_\_\_ Rescission of Payments for Undispatchable Ancillary Service Capacity**

-The CAISO shall calculate the Real-Time ability of each ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ to deliver Energy from Ancillary Services capacity or Self-Provided Ancillary Services capacity for each Settlement Interval based on its maximum operating capability, actual telemetered output, and Operational Ramp Rate as described in Section 30.10. System Resources that are awarded Ancillary Services capacity in the Day-Ahead Market are required to electronically tag (E-Tag as prescribed by the WECC) the Ancillary Services capacity. If the amounts of Ancillary Services capacity in an electronic tag differ from the amounts of Ancillary Services capacity for the System Resource, the Undispatchable Capacity will equal the amount of the difference, and will be settled in accordance with the provisions of Section 11.10.9.1.

#### **8.10.8.2 \_\_\_\_\_Rescission of Payments for Unavailable Ancillary Service Capacity**

-If the CAISO determines that a Scheduling Coordinator has supplied Uninstructed Imbalance Energy to the CAISO during a Settlement Interval from the capacity of a ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ that is obligated to supply Spinning Reserve or Non-Spinning Reserve to the CAISO, payments to the Scheduling Coordinator for the Ancillary Service capacity used to supply Uninstructed Imbalance Energy shall be eliminated to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.2.

#### **8.10.8.3 \_\_Rescission of Payments for Undelivered Ancillary Service Capacity**

-For each Settlement Interval in which a ~~resourceGenerating Unit, Participating Load, System Unit or System Resource~~ fails to supply Energy from Spinning Reserve or Non-Spinning Reserve capacity in accordance with a Dispatch Instruction, or supplies only a portion of the Energy specified in the Dispatch Instruction, the capacity payment will be reduced to the extent of the deficiency, in accordance with the provisions of Section 11.10.9.3.

\* \* \*

## **Appendix A Definitions**

### ***- Ancillary Service Provider***

A Participating Generator, System Resource operator, ~~or Participating Load~~, Proxy Demand Resource operator or other resource operator that is certified to provide an Ancillary Service.

\* \* \*

### **- Non-Spinning Reserve**

-The portion of resourcegenerating capacity that is capable of being synchronized and Ramping to a specified load in ten minutes (or ~~Load~~ that is capable of being interrupted in ten (10) minutes) and that is capable of running (or being interrupted) for at least thirty (30) minutes from the time it reaches its award capacity.

\* \* \*

### **- Regulating Range**

-The operating level range within which a generating resource may provide Regulation.

### **- Regulation**

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

### **- Regulation Down Or Regulation Down Reserve**

-Regulation reserve provided by a resource under CAISO EMS control that can decrease its Energy production or increase its Energy consumptionactual operating level in response to a direct electronic signal from the CAISO to maintain standard frequency in accordance with established Reliability Criteria.

### **- Regulation Limits**

The MW limits, up and down, set by a resource's operation under CAISO EMS control.

## **- Regulation Up Or Regulation Up Reserve**

Regulation provided by a resource under CAISO EMS control that can increase its Energy production or decrease its Energy consumption in response to a direct electronic(AGC) signal from the CAISO to maintain standard frequency in accordance with established Reliability Criteria.

~~The MW limits, up and down, set by a Generator for a Generating Unit's operation on Automatic Generation Control.~~

## **- Spinning Reserve**

The portion of unloaded synchronized ~~resource~~~~generating~~ capacity that is immediately responsive to system frequency and that is capable of being loaded in ten (10) minutes, and that is capable of running for at least thirty (30) minutes from the time it reaches its award capacity~~two hours~~.

# Appendix K Ancillary Service Requirements Protocol (ASRP)

## PART A

### CERTIFICATION FOR REGULATION

**A 1** An Ancillary Service Provider~~A Generator~~ wishing to provide Regulation as an Ancillary Service from a resource~~Generating Unit~~ whether pursuant to a CAISO award or as part of a self-provision arrangement must meet the following operating characteristics and technical requirements in order to be certified by the CAISO to provide Regulation service unless granted a temporary exemption by the CAISO in accordance with criteria which the CAISO shall publish on the CAISO Website;

\* \* \*

**A 1.1.1** the rated capacity of the resource~~Generating Unit~~ must be 500 KW~~1 MW~~ or greater (i.e. the resource must be capable of providing at least 500 KW of Regulation) unless the resource~~Generating Unit~~ is participating in an aggregation arrangement approved by the CAISO;

\* \* \*

**A 1.1.3** the resource must be able to increase or decrease real power levels immediately in response to signals from the CAISO's EMS control;

**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.

\* \* \*

**A 1.2.1.2** the resource~~Generating Unit power output~~ response (in MW) to a control signal must meet the minimum performance standards for control and ~~unit~~ response which will be developed and posted by the CAISO on the CAISO Website. As indicated by the resource response~~Generating Unit power output~~ (in MW), the resource~~Generating Unit~~ must respond immediately, without manual ~~Generating Unit~~ operator intervention, to control signals and must sustain its specified Ramp Rate, within specified Regulation Limits, for each minute of control response (MW/minute);

**A 1.2.2 Monitoring:**

-the resourceGenerating Unit must have a standard CAISO direct communication and direct control system to send signals to the CAISO EMS to dynamically monitor, at a minimum the following:

**A 1.2.2.1** actual real power level output (MW);

**A 1.2.2.2** high limit, low limit and rate limit values as selected by the resourceGenerating Unit operator; and

\* \* \*

**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 resourceGenerating Unit at the resourcegenerating site and between the Scheduling Coordinator and the operator. The primary dedicated voice communication between the CAISO Control Center and the operator controlling the resourceGenerating Unit at the resourcegenerating 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 resourceGenerating Unit must pass a qualification test to demonstrate the overall ability to provide Regulation meeting the performance requirements of the ASRP for Regulation.

**A 2** An Ancillary Service ProviderA Generator wishing to be considered for certification for Regulation service by the CAISO must make a written request to the CAISO, giving details of the technical capability of the resourceGenerating Units concerned and identifying the Scheduling Coordinator through whom the Ancillary Service ProviderGenerator intends to offer Regulation service. The Ancillary Service ProviderGenerator shall at the same time send a copy of its request to that Scheduling Coordinator. Technical review request forms will be available from the CAISO.

**A 3** No later than one week after receipt of theAncillary Service Provider'sthe Generator's request, the CAISO shall provide the Ancillary Service ProviderGenerator with a listing of required interface equipment for Regulation, including a standard CAISO direct communication and direct control system. The CAISO shall send a copy of the listing to the resource'sGenerator's Scheduling Coordinator.

**A 4** The Ancillary Service ProviderGenerator may propose alternatives that itthe Generator believes may provide an equivalent level of communication and control for consideration by the CAISO. Such proposals shall be in writing and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.

**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 weeks after the proposal is received by the CAISO. The Ancillary Service ProviderGenerator 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~~Generator, the CAISO shall provisionally approve the proposal in writing providing a copy to ~~theAncillary Service Provider's~~the Generator's Scheduling Coordinator at the same time. If agreed by the CAISO, the ~~Ancillary Service Provider~~Generator may then proceed to procure and install the equipment and make arrangements for the required communication and control.
- A 7- Design, acquisition, and installation of the CAISO-approved communication and control equipment shall be under the control of the CAISO. The CAISO shall bear no cost responsibility or functional responsibility for such equipment, except that the CAISO shall arrange for and monitor the maintenance of the communication and control system at the ~~Ancillary Service Provider's~~Generator's expense, unless otherwise agreed by the CAISO and ~~theAncillary Service Provider.~~the Generator. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to the CAISO EMS at its own cost.
- A 8- The CAISO, in cooperation with the ~~Ancillary Service Provider~~Generator shall perform testing of the communication and control equipment to ensure that the communication and control system performs to meet the CAISO requirements.
- A 9- When the CAISO is satisfied that the communication and control systems meet the CAISO's requirements, the ~~Ancillary Service Provider~~Generator shall request in writing that the CAISO conduct a certification test with a suggested primary date and time and at least two alternative dates and times. The CAISO shall, within two Business Days of receipt of the ~~Ancillary Service Provider's~~Generator's request, accept a proposed time if possible or suggest at least three alternatives to the ~~Ancillary Service Provider.~~Generator. If the CAISO responds by suggesting alternatives, the ~~Ancillary Service Provider~~Generator shall, within two Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three 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.~~Generator. Such tests shall include, but not be limited to, the following:
- \* \* \*
- A 10.3 ~~\_\_\_\_\_~~confirmation of the ~~resource's~~Generating Unit control performance; and
- A 10.4 confirmation of the CAISO EMS control to include changing the ~~resource operating level~~Generating Unit output over the range of Regulation proposed at different Set Points, from minimum to maximum ~~output~~, and at different rates of change from the minimum to the maximum permitted by the design of the ~~resource~~Generating Unit.
- A 11 ~~\_\_\_\_\_~~ Upon successful completion of the test, the CAISO shall certify the ~~resource~~Generating Unit as being permitted to provide Regulation as an Ancillary Service ~~Provider~~ and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The ~~Scheduling Coordinator~~CAISO shall ~~request the CAISO to update~~change its ~~database~~Generating Unit data base to reflect the ~~ability of~~permission for the ~~resource~~Generating Unit to provide Regulation ~~service~~.
- A 12 ~~\_\_\_\_\_~~ The Scheduling Coordinator may submit Bids for Regulation service from the certified ~~resource~~Generating Unit into the CAISO Markets starting with the Day-Ahead Market for

the hour ending 0100 on the second Trading Day after the CAISO's database reflects the resource's~~CAISO issues the~~ certificate.

- A 13** The certification to provide Regulation shall remain in force until:
- (a) withdrawn by the Scheduling Coordinator or the Ancillary Service Provider~~Generator~~ by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day; or
  - (b) if the resource~~Generating Unit~~ obtained CAISO certification on the basis of a prior communication and control technology, until revoked by the CAISO for failure to comply with the requirement set forth in A 13.1 that the resource~~Generating Unit~~ install a CAISO-specified standard CAISO direct communication and direct control system (unless exempted by the CAISO).

**A 13.1** ~~\_\_\_\_\_~~ Unless exempted by the CAISO, if the resource~~Generating Unit~~ obtained CAISO certification on the basis of a prior communication and control technology, the CAISO shall provide written notice to the Ancillary Service Provider of the Ancillary Service Provider's~~Generator of the Generator's~~ obligation to install a CAISO-specified standard direct communication and direct control system along with a required date for said work to be completed as mutually agreed upon by the CAISO and the Ancillary Service Provider~~Generator~~. Failure to meet the completion date shall be grounds for the revocation of certification, provided that the CAISO must provide the Ancillary Service Provider~~Generator~~ with at least ninety (90) days advance notice of the proposed revocation.

**A 14** ~~\_\_\_\_\_~~ The certification may be revoked by the CAISO only under provisions of the ASRP ~~or other provisions of the~~ CAISO Tariff.

## PART B

### CERTIFICATION FOR SPINNING RESERVE

**B 1** An Ancillary Service Provider~~A Generator~~ wishing to provide Spinning Reserve as an Ancillary Service from a resource~~Generating Unit or System Resource~~ whether pursuant to a CAISO award or as part of a self-provision arrangement must meet the following requirements in order to be certified by the CAISO to provide Spinning Reserve service:

**B 1.1** the rated capacity of the resource~~Generating Unit~~ must be 500 KW~~1-MW~~ or greater (i.e. the resource must be capable of providing at least 500 KW of Spinning Reserve) unless the resource~~Generating Unit~~ is participating in an aggregation arrangement approved by the CAISO;

**B 1.2** ~~\_\_\_\_\_~~ the minimum governor performance of the Generating Unit or System Resource shall be as follows:

**B 1.2.1** ~~\_\_\_\_\_~~ 5% drop;

**B 1.2** ~~\_\_\_\_\_~~ the resource must respond immediately and automatically in proportion to frequency deviations through the action of a governor or other control system in accordance with the following requirements:

Minimum Governor Performance:

a. 5 percent droop;

b. +/- 0.036 Hz ~~B 1.2.2~~ ~~\_\_\_\_\_~~ governor deadband must be plus or minus 0.036Hz; and

c. ~~Power B 1.2.3~~ the power output ~~changes in must change within~~ one second for any frequency deviation outside ~~of the governor~~ deadband.

Minimum Frequency Responsive Device Performance:

a. If frequency is less than or equal to 59.92 Hz, the resource must reach ten (10) percent of its awarded spinning capacity within eight (8) seconds; and

b. The resources must change the power it delivers or consumes in one (1) second for any frequency deviation less than or equal to 59.92 Hz

- B 1.3** the operator of the ~~resource~~Generating Unit or System Resource must have a means of receiving Dispatch Instructions to initiate an increase or decrease in real power ~~output~~ (MW) within one (1) minute of the CAISO Control Center determination that Energy from Spinning Reserve capacity must be dispatched;
- B 1.4** the ~~resource~~Generating Unit or System Resource must be able to increase or decrease its real power ~~output~~ (MW) by the maximum amount of Spinning Reserve to be offered within ten (10) ~~minutes and be capable of maintaining its real power for thirty (30)~~ minutes;
- B 1.5** CAISO approved voice communications services must be in place to provide both primary and alternate voice communication between the CAISO Control Center and the operator controlling the ~~resource~~Generating Unit or System Resource; and
- B 1.6** The communication system and the ~~resource~~Generating Unit or System Resource must pass a qualification test to demonstrate the overall ability to meet the performance requirements of the ASRP for Spinning Reserve.
- B 2** ~~An Ancillary Service Provider~~A Generator or System Unit wishing to be considered for certification for Spinning Reserve service by the CAISO must make a written request to the CAISO, giving details of the technical capability of the ~~resource~~Generating Units or System Resources concerned and identifying the Scheduling Coordinator through whom the ~~Ancillary Service Provider~~Generator or System Unit intends to offer Spinning Reserve service. The ~~Ancillary Service Provider~~Generator or System Unit shall at the same time send a copy of its request to that Scheduling Coordinator. Technical review request forms will be available from the CAISO.
- B 3** No later than one week after receipt of the request, the CAISO shall provide the ~~Ancillary Service Provider~~Generator or System Unit with a listing of acceptable communication options and interface equipment options for Spinning Reserve. The CAISO shall send a copy of the listing to the ~~Ancillary Service Provider's~~Scheduling Generator's or System Unit's Scheduling Coordinator.
- B 4** The ~~Ancillary Service Provider~~Generator or System Unit may elect to implement any of the approved options defined by the CAISO, and, if it wishes to proceed with its request for certification, shall give written notice to the CAISO of its selected communication option, with a copy to its Scheduling Coordinator.
- B 5** When it receives the ~~Ancillary Service Provider's~~Generator's or System Unit's notice, the CAISO shall notify the ~~Ancillary Service Provider~~Generator or System Unit and the Scheduling Coordinator in writing no later than two weeks after receipt of the notice confirming receipt of the notice and issuing provisional approval of the selected options. Upon receipt of the CAISO acknowledgment, the ~~Ancillary Service Provider~~Generator or System Unit may proceed as indicated below to secure the necessary facilities and capabilities required.
- B 6** The ~~Ancillary Service Provider~~Generator or System Unit may also propose alternatives that it believes may provide an equivalent level of control for consideration by the CAISO. Such proposals shall be in writing and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.

- B 7** 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 weeks after the proposal is received by the CAISO. The ~~Ancillary Service Provider~~Generator or the System Unit 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.
- B 8** Upon agreement as to the method of communication and control to be used by the ~~resource~~Generator or System Resource, the CAISO shall provisionally approve the ~~Ancillary Service Provider's~~Generator's proposal ~~or the System Resource's proposal~~ in writing providing a copy to the ~~resource's~~Generator's or System Resource's Scheduling Coordinator at the same time. The ~~Ancillary Service Provider~~Generator or System Resource may then proceed to procure and install the equipment and make arrangements for the required communication.
- B 9** Design, acquisition, and installation of the ~~resource's~~Generator's equipment or the System Resource's equipment shall be under the control of the respective ~~Ancillary Service Provider~~Generator or System Resource. The CAISO shall bear no cost responsibility or functional responsibility for such equipment. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to its own equipment at its own cost.
- B 10** The ~~Ancillary Service Provider~~Generator or System Resource shall perform its own testing of its equipment to ensure that the control system performs to meet the CAISO requirements.
- B 11** When it is satisfied that its plant, equipment and communication systems meet the CAISO's requirements, the ~~Ancillary Service Provider~~Generator or System Resource shall request in writing that the CAISO conduct a certification test with a suggested primary date and time and at least two alternative dates and times. The CAISO shall, within two Business Days of receipt of the request, accept a proposed time if possible or suggest at least three alternatives to the ~~Ancillary Service Provider~~Generator or System Resource. If the CAISO responds by suggesting alternatives, the ~~Ancillary Service Provider~~Generator or System Resource shall, within two Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three alternatives, and this procedure shall continue until agreement is reached on the date and time of the test. The ~~Ancillary Service Provider~~Generator or System Resource shall inform its Scheduling Coordinator of the agreed date and time of the test.
- B 12** Testing shall be performed under the direction of the CAISO. Such tests shall include, but not be limited to, the following:
- B 12.1** confirmation of control communication path performance for Dispatch Instruction;
- B 12.2** confirmation of primary and secondary voice circuits for receipt of Dispatch Instructions;
- B 12.3** confirmation of the ~~resource~~Generating Unit or System Resource performance to include changing the ~~resource's real power~~Generating Unit or System Resource output over the range of Spinning Reserve proposed from minimum to maximum ~~output~~, and at different rates of change from the minimum to the maximum permitted by the design of the ~~resource~~Generating Unit or System Resource; and
- B 12.4** testing the ~~resource's governor or other control system performance characteristics~~drop characteristic of the Generating Unit or System Resource by simulating frequency excursions outside the allowed deadband and measuring the response of the ~~resource~~Generating Unit or System Resource.
- B 13** Upon successful completion of the test the CAISO shall certify the ~~resource~~Generating Unit or System Resource as being permitted to provide Spinning Reserve as an Ancillary Service Provider and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The ~~Scheduling Coordinator~~CAISO shall request the CAISO to update

~~its database~~change the ~~Generating Unit or System Resource data base~~ to reflect the ability of the ~~resource~~Generating Unit to provide Spinning Reserve.

- B 14** The Scheduling Coordinator may bid Spinning Reserve from the certified ~~resource~~Generating Unit or System Resource into the CAISO Markets starting with the Day-Ahead Market for the hour ending 0100 on the Second Trading Day after the ~~CAISO's database reflects the resource's~~CAISO issues the certificate.
- B 15** The certification to provide Spinning Reserve shall remain in force until withdrawn by the Scheduling Coordinator or the ~~Ancillary Service Provider~~Generator or System Resource by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day.
- B 16** The certification may be revoked by the CAISO only under provisions of the ~~ASRP or other provisions of the~~ CAISO Tariff.

## **PART C**

### **CERTIFICATION FOR NON-SPINNING RESERVE**

- C 1** An Ancillary Service Provider wishing to provide Non-Spinning Reserve as an Ancillary Service from a ~~resource~~Generating Unit or System Resource whether pursuant to the CAISO's auction or as part of a self-provision arrangement must meet the following requirements in order to be certified by the CAISO to provide Non-Spinning Reserve service:
- C 1.1** the rated capacity of the ~~resource~~Generating Unit or System Resource must be 500 KW~~4 MW~~ or greater (i.e. the resource must be capable of providing at least 500 KW of Spinning Reserve) unless the ~~resource~~Generating Unit is participating in an aggregation arrangement approved by the CAISO;
- C 1.2** the ~~resource~~Generating Unit must be able to increase or decrease its real power (MW)~~output~~ as soon as possible to the value indicated in a Dispatch Instruction, reaching the indicated value within ten (10) minutes after issue of the instruction and be capable of maintaining output for thirty (30) minutes~~2 hours~~.
- ~~**C 2 C 2** An Ancillary Service Provider wishing to provide Non-Spinning Reserve as an Ancillary Service from Curtailable Demand whether pursuant to a CAISO award or as part of a self-provision arrangement must meet the following requirements in order to be certified by the CAISO to provide Non-Spinning Reserve service:~~
- ~~**C 2.1** the operator must be able to completely disconnect the required Load pursuant to a Dispatch Instruction within ten minutes after issue of the instruction;~~
- ~~**C 2.2** the minimum change in the electrical consumption of the Load must be at least 1 MW; and~~
- ~~**C 2.3** the Load must be capable of being interrupted for at least two hours.~~
- C 3** An Ancillary Service Provider wishing to provide Non-Spinning Reserve as an Ancillary Service, whether pursuant to a CAISO award or as part of a self-provision arrangement, must also meet the following requirements in order to be certified by the CAISO to provide Non-Spinning Reserve service:
- C 3.1** the operator of the ~~resource~~Generating Unit, System Resource or the Curtailable Demand must have a means of receiving a Dispatch Instruction to initiate an increase or decrease in its real power ~~output or a reduction in Demand~~ (MW) within one (1) minute of the CAISO Control Center's determination that Non-Spinning Reserve capacity must be dispatched; and
- ~~**C 3.2.2** the communication system and the ~~resource~~Generating Unit, System Resource or Load must pass a qualification test to demonstrate the overall ability to meet the performance requirements of the ASRP for Non-Spinning Reserve.~~
- C 3.4** An Ancillary Service Provider wishing to be considered for certification for Non-Spinning Reserve service must make a written request to the CAISO, giving details of the technical

capability of the ~~resource~~ ~~Generating Unit, System Resource or Load~~ concerned and identifying the Scheduling Coordinator through whom the Ancillary Service Provider intends to offer Non-Spinning Reserve. The Ancillary Service Provider shall at the same time send a copy of the request to that Scheduling Coordinator. Technical review request forms will be available from the CAISO.

- C ~~45~~** No later than one week after receipt of the Ancillary Service Provider's request, the CAISO shall provide the Ancillary Service Provider with a listing of acceptable communication options and interface equipment options for Non-Spinning Reserve. The CAISO shall send a copy of the listing to the Ancillary Service Provider's Scheduling Coordinator.
- C ~~56~~** The Ancillary Service Provider may elect to implement any of the acceptable communication options and interface equipment options. ~~The certification, the~~ Ancillary Service Provider shall give written notice to the CAISO of its selected communication option and interface equipment option, with a copy to its Scheduling Coordinator.
- C ~~67~~** When it receives the Ancillary Service Provider's notice, the CAISO shall notify the Ancillary Service Provider and the Scheduling Coordinator in writing no later than two weeks after receipt of the notice confirming receipt of the notice and issuing provisional approval of the selected options. Upon receipt of the CAISO acknowledgment the Ancillary Service Provider may proceed as indicated below to secure the necessary facilities and capabilities required.
- C ~~78~~** The Ancillary Service Provider may also propose alternatives that it believes may provide an equivalent level of control for consideration by the CAISO. Such proposals shall be in writing and contain sufficient detail for the CAISO to make a determination of suitability. The CAISO may request additional information, if required, to assist in its evaluation of the proposal.
- C ~~89~~** 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 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.
- C ~~940~~** Upon agreement as to the 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. The Ancillary Service Provider may then proceed to procure and install the equipment and make arrangements for the required communication.
- C ~~1044~~** Design, acquisition, and installation of the Ancillary Service Provider's equipment shall be under the control of the Ancillary Service Provider. The CAISO shall bear no cost responsibility or functional responsibility for such equipment. The CAISO shall be responsible for the design, acquisition and installation of any necessary modifications to the CAISO's equipment at its own cost.
- C ~~1142~~** The Ancillary Service Provider shall perform its own testing of its equipment to ensure that the control system performs to meet the CAISO requirements.
- C ~~1243~~** When it is satisfied that its plant, equipment and communication 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 alternative dates and times. The CAISO shall, within two Business Days of receipt of the Ancillary Service Provider's request, accept a proposed time if possible or suggest at least three alternatives. If the CAISO responds by suggesting alternatives, the Ancillary Service Provider shall, within two Business Days of receipt of the CAISO's response, respond in turn by accepting a proposed alternative if possible or suggesting at least three alternatives, and this procedure shall continue until agreement is reached on the date and time of the test. The Ancillary Service Provider shall inform its Scheduling Coordinator of the agreed date and time of the test.

- C ~~13~~44 Testing shall be performed under the direction of the CAISO. Such tests shall include, but not be limited to, the following:
- C ~~13~~44.1 confirmation of control communication path performance;
  - C ~~13~~44.2 confirmation of primary and secondary voice circuits for receipt of Dispatch Instructions;
  - C ~~13~~44.3 confirmation of the ~~resourceGenerating Unit, System Resource or Load~~ control performance; and
  - C ~~13~~44.4 confirmation of the range of ~~resourceGenerating Unit or System Resource~~ control to include changing the ~~real power (MW)output~~ over the range of Non-Spinning Reserve proposed.
- C ~~14~~45 Upon successful completion of the test, the CAISO shall certify the ~~resourceGenerating Unit, System Resource or Load~~ as being permitted to provide Non-Spinning Reserve as an Ancillary Service and shall provide a copy of the certificate to the Scheduling Coordinator at the same time. The ~~Scheduling Coordinator CAISO~~ shall ~~request the CAISO to updatechange~~ its ~~database~~~~data-base~~ to reflect the permission for the ~~resourceGenerating Unit or Load~~ to provide Non-Spinning Reserve ~~service~~.
- C ~~15~~46 The Scheduling Coordinator may bid Non-Spinning Reserve service from the certified ~~resourceGenerating Unit or Load~~ into the CAISO Markets starting with the Day-Ahead Market for the hour ending 0100 on the second Trading Day after the CAISO ~~database reflectsissues~~ the ~~resource's~~ certificate.
- C ~~16~~47 The certification to provide Non-Spinning Reserve shall remain in force until withdrawn by the Scheduling Coordinator or the Ancillary Service Provider by written notice to the CAISO to take effect at the time notified in the notice, which must be the end of a Trading Day.
- C ~~17~~48 The certification may be revoked by the CAISO only under provisions of the CAISO Tariff.

## Attachment C

# Memorandum

**To:** ISO Board of Governors

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

**Date:** March 17, 2010

**Re: Decision on Participation of Non-Generator Resources in ISO Ancillary Services Markets.**

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*This memorandum requires Board action.*

## EXECUTIVE SUMMARY

FERC Order No. 719 directs regional transmission organizations and independent system operators to allow demand response resources to participate in ancillary services markets. This is contingent on whether the demand response resources are technically capable of providing an ancillary service within response times and other reasonable requirements adopted by the RTO or ISO. FERC Order No. 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. The California Independent System Operator Corporation commenced this initiative on participation of non-generator resources in ancillary services to comply with these FERC orders.

Management proposes modifications to existing ISO operating and technical requirements for ancillary services in order to facilitate participation by non-generator resources in the ISO ancillary services markets. If adopted, these modifications would apply to both generation and non-generation resources participating in the ancillary services markets.

We are proposing the following modifications to the ISO operating and technical requirements for existing ancillary services products:

1. Reduce the minimum rated capacity requirement to 500 kW from the existing 1 MW requirement;
2. Clarify that the measurement of the continuous energy requirement will start from the point a resource reaches its award capacity rather than the existing measurement starting after the 10 minute ramp requirement;

3. Reduce the continuous energy requirement for ancillary services from the existing 2 hour requirement to:
  - 30 minutes for spinning and non-spinning reserves
  - 60 minutes for day-ahead regulation up/down, and
  - 30 minutes for real-time regulation up/down

Management recommends that ISO Board of Governors approve the proposal for modifying the ISO operating characteristics and technical requirements for existing ancillary services products as described in this memorandum.

***Moved, that the ISO Board of Governors approves the proposal to modify existing ancillary services products, as detailed in the memorandum dated March 17, 2010; and***

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

## **DISCUSSION AND ANALYSIS**

### ***Background***

The ISO commenced this initiative to comply with FERC Order Nos. 719 and 890. FERC Order No. 719, *Wholesale Competition in Regions with Organized Electric Markets*, 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 of providing the ancillary service within response times and other reasonable requirements adopted by the RTO or ISO. FERC Order No. 890, *Preventing Undue Discrimination and Preference in Transmission Service*, 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.

Based on its review and discussions with stakeholders, Management proposes certain modifications to existing operating characteristics and technical requirements for ancillary services. Specifically, Management is proposing to modify the minimum rated capacity and continuous energy requirements for providing ancillary services.

### ***Proposed minimum rated capacity requirement***

The minimum rated capacity is the lowest MW level a resource must be capable of providing in order to be certified to provide ancillary services. For regulation, spinning reserve and non-spinning reserve, Management proposes to reduce the minimum rated capacity from 1MW to 500KW. This change will open the door to a broader spectrum of resource types to participate in the ISO ancillary services markets. This is particularly important for demand response

resources whose capability for providing ancillary services is often only a fraction of the total load of the facility.

### ***Proposed continuous energy requirement***

The ISO defines the continuous energy requirement for regulation, spinning reserve and non-spinning reserve as the amount of energy a resource must deliver at a sustained level for a determined interval. The current requirement for all ancillary services is two hours of continuous energy.

The current requirement is a historical legacy given the operational characteristics of traditional generators that comprised the bulk of supply resources in the ISO market. As a result, the continuous energy requirement was technology-accommodating versus technology-agnostic. Given technological advancements, new resources such as flywheels, batteries and demand response have the potential to provide ancillary services, but many of these technologies cannot meet the current 2-hour continuous energy requirement. Therefore, the ISO reevaluated the continuous energy requirements based upon the how the various ancillary services are used to meet operational needs and set the new proposed requirements accordingly. The new proposed requirements significantly lower continuous energy limits, which should provide increased opportunities for non-generation resources to provide ancillary services while still maintaining the reliability standards required from these services.

Management proposes to reduce the continuous energy requirement for spinning and non-spinning reserves from 2 hours to 30 minutes. This 30 minute time period is sufficient as it meets ISO requirement to recover from a contingency within 15 minutes and allows another 15 minutes for the real-time energy market to return to a normal state.

We also propose to reduce the continuous energy requirement for regulation up and regulation down from 2 hours to 60 minutes for the day-ahead market and to 30 minutes for the real-time market. The regulation continuous energy requirements align with the awarded interval's time duration and allow the regulation award to substitute as spinning reserves if it is economic to do so. In the day-ahead market, the ISO procures 100% of the forecasted regulation requirements for each hour. In the real-time market, the ISO procures incremental regulation requirements in 15 minute intervals. However, in order to allow bids for regulation services to also be considered for spinning reserves, the continuous energy requirement for regulation capacity aligns with the longer run time requirement of 30 minutes for spinning reserves.

### ***Regulation energy management (deferred item)***

With the above modifications, limited energy storage resources such as flywheels and batteries will now be able to participate in the day-ahead and real-time regulation market. However, the amount of day-ahead capacity provided by these resources will be limited by the amount of storage capacity versus total MW quantity that can be dispatched in any 4 second automated generation control interval. The ISO initially proposed a regulation energy management scheme which would manage limited energy storage resources so they can provide regulation based on fifteen minutes of energy production. Management decided to exclude this provision from the proposal at this stage but is committed to address regulation energy management in the larger context of the ancillary services product review initiative

which is scheduled to begin in the second quarter of this year. Regulation energy management, if approved through the upcoming stakeholder process, will address limited energy storage resources concerns regarding the regulation capacity which may be awarded in the day-ahead market.

## **POSITIONS OF THE PARTIES**

Market participants have been generally supportive of the proposed changes to ISO operating requirements to allow participation by all resource types. However, some stakeholders believe that the proposed modifications do not go far enough to fully meet the intentions of FERC Orders 719 and 890. Specifically, these stakeholders are concerned that limited storage resources are not fully able to participate in the day-ahead market now that regulation energy management was removed from the proposal. Other stakeholders attest that regulation energy management is a new product offering that warrants further discussion and that it is out of scope for this stakeholder initiative. Stakeholder comments are summarized in a *Stakeholder Matrix* which is Attachment A to this memorandum.

## **FUTURE ACTIVITIES**

### ***Ancillary services market review***

In late spring, the ISO will commence the ancillary services market product review initiative. The initiative will comprehensively review the ISO ancillary services products and market based upon the findings of the renewable integration technical studies. The 20% renewable integration study is scheduled to be completed in late March 2010. The 33% renewable integration study is scheduled to be completed in mid-late spring. The scope of the ancillary services market product review initiative is to design and implement changes to products and markets where needed to enable the ISO to meet reliability requirements outlined in the two studies above.

As part of this initiative, the ISO will continue stakeholder discussions regarding regulation energy management to allow limited energy storage devices such as flywheels and batteries to provide day-ahead regulation at their full capacity. In addition, the development of new products such as frequency response or fast regulation will be analyzed to determine if emerging reliability requirements necessitate the development of these new products.

### ***Storage pilots***

In February 2010, the ISO commenced the Sano Regulation Center Pilot Project. SANO is a 2 MW – 500 KW-Hr Lithium Ion battery energy storage facility installed at the Huntington Beach Generating Plant and it is interconnected to the Southern California Edison system. The first phase seeks (a) to demonstrate the capability of SANO to provide the ISO with regulation or a “regulation-like” service consistent with reliability criteria and then developed interim certification procedures and (b) to provide the ISO and AES with experience and data for understanding the processes and effects, both financial and operational, of allowing a limited energy storage device to provide ancillary services through the ISO market.

The ISO will evaluate additional storage pilots to increase operational experience and market participation of limited energy storage resources as the ISO continues to review the ancillary services requirements based upon the 20% and 33% renewable integration studies. Information gained from storage pilots will help to shape future policy designed to increase the participation of these resources in the ISO market.

#### **MANAGEMENT RECOMMENDATION**

Management recommends that the Board approve the proposal to modify existing ancillary services products to allow participation of a deeper pool of resources as described in this memorandum.

**Stakeholder Process: Participation of Non-Generator Resources  
in Ancillary Services Markets Initiative**

**Summary of Submitted Comments**

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

- Round One, 09/15/09
- Round Two, 10/28/09
- Round Three, 12/08/09
- Round Four, 02/24/10
- Round Five, 03/12/10

**Stakeholder comments are posted at:** <http://www.caiso.com/2415/24157662689a0.html>

**Other stakeholder efforts include:**

- Conference Call, 09/08/09
- Conference Call, 10/21/09
- Conference Call, 12/01/09
- Conference Call, 02/17/10
- Conference Call, 03/15/10

Management Proposal	PG&E	SCE	DMM	Beacon	CESA	Management Response
Regulation energy management will be address in ancillary services market product review	Support  Regulation energy management is a new product	Support  Regulation energy management is a new product	Support  Disqualifying of regulation energy resources and uplift cost allocations should be reviewed further.	Oppose  ISO regulation energy management was consistent with designs FERC approved at other ISO/RTO. Given FERC rulings no need for additional delay.	Oppose  Without regulation energy management, limited energy storage resources are not able to bid comparable capacity in to the day-ahead market for regulation.	Regulation energy management was originally included in the draft final proposal; however, stakeholders highlighted the need for additional discussions regarding regulation energy management and the development of new products. The scope of this initiative was limited to modifications of existing ancillary services products. The development of new ancillary services products is within the scope of ancillary services market product review scheduled to begin in Q2'10.
Modifications to continuous energy requirements allow a deeper pool of resources to participate	Support	Support	No Comment	Conditional  The proposed modifications are necessary, but not sufficient to allow comparable participation by limited energy storage resources in ISO markets.	Conditional  The proposed modifications are necessary, but not sufficient to allow comparable participation by limited energy storage resources in ISO markets.	The proposed modifications to remove resource type restrictions from operating characteristics on technical requirements opens the ancillary services market to all technology types capable of meeting ISO requirements. The reduction in the following requirements allow a deeper pool of resources to participate in ISO ancillary markets consistent with FERC Order Nos. 719 & 890: <ul style="list-style-type: none"> <li>• Spinning continuous energy to 30 minutes from 2 hours;</li> <li>• Non-spinning continuous energy to 30 minutes from 2 hours;</li> <li>• Day-ahead regulation continuous energy to 60 minutes from 2 hours;</li> <li>• Real-time regulation continuous energy to 30 minutes from 2 hours;</li> <li>• Minimum rated capacity to 500kW from 1MW.</li> </ul>



**Board of Governors**

March 25-26, 2010

Decision on Participation of Non-Generator Resources in Ancillary Services Markets

**Motion**

***Moved, that the ISO Board of Governors approves the proposal to modify existing ancillary services products, as detailed in the memorandum dated March 17, 2010; 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:	<b>Passed</b>	Vote Count:	<b>5-0-0</b>
Doll	Y		
Foster	Y		
Habashi	Y		
Hafner	Y		
Willrich	Y		

**Motion Number: 2010-03-G3**

## Attachment D

## Minimum Performance Requirement for Frequency Responsive Device

The ISO dispatches contingency reserve following a system disturbance that results in the loss of resource(s). Contingency reserves comprise both spinning reserve and non-spinning reserve and must be fully deployable within 10 minutes. Conventional generating resources providing spinning reserve must be synchronized to the grid and respond to frequency events (i.e. respond immediately and automatically proportional to frequency deviations). Conventional resources are also typically equipped with a governor to ensure coordinated response among generators to frequency deviations based on a droop setting and an operating deadband of  $\pm 0.036$  Hz.

Following a contingency event that results in the loss of generation, frequency response is typically provided by governors and frequency responsive loads to arrest frequency and stabilize the system before EMS dispatch and before the ISO can dispatch contingency reserve. Like generators, non-generator resources must also respond to frequency deviations in order to provide spinning reserve. The ISO is proposing that these resources have a governor or other frequency responsive device in order to provide a certain amount of automated frequency response following a disturbance.

Table 1 shows the typical frequency response following a system disturbance. The ISO analyzed frequency response for over 20 major contingency events in the Western Interconnection and determined that the maximum frequency decline (Point C) occurs approximately 8 seconds following a disturbance and the system is typically stabilized within 30 seconds (Point B) from the start of the disturbance (Point A). The level of frequency decline (Point C) is highly dependent on system inertia or rotating mass synchronized to the grid at the time of the disturbance. As more conventional resources are replaced with variable resources or non-generator resources that do not have the capability to help arrest frequency, frequency decline could reach unacceptable levels causing load to trip off-line following a disturbance.

The ISO uses contingency only operating reserve in the event of system disturbances resulting from loss of generation or transmission. In order to allow non-generator resources to provide spinning reserve, the ISO is proposing to require that the resource have a governor or other frequency responsive device. The ISO's current certification requirement is generation-specific. It requires a governor and defines resource response based upon the droop setting and a dead band. In order to allow comparable treatment for resources utilizing a frequency responsive device, the ISO has developed a comparable requirement for non-generator resources providing spinning reserve to respond to a drop in frequency.

The ISO is proposing that non-generating resources providing spinning reserve must meet the following requirements:

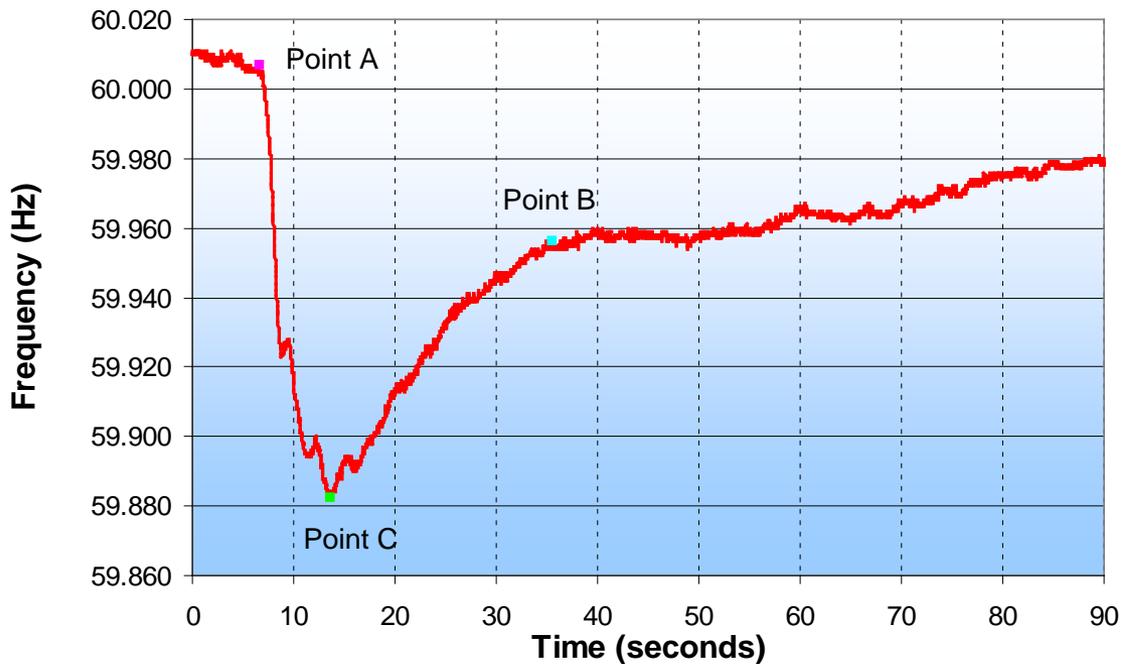
- a. If frequency is less than or equal to 59.92 Hz, the resource must reach 10 percent of its awarded spinning capacity within 8 seconds; and

- b. The resources must change the power it delivers or consumes in one second for any frequency deviation less than or equal to 59.92 Hz

This requirement will allow resources without a governor that receive a spinning reserve award to help arrest frequency decline in the event of a contingency event until a contingency dispatch occurs.

# Figure 1: Frequency Responsive Device Certification Requirement – Spinning Reserve

## Typical Frequency Response



Points on Graph

- A: Event Occurs
- B: EMS Dispatch
- C: Frequency Decay Arrested

Certification Requirement

If Frequency < 59.92 Hz

1. 10% of Spin in 8 seconds
2. Power change in 1 second

Comparable Response to Frequency Decline to Governor Droop

Contingency Dispatch occurs if the event is within ISO Balancing Authority

## **Attachment E**

NON-GENERATOR RESOURCES  
Modifications to Tariff

ISO Tariff Section	Proposed Modification
8.1	Modify language to reflect that scheduling coordinators may submit bids for ancillary services on behalf of resources that are capable of providing the specific service and meet applicable technical requirements. Eliminate language that is unnecessary in light of proposed changes to Appendix K.
8.2.2	Replace the term <i>Generating Unit Outages</i> with the term <i>resource Outages</i> .
8.2.3.1	Replace the term <i>Generating Units</i> to the term <i>resources</i> ; replace the term <i>AGC</i> with the term <i>CAISO EMS control</i> ; replace the reference to <i>balancing Generation</i> with <i>balancing resources</i> .
8.2.3.5(c)	Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
8.2.3.5(g)	Delete the word “for” on last line to correct typographical error.
8.3.1	Replace the terms <i>Generating Units</i> , <i>System Units</i> , <i>System Resources</i> , <i>Non-Dynamic System Resources</i> , <i>Dynamic System Resources</i> , <i>Participating Loads</i> and <i>internal Generation</i> with the term <i>resources</i> .
8.3.2	Change the term <i>Generating Units</i> to the term <i>resources</i> .
8.3.3.1	Change the word “can” with the word “must” in first sentence to specify that CAISO may designate a required amount of Ancillary Services from within the Expanded System Region, the System Region and Ancillary Service Sub-Regions.
8.3.4	Replace the terms <i>Generating Unit</i> , <i>System Unit</i> , <i>Dynamic System Resource</i> and <i>Participating Load</i> with the term <i>resource</i> ; specify that regulation, spinning reserve and non-spinning reserve may be provided from <i>resources</i> certified and tested by the CAISO to provide each of these ancillary services using the process defined in Appendix K.
8.3.7	Replace the terms <i>Generating Unit</i> , <i>System Unit</i> , <i>Participating Load</i> and <i>System Resource</i> with the term <i>resource</i> .
8.4	Replace the terms <i>Generating Unit</i> , <i>System Unit</i> , <i>Participating Load</i> and <i>System Resource</i> with the term <i>resource</i> .
8.4.1	Replace the terms <i>Generating Unit</i> , <i>System Unit</i> , <i>Participating Load</i> and <i>System Resource</i> with the term <i>resource</i> ; replace the reference to <i>AGC</i> with a reference to <i>CAISO EMS control</i> .
8.4.1.1	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; delete term <i>Energy Management System</i> already defined by the acronym <i>EMS</i> ; replace the term <i>unit</i> with the term <i>resource</i> ; replace reference to the term <i>AGC</i> with reference to the term <i>CAISO EMS control</i> ; replace the term <i>Participating Generator</i> with the term <i>Ancillary Service Provider</i> ; replace the term <i>generating facility</i> with the term <i>resource</i> .
8.4.1.1(g)	Specify that continuous energy requirement for regulation is 60 minutes in the day ahead market and 30 minutes in the real time market after the ISO issues a dispatch instruction.
8.4.2(a)	Replace the terms <i>Generating Units</i> and <i>System Resources</i> with the

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	term <i>resources</i> .
8.4.2(b)	Change the word “issue” to “issuance” to correct a typographical error.
8.4.3(a)	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; specify that continuous energy requirement for spinning reserve and non-spinning reserve is 30 minutes from the point at which the resource reaches its award capacity.
8.4.4	Replace the term <i>Participating Generator</i> with the term <i>Ancillary Service Provider</i> ; replace the term <i>Generating Units</i> with the term <i>resources</i> .
8.4.5	Replace the terms <i>Generating Unit, System Unit, Load and System Resource and Curtailable Demand</i> with the term <i>resource</i> ; replace the terms <i>Participating Generators, owners or operators of Loads and owners or operators of System Units and System Resources</i> with the term <i>Ancillary Service Providers</i> .
8.4.6	Replace the terms <i>Participating Generators, owners or operators of Loads and owners or operators of System Units or System Resources</i> with the term <i>Ancillary Service Providers</i> ; replace the terms <i>Generating Units, System Units, Loads and System Resources</i> with the term <i>resources</i> ; replace the words <i>shall have the metering infrastructure</i> with the words <i>shall maintain metering infrastructure</i> ; replace the term <i>AGC</i> with the term <i>CAISO EMS control</i> .
8.6.2	Add the article <i>the</i> before the word <i>CAISO’s</i> to correct a typographical error.
8.6.4.4	Replace the terms <i>Generating Units, System Units, Loads and System Resources</i> with the term <i>resources</i> .
8.9	Replace the terms <i>Generating Units, System Units, Loads and System Resources</i> with the term <i>resources</i> ; replace the terms <i>Participating Generators, owners or operators of Loads and owners or operators of System Units or System Resources and owners or operators of reactive devices</i> with the term <i>Ancillary Service Providers</i> .
8.9.2	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> .
8.9.3.1	Replace the terms <i>Generating Unit, System Unit and System Resource</i> with the terms <i>resource that is not Curtailable Demand and resource</i> .
8.9.3.2	Replace the term <i>Load</i> with the term <i>resource</i> .
8.9.6	Replace the terms <i>Generating Unit, System Unit and System Resource</i> with the term <i>resource</i> .
8.9.7.1	Replace the terms <i>Generating Unit, Load, Participating Load and System Resource</i> with the term <i>resource</i> .
8.9.10	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> ; replace the words <i>outside the allowed frequency deadband</i> with the words <i>as specified in Appendix K</i> ; eliminate

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	unnecessary language in light of replacing the term <i>System Resource</i> with the term <i>resource</i> .
8.9.11	Replace the terms <i>Generating Unit, Load and System Resource</i> with the term <i>resource</i> ; eliminate unnecessary language in light of replacing the term <i>System Resource</i> with the term <i>resource</i> .
8.9.14	Replace the terms <i>Generating Unit, Participating Load and System Resource</i> with the term <i>resource</i> ; eliminate unnecessary language in light of replacing the term <i>System Resource</i> with the term <i>resource</i> .
8.9.16.4	Add language concerning notice of a resource's failure of compliance test or performance audit to mirror similar notice requirements set forth in section 8.9.7.1.
8.10	Replace the terms <i>Generating Unit, System Unit, Load and System Resource</i> with the term <i>resource</i> ; replace the terms <i>Participating Generator, owner or operator of Loads, System Units or System Resources</i> with the term <i>Ancillary Service Provider</i> .
8.10.1	Replace the terms <i>Generating Unit, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.2	Replace the terms <i>Generating Unit, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.3	Replace the terms <i>Generating Unit, Load, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.6	Replace the terms <i>Generating Unit, Load, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.7	Replace the terms <i>Generating Unit, Participating Load, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.8	Replace the terms <i>Generating Unit, Load, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.8.1	Replace the terms <i>Generating Unit, Load, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.8.2	Replace the terms <i>Generating Unit, Load, System Unit and System Resource</i> with the term <i>resource</i> .
8.10.8.3	Replace the terms <i>Generating Unit, Load, System Unit and System Resource</i> with the term <i>resource</i> .
Appendix A	Revise the following definitions to conform with proposed modifications to Section 8 of ISO tariff: Ancillary Service Provider, Non-Spinning Reserve, Regulating Range, Regulation, Regulation Down or Regulation Down Reserve, Regulation Limits, Regulation up or Regulation Up Reserve and Spinning Reserve.
Appendix K A 1	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> ; replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 1.1.1	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; specify resource must be capable of providing at least 500 kW of regulation to obtain certification for regulation.

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Appendix K A 1.1.3	Specify that a resource must be able to increase or decrease real power levels immediately in response to signals from the CAISO's EMS control.
Appendix K A 1.1.4	Specify continuous energy requirements for regulation is 60 minutes in the day ahead market and 30 minutes in the real time market after the ISO issues a dispatch instruction.
Appendix K A 1.2.1.2	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; replace the term <i>power output</i> with the term <i>resource response</i> .
Appendix K A 1.2.2	Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 1.2.2.1	Replace reference to <i>actual power output (MW)</i> to refer to <i>actual real power level (MW)</i> .
Appendix K A 1.2.2.2	Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 1.2.3	Replace the terms <i>Generating Unit and generating site</i> with the terms <i>resource and resource site</i> .
Appendix K A 1.3	Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 2	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> ; replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 3	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 4	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 5	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 6	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 7	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 8	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 9	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 10	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> .
Appendix K A 10.3	Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 10.4	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; replace the term <i>output</i> with the term <i>operating level</i> .
Appendix K A 11	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; add the word " <i>Provider</i> " to correct a typographical error; change the words <i>data base</i> to one word <i>database</i> ; modify process to change ISO

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	database in accordance with current ISO business practices.
Appendix K A 12	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; modify time period Scheduling Coordinator may submit bids in accordance with current ISO business practices.
Appendix K A 13	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> ; Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 13.1	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> ; Replace the term <i>Generating Unit</i> with the term <i>resource</i> .
Appendix K A 14	Delete reference to acronym ASRP because the Ancillary Service Requirements Protocol is part of the ISO tariff.
Appendix K B 1	Replace the term <i>Generator</i> with the term <i>Ancillary Service Provider</i> ; Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> .
Appendix K B 1.1	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; specify resource must be capable of providing at least 500 kW of regulation to obtain certification for spinning reserve.
Appendix K B 1.2	Replace the term <i>Generating Unit</i> with the term <i>resource</i> ; specify resource must have a governor that meets minimum performance requirements or a frequency responsive device meets minimum performance requirements.
Appendix K B 1.2.1	Deleted. Text moved to Part B1.2.
Appendix K B 1.2.2	Deleted. Text moved to Part B1.2.
Appendix K B 1.2.3	Deleted. Text moved to Part B1.2.
Appendix K B 1.3	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> ; clarify that a resource must have a means of receiving dispatch instructions to initiate an increase <i>or decrease</i> in real power; delete reference to the word <i>output</i> .
Appendix K B 1.4	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> ; specify continuous energy requirement for spinning reserve is 30 minutes.
Appendix K B 1.5	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> .
Appendix K B 1.6	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> .
Appendix K B 2	Replace the terms <i>Generating Units and System Resources</i> with the term <i>resources</i> ; replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider</i> .
Appendix K B 3	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider</i> .
Appendix K	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary</i>

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B 4	<i>Service Provider.</i>
Appendix K B 5	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 6	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 7	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 8	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 9	Replace the terms <i>Generator and System Resource</i> with the term <i>resource</i> ; replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 10	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 11	Replace the term <i>Generator and System Unit</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 12.3	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> ; replace the term <i>output</i> with the term <i>real power.</i>
Appendix K B 12.4	Replace the reference to drop characteristic of the Generating Unit or System Resource with the phrase <i>resource's governor or other control system performance characteristics</i> to recognize the use of a frequency control device other than a governor.
Appendix K B 13	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> ; add the word " <i>Provider</i> " to correct a typographical error; change the words <i>data base</i> to one word <i>database</i> ; modify process to change ISO database in accordance with current ISO business practices.
Appendix K B 14	Modify time period in which Scheduling Coordinator may submit bids in accordance with current ISO business practices.
Appendix K B 15	Replace the terms <i>Generator and System Resource</i> with the term <i>Ancillary Service Provider.</i>
Appendix K B 16	Delete reference to acronym ASRP because the Ancillary Service Requirements Protocol is part of the ISO tariff.
Appendix K C 1	Replace the terms <i>Generator and System Resource</i> with the term <i>Ancillary Service Provider.</i>
Appendix K C 1.1	Replace the terms <i>Generating Unit and System Resource</i> with the term <i>resource</i> ; specify resource must be capable of providing at least 500 kW of regulation to obtain certification for non-spinning reserve.
Appendix K C 1.2	Replace the terms <i>Generating Unit</i> with the term <i>resource</i> ; clarify that a resource must have a means of receiving dispatch instructions to initiate an increase <i>or decrease</i> in real power; delete reference to the word <i>output</i> ; specify continuous energy requirement for non-

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	spinning reserve is 30 minutes.
Appendix K C 2	Deleted. Requirements now set forth in Part C 1.2.
Appendix K C 2.1	Deleted. Requirements now set forth in Part C 1.2.
Appendix K C 2.2	Deleted. Requirements now set forth in Part C 1.1.
Appendix K C 2.3	Deleted. Requirements now set forth in Part C 1.2.
Appendix K C 3	Changed to C 2.
Appendix K C 3.1	Changed to C 2.1. Replace the terms <i>Generating Unit</i> , <i>System Resource</i> and <i>Curtable Demand</i> with the term <i>resource</i> ; clarify that a resource must have a means of receiving dispatch instructions to initiate an increase or decrease in real power.
Appendix K C 3.2	Changed to C 2.2. Replace the terms <i>Generating Unit</i> , <i>System Resource</i> and <i>Load</i> with the term <i>resource</i> ; delete reference to ASRP.
Appendix K C 4	Changed to C 3. Replace the terms <i>Generating Unit</i> , <i>System Resource</i> and <i>Load</i> with the term <i>resource</i> .
Appendix K C 5	Changed to C 4.
Appendix K C 6	Changed to C 5. Replace the word <i>certification</i> with the words <i>acceptable communicates options and interface equipment options</i> to correct a typographical error.
Appendix K C 7	Changed to C 6.
Appendix K C 8	Changed to C 7.
Appendix K C 9	Changed to C 8.
Appendix K C 10	Changed to C 9.
Appendix K C 11	Changed to C 10.
Appendix K C 12	Changed to C 11.
Appendix K C 13	Changed to C 12.
Appendix K C 14	Changed to C 13.
Appendix K C 14.1	Changed to C 13.1.
Appendix K	Changed to C 13.2.

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C 14.2	
Appendix K C 14.3	Changed to C 13.3. Replace the terms <i>Generating Unit</i> , <i>System Resource</i> and <i>Load</i> with the term <i>resource</i> .
Appendix K C 14.4	Changed to C 13.4. Replace the terms <i>Generating Unit</i> and <i>System Resource</i> and with the term <i>resource</i> ; replace the term <i>output</i> with the term <i>real power</i> .
Appendix K C 15	Changed to C 14. Replace the terms <i>Generating Unit</i> , <i>System Resource</i> and <i>Load</i> with the term <i>resource</i> ; change the words <i>data base</i> to one word <i>database</i> ; modify process to change ISO database in accordance with current ISO business practices.
Appendix K C 16	Changed to C 15. Replace the terms <i>Generating Unit</i> and <i>Load</i> with the term <i>resource</i> ; modify time period in which Scheduling Coordinator may submit bids in accordance with current ISO business practices.
Appendix K C 17	Changed to C 16.
Appendix K C 18	Changed to C 17.