California Independent
System Operator Corporation

May 7, 2010

VIA FEDEX

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

Re: Amendments to the FERC Electric Tariff of the California Independent System Operator Corporation Implementing Information Regarding Transmission Constraints

Docket No. ER10- ___
Docket No. ER09-1542-001

Dear Secretary Bose:

The California Independent System Operator Corporation (the ISO) hereby respectfully submits for approval by the Federal Energy Regulatory Commission (Commission or FERC) amendments to the ISO Tariff,[1] pursuant to Section 205 of the Federal Power Act (FPA),[2] and Section 35.13 of the Commission regulations.[3] These amendments would enable the ISO to release information regarding its transmission constraints enforcement and management. In addition, the ISO reports on the stakeholder process mandated by the Commission in Docket No. ER09-1542 to explore additional means of improving market transparency and information sharing and the provision by the ISO of the list of transmission constraints enforced or not enforced by the ISO.[4]

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1 California Independent System Operator Corporation, FERC Electric Tariff, Fourth Replacement Volume, Nos. I & 2 (ISO Tariff). Capitalized terms not otherwise defined herein have the meanings set forth in the Master Definitions Supplement, Appendix A to the ISO Tariff.

2 16 U.S.C. § 824d.

3 18 C.F.R. § 35.13 (2009)

4 *Id.* at P 44.

An original and five copies of the amendment are included for the filing. One additional copy is included to be date and time stamped and returned in the pre-addressed, postage paid envelope.

I. Background

On August 3, 2009, pursuant to section 205 of the FPA the ISO filed amendments to its tariff to: (1) clarify that applicable generating units located outside the CAISO's balancing authority area can be treated as regulatory must-take generation under the tariff; and (2) clarify the tariff language regarding the role of the full network model in enforcement of transmission constraints. On October 2, 2009, the Commission conditionally accepted the CAISO's filing and proposed tariff revisions subject to additional requirements on compliance as discussed further below. Item (1) of the August 3 filing concerning regulatory must-take generation was accepted in the October 2 Order without further compliance requirements. On December 31, 2010, the ISO submitted a compliance filing addressing item (2) concerning the role of the full network model and other matters related to the ISO's constraint enforcement practices.

In the December 31, 2010 compliance filing, the ISO submitted the proposed tariff sheets that include high level guidelines that describe the ISO's transmission constraint management practices. In addition, the ISO reported on the status of additional efforts taken on by the ISO and its stakeholders to explore additional means of improving market transparency and information sharing and the provision by the ISO of "(1) either the list of the constraints that are not enforced in the CAISO market or more visibility into how they are established and (2) the list of contingencies that are enforced in the CAISO market process."[5] The ISO's proposed data release provisions submitted in the instant filing resulted from that stakeholder process.

II. Description of Filing

A. Transmission Constraint Related Data Release Policy

As a result of the recent Commission-mandated stakeholder process, the ISO and its stakeholders developed new data release policy that significantly improves market transparency and information sharing with market participants regarding the ISO's transmission constraints enforcement and management. The data release policy includes the release of the following three new data sets, discussed further below: (1) the daily constraint and contingency lists, (2) information regarding the cause of the binding constraint in any given ISO market interval, and (3) a monthly report on the degree of manual adjustments to transmission constraints. The provision of this information provides significant

[5] *Id.* at P 44.

visibility into the ISO's transmission constraint enforcement and management and enables market participants to better evaluate the impact of these practices on prices and schedules or dispatches.

1. List of Constraints the ISO Plans to Enforce and Actually Enforces in Each Day-Ahead Market

In its October 2 Order the Commission ordered the ISO to commence a stakeholder process to explore ways of improving market transparency and information sharing and, more specifically, how the ISO could provide "(1) either the list of the constraints that are not enforced in the CAISO market or more visibility into how they are established and (2) the list of contingencies that are enforced in the CAISO market process."[6] Through its stakeholder process and following an evaluation of the feasibility of providing such information, the ISO was able to develop a proposal for the provision of daily information regarding both the list transmission constraints, including nomograms and contingencies, that are actually enforced in the given day-ahead market and the list of constraints the ISO plans to enforce in the next day's day-ahead market.

This data release will consist of two separate daily data releases. Both of the data releases will be made available to parties that have executed a non-disclosure agreement. The data will consist of information pertaining to the characteristics of ISO controlled grid infrastructure, the release of which may pose a security risk. Therefore, the ISO proposes to follow the same procedure created for the release the Congestion Revenue Rights Full Network Model as provided in Section 6.5.1.4 of the ISO Tariff.

The first data set the ISO will make available on any given day consists of a list of the transmission constraints, including nomograms and contingencies, that are enforced and the list of such constraints not enforced in running that day's Day-Ahead Market.[7] This list is referred to as the post-Day-Ahead Market Transmission Constraints Enforcement List, which the ISO will endeavor to make available as soon as practicable after the Day-Ahead Market closes each day.[8]

The second data set is referred to as the pre-Day-Ahead Market Transmission Constraints Enforcement List and consists of the list of

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[6] *Id.* at P 44.

[7] Note that Day-Ahead Market for energy and ancillary services on any given day is conducted for delivery and use the next operating day.

[8] The Draft Final Proposal provided in Attachment D specifies that this data would be released simultaneously with the Day-Ahead Market results. The ISO has clarified that this not feasible because this information is not part of the Day-Ahead Market results and requires some additional preparation after the Day-Ahead Market results have posted before they can be released.

transmission constraints, including nomograms and contingencies, the ISO *plans* to enforce in the next day's Day-Ahead Market. This list will be made available after the ISO has released the pre-Day-Ahead Market Transmission Constraints Enforcement List on any given day.

The pre- and post-Day-Ahead Market Transmission Constraints Lists will each contain the same data elements set forth in the Attachment A to the Draft Final Proposal, which is provided in Attachment D of this transmittal letter. There are four standard tables that will be made available that contain the data discussed above. Table 1 will provide the flowgate constraints and will identify the name and type of the flowgate, the enforcement status of the flowgate, and the competitive constraint flags for each flowgate. Table 2 will provide the transmission corridor constraints and will identify the name of the branch group, equipment type, the station name, voltage level, and the equipment name. Table 3 will provide the nomogram constraints and will identify the nomogram name, the resource name, corridor name, flowgate, station name, the enforcement status of the nomogram, and competitive constraint flags. Table 4 will list the transmission contingencies and will identify the title of the contingency, enforcement status flag, the ISO Transmission Access Charge area, and the equipment station, voltage, status and name.

This data release proposal was developed through the ISO's recent stakeholder process adopted to determine what additional visibility into the management of transmission constraints was needed and how the ISO could provide such visibility. The ISO commenced the stakeholder process by providing stakeholders an opportunity to discuss and consider the various actions the ISO takes and how it determines what transmission constraints it should or should not enforce in any given market run. This process is already largely described in the ISO's Business Practice Manual for Managing the Full Network Model (FNM BPM).[9] However, the ISO believed the task of determining what additional visibility the ISO could provide into these practices would have be made easier if preceded by a discussion about the ISO's practices and what data is actually produced through this process.

Accordingly, in its initial issue paper the ISO described the various procedures, guidelines, and processes ISO operators and operations engineers follow in ensuring that the market model is consistent with actual conditions on the grid and that may be necessary for maintaining grid security and reliability. Subsequently, the ISO provided presentation materials that illustrated these procedures and conducted a stakeholder conference call to provide participants and ISO staff an opportunity to discuss these procedures. This approach proved to be effective because it allowed the ISO and stakeholders to better identify the type of data and information that would be useful and could actually be produced

[9] *See* FNM BPM, Section 2.1.1. https://bpm.caiso.com/bpm/bpm/doc/000000000000235

by the ISO. The ISO and stakeholders determined that the release of the proposed Transmission Constraints Enforcements List will provide parties that wish to participate or analyze the ISO markets with significant visibility into the actions the ISO takes enforcing and managing constraints on the ISO grid. This will enable parties to better understand and evaluate the impact such enforcement may have on market outcomes, which in turn will enable them to more effectively participate in the ISO markets.

Similar to the release of the CRR FNM, the ISO will make the Transmission Constraints Enforcement Lists available to parties subject to certain protective measures. The protective measures depend on whether the party is a Market Participant[10] and whether the party is a member of WECC. Market Participants that are WECC members, would be provided access to the Transmission Constraints Enforcement List, if the Market Participant: (i) executes and submits to the CAISO the Non-Disclosure Agreement for Transmission Constraints Enforcement List that will be posted on the CAISO Website; and (ii) provides the CAISO a non-disclosure statement, the form of which will be attached as an exhibit to the Non-Disclosure Agreement executed by the Market Participant, and by each employee and consultant of the Market Participant who will have access to the Transmission Constraints Enforcement List. Market Participants that are not also members of the WECC will be provided access to the Transmission Constraints Enforcement Lists if, in addition to the requirements listed above, such Market Participants also provide the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data. Non-Market Participants parties may also obtain access to the Transmission Constraints Enforcement List if, in addition to the above specified requirements, the party reasonably demonstrates a legitimate business or governmental interest in the CAISO Markets. The ISO will post a form Non-Disclosure Agreement and upon approval by the Commission of the proposed tariff provisions herein the ISO can begin receiving the executed Non-Disclosure Agreements. Participants will be provided access to the information after the ISO has accepted an executed Non-Disclosure Agreement.

2. Information Regarding the Cause of Binding Constraint

In any given market interval, if a transmission constraint binds, a shadow price at that location will is published. The shadow price is the marginal value of relieving the constraint and reflects the cost of congestion based on effectiveness

[10] A Market Participant is defined in the ISO Tariff as: An entity, including a Scheduling Coordinator, who either: (1) participates in the CAISO Markets through the buying, selling, transmission, or distribution of Energy, Capacity, or Ancillary Services into, out of, or through the CAISO Controlled Grid; or (2) is a CRR Holder or Candidate CRR Holder.

as determined by the Power Transfer Distribution Factor[11] of a location to relieve the constraint. The ISO already publishes on its OASIS the shadow price for each binding constraint for every market interval. As a result of its recent stakeholder process, based on the ISO's survey and review of practices in other ISO/RTO markets, the ISO now proposes to also post additional information regarding the cause for a binding constraint when one is reported.

The ISO proposes to provide the cause for each binding constraint by identifying whether the constraint was binding under the base case (base operating conditions relevant to the different markets) or due to contingency conditions. If the constraint was binding due to a contingency, the ISO proposes to identify the associated contingency. Otherwise the binding constraint cause would be identified as base case (non-contingency) condition. Public access to this information would be provided through OASIS, similar to the binding constraints and shadow prices.

This proposed change again increases visibility into the causes for binding constraints in the ISO markets. Combined with the details the ISO proposes to provide regarding the enforcement of constraints as discussed above, this provides market participants significant visibility into how transmission constraints, including nomograms and contingencies, impact market outcomes.

3. Conforming Constraint Report

During its recent stakeholder process to explore ways of improving market transparency and information sharing and in an effort to develop the highlevel guidelines filed on December 31, 2009, in FERC Docket No. ER09-1542, the ISO discussed with stakeholders the details of its practice of adjusting market transmission system limits. ISO operators make adjustments for (1) conforming transmission limits to achieve greater alignment between the energy flows calculated by the market software and those observed or predicted in real-time operation across various paths, and (2) setting prudent operating margins consistent with good utility practice to ensure reliable operation under conditions of unpredictable and uncontrollable flow volatility. In conforming transmission limits the operators and operating engineers seek in part to compensate for the time lag, inherent in the structure of the five-minute real-time dispatch, between first detecting imminent congestion and the response of resources to dispatch instructions. In setting reliability margins, the operators seek to ensure that the market software produces a solution that is reliable and consistent with good utility practice within the general state of the system including potentially unpredictable flow variability and changing congestion patterns.

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[11] The Power Transfer Distribution Factor is defined as: The percentage of a power transfer that flows on a transmission facility as a result of the injection of power at a specific bus and the withdrawal of power at another bus or a Reference Bus.

Through the stakeholder process, the ISO agreed that additional visibility into these practices would provide market participants with better insights on the role transmission constraints in the ISO markets. To this end, the ISO has already began producing a monthly "conforming constraint report."[12] This report is similar to the "biased flowgate" information provided in the DMM Q3 2009 Report.[13] Unlike the DMM Q3 2009 Report, which only focused RTM activity, the conforming constraint report provides information on activity for both in the IFM in the Day-Ahead Market and the Real-Time Unit Commitment and Real-Time Dispatch runs of the Real-Time Market. The conforming constraint report lists all flowgates that had the limit adjusted in the integrated forward market,[14] real-time unit commitment and real-time dispatch runs, along with the percentage of hours that each flowgates' limit was adjusted, and other related statistics (*i.e.*, average, minimum, and maximum percent of actual limit adjustment).

Stakeholders requested that the ISO capture and differentiate the two types of adjustments (conforming and reliability) in the report. However, the ISO has investigated the feasibility of providing the report in this fashion and the ISO has determined that it is not feasible to provide this information in this manner.

B. Description of Proposed Tariff Changes

The ISO proposes the following tariff amendments to include enabling language reflecting the new transmission constraints data release policy described above.

1. List of Constraints the ISO Plans to Enforce and Actually Enforced

The ISO proposes to add Section 6.5.3.3 to the ISO Tariff, which would include the details for the ISO provision of the pre- and post-Day-Ahead Market Transmission Constraints List. Proposed Section 6.5.3.3 includes the terms and conditions for the provision of the daily post-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the list of Transmission Constraints, including contingencies and nomograms, that are enforced and not

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[12] See pages 33 and 34 of the California Independent System Operator Corporation Market Performance Report February 2010, issued on March 26, 2010, http://www.caiso.com/2765/2765e19f71120.pdf.

[13] Department of Market Monitoring (DMM) Quarterly Report on Market Issues and Performance, October 30, 2009, Table 5.1 RTD Biased Flowgates and Frequency of Biasing with Additional Statistics (http://www.caiso.com/2457/2457987152ab0.pdf).

[14] The integrated forward market is one of the components of Day-Ahead Market, in which the ISO clears bids for supply and demand of energy for the next day and procures ancillary services requirements for the next day.

enforced in that day's Day-Ahead Market, and the pre-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the same daily list of information for the transmission Constraints, including contingencies and nomograms, the ISO plans to enforce or not enforce for the next day's Day-Ahead Market. Proposed Section 6.5.3.3 also provides that to the extent that the ISO fails to make either of these two reports available on any given Operating Day, the ISO will instead provide only the list of transmission Constraints, including contingencies and nomograms, that were enforced or not enforced for the applicable Day-Ahead Market. Further, the ISO would endeavor to provide this information on the failed publication within the next thirty (30) days, after which the information will not be provided.

Proposed Section 6.5.3.3 also details the terms for the terms for the confidential treatment of the Transmission Constraints Lists. As described above, these terms are the same terms that apply to the release of the CRR FNM.

The ISO also proposes to modify Section 6.5.1.4, to clarify that parties may obtain to the CRR FNM for the purposes of reviewing and using the confidential information disclosed by the ISO solely in connection with review and analysis of the CAISO Markets. The term CAISO Markets is already defined to include "[a]ny of the markets administered by the CAISO under the CAISO Tariff, including, without limitation, the DAM, HASP, RTM, transmission, and Congestion Revenue Rights." This clarifies that the CRR FNM can be used for purposes other than participation and analysis of the ISO CRR markets, as was previously specified in the ISO Non-Disclosure Agreement for the CRR FNM.[15]

The ISO also proposes to include the following definition for Transmission Constraints Enforcement Lists:

> Consist of the post-Day-Ahead Market transmission Constraints list and the pre-Day-Ahead Market transmission Constraints list made available by the CAISO pursuant to Section 6.5.3.3. The post-Day-Ahead Market transmission Constraints list consists of the transmission Constraints enforced or not enforced in the Day-Ahead Market conducted on any given day. The pre-Day-Ahead Market transmission Constraints the CAISO plans to enforce or not enforce in the next day's Day-Ahead Market. These lists will identify and include definitions for all Constraints, including contingencies and nomograms. The definition of the Constraint includes the individual elements that constitute the transmission Constraint. Both lists will each contain the same data elements and will provide: the flowgate Constraints; transmission corridor Constraints; the Nomogram Constraints; and the list of transmission Contingencies.

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[15] The ISO will modify the CRR FNM NDA form on this website with this clarification.

2. Information Regarding the Cause of Binding Constraint

The ISO proposes to modify the references to the publication of shadow prices in Sections 6.5.3.2.2 (Day-Ahead Market), 6.5.4.2.2 (HASP) and 6.5.5.2.2 (RTM) to specify that, as discussed above, in addition to the shadow prices, the ISO will also publish an indication of whether the constraints were binding because of the base operating conditions or contingencies and if caused by a contingency, the identity of the specific contingency.[16]

3. Conforming Constraint Report

The ISO proposes to add Section 6.5.7 to indicate the ISO's commitment to post on its website monthly reports on the degree of adjustments to transmission Constraints made pursuant to Section 27.5.6. Similar to the information requirements in Section 6.5.3.3, the ISO proposes to include in Section 6.5.7 the limitation that to the extent that in any given month the ISO fails to post this report on its website, the ISO will provide the report in the subsequent month and if it is not reasonably feasible to fulfill this requirement, within the two months after the applicable month of the report, the ISO will not provide the information for the missed month and will continue to publish the data for the available months. This is provision is necessary to ensure that the ISO is not required to continue to toil with the release of a report for a given month after some reasonable amount of time has elapsed, given that by that time the information is less important to market participants.

C. Stakeholder Process

The recent stakeholder process to address the issue of increased visibility into the ISO's transmission constraints enforcement and management was very successful in yielding a proposal for data releases that was widely supported by all participants. The stakeholder process provided the ISO and its stakeholders an opportunity to better understand the ISO processes and participants' needs for additional visibility into ISO practices.[17]

The ISO issued its initial issue paper on November 5, 2009, in compliance with the Commission's October 2 Order. This initial issue paper described the various procedures, guidelines, and processes ISO operators and operations engineers follow to ensure that the market model is consistent with actual conditions on the grid and that may be necessary for maintaining grid security

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[16] For a list of binding constraint shadow price reports, see Slide 31, http://www.caiso.com/271b/271bf2e05b80.pdf

[17] The ISO also provided a description the status of the stakeholder process in its December 31, 2009 transmittal letter to FERC in the above referenced docket.

and reliability. On November 12, 2009, the ISO held a stakeholder conference call in which the ISO provided additional presentation materials that illustrated these procedures. The ISO believes this was an important first step toward establishing better understanding of its procedures by market participants and facilitating discussions about how to enhance data and information availability on the ISO's transmission constraint management and enforcement, and their market implications.

The initial issue paper also included a preliminary discussion of areas in which the ISO could provide better visibility into the practices of enforcement of constraints of interest to participants, based on the ISO's survey and review of practices in other ISO/RTO markets. In particular, the ISO discussed the additional information provided by other ISO's regarding the cause for a binding constraint when one is reported. This led the ISO to identify the need to provide this additional data, which participants agreed would also be beneficial in understanding the impact the binding constraints have in a market outcome.

During the stakeholder process, participants also identified the limitation under the existing non-disclosure agreement for the release of the CRR FNM which requires that signatories to agree to only use the information for participation or analysis of the CRR markets alone. Participants pointed out that this data is useful in analyzing and understanding outcomes of the ISO’s energy and ancillary services markets. The ISO agreed to modify the non-disclosure agreement to broaden the permissible uses of the CRR FNM to include for the participation and analysis of the ISO’s energy and ancillary services markets. The ISO acknowledges that there is information such as the actual limits of the transmission grid facilities in that data set that is also useful in understanding how the ISO’s transmission constraints enforcement practices may influence the outcome of energy markets. However, the ISO advised participants, and again clarifies here, that while the CRR FNM data can be used to analyze the ISO energy and ancillary services markets, the ISO prepares that data set for the purpose of releasing the CRR FNM. Therefore, there is information in that data set regarding the enforcement of constraints that pertains to the CRR markets and would not necessarily pertain to the ISO energy and ancillary services markets.

During the stakeholder process, participants also requested that the constraint definition should include the actual constraint limit used in the running of the ISO energy and ancillary services markets. At this time, the ISO is continuing to evaluate what is required before the ISO can consider providing this information. However, rather than delay the current filing to resolve this additional data request, in the interest of beginning to make available the information identified in this transmittal letter as soon as practicable, the ISO agreed to consider this request in an upcoming stakeholder process and proceed with this filing.

The table below provides the dates for the complete stakeholder process that led to this proposed tariff amendment. All documents posted by the ISO and comments submitted by participants with regards to this initiative are available on the ISO website.[18]

Table 1
Stakeholder Process on Transmission Constraints

Date	Milestone
Nov. 5, 2009	Issue Paper, Phase 1 Transmission Constraints
Nov. 12, 2009	Conference Call Meeting
Nov. 23, 2009	Comments on Discussion Paper due
Dec. 3, 2009	Straw Proposal -- Proposed Procedures & Tariff Language
Dec. 10, 2009	On-Site Meeting
Dec. 16, 2009	Comments on Straw Proposal due
Dec. 31, 2009	FERC Compliance Filing (High Level Guidelines and Update)
Jan. 6, 2010	ISO Draft Final Proposal Regarding Data Release Policy Changes
Jan. 13, 2010	Conference Call Meeting
Jan. 15, 2010	Comments on Draft Final Proposal due
Feb. 10-11, 2010	Board Meeting and Decision on Data Release Policy
Mar. 12, 2010	Posted Proposed Tariff Language
Mar. 19-22, 2010	Stakeholders Submitted to Tariff Language
Mar. 24, 2010	ISO Reposted Tariff Language
Mar. 24, 2010	Stakeholder Conference Call on Proposed Tariff Language

18 *See* http://www.caiso.com/244c/244cae3b46bb0.html.

III. Communications

Communications regarding this filing should be addressed to the following individuals:

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

IV. Service

The ISO has served copies of this transmittal letter, and all attachments, on the parties included on the service lists for the docket in which the October 2 Order was issued (ER10-1542). The ISO has served copies of this transmittal letter and all attachments to the Public Utilities Commission of the State of California, the California Energy Commission, and all parties with Scheduling Coordinator Agreements under the ISO Tariff. In addition, the CAISO has posted a copy of the filing on the CAISO Website.

V. Materials Provided in the Instant Compliance Filing

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

Attachment A	Clean ISO Tariff sheets incorporating the red-lined changes contained in Attachment B
Attachment B	Red-lined changes to the ISO Tariff to implement the revisions contained in this filing

Attachment C Board of Governors Memorandum

Attachment D Draft Final Proposal

VI. Effective Date

The ISO requests that the amendments included in this filing be made effective on the July 13, 2010. If accepted by the Commission, as of that day provided parties have executed the Non-Disclosure Agreement discussed in Section II. A. 1, the ISO would be prepared to make available to such parties the data identified in that section. In addition, the ISO would be prepared to post the cause of the binding constraints discussed above in Section II. A. 2. Finally, the data described in Section II. A. 3 is already posted on the ISO website because, as discussed above, the ISO does not believe tariff authority is necessary in order to provide this data that is neither commercially sensitive nor infrastructure data the release of which could pose a security threat.

VII. Conclusion

The ISO respectfully requests that the Commission approve the attached tariff sheets. Please contact the undersigned if you have any questions regarding this matter.

Respectfully submitted,

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Attachment A – Clean Sheets

Transmission Constraint Relaxation Amendment

ER10-___-000

Fourth Replacement CAISO Tariff

May 7, 2010

6.5.1.3.2 Monthly, the CAISO shall publish the following information including, but not limited to:

(a) Market Clearing Prices for all Aggregated PNodes used in the CRR Auction clearing for on-peak and off-peak;

(b) CRR Holdings by CRR Holder (including):

(i) CRR Source name(s);

(ii) CRR Sink name(s);

(iii) CRR quantity (MW) for each CRR Source(s) and CRR Sink(s);

(iv) CRR start and end dates;

(v) Time of use specifications for the CRR(s); and

(vi) Whether the CRR is a CRR Option or a CRR Obligation.

6.5.1.3.3 Seasonally, the CAISO shall publish the following information including, but not limited to:

(a) Set of LDFs that represent typical seasonal on-peak and off-peak values, not used for Settlements, before the new season.

6.5.1.4 Requirements to Obtain the CRR Full Network Model.

To permit participants to review and use the Confidential Information disclosed by the CAISO solely in connection with review and analysis of the CAISO Markets, the CAISO shall distribute the CRR Full Network Model only to those Market Participants and non-Market Participants that satisfy the following requirements and the related procedures set forth in the Business Practice Manual.

(a) A Market Participant that is a member of the WECC and that requests the CRR Full Network Model: (i) shall execute the Non-Disclosure Agreement for CRR Full Network Model Distribution that is posted on the CAISO Website and (ii) shall provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the Market Participant, executed by each employee and consultant of the Market Participant who will have access to the CRR Full Network Model.

6.5.3.2.2 The results of the Day-Ahead Market will be published on OASIS by 1:00 p.m. and will include:

(a) Total Day-Ahead Schedules (MWh) for total Supply and Demand by TAC Area and for the entire CAISO Balancing Authority Area;

(b) Total Day-Ahead Schedules (MWh) of imports and exports by Transmission Interface;

(c) Total Day-Ahead AS Awards by AS Region and AS type;

(d) RUC Prices by PNode and APNodes, RUC Forecast Demand for each RUC Zone, hourly RUC Capacity from Generation, and hourly RUC Capacity from imports for each TAC Area and the entire CAISO Balancing Authority Area;

(e) Day-Ahead LMP for Energy for each PNode and APNode, including the Energy, MCC and MCL components;

(f) Day-Ahead ASMP by AS Region and AS type;

(g) Day-Ahead mitigation indicator;

(h) CAISO Forecast of CAISO Demand for each TAC Area and the entire CAISO Balancing Authority Area;

(i) Shadow Prices of binding transmission Constraints and an indication of whether the Constraints were binding because of the base operating conditions or a Contingency, and if caused by a Contingency, the identity of the specific Contingency; and

(j) Total Day-Ahead system Marginal Losses in MWh and Marginal Cost of Losses for each Trading Hour of the next Trading Day.

6.5.3.3 Communications with Market Participants

After the results of the Day-Ahead Market are posted, the CAISO will provide to parties that have signed a Non-Disclosure Agreement in accordance with Section 6.5.3.3.1, the daily post-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the list of Transmission Constraints, including contingencies and nomograms that are enforced and not enforced in that day's Day-Ahead Market. Subsequently and prior to the next Day-Ahead Market, the CAISO will provide to parties that the pre-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the daily list of information for the transmission Constraints, including contingencies and nomograms, the CAISO plans to enforce or not enforce for the next day's Day-Ahead Market. To the extent that the CAISO does not make either of these two reports available on any given Operating Day, the CAISO will instead provide only the list of transmission Constraints, including contingencies and nomograms, that were enforced or not enforced for the applicable Day-Ahead Market within the next thirty (30) days, after which the information will not be provided.

6.5.3.3.1 Requirements to Obtain the Transmission Constraints Enforcement Lists

The CAISO shall provide the Transmission Constraints Enforcement Lists only to those Market Participants and non-Market Participants that satisfy the following requirements.

(a) To obtain access to the Transmission Constraints Enforcement Lists, a Market Participant that is a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) execute and submit to the CAISO the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists that is posted on the CAISO Website; and (ii) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the Market Participant, executed by each employee and consultant of the Market Participant who will have access to the Transmission Constraints Enforcement Lists.

(b) To obtain access to the Transmission Constraints Enforcement Lists, a Market Participant that is not a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) execute and submit to the CAISO the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists that is posted on the CAISO Website, (ii) provide to the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data, and (iii) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-WECC Market Participant, executed by each employee and consultant of the non-WECC Market Participant who will have access to the Transmission Constraints Enforcement Lists.

(c) To obtain access to the Transmission Constraints Enforcement Lists a non-Market Participant that is a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) reasonably demonstrate a legitimate business or governmental interest in the CAISO Markets, (ii) execute the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists posted on the CAISO Website, and (iii) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-Market Participant, executed by each employee and consultant of the non-Market Participant who will have access to the Transmission Constraints Enforcement Lists.

(d) To obtain access to the Transmission Constraints Enforcement Lists , a non-Market Participant that is not a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) reasonably demonstrate a legitimate business or governmental interest in the CAISO Markets, (ii) execute the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists that is posted on the CAISO Website, (iii) provide to the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data, and (iv) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-Market Participant, executed by each employee and consultant of the non-Market Participant who will have access to the Transmission Constraints Enforcement Lists.

6.5.3.3.2 Obligation to Report Violations of Section 6.5.3.3

Each Market Participant, non-Market Participant, employee of a Market Participant, employee of a non-Market Participant, consultant, and employee of a consultant to whom the CAISO distributes the Transmission Constraints Enforcement Lists shall be obligated to immediately report to the CAISO any violation of the requirements of Section 6.5.3.3.

6.5.4 HASP Communications.

The HASP opens at 1:00 p.m. the day before the target Operating Day and Scheduling Coordinators can submit Bids into the HASP as of that time.

6.5.4.2.2 At thirty (30) minutes before the Trading Hour, on an hourly basis, the CAISO will publish on OASIS the following:

(a) Total HASP Intertie Schedules for imports and exports by TAC Area and for the entire CAISO Balancing Authority Area;

(b) HASP Intertie LMPs by PNodes and APNodes;

(c) HASP advisory LMPs by PNode and APNode;

(d) HASP Shadow Prices of binding Transmission Constraints and an indication of whether the constraints were binding because of the base operating conditions or contingencies and if caused by a contingency, the identity of the specific contingency; and

(e) Total HASP system Marginal Losses in MWh for the next Operating Hour.

6.5.5 Real-Time Market Communications.

The CAISO shall issue Dispatch Instructions to Scheduling Coordinators determined pursuant to the RTM throughout any given day.

6.5.5.1 Communications with Scheduling Coordinators.

Communications between the CAISO and Scheduling Coordinators shall take place via the CAISO's secure communication system to a dedicated terminal at the Scheduling Coordinator's scheduling center. If there is a failure of electronic communications with a Scheduling Coordinator, then, at the CAISO's discretion, the Scheduling Coordinator may communicate by facsimile. Communication by facsimile requires verbal approval by the CAISO.

6.5.5.1.1 Every fifteen (15) minutes, the CAISO will communicate via the secure communication system Start-Up and Shut-Down Instructions and Real-Time AS Awards to internal resources.

6.5.5.1.2 Every five (5) minutes for Target T+10, the CAISO will send Dispatch Instructions via the secure communication system. The Dispatch Instruction will be flagged if a resource is being dispatched under its RMR Contract.

6.5.5.2 Public Market Information.

6.5.5.2.1 Every hour the CAISO shall post via OASIS information regarding the status of the RTM. This information shall include but is not limited to the following:

(a) Mitigation indicator.

6.5.5.2.2 Every fifteen (15) minutes the CAISO shall post via OASIS information regarding the status of the RTM. This information shall include but is not limited to the following:

(a) Total Real-Time AS Awards by AS Region and AS type; and

(b) Real-Time ASMPs by AS Region and AS type.

6.5.5.2.3 [NOT USED]

6.5.5.2.4 Every five (5) minutes the CAISO shall post via OASIS information regarding the status of the RTM. This information shall include but is not limited to the following:

(a) CAISO Forecast of CAISO Demand;

(b) Total Real-Time dispatched Energy and Demand on a 24-hour delayed basis;

(c) Real-Time Dispatch Interval LMP;

(d) Real-Time system losses;

(e) Actual Operating Reserve; and

(f) The Real-Time shadow price of binding Transmission Constraints and an indication of whether the constraints were binding because of the base operating conditions or contingencies and if caused by a contingency, the identity of the specific contingency.

6.5.6 Market Bid Information.

6.5.6.1 Public Market Information.

6.5.6.1.1 The following information shall be published on OASIS 180 days following the applicable Trading Day, with the exclusion of the information that is specific to Scheduling Coordinators:

(a) AS market Bids;

(b) Energy market Bids; and

(c) RUC market Bids.

6.5.6.1.2 Within seven (7) days after the Trading Day, the CAISO will publish via OASIS all Start-Up Costs and Minimum Load Costs for CAISO committed resources.

6.5.7 Monthly Report on Conforming Transmission Constraints

The ISO will post on its website a monthly report or incorporate into a monthly report on the degree of adjustments to transmission Constraints made pursuant to Section 27.5.6. To the extent that in any given month the ISO does not post on its website such reports, the ISO will provide the report in the subsequent month. If it is not reasonably feasible to provide such the monthly report two months after the applicable month of the report, the information for the missed month will not be provided.

Trading Hub	An aggregation of network Pricing Nodes, such as Existing Zone Generation Trading Hubs, maintained and calculated by the CAISO for settlement and trading purposes posted by the CAISO on its CAISO Website.
Trading Interval	A Settlement Period.
Trading Month	The period beginning at the start of the hour ending 0100 and ending at the end of the hour ending 2400 for each calendar month, except where there is a change to and from daylight savings time on the first or last day of a month.
Transformer and Line Loss Correction Factor	The transformer and line loss correction factor as set forth in the applicable Business Practice Manual or Technical Specifications to be applied to revenue quality meters of CAISO Metered Entities which are installed on the low voltage side of step-up transformers.
Transition Charge	The component of the Access Charge collected by the CAISO with the High Voltage Access Charge in accordance with Section 5.7 of Appendix F, Schedule 3.
Transmission Access Charge (TAC)	Access Charge
Transmission Access Charge Area (TAC Area)	A portion of the CAISO Controlled Grid with respect to which Participating TOs' High Voltage Transmission Revenue Requirements are recovered through a High Voltage Access Charge. TAC Areas are listed in Section 3 of Schedule 3 of Appendix F.

Transmission Constraints Enforcement Lists	Consist of the post-Day-Ahead Market transmission Constraints list and the pre-Day-Ahead Market transmission Constraints list made available by the CAISO pursuant to Section 6.5.3.3. The post-Day-Ahead Market transmission Constraints list consists of the transmission Constraints enforced or not enforced in the Day-Ahead Market conducted on any given day. The pre-Day-Ahead Market transmission Constraints the CAISO plans to enforce or not enforce in the next day's Day-Ahead Market. These lists will identify and include definitions for all Constraints, including contingencies and nomograms. The definition of the Constraint includes the individual elements that constitute the transmission Constraint. Both lists will each contain the same data elements and will provide: the flowgate Constraints; transmission corridor Constraints; the Nomogram Constraints; and the list of transmission Contingencies.
Transmission Control Agreement (TCA)	The agreement between the CAISO and Participating TOs establishing the terms and conditions under which TOs will become Participating TOs and how the CAISO and each Participating TO will discharge their respective duties and responsibilities, as may be modified from time to time.

Attachment B - Blacklines

Transmission Constraint Relaxation Amendment

ER10-___-000

Fourth Replacement CAISO Tariff

May 7, 2010

* * *

6.5.1.4 Requirements to Obtain the CRR Full Network Model.

To permit participants to review and use the Confidential Information disclosed by the CAISO solely in connection with review and analysis of the CAISO Markets, ~~T~~the CAISO shall distribute the CRR Full Network Model only to those Market Participants and non-Market Participants that satisfy the following requirements and the related procedures set forth in the Business Practice Manual.

(a) A Market Participant that is a member of the WECC and that requests the CRR Full Network Model: (i) shall execute the Non-Disclosure Agreement for CRR Full Network Model Distribution that is posted on the CAISO Website and (ii) shall provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the Market Participant, executed by each employee and consultant of the Market Participant who will have access to the CRR Full Network Model.

(b) A Market Participant that is not a member of the WECC and that requests the CRR Full Network Model: (i) shall execute the Non-Disclosure Agreement for CRR Full Network Model Distribution that is posted on the CAISO Website, (ii) shall provide to the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data, and (iii) shall provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the Market Participant, executed by each employee and consultant of the Market Participant who will have access to the CRR Full Network Model.

(c) A non-Market Participant that is a member of the WECC and that requests the CRR Full Network Model: (i) shall reasonably demonstrate a legitimate business or governmental interest in the CAISO Markets, (ii) shall execute the Non-Disclosure Agreement for CRR Full Network Model Distribution that is posted on the CAISO Website, and (iii) shall provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure

Agreement executed by the non-Market Participant, executed by each employee and consultant of the non-Market Participant who will have access to the CRR Full Network Model.

(d) A non-Market Participant that is not a member of the WECC and that requests the CRR Full Network Model: (i) shall reasonably demonstrate a legitimate business or governmental interest in the CAISO Markets, (ii) shall execute the Non-Disclosure Agreement for CRR Full Network Model Distribution that is posted on the CAISO Website, (iii) shall provide to the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data, and (iv) shall provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-Market Participant, executed by each employee and consultant of the non-Market Participant who will have access to the CRR Full Network Model.

* * *

6.5.3.2.2 The results of the Day-Ahead Market will be published on OASIS by 1:00 p.m. and will include:

(a) Total Day-Ahead Schedules (MWh) for total Supply and Demand by TAC Area and for the entire CAISO Balancing Authority Area;

(b) Total Day-Ahead Schedules (MWh) of imports and exports by Transmission Interface;

(c) Total Day-Ahead AS Awards by AS Region and AS type;

(d) RUC Prices by PNode and APNodes, RUC Forecast Demand for each RUC Zone, hourly RUC Capacity from Generation, and hourly RUC Capacity from imports for each TAC Area and the entire CAISO Balancing Authority Area;

(e) Day-Ahead LMP for Energy for each PNode and APNode, including the Energy, MCC and MCL components;

(f) Day-Ahead ASMP by AS Region and AS type;

(g) Day-Ahead mitigation indicator;

(h) CAISO Forecast of CAISO Demand for each TAC Area and the entire CAISO Balancing Authority Area;

(i) Shadow Prices of binding transmission Constraints and an indication of whether the Constraints were binding because of the base operating conditions or a Contingency, and if caused by a Contingency, the identity of the specific Contingency; and

(j) Total Day-Ahead system Marginal Losses in MWh and Marginal Cost of Losses for each Trading Hour of the next Trading Day.

6.5.3.3 Communications with Market Participants

After the results of the Day-Ahead Market are posted, the CAISO will provide to parties that have signed a Non-Disclosure Agreement in accordance with Section 6.5.3.3.1, the daily post-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the list of Transmission Constraints, including contingencies and nomograms that are enforced and not enforced in that day's Day-Ahead Market. Subsequently and prior to the next Day-Ahead Market, the CAISO will provide to parties that the pre-Day-Ahead Market Transmission Constraints Enforcement List, which consists of the daily list of information for the transmission Constraints, including contingencies and nomograms, the CAISO plans to enforce or not enforce for the next day's Day-Ahead Market. To the extent that the CAISO does not make either of these two reports available on any given Operating Day, the CAISO will instead provide only the list of transmission Constraints, including contingencies and nomograms, that were enforced or not enforced for the applicable Day-Ahead Market within the next thirty (30) days, after which the information will not be provided.

6.5.3.3.1 Requirements to Obtain the Transmission Constraints Enforcement Lists

The CAISO shall provide the Transmission Constraints Enforcement Lists only to those Market Participants and non-Market Participants that satisfy the following requirements.

(a) To obtain access to the Transmission Constraints Enforcement Lists, a Market Participant that is a member of the WECC that requests the Transmission

Constraints Enforcement Lists must: (i) execute and submit to the CAISO the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists that is posted on the CAISO Website; and (ii) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the Market Participant, executed by each employee and consultant of the Market Participant who will have access to the Transmission Constraints Enforcement Lists.

(b) To obtain access to the Transmission Constraints Enforcement Lists, a Market Participant that is not a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) execute and submit to the CAISO the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists that is posted on the CAISO Website, (ii) provide to the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data, and (iii) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-WECC Market Participant, executed by each employee and consultant of the non-WECC Market Participant who will have access to the Transmission Constraints Enforcement Lists.

(c) To obtain access to the Transmission Constraints Enforcement Lists a non-Market Participant that is a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) reasonably demonstrate a legitimate business or governmental interest in the CAISO Markets, (ii) execute the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists posted on the CAISO Website, and (iii) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-Market Participant, executed by each employee and consultant of the non-Market Participant who will have access to the Transmission Constraints Enforcement Lists.

(d) To obtain access to the Transmission Constraints Enforcement Lists , a non-Market Participant that is not a member of the WECC that requests the Transmission Constraints Enforcement Lists must: (i) reasonably demonstrate a legitimate business or governmental interest in the CAISO Markets, (ii) execute the Non-Disclosure Agreement for Transmission Constraints Enforcement Lists that is posted on the CAISO Website, (iii) provide to the CAISO a fully executed WECC Non-Member Confidentiality Agreement for WECC Data, and (iv) provide to the CAISO a non-disclosure statement, the form of which is attached as an exhibit to the Non-Disclosure Agreement executed by the non-Market Participant, executed by each employee and consultant of the non-Market Participant who will have access to the Transmission Constraints Enforcement Lists.

6.5.3.3.2 Obligation to Report Violations of Section 6.5.3.3

Each Market Participant, non-Market Participant, employee of a Market Participant, employee of a non-Market Participant, consultant, and employee of a consultant to whom the CAISO distributes the Transmission Constraints Enforcement Lists shall be obligated to immediately report to the CAISO any violation of the requirements of Section 6.5.3.3.

* * *

6.5.4.2.2 At thirty (30) minutes before the Trading Hour, on an hourly basis, the CAISO will publish on OASIS the following:

(a) Total HASP Intertie Schedules for imports and exports by TAC Area and for the entire CAISO Balancing Authority Area;

(b) HASP Intertie LMPs by PNodes and APNodes;

(c) HASP advisory LMPs by PNode and APNode;

(d) HASP Shadow Prices of binding Transmission Constraints and an indication of whether the constraints were binding because of the base operating conditions or contingencies and if caused by a contingency, the identity of the specific contingency; and

(e) Total HASP system Marginal Losses in MWh for the next Operating Hour.

* * *

6.5.5.2.4 Every five (5) minutes the CAISO shall post via OASIS information regarding the status of the RTM. This information shall include but is not limited to the following:

(a) CAISO Forecast of CAISO Demand;

(b) Total Real-Time dispatched Energy and Demand on a 24-hour delayed basis;

(c) Real-Time Dispatch Interval LMP;

(d) Real-Time system losses; ~~and~~

(e) Actual Operating Reserve~~.~~; and

(f) The Real-Time shadow price of binding Transmission Constraints and an indication of whether the constraints were binding because of the base operating conditions or contingencies and if caused by a contingency, the identity of the specific contingency.

* * *

6.5.7 Monthly Report on Conforming Transmission Constraints

The ISO will post on its website a monthly report or incorporate into a monthly report on the degree of adjustments to transmission Constraints made pursuant to Section 27.5.6. To the extent that in any given month the ISO does not post on its website such reports, the ISO will provide the report in the subsequent month. If it is not reasonably feasible to provide such the monthly report two months after the applicable month of the report, the information for the missed month will not be provided.

* * *

Appendix A

Master Definition Supplement

* * *

Transmission Constraints Enforcement Lists	Consist of the post-Day-Ahead Market transmission Constraints list and the pre-Day-Ahead Market transmission Constraints list made available by the CAISO pursuant to Section 6.5.3.3. The post-Day-Ahead Market transmission Constraints list consists of the transmission Constraints enforced or not enforced in the Day-Ahead Market conducted on any given day. The pre-Day-Ahead Market transmission Constraints the

CAISO plans to enforce or not enforce in the next day's Day-Ahead Market. These lists will identify and include definitions for all Constraints, including contingencies and nomograms. The definition of the Constraint includes the individual elements that constitute the transmission Constraint. Both lists will each contain the same data elements and will provide: the flowgate Constraints; transmission corridor Constraints; the Nomogram Constraints; and the list of transmission Contingencies.

* * *

ATTACHMENT C

California ISO
Your Link to Power

California Independent
System Operator Corporation

Memorandum

To: ISO Board of Governors

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

Date: February 3, 2010

Re: **Decision on Information Release Policy on Transmission Constraints**

This memorandum requires Board action.

As part of its efforts to evolve and enhance market efficiency, the ISO launched a stakeholder process to evaluate information release policies that best support effective and efficient market participation. In particular stakeholders have expressed a need for information regarding ISO's management of transmission constraints in market operations. Management of transmission constraints refers to the practice of enforcing or not enforcing specific transmission constraints, and in the context of this effort it also refers to the ISO's definitions and descriptions of such constraints as well as the ISO's practice of adjusting constraints in its market operations. Stakeholder assert increased transparency into the management of constraints would enable them to better understand ISO market results and would, therefore, facilitate more effective participation in the ISO market. As a result of these requests, a major part of the ISO's current initiative on information policy is focused on transmission constraints management. Further, late last year the ISO expedited its information initiative in response to a Federal Energy Regulatory Commission order issued in October 2009 directing that the ISO more expeditiously address information requests related specifically to the management of transmission constraints. Following a robust stakeholder process, Management proposes new procedures for the release of information on transmission constraint enforcement and non-enforcement, causes of binding constraints, and operator adjustments to such constraints. This information will provide more market transparency and should enable market participants to more effectively participate in the ISO market.

Management recommends that the ISO Board of Governors approve the release of the following information, as further discussed in this memorandum:

- The daily list of constraints, including contingencies and nomograms, that are enforced and not enforced in each day-ahead market run after the results of the day-ahead market are posted;

- The same daily list of information for the constraints the ISO intends to enforce or not enforce for the next day's day-ahead market;
- The cause for any binding constraint shadow price that the ISO already posts on its public website; and
- A new monthly report for all markets on the number and degree of manual adjustments to transmission constraints within the ISO controlled grid by market operators.

Management has also adopted new advance notifications, to the extent feasible, for planned changes to the market model and/or constraint enforcement as well as significant changes between updates. Finally, Management has committed to develop improved network terminology and nomenclature, and expand the permissions for use of the congestion revenue rights (CRR) full network model for the purpose of analyzing and participating in the ISO market.

Moved, that the ISO Board of Governors approves the proposal concerning release of the information about transmission constraints, as detailed in the memorandum dated February 3, 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 launched a new information requirements initiative in early September 2009 to explore more thoroughly what type of additional information market participants require to effectively and efficiently participate in the ISO markets. This initiative is intended to cover numerous aspects of participation in the ISO markets. The first phase is focused on information related to transmission constraints management both because of requests made by market participants and because of recent FERC directives.

Before and after the start of the new market, stakeholders expressed a need for more information regarding the ISO's transmission constraint management and adjustments practices. In response to such information requests, the ISO included additional information in its Business Practice Manuals prior to the start of the new market and in Technical Bulletins after the start of the new market. The information provided in the BPM and Technical Bulletin explains more thoroughly the reasons for and the process the ISO follows to make decision about what transmission constraints it should enforce or not and guidelines the ISO follows to adjust transmission constraint limits in its market operations. Market participants have, however, since continued to request more information regarding the actual adjustments made to the setting and enforcement of transmission constraints, including contingencies and nomograms, in addition to the already released guidelines the ISO operators and engineers follow for this purpose.

Concurrently with the ISO's information policy initiative, on October 2, 2009, FERC directed the ISO to expedite its stakeholder process related to information that specifically pertains to transmission constraints, which led the ISO to segment this initiative into three phases. The order was issued in response the ISO's filing on August 3, 2009, clarifying the role of the full network model in the ISO markets and to clarify that in running its markets to avoid infeasible and unrealistic market solutions the ISO does not and cannot enforce all modeled transmission constraints all the time. The FERC accepted the ISO's proposed clarifications with the additional requirement that the ISO include, in its tariff, high-level guidelines that govern its transmission constraints management and that the ISO expedite the stakeholder process to determine what additional information on transmission constraints the ISO can provide and how it can provide such information. FERC specifically identified and directed that the ISO determine through this stakeholder process how it can provide to market participants the list of constraints and contingencies that are or are not enforced in its markets runs. In response the ISO focused the first phase of its information requirements initiative on the transmission constraints.

ISO staff and stakeholders made significant progress last fall with the phase 1 effort and on December 31, 2009, the ISO was able to submit in compliance with the FERC order high-level tariff language that governs over transmission constraint management practices at the ISO. Since then, the ISO has completed its stakeholder process to address the transmission constraint management information requirements and now proposes the provision of new data that satisfies FERC's request and addresses additional information requirements identified through the recent stakeholder process.

Proposed Information Requirements

Management understands that more transparency regarding the ISO's establishment, management, and enforcement of transmission constraints enables participants to anticipate and address market results more effectively. The ISO market optimization processes rely on a series of inputs including in particular the accurate representation of the state of the ISO grid facilities. This particular task is accomplished through the development of network models used to represent the resources in processing an optimal market solution through the ISO market, which the ISO uses to operate the grid and manage congestion effectively and reliably. Phase 1 of this initiative seeks to provide greater insight into the actual constraint definition and enforcement practices so that market participants are better able to determine how such representations drive market results over time.

After a robust stakeholder process to consider these information needs, Management proposes three new data release elements.

1. ***Transmission Constraint and Contingency Lists in the Day-Ahead Market***. Management proposes the release of, 1) a post-day-ahead market constraints list that would be published daily after the results of the day-ahead market are posted, and, 2) a pre-day-ahead market constraints list that would be published daily after a preliminary market run that the ISO performs to review issues in preparing for the next day's day-ahead market. The proposed two lists of constraints, including contingencies and nomograms, will provide market participants with significant information regarding what actual constraints are enforced or not enforced in the ISO day-ahead market. This is in direct response to requests by market participants for this information and to FERC's October 2 order. At this time, Management only proposes to provide this information for the day-ahead market due to the voluminous amount of information associated with the real-time market, which is run more frequently than the day-ahead market. Because this information identifies transmission facilities specifically and the state of such transmission facilities, Management proposes that the distribution of such information be protected pursuant to a non-disclosure agreement and that the stated purpose of receipt of this information be for the limited purpose of analysis associated with actual participation in the ISO market. Management proposes to seek FERC-approval of high-level tariff language that enables the provision of such information.

2. ***Cause of Binding Constraint***. In addition to the current publication of the shadow price for each binding constraint on OASIS, Management proposes that the ISO post at the same location the cause behind the binding constraint. The ISO would identify whether the constraint was binding under the base case (base operating conditions relevant to the different markets) or due to contingency conditions, in which case the ISO would identify the actual name of the contingency. The information regarding the cause of the binding constraint will provide market participants with additional insights into the confluence of the market and system operations and the driving forces behind observed congestion. This change will render the ISO practices consistent with the practices of other ISOs and RTOs. Management proposes to seek FERC-approval of high-level tariff language that enables the provision of such information.

3. ***Conforming Constraint Report for the Day-Ahead and Real-Time Markets***. Management proposes to provide to the public a new monthly constraint report that would include the number and degree of manual adjustments to transmission constraints within the transmission grid controlled by the ISO for the day-ahead and real-time markets. These manual adjustments are made by market operators to conform and adjust transmission constraints and limits to ensure the market optimization has a realistic representation of the actual grid conditions or to allow the market optimization software achieve a more reliable solution based on operator observations of real-time conditions not captured by other market optimization inputs. The ISO would report on such adjustments much like what was provided in the

quarterly Department of Market Monitoring report, but on a more frequent basis.[1] Management proposes to seek FERC approval of high-level tariff language that enables the provision of such information.

Non-Disclosure Agreements (NDAs). Management proposes to modify the stated purpose of the current Non-Disclosure Agreement that governs over the release of the CRR Full Network Model so that it is clear that the CRR Full Network Model can be utilized for purposes of analyzing and participating in all ISO markets including the day-ahead and real-time markets and not only the CRR markets. This modification is proposed in direct response to stakeholder requests that the current restriction prevents parties that don't participate in CRR markets to use the information for purposes of participating in the day-ahead and real-time markets. This modification will not require a tariff amendment given that the tariff does not include this specification. Management also proposes to formulate a similar Non-Disclosure Agreement for execution by parties that seek access to the new transmission constraint and contingency lists in the day-ahead market discussed above.

POSITIONS OF THE PARTIES

The proposal was created through the direct feedback received at three stakeholder meetings, three rounds of formal comments on three papers, and specific guidance from FERC. The straw proposal issued by the ISO on November 5, 2009 contained many of the elements incorporated in the current proposal. Stakeholders generally supported the proposal and expressed significant appreciation for the ISO's current efforts to increase transparency through additional data release.

However, a number of stakeholders have expressed a desire to receive the actual transmission constraint limit values used in the various market runs. Due to complexities, hourly variation and in some cases operational linkages to conditions outside of ISO Balancing Authority Area and, Management proposes to consider release of limits, beyond path limits already provided in OASIS, in phase 3 of the information release initiative.

In direct response to concerns raised by stakeholders during this stakeholder process, Management adopted several new advance public notifications to inform stakeholders of significant planned changes to the ISO's market model or constraint enforcement.[2] The advance notifications provide market participants with prior notice regarding:

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[1] Department of Market Monitoring Quarterly Report on Market Issues and Performance, October 30, 2009, Table 5.1 Real-Time Dispatch Biased Flowgates and Frequency of Biasing with Additional Statistics http://www.caiso.com/2457/2457987152ab0.pdf

[2] Management, however, still proposes to maintain the necessary flexibility to enforce additional constraints in response to unplanned outages and network conditions even after such notifications are provided. Such flexibility is needed to be responsive to unplanned outages and to enforce additional constraints when reacting to unplanned outages in order to maintain its systems and market reliable.

- the implementation of a new full network model or base market model in the market systems, which as part of the ISO normal model maintenance generally occurs every 4 to 8 weeks;

- changes in deployment dates of new market models;

- description of network model changes associated with the model build;

- adoption of new constraint or contingency into the market systems in between model builds; and

- new events or operating condition requires that a new constraint or contingency. [3]

RECOMMENDATION

The new data elements and information release policy provisions will significantly increase market transparency and will greatly enhance market participants' understanding of market results and outcomes. Management recommends that the Board approve the information release policy on transmission constraints as discussed in this memorandum.

[3] The ISO also plans to improve network terminology and nomenclature to use more consistent naming conventions and common data elements and is exploring the possibility of creating additional data mapping that would correlate the transmission facilities in outage reports with the proposed constraints list. The ISO is exploring the possibility of creating additional data mapping that would correlate the transmission facilities in outage reports with the proposed constraints list.

ATTACHMENT D

Draft Final Proposal

Modeling of Multi-Stage Generating Units

May 8, 2009

Modeling of Multi-Stage Generating Units

Prepared for Decision by the CAISO Board of Governors Meeting – May 18-19, 2009

1 Summary

The operational capabilities of multi-stage generating resources are similar to an aggregation of individual units. In fact, many are aggregations of sub-resource generating units. As a result, they can provide valuable flexible generation to the system, but they also are more complex to accurately model and dispatch. Specifically, these multi-stage generating units often have output ranges in which they cannot operate. That is, between their minimum and maximum operating levels, there are output levels at which the units cannot be dispatched. Transitioning between operating these operating ranges, or configurations, is costly, takes time, and should be done a limited number of times each operating day. In order to model multi-stage generating resources with these considerations accurately reflected, and to thereby achieve feasible, optimal dispatch for them, the California Independent System Operator (the ISO) proposes to implement the design described in this *Draft Final Proposal*.

The new ISO market design has Forbidden Operating Regions (FOR) captured in the Master File data set by which the ISO records critical operating and business information for each generating unit. FOR are ranges through which a unit must be ramped up or down, but within which it cannot be dispatched. The Forbidden Operating Ranges were intended to be used to prevent infeasible dispatch of multi-stage units at the start of the new ISO markets. However, while the enforcement of the Forbidden Operating Region constraints keeps units from being dispatched at infeasible output levels, it does not economically optimize the dispatch of multi-stage generating units. That is to say, simply forbidding the software from certain dispatch ranges for specific units does not optimize that dispatch with respect to costs, the various operating configurations of multi-stage generating units, and other resources in the market. It is for this reason that the Federal Energy Regulatory Commission mandated[1] that the ISO modify the software used to reach an economic dispatch solution to explicitly account for the operating constraints of multi-stage generating units within three years of the start of the new ISO markets.

The market simulations done in preparation for the start-up of the new markets revealed stability and performance issues relative to enforcement of the Forbidden Operating Region constraints. These issues were reviewed during the October 28th meeting of the ISO Board of Governors, and the Board approved a recommendation to defer the functionality for enforcing Forbidden Operating Regions from the Real Time Market optimization. The Commission has since approved the proposed tariff amendment deferring the implementation of the functionality enforcing Forbidden Operating Regions in the Real-Time. [2]

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1 Paragraph 573 of FERC's September 21, 2006 Order on MRTU "direct(s) the ISO to continue working with software vendors to develop an application that will accurately detail the constraints of combined cycle units, and to file tariff language" for implementation of such improvements no later than three years after MRTU start up.

2 The explanatory memorandum and presentation to the ISO Board of Governors and the approved Board motion to defer this functionality is located at:

Thus, the new ISO market software will not automatically dispatch multi-stage generating units through their Forbidden Operating Regions. This will require market participants and the ISO to manually manage the dispatch of multi-stage units by using outage reporting tools and Exceptional Dispatch. As a result, the ISO now proposes to expedite the design and implementation for the explicit modeling of multi-stage generating units into the market software. Specifically, the ISO is targeting resolution of policy issues associated with this modeling enhancement to go before the ISO Board of Governors for approval in May of 2009, and it is targeting the fourth quarter of 2009 for implementation of these modeling features.

It is planned that reinstatement of the Forbidden Operating Region functionality in the real-time market will tested along with the modeling of multi-stage units. As long as the FOR functionality is not being used to substitute for accurate modeling of multi-stage units, its reinstatement is not anticipated to contribute to unstable results like those seen in market simulation. The rationale for re-instating the Forbidden Operating Region functionality in the real time is that there are some generating resources for which FOR better capture the operating constraints. Specifically, units with operating ranges through which they can ramp up or down, but in which they cannot be dispatched might do better to choose to rely on the FOR functionality than to submit configuration-level bids. Units for which transitions between configurations are more costly and time-intensive would do better to use the multi-stage generating unit modeling to account for this. It may be that some multi-stage generators have, within a configuration, a true FOR. Re-instatement of the FOR functionality will also enable those resources to specify such operating constraints.

At this time, the proposal for changes to modeling multi-stage units will be applied only to those units that have specified Forbidden Operating Regions in the Master File.[3] This will resolve the issue of infeasible dispatch of those units, and will satisfy the FERC mandate. It may well be that additional generating resources other than those with FOR in the Master File would be more accurately modeled and feasibly dispatched were they able to bid in multiple configurations. It is in the best interest of market participants as well as the ISO to extend MSG unit modeling to such resources. Therefore, in conjunction with the testing of the MSG modeling functionality and of the re-instatement of FOR in the real time market, the ISO will evaluate the impact of extending MSG modeling to other generating resources.

With this *Draft Final Proposal*, the ISO offers a conceptual approach for the modeling of multi-stage generation units in the new market software that is based on the pseudo-plant model. Scheduling Coordinators will submit operating parameters and costs associated with up to *ten* configurations of their multi-stage unit. Scheduling Coordinators will be able to submit monotonically non-decreasing configuration-level bid curves into the Integrated Forward Market. The ISO model will use these configuration-based or "sub-resource" bids to determine the optimal dispatch for a given hour. Scheduling Coordinators can submit up to *three* configurations (currently planned default value) of

http://www.caiso.com/2067/2067aeac40f40.html. *See California Indep. Sys. Operator Corp.,* 125 FERC ¶ 61,081 (2009) http://www.caiso.com/2347/2347502a5c5d0.pdf.

3 Metered Sub-System (MSS) load-following resources will not eligible to bid multiple configurations under this initial implementation due to the significant added complexity posed by the fact that those resources follow load on their own as well as bid into the ISO markets.

their multi-stage unit into the real time market, subject to some restrictions which are described in section 4.2 of this *Draft Final Proposal*.

2 Key Criteria for Evaluating Potential Solutions

This section provides some key evaluation criteria the ISO believes are important. Stakeholders are invited to identify and suggest other criteria that should be considered in assessing potential solutions.

- Any policy that is developed should achieve the objective of more accurately incorporating the operating parameters of multi-stage generating units so that the units will be economically and feasibly dispatched, and so that the market can benefit from their full participation.

- Any policy that is developed should address the need for Bid Cost Recovery for the embedded generators, i.e. operating configurations, of multi-stage generating units.

- Policy and design options should be evaluated for implementation feasibility and costs for both the ISO Stakeholder and for the ISO. This evaluation should be done keeping in mind (1) the magnitude of the potential issue, and (2) work that has already been done on multi-stage modeling for other markets.

3 Candidate Design Options

There are two primary categories of models for multi-stage generating units. These are pseudo-plant (or configuration-based) models, and pseudo-unit models. Discussion of these approaches is included below:

Pseudo-plant models treat various configurations of a multi-stage unit as units themselves, allowing the resource owner to bid these configurations or pseudo-plants into the market independently. The market optimization chooses which configuration, if any, is part of the optimal solution. In this type of model, the configurations are mutually exclusive, which means that only one configuration can be chosen by the optimization. This pseudo-plant model is employed by the market being developed by ERCOT.

The pseudo-plant approach is problematic from an implementation standpoint. A 3 x 1 combined cycle unit that could have more than ten possible configurations would thus require ten pseudo-plants. A 4 x 2 combined cycle unit could have over forty possible configurations or pseudo-plants. Modeling each of the potential configurations of a resource would give more granularity to the dispatch results. However, investigation into recent attempts to model multi-stage units based on the pseudo-plant approach has shown this to be infeasible due to the large number of variables and permutations with which the optimization engine must cope. In particular, these trials take more time to run than is acceptable for real time dispatch due to their complexity.

Pseudo-unit models divide resources into mutually exclusive aggregations that may include portions of an embedded unit. For example, a 3 x 1 combined cycle generating unit would be modeled as three separate pseudo-units. Each of the three pseudo-units would be one gas turbine plus one third of a steam turbine. This is similar to the way the NYISO and PJM approximate the modeling of different configurations of multi-stage generators. This is less than ideal because such a model requires market participants to assign costs and operating parameters to pseudo-units, which is not necessarily intuitive or accurate. In addition to assigning costs to such a pseudo-unit, resource owners would need to provide operating constraints for them.

Although the pseudo-unit model is much simpler from an implementation standpoint, it does not appreciably improve the ability of market participants to offer the inherent flexibility of multi-stage units into the market.

4 Proposed Resolution

The ISO's *Draft Final Proposal*, summarized below, seeks to respect the implementation constraints we will face while providing the framework necessary to accurately bid and model and dispatch multi-stage units. Multi-stage units, for the purpose of the current implementation effort are those with Forbidden Operating Regions specified in the Master File. The set of resources includes combined cycle, steam-injected gas turbines, steam turbines, and a handful of other units. Forbidden Operating Regions have been specified for many of these units in order to avoid being dispatched back and forth between operating configurations. A true FOR is simply a range through which a unit can be ramped but within which it cannot be dispatched. Therefore, there is no functionality associated with that range that prevents the market optimization from repeatedly moving from one side of a FOR to the other. Any generating unit with a specified Forbidden Operating Region that actually represents a "dead zone" between operating configurations, and not simply a range through which to be ramped, will be able to benefit from multi-stage modeling.

4.1 IFM Bidding

We recommended that the model optimize over up to *ten* configurations of each multi-stage units as mutually exclusive resources in the IFM. Under this proposal, market participants will be able to submit bid curves for the individual configurations of their multi-stage units into the IFM. Those bids must follow all the bid-submission rules for standard resources including being non-decreasing. The IFM will yield a schedule for at most one configuration per multi-stage unit.

4.2 Real Time Bidding

We recommend that Market Participants be able to bid in up to *three* configurations of a multi-stage unit into the Real Time Market. This limitation is recommended in order to limit the number of configurations over which the Real Time Market must optimize, but at the same time enable the multi-stage units to fully participate in the market. If one of a multi-stage unit's configurations is taken in the IFM, then that configuration or one that can support the day-ahead energy schedule and RUC schedules or awards must be bid into the real time market for that same hour. Two other configurations may also be bid into the real time market provided that transitions within those three configurations are feasible and that the transition from the previous hour is feasible. All configurations bid into the real time market must reflect a reservation of capacity in the amount and for the product of any day-ahead award of ancillary services. The SIBR software will validate real-time configuration-level bids to ensure that these stipulations are met, and that transitions between bid-in configurations are feasible according to the information in the ISO Master File data.

To reiterate, the main limitations, in addition to the number of configurations that participants may bid into real time for an MSG unit, are the requirements as follow:

1. At least one configuration's bid must be sufficient to cover any day-ahead energy schedule **and** any Resource Adequacy must-offer obligation;
2. At least one configuration's bid must be sufficient to cover any Residual Unit Commitment schedule or award **and** transition to this configuration must be feasible given the configurations bid into the previous hour;
3. All configurations bid into real time must reserve capacity to fulfill day-ahead ancillary services awards;
4. Configurations bid into the real time market for a particular hour can be feasibly transitioned between one another by the 15-minute unit commitment that occurs in real time; and
5. At least one configuration bid into the real-time market must be feasible given the configurations bid into the previous hour.

The intention of the first three requirements listed above is not to place any additional or different burdens on MSG units. The motivation is to ensure that the units are not physically withheld from the real time ISO market. If, between the day-ahead and real-time market timeframes, the costs associated with operating at a particular level or in a given configuration change, market participants should submit bids commensurate with those updated costs and trade-offs.

The fourth and fifth requirements are intended to avoid situations in which a resource cannot be utilized by the market because it cannot be feasibly transitioned from the configuration in which it is operating to the ones it has bid into the market for the subsequent interval. In section 4.8 below, there is a discussion of the transition matrix which will contain the cost and operating constraints associated with transitioning between configurations. Transitions for which those parameters are specified are feasible by definition.

4.3 Bid Cost Recovery

We recommend that Bid Cost Recovery be available at the resource level, and that the ISO only pay commitment costs (including transition costs) associated with the real time market. If, however, a resource self-schedules energy and/or self-provides ancillary services in the real time, then IFM commitment costs (including transition costs) would be eligible for BCR. If a unit is not taken in the real-time market, then day-ahead commitment costs would be used for the BCR calculation for that hour. Because configurations are essentially modeled as individual generators in the market optimization, and re-aggregated for the purpose of settlements, it is essential to alter the BCR calculation methodology for multi-stage units. If the standard BCR calculation methodology were used, it would result in significant double-payment of eligible commitment costs.

The net revenue calculation for any given hour will be performed at the resource level although the cost component of that calculation will be informed by the configuration-level costs. In actuality, the sequential netting that is performed to arrive at the BCR values is complex. For the purpose of gaining intuition for how the calculation would be done in the case of MGS units, but without going through the rigorous accounting, please consider the simple example included as Appendix B to this Proposal.

4.4 Resource Adequacy Offer Obligations

In order to meet resource adequacy offer obligations, multi-stage units with such contractual arrangements should offer in at least one configuration into each the day-ahead and real-time markets.[4] If a multi-stage resource with an offer obligation does not offer in a configuration that can fulfill the offer obligation, the SIBR system will insert a default energy bid and $0 ancillary services bid for the configuration designated by the Scheduling Coordinator as the default configuration for meeting the unit's resource adequacy obligation.[5] The SIBR system will *not* extend the bid curve for a configuration that was not bid in to the full megawatt value of the RA obligation.

In the real-time market, in which the number of configurations that can be bid in for a multi-stage unit is limited to three, the automatic insertion of the default price-taking resource adequacy would be a fourth configuration. Rather than overwrite a submitted configuration-level bid, the system will insert a fourth configuration bid for the resource.

The validation of the fulfillment of the Resource Adequacy must-offer obligation will be based on the generation capacity bid in for a configuration. It will not be based on the increment of generating capacity that can be provided by a configuration. For example, consider a multi-stage unit with two configurations, (C1 and C2) with MW ranges (100, 250) and (300, 525), and a resource adequacy contract for 300 MW. The RA offer obligation is met by bidding in the second configuration (C2) with a minimum operating level of 300 MW and a maximum of 525 MW despite the fact that the incremental capacity that is provided by C2 is only 225 MW which is less than the RA contract.

4.5 Residual Unit Commitment

A multi-stage unit with a resource adequacy contract can be committed in the Residual Unit Commitment run at any configuration with capacity equal to or greater than the configuration

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4 Note that the real-time RA offer obligation does not extend to long-start units. If long-start RA units are not picked up in the day-ahead market, they are not required to offer their RA capacity in real time. There is true for all RA units, multi-stage units and otherwise.

5 Note that the RA offer obligation does not currently extend to Ancillary Services. This change has been filed with FERC within the filing of the Standard Capacity Product tariff language. It is anticipated that a FERC Order will be released in response to this filing during 2009. The ISO filing is available at the following link: http://www.caiso.com/239e/239ee59b11f50.pdf

committed in the day-ahead market. If a configuration is given a RUC schedule or award, the scheduling coordinator is obligated to offer the configuration for the megawatt value scheduled/awarded into the real-time market. Additionally, the configuration chosen to support the RUC commitment must be one to which the unit can feasibly transition. If the configuration scheduled or awarded by RUC can additionally accommodate the day-ahead energy schedule and ancillary service award and any Resource Adequacy offer obligation, then bidding in this configuration to that megawatt value will satisfy the all the real-time bidding requirements. In that case, the Scheduling Coordinator has two remaining configuration-level bids that are restricted only in that they can be feasibly transitioned within and between hours, and that capacity is reserved and the configuration is certified to provide any day-ahead AS award.

4.6 Reliability Must Run Units

Reliability Must Run (RMR) units will be dispatched and settled per their contracts. RMR contracts negotiated in the future can include different costs for different configurations. Currently there is only one MSG unit with an RMR contract. Ramifications for the dispatch and settlement of this unit will be analyzed, and any required tailored treatment of this unit will be consistent with the RMR contract.

4.7 Ancillary Services

We propose that multi-stage generating units that are certified to provide Ancillary Services obtain certification to provide AS at the configuration level, and can then bid in AS for those configurations for which they are certified.

Any ancillary services award from the day-ahead market will carry through to the real-time market. Thus, bids for any configuration in the real-time must respect the reservation of awarded AS capacity. SIBR will reject real-time bids for which energy bid plus the day-ahead awarded AS capacity exceed the upper operating limit of the configuration. SIBR will also reject bids for configurations that are not certified to provide ancillary services if the resource received an AS award in the day-ahead market.

4.8 Information Submittal

Market participants with multi-stage generating units will need to submit detailed information on those units[6]. In particular, information will be required for each configuration and will include the same specificity as is required for generators in general. Parameters such as operating minimum and maximum values, minimum run times, minimum down times, ramp rates, AS certifications, heat rates, and *etcetera* will be stored at the configuration level. **The ISO recommends that each configuration be able to submit a single operational ramp rate, and up to two AS ramp rates – one for Spinning and Non-Spinning Reserves, and one for Regulating Reserves.**

6 A sample of the form used by ERCOT for the capture of this information was included as Appendix B to the Straw Proposal posted on February 17, 2009. This document and the glossary that accompanies it are available at the following link: http://www.caiso.com/2078/2078908392d0.html

Additionally, the ISO will require data related to the transitions between the configurations of each multi-stage unit. This information will be stored in a “transition matrix,” a simple example of which is provided below. For each transition between configurations that is feasible, the ISO will require transition time and cost information as well as the number of times in an operating day that this transition can be made. This is akin to the start-up and shut-down related data provided for single-stage generators since each transition between the configurations of multi-stage units is like a shut down of one configuration and a start up of another. Note that, in the example below, the all transitions between configurations are feasible.

<u>Table 2</u>: Simple Example of a Transitions Matrix

	“To” Configuration				
		0 – offline	**1**	**2**	**3**
“From” Configuration	**0 – offline**		**$ # minutes max/day**	**$ # minutes max/day**	**$ # minutes max/day**
	1	**$ # minutes max/day**		**$ # minutes max/day**	**$ # minutes max/day**
	2	**$ # minutes max/day**	**$ # minutes max/day**		**$ # minutes max/day**
	3	**$ # minutes max/day**	**$ # minutes max/day**	**$ # minutes max/day**	

There will be the need to have a default configuration flag for the purpose of meeting resource adequacy offer obligations as noted above. The need for additional data items may become apparent in the implementation stage of this effort.

Data for the ten (or fewer) configurations associated with a given multi-stage resource will be stored in the Master File. Any changes to the configurations can be made through the ten-day process by which changes are made to Master File data.

4.9 Local Market Power Mitigation

We recommend that Local Market Power Mitigation (LMPM) be performed on a configuration-by-configuration basis. Since LMPM is performed on all clean bids submitted for use in the IFM, individual configurations’ bids may be flagged for mitigation. Configurations (or pseudo-plants) that are incremented up in the All Constraints Run would have their bid mitigated based on the relevant operating parameters which would be included in the configuration-level information. In addition, if a unit has a configuration committed in the Competitive Constraints Run, and another committed in the All Constraints Run, both configurations’ bids would be flagged for mitigation.

Default Energy Bids, whether cost-based or negotiated, will be developed by configuration.

Two examples of how the market power mitigation will be implemented are included in Appendix B to this proposal. The second example is new to this *Draft Final Proposal* and is provided to address questions in the stakeholder comments on the first market power mitigation example provided previously.

4.10 Self-Schedules

Self-Schedules must be such that transitions between configurations are feasible. In addition, market bids must be feasible given self-schedules. For each hour, only one configuration is permissible in a self-schedule. It is possible to change the self scheduled configuration between DA and real-time for the same trade hour.

Note that if a multi-stage unit submits a self-schedule for part of its capacity, any additional capacity for which the participant wants to submit economic bids must be for the same configuration. The reason for this is that submitting a self-schedule in a particular configuration indicates to the market software that the unit is being self-committed into the configuration. To submit an economic bid for a different configuration would run counter to the iterative nature and logical structure of the market software. SIBR will not accept bids for a configuration other than the one self-scheduled.

Based on stakeholder feedback, the ISO understands that this causes concern for participants bidding in units with both RA contracts and firm energy obligations, for example bi-lateral contracts. The full RA capacity must be bid in (or self-scheduled) in order to meet the offer obligation. The bi-lateral contract, however, might be more efficiently delivered by a different, perhaps lower, configuration and so the participant would like to self-schedule in this configuration. Again, the market optimization software does not permit a sequential evaluation of two alternative dispatch configurations of a multi-stage unit. The optimization can only pick one configuration for dispatch. In order to satisfy the RA must-offer obligation as well as protect the bid for the bi-lateral contract, market participants will need to submit economic bids for both configurations. Participants can structure those economic bids so as to protect the schedule for the bi-lateral contract.

4.11 Outage & De-Rate Reporting

For multi-stage units that are comprised of one physical generating unit, SLIC tickets for each configuration impacted by an outage or de-rate of that unit will need to be submitted. Multi-stage units comprised of more than one generating unit are likely to have more configurations, and thus putting in SLIC tickets for each effected configuration could be onerous. For this reason, the ISO's ideal proposal is that the SLIC tool for outage and de-rate reporting be adapted such that, within a resource's SLIC screen, a Scheduling Coordinator can select specific units within the multi-stage resource that are out or de-rated. The SLIC tool would then be able to extrapolate these outages or de-rates to the configurations of which the unit is a component.

The extent to which this is ideal proposal is feasible is not certain at this time. It may be that SLIC cannot readily be augmented to extrapolate sub-resource generating unit outages and de-rates to the effected configurations. If that is the case, participants will have to submit SLIC tickets for each configuration of their multi-stage units that is impacted by an outage or de-rate. Stakeholder feedback has indicated that, while the ideal SLIC functionality would be desirable, the burden of submitting SLIC tickets for individual configurations is not troublesome, and may be preferred to uncertainties associated with more dramatic modifications to the SLIC tool.

Based on stakeholder input, the current proposal is to enable SLIC to manage the outrages, de-rates and re-rates at the plant level, and to manage ramp-rate changes at the configuration level.

4.12 Uninstructed Deviations

Under the new ISO market design, penalties for uninstructed deviations from dispatches are tabulated but not assessed. In part, this is because multi-stage units are not currently being modeled and thus dispatched accurately, and so penalizing participants for deviated from sub-optimal dispatches would be unfair. The extent of uninstructed deviations will continue to be carefully monitored after the implementation of MSG unit modeling to determine if there is a need to seek authority to impose uninstructed deviation penalties. To clarify, the ISO is not proposing to seek authority to implement uninstructed deviation penalties as part of this stakeholder effort. The change in modeling to more accurately dispatch units is intended and expected to alleviate many instances of uninstructed deviations. Simply, the monitoring effort associated with uninstructed deviations will continue, and will be informed by the change in the accuracy of unit dispatch.

Telemetry data will indicate to the ISO the operating range of the configuration in which the resource was dispatched. The ISO will incorporate into the market systems the individual telemetry data from each unit that is part of a multi-stage resource. If the resource is operating within the range of the dispatched configuration and deviates from instructions, the usual non-response to dispatch rules will apply. If the resource is outside the configuration's range based on telemetry data, then it will be dispatched to the boundary of the actual configuration based on the requirements of the dispatcher.

5 Stakeholder Feedback

Stakeholder feedback on the *Revised Straw Proposal* was generally supportive. The stakeholder comments matrix included as Appendix C to this *Draft Final Proposal* summarizes this feedback. In addition, brief responses are provided. The *Draft Final Proposal* also seeks to provide additional clarification and examples that was requested in the written stakeholder comments.

6 Conclusion

The ISO is targeting the fourth quarter of 2009 for the incorporation of modeling multi-stage generating units within the ISO market systems. Particularly in light of the significant enhancements that this *Draft Final Proposal* offers, significant software performance issues may need to be overcome. Given the importance and value of competing enhancements to the new market design in this first year of its operation, it may be necessary to prioritize and compromise to accomplish important market enhancements. The ISO will seek to keep stakeholders apprised should changes become necessary in the planned implementation of multi-stage generating unit modeling.

Having completed a thorough process of soliciting and incorporating stakeholder feedback, the ISO will be presenting this *Draft Final Proposal* to its Board of Governors at the May 18-19, 2009 meeting. If questions, comments or concerns arise on multi-stage generating unit modeling in general, or this *Draft Final Proposal* specifically, please address them to gbiedler@caiso.com or call Gillian Biedler at 916-608-7203.

7 Appendix A: MSG Unit Bid Cost Recovery Example

The following simple example describes the Bid Cost Recovery calculation for a day in which an MSG resource was dispatched in only three hours, and in which real-time dispatch is hourly:

Table 1: Simple Example of Bid Cost Recovery for MSG Units

	Hour Ending		Configuration	Bid Costs	MW * LMP	Net Revenue
Day-Ahead	13	Economic Bid	C1	$10,000 (SU and ML)	120 MW*$25	($7,000)
Day-Ahead	14	Economic Bid	C2	$2,000 (transition)	200 MW*$30	$4,000
Day-Ahead	15	Economic Bid	C2	-	190 MW*$15	$2,850
Real-Time	13	Economic Bid	C1	$10,000 (SU and ML)	30 MW*$25	($9,250)
Real-Time		Self-Schedule	C1	-	120 MW*$25	$3,000
Real-Time	14	Economic Bid	C1	-	Not Taken	$0
Real-Time		Self-Schedule	C1	-	150 MW*$35	$5,250
Real-Time	15	Economic Bid	C2	$2,000 (transition)	25 MW*$18	($1,550)
Real-Time		Self-Schedule	C2	-	190 MW*$18	$3,420

	Hour Ending		Bid Costs	BCR Calculation	Rationale
Bid Cost Recovery	13	Day Ahead	($7,000)		Defer to RT dispatch
		Real Time	($9,250)	($9,250)	In RT, C1 was dispatched
		RT- Self-Schedule	$3,000		SS not eligible for BCR
	14	Day Ahead	$4,000	$4,000	No RT dispatch, defer to DA costs
		Real Time	$0		No RT dispatch
		RT- Self-Schedule	$5,250		SS not eligible for BCR
	15	Day Ahead	$2,850		Defer to RT dispatch
		Real Time	($1,550)	($1,550)	In RT, C2 was dispatched
		RT- Self-Schedule	$3,420		SS not eligible for BCR
	Overall Value Eligible for Bid Cost Recovery			**($6,800)**	

In this simplified case, the resource came up short for this day, and is eligible for Bid Cost Recovery in the amount of $6,800.

8 Appendix B: MSG Unit Local Market Power Mitigation Examples

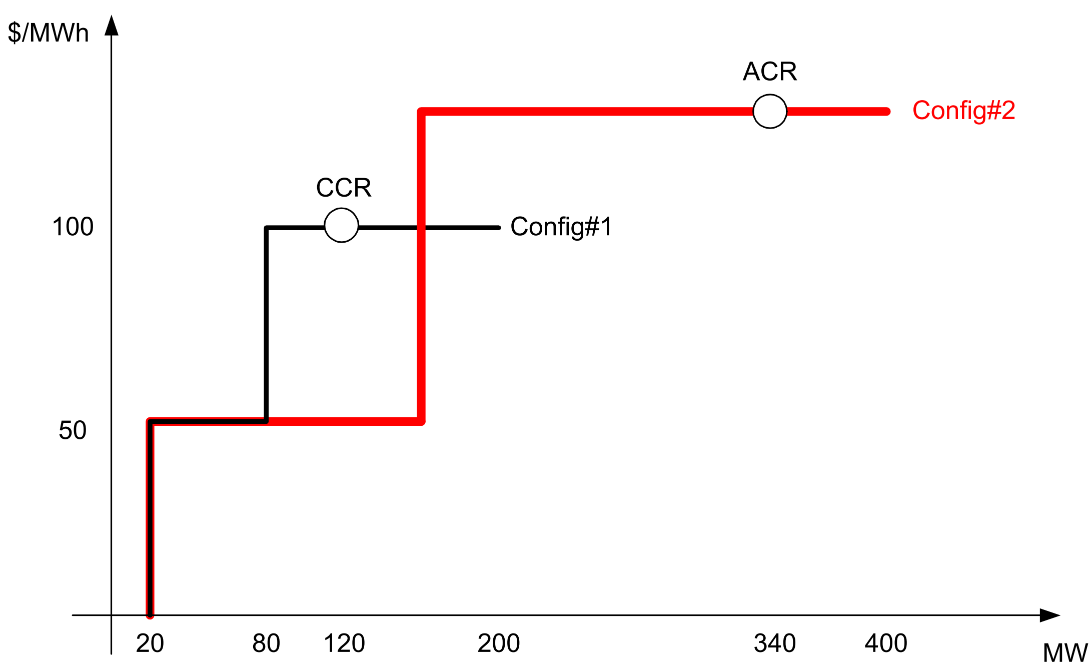
8.1 Example 1

<u>Assumptions</u>

1. The MSG resource has 2 identical Gas Turbines (GT1 and GT2) and 1 Steam Turbine (ST). The feasible configurations are:
   a. Configuration 1: (GT1 and ST) or (GT2 and ST)
   b. Configuration 2: GT1 and GT2 and ST

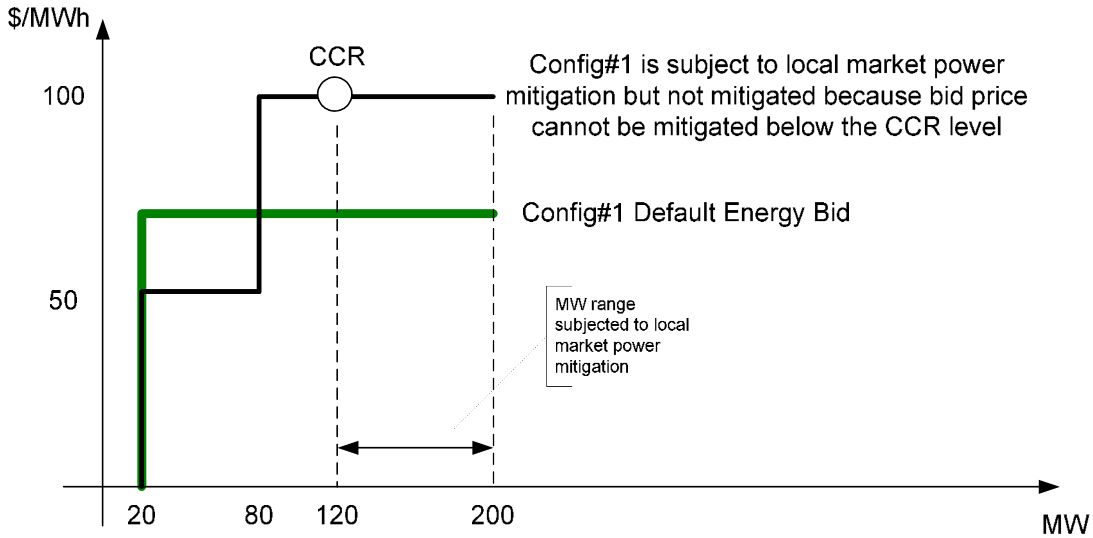
2. The bid curves are as follow:
   a. Configuration 1 (MW, $/MW): (20, 50), (80, 100), (200, 100)
   b. Configuration 2 (MW, $/MW): (20, 50), (160, 130), (400, 130)

3. Configuration 1 (Config#1) is committed in the Competitive Constraints Run (CCR) at 120 MW; configuration 2 (Config#2) is committed in the All Constraints Run (ACR) at 340 MW, as is shown below:



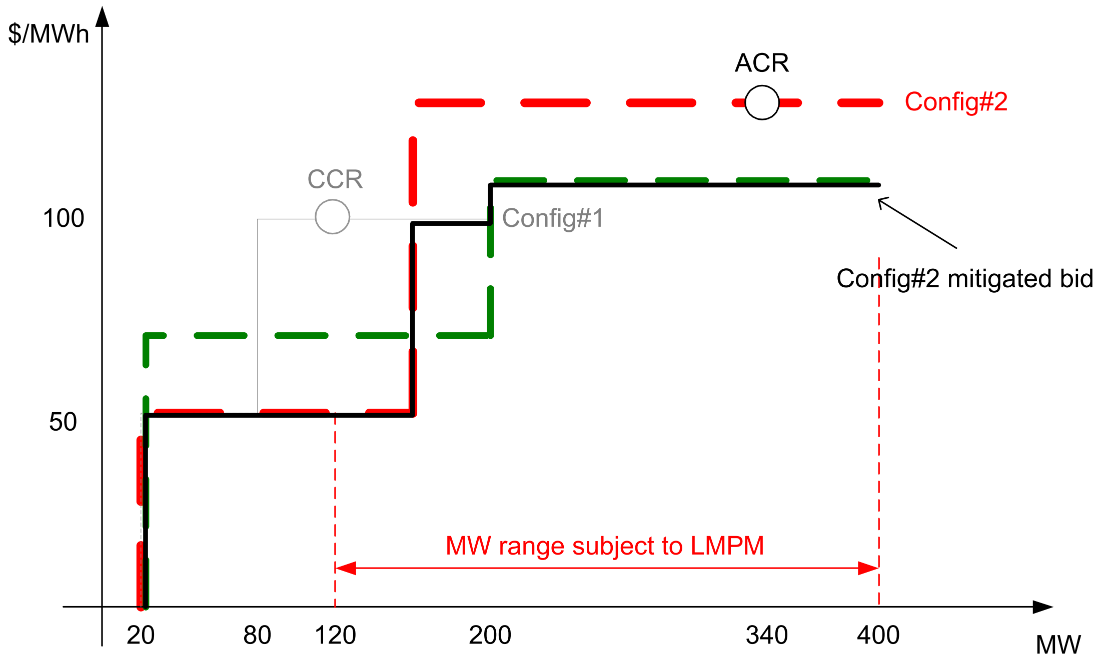
Configuration 1 Mitigation

Config#1 is subject to local market power mitigation but not mitigated because bid price cannot be mitigated below the CCR level.



Configuration 2 Mitigation

Config#2 is mitigated to the lower of the submitted bid price and the default energy bid price but not lower than the CCR bid price of the CCR corresponding configuration.



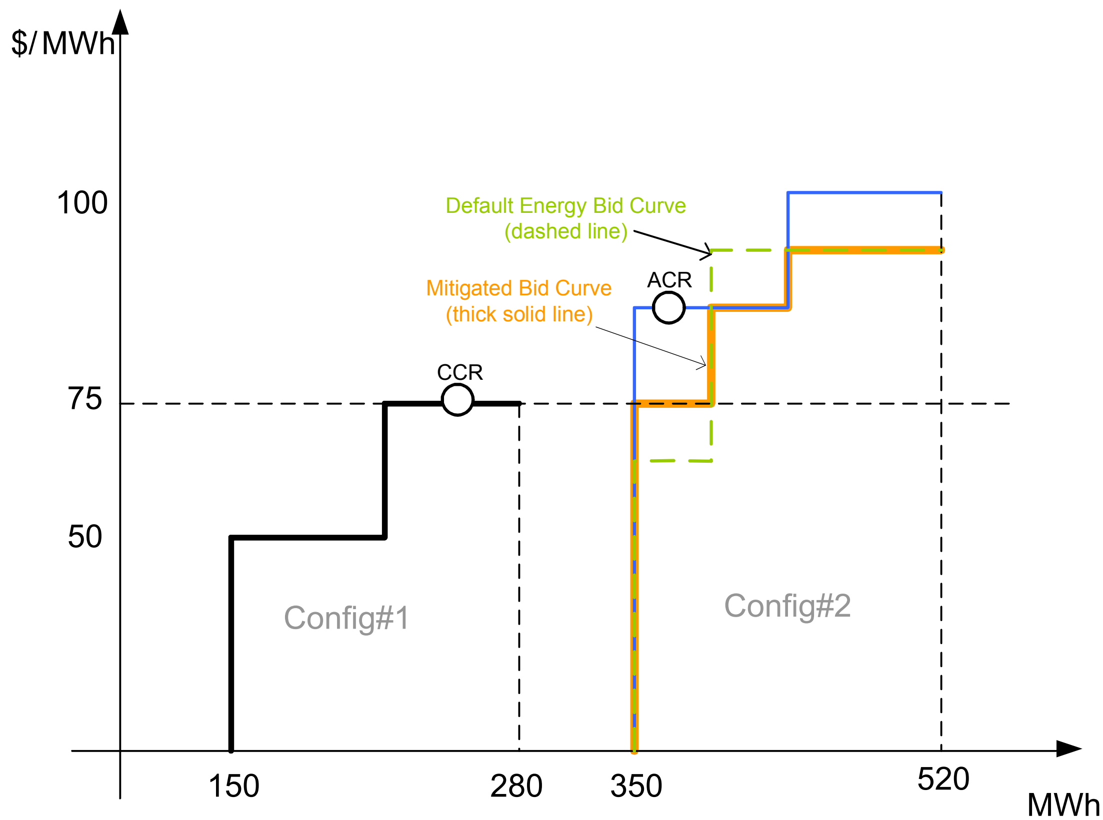
8.2 Example 2

Assumptions

1. The MSG resource has 2 configurations such that:
   a. Configuration 1: Pmin = 150, Pmax = 280
   b. Configuration 2: Pmin = 350, Pmax = 520

2. The bid curves are as follow:
   a. Configuration 1 (MW, $/MW): (150, 50), (230, 75), (280, 75)
   b. Configuration 2 (MW, $/MW): (350,75), (430, 85), (520, 100)

3. Configuration 1 (Config#1) is committed in the Competitive Constraints Run (CCR) at 260 MW; configuration 2 (Config#2) is committed in the All Constraints Run (ACR) at 360 MW, as is shown below:



Configuration 1 is not mitigated. Configuration 2 has a mitigated bid curve (think orange line) that is the higher of the Default Energy Bid Curve (dashed green line) and the last bid segment from the Competitive Constraints Run, but not above the submitted bid curve (thin blue line) for Configuration 2.

9 Appendix C: Stakeholder Feedback on the MSG unit modeling *Revised Straw Proposal*

The following matrix summarizes the stakeholder feedback on the *Revised Straw Proposal* on multi-stage modeling. The *Revised Straw Proposal*, upon which this *Draft Final Proposal* is largely based, was posted on April 13, 2009, and a stakeholder conference call was held to discuss it on April 17, 2009. The written comments upon which the following matrix is based were due April 24, 2009. All documents related to the stakeholder process for multi-stage generating unit modeling are posted and available at the following link: http://www.caiso.com/2078/2078908392d0.html.

Management Proposal	**Calpine Corp.**	**J.P. Morgan Ventures Energy Corp.**	**Pacific Gas & Electric**	**Reliant Energy**	**San Diego Gas & Electric**	**Southern California Edison**	**Management Response**
MSG units limited initially to those units that have Forbidden Operating Regions in the Master File	No Comment	No Comment	Conditional Plans to evaluate the dispatch of pump storage hydro units under new market. May seek MSG modeling for those units.	No Comment	No Comment	Conditional Encourages the ISO to set a timeline for extending MSG modeling to units without Forbidden Operating Regions.	The initial implementation of MSG modeling is intended to mitigate the suspension of the Forbidden Operating Region (FOR) functionality. Those units with FOR will be addressed first. The ISO will work to establish a timeline for opening the functionality to other units. It is management's position that the MSG modeling should ultimately be extended to all units it would enable to be accurately modeled. This goal needs to be balanced against software performance limitations which are not fully known at this time.
Up to *ten* configurations of an MSG unit can be bid into the **DA market**. One must meet RA obligation.	Support Supports configuration-based modeling of MSG units. Comfortable with limiting DA configurations to ten.	Support	Support	Notes that the transition matrix needs to include the maximum number of times per day that a unit can be transitioned between two configurations.	Support Notes that the transition matrix is the key to accurate modeling	Support	Management agrees that ten configurations will adequately capture the operating configurations of MSG units. Capturing the cost and operational considerations associated with all feasible transitions is indeed essential to successful MSG modeling. The maximum number of times a transition can occur within a day will be included in the transition matrix.
Up to *three*	Support	Conditional	Support	No Comment		Support	MSG resources that receive a DA

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configurations can be bid into the **RT market**. One must meet RA and RUC obligation, one must meet DA schedule, and all must honor DA A/S awards.	Limitation to three configurations balances desired flexibility with processing time constraints.	Seeks clarification that MSG resources will not face offer obligations or restrictions not imposed on other generating units.	Notes that one configuration's bid should meet the DA and RUC schedules and be feasibly transitioned to from the previous interval's configuration.		Seeks clarification on the requirement that configurations bid into the RT market be feasibly transitioned between one another.		schedule must bid a configuration into RT that can fulfill that schedule. The RT bid for the energy and/or A/S capacity can be different from the bid submitted in DA. Specifically, the RT bid can be structured to reflect changes in operating conditions and/or opportunity costs. If different configurations bid in to successive intervals, the transition matrix should indicate that the transition between these two configurations is feasible.
Forbidden Operating Region Functionality will be evaluated for re-instatement in the RT market.	No Comment	No Comment	No Comment	Conditional Seeks confirmation that MSG modeling would be appropriately used for units such as a steam turbine which is currently modeled as having a Forbidden Operating Region..	No Comment	No Comment	MSG modeling can effectively be used to model combined-cycle units, steam units, and steam-injected gas turbine units. There may be other generation technologies that could also be accurately modeled and dispatched using MSG functionality. For some units, however, the Forbidden Operating Region functionality will better capture their operating constraints than MSG modeling would. Additionally, it is possible that some MSG units will have true FORs within a configuration. Therefore, the proposal is to re-

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							instate FOR functionality in the RT market once MSG functionality is in place..
Self-Schedules must be for a configuration that satisfies RA obligation. Any additional market bids must be for the same configuration as the Self-Schedule	Support Given the structure of the market optimization, this limitation is understandable and acceptable, though not ideal.	No Comment	No Comment	No Comment	No Comment	Does not Support	If an MSG unit self-schedules a configuration, it is thus indicating that it must be dispatched in that configuration. To then submit a market bid for a different configuration is at odds with the iterative logic and structure of the optimization software. Participants can structure their market bids so that RA capacity is offered, and the desired schedule is protected.
Bid Cost Recovery is calculated based on the configuration dispatched in RT	Support	No Comment	No Comment	Conditional Seeks clarification as to the limitations to changes in scheduled configurations while retaining eligibility for BCR. Also, requests summary of difference in BCR between MSG and non-MSG units.	No Comment	Conditional Would not support a BCR scheme in which a unit committed in the DA and not in the RT would not be eligible for BCR.	The final proposal clarified that a unit committed in DA and not in RT would be eligible for BCR based on the DA commitment costs.
RA must-offer obligations must	Support	No Comment	Conditional	Conditional	No Comment	No Comment	Management confirms that RA units are not currently required to

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be met in the DA and RT by submitting a configuration that can supply the obligated MWs	Clarifies that the obligation of RA units to offer A/S bids is not in effect at this time. This obligation will not be specific to MSG units.		Notes that the requirement that RA units bid in A/S capacity is not yet approved by FERC.	Seeks clarification that there is not a requirement that long-start RA units bid into the RT market. Seeks clarification that satisfaction of the RA obligation is not calculated based on the *incremental* capacity made available by a configuration.			offer A/S capacity. This requirement is pending approval by FERC. It will not be limited to MSG RA units. Long-start MSG units with RA obligations must offer their RA capacity into the DA market. If the unit is not taken in the DA market, it is not required to offer into the RT market. Its obligation would be met by the DA bid or self-schedule. The RA obligation would be met by offering in a bid or self-schedule for a configuration such that the MW value meets or exceeds the RA obligation. Thus, the satisfaction of the obligation is based on the total capacity of the configuration and not the incremental increase from a lower configuration.
RMR units will be dispatched and paid according to their contractual arrangements	Conditional Recommends more study, particularly in the case of units with partial RMR contracts	No Comment	No Comment	No Comment	No Comment	No Comment	Management appreciates this thoughtful observation. This issue will be studied further. As with the whole of the MSG modeling proposal, it is designed to limit the extent to which treatment of MSG units differs from non-MSG units.

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Local Market Power Mitigation	Conditional Poses clarifying questions which the final draft proposal will seek to address.	No Comment	No Comment	No Comment	No Comment	No Comment	An additional example was added to the appendix of the Draft Final Proposal to help clarify this issue. In short, bids are only mitigated down (not up). Thus, the mitigated price is the higher of the accepted price or the DEB, but *not* higher than the submitted bid.
Outage and de-rate reporting	No Comment	No Comment	Conditional Is supportive of the goal to save participants the task of entering outages and de-rates by configuration, but has implementation feasibility concerns.	Conditional Seeks confirmation that outages and de-rates can be submitted on an hourly basis, and that participants can ensure that RT dispatches are consistent with outages.	No Comment	Does Not Support Does not support the goal of automated extrapolation from unit level outage information to configuration availability. Supports configuration-level outage reporting which places more of a burden on stakeholders and less on the SLIC system.	Management is mindful that unit-level outage reporting, and automated extrapolation of that information to configurations may not be feasible. This was proposed to alleviate the burden that configuration-level reporting could place on participants. If the proposal is not feasible, then configuration-level outage reporting will be implemented. Management appreciates Stakeholder willingness to take on configuration-level outage reporting.
Uninstructed deviations (UD) will be monitored to assess the need to seek authority	No Comment	No Comment	No Comment	No Comment	No Comment	Objects to the notion that successful implementation of MSG modeling is a step toward	Under MSG modeling, dispatches will be more accurate, and thus UD should decrease. Management recognizes that MSG units operating in the wrong configuration have the potential to

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to charge penalties						implementing UD penalties.	cause reliability problems. Management simply recommends monitoring of UDs, and points out that, if UDs are problematic, penalties could be sought.

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 7th day of May, 2010.

Jane Ostapovich

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