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I. Plan for Stakeholder Engagement

The proposed schedule for stakeholder engagement is listed below. If this stakeholder process results in the need for tariff changes, ISO management will present any proposed changes and policy recommendations to the CAISO Board of Governors in September 2013.

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<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Thu 5/23/13</td>
<td>Issue Paper Posted</td>
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<tr>
<td>Thu 5/30/13</td>
<td>Stakeholder Call 10 am to 12 pm</td>
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<tr>
<td>Thu 6/6/13</td>
<td>Stakeholder Comments Due</td>
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<tr>
<td>Thu 6/20/13</td>
<td>Straw Proposal Posted</td>
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<tr>
<td>Thu 6/27/13</td>
<td>Stakeholder Call 1 pm to 3 pm</td>
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<tr>
<td>Thu 7/8/13</td>
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<td>Wed 7/15/13</td>
<td>Draft Final Proposal Posted</td>
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<td>Wed 7/22/13</td>
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<td>Wed 7/29/13</td>
<td>Stakeholder Comments Due on Draft Final Proposal</td>
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<td>Thu-Fri 9/12-13</td>
<td>BOG</td>
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II. Background

The ISO FERC Electric Tariff (ISO Tariff) section 35.3 and section 8 of the BPM for Market Operations set forth the scope, process, and time horizon for price corrections. The intent of the price correction process is to ensure appropriate and accurate inputs are used in settlements as well as to ensure prices accurately reflect system conditions. The ISO corrects invalid prices pursuant to a set of requirements defined in the tariff, by either recalculating prices or selecting replacement prices from similar market intervals. The goal of the price correction is to produce prices that are as close as possible to the prices that should have resulted under the terms of the ISO tariff provisions had there been no issue. Under the current ISO tariff provisions, prices can be corrected due to: i) a data input error, ii) a hardware/software failure, or iii) an inconsistency with the tariff.

At the start of its new market design in 2009, the ISO set the time horizon for price corrections at eight days. In 2010, the ISO conducted a stakeholder process to review its price correction rules and processes. Out of that stakeholder process, the ISO proposed to reduce the price correction time horizon to five calendar days, with certain exceptions to accommodate processing and publication issues outside of that time frame.1

The ISO committed to continuously review its price correction processes and results and consider further changes as necessary over time. Given the importance of producing correct prices and the need to weigh that against price certainty, and in light of its experiences over the past four years of market experience, the ISO is initiating this stakeholder process to discuss and identify improvements in the price correction rules and requirements, and if required, streamline and clarify the scope, reasons, and time horizon for price corrections.

III. Scope of Initiative

This stakeholder initiative is focused on the scope, reasons, criteria, and time horizon of price corrections. Below, the ISO is proposing a specific set of items for discussion. Stakeholders are invited to identify other items that should be considered through this stakeholder process.

Possible Changes:

1. Revision of the scope for price corrections for the day-ahead market in order to provide more certainty about the finality of day-ahead prices.

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2. Time horizon for price corrections; finality of prices, the 5 calendar day window for price corrections and the 20-day window to resolve processing and publication issues.
3. Timely updates of issues potentially leading to price corrections.
4. Revision of criteria for price corrections.
5. Other items identified by stakeholders through this effort.

IV. Description of Issues

IV.1 Revision of the scope for price corrections for the day-ahead

In 2012 the day-ahead market experienced an increased volume and frequency of price corrections. The ISO took certain steps within its current tariff authority to refine its processes for validation of the day-ahead market results prior to publication of prices in order to minimize the need for price corrections. Given the time horizon for conducting the day-ahead market, there is a short window of time to validate market results before publication. The ISO has implemented proactive validation and monitoring of the day-ahead market to identify issues prior to publication. When a data or software issue is identified, the ISO uses the short window to resolve the issue and, if feasible, rerun the day-ahead market with the correct information, before issuing the market results. This validation leverages the ability to run the market two days in advance in what is referred to as the DA+2 pre-market run. Each day, this DA+2 pre-market run is implemented right after the actual run for the next trading day is complete. The same hardware and software is used for this run, using the most recent information available for outages and transmission constraints, and using a set of historical market bids. This DA+2 pre-market run is, therefore, the most readily available and accurate projection of the results for the actual day-ahead market to be run next morning. Having this run two days in advance allows the ISO to identify potential issues that need further investigation to be resolved before reaching the next morning when the actual day-ahead market is run.

In recent months the ISO has found that this validation of the day-ahead market has served to identify and correct the majority of issues related to either software or data that required a rerun of the day-ahead market. However, in some instances where an issue has been identified and is being resolved, publishing results by the 13:00hrs target for publishing the day-ahead market results has been challenging. This effort has resulted in avoiding price corrections after the day-ahead market results are published. In some instances, the ISO has had to proceed to publishing day-ahead market results even after an issue is identified because the ISO was not able to identify the precise cause of the issue and correct the underlying problem within a reasonable time. For example, this has happened where the problem resides in a market functionality which the ISO cannot temporally fix while running the market. In such instances, a software patch maybe
required from the software vendor, which could only arrive after publication. After publishing results the ISO still pursues further validation of market results within the five-day window, and if there proves to be an issue, the ISO will make the price correction, as feasible and as permitted within the tariff requirements. This proactive validation has avoided subsequent price corrections, but the trade-off may be not meeting the publication target for publishing the day-ahead market results of 13:00hrs. This is a trade-off between accuracy and price certainty, and timely publication. The ISO seeks stakeholders’ feedback about this this trade-off.

Given the financial impact of price corrections for the day-ahead market, certain stakeholders have expressed that they prefer to minimize price corrections for the day-ahead market. Stakeholders have also expressed a need for timely disclosure of major events impacting the day-ahead market. Currently, price corrections impacting the day-ahead market, or the real time market, are known by participants either by reaching the end of the five-day window when corrected prices are actually posted, or by the release of information by the ISO about a specific event through market notices or discussions in the fortnightly market update call. As required by Section 35.6 of the ISO tariff, the ISO provides a price correction report indicating the applicable market run, reasons to correct, and method used to correct prices. Given the cycle for generating this report, the information is posted after the corrected prices are already posted. The timing of this information creates uncertainty of the finality of day-ahead prices.

Based on the experience gained by the enhanced validation of the day-ahead market, the ISO has found that issues affecting the day-ahead market results are identified, and the bulk of these are resolved, before publishing results. When an issue is identified only after the posting of the results, for which the ISO later made a price correction, it has generally been the case that the issue had a more subtle impact on the overall market results or that it had only a local impact. Whether the issue has been identified with the proactive validation or with the post-validation, the information about price corrections is known to participants only by the end of the five-day window. Also, day-ahead market results that did not raise any concerns through the proactive validation and that were not subject to any price correction are treated the same way as those subject to corrections. That is, participants are not informed that there are no corrections for such prices until after the end of the five-day window. Again, there is uncertainty over the finality of all day-ahead prices during that time frame, even when prices do not ultimately require a price correction.

The ISO seeks feedback from stakeholders on whether there are concerns with these existing processes and whether a modified approach to handling price corrections pertaining to the day-ahead market would be preferable. Under a modified approach, the ISO would leverage the enhanced monitoring and validation of the day-ahead market to gain more certainty about the finality of day-ahead prices. If a potential issue is identified and the ISO is not able to reach reliable grounds for correcting an input or is unable to conduct the re-run and correct the issue before publication, this day-ahead case will be deemed to be subject to further validation and to a possible

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Correction, if applicable, within the standard five-day window. The ISO would inform the market about such instance after publication of the day-ahead market. If the ISO did not find any potential issue during the monitoring and validation prior to publication, then the original prices will be final and no longer subject to price correction. The ISO is cognizant that there may be instances where the validation did not find any issue, but it happens that there is a more subtle issue impacting the market and if the market participants raise the issue to the ISO within the five-day window, only then will the ISO pursue such validation and a price correction after publication, if appropriate. This approach will provide more certainty to the market about the finality of prices in the day-ahead market by identifying, the same day of the publication, and whether or not the ISO is pursuing a further validation with resulting price corrections. This suggested approach is in addition to efforts by the ISO to pursue long term solutions to root causes leading to price corrections.

In adopting the pre-market publication validation process, the ISO may have to consider realignment of the day-ahead market publication timeline and other timeframes that may impact this publication time target, including but not limited to inter-scheduling coordinator trades validation timeframe and publication target. The ISO seeks input on balancing the need for publishing correct prices versus publishing per the current day-ahead market timeline requirements. The ISO also seeks stakeholder input on the parameters to consider in making changes to the timing of the publication of the day-ahead market results, including inter-scheduling coordinator trades.

### IV.II Time horizon for price corrections

Section 35.2 of the ISO tariff provides that up to five calendar days after the applicable trading day, the ISO can make a price correction for the applicable market and intervals. The ISO will not make any price corrections after this price correction window has expired except as otherwise directed by the Federal Energy Regulatory Commission or for the limited reasons stated in section 35.3. Section 35.3 of the ISO tariff stipulates:

All prices shall be considered provisional until the CAISO has completed the price correction process regarding them. All prices for each Trading Day shall be considered final for purposes of this Section 35 once the price correction process for that Trading Day has ended and the CAISO will not make price corrections or change published prices after the price correction process time period has expired except as further discussed in this Section 35.3. The CAISO will not make price corrections after the price correction process time period specified in Section 35.2 has expired, except as otherwise directed by the Federal Energy Regulatory Commission. In addition, for intervals in which the CAISO experiences a problem with the processing or publication of prices, the CAISO will make changes to the affected prices to remedy the processing or publication problems within the time period following
the applicable Trading Day as specified in the Business Practice Manual, except as otherwise
directed by the Federal Energy Regulatory Commission. After the after expiration of the
applicable time horizon for addressing processing and publication issues, as specified in the
Business Practice Manual, in the case of a price discrepancy between prices posted on the
CAISO’s OASIS and prices provided to Scheduling Coordinators through other means, the
CAISO will use the price posted on OASIS for Settlement purposes.

The ISO has a time window of 20 business days after the applicable trading day for resolving
processing and publication issues, as defined in the business practice manual for Market
Operations, section 8.1.6.2.

The price correction end-to-end process is composed of price validation and price-
correction implementation. In the first phase, market results, including prices, are
programmatically validated. The outcome of that process is the determination of whether a price is
correct or not, and if applicable what approach needs to be used to correct the identified prices in
error (selective recalculation, rerun, interval replacement). The second part of the process is more
related to the actual processing of the corrections, which is conducted through a set of automated
procedures with predefined methods for correcting erroneous prices depending on the method
chosen to correct prices. Normally, the recalculation of prices is done in a matter of minutes using
the automated tools. The prices are then updated in the downstream repository system, and then
the corrected prices are posted on OASIS. The majority of price corrections is done with one of the
preset methods and the ISO perform all the steps required to have a price correction complete
before the end of the fifth day.

The ISO seeks stakeholder input on the permitted processing or publication issues that
should be rectified and prices should be corrected beyond the five days. The ISO’s experiences over
the past four years provide a number of processing and publication examples that the ISO now
wishes to evaluate with stakeholders. The processing and publications challenges experienced by
the ISO can be categorized as follows:

a) Volumetric issue. In some instances prices need to be corrected for multiple time
intervals. Even if there are only a few nodes to be price corrected, process wise, the
same sequential steps need to take place. Market intervals to be corrected are queued
for processing, and in some cases some of the records may be processed after midnight
of the 5th day.

b) Hardware/software issues. In several instances, although the ISO has made the
determination of incorrect prices and the need to correct for those, a software or
hardware issues impedes the processing of the corrections by the end of the fifth day.
c) Business process issues. Although the ISO may have made the determination for price corrections, a limitation or failure in the business process to properly reflect such corrections impedes the publication of price corrections by the end of the fifth day.

d) Complex manual corrections: For the most part price corrections are implemented using pre-prepared scripts and are readily implementable. On occasion the nature of the issue resulting in erroneous prices may require the use of tailored methodologies and thus the preset methods cannot be used. This approach is required to selectively correct the prices in error without impacting the overall set of prices. Since prices may need to be corrected for multiple market intervals across all markets, these tailored methodologies need to be comprehensive enough to cover the different potential scenarios found in the market. If the volume of the prices that need to be corrected is large, manually correcting the prices may not be feasible. When such scenarios are found, the ISO may have challenges doing the processing of such price corrections by the end of the fifth day.

Based on the price corrections experiences over the past four years, the ISO has also identified an improvement in its process when it experiences a processing or publication issue that falls under the 20 day window. First, when the ISO encounters, and is aware of, a processing and/or publication issue that would impede the successful posting of corrected prices within the five-day calendar window for corrections, the ISO will inform the market about the delay as soon as practical. The ISO is exploring the feasibility of this communication to take place through either a market notice or a posting on the ISO website. With the end-to-end process involving the reliance on multiple systems and data flow along these systems and the existence of predefined tools, there are various points for the process to encounter processing and publication issues. The current business practice is that within the five-day window for price corrections the process starts with the validation of market solutions, continues with any determination of prices corrections, and it does not stop until corrected prices are posted on OASIS. If the ISO encounters any challenges to fully process the price corrections that results in posting information beyond the five days, the ISO deems this to be part of processing and publication issue, for which the 20-day window exists. The ISO believes that processing and publication issues, even if the issues are known before the expiration of the five-day window, should not limit the completion of correcting prices identified to be in error once the determination for price correction has been made and the process has started.

The ISO seeks input from stakeholders whether any of the identified processing or publication issues should be explicitly excluded within the extended window for dealing with processing and publication issues specified in Section 35.3, or whether it should be included. Once the ISO establishes the list of permitted uses, the ISO intends to supplement its tariff with such detail and limit corrections beyond the five days to such identified issues. The ISO also seeks input
on whether other potential processing issues should be specified in the tariff and restrict the ISO’s authority to those processing issues alone.

The ISO has also determined that the current five calendar requirement specified in Section 35.2 of the tariff poses a challenge when the fifth day falls on a weekend or holiday. The ISO seeks stakeholder input on whether a modification to a five business day requirement would be problematic. This modification would allow the ISO to avoid processing and publication issues that occur during such times.

IV.III Timely updates of issues potentially leading to price corrections

Market Participants have raised concerns about not having timely updates of price corrections. The ISO publishes a price correction reports with details of the market and intervals corrected, including the reason for the correction. This report, however, is posted after the five-day window for corrections. To address participants’ concerns, the ISO started to post market notices when major events impacted the day-ahead market and resulted in price corrections. As explained in the previous two subsections, the ISO is committing to provide more timely information about price corrections when i) the day ahead market is impacted, and ii) when the ISO is aware of processing and publication issues impacting the timely publication of price corrections. The ISO would like to discuss this item with stakeholders and potentially provide a programmatic solution for providing more timely information about major events resulting in price corrections. The ISO may potentially use the ISO website to inform the market about major price correction events, instead of sending market notices.

IV.IV Redefinition of criteria for price corrections

As per tariff requirements, section 35.4, the scope of price corrections is confined to instances of invalid market solutions or invalid market prices. The ISO practice has been to pursue price corrections as long as there is an issue identified that renders the prices to be incorrect, namely software/hardware issue, data input error or results inconsistent with the tariff. Stakeholders have expressed concerns in different forums about the scope of price corrections. Some have expressed that price certainty is more important than accuracy, mainly in regards for the day-ahead prices. Others have expressed that the transitory real-time spikes driven by the inherent working logic of the market software (such as transitory spikes when a data update happens) should also be corrected as they may not track closely the reality of system conditions. Another item concern is when congestion is observed in the market on a given transmission constraint, but actual flows may not be tracking closely given data misalignment such as the market running with certain transmission configuration while in the actual system some switching may have taken place and that it is not visible to the market system yet, or when the ISO system may not have full visibility of flows coming from elsewhere into the system. As of now this type of issues leading to high prices
are not within the scope of price corrections. This initiative would be an opportunity for stakeholders to discuss with ISO concerns about the scope of price corrections, and whether the scope needs to be revisited.

V. Next Steps

The ISO will discuss the issue paper with stakeholders during a teleconference to be held on May 30, 2013. Stakeholders should submit written comments by June 6, 2013 to PCprocess@caiso.com.